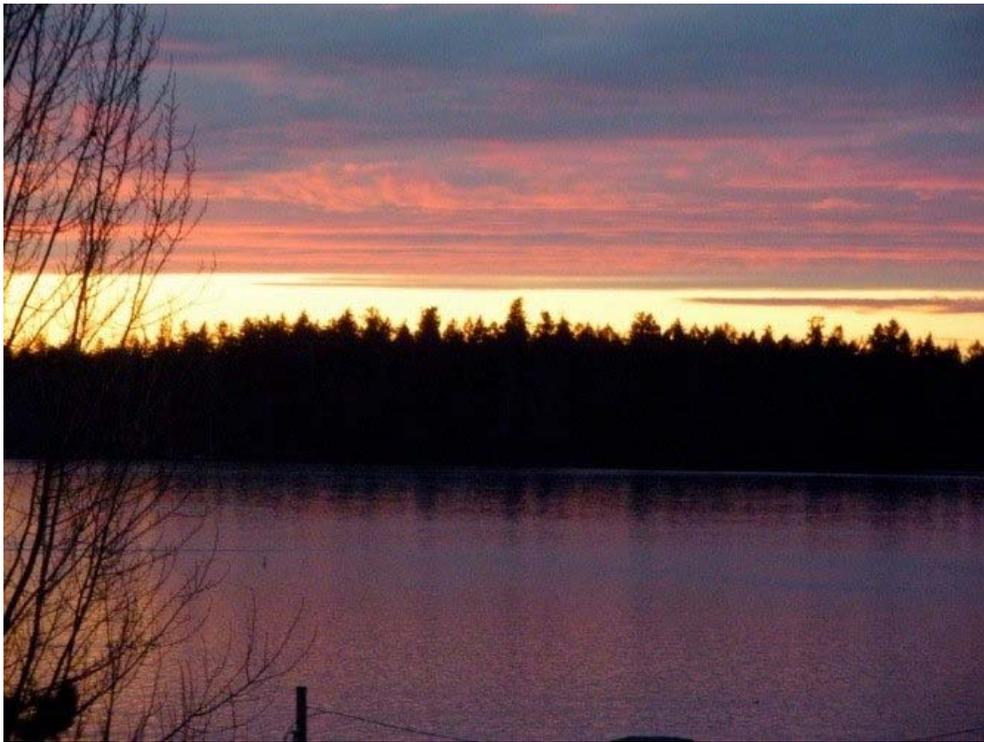




TILLICUM NEIGHBORHOOD PLAN

**Adopted
June 2011**



Spring Is in the Air (February 2009)

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“Klahowya tillicum!”
~“Greetings, friend” in Chinook language

ACKNOWLEDGMENTS

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At residential school, the children joined hands under the table and they whispered, “All my relations” while Father said grace. In the dark, before Father came to choose, they planned their freedom rides across the water.

Some said it was better to find logs on the beach and paddle with tree branches. Others said they would wait for the whales. “We’ll catch a ride with Tillicum,” meaning “our brother” in the Chinook language, the children said when Father wasn’t looking.

Several children disappeared on the exodus from Kuper Island. When the Orcas sang, I wondered if they were trying to tell us what happened to children and whales in captivity.

We say the same thing about captured whales & stolen children as we do of women in labour, “They will forget the pain,” but do they, their loneliness breaching in every leap from the deep pools where they grieve for freedom & all their relations? Do we stop to think that the Orca Tillicum, companion of three drowned souls, might also be desperate to find his way home?

~“Tillicum” (2010) by Linda Rogers, City of Victoria, BC, poet laureate

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¹ All base maps used for figures contain references to Ft. Lewis & McChord Air Force Base, which are now joined as Joint Base Lewis-McChord (JBLM).

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LIST OF ACRONYMS

ADA	Americans with Disabilities Act
BNSF	Burlington Northern Santa Fe
CDBG	Community Development Block Grant
CISL	Communities in Schools (Lakewood)
CPSD	Clover Park School District
CPTED	Crime prevention through environmental design
DoD	(United States) Department of Defense
EPA	(United States) Environmental Protection Agency
FONSI	Finding of No Significant Impact
GMA	(Washington State) Growth Management Act
I-5	Interstate 5
JBLM	Joint Base Lewis-McChord
LID	Local Improvement District
LMC	Lakewood Municipal Code
LOS	Level of service
NEPA	National Environmental Policy Act
NMTP	Non-Motorized Transportation Plan
PSE	Puget Sound Energy
SEPA	(Washington) State Environmental Policy Act
SPUI	Single-point urban interchange
SR 704	State Route 704 (also known as Cross-Base Highway)
ST	Sound Transit
TAC	Tillicum Action Committee
TWNA	Tillicum/Woodbrook Neighborhood Association
ULID	Utility local improvement district
VFW	Veterans of Foreign Wars
WSDOT	Washington State Department of Transportation

Additional acronyms used in the implementation tables may be found on page 84 (**Table 16**).

BACKGROUND

What's the Purpose of this Plan?

This neighborhood plan offers a foundation for Lakewood's efforts to revitalize a long neglected and isolated part of the community. Tillicum has a rich history and many unique landmarks. At one time, it was a vibrant vacation destination with a commuter rail system that connected Tillicum with Tacoma and other parts of pre-incorporation Lakewood. Tillicum also provided much-needed housing for soldiers and their families during World Wars I and II. Unfortunately, the replacement of old Hwy. 99 with a limited access freeway in the 1950s² severed Tillicum from the rest of the community, leaving it isolated and distinctly separate from other urban and suburban areas. Redevelopment opportunities dwindled in part because of new environmental regulation introduced in the 1970s as well as neglect from county government, which is often poorly suited to address urban problems. As a result, property values diminished, and crime became a chronic issue.

Nevertheless, Tillicum possesses three unique urban features that distinguish it from other Lakewood neighborhoods. Tillicum is one of the few neighborhoods in the city with public waterfront access and a public park. Tillicum also has a traditional street grid system which better supports connectivity and pedestrian appeal. Even while Interstate 5 (I-5) created a barrier, it also provides Tillicum with freeway frontage which benefits commercial redevelopment. That frontage, together with the proximity to Ft. Lewis and Madigan Hospital, offers untapped opportunities.

Beyond physical features, Tillicum enjoys a strong sense of community. Long-time residents who live there remember Tillicum for what it was, they believe in its future, and they are committed to positive change for the area.

This plan seeks to revitalize the community by building upon the neighborhood's assets. To make this work, the plan includes specific implementation measures that would be introduced over the next five years based on neighborhood input, City Council priorities, and budget resources. As the community evolves and moves forward, the implementation measures would also evolve to meet specific needs. In essence, these measures represent a report card for Tillicum residents, merchants and property owners, and the City of Lakewood.

Another important goal of this plan is to involve local residents in a new empowerment paradigm. To relieve many of the social ills confronting this small community, the City encourages neighborhood leadership development and collaborative community involvement. While the City can take some actions to bring about change, those who reside in Tillicum must accept responsibility for and actively participate in steering that change. In

² According to a website privately maintained by a WSDOT cartographer, the portion of I-5 between Exits 116 (Mounts Road) and 124 (Gravelly Lk. Dr. SW) was built on top of old US 99 through Ft. Lewis: "Originally a two lane road, US 99 through Fort Lewis had been widened to 4 lanes in the later 1930s. At first there were grade crossings in this area but there were no private driveways since this section of highway passed through federal government land." The author explains that the segment in the immediate area of Tillicum was upgraded to "freeway" in the 1950s and, just a few years later, was widened to six lanes. At the north end of Tillicum, the segment between Thorne Lane and Gravelly Lk. Dr. SW was widened to eight lanes in the mid 1970s.

this sense, the Tillicum plan can offer a model for other distressed neighborhoods and, ultimately, for the revitalization of Lakewood as a whole.

Neighborhood Plan Area

The Tillicum neighborhood encompasses the area outlined in **Figure 1** on the next page. The area is bounded by I-5 and the former Burlington Northern Santa Fe (BNSF)³ railroad to the southeast, Camp Murray to the southwest, the American Lake shoreline to the northwest, and private gated communities to the northeast. The neighborhood can be broken into three subareas: shoreline single-family properties, mixed density residential areas, and the Union Avenue SW commercial corridor.

The Tillicum neighborhood plan area is about 330 acres in size and, according to property tax and geographic information system data, contains 1,081 dwelling units⁴, yielding an overall density of approximately 3.28 dwelling units per acre.

Other Plans & Projects

A number of public and private plans and initiatives involving or affecting Tillicum have either taken place in the past 30 years, are currently underway, or are “on the drawing board.”

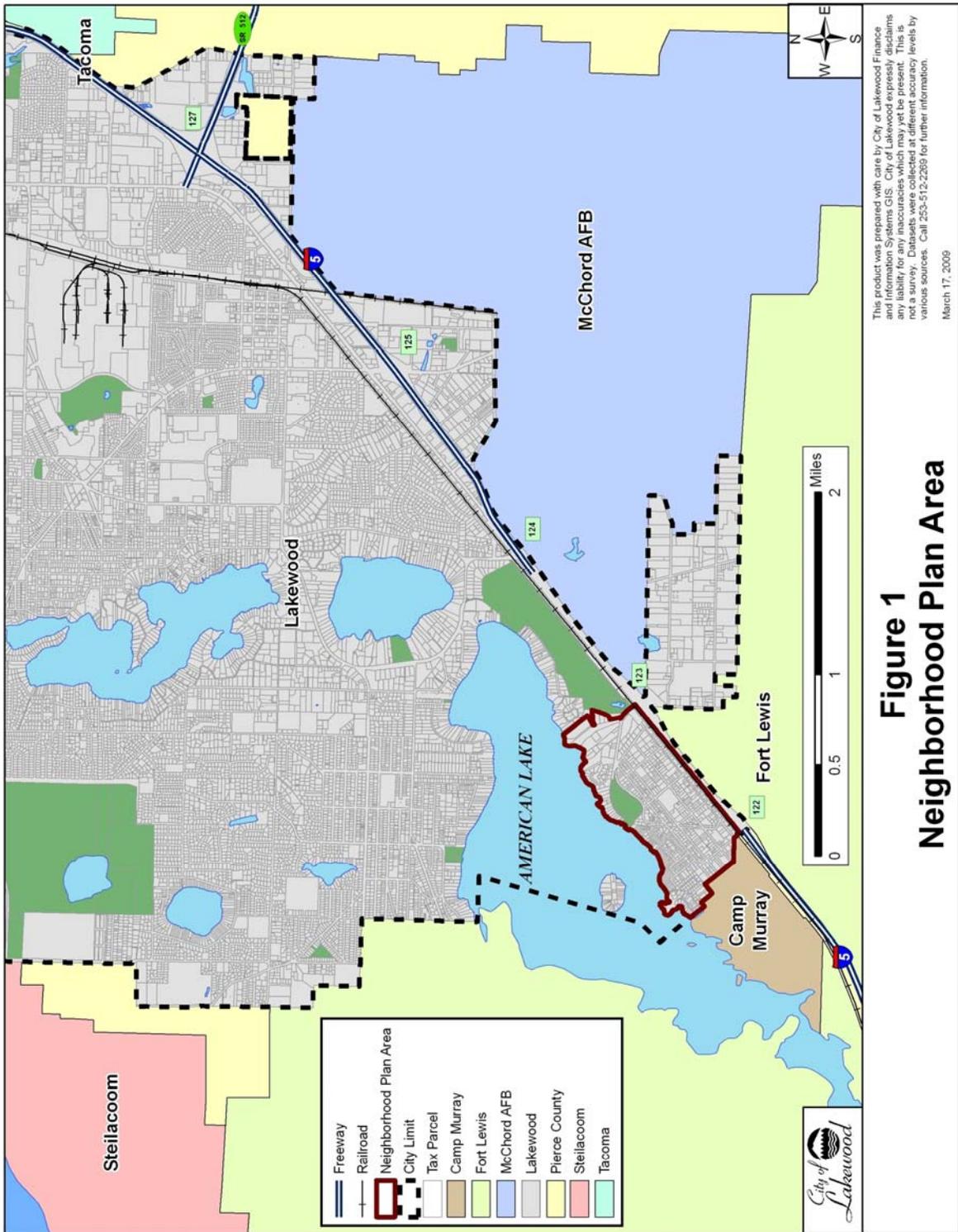
Comprehensive Neighborhood Land Use Plan [for] Tillicum, Washington (December 1980)

In 1979, Tillicum residents approached Pierce County for assistance in developing a library and making improvements to Harry Todd Park. County officials wanted to help the neighborhood but felt that a more comprehensive view of the community's problems, needs and priorities were required. A block grant advisory board was established consisting of local residents from a wide variety of backgrounds. To assist the board, the then-Pierce County Board of Commissioners retained Calvin Jordan and Associates to develop a comprehensive neighborhood plan to guide the future development of Tillicum. Surveys of Tillicum residents and property owners were conducted. Monthly informal meetings were held to discuss and review information and, through this process, recommendations came forward regarding growth, land uses and implementation tools and procedures.

One interesting aspect of this first neighborhood plan was public opinion on public services and incorporation. Property owners and local residents felt that significant improvements were needed to streets, sidewalks and storm drainage. Negative comments were received regarding community appearance, crime rates and lack of adequate police protection. Property owners indicated that police protection would improve if Tillicum would incorporate, but only 20 percent felt that incorporation was warranted.

³ Sound Transit (ST) has acquired the rail line that runs nearest I-5 in Lakewood, whose proper name was previously the “BNSF Lakeview Subdivision.” Although ST has not formally renamed the line, its staff indicated that due to the ownership change, referring to it as the “ST line” would be appropriate. Further, they noted that the line adjacent to Tillicum could potentially be referenced as the “Lakewood to DuPont segment” as Sounder service extends southward in the future.

⁴ This differs considerably from the 2,189 dwelling units shown in the census data on page 33 because, as explained in the preface on page 32, the census data includes the entirety of Census Tract 720 which is considerably larger than the neighborhood plan area.



In many cases, older planning documents are fully outdated in terms of their applicability to current-day situations. Circumstances may have changed, and intermediate steps may have been taken to address the issues involved in earlier plans. However, a considerable degree of stagnation facing Tillicum is evident in reviewing this old plan. Many of the same challenges and infrastructure deficits continue to confront Tillicum some 30 years later, only to become further entrenched in the intervening years.

Figure 2 on the following page shows the general land-use designations for Tillicum that were a part of the plan developed in 1980. It should be noted that this figure merges the map created at the time with today's parcel boundaries, so some property that has since been developed is shown as open space.

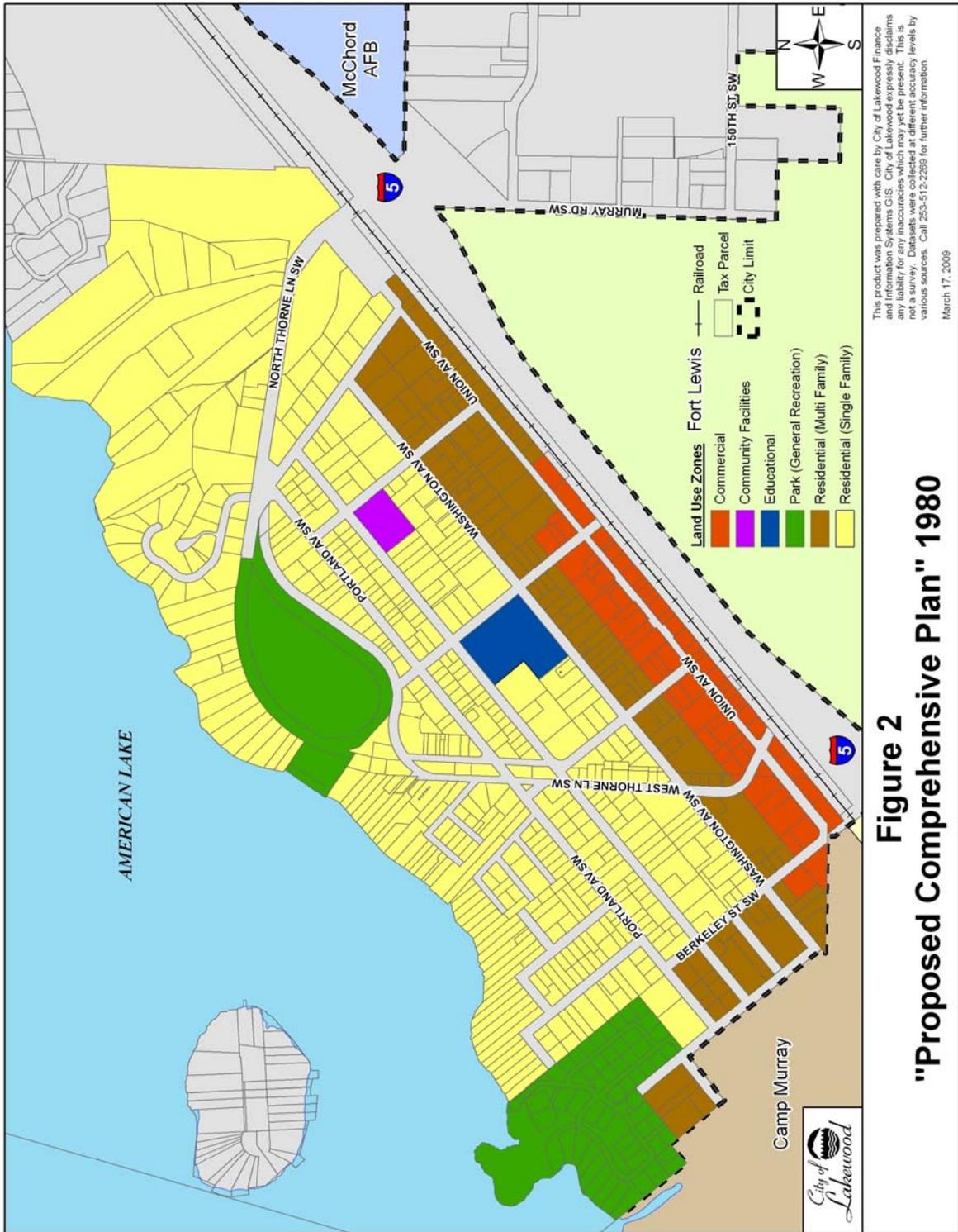
City of Lakewood Comprehensive Plan (2000) and New Citywide Zoning (2001)

Adoption of Washington State's growth management law trailed the 1980 plan by ten years. Although the 1980 plan was not adapted by Lakewood as it began developing its own comprehensive plan following its 1996 incorporation, many of the basic land-use attributes of the first neighborhood plan are similar to today's comprehensive plan. The comprehensive plan, though, provides greater levels of detail and is responsive to the state law that didn't previously exist.

This neighborhood plan builds upon the City's comprehensive plan. Lakewood's comprehensive plan presents a citywide perspective, while the Tillicum Neighborhood Plan provides more specific guidance both for the allocation of City resources and for the location and design of private development. It may serve to direct subsequent refinements to the goals and policies specific to Tillicum which are contained in the comprehensive plan.

There is a notable section within the comprehensive plan referred to as "Isolated Areas" that includes Tillicum. These are the three geographically isolated communities that are physically separate from the rest of Lakewood which often exhibit signs of neglect; in many cases improvements are old and run down, and property values suffer as a result.

The comprehensive plan attempts to minimize the isolation of these areas through improving the quality of life and focusing on capital investments. Other aspects of the comprehensive plan specific to Tillicum concentrate on improving housing conditions, increasing public safety, recognizing the impact from adjoining military installations upon this part of Lakewood, and providing for commercial and service uses for the daily needs of local residents. The comprehensive plan also posed an urban design framework for Tillicum that envisioned considerable redevelopment and eventual extension of ST Sounder (commuter rail) service to this area. Significant policy statements are included in **Appendix A** (page 91).



On the next two pages, **Figure 3** shows the current comprehensive plan future land-use designations for Tillicum, whose direction was carried forward into the City's new zoning adopted in 2001 (**Figure 4**). While this neighborhood plan does not serve to directly amend the comprehensive plan or zoning, their text and/or maps, as well as development regulations embodied in the Lakewood Municipal Code (LMC), could be amended in the future if necessary to carry out recommendations contained within this plan.

Lakewood Parks & Recreation Master Plan (2005)

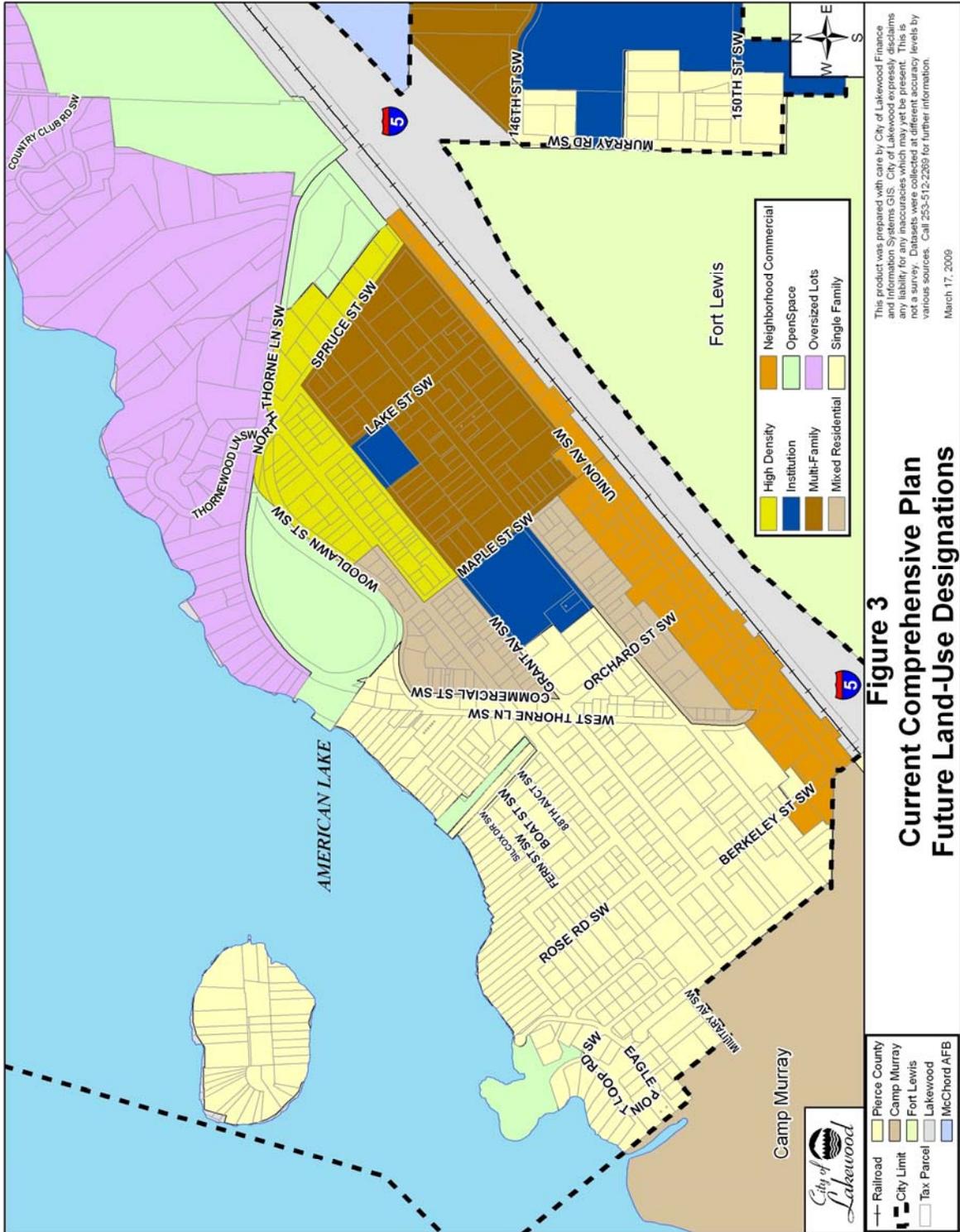
The Parks and Recreation Master Plan identifies improvements to Harry Todd Park in the amount of \$750,000. This amount is higher than what has been shown in the capital improvement program.

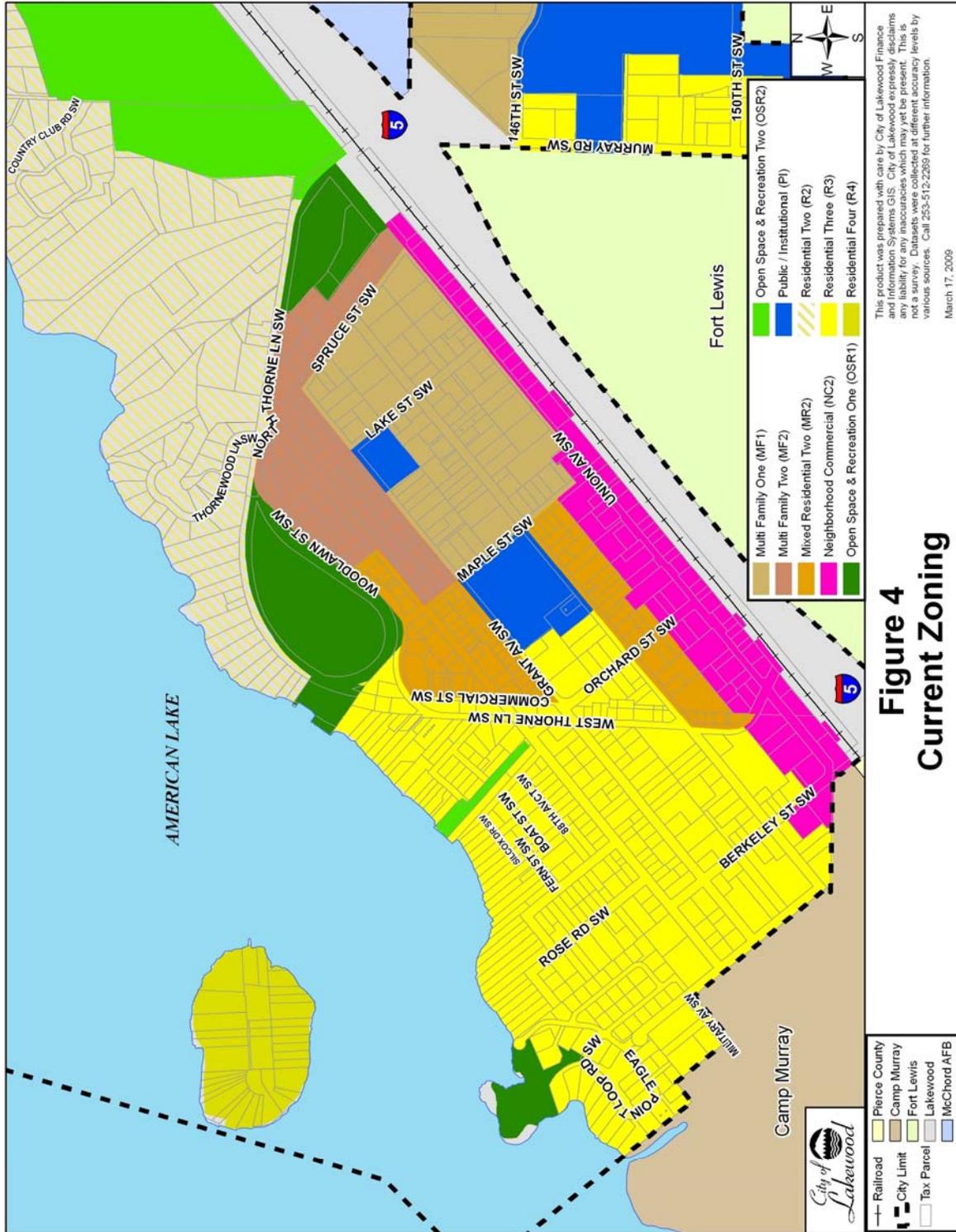
Recommended improvements include:

- Create a new perimeter paved pathway system
- Establish a disabled access route to the dock area
- Install a new bulkhead and shoreline improvements
- Develop an additional athletic field on the northeast corner of the park
- Construct a ropes course in conjunction with the Clover Park School District (CPSD)

Some of these planned improvements are depicted in **Figure 5** on page 17.

The master plan for citywide parks is currently being updated. Work on the "Legacy Plan," as it is now being called, is currently underway.





Progress! - A Vision for Tillicum (2007)

Tacoma-based BCRA, an architectural and planning firm, undertook a demonstration project that focused on finding new potential for Tillicum. The resulting *Progress! - A Vision for Tillicum* report was designed to act as a catalyst for redevelopment.

The *Progress!* report focused on strengthening some of the key community elements that make a neighborhood desirable and contribute to creating a sense of place. These initiatives were intended to spur new development and underpin home ownership, while increasing the overall security of the area. The report also included recommendations intended to provide additional housing opportunities by increasing residential densities in key locations; in turn, this would provide the necessary residential population to support local businesses and commercial activities. Other important purposes included protection of the natural environment, improved water quality, and creation of additional open spaces.

More than 200 people – homeowners, local merchants, CPSD, elected officials, City staff, representatives from the military, real estate brokers, developers, and the Tillicum/Woodbrook Neighborhood Association (TWNA, also known as “Community Matters”) – participated in either individual stakeholder interviews, neighborhood meetings, or completed a detailed opinion survey.

Key findings emerging from the survey results included:

- Almost 75 percent feel that Tillicum’s environmental features such as woodlands, open spaces, streams, wetlands, and shorelines are less than acceptable.
- Nearly eight of ten are open to change in the existing character of Tillicum.
- Eighty-eight percent dislike the appearance of the Union Avenue SW corridor.
- Eighty-two percent agree that a trail and sidewalk system should be developed for biking or walking between commercial areas, schools, parks, and other neighboring facilities.
- Seven of ten business owners and eight of ten homeowners say additional commercial property should be made available for professional and retail businesses.
- Ninety-one percent agree that the Union Avenue commercial area should be expanded beyond Union Avenue SW to accommodate retail uses.
- Among homeowners, protection of the natural environment is important to 86 percent.

In addition, consistent themes surfaced at public meetings. History and heritage were important values. The lack of sewers and other basic infrastructure were high on the list of concerns. Continued reduction of crime and an increased police presence were listed as an important service among homeowners. Those living in Tillicum were consistently concerned about the lack of goods and services for the residents. In fact, survey results showed that 94 percent of respondents buy the majority of their commercial goods outside of Tillicum. Absentee landlords and the lack of maintenance to the majority of the rental housing stock remains a significant issue. Preservation of an affordable mix of housing types is important to elected officials and City staff. American Lake and access to the waterfront for all residents of Tillicum was cited as an important feature. Lastly, residents expressed anxiety that as Tillicum redevelops property taxes would rise and that the availability of affordable housing would decrease to the point that they would be forced to relocate.

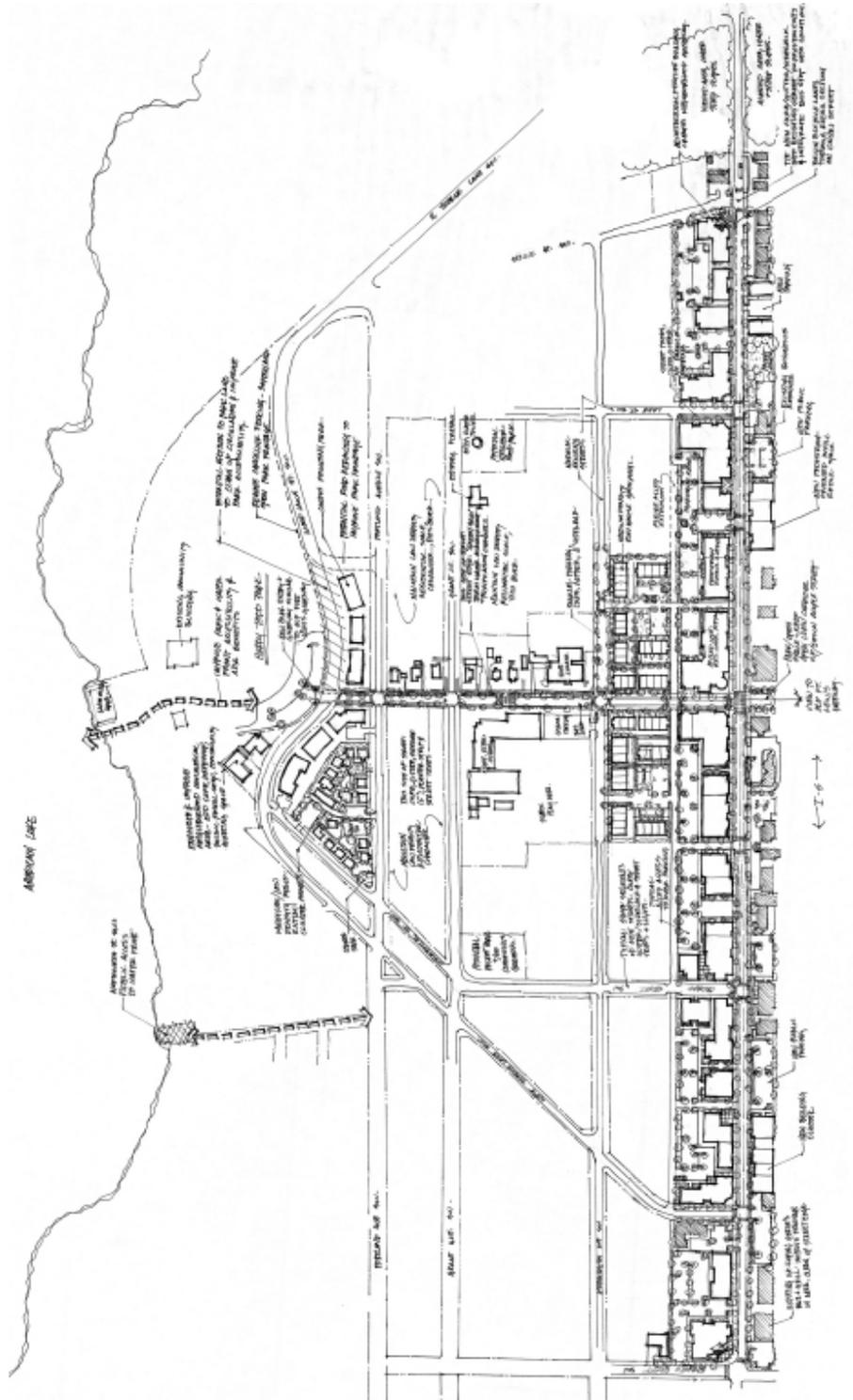
The *Progress!* document went on to develop wholesale redevelopment concepts for Tillicum that would dramatically change the community's face and function. Six initiatives were identified as keys to revitalization:

- Provide a Maple Street SW link, tying Union Avenue SW with Harry Todd Park.
- Develop a Union Avenue SW commercial/retail corridor including widening Union Avenue SW from 40 feet to 60 feet.
- Encourage multi-family development across from Harry Todd Park.
- Realign the Harry Todd park entrance.
- Establish gateways at either end of Union Avenue SW.
- Provide a pedestrian/bike path loop along Union Avenue SW, North Thorne Lane SW, Woodlawn Street SW, and West Thorne Lane SW.

Two concept designs were brought forward, shown in **Figures 6** and **7** on the following two pages. Such designs are not necessarily supported by the City's current comprehensive plan, zoning, or other plans and would require considerable redesignation and rezoning, public infrastructure investment, private financing, land assembly and physical redevelopment in order to carry them out.

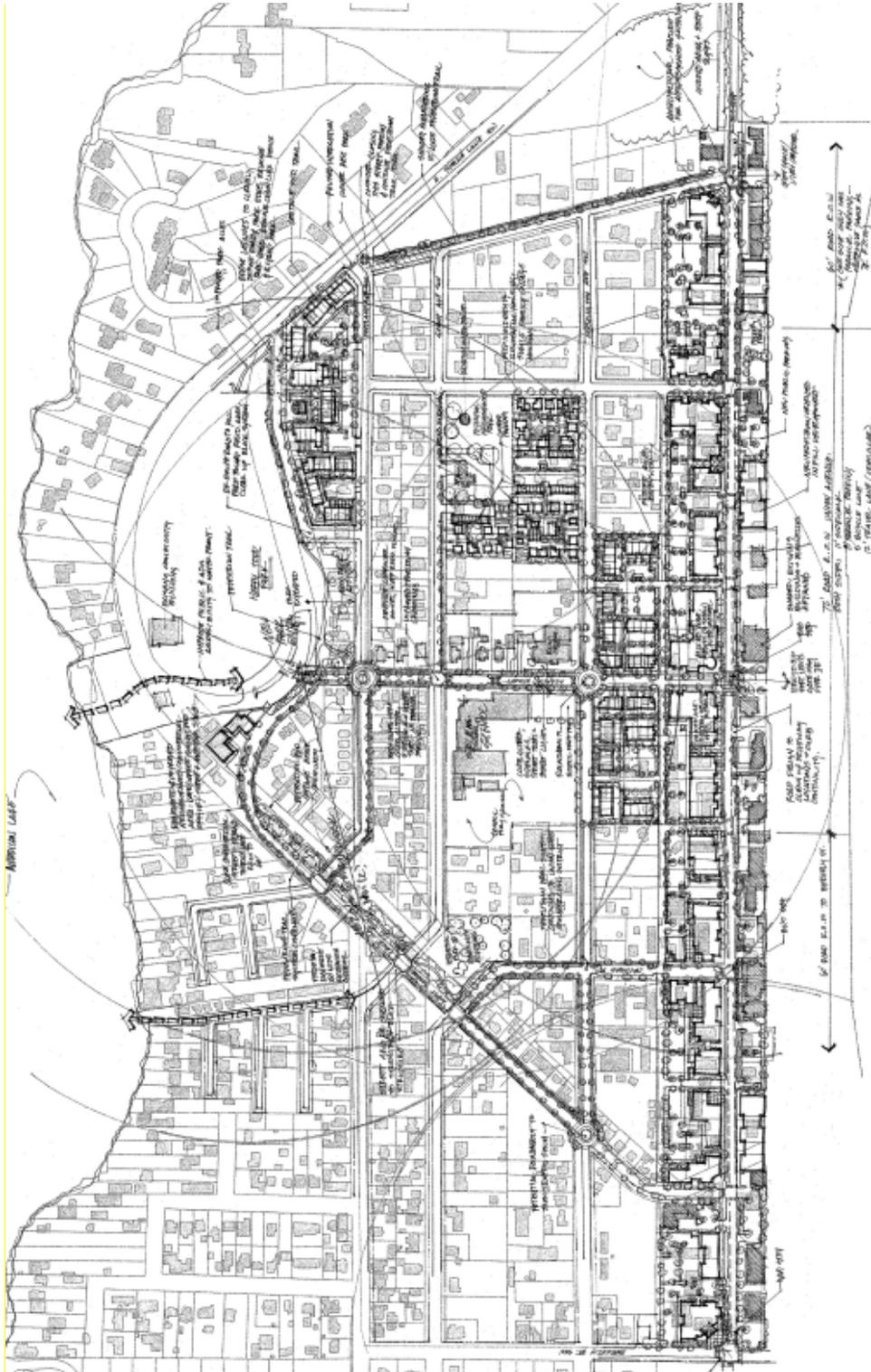
Because of the extensive public outreach connected to the *Progress!* project, many people believed this was a public planning process. However, BCRA was not paid nor subsidized by the City of Lakewood, Pierce County or any other outside agency or jurisdiction. Still, the project helped to create interest and to develop an impetus for the current City planning initiative. After reviewing the report, the Lakewood City Council adopted Motion No. 2007-16 on April 2, 2007, directing the preparation of a neighborhood plan for Tillicum.

**FIGURE 6
BCRA CONCEPT DESIGN 1⁵**



⁵ Source: BCRA. Used with permission; all rights reserved.

FIGURE 7
BCRA CONCEPT DESIGN 2⁶



⁶ Source: BCRA. Used with permission; all rights reserved.

New Home Trends Housing Market Study (2007)

In June 2007, the consulting firm of New Home Trends was retained by a group of private developers to analyze market trends for Tillicum. At about the same time, the City began developing the Tillicum Neighborhood Plan. When City staff discovered that this privately financed market conditions study had been commissioned, they asked to review the document and subsequently arranged to purchase the report, which is proprietary. The report provided information on housing sales trends, absorption rates and availability. Recommendations on potential commercial redevelopment opportunities were also included. Summary findings are listed below:

- Tillicum's reputation was found to restrict investment.
- Many of the problems that currently exist in Tillicum stem from a high percentage of absentee landlords and residential turnover of rental properties.
- The existing housing stock is reaching the end of its useful life.
- Price is and will be a motivating factor for any new sales in Tillicum until it can be proven that the area has turned around.

The report concluded that the creation of a middle class is crucial and that an influx in long-term home owners and business owners is needed. Their stake in the future character of Tillicum will drive additional redevelopment in the area. Extensive housing renovation is necessary in order to improve the urban image of the area and open new opportunities. Additional information about the New Home Trends housing market study is found under the economics section of this report.

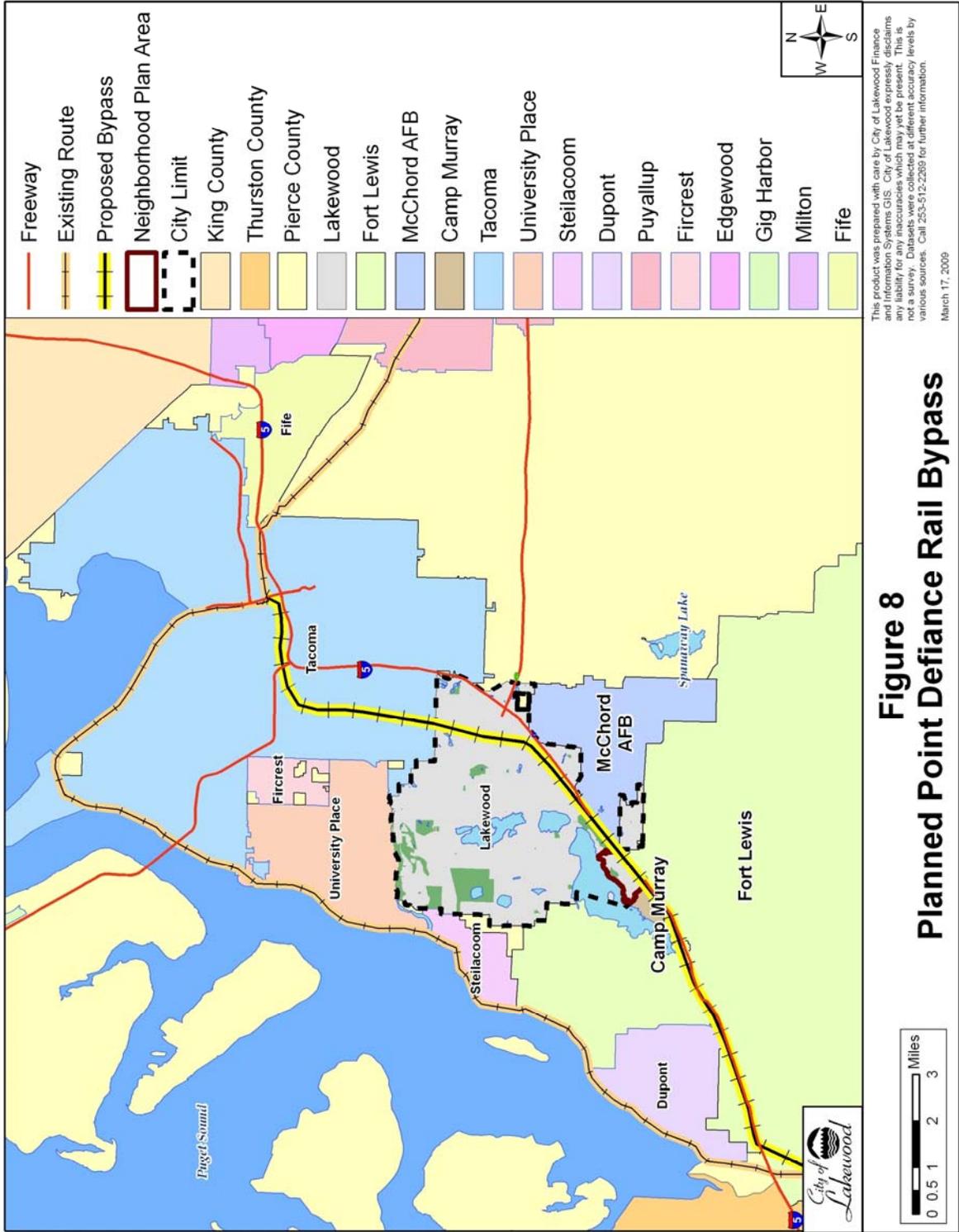
Non-Motorized Transportation Plan (2008)

The Non-Motorized Transportation Plan (NMTP) is a legally mandated, citywide plan for pedestrian and bicycle systems. It somewhat parallels the Tillicum neighborhood planning process as it was released in draft form in late 2008 and was adopted in 2009, with amendments to the comprehensive plan to follow. It contains a number of recommendations relating to Tillicum but is responsive to its current form and not any change that may occur within the community. In the end, the NMTP, neighborhood plan, comprehensive plan, and any other related planning documents will need to achieve consistency.

Point Defiance Bypass

Trains, including Amtrak *Cascades*, currently must slow down due to curves and single-track tunnels on the BNSF main line tracks near Point Defiance and along Puget Sound to the west of Lakewood. The Point Defiance Bypass project, an initiative of the Washington State Department of Transportation (WSDOT) Rail Office, would reroute passenger trains to an inland route – the ST line⁷ located generally west of I-5 through Lakewood, bordering on the easterly boundary of Tillicum. It reconnects to the main BNSF line near Nisqually. **Figure 8** on the following page includes both the existing and proposed routes. Most freight trains will continue to use the line near Point Defiance and along Puget Sound. There is some current freight traffic (Tacoma Rail) on the ST line, which will remain unchanged by the project. Some improvements would need to be made to the ST line to facilitate this project, which is slated for completion in early 2015.

⁷ See **Footnote 3**.



Despite ongoing concerns expressed by the City about the project and its relationship to traffic and circulation, the project continues to move forward, bolstered by major federal funding provided to WSDOT in 2010 and 2011. The City is currently in negotiations with WSDOT and others about the project's impacts.

Tillicum/Woodbrook Sewer Extension

The state Growth Management Act (GMA) anticipates that all development within cities will be served by "urban" level services, which includes sewers as opposed to septic systems. While the majority of Lakewood is already connected to the Pierce County sewer system, Tillicum and Woodbrook remain unsewered. One of Lakewood's start-up priorities was to extend sewer service to unserved areas.

The City's Public Works Department conducted three public outreach meetings through August 2006 in preparation for sewer extension to Woodbrook and Tillicum. Surveys were also mailed to property owners whose properties were adjacent to the sewer extension project, and approximately 2,450 notices were mailed/delivered to persons residing in the affected area. A total of 123 people attended the outreach meetings, and 50 people responded to the surveys.

A variety of issues and concerns were raised. Property owners both on and off of the proposed alignment wanted more information about the costs of connecting to the sewer system. Would the City provide financial assistance to connect to the system? Would connection be mandatory or voluntary? Participants also wanted additional information on future extensions to the main trunk line construction, particularly process and costs. There were also questions about water quality issues with the continued use of septic systems.

The potential of the sewer project to stimulate redevelopment was also recognized; and residential displacement, increased housing costs, and increases in traffic and noise were also of concern.

The City of Lakewood successfully sought a Special Appropriation Act grant from the federal Environmental Protection Agency (EPA) to install sewers into the Tillicum and Woodbrook neighborhoods. On page 26, **Figure 9** shows the location of the proposed force and gravity mains and pump stations in these areas. Sewer service will address the issue of failing septic systems and provide the necessary infrastructure to economically revitalize these communities, thus improving the overall quality of life.

The sewer project was subject to the National Environmental Policy Act and SEPA. An environmental assessment was prepared, and it was found that the project would have no significant adverse impacts that could not be mitigated. A Finding of No Significant Impact (FONSI) was issued on August 1, 2007. The City of Lakewood also adopted the FONSI for its SEPA review in compliance with Section 197-11-630 of the Washington Administrative Code. Mitigation and monitoring measures to minimize adverse environmental impacts associated with the proposed project are contained in **Appendix B** (page 95).

Cross-Base Highway (State Route 704)

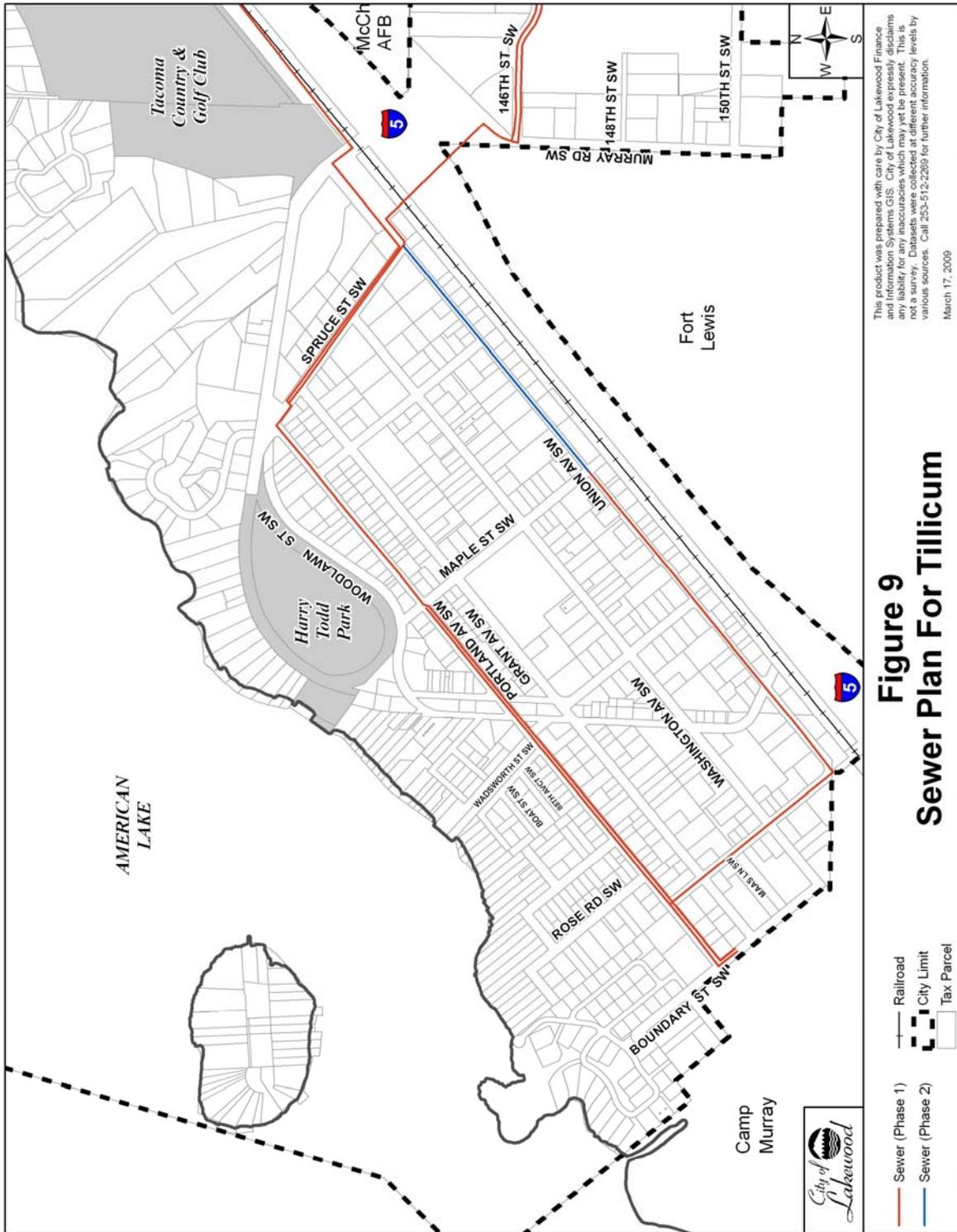
Washington State Department of Transportation's Cross-Base Highway (SR 704) will provide regional travelers with a new six-mile-long, multi-lane divided highway beginning at the I-5/Thorne Lane interchange at the west end, connecting to 176th Street at SR 7 at the eastern terminus. This new east-west route is intended to ease congestion on I-5, State

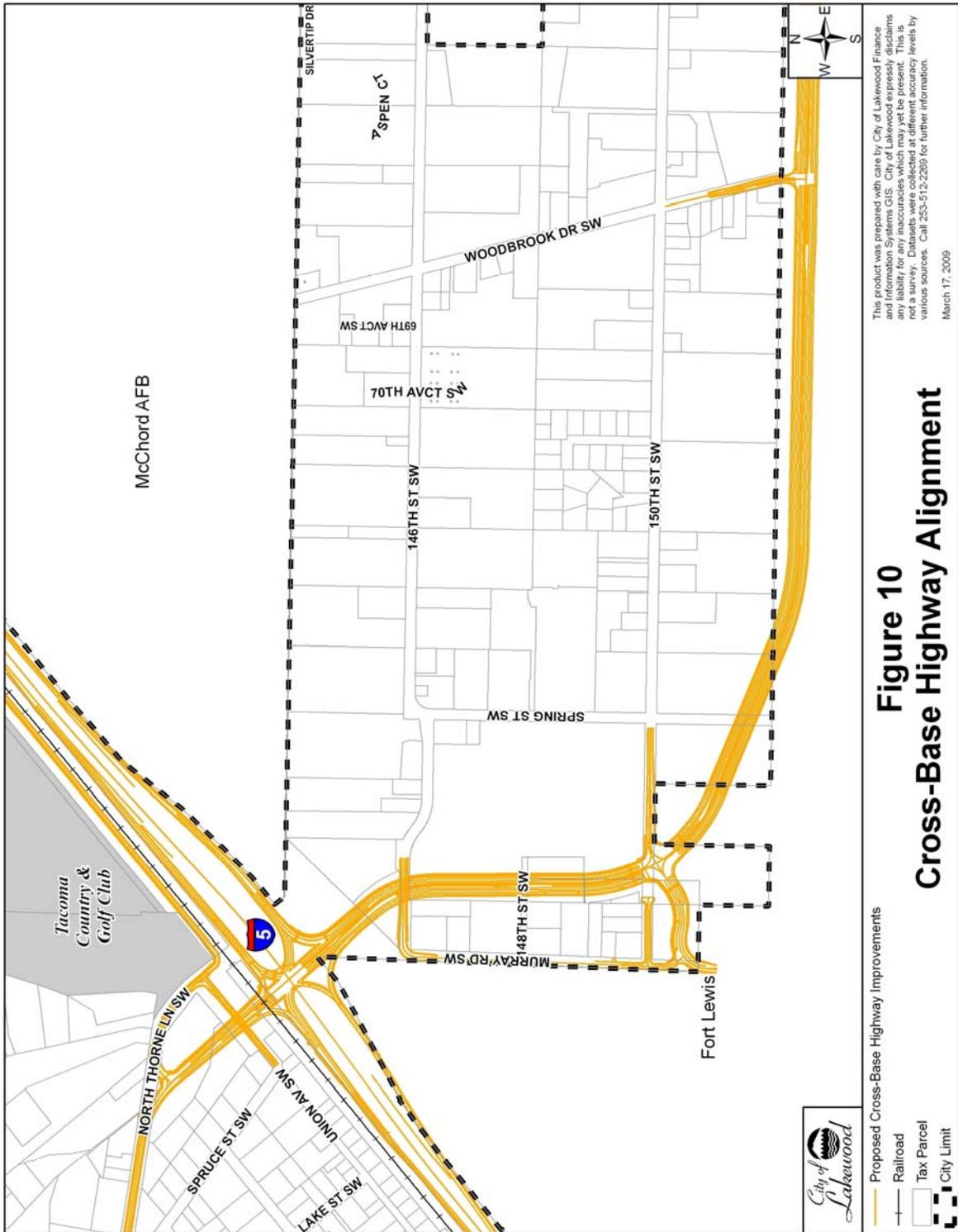
Routes 512 and 7, Spanaway Loop Road, 152nd/Military Rd., and 174th Street by providing a route through instead of around JBLM.

Environmental review and design are complete for the project, whose total estimated cost is \$453 million (based on 2006 dollars). The project is only partially funded, with construction having begun at the easterly end in 2008.

Specific to Tillicum, the highway project includes construction of a significantly larger and improved interchange at Thorne Lane SW that involves a new connecting road from Gravelly Lake Drive SW to Thorne Lane SW and construction of a roadway/railway separation at Thorne Lane SW. **Figures 10** and **11** on pages 27 and 28 show the highway alignment and Tillicum intersection improvements. However, this portion of the project is not currently funded, and it is unknown at this point when funds might be available.

In conjunction with the Cross-Base Highway project and also the joining of the former Ft. Lewis and McChord Air Force Base to create JBLM, the military has indicated it intends to pursue construction of a separate north-south alignment that would either go over or under SR 704. This would offer internal connectivity to the joined installations and may have some impact upon traffic in Tillicum as it could serve to change driver patterns. This project is still in the formative stages.

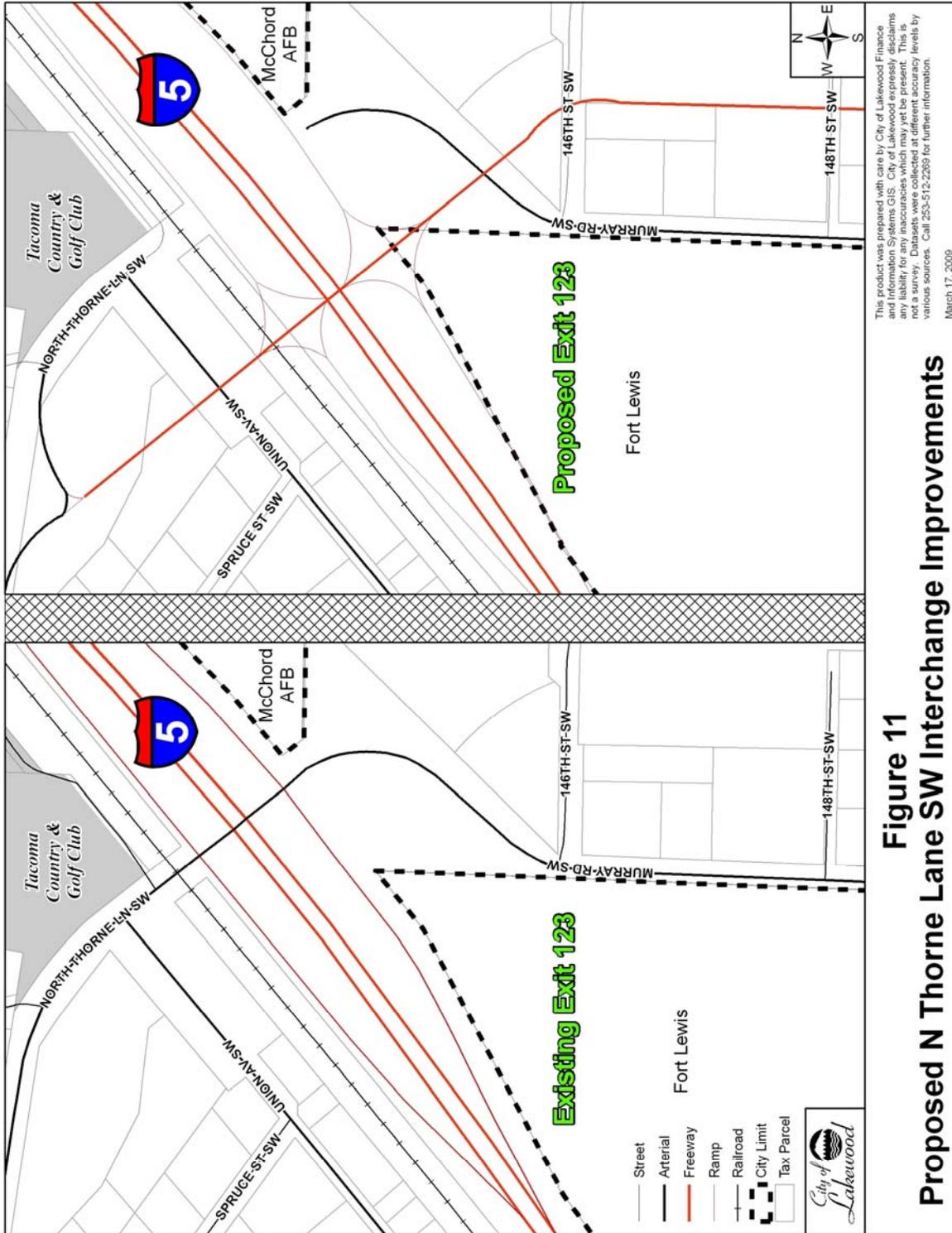




This product was prepared with care by City of Lakewood Finance Department. The City of Lakewood Finance Department is not a surveyor and is not responsible for any inaccuracies which may yet be present. This is not a survey. Datasets were collected at different accuracy levels by various sources. Call 253-512-2289 for further information.

March 17, 2009

Figure 10
Cross-Base Highway Alignment



This product was prepared with care by City of Lakewood Finance Department. Staff have reviewed the data for accuracy, but we are not a survey. Datasets were collected at different accuracy levels by various sources. Call 253-512-2289 for further information.

March 17, 2009

Figure 11
Proposed N Thorne Lane SW Interchange Improvements

Capital Improvements

A key function of cities' long-range planning endeavors is to coordinate, from a financial planning perspective, the provision of public infrastructure and utilities. The City's comprehensive plan establishes policies to direct the development of the City's capital investment program in support of the community's vision for the future. It guides the actions of public agencies as well as private decisions related to individual developments. In recent years, as well as for the upcoming capital facilities planning period, Lakewood's capital investments focus on four primary projects: installation of a new sewer trunk line, upgrading the existing stormwater and water lines, and installation of new Americans with Disabilities Act (ADA) facilities at Harry Todd Park. The majority of this work began in 2009.

Estimated expenditures by project and funding source are listed below.

Main sewer trunk line	
Washington State Public Works Trust Fund	\$ 6,400,000
U. S. Economic Development grant	1,500,000
U. S. Environmental Protection Agency grant	600,000
U. S. Housing & Urban Development Community Block grant	250,000
City of Lakewood in-house design	700,000
Washington State Department of Commerce (formerly Community, Trade & Economic Development)	500,000
Total	\$9,950,000
Side sewer installation	
Public Works Trust Fund financial assistance program	\$ 1,000,000
Replace & upgrade existing stormwater system	
City of Lakewood surface water management fund	\$ 5,600,000
Water system upgrades	
Lakewood Water District	\$ 1,000,000
Harry Todd Park	
ADA improvements	\$ 500,000
Total expenditures	\$18,050,000

The cost estimate for sewer trunk line and stormwater improvements includes both the Tillicum and Woodbrook neighborhoods. Separate breakdowns have not been provided. Not included in this tabulation are the Tillicum intersection and roadway improvements associated with the Cross-Base Highway; this project falls outside the current six-year planning cycle.

Human Services Needs Assessment (2008)

A citywide human services needs assessment was conducted in 2008. The report listed Tillicum assets which included Woodbrook Middle School, Tillicum Elementary School, local churches, the Tillicum/American Lake Gardens Community Service Center, Community Health Care (operated out of the Community Service Center), Emerson Lake, American Lake, Harry Todd Park, the Lakewood fire station, and the active service organizations of TWNA and the Tillicum Merchants' Association.

Liabilities were also cataloged. The Tillicum/Woodbrook areas serve a population of 4,754. However, there are unique characteristics of this population that make it different from other Lakewood neighborhoods. Forty eight percent are non-English speaking, 78 percent of the total households are renter-occupied, and 90.9 percent of elementary children and 67.4 percent of middle school children are on free and reduced lunches. The report indicated a sharp increase in basic needs (food, shelter, health care) among residents; the Tillicum/American Lake Gardens Community Service Center responds to 20-30 requests a day for food and medical assistance. The lack of transportation to and from surrounding urban areas was also noted a significant problem. The number of single-parent households appears to be on the rise. Other challenges included:

- Lack of parenting skills⁸
- Affordable child care
- Early screening for disabilities and school readiness
- Increasing level of transience
- Youth with limited access to extended families or longer-term family-like relationships
- Lack of support systems that increase access to job opportunities
- Training skills that help reduce ongoing reliance on emergency and basic needs programs

Pierce County Library 2030 (2009)

Both the Tillicum and Lakewood libraries are part of the Pierce County Library System (PCLS). The PCLS has developed a master plan for its facilities over the next 20 years. This plan forms a basis for facility improvements, including new buildings and renovations to or replacements of library branches. The goal is to provide libraries that are conveniently located, appropriately sized to meet the needs of growing and changing communities, and appropriately designed to accommodate changing technology. As part of this process, the PCLS has evaluated the future of the Tillicum library as well as all its other sites and will use its findings to support financing.

⁸ The Tillicum focus group identified life skills and specifically parenting skills as essential.

**FIGURE 12
PCLS LIBRARY AT TILLICUM/AMERICAN LAKE GARDENS
COMMUNITY SERVICE CENTER**



Camp Murray Site Development Plan (2010)

The Washington State Military Department retained a consultant to carry out a master plan for Camp Murray, including such things as identifying the placement of new buildings on the site and realigning some functions within different facilities. For the most part, these improvements would take place inside the fence and bear little or no relationship to the Tillicum neighborhood. However, one proposal – the relocation of the main access gate to Berkeley and Portland Avenue – would be extremely likely to change where traffic associated with Camp Murray travels within Tillicum. City staff, elected officials, and concerned neighborhood residents worked with Camp Murray officials throughout much of 2010 to arrive at a more desirable option. However, this proposal was extremely controversial; there does not appear to be an easy means of distancing Camp Murray's main entrance from Berkeley interchange congestion and the ST line without impacting Tillicum residents. Camp Murray worked on a draft environmental assessment under the *National Environmental Policy Act* (NEPA), but a final environmental assessment has not yet been issued. Communication remains open between the City and Camp Murray officials.

Neighborhood Stabilization Program (NSP)

Washington State, through the Department of Commerce, was allocated over \$33 million (\$28 million as part of NSP1; \$5 million from NSP3) in federal funding to establish and implement a state-level NSP. The purpose of the NSP is to acquire and redevelop foreclosed properties that might otherwise become sources of abandonment and blight within their communities. In turn, the Department of Commerce awarded Lakewood \$626,793 in NSP1 funding in December 2008 and \$640,000 in NSP3 funding in 2011. Of the total \$1,266,793 awarded the City, \$1,010,523 was allocated for redevelopment of foreclosed or abandoned properties for the purpose of providing low-income housing, with the remaining \$192,930 allocated for the removal of slums and blight. To date, the City has partnered with Habitat for Humanity to acquire two foreclosed residential properties in Tillicum, with which it intends to construct up to eight low-income, single-family residences; and is in the process

of abating nine blighted properties, three of which are located in Tillicum. City staff is in the process of identifying additional properties that may be eligible for participation in the NSP3 program; multiple properties in Tillicum are being evaluated for redevelopment based upon program compliance and overall project feasibility.

THE STATE OF THINGS

Who Lives Here?

In order to understand a neighborhood's needs, it is first necessary to understand the people who live there. A neighborhood's demographics, or the characteristics of its people such as age, race, gender, and economic means, help to make up the neighborhood's identity. The information that follows about Tillicum demographics is written in present tense so it will appear as though this is current information, but it is not. Except for schools information, all demographic data is based on the 2000 Census, which in turn asks people about the previous year; so it is quite outdated at this point. The 2010 federal census data is not yet available at this level of detail so will not be timely for this plan's adoption.

Tillicum is part of Census Tract 720 for data reporting purposes. Census Tract 720 includes not only Tillicum but also Woodbrook, Silcox Island, and a portion of Camp Murray; so *the data contained here represents that entire area*. For the purposes of this report, though, it is generally referred to as "Tillicum." Census percentages are rounded.

Race

Of the 4,754 residents living in Tillicum and the surrounding area, about 65 percent is white. About 15 percent is black or African/American, three percent is American Indian or native Alaskan, three percent is Asian, and one percent is native Hawaiian or Pacific Islander. Additionally, four percent identified themselves as some other race; and a total of nine percent identified themselves as being of some combination of multiple races. Over 90 percent are native citizens, with 161 foreign-born, naturalized citizens and 250 foreign-born, non-citizens.

Age

The population is split roughly evenly between men (2,329) and women (2,425). A total of 551 children is under age five, and 1,109 are school-age (through age 19 in census categories). A total of 30.7 percent of the population is children through age 18. The greatest percentage of population is concentrated between ages 22 and 54, slightly more than 49 percent. Seniors (62 and older) make up about 6.5 percent of the population.

Comparatively, within Pierce County as a whole 27.2 percent of the population is children, 62.6 percent is between the ages of 18 and 64, and 10.2 percent is age 65 and older. From among the 158 census tracts in Pierce County, Tillicum ties for 35th place in having the most children living there.

Households

There is a total of 1,954 households in the area, and the average household size is 2.43 people. This is less than the Pierce County average of 2.6 people. A small percentage (under four) of households consists of a single person, while most households (69 percent) contain two or more people. Over 21 percent of these (417) are single-parent households with children under age 18. The majority of these (343) are single mothers. Almost 60 percent of the households have no children under age 18. The unmarried-couple households are about evenly split between households having a female householder and male partner, and having a male householder and female partner. There is also a small percentage having roomers, boarders, roommates, or some other kind of unrelated housemate.

Within Pierce County as a whole, 35.9 percent of all family households have children under age 18, and Tillicum comes in just slightly higher at 37.5 percent.

Families

There is a total of 1,143 families in the area, and the average family size is 3.03 people. Only about half of these (54 percent) report themselves as being married-couple families, while the remainder is made up of other family including single-parent families. Of the married-couple families, almost 94 percent have children under age 18.

Category	Men	Women
Never Married	609	544
Married	738	733
Separated	101	125
Widowed	9	66
Divorced	269	306

Housing

Of a total 2,189 housing units⁹, 1,954 units are occupied and 235 are vacant. However, only 421 units are owner-occupied; the area is dominated by rental housing at almost 79 percent, or 1,533 units. Of the vacant units, the majority (155) are rentals as well. When considering the number of people within those housing units, the number of people within rental housing is slightly higher, at 79.2 percent. Families living in rental housing outweigh families living in owned housing by more than three to one.

Comparatively, within Pierce County as a whole almost 64 percent of the housing units are owned, with 37 percent rentals. From among the 158 census tracts in Pierce County, only nine have more rental housing than Tillicum. The median gross rent per month is \$481, with most people paying between \$300 and \$549.

Some owner-occupied housing was surveyed regarding value and housing costs. The median mortgage cost, which includes certain other costs, of homes with a mortgage is

⁹ See **Footnote 4**.

\$781 per month. The median percentage of household income represented by these housing costs is 25.3 percent. The median value of owner-occupied homes is \$89,200, compared with a median value of \$147,600 for Lakewood as a whole and \$149,600 for Pierce County as a whole. This undoubtedly correlates with housing age, at least to some extent; the median year in which owner-occupied homes in Tillicum were built is 1959 (1966 for rentals).

Work

Of a total population age 16 and older of 3,419, 2,089 persons are in the labor force. The majority (1,923) is in the civilian labor force, with a 16.5 percent unemployment rate in that group. This is slightly higher (17 percent) for females versus males (16.1 percent). Of those who are employed, the vast majority is between ages 25 and 54 whether male or female. Most work within Pierce County, but about 14 percent work outside Pierce County or even out of state. The mean travel time to work is about 26 minutes, implying that even those who work within Pierce County do not work within the immediate area. Only 166 persons in the area are in the armed forces, which is notable given the area’s proximity to the military bases.

Income & Poverty

The annual median income for all households in Lakewood is \$36,422, which increases to \$52,461 when considering married-couple families and drops to \$20,376 for female householders without a husband. Within Tillicum, the median income for all households is only \$21,853, increasing to \$38,317 for married-couple families and dropping to \$13,089 for female householders without a husband. From among the 158 census tracts in Pierce County, only five census tracts have a lower median income level than Tillicum. Additional income data is included in the Economics section of this report.

TABLE 3 INCOME & POVERTY				
Income below poverty level	All ages	Children	Seniors	Families
Pierce Co.	10.5%	13.2%	7.2%	7.5%
Census Tr. 720	37.0%	49.2%	0.0%	34.2%

The number of males in poverty (1,793) outweighs females in poverty (1,037). Poverty rates by age are disproportionately visited upon male children. There are a total of 1,104 males through age 17 living in poverty, while only 411 females. Female poverty shows a more even spread which is concentrated at ages 18 through 64.

Disability

Even though it might be expected that seniors would represent the highest number of persons with disabilities overall, the age of persons having disabilities within Tillicum focuses on the working-age group.

TABLE 4 DISABILITY				
Disability by Age Group	Age 5-15	Age 16-20	Age 21-64	Age 65+
Male	40	13	359	63
Female	43	78	366	54
Total	83	91	725	117

Veteran Status

There are 753 civilian veterans age 18 and older within the area. About a third of these are Vietnam-era veterans, with about another third who are Persian Gulf War-era veterans.

Overall Education

The greatest percentage of people in Tillicum have only a high-school education (36 percent). This is followed by 16.3 percent having completed 9th to 12th grade but with no diploma, and 15.3 percent having completed one or more years of college but with no degree. Only 9.2 percent of people in Tillicum have completed a bachelor’s degree or higher. This profile appears to be roughly proportionate between males and females. The highest percentage of males having a bachelor’s degree or higher is between 45 and 64 years of age, while the highest percentage of women is between 35 and 44 years of age.

Children’s Education

The information that follows is based on the most recent “report card” for schools produced by the Office of the Superintendent for Public Instruction, and those of previous years.

In May 2009, there were 12,210 students in CPSD, 364 (3 percent) of them at Tillicum Elementary and 509 (4.2 percent) at Woodbrook Middle School. Although Tillicum is the smallest elementary school in the district, it has the highest concentration of poor children as evidenced by its inordinately high free and reduced-price meal rate.

TABLE 5 POVERTY: STUDENTS WHO QUALIFY FOR FREE AND REDUCED-PRICE MEALS	
Free/Reduced-Price Meals (May 2010)	% of students
Statewide Aggregate	42.3%
CPSD Aggregate	63.9%
Tillicum Elementary	93.4%
Woodbrook Middle School	75.8%

- The free/reduced-price meal rate at Tillicum Elementary is 51.1 points greater than the statewide average and 29.5 points greater than the district-wide average.
- The free/reduced-price meal rate at Woodbrook Middle School is 33.5 points greater than the statewide average and 11.9 points greater than the district-wide average.
- The free/reduced-price meal rate throughout the CPSD is 21.6 points greater than the statewide average.

- All rates have been updated through the course of this plan's development as new data becomes available. Although trend data is not included, the rate has generally been trending upward; although the 2010 rates show a lesser gap between CPSD and individual school rates and the statewide average, which has also increased as the economy has slumped.

What does this data show? Children throughout the CPSD are more poor than those elsewhere in the state. Both grade-school and middle-school age children in Tillicum are more poor than those elsewhere in the district and elsewhere in the state. Hunger and poor nutrition, which often accompanies poverty, are known to be impediments to student readiness to learn. Considering that as a measure, Tillicum students are likely to be profoundly less ready to learn.

TABLE 6 COMPARISON OF WASL SCORES¹⁰ – 2009-10				
Reading	State Aggregate	CPSD Aggreg.	Tillicum Elem.	Woodbrook MS
4th grade	67.2%	50.3%	44.7%	NA
7th grade	63.4%	49.0%	NA	46.4%

TABLE 7 WRITING				
Grade level	State Aggregate	CPSD Aggreg.	Tillicum Elem.	Woodbrook MS
4th grade	61.1%	45.8%	36.8%	NA
7th grade	70.3%	58.7%	NA	56.4%

TABLE 8 MATH				
Grade	State Aggregate	CPSD Aggreg.	Tillicum Elem.	Woodbrook MS
4th grade	53.7%	42.4%	39.5%	NA
7th grade	55.3%	45.5%	NA	35.7%

TABLE 9 SCIENCE				
Grade	State Aggregate	CPSD Aggreg.	Tillicum Elem.	Woodbrook MS
5th grade	34.0%	20.4%	13.0%	NA
8th grade	54.5%	31.6%	NA	27.5%

What does this data show? Neither elementary nor middle-school children in Tillicum can read, write, or do math or science as well as others, either within the district or across the state. Similarly, both elementary and middle-school children throughout the CPSD cannot read, write, or do math or science as well as others across the state.

¹⁰ For test scores, percentages = percent meeting standard.

TABLE 10 TILlicUM ELEMENTARY SCHOOL WASL SCORES OVER TIME				
Year	Reading	Math	Writing	Science
2009-10	44.7%	39.5%	36.8%	13.0%
2008-09	55.8%	18.6%	53.5%	23.4%
2007-08	60.0%	33.3%	46.7%	11.8%
2006-07	64.3%	23.8%	31.0%	2.4%
2005-06	53.7%	31.7%	31.7%	16.0%
2004-05	58.7%	41.3%	43.5%	24.3%
2003-04	39.5%	26.3%	34.2%	19.3%
2002-03	64.7%	48.5%	38.2%	--

TABLE 11 WOODBROOK MIDDLE SCHOOL WASL SCORES OVER TIME				
Year	Reading	Math	Writing	Science
2009-10	46.4%	35.7%	56.4%	27.5%
2008-09	41.3%	21.0%	56.9%	24.1%
2007-08	58.7%	37.0%	64.7%	28.3%
2006-07	58.1%	32.9%	53.8%	20.6%
2005-06	43.7%	27.0%	54.3%	17.9%
2004-05	57.9%	27.9%	41.1%	14.2%
2003-04	46.3%	26.3%	45.9%	14.4%
2002-03	40.7%	23.9%	41.6%	17.2%

Tables 10 and 11 demonstrate that, prior to 2008-09, there generally had been a trend of improvement in scores across the board at Woodbrook Middle School. So while scores may not compete favorably with the district as a whole or statewide, it appears to be a situation that was incrementally improving. Tillicum Elementary is, however, a different matter. As may be seen from the data, some years the scores go up, some years the scores go down. This data may be reflective of the nature of the Tillicum and Woodbrook neighborhoods which feed into these schools, where many students come and go. With a stable student base, one might expect to see a clear trend in scores. Uncertain score levels such as these might indicate an unstable student base, although there is nothing to prove this inference.

What Does All This Mean?

Tillicum’s population is largely white and working-age, but at the same time is educationally and economically limited. People living in Tillicum do not make as much money as people living in Lakewood as a whole, or within Pierce County. The area has poor housing values and a very large rental rate, which implies that even with low housing prices people still cannot afford to buy homes. The percentage of people living in poverty, and especially the percentage of children living in poverty – almost half – outstrips the Pierce County average. At the same time, the area has more children than about two-thirds of the rest of Pierce County’s census tracts – keeping in mind this may not represent two-thirds of the population or land area. Combined with the poverty rate, this sets up these children for the potential of poverty.

Students living in Tillicum are economically limited and have a greater chance of failing at education. Educational limitation often means a lack of success and limited income potential as adults. Poverty has a relationship to crime and the potential of young people to turn to crime to improve their economic circumstances.

Physical Conditions & Influences

Tillicum functions as a small, separate village within Lakewood. Accessible only by freeway ramps at the north and south end of the area, it has its own commercial corridor, moderately dense residential development, an elementary school, a library, and a park. In terms of its development patterns, Tillicum is a very walkable neighborhood with a tight street grid and relatively low speed traffic (although there exist few sidewalks). Harry Todd Park is one of the largest City-owned parks, and Tillicum is one of the few neighborhoods in the city with public waterfront access.

Heritage & Landmarks

Tillicum was first platted in the early 1900s. The first permanent families arrived in 1910; they offered eating and sleeping accommodations for those who came to enjoy American Lake. Tillicum's early history indicates that the community was known for its social and recreational attractions. The Pacific Traction Company, which ran a street car system from South Tacoma to what is now Lakewood, brought visitors to enjoy American Lake and other social activities. The streetcar terminus is evident in Tillicum today based on the alignments of North Thorne Lane SW, West Thorne Lane SW, Union Avenue SW, and Harry Todd Park.

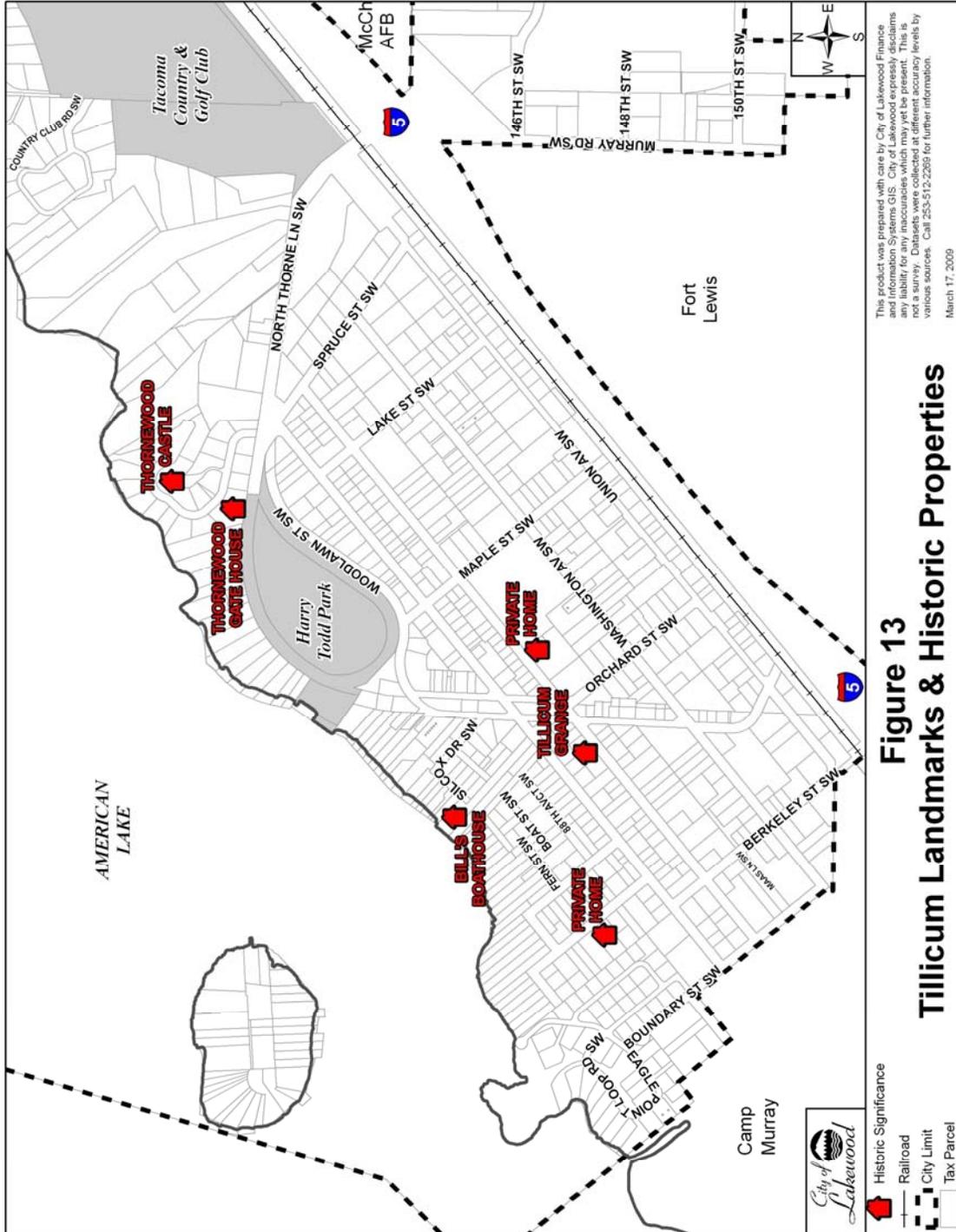
In 1917, Pierce County donated adjoining lands to the U.S. Army for the construction of Camp Lewis, until recently known as Ft. Lewis. The Army's need for housing was a major factor in the development of Tillicum. In fact, housing was at such a premium during both world wars that people lived in tents covered with tar paper.

Thornewood Castle is located at the north end of Tillicum. Built in 1908 by Chester A. Thorne as a single-family residence, Thornewood Castle is 27,000 square feet in size with 54 rooms, 22 bedrooms, and 22 baths designed in the Gothic Tudor style. The mansion is the only one of its kind on the West Coast. Its construction took place from 1908 to 1911. The structure is built of concrete and steel with a brick exterior and oak paneling, an oak staircase, and stained glass interior finishings which were imported from a 15th-century English mansion. Other interior furnishings were imported and previously owned by an English duke. Thornewood has been restored as a country inn and is privately owned and operated as a bed and breakfast and venue for weddings and other events.

Bill's Boathouse on American Lake was once Garrison's Swimming Resort, which was used for dances and special events. In 1945, the resort was sold and then renamed as Bill's Boathouse. Since then, it has belonged to the Anderson family and has been used to restore classic boats, motors, and cars, which are currently displayed there.

Tillicum Grange (Community Center) on Grant Avenue was built on Ft. Lewis in 1917 and moved to Tillicum in 1922. During the pre-World War II period, the grange was the dance center. It was a popular community gathering place that people described as having the best dance floor in the nation. The dance hall was later converted into a skating area. Today, it is privately owned by K.H. Rowe.

Historically significant properties and landmarks located in Tillicum are tagged in **Figure 13** below. Some of these are designated historic register sites while others just possess strong community identity.



American Lake

Both historically and today, Tillicum bears a strong relationship to American Lake. Bill's Boathouse is not just a community icon but continues to provide recreational opportunities on the lake. The nearby Wadsworth St. SW street end is used as a "jumping-off point" for residents of Silcox Island, many of whom keep their boats and vehicles there and use it as a sort of ferry landing when traveling to and from their homes. American Lake sees a myriad of users, including swimmers, both motorized and non-motorized boats and other waterborne recreational vehicles, water skiers, seaplanes, and rowing teams. The University of Puget Sound's men's and women's crew teams row on American Lake and share the boathouse with Pacific Lutheran University and the Commencement Bay Rowing Club, which owns the structure.

**FIGURE 14
COMMENCEMENT BAY ROWING CLUB BOATHOUSE**



Harry Todd Park

Yet another unique feature of Tillicum is Harry Todd Park. The park is about 17 acres in size, the greater part of which was a gift to the City of Tacoma by the Keystone Land and Investment Company for a public park and playground. E.I. Gregory, William Delivier and Charles Reeves were the principal share holders and directing officers of the company in 1914. At that time, the Metropolitan Park District acquired title to the park shoreline to ensure it remained accessible to the public for their enjoyment of the park facilities. Some

may also remember Harry Todd Park as Bona Park. Harry M. Bona was influential in Tillicum's history, and the park was originally dedicated in his name on July 4, 1953. However, the park was later renamed upon the passing of Harry Todd, who made significant donations to the park's improvement. The park remains an important piece of the foundation of Tillicum and is considered a space that contributes to the quality of Lakewood's urban environment. It is the public gateway to American Lake for the Tillicum residents.

**FIGURE 15
HARRY TODD BOAT DOCKS**



Utilities

Water: The Lakewood Water District provides water service to the Tillicum community. The water district and the City rely on groundwater from the Central Pierce County Aquifer System and the underlying Chambers/Clover Creek Basin for its water needs. This same aquifer serves several neighboring communities. Pumping capacity is determined by groundwater rights.

Storm Drainage: Currently, Tillicum is not served by a comprehensive system that collects, conveys, treats, and discharges storm water. Instead, there is a limited drainage system that serves portions of the existing streets. The existing drainage system includes catch basins, dry wells, perforated pipes, and storm drain pipes. The age, condition and functionality of the existing system vary. Where possible, storm water infiltrates through existing sections of perforated pipe and dry wells. Locations served by catch basins and storm drains discharge to the ground. Some storm water discharges through existing outfalls to American Lake, including that conveyed via drainage ditch through Tillicum during high flow events.

Sewer: Through the early 1970s, sewer service was not provided in the area that is now within Lakewood. Up until that point in time, the Lakewood community relied entirely upon the use of on-site septic systems. However, the septic tank discharge was polluting underground aquifers which were also Lakewood's water supply. Pierce County proposed a Utility Local Improvement District (ULID) in which property owners would be assessed a share of the cost to provide sewers. The ULID was submitted to property owners in the form of a public vote, which failed. In 1971, the state Department of Ecology issued a violation notice requiring that Pierce County implement the ULID. Pierce County went on to unilaterally develop what was known as ULID 73-1, and sewer lines were installed in most of the Lakewood community, except for small pockets located on the west and east sides, in addition to all of the Tillicum and Woodbrook neighborhoods.

Sewers were not installed in Tillicum and Woodbrook for a variety of reasons. Tillicum's topography presented unusual engineering design considerations. Another issue was these communities' isolation and their proximity to existing military installations. It was assumed that Ft. Lewis would provide sewers given the location of a major trunk line in Woodbrook; however, no formal commitments were ever made, and it was later shown to be infeasible. Tillicum and Woodbrook were also outside the aquifer basins of immediate concern and had relatively low development densities.

Instead of extending sewer service to these communities, development in these areas was subsequently restricted. Permitted development densities were lowered to two dwelling units per acre, and on-site septic systems had to be engineered based on site and soil conditions. However, development prior to this time was not restricted in either development densities or by engineering criteria; existing development densities in many areas exceed two units per acre and many, if not all of, the existing septic systems predate the more stringent requirements.

When Lakewood incorporated in 1996, Tillicum became a part of the incorporated area. The City then began trying to address the issues resulting from the lack of sewer, the community's isolation, undervalued properties, and high crime rates. With adoption of the City's comprehensive plan, policies were established to provide sanitary sewer in Tillicum and Woodbrook. Thereafter, the City began the process of assembling funds through grants and sewer surcharge on the whole of the City to construct new infrastructure.

During in the development of both the City's comprehensive plan and the BCRA *Progress!* project, Tillicum emerged as a neighborhood having significant potential for residential growth over the next 20 years. Given its location and assets, there is an opportunity for Tillicum to evolve into a more urbanized, pedestrian-oriented community. A significant constraint in realizing this vision is the lack of sewers in Tillicum. Design, funding, and environmental review for new sewer service to Tillicum and Woodbrook has been completed, and construction began in 2009.

Redevelopment of Tillicum's commercial areas and housing will not be possible until sewer connections are available – *and, very importantly, there is enough flow generated to initiate service*. Even with the infrastructure complete, service initiation is dependent on achieving a sufficient number of connections and flow to enable the system to be turned on. The financial incentive programs initiated and marketed during 2010 did not attract a sufficient number of connections. In October 2010, the City Council reviewed the status of main sewer line and side sewer construction in Tillicum and Woodbrook and the deferred and low-interest sewer loan programs. These reviews spurred an interest in reconsidering the voluntary connection policy which had earlier been decided upon.

As a result of this discussion, the City Council began looking at making sewer connections mandatory. Two alternatives were considered, "low flow" and deferral.

The "low flow" option presumed that all properties to which sewer service is available would connect and/or pay sewer service charges. The option assumed that the sewer service charges would be remitted to the County and that the funds would be used to service the system, which would necessitate system flushing if the required flow is not met. It is anticipated that connections to the sewer system would occur more slowly under this option than under the deferral option. "Low flow" property owners who pay monthly sewerage charges could continue to use septic systems until those septic systems fail, the property is sold to a new owner, or the use of the property changes.

Under the deferral program, connections are mandatory, but the property owner must seek or qualify for a deferral if they do not immediately connect to an available sewer system. As with the "low flow" option, the property owner is required to pay the monthly sewerage charges during any period of deferral. Qualifying for a deferral would depend upon whether a property owner can establish that connecting to the sewer creates an "economic hardship" according to set thresholds. Deferrals would last up to five years, although there are some conditions under which a property may be ineligible or could become ineligible.

This triggered NEPA reevaluation since federal grant money was used in the construction of Tillicum/Woodbrook sewers. A primary concern was impact upon the so-called environmental justice population, since the Tillicum/Woodbrook areas contain a considerable amount of poverty. The NEPA reevaluation was completed in January 2011 and concluded that requiring mandatory connection would not affect the sewer project's previously issued Finding of No Significant Impact. The Woodbrook and Tillicum communities are expected to experience an improved quality of life over existing conditions if sewer service is implemented in the following ways:

- Sewer service will begin to address the issue of failing or older, inadequate septic systems and the potential effects of these systems on human health and the environment; and
- Sewer service will serve to promote community reinvestment and better accommodate the higher-density, multi-family residential uses, as well as higher-intensity, employment-generating commercial and industrial uses envisioned in the City's current comprehensive plan.¹¹

In the end, the City Council chose to blend the two options. On March 21, 2011, the City Council adopted Ordinance No. 530 mandating connection to sanitary sewers. This ordinance states that where sewers are available to a property, that property owner has five years in which to connect or apply for and receive a deferral of the requirement to connect, but in no event shall the private septic system be allowed to continue longer than eight years after notice is served that sanitary sewer is available to a property. Should a deferral be sought, the owner is also subject to paying the monthly sewer charge. Separate from the ordinance, the Council directed the City Manager to pursue the "low flow" option with Pierce County Public Works and Utilities. Work is in progress toward this end.

Gas & Electricity: Electric utilities are provided by three different purveyors within Lakewood - Tacoma Power, Lakeview Light and Power, and Puget Sound Energy (PSE). PSE provides electricity to all of Tillicum and Silcox Island. Power to Silcox Island is through an underwater utility line originating in Lake City at the north end of American Lake. PSE also

¹¹ Technical memorandum dated January 5, 2011.

provides natural gas to the entire city, including Tillicum. Over the past ten years, PSE has made significant improvements in its distribution systems in an effort to reduce power outages caused by inclement weather. Major feeder lines have been upgraded, which may or may not provide direct benefit to Tillicum, yet it still potentially benefits indirectly from improved service and fewer power outages.

There has been a desire to underground major utilities throughout the City. In discussions with community members, the idea undergrounding utility lines along Union Avenue SW has been broached repeatedly. Costs to underground utility lines along Union Avenue SW are estimated by City staff at \$1 million, which is well beyond the capacity of the City's capital budget. Another option is the formation of a Local Improvement District (LID) where property owners tax themselves and pay for utility improvements. Given the current value of the property, the weak return on investment and the state of the economy, the property owners' ability or willingness to absorb these costs is unlikely.

Cities typically address undergrounding through franchise agreements with utility providers. Lakewood entered into such an agreement with PSE on January 23, 2006, which remains in effect. Generally, PSE does not favor underground installations because of the expense. The City addresses the issue in its development regulations. LMC 18A.50.135 requires utilities to be placed underground wherever possible, as determined by the City Engineer. To date, electrical lines running from the main feeder line onto private property are required to be underground. PSE has indicated that it will cooperate and participate with the City in the formulation of policy and development of an undergrounding management plan, which has yet to be constituted, either within Tillicum or citywide.

Schools

The CPSD owns and operates Tillicum Elementary School, located at 8514 Maple Street SW. Grades taught at the school are pre-kindergarten through the fifth grade. The school is located on a 5-1/2 acre site and was built in 1944. School buildings have not been modernized; existing structures suffer from deferred maintenance.

**FIGURE 16
TILLICUM ELEMENTARY SCHOOL**



In May 2010, a total of 290 students were enrolled¹², although not all of the children enrolled there live in Tillicum. Although numbers fluctuate somewhat from year to year, enrollment is down from a high of 462 in 1999, or a loss of about 37 percent over the years. Tillicum Elementary has the highest concentration of poor children in the district.

Tillicum Elementary is additionally supported by Communities in Schools [Lakewood] (CISL), a non-profit organization with its own board of directors. Since its inception in 1993, CISL's mission has been to promote children's readiness to learn and success in life. The organization's vision is "to help kids prepare for life through a network of parents, volunteers, businesses, and community organizations working together and focused at school sites." Programs include mentoring, tutoring, and basic needs assistance to families of students. It is organized under the national and state CIS organization and receives funding from the City of Lakewood as well as other public and private sources. Through CISL, State Farm® has "adopted" Tillicum Elementary, helping to financially support afterschool programs and encouraging its employees to volunteer as classroom aides and individual student mentors.

Community Services

Located at 14916 Washington Avenue SW, public services provided at the Tillicum/American Lake Gardens Community Service Center (CSC) include a feeding program for pregnant women and small children; senior activities and meals; food and clothing banks; and a rental hall that is also used for community meetings. It, too, is a non-profit entity with its own board of directors that receives partial funding from the City of Lakewood. The Tillicum Library is located within the CSC. Recently, management has replaced the community clinic that is closing with Sea-Mar Community Health, a full-service medical clinic which is also expected to assume operation of the maternity/children's (WIC) nutrition program. In addition, CSC staff is working toward offering a broader array of recreational opportunities outside of the City's formal parks and recreation program offerings, including such things as children's cooking classes, weekend movies, guest speakers, and the like.

FIGURE 17
TILLICUM/AMERICAN LAKE GARDENS COMMUNITY SERVICE CENTER



¹² Enrollment data is drawn from the Office of the Superintendent of Public Instruction's annual "school report card."

Table 12 below shows the activity levels reported by Tillicum/American Lake Gardens Community Service Center for the last quarter of 2010. This is only a three-month snapshot in time but offers insight into the range of community service needs in the Tillicum neighborhood.

TABLE 12 OCTOBER - DECEMBER 2010 COMMUNITY SERVICE LEVELS¹³	
Feeding Programs	Three-Month Utilization
Senior meals	508 meals served
Japanese meals	592 meals served
Food bank	1,160 clients served
Free holiday dinner	273 people served
Thanksgiving/Christmas baskets	1,345 people served
Senior Activities	
Card games	56 participants
Bingo	525 participants
Medical Services	
CHC clinic	1,256 clients served
WIC clinic	510 clients served
Blood pressure checks	127
Diabetes checks	70
Other	
Clothing bank	459 clients served
Total volunteers	40

Additionally, **Figure 18** shows the home of the Tillicum Youth and Family Center developed in 2009 at 14511 West Thorne Lane SW. The center, owned by Youth for Christ, reclaimed what was formerly a bar and, more recently, an unsightly, ill-maintained vacant building.

**FIGURE 18
TILlicum YOUTH & FAMILY CENTER¹⁴**



¹³ Source: Karen Priest, Exec. Dir., Tillicum/American Lake Gardens Community Service Center (personal email).

¹⁴ Source: Tacoma Area Youth for Christ website.

Tillicum also has a Veterans of Foreign Wars (VFW) club that was chartered in 1973. VFW Post 2329 is located at 14809 Woodlawn Avenue SW and is shown in **Figure 19** below:

FIGURE 19
VFW POST 2329¹⁵



Additional veterans' services in Tillicum are provided by GI Voice, a non-profit organization of recent veterans and civilian supporters, which operates Coffee Strong at 15109 Union Avenue SW. Expanding on a traditional coffeehouse environment, Coffee Strong offers computers, free wi-fi, recreational events and resources. It is intended to serve as a safe space for service members, military families and veterans to discuss issues like war, deployment, post-traumatic stress, and life in the military. Coffee Strong is also home to GI Radio, a fledgling internet-based radio station similarly targeted at service members, veterans, and their loved ones.

Human Services & Youth Programs

The City's General Fund supports human services via contracting and through its Parks and Recreation Department's youth programs. Funding these programs has become increasingly challenging given the limited fiscal resources of the City. As a means of increasing efficiencies in the delivery of services, a human needs assessment was commissioned in 2008. Total human services allocation in 2011 for the entire City was \$366,000, a portion of which went toward operating human services programs in the Tillicum community. It is likely that human services funding will become even more challenging in years to come. It is critical that Lakewood maintain a strategic plan to direct collaborative human services efforts among other public agencies and funding partners.

Youth programs in this part of the City are provided through volunteers and semi-public agencies. As discussed above, the afterschool program is now operated by CISL, and the new youth center has proven extremely popular and is well utilized. A free summer day camp had been provided in previous years by the City but, because of budget constraints,

¹⁵ "Home Sweet Home – Not Pretty But It Is Ours" (VFW website).

was discontinued in 2009 in favor of fee-based recreation programs. The City provides a late-night program for teens twice a month at Woodbrook Middle School during the school year (October through May). An open gym, board games and Wii are offered to the participants as well as a meal-type snack. (Parks staff adds that for 90 percent of the participants, this is their only evening meal.) The City currently partners with Lakewood Communities in Schools on its afterschool program at Tillicum Elementary each Friday during the school year. During the summer, rowing scholarship programs are offered by the rowing club during the summer, but there are no public agency programs available.

Funding for youth programs in Tillicum and Woodbrook is meager. There are no plans to add programs unless additional funding is secured. The resultant effect could include increased gang activity and crime. This is an area that decision makers may want to monitor carefully.

Military Influence

There are two military installations in the vicinity of Tillicum, Camp Murray and JBLM. Although they are currently within unincorporated Pierce County, Camp Murray and JBLM's urban cantonment areas are within Lakewood's designated urban growth area¹⁶ shown in **Figure 20** on page 50.

Camp Murray: Camp Murray is home to the Washington Air National Guard, Washington Army National Guard, the Washington State Military Department's Emergency Operations Center, and Washington State Guard. It is located south of Tillicum between American Lake and I-5. Primary access to the camp is through Tillicum via I-5 at Berkeley Avenue SW.

JBLM.¹⁷ JBLM has a rich and expansive history. Since its inception in 1917 as Camp Lewis, the base has grown and undergone several organizational changes. Comprised of the former Ft. Lewis and McChord Air Force Base, the creation of JBLM is the product of the most recent round of base closures and realignments. It is broken into three segments known as JBLM Main, JBLM North, and JBLM McChord Field. The latter represents what was previously McChord Air Force Base, while "Main" refers to the previous Ft. Lewis main post. "North" is physically separated from Lakewood, while Camp Murray and JBLM Main border Tillicum. Altogether, JBLM contains 86,000 acres, while its Yakima Training Center covers 324,000 acres.

The former Ft. Lewis is a U.S. Army post. Part of Forces Command, it has been the home of I Corps since 1981 and is one of 15 US power projection platforms. The principal Ft. Lewis maneuver units are the 62nd Medical Brigade and the 2nd, 3rd, and 4th Brigade, 2nd Infantry Division. It is also home to the 593d Corps Support Group, the 555th Engineer Group, the I Corps NCO Academy, Headquarters, Fourth ROTC Region, the 1st Personnel Support Group, 1st Special Forces Group (Airborne), 2d Battalion (Ranger), 75th Infantry, and Headquarters, 5th Army (West).

JBLM McChord hosts the 62nd Airlift Wing and 446 Airlift Wing (reserve), which are part of Air Mobility Command and provide the federal Department of Defense with a fast, flexible and responsive airlift capability. The wing's tasking requirements range from supplying humanitarian airlift relief to victims of disasters to airdropping troops into the heart of hostile areas.

¹⁶ Also shown is off-base urban growth area.

¹⁷ This section is largely adapted from the Joint Base Lewis-McChord Growth Coordination Plan (December 2010).

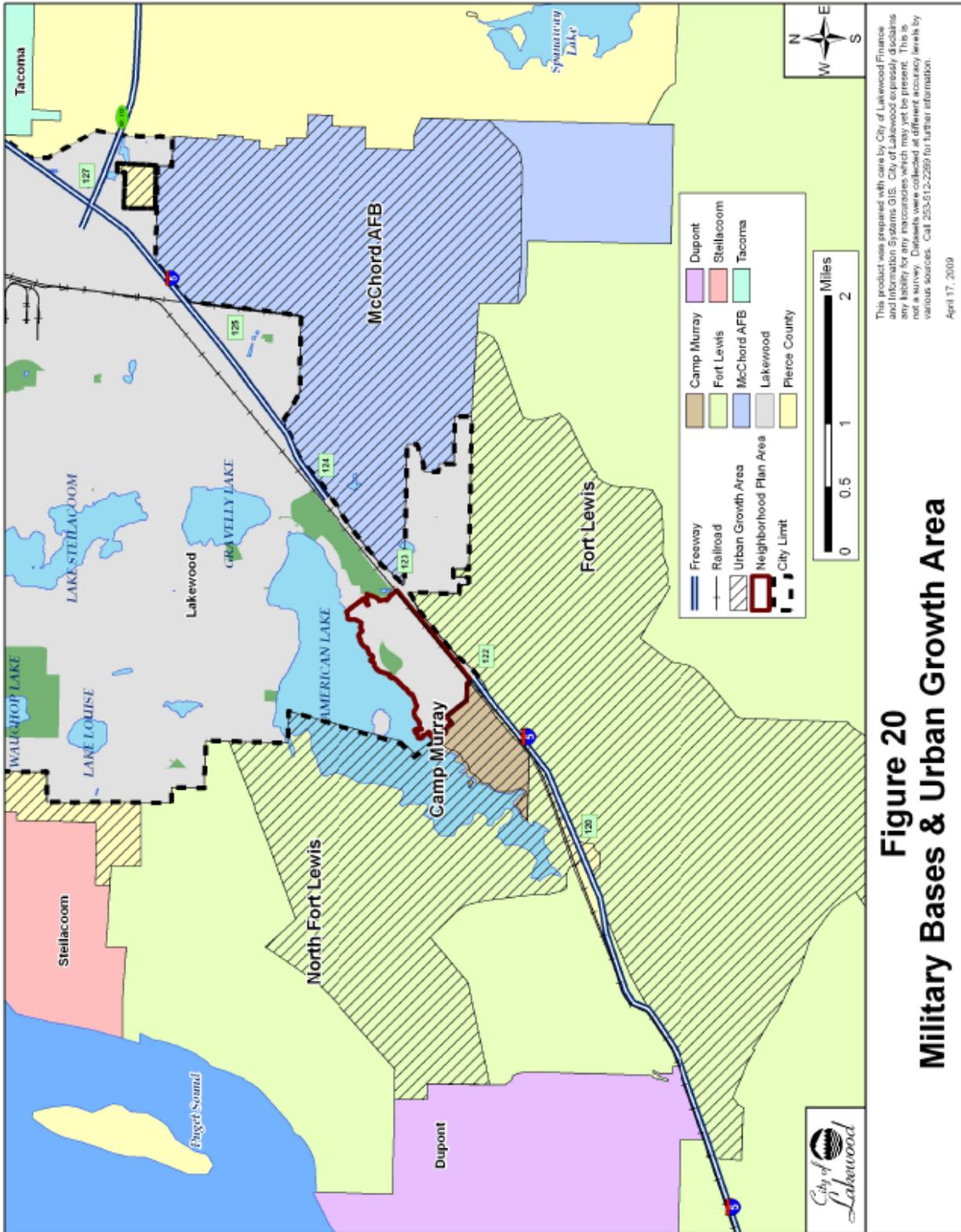
Located within the confines of JBLM Main is the Madigan Army Medical Center. Although it is not accessible to the general public except for trauma care in emergent situations, Madigan is one of the busiest hospitals in the Pacific Northwest. Outpatient visitors total 981,067 per year. There are an estimated 160,000 soldiers, family members and military retirees residing in Madigan's 40-mile catchment area. Madigan's health care mission is executed by nearly 4,000 staff members. Madigan is one of the Army's most state-of-the-art and technically advanced medical centers. It has 1.2 million square feet of building space on 120 acres. Notably, Madigan is located within one-half mile of Tillicum.

JBLM is now the premier military installation in the Northwest and is the most requested duty station in the Army. It has grown to be one of the foremost economic and cultural engines of the South Sound region and wields significant influence on surrounding communities.

As a result of several Department of Defense (DoD) initiatives, the first decade of the 21st century was a period of rapid military growth and unanticipated economic opportunity for the South Sound region. Between 2003 and 2010, the military-related population increased by 44 percent, from about 92,000 to almost 132,000 people, including military personnel and their families, DoD contractors, and civilian workforce in the South Sound region. Not counting JBLM-McChord personnel or other military personnel transiting through the base, more than 17,000 soldiers abroad returned to JBLM from deployments in Iraq and Afghanistan during much of 2010. With the termination of combat operations in Iraq, additional JBLM brigades have also returned. This is the first time in recent memory that the JBLM population is substantially in one place at one time. By October 2010, the region felt the full impact of JBLM's recent personnel growth.

Returning soldiers are expected to have a variety of impacts on social services, health and medical services, transportation, housing, public safety, education, and other regional resources. As many as 1,175 returning soldiers with family households and 570 unaccompanied soldiers were expected to establish new off-base residency within the region during the last quarter of 2010. JBLM is expected to add approximately 4,000 military personnel and family members in the coming five years, as well.

Also, more than 23,000 Army retirees live within a 50-mile radius of JBLM. The combined payroll of its military and civilian workforce is \$2.017 billion. It is the single largest employer both within Pierce County and the entire state. Coupled with \$336.3 million in contracts, services, and construction and \$13 million in federal Impact Aid funding, the overall economic impact of JBLM to the surrounding communities is \$2.679 billion.



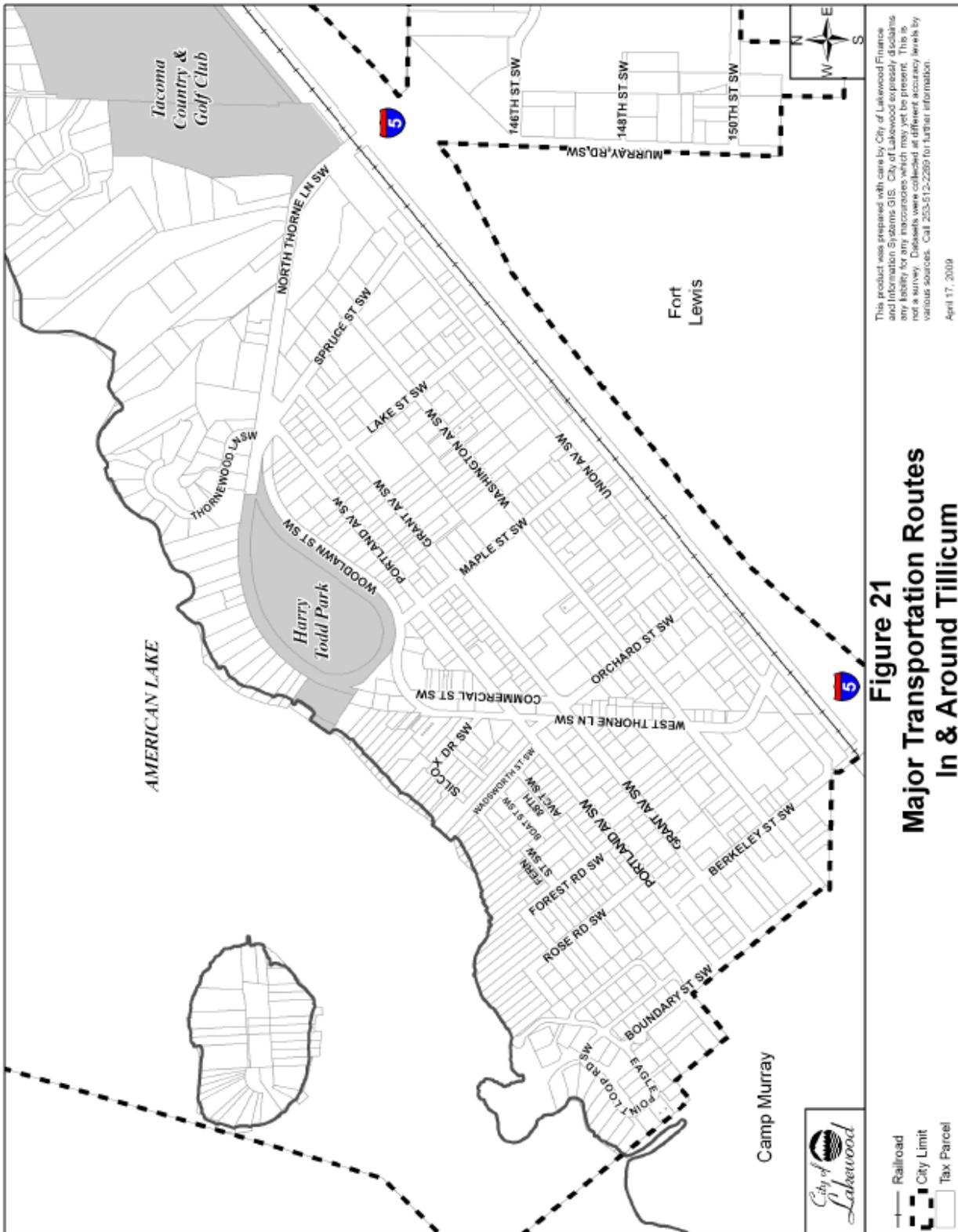
Traffic/Transportation

Currently, access into and through Tillicum is limited due to American Lake, the Tacoma Country and Golf Club, and the military installations. In addition, access to the military installations heavily influences congestion. Major transportation routes are labeled in **Figure 21** on page 52.

- I-5 is an eight-lane freeway north of the Thorne Lane SW/Murray Road SW interchange that narrows to six lanes prior to the Berkeley Avenue SW interchange to the south. This generally north-south alignment is a mainstay of regional travel, including freight, and provides access to Camp Murray, and JBLM. The Thorne Lane SW/Murray Road SW and Berkeley Avenue SW interchanges are the primary connections between I-5 and the communities of Tillicum and Woodbrook.
- Thorne Lane SW is a two-lane collector arterial located on the west side of I-5 (opposite Murray Road SW) at the Thorne Lane SW interchange. This east-west roadway has four- to six-foot paved shoulders on both sides and a speed limit of 25 mph. Thorne Lane SW is one of two primary routes that provide access to and from I-5 into Tillicum. The average daily traffic volumes on Thorne Lane SW range between approximately 2,200 vehicles northwest of Union Avenue SW to 5,800 vehicles southwest of Union Avenue SW.
- Berkeley Avenue SW is a two-lane collector arterial providing access to Tillicum and Camp Murray. This east-west roadway is 40 to 45 feet wide, has four- to six-foot gravel shoulders on both sides, and has a speed limit of 25 mph. Berkeley Avenue SW is the other primary route that provides access to and from I-5 into the Tillicum. It has an average daily traffic volume of approximately 2,200 vehicles per day between Union and Portland avenues.
- Portland Avenue SW primarily provides access to residential areas of Tillicum. The average daily traffic volumes for this 40- to 45-foot-wide street range between approximately 1,200 and 1,900 vehicles per day.
- Union Avenue SW primarily provides access to both residential areas and the neighborhood business district in Tillicum. Union Avenue SW also has a limited 40 foot right-of-way which restricts traffic movement.
- Spruce Street SW is a two-lane 40- to 45-foot-wide roadway currently providing access to residential uses.

A traffic study was prepared in conjunction with environmental review for the sewer project currently under construction to identify existing conditions and to project how traffic conditions will change over time with the extension of sewer service. The traffic study is provided in **Appendix C** (page 97).

Existing conditions at four intersections were analyzed using a level of service (LOS) methodology. LOS is a measure by which traffic engineers analyze the delay at a given intersection – how long do vehicles have to wait at the traffic signal? – to determine how it is performing. Delays can result in inconvenience, traffic interruptions, inability to maneuver, inefficient fuel consumption, and lost travel time. It is measured using a mathematical formula that considers numerous variables, expressed as a letter A (for best quality conditions) to F (for worst conditions). **Table 13** (page 53) generalizes the LOS criteria for signalized intersections.



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 April 17, 2009

Figure 21
Major Transportation Routes
In & Around Tillicum

TABLE 13 LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS¹⁸		
Level of Service	Average Delay per Vehicle	General Description
A	10 seconds or less	Free flow
B	10-20 seconds	Stable flow (slight delays)
C	20-35 seconds	Stable flow (acceptable delays)
D	35-55 seconds	Approaching unstable flow (tolerable delay – traffic must occasionally wait through more than one signal cycle before proceeding)
E	55-80 seconds	Unstable flow (approaching intolerable delay)
F	More than 80 seconds	Unacceptable delay

The traffic study assessed average intersection delays (seconds/vehicle). Notable findings include:

- At the northbound I-5 ramp at Berkeley Avenue SW (signalized), the average delay is over 2-1/2 minutes per vehicle. (LOS F)
- At the southbound I-5 ramp at Berkeley Avenue SW (signalized), the average delay is over two minutes per vehicle. (LOS F)
- At the northbound I-5 ramp at Murray Road SW (signalized), the average delay is 30 seconds per vehicle. (LOS C)
- At the southbound I-5 ramp at Thorne Lane SW (signalized), the average delay is over 50 seconds per vehicle. (LOS D)

The topic of Union Avenue’s optimal design came up repeatedly not just during the course of the this plan’s development, but also earlier during the design phase of the sewer project. The draft *Tillicum Neighborhood Plan* noted that a final decision was needed in arriving at a preferred street plan approved by the City Council and setting street design standards for Union Avenue SW. It will serve as a footprint for Union Avenue SW’s redevelopment, provide for a system for capital outlay, and will give property owners and other in the area certainty about what is to happen.

The Union Avenue SW right of way is currently 40 feet wide and is classified as a minor arterial in the City’s comprehensive plan. It is narrow and will not meet transportation needs should commercial redevelopment take place after the main sewer trunk line is installed. The redevelopment of Union Avenue SW poses thorny questions, including some of critical importance:

- Since the current right of way is only 40 feet wide, how should the City obtain the additional 20 feet? Should acquisition be by development exactions (piecemeal, over time as properties redevelop) or at once (or in phases) via buyout/condemnation?

¹⁸Source: Transportation Research Board, *Highway Capacity Manual*, 2000.

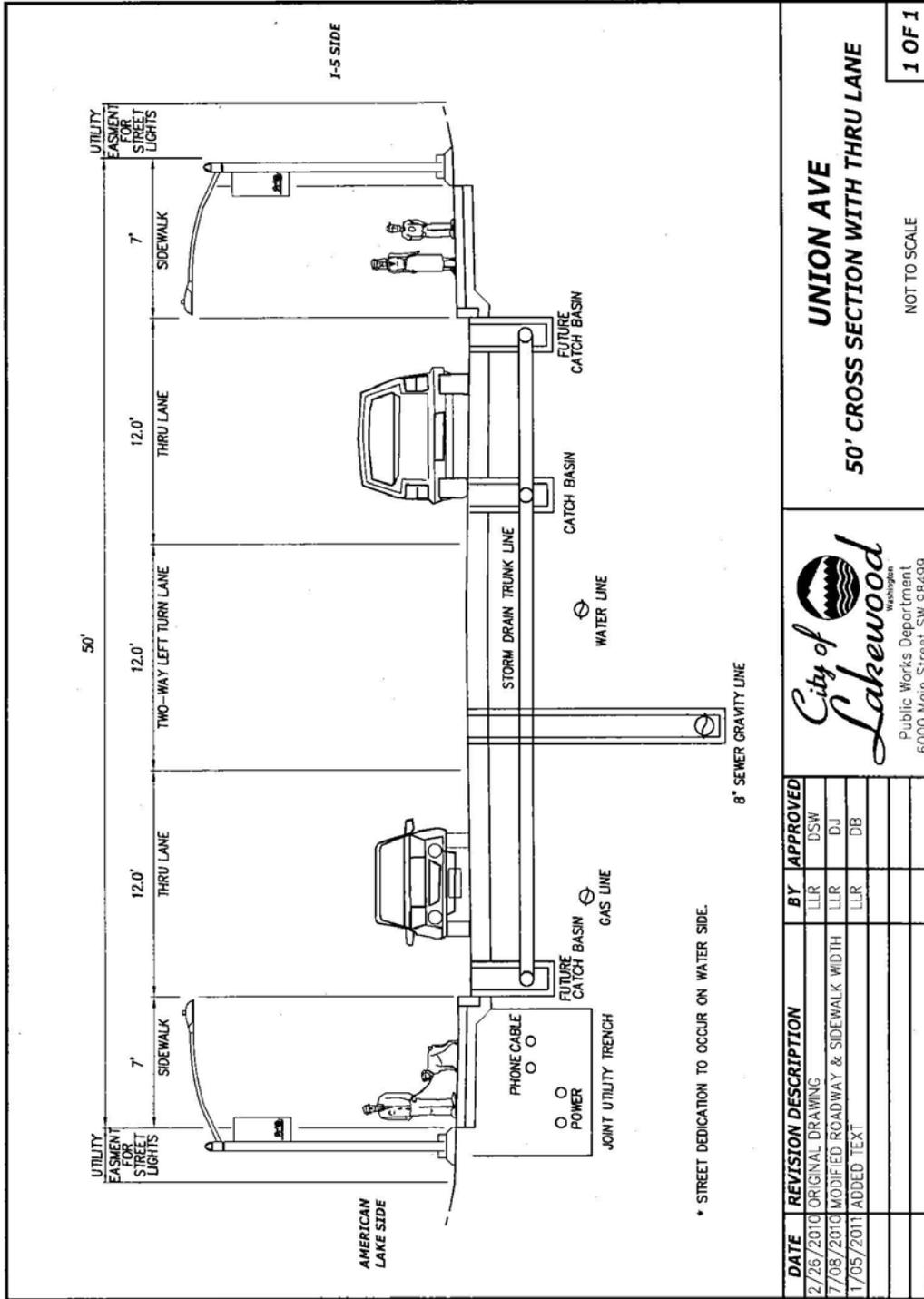
- On which side of the street should the City pursue acquisition of the additional right of way? Should it come both sides of Union Avenue SW (ten feet from each side)? Or, since the properties on the freeway side of Union Avenue SW have less lot depth, should the City seek the entire 20 feet along the lake side of the street?
- How will the additional right of way be used? Which cross-section shown above should be used, or should some other design be used? How wide should the sidewalks be?
- How will any acquisition and improvement costs be funded?

Public workshops were conducted with Tillicum property owners and businesses to probe these vexing questions. Generally, property owners on the freeway side of Union Avenue SW believed it was prudent that the additional 20 feet come fully from the other side of the street because their properties have greater value, contain less lot depth, and have limited space for parking. The property owners on the lake side of Union Avenue SW felt differently. There was also debate over the use of the proposed right of way and such features as a center turn lane, sidewalk widths, and bike lanes. The discussion was often heated, there was no consensus, and positions were often evenly divided. Citizen advisory boards did not arrive at a consistent position, either. At the moment, the City has adopted an interim street plan which requires a ten-foot dedication from each side of the street. However, the City Council may want to reexamine this policy since it may adversely impact commercial redevelopment potential. In March 2011, after prolonged consideration of these various perspectives, the City Council adopted a resolution approving a modified Union Avenue street profile (see **Figure 21A** on next page) which provides that:

- (a) From West Thorne Lane SW to North Thorne Lane SW, Union Avenue shall consist of a 50-foot wide right-of-way width with a two-lane roadway and center turn lane. The pavement width shall be 36 feet and include seven-foot-wide sidewalks on each side. Street dedications or right-of-way acquisitions are to occur from the water side, rather than the freeway side, of Union Avenue.
- (b) From Berkeley Avenue SW to West Thorne Lane SW, the existing 60-foot-side street profile shall remain.

FIGURE 21A
ADOPTED UNION AVE SW STREET PROFILE¹⁹
(W. THORNE LANE SW TO N. THORNE LANE SW)

EXHIBIT A



UNION AVE
50' CROSS SECTION WITH THRU LANE

1 OF 1

NOT TO SCALE

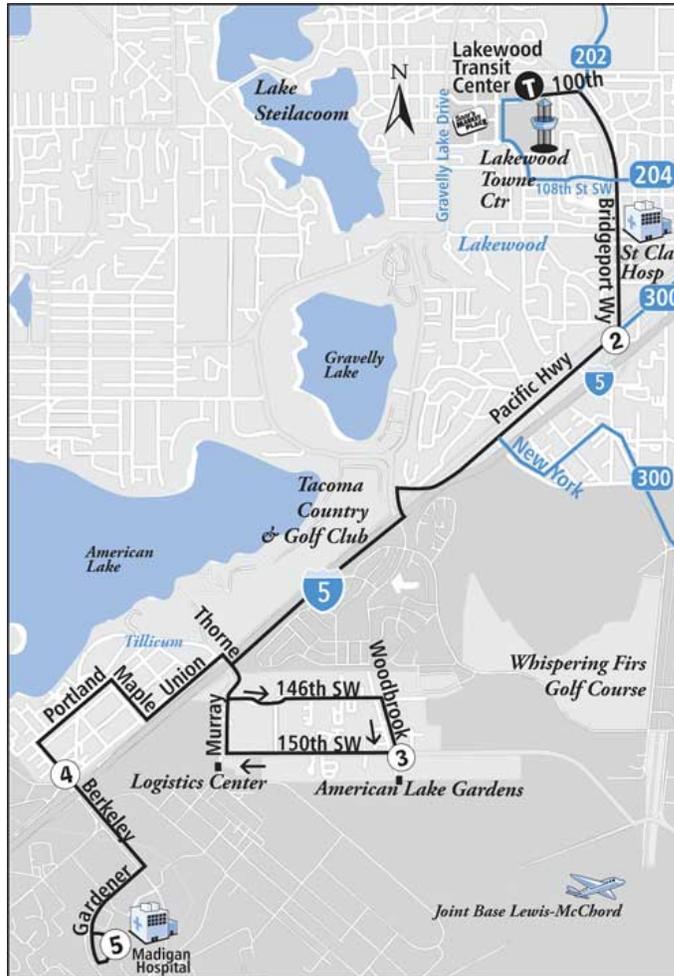


DATE	REVISION DESCRIPTION	BY	APPROVED
2/26/2010	ORIGINAL DRAWING	LLR	DSW
7/08/2010	MODIFIED ROADWAY & SIDEWALK WIDTH	LLR	DJ
1/05/2011	ADDED TEXT	LLR	DB

¹⁹ Exhibit A to Resolution No. 2011-04 adopted March 21, 2011.

Tillicum is served by Pierce Transit route 206. (See **Figure 21B.**) Funded principally by sales tax, Pierce Transit has been adversely impacted by the state of the economy; its board has just authorized an identified set of service cuts. Although cuts to Lakewood routes are minimal compared with certain other areas within the county, timing of the Tillicum route has changed somewhat.

**FIGURE 21B
PIERCE TRANSIT ROUTE 206**



As of October 2, 2011, weekday service is to occur every 30-40 minutes during commute times and hourly the rest of the day. Saturday service will occur every 30 minutes midday and hourly in early morning and late evening, and Sunday service will occur hourly. There will be no service between 9pm and 5:30am Mondays through Fridays, between 9pm on Fridays and 8am on Saturdays, between 8pm on Saturdays and 9am on Sundays, or between 5pm on Sundays and 5:30am on Mondays.²⁰

²⁰ October Service Reduction Focusing on Efficiency & Ridership, Pierce Transit, adopted June 13, 2011.

Police & Fire/Medic

Public Safety: Although early Tillicum was a quiet resort and retirement community with a strong sense of community and independence, construction of I-5 in the mid-1960s increased its sense of isolation from the rest of what went on to incorporate as Lakewood. Throughout the 1960s and 70s, greater Lakewood grew rapidly by attracting major retail, grocery, service, and other businesses. Tillicum residents enjoyed their own small corner grocery store, a laundromat, a community center, and other amenities; but with the new freeway, many residents took their business to more centralized central shopping areas, further diminishing Tillicum's local businesses.

As locals went north and fewer "outsiders" came south to visit or shop in Tillicum, more local property owners moved elsewhere. Many homes became rentals, were sold to property management agencies, or were simply abandoned - sometimes resulting in an undesirable criminal element infiltrating the area. Prior to Lakewood's incorporation, police and other government services were less accessible, so crime and blight slowly grew in Tillicum. Gradually more residents left, more housing became run-down, and more very low-income residents moved in. Crime and mental health issues continued to grow in the community.

Tillicum suffered an influx of Los Angeles gangs during the 1980s. Deteriorating conditions, low rents, and poor community morale created a market for drugs, prostitution, and property crime. Tillicum acquired a negative image as a high crime center.

More recently, residents are again taking pride in their neighborhood, communicating with neighbors, and forming Block Watch and other anti-crime programs. The police district that encompasses the Tillicum neighborhood holds a little over 12.5 percent of Lakewood's population, with approximately 7,300 people, and has experienced a significantly improved crime rate over the past several years largely due to a proactive police and community effort. Property crime is relatively low, while violent crime per capita is still a challenge.

From 1996 through September 2004, police services were provided by contractual arrangement with the Pierce County Sheriff's Department. In September 2004, the City of Lakewood formed its own police department. While Tillicum's particular needs sometimes outpaced the young city's resources, in the last few years Tillicum has seen remarkable improvement. Various programs were instituted citywide and are practiced in Tillicum:

- Proactive property maintenance and code enforcement including abatement of dangerous buildings and public nuisances.
- Intragency cooperation between the police department and other City departments to provide a high level of service in all aspects of civic support to Tillicum. The police partner with the City's own code enforcement, building inspection, public works, and human services staff; and other city, county, state, and even federal resources to ensure rapid, effective communication and response to developing issues in Tillicum and elsewhere.
- Implementation of crime prevention measures and youth enrichment programs to foster community involvement and civic partnerships.
- Implementation of a community-based policing organization, dedicated to proactive crime prevention. These programs include motel "best practices" checks, Raising the Bar (training and enforcement of local bars, taverns, and

lounges), neighborhood associations, residential and business Block Watches, and a citizen-based volunteer patrol group.

- Implementation of a Crime-Free Housing program. Dedicated neighborhood policing teams work continually with tenants, management and owners of apartments, mobile home parks, and motels to train and enforce best practices for stopping crime and criminals at the door. Denying criminals a place to live and operate forces them out of the neighborhoods. Property managers learn to conduct thorough background screenings of tenants, enforce rental agreement rules, professionally evict troublesome tenants, and facilitate periodic “safety social” events for tenants to share crime prevention tips and get to know their neighbors. Police share information, evaluate calls for service, watch for patterns of crime and conduct routine patrols to engender a sense of safety for the residents. The police watch for a high draw of police services and address the underlying problems directly. These partnerships and tools are especially meaningful in Tillicum with its high number of multifamily properties.
- Support of youth-oriented programs, including a local Boys & Girls Club and development of the new Tillicum Youth and Family Center – reclaiming a derelict bikers’ bar to house this new service. (See **Figure 18.**)
- Provision of hotlines for non-priority issues like abandoned vehicles, prostitution, drug/gang tips, and animal issues. These voice messages are reviewed daily and assigned to the proper resource for follow up. This allows the police department to efficiently manage its resources while insuring a prompt response to the citizens’ concerns.

Fire Prevention & Emergency Medical Response: Fire prevention and response in Tillicum are the responsibility of West Pierce Fire and Rescue, which assumed the former Lakewood Fire District No. 2 following a public vote. Tillicum is served by Station 23, located at 14505 Grant Avenue SW, adjacent to a Lakewood Water District water tank. Response times from dispatch averaged four minutes and 30 seconds on high priority calls, with an average arrival time of five minutes and 24 seconds from dispatch on all calls. Mutual aid agreements exist between the fire district and the fire departments of all adjoining jurisdictions, including military installations. The Tillicum station was recently remodeled and is expected to meet projected service needs for the foreseeable future.

**FIGURE 22
TILLICUM FIRE STATION**



Housing

Tillicum hosts many older homes, manufactured homes, and older multifamily units. There is a considerable dichotomy of the “haves” and “have-nots” within the community, which is evident from the housing. To the north and along American Lake, large, newer homes are contained inside gated communities that form a real as well as perceived boundary between socio-economic classes. Although some of the older housing stock is well maintained, much is not. As noted in the census data, there is a low rate of owner occupancy that likely contributes to property maintenance issues. Between 2006 and 2009, Lakewood performed abatements of hazardous conditions on 20 properties, seven of which are located in Tillicum (35 percent). As of January 2009, two properties in Tillicum were on the City’s priority list for abatement. Apartment complexes or mobile home parks that have serious calls for service have been closed using the City’s business license provisions. Often, these same apartment complexes and mobile homes contain numerous health and safety violations. Only the more serious cases are acted upon because of budget constraints. At the same time, the City recognizes that although it may be substandard and in some cases dangerous, such housing sometimes provides a last-resort roof over the heads of those who would otherwise be homeless.

Between 1998 and 2007, only four new single-family residences and three new commercial projects were built in Tillicum besides the Eagle Point subdivision, an approximately 20-acre area formerly owned by PSE. There has been no new multi-family development. Eagle Point includes 17 detached single-family residences, 33 attached single-family residences, and four duplexes. This gated community, served by private roads, was approved as a Planned Development District. It is served by a private community septic system which required special approval from the City’s Hearing Examiner and the Tacoma-Pierce County Health Department.

Future Plans & Zoning

Lakewood has four general-purpose commercial zoning districts: the Commercial 1 and 2 (C1 & C2) zones and the Neighborhood Commercial 1 and 2 (NC1 & NC2) zones. The former are tied to the Corridor Commercial comprehensive plan future land-use designation, while the latter are applied to areas designated Neighborhood Business District. According to the comprehensive plan:

“Neighborhood Business Districts are intended to foster a sense of urban community in neighborhoods. They provide for a concentrated mix of activities, including retail and other local services, residential, and some office use. Over time, districts evolve and mature into distinctive compact urban environments, providing unique commercial character to neighborhoods in Lakewood. Districts may serve the surrounding neighborhood only or may serve more than one neighborhood and attract people from other areas. Districts may facilitate restoration and vitality in an existing neighborhood center or may create a new focus for a neighborhood. These districts are expected [to] provide commercial services, as well as residential uses in the upper floors of some buildings.”

In recognition of the limited nature of the commercial area within Tillicum, it was the Neighborhood Business District designation²¹ which was applied at the time of the comprehensive plan's creation. It appeared best suited to maintaining the status quo in light of the physical restrictions on commercial expansion posed by the lack of sewers and relatively small commercial lot sizes.

Correspondingly, some of the area along Union Avenue SW was zoned NC2²². This generally followed existing development patterns, while recognizing there do exist some nonconforming commercial uses that are not, today, zoned commercial.

The majority of Tillicum is zoned for either single-family or multifamily residential uses, depending on the area; with open space and public facilities zones applied to appropriate locations. Overall, development activity is very limited; most projects are remodels, repairs, and minor additions and commercial tenant improvements.

Economics

In 2007, New Home Trends performed an economic analysis of the Tillicum community. The report was commissioned by a private party and later purchased by the City. The report contained a variety of conclusions and recommendations which are summarized below:

Opportunities/Strengths

- Tillicum's location will be one of the key elements to its success. The community is located adjacent to I-5, 20 minutes from Olympia, 10 minutes from Tacoma and five minutes from JBLM and Madigan Hospital.²³

²¹ See **Figure 3**.

²² See **Figure 4**.

²³ While these travel times were stated in the New Home Trends report, actual travel times are likely to vary and rely in part on traffic congestion and level of gate activity in accessing JBLM Main.

- Tillicum is large enough to create a sense of place. It has the flavor of an “all-American town” with its size, park, the military presence and the lake.
- Tillicum borders American Lake, has a boat launch, public docks and is adjacent to the Tacoma Country and Golf Club.
- Tillicum has higher-end homes adjacent to the lakefront.
- The location of JBLM provides opportunities for new housing in Tillicum.
- There is a shortage of small lots in Pierce County.
- There are few newer apartments in Lakewood.
- Military families are priced out of the new home market, which is forcing many to rent instead of buying, or to move to Thurston County.
- Tillicum has the potential demand for between 139 and 186 new housing units per year.
- The urbanized area of the Puget Sound will continue to creep south into Thurston County along the I-5 corridor. Tillicum has the potential to be a great midway point for dual income households that work both north (Tacoma-Seattle) and south (Lacey-Centralia).

Weaknesses/Threats

- Tillicum has a bad reputation and does not feel safe.
- Much of the community appears to be run down. Current retail development needs a facelift in order to attract new residents and business. Clean-up efforts are highly encouraged. Design standards are also encouraged for both residential and commercial development.
- Harry Todd Park is a beautiful waterfront park but is not ADA accessible so has limited access to its waterfront, and it feels like a fortress because of the chain link fence surrounding its edge.
- The primary buyer of new home products would be the military if prices are kept under \$250,000.
- DuPont’s Northwest Landing has difficulty attracting retail tenants even with 1,000 new households and higher economic levels. It is expected that Tillicum will experience similar problems attracting commercial redevelopment.
- Economically, Pierce County is growing at a slower pace than the other counties in the region.
- New development will be infill. The majority of the new construction will be smaller developments. These projects will not be staffed with on-site real estate agents which means lower than normal absorption rates.

New Home Trends examined the potential for commercial and retail development. To do so they made two assumptions. First, potential customers would come from a 1.5 mile radius or a five to ten minute drive time. Second, given JBLM's proximity to Tillicum, it was assumed that 47 percent of the population within the captured area would be military. It was also acknowledged that this number was problematic since soldiers and their families can shop on-post, where many retail goods cost less. New Home Trends then examined the overall demographic of those who work and reside within the 1.5 mile radius. **Table 14** summarizes income levels for the potential "customer capture" area used by New Home Trends in performing its analysis.

TABLE 14 2007 Income Data	
Median disposable income	\$29,842
Median income	\$35,673
Per capita income	\$19,020

Businesses that are projected to do well are those catering to the traveling public on I-5, taking advantage of the interchanges. Tillicum's economic strengths include its proximity to I-5, Tacoma, Olympia, Madigan Hospital and adjoining military installations. Other commercial services projected for the near term include dry cleaning and laundry facilities, banking, personal services, gift shops, a small new or used book store, and possibly children's consignment.

The New Home Trends report did not take into account the growth of JBLM. The proximity of Madigan and JBLM have highly influenced existing commercial development in Tillicum, which is largely comprised of fast food eateries, barber shops, and other services that might be sought by base personnel during break periods. Perhaps the 1980 plan was correct in concluding that Tillicum would continue to be strongly influenced by JBLM; however, conditions at JBLM are changing in a way that may negatively impact demand for off-base food and services. It is pursuing the development of a "lifestyle center" which would essentially provide it with a downtown-type commercial area on base. If this development succeeds, it is likely to diminish base personnel's practice of leaving the installation for meals and other services. This could undermine existing Tillicum commercial uses, but at the same time it may promote redevelopment as a means of bringing in new and more competitive uses.

WHAT WILL THE FUTURE BRING?

Community Infrastructure

Sewer

Figure 9 (page 26) provides a schematic drawing of the new sewer extension system. The system does not extend to all of Tillicum; rather, it provides a backbone for initial service and envisions subsequent expansion. Because of topography, sewage from the two neighborhoods will flow by gravity to one of three pump stations and then be pumped through force mains to the Pierce County system. In Tillicum, pipes have been installed along portions of Spruce Street SW, Portland Avenue SW, Berkeley Street SW, and Union Avenue SW.

Future extensions would likely be financed and implemented through developer-financed sewer extensions or ULIDs. Under a ULID, the connection of a single-family residence to the sewer system is estimated to be between \$15,000 and \$25,000.

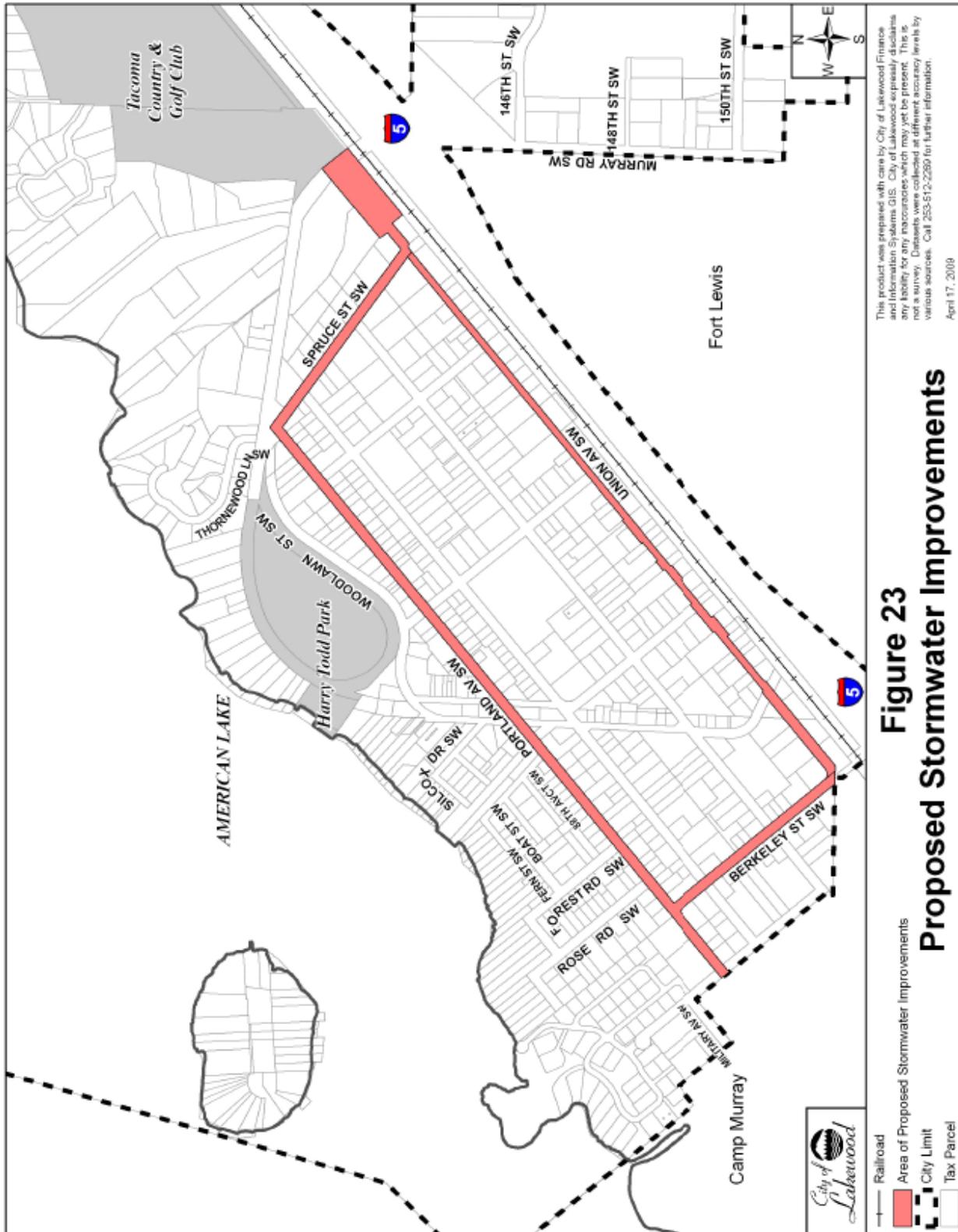
Stormwater Management

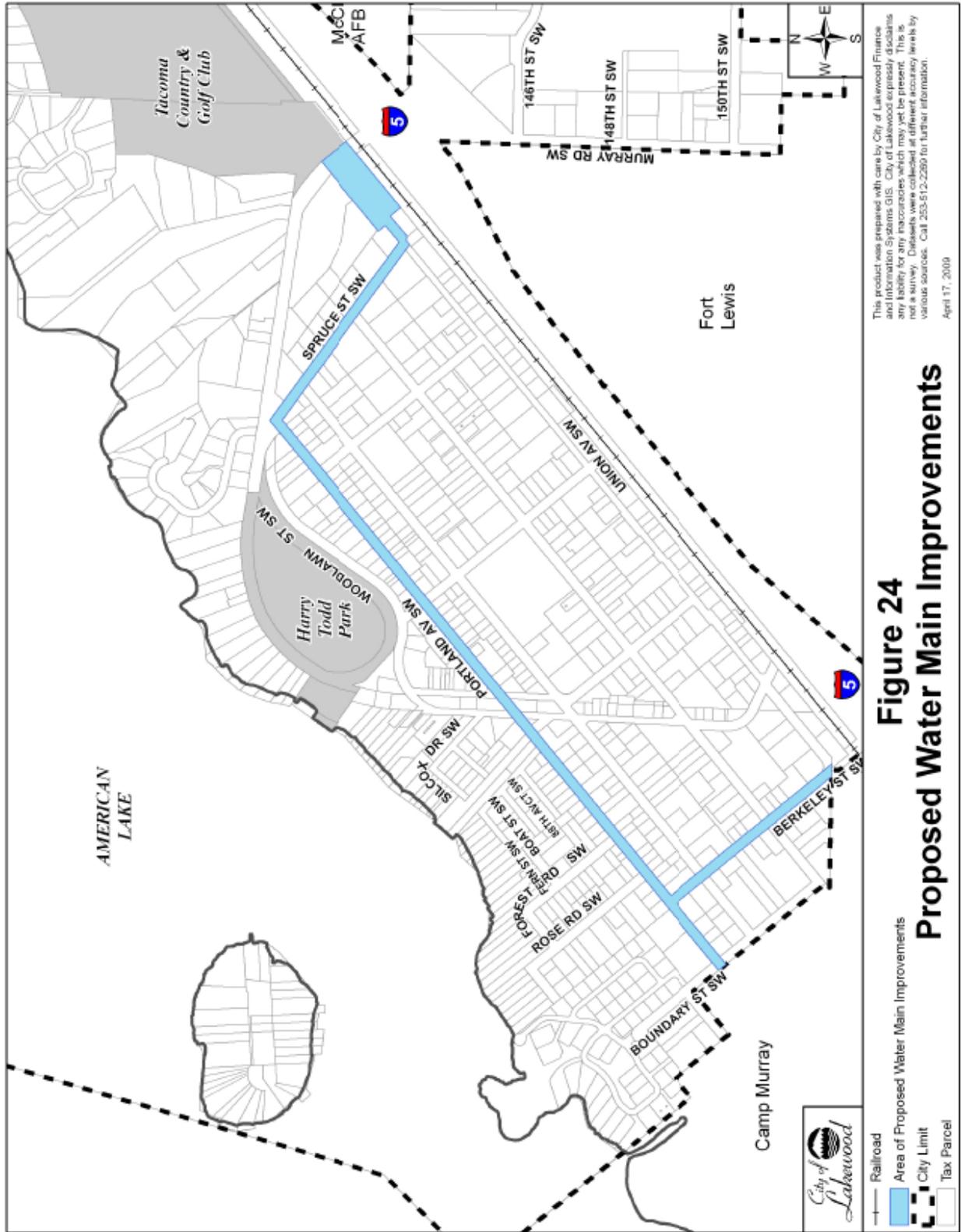
Upgrading of the existing storm water system was integrated into the sewer system installation. The new stormwater system, shown on the next page in **Figure 23**, includes facilities specifically designed to treat and infiltrate storm water. The new system may infiltrate surface water in different locations, but it is not expected to substantially change groundwater flow. There is intended to be, however, an improvement in water quality over existing conditions.

Water

Lakewood Water District reported that Tillicum is adequately supplied by recent improvements in the Woodbrook area, including 3.5 million gallons of storage and 12- and 16-inch water mains that cross I-5. An upgraded 12-inch diameter water main was recently installed in the Union Avenue SW right of way.

However, as the City began the engineering analysis of the new sewer project, it was discovered that much of the existing water distribution system was undersized and in a deteriorating condition. The Water District budgeted over \$1 million to upgrade about 6,500 feet of Tillicum water mains. New, larger water mains of six to 12 inches in diameter were installed on portions of Union Avenue SW, Spruce Street SW, Portland Avenue SW, and Berkeley Avenue SW in conjunction with the installation of new stormwater and sanitary sewer systems and road restoration. **Figure 24** shows the locations of these new lines.





Traffic/Transportation

There is a relationship between installation of sewers and increased traffic. Availability of sewers in Tillicum is likely to spur interest in expanding, intensifying, and/or replacing existing commercial uses and in adding more residential units. These land-use improvements are, in turn, expected to lead to increased trip generation and an accompanying degradation in traffic conditions. The anticipated LOS reductions are shown in **Table 15**, which is drawn from environmental information developed for the City's sewer project and compares existing conditions with future projections.

Intersection	2007 existing conditions		Projected 2017 Scenario A ²⁴		Projected 2017 Scenario B ²⁵	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
SB I-5	D	50.7	D	54.4	F	<200
NB I-5 ramps/Murray Road SW	D	35.2	D	36.2	F	>200
Murray Road SW/150 th Street SW	F	71.9	F	134.1	F	>200
SB I-5 ramps/Berkeley St. SW	E	61.5	F	93.7	F	186.0
SB I-5 ramps/Jackson Avenue	F	82.9	F	82.1	F	160.1

As may be seen, major intersections are anticipated to operate at unacceptable levels by the year 2017, which is the assumed horizon for full build-out of the proposed land uses.

While the lack of sewers has impeded redevelopment in Tillicum, just as problematic is Tillicum's limited access onto I-5. For redevelopment to take place, resolving longstanding transportation issues remains a high priority.

The traffic forecasts and analysis conducted as part of the environmental review for the Cross-Base Highway also relate to Tillicum traffic. As part of the Cross-Base Highway project, the I-5/Thorne Lane SW interchange would be reconstructed as a "single-point urban interchange," (SPUI) and a southbound local-access roadway from SW Gravelly Lake Drive to Thorne Lane SW would be constructed. These proposed changes to the transportation system would increase future travel demand at the I-5/Thorne Lane SW interchange. However, the increased traffic volumes at this interchange would be more effectively served by the SPUI configuration compared to the existing full diamond interchange configuration, resulting in improved LOS and less delay.

Traffic volumes at the I-5/Berkeley Avenue SW interchange would likely decrease as a result of the new highway connection, as some vehicles traveling between the Tillicum neighborhood and points to the north and east (via I-5 and SR 704) are expected to divert to the improved I-5/Thorne Lane SW interchange. These traffic diversions would not likely improve intersection LOS but could result in slightly reduced delays at the north- and

²⁴ Based on a 1.5% annual growth rate, but without sewers

²⁵ Based on a 1.5% annual growth rate and with sewers

southbound I-5/Berkeley Avenue SW intersections. However, it is important to keep in mind the Cross-Base project is unfunded at this time, so these improvements cannot be relied upon at a known point in time.

Housing

Tillicum's location will be one of the key elements to its success in the coming years. It is both proximate to and within visual sight of I-5 and within convenient driving distance to Tacoma and Olympia. Its close proximity to military facilities is important because the military is often priced out of the new home market, forcing many to rent instead of buy. The primary buyer, according to the New Home Trends analysis, will be military if the prices for housing can be kept under \$250,000.²⁶

The construction of a range of housing types will provide future homeowners with additional choices based on their lifestyles. This will build the residential population density to a level that can begin to foster a sense of community.

Tillicum is large enough to create a sense of place, and there is enough vacant land and dilapidated housing stock that can be utilized as a catalyst for redevelopment. Since, economically, Pierce County is growing at a slower pace than other counties in the region, and the majority of the new construction would be infill and smaller developments, absorption rates are likely to be lower.

New strategies are necessary to increase quality affordable housing. Listed below are some suggestions for consideration. These concepts are generally drawn from the Pierce County housing affordability report (March 2007) and have been tailored to some extent to fit Tillicum.

Affordable Housing Incentive Area

Affordable housing districts are areas targeted for affordable housing development. Within these areas, special zoning exceptions may be applied such as relaxed height restrictions and decreasing parking requirements to offset developer costs of producing housing that remains at an affordable price level for a protracted period of time. Often this type of designation is used along with other incentives such as waiving fees and providing density bonuses. Since Lakewood does not directly provide utility services, one of the challenges will be to seek reductions in capacity charges from local utility providers.

Non-Profit & Community-Based Developers

Several non-profit or community-based developers have expressed interest in partnering with the City of Lakewood. Such groups are more likely to invest in real estate projects in areas like Tillicum where there has traditionally been a weak demand for land and little interest among traditional developers. Organizations such as the Tacoma and Pierce County housing authorities, Habitat for Humanity, and Catholic Community Services often have a strong commitment to specific geographic areas and remain committed to transforming those neighborhoods over a long period of time. Unlike private developers, they are not necessarily seeking prime locations that will realize high financial returns.

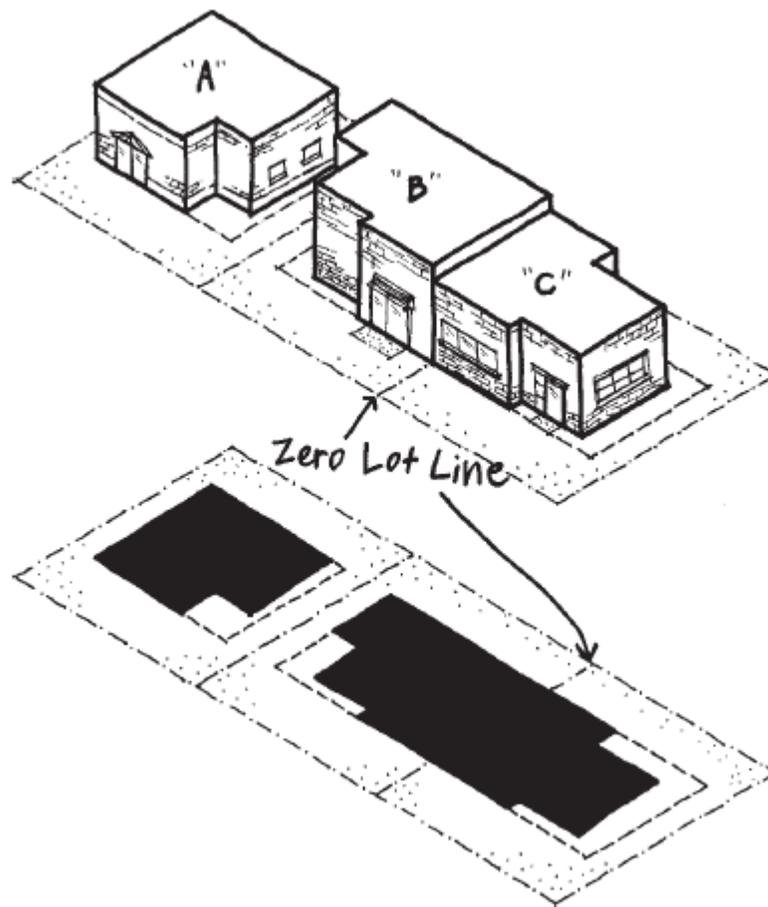
²⁶ In 2007 dollars. It should be noted that this analysis was performed prior to the current economic downturn.

Recently, Tacoma-Pierce Co. Habitat for Humanity won a \$15,000 "Challenge for Change" award to be used toward affordable housing construction in Tillicum. Currently, Habitat is conducting community meetings to engage prospective buyers in the lead-in process.

Zero Lot Line Development

This development format allows lot widths to be reduced, creating garden homes, patio homes and narrow lot homes. Building heights range from one to three stories, and their designs and demographics vary greatly from neighborhood to neighborhood. It creates higher-density housing, allowing developers to spread costs over more units. This, in turn, potentially reduces final purchase prices for homeowners. Because of the way in which much of Tillicum was originally platted with small lots, zero lot line development has considerable potential as older units are demolished and replaced. One concern is addressing parking. In some communities, off-street parking is not provided which means cars are parked on the street and can create congestion.

**FIGURE 25
ZERO LOT LINE CONCEPT²⁷**

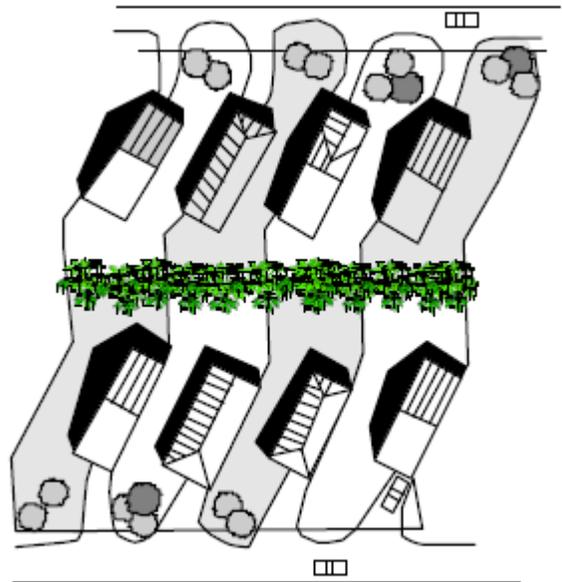
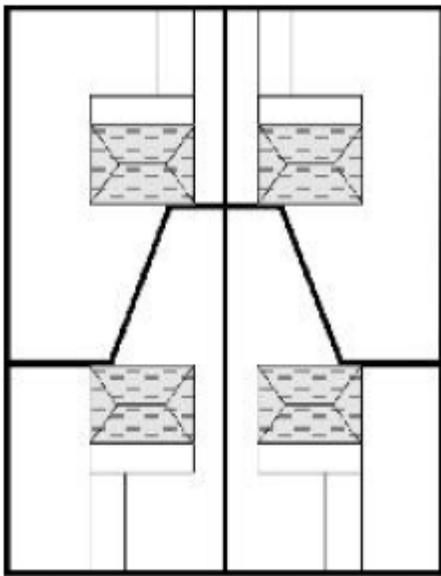


²⁷ Source: City of Bozeman, Montana.

Zero lot line development particularly offers an advantage in reusing existing plats, but it can also be utilized in new plats or modified through such variations as the "angled Z-lot," "zipper lots," and "alternate width lots."

The angled Z-lot turns the home at a 45-degree angle to the street, which enhances visual appeal and makes it possible to add more windows without compromising privacy. Zipper lots vary the depths of rear lot lines, which concentrate open space on one side of the lot and make wider lots possible, with only garages located on the property line. Alternating width lots combine narrow and wide lots to give visual variety to the streetscape.

**FIGURE 26
ZIPPER & ANGLED Z-LOTS²⁸**



Cottage Housing

Key areas, such as the blocks located directly north and south of Maple Street SW and toward the elementary school, are envisioned as higher-density areas (mixed-use retail and residential housing, row housing and condos). Tillicum was designated, in the comprehensive plan, to carry a higher concentration of higher-density housing. High-density neighborhoods build a critical mass of residential density to support new local businesses and discourage unwanted street activity. Cottage housing, small homes clustered around common green open spaces, could be incorporated into the area near Maple Street SW and Harry Todd Park. This type of housing could be allowed in single-family or multifamily zoning districts. Standards for cottage housing would promote development that is similar in scale and design of bungalows. Cottage housing can provide an affordable alternative to single-family home ownership and create additional affordable housing options in a community.

²⁸ Source: City of Suffolk, Virginia.

**FIGURE 27
COTTAGE HOUSING DESIGN²⁹**



Third Street Cottages, Langley, Washington

“Great House” Design

Another form of housing is called the “great house.” This concept uses urban design that makes an apartment look like a large single-family house. It can be used on single lots or throughout a larger piece of land using common open space. The design helps to reduce stereotypical images of apartments and affordable housing, it fits in better visually with existing single-family development, and it also reinforces property values by giving continuity and aesthetic appeal to adjoining properties.

²⁹ Source: The Cottage Company.

**FIGURE 28
GREAT HOUSE DESIGN³⁰**



Kyle Center, San Antonio, Texas

Affordable Building Design

A unique concept that both the private and public sector may wish to consider is having preapproved, permit-ready plans on file with the City. This would allow faster permit turnaround time and may be used to permit development to locate on narrow lots or infill sites that are difficult to develop and use existing infrastructure.

Inclusionary Housing

The inclusionary housing concept requires developers to include a number of affordable homes in new residential developments. The number of affordable units to be included in the new developments is based on a percentage of the total number of units in the development (generally 12 to 15 percent). The cost of providing the affordable units is

³⁰ Source: Humphreys & Partners Architects, LP. Kyle Center is a “Big House”® project containing 382 units in 41 buildings at a density of 15.23 units per acre. Used with permission; all rights reserved.

offset with a density bonus or other developer incentives. Additionally, the resale price of the affordable units is restricted for a number of years (e.g., 20 to 30 years).

There are two types of inclusionary housing used by cities:

- Required – The number of affordable units and their guidelines for inclusion into new developments are required for compliance.
- Flexible – A city may allow developers the opportunity to pay a proportional fee per unit or to include affordable units in another development, instead of including the affordable units at the present time and location.

Inclusionary housing has its pros and cons. From a social perspective, it helps to integrate the “haves” and “have-nots” in a single development. This can raise the bar for home maintenance that is sometimes lacking among low-income homeowners, and at the same time it reduces concentrations of poverty that lead to areawide blight. New home buyers are strong supporters because it makes affordable housing available to persons who otherwise would not be able to purchase a house. Elected officials may back such a program because it does not require a large financial investment by the jurisdiction. In some parts of Lakewood, rezoning has resulted in redevelopment opportunities that would result in a loss in existing affordable units. Inclusionary housing would help offset the overall impact. Employers and businesses are helped because it makes housing available to entry level and mid-management employees.

There remains some “gray area” as to whether such a program is feasible. Lakewood already included a incentive-based inclusionary zoning program in its zoning code³¹; however, to date no one has taken advantage of it. If the City were to make such a program mandatory, it would be the first jurisdiction in Pierce County to do so. Generally, it is thought that such programs are only successful when they are available throughout a broader geographic area, not in just one city. It is not clear whether the current and future market conditions support such a program without performing a detailed pro forma analysis of the Lakewood housing market – which, at present, is interrupted by the state of the economy. An inclusionary housing program would require promulgation of new procedures and regulations to which the building industry may object. It would also require additional staff to administer the program.

Rental Housing Inspections

Some of Tillicum’s rental housing stock is in extremely poor shape. This statement is based on various housing inspections carried out by staff through investigations into illegal construction and enforcement actions. The Community Development Department has considered, but has not put into practice, carrying out annual housing inspections on rental properties through the City’s business license and building code regulations. If residential units pass the inspection, they would be available for rent. If they did not pass, they would be unavailable for rent until proper improvements are made, including permit acquisition and construction inspections where necessary.

Over time, such a program would improve housing stock, increase property values, reduce property maintenance complaints, and promote fire safety. It sends a strong message to absentee landlords that deferred maintenance practices are no longer permitted. However,

³¹ LMC 18A.50.700, Housing Incentives Program.

such a program may serve to decrease housing availability and cause displacements in the short run as well as resulting in increased rents.

The scale of the inspection process also poses a problem. There are well over 12,000 rental units in Lakewood as a whole. Resource limitations restrict the City's ability to carry out such an assignment citywide. However, a pilot project in Tillicum may prove beneficial to the area in the long run. Prior to implementing such a program, the City Council would need to decide to invest in such a program, beginning by altering codes and business license provisions, and further determining specific funding. Would such a program be funded through general fund revenues or using CDBG funds? Who would perform the inspections and follow-up assignments? Would this be accomplished through increasing City staff (estimated at \$111,000 in 2008 dollars) or retaining a qualified consultant?

Schools

Both CPSD and the Tillicum community are confronted with difficult questions about the future of Tillicum Elementary, given its physical condition and declining student population.

- Should CPSD close Tillicum Elementary and disperse the students to other schools throughout the district? Given the school's current relatively low academic performance, removing the students from this environment and placing them with a higher-achieving student population may be of benefit. If this is the case, what happens to the existing building and school grounds?
- With sewers and new infrastructure being proposed, community revitalization and higher residential densities are likely. Should CPSD upgrade or replace the school in anticipation of future growth? Would voters support a bond measure to refurbish the school, keeping in mind that any such measure would be voted upon by not just Tillicum but everyone living in the district?
- Should the facility remain open but be used for a different purpose? Could Tillicum Elementary be upgraded and used as a magnet school? Or could the school be used as a joint facility with primary education offered during the day and adult education offered in the evenings in cooperation with a local community or technical college?

This is a difficult decision. The future of this elementary school was considered in 2009 by a citizens' advisory committee appointed by the school superintendent. This committee was charged with updating a revised district-wide capital facilities master plan that includes Tillicum Elementary. Its recommendations to the school board anticipated that future redevelopment in Tillicum would likely increase the demand for an elementary school within four to five years and included this specific follow-up work to align with the *Tillicum Neighborhood Plan*:

"Conduct a study beginning the spring of 2010 to consider the temporary closure of Tillicum Elementary beginning the 2011-12 school year. This would include where to distribute students and programs during this time identified in any recommendation and a revisiting of school boundaries within the affected areas. Identify, as a part of this study, a plan for potential future reconstruction as part of a 2014 bond. Consider community service

partnership opportunities in any new facility to optimize operating and service capabilities.”³²

Currently, CPSD has not taken any action with regard to the recommended study. It is expected that the City's actions on the *Tillicum Neighborhood Plan* will drive any decision to initiate the study.

It would appear that demolishing the existing Tillicum Elementary School has merit, as long as CPSD plans for a future school when redevelopment within the Tillicum community begins to take place. Combining an elementary school with adult education and community recreation would go a long way in improving the quality of life for Tillicum and Woodbrook residents, particularly in light of the transportation impediments of local residents, the area's isolation, and the low educational level among a majority of residents.

CONTINUING CHALLENGES

Many of the conditions and challenges identified in this plan are the same fundamental issues as those identified in the initial Tillicum plan that was done almost 30 years ago. While it is a positive step to identify issues, without going on to put solutions into place a plan is rendered meaningless. It is, therefore, crucial to move this plan into implementation.

This section focuses on those issues that are of the most concern and that should be addressed within the next year or two. The primary topics include community capacity, image, land use, and transportation. That is not to suggest that other areas are not equally important – they are; however, the City has limited resources. Therefore, it becomes important that existing structures be called upon to contribute. Once priority issues have been properly examined by the public and local decision makers, public policy is established, and implementation programs are put into practice, then City staff would move forward with other topics as directed. Key to this plan's successful implementation is developing community stability – to have forums and processes through which the community shares information, identifies priorities, and manages limited resources.

Community Capacity

It is extremely challenging financially to quickly repair longstanding problems that have evolved in a given neighborhood over time. While public as well as private sector capital investment will be necessary, it is also beneficial to invest in “social capital,” or the capacity of the community members themselves to address issues. If Tillicum residents can identify their priority issues, work with the City, provide the right incentives to spur positive change, and track the results of their efforts, they can achieve a great deal. Community capacity is grounded in improving communication and information-sharing between different interest groups that have a mutual stake in the community.

Strong community leadership and involvement are essential to solving neighborhood issues. At a grassroots level, neighborhoods must take responsibility and be integrally involved in addressing local problems. Tillicum already possesses neighborhood and merchants' associations, TWNA/“Community Matters” and the Tillicum Merchants' Association. The vitality of these organizations is largely due to the strong commitment of a single resident,

³² Source: Clover Park School District Facilities Advisory Committee Final Report and Recommendations, 2008-09

David Anderson, in coordinating each. In 2010, another community group, the Tillicum Action Committee (TAC), coalesced around issues such as the proposed Camp Murray gate relocation and the Pt. Defiance Bypass project and has continued to be actively involved in matters relating to Tillicum.

Through the City's neighborhood patrol program, there is good communication between residents and the Police Department. Among a certain group of more involved, vocal residents, there is a strong desire for change and improvement. These conditions speak well of the community's capacity for addressing local issues. On the other hand, the high percentage of absentee landlords and turnover of rental tenants negatively impacts collaborative community involvement. The same tired problems never quite seem to get resolved – garbage doesn't get picked up; graffiti gets painted over, only to be quickly re-tagged; when one property maintenance violation is removed another pops up at the same location with a new tenant.

Also challenging is bringing together the neighborhood's different socio-economic means which, as noted, fall largely into the "haves" and the "have-nots." As a means of bridging these gaps and empowering Tillicum through grassroots problem-solving and building strengths and competencies, the draft *Tillicum Neighborhood Plan* urged the creation of a community leadership team that involves people from all socio-economic segments of Tillicum as well as City Council and school board members. The intent was to expand the capacity of the current TWNA and merchants' association to build relationships and leverage resources to the betterment of the community. However, since the TAC formed itself spontaneously, spurred on by merely the suggestion, it would be redundant for the City to seek to form yet another community group, which could be viewed as competing with that which shaped itself. Instead, it is now incumbent upon the City of Lakewood to continue to support and work with the TAC as the recognized grassroots community improvement group for the area.

Image

In light of its past public safety issues, Tillicum's reputation appears to among its biggest ongoing challenge, perpetuating a feeling of lack of safety and that it is an area for all but those who live there to avoid. While the City has invested significant dollars in public safety and has reduced crime since incorporation, Tillicum's image very much remains a work in progress. One of the City's goals will be to change Tillicum's image as a means of attracting redevelopment. Tillicum's commercial district is also in need of a facelift, but without adequate infrastructure – specifically, road, stormwater and sewer improvements – there remains unwillingness on the part of the private market to invest.

Existing amenities such as American Lake and the adjacent Tacoma Country and Golf Club are important to consider. Opening up full access to Harry Todd Park by removing the chain link fence that surrounds it should be a priority. Removing the disconnection between the higher-end homes and the rest of Tillicum would create a more interconnected and diverse neighborhood. The City's current policy and regulations do not disallow gating of private roads, but such a measure should be considered to preclude the creation of additional socio-economic divisiveness.

Land Use, Zoning & Transportation

Zoning

The focus of Tillicum's commercial district is changing. With sewers and other improvements expected over the next two years, the potential for investment is improving. Sanitary sewer allows for commercial business expansion which for years has been stagnant. Thus, the future direction set by the comprehensive plan and the current zoning may not represent emerging market demands. City staff has conceptualized around the creation of two new commercial zoning classifications along Union Avenue SW to better reflect the market demands and redevelopment potential post-sewers.

Generally, the future land-use designation and zoning on the southeast side of Union Avenue SW – the lots fronting onto Union with the ST line and I-5 at the rear – could be modified to create a freeway commercial zone that accommodates businesses that typically serve the military installations, I-5 traffic, and tourists. The mitigating factor would be limited lot depths because of the public rights of way along both the front and rear of the strip.

Meanwhile, the opposite side of Union Avenue SW could lend itself to creation of a neighborhood commercial zone tailored for Tillicum (as opposed to the current NC2 zone that is applied citywide). This would focus commercial uses more toward serving the residents of Tillicum and create a step-down or separation between more intensive business activity and the neighborhood to the northwest. Mixed-use development with upper-story residential use seems most promising in this location as the area evolves and redevelops into a more conducive and positive living environment.

It is not the purpose of this plan to arrive at specific zoning regulations, but to create a basis for them to be further developed. It is likely these two primary concepts would be followed in designing new zoning for Union Avenue SW frontages.

Development Regulations & Design Standards

Though across the street from one another, any such new zones along Union Avenue SW would have considerably different land-use profiles. For this concept to work, revised design and performance standards would be required in order to establish some level of cohesiveness and integrated design. Available space is tight, and many of not just the commercial but also residential lots within Tillicum are small. As redevelopment takes place, it is likely that some of the current development regulations such as parking, landscaping, and building setbacks may prove to be problematic. Therefore, it would appear reasonable to reduce off-street parking, landscaping and setback requirements provided it does not inhibit public safety.

Design standards are also suggested as a means to promote small lot residential development. Such standards would cover such topics as driveway and curb cut standards, roof pitch, windows, exterior wall modulation, and garage locations. Along Union Avenue SW, it may prove advantageous to promote an urban scale of development, or the creation of a "traditional downtown" streetscape, not requiring the same landscaping and parking standards as is found in other commercial zoning districts.

Signs

The economic analysis has pointed out that Tillicum's location adjacent to the I-5 right of way is a key feature in promoting economic redevelopment. The creation of a freeway-oriented commercial zone begs the question as to whether or not the City would allow larger pole signs adjacent to the freeway. Interim zoning controls that existed during this plan's development allowed two types of pole signs referred to as Type C and Type D. Type C signs were allowed to be a maximum height of 20 feet, with 60 square feet of sign face. Type D signs were allowed to be a maximum height of 25 feet, with 120 square feet of sign face. The draft Tillicum Neighborhood Plan recommended that the City consider allowing taller pole signs and a proportionate increase in sign face in order to alleviate the current practice of fascia signage on the rear of buildings, which creates an unattractive, unprofessional image when viewed from the freeway.

In 2010, the Lakewood City Council adopted amendments to the sign code that addressed this issue. The now-in-effect sign code enables certain properties adjacent to I-5 or the ST right of way to have taller, larger pole signs in order to be more visible. Wall signs may also be used on the rear of a building that is, for example, fronting onto Union Avenue in order to be visible from I-5. Applicability varies depending on the specifics of the site and type of development; regulations are set in LMC 18A.50.655 (generally). Further refinements may be considered as the amended code is set into practice and new zoning is developed for the area.

Union Avenue SW Street Profile

The decision on a Union Avenue street profile left some questions remaining regarding the acquisition of additional right of way. Right-of-way expansion could cause either the relocation and/or demolition of some structures. It will reduce existing parking since much of it is located in the right of way; somehow this will need to be mitigated. A parking improvement district has merit but it is not feasible in that area businesses lack the financial ability to support such a program at this time. Another solution would be for the City to condemn private property and establish public parking lots, although there are no capital funds for such a program. Costs to acquire property and obtain professional engineering design services for a 60-foot right of way (keeping in mind that a portion is set at only 50 feet) were estimated at about \$3 million in 2007 dollars. This estimate does not include actual construction. The project is not included in the City's current transportation improvement program or capital facilities plan.

Gateways & Urban Design

Emphasizing entry points would improve the physical appearance of Tillicum and help reduce the psychological isolation created by the I-5 corridor. This concept emerged in the City's comprehensive plan. Further, the comprehensive plan puts forward ideas on creating landmark/activity nodes, civic boulevards, "green streets," and improving and upgrading existing recreation facilities at Harry Todd Park. A graphic illustration of an urban design framework was incorporated into the comprehensive plan and is included in this report within **Appendix A** (page 91). Many of these same concepts emerged in BCRA's *Progress!* document. Keep Lakewood Beautiful has installed a modest gateway at North Thorne Lane SW near the freeway interchange. However, gateways and urban design concepts have not moved forward for lack of funding.

Alleyways

One of the concepts BCRA presented in its *Progress!* document was the dedication and construction of alleyways for properties located on the water side of the Union Avenue SW. The alleyway concept serves several purposes. It supports the existing street grid system, allows for better traffic circulation, provides separation between commercial and residential uses, and could be used to downplay the visual clutter of overhead utility lines without involving the expense of undergrounding. There are a number of questions which must be addressed prior to undertaking the establishment of alleyways, though. Would the City require piecemeal right-of-way dedication when development was proposed, or would it be acquired all at once through condemnation? If alleys were to be dedicated as development mitigation, it would take a long time to see them constructed unless a private developer was able to assemble many adjoining properties all at once. This approach may also increase project construction costs which, in turn, may slow down redevelopment. The condemnation approach has its own difficulties. Property owners and elected officials tend to take a negative view of condemnation, plus there are no capital funds identified to carry out this type of project. Because of these difficulties, City staff is not including alleyways within this plan.

RECOMMENDATIONS

The following recommendations are drawn largely from the City's comprehensive plan, the results of BCRA's public outreach, existing programs, and pending projects. Goals are not guarantees or mandates; rather, they represent the results that the City and neighborhood hope to achieve. Following the goals are tasks. The tasks represent a general approach to achieving the goals. Carrying out these tasks will help to initiate change and, where incremental change has already begun, to hold the course. Still, it is important to recognize that realizing the goals will involve a range of actions over time. Implementing actions, together with suggested prioritization, are included in the recommended action tables that follow the goals and tasks.

Under the GMA, this neighborhood plan constitutes a subarea plan to the City's comprehensive plan, and as a policy document it is subject to non-project SEPA review which is being integrated with the plan as provided for in state law. Many of the specific action items, however, would be subject to more intense, project-level environmental review. Some of this work has already been accomplished, either for City projects or other initiatives, where work is pending. Where project-level SEPA review has already occurred, such as the sewer extension, these are noted in the SEPA checklist for this plan (**Appendix D**, page 147).

Goal 1: Develop community capacity

Encourage neighborhood leadership development and collaborative community involvement as a means of grassroots problem-solving.

Tasks:

1.1 Work with the Tillicum Action Committee, as the established community leadership team within Tillicum, or its successor group toward resolving community issues.

- 1.2** Dependent on the availability of private and public resources and a venue, promote the development of community outreach and life skills programs for youth.
- 1.3** Encourage public and private investment in human services, libraries, community centers, schools, and the arts to support Tillicum.
- 1.4** Support or foster relationships with educational institutions and organizations that encourage the development of higher education, apprenticeship and internship opportunities, and adult learning offerings to contribute to building community capacity and innovation.

Goal 2: Update infrastructure

Complete the sewer, water, and storm water infrastructure projects that are currently funded in the Tillicum and Woodbrook neighborhoods. Support the efforts of the school district to provide quality school facilities that function as focal points for family and community activity. Maintain a six-year capital facilities plan as a basis for seeking grants.

Tasks:

- 2.1** Institute a specific element for Tillicum within the City's statutorily required six-year capital facilities plan, incorporating the following major elements:
- Completion and implementation of the current phase of sewer trunk line and side sewer installations, including appurtenant stormwater and road restoration elements.
 - Identify and seek funding for future extensions of the Tillicum/Woodbrook sewer system.
- 2.2** As part of working with WSDOT and other affected/involved agencies to develop and construct improvements to the I-5/Berkeley interchange, consider a revised intersection at Union Avenue SW/Berkeley Avenue SW that would fall within the capital facilities element referenced above. Inasmuch as possible, projects should be integrated and complementary to assure smooth functionality of the system. (See also 4.3 below.)
- 2.3** Work with the Lakewood Water District to perform water delivery system upgrades.
- 2.4** Work with the Clover Park School District to address the need for school facilities to serve Tillicum as redevelopment takes place.

Goal 3: Reduce crime and neglect

Enhance the ability of Tillicum citizens and the Lakewood Police Department to minimize crime through stepped up property maintenance enforcement and the implementation of public outreach programs.

Tasks:

- 3.1** Continue Lakewood's active enforcement of codes and public nuisance abatement aimed at improving property maintenance and building standards in residential neighborhoods to bolster neighborhood quality and the overall quality of life.
- 3.2** Continue targeted efforts such as the crime-free rental housing program and seek out a variety of funding sources for this and other such outreach programs.

3.3 Where public actions such as targeted crime reduction programs result in the unexpected displacement of people from their housing, coordinate the availability of social services to assist them in finding other shelter.

3.4 Maintain the City's current neighborhood patrol program in Tillicum.

3.5 Support and encourage community-based crime-prevention efforts through interaction and coordination with existing neighborhood watch groups, assistance in the formation of new neighborhood watch groups, and regular communication with neighborhood and civic organizations.

3.6 Increase participation in the crime-free housing program as a means of controlling crime related to rental properties.

3.7 Develop and implement a crime prevention through environmental design (CPTED) program that results in the creation of well-defined and defensible spaces by reviewing such things as proposed developments' demographic settings; intended uses; and landscaping, lighting, and building layout as a means of access control.

3.8 Seek ways to involve police with youth education, such as bike safety training, anti-drug courses, "cop in school" program, etc.

3.9 Work with the Tillicum community to develop a safety plan for Harry Todd Park.

Goal 4: Improve transportation into and within the area

Minimize the growth of traffic congestion. Balance the need for property access with traffic safety considerations. Apply standardized set of street classifications. Find new sources of revenue to upgrade streets and key intersections in Tillicum.

Tasks:

4.1 Develop "civic boulevard" design standards for the following streets:³³

- North Thorne Lane SW from I-5 to Portland Avenue SW
- West Thorne Lane SW between Portland Street SW and Union Avenue
- Portland Street SW between North Thorne Lane SW and West Thorne Lane SW
- Union Avenue from Berkeley Avenue SW to Spruce Street SW
- Spruce Street SW from Union Avenues SW to Portland Avenues SW

4.2 Develop "major gateway" design standards for the following streets:

- North Thorne Lane SW at I-5
- Berkeley Avenue SW at I-5

4.3 Work with Camp Murray, JBLM, WSDOT, and ST to improve the Berkeley Avenue SW/Union Avenue SW intersection. (See also 2.2 above.)

4.4 Seek a method of providing an alternate connection between Tillicum and the northern part of the city besides I-5.

³³ Improvements have occurred to the last three streets listed as part of the immediate sewer project, which will direct further improvements to these streets in the future.

- 4.5 Provide opportunities for pedestrian and bicycle connections from Tillicum to other portions of Lakewood.
- 4.6 Consider a pedestrian and bicycle trail within Tillicum to safely connect the residential area with the business district. Examine the potential of a two-mile loop trail connecting Union Avenue SW, Spruce Street SW, Woodlawn Street SW, and N. Thorne Lane SW.
- 4.7 In partnerships with private and public property owners and organizations, establish a Tillicum gateway enhancement program at the entrances to Tillicum.
- 4.8 Develop flexible off-street parking requirements and encourage transit use, walking, and bicycling.
- 4.9 Allow flexibility for shared use of off-street parking along Union Avenue SW, Berkeley Street SW, and other key arterials in Tillicum.
- 4.10 Seek out grants or other means of financing to design and construct improvements to intersections nearest to and serving I-5 interchanges, and work with WSDOT to seek funding for improvements to the interchanges themselves.
- 4.11 Use the outcome of the current planning process being funded by the Office of Economic Adjustment to direct redevelopment of key Tillicum intersections affected by military traffic.

Goal 5: Revitalize and upgrade residential and commercial areas

Identify where more dense, mixed-use development can be used to offer affordable housing opportunities within walking distance of amenities. Improve residential areas and streets to enhance the neighborhood appeal.

Tasks:

- 5.1 Develop new comprehensive plan designations and zoning classifications to be applied along Union Avenue SW, which would result in the placement of traveler services along the I-5 side of Union Avenue SW and neighborhood services on the other side.
- 5.2 Consider disallowing any additional gated communities as an impediment to social integration within neighborhoods.
- 5.3 Minimize the impact of infill development upon existing development by incorporating, to the maximum extent possible, features which impart a unique identity and sense of coherence.
- 5.4 Require that on-site amenities such as walkways, trails, or bike paths be connected to adjacent public facilities.
- 5.5 Establish public programs and/or public-private partnerships to encourage and assist redevelopment of outdated or substandard multi-family dwellings aimed at providing opportunities for affordable housing.

Goal 6: Provide a mix of housing opportunities

Enhance social and economic diversity within Tillicum by mixing affordable housing in with new market-rate development.

Tasks:

- 6.1** Encourage and support efforts to increase home ownership.
- 6.2** Support agencies and organizations that provide housing and related services to very low-, low-, and moderate-income households, and encourage their acquisition of affordable rental housing.
- 6.3** Provide for a variety of housing options in the city to support the unique housing requirements of the military personnel and their families.
- 6.4** Adopt a cottage housing ordinance.
- 6.5** Revisit the City's adopted housing incentives program (LMC 18A.50.710) and update it as appropriate to utilize such tools as density bonuses, fee waivers, reduced zoning requirements, and expedited permitting. Consider marketing efforts to stimulate use of the program.
- 6.6** Promulgate preapproved base plans for single-family construction specific to the Tillicum area. Offer these plans to individuals proposing to construct owner-occupied housing.
- 6.7** Collaborate with the Master Builders Association to provide technical assistance/ education to developers to encourage greater use of green standards.
- 6.8** Develop a regulatory strategy to allow for the great house concept.

Goal 7: Expand access to American Lake

Make American Lake more accessible to Tillicum residents and visitors by identifying and enhancing more public access points to the lake, providing public amenities, and improving disabled access to the shoreline.

Tasks:

- 7.1** Expand public ownership of shorelines and opportunities for access to lakes.
- 7.2** Identify additional opportunities to provide public access to American Lake within Tillicum.
- 7.3** Install planned ADA improvements at Harry Todd Park.

Goal 8: Enhance and protect Tillicum’s natural environment

Protect forest cover, riparian habitat, air quality, and the quality of groundwater flowing into American Lake.

Tasks:

- 8.1** Assist Tillicum’s revitalization through the thoughtful placement and improvement of parks and recreational activities.
- 8.2** Identify opportunities for additional public/semi-public green space in Tillicum.
- 8.3** Work cooperatively with development interests to protect aquifers and surface water by the gradual extension of sanitary sewers and replacement of stormwater systems with priority for those areas bordering or hydrologically related to American Lake.
- 8.4** Utilize creative stormwater management techniques such as green roofs, rain gardens, and/or vegetated bioswales to purify water before it enters the ecosystem.

Goal 9: Maintain a sensitivity to the area’s history and historical elements

Promote Tillicum’s unique heritage, foster civic pride and honor past accomplishments, and use landmarks as a means to advance economic redevelopment.

Tasks:

- 9.1** Direct the City’s Historic Preservation Officer to work with the City’s Landmarks and Heritage Advisory Board to produce a brochure on Tillicum’s history.
- 9.2** Work with the City’s Landmarks and Heritage Advisory Board and the Lakewood Historical Society to install historic markers at selected locations in Tillicum.

IMPLEMENTATION STRATEGIES

The following tables list specific implementation strategies for the *Tillicum Neighborhood Plan*. The actions included within these tables are tied to the goals and tasks listed in the previous section and go on to set priorities and time frames. They are intended to provide guidance to decision makers as they seek to implement the recommended actions.

Implementation of near-term actions will be sought in the next five years. Long-term actions may be implemented over the next 20 years. Actions that have both near-term and long-term components are best implemented as an ongoing activity over the next 20 years or may have multiple steps that require action at different times.

All of the strategies in this plan are important, and it is difficult to rank them in priority as there are so many pressing needs in Tillicum. The priorities are not intended to provide a “hard” schedule but rather a sense of the relative importance among the strategies in the plan. It is staff’s expectation that the public review and adoption process will be used to vet and refine these priorities.

TABLE 16 ACRONYMS USED IN IMPLEMENTATION STRATEGIES			
CA	City administration (may refer to any city department, as applicable)	LHAB	Landmarks & Heritage Advisory Board (City)
CC	City Council	LWD	Lakewood Water District
CM	City Manager	MD	Wash. State Military Department (Camp Murray)
COMMUNITY	Tillicum residents, property owners, businesses & social svcs. providers	PAB	Planning Advisory Board (City)
CPSD	Clover Park School District	PC	Pierce College
CPTC	Clover Park Technical College	PT	Pierce Transit
CTAC	Citizens' Transportation Advisory Committee (City)	PSE	Puget Sound Energy
FIRE	West Pierce Fire & Rescue	TAC	Tillicum Action Committee
JBLM	Joint Base Lewis McChord	USPS	United States Postal Service
		WSDOT	Wash. State Dept. of Transportation

TABLE 17 ACTION ITEMS: COMMUNITY CAPACITY DEVELOPMENT				
NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
A-1	Recognize the Tillicum Action Committee (TAC) as the community leadership team and primary point of community organizing for Tillicum. Explore whether the existing merchants' & neighborhood associations could be rechanneled into the community leadership team, or if those associations wish to continue to exist independently.	CC, CA, TAC & COMMUNITY	Near-term (2011)	High
A-2	Identify & appropriate funding to support the development of community outreach & life skills programs utilizing existing community facilities such as the Tillicum/American Lake Gardens Community Service Center, PCLS Library, &/or Youth & Family Center.	CC & CA	Near- & long-term (2011-2015)	High

TABLE 18 ACTION ITEMS: UPDATE INFRASTRUCTURE				
NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
B-1	Complete implementation of major sewer trunk line & side sewers in selected parts in Tillicum.	CA	Near-term (2011)	High
B-2	Determine & work toward outcome for Tillicum Elementary School.	CPSD, CA, CPTC, & PC	Long-term (date unknown)	High (lack of funding)
B-3	Prepare & maintain an ongoing capital facilities plan to prioritize & direct City capital investment.	CA, CM, CC	Immediate need (2011)	High
B-4	Monitor & pursue concurrency with outside agency (such as utilities, fire, schools, etc.) capital improvement projects & programs.	CA	Near- & long-term	High
B-5	Monitor implementation of the completed PCLS master planning process re Tillicum branch.	PCLS, CPSD, & CA	Near-term (2011-2015)	Medium

TABLE 18 (CONTINUED)
ACTION ITEMS: UPDATE INFRASTRUCTURE

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
B-6	Make minor improvements to Harry Todd Park: <ul style="list-style-type: none"> ▪ Install trash enclosures with gates ▪ Install new playground border (wood chips) ▪ Install paved walking path around the park ▪ Resurface tennis/skate park area ▪ Remove perimeter fence at the park once a Park Watch team has been established & is in operation 	CA	Near-term (2013)	Medium
B-7	Require commercial, institutional and multi-family developments to provide protected & secure bicycle parking.	CA	Near-term	Medium
B-8	Make major improvements to Harry Todd Park: <ul style="list-style-type: none"> ▪ Repair existing docks ▪ Install new docks ▪ Install ADA improvements at Harry Todd Park ▪ Redesign Harry Todd park with realignment of Maple Street SW 	CA & TAC	Long-term (date unknown)	Low (lack of funding)
B-9	Develop/expand gateways that mark the entrances to Tillicum.	CA & TAC	Near-term (2013)	Low (lack of funding)
B-10	Improve facilities in community centers, school & parks to provide facilities for after-school & weekend activities for youth.	CA, CPSD & COMMUNITY	Long-term (date unknown)	Low (lack of funding)

TABLE 19
ACTION ITEMS: REDUCE CRIME & NEGLECT

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
C-1	Maintain funding for the neighborhood patrol program in Tillicum to support neighborhood watch groups & provide regular communication with neighborhood & civic organizations.	CA & CC	Near-term (2011-2015)	High
C-2	Maintain funding for public nuisance abatement aimed at improving property maintenance & building standards.	CA & CC	Near-term (2011-2015)	High
C-3	Finalize development of & carry out a Neighborhood Stabilization Program to address neighborhood blight, including purchasing & rehabilitating residential properties for redevelopment by Habitat for Humanity to provide homeownership.	CA	Near-term (2011-2015)	High
C-4	Provide development preapplication packets to the Police Department & include their feedback on design from a CPTED perspective.	CA	Near-term (2011-2013)	High
C-5	Use the community service & code enforcement officer positions to proactively ensure all Tillicum businesses & rental housing are properly licensed.	CA	Near-term (2011-2013)	High
C-6	Develop a safety plan for Harry Todd Park.	CA & COMMUNITY	Near-term (2011-2013)	High

**TABLE 20
ACTION ITEMS: TRANSPORTATION IMPROVEMENTS**

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
D-1	Establish bicycle & pedestrian connections between residential areas, Union Avenue SW, & Harry Todd Park	CA, PAB, & CTAC	Near-term (2011)	High
D-2	Initiate formal discussions with other agencies regarding improvements to the I-5, Union Avenue SW, & Berkeley Street SW road intersections.	CA, MD, JBLM, WSDOT & COMMUNITY	Near-term (2011)	High
D-3	Work with the Tacoma Country & Golf Club establish a preliminary pedestrian pathway design to connect Tillicum with the main body of Lakewood.	CA	Near-term	High ³⁴
D-4	Seek additional funding to upgrade the following streets/intersections: <ul style="list-style-type: none"> ▪ Union Avenue SW from Berkeley Street SW to West Thorne Lane SW ▪ Berkeley Street SW/Union Avenue SW intersection ▪ Realignment of Maple Street SW at Harry Todd Park ▪ Maple Street SW from Union Avenue SW to Harry Todd Park 	CA	Near- & long-term	High High Low Low
D-5	Identify bus stops with inadequate lighting & improve lighting at these stops. Examine the need for more shelters & posted schedules. Provide the telephone number of Pierce Transit's community liaison at bus stops.	CA & PT	Near- & long-term	Medium
D-6	Periodically review & update routes & frequency of transit bus lines with community input. Provide timely notification of route & service changes.	CA & PT	Near- & long-term	Medium
D-7	As properties redevelop along Union Avenue SW, explore opportunities to create adequate street frontage to provide new on-street parking.	CA	Near-term (2011–2015)	Medium
D-8	Address the need for on-street parking by small businesses.	CA	Near-term (2011)	Medium
D-9	Establish street design guidelines for other streets including North Thorne Lane SW, Woodlawn Avenue SW, Maple Street SW, West Thorne Lane SW, & portions of Portland Avenue SW and Berkeley Street SW	CC, CA & COMMUNITY	Near-term (2013)	Medium
D-10	Monitor the Pt. Defiance Bypass project	CA & CC	Near- & long-term	High
D-11	Monitor & support funding for the Cross-Base Highway project	CA & CC	Near- & long-term	Low
D-12	Establish "green street" designations & associated improvements, including sidewalks, landscaping, bike lanes, crosswalks, & lighting, for Union Avenue SW, North Thorne Lane SW, Woodlawn Avenue SW, & West Thorne Lane SW. Seek compatibility between the provision of bicycle lanes & vehicular parking.	CC, PAB, CA, & COMMUNITY	Long-term	Low (lack of funding)

³⁴ Stimulus funding may become available for this work.

TABLE 20 (CONTINUED)
ACTION ITEMS: TRANSPORTATION IMPROVEMENTS

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
D-13	Install pedestrian signals on streets with high traffic volumes.	CA	Near-term (2015)	Low
D-14	Require commercial, institutional & multi-family developments to provide protected & secure bicycle parking.	CA	Near- & long-term	Low
D-15	Reconstruct the I-5/Berkeley interchange	WSDOT	Long-term	High (lack of funding)

TABLE 21
ACTION ITEMS: RESIDENTIAL & COMMERCIAL REVITALIZATION

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
E-1	Develop a marketing program to improve perceptions of the Tillicum neighborhood & promote the neighborhood as a desirable & affordable place to live.	CA, TAC & COMMUNITY	Near-term (2011)	Medium
E-2	Develop & adopt new zoning classifications to implement freeway-oriented commercial on the I-5 side of Union Avenue SW & tailored neighborhood commercial on the opposite side.	CA, COMMUNITY, PAB, & CC	Near-term (2012)	High
E-3	Amend the City's development regulations to enable innovative layouts, designs & configurations such as Z-lots, great house design, & cottage housing.	CA, COMMUNITY, PAB, & CC	Near-term (2012)	High
E-4	Amend the City's development regulations to require a greater level of design for small lot residential development & for commercial development located along Union Avenue SW.	CA, COMMUNITY, PAB & CC	Near-term (2012)	High
E-5	Update the City's current subdivision regulations, including the establishment of new regulations for condominiums & townhouses, & new design standards for small lots. Consider automatic consolidation of outdated "skinny-mini" lots.	CA, COMMUNITY, PAB, & CC	Near-term (2011)	High
E-6	Establish a contract post office on Union Avenue SW	CA, TAC & USPS	Near-term (2012)	Medium
E-7	Allow a reduction in the amount of off-street parking based on a parking study prepared by a registered professional engineer.	CA, COMMUNITY, PAB, & CC	Near-term (2012)	High
E-8	Support driveway consolidation & shared use of parking lots by Tillicum businesses.	CA & COMMUNITY	Near- & long-term	High
E-9	Prepare a utility plan for Union Avenue SW. <ul style="list-style-type: none"> ▪ Determine the desirability & cost of placing utilities underground ▪ Work with utility purveyors to underground existing utilities ▪ Survey property owners to determine willingness to participate in a local improvement district (LID) ▪ Form an LID if property owners are in favor of doing so ▪ Work with present and future developers to ensure conformance with this action 	CA, PSE, LWD & COMMUNITY	Near-term (2012-2013)	High

TABLE 21 (CONTINUED)
ACTION ITEMS: RESIDENTIAL & COMMERCIAL REVITALIZATION

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
E-10	Monitor development activity to identify regulatory &/or cost barriers that discourage investment in Tillicum.	CA	Near- & long-term	Medium
E-11	Review Housing Incentives Program (LMC 18A.50); potentially adjust inclusionary housing, density bonuses, development standards modification, & fee reductions.	CA	Near-term (2012)	High

TABLE 22
ACTION ITEMS: ENHANCE HOUSING OPPORTUNITIES

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
F-1	Where feasible, use CDBG funding to enable owner-occupied residences to connect to the City's sewer system.	CA	Near-term (2011- 2013)	High
F-2	Initiate discussions with other agencies to consider a program of reducing/waiving development &/or capacity fees as a means of promoting housing affordability.	CC, CA, & CM	Near-term (2011- 2013)	High
F-3	Identify & take action against landlords who violate City codes, particularly building standards & garbage removal requirements.	CA	Near-term (2011-2013)	High
F-4	Where appropriate, apply revised zoning regulations which remove impediments to urban infill and rehabilitation of existing housing stock.	CA, PAB, COMMUNITY & CC	Near-term (2012-2015)	High
F-5	Provide the news media with information about potential apartment closures.	CM	Immediate	High
F-6	Vigorously enforce the 1997 Uniform Code for the Abatement of Dangerous Buildings (or subsequent code as may be adopted in the future).	CA & FIRE	Near-term (2011-2015)	High
F-7	Vigorously enforce the 2006 International Property Maintenance Code.	CA & FIRE	Near-term (2011-2015)	High (lack of funding)
F-8	Provide sufficient funds to relocate eligible individuals & families who are forced to move from their residences because of serious health & safety violations.	CA	Near-term (2011-2015)	High (lack of funding)
F-9	Aggressively seek compensation from property owners where the City is forced to close housing units for health and safety reasons.	CA	Near-term (2011-2015)	High (lack of funding)
F-10	Build at least one Habitat for Humanity home in Tillicum per year.	CA & COMMUNITY	Near-term (2011-2015)	Medium

TABLE 22 (CONTINUED)
ACTION ITEMS: ENHANCE HOUSING OPPORTUNITIES

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
F-12	Seek new sources of housing subsidies for affordable housing. Work with non-profit corporations, investors, & financial brokers to secure funds which can be used to expand opportunities for lower-cost home ownership & affordable rental housing.	CA	Near- & long-term	Medium
F-13	Establish an incentive awards program for well-maintained & trouble-free rentals.	CLT & CA	Near-term (2012)	Medium
F-14	Promote community awareness of financial subsidies available from public agencies for property & home improvement.	CA	Near-term (2012)	Medium
F-15	Once sewers have been installed, consider use of the multi-family tax incentive program to target multi-family growth into selected parts of Tillicum.	CA, COMMUNITY, PAB & CC	Near-term (2012-2014)	Medium
F-16	Hold joint landlord training sessions with the Tillicum and Woodbrook neighborhoods.	CA	Near-term (2012)	Low (lack of funding)
F-17	Seek to increase the amount of transitional housing for homeless families & domestic violence victims.	CA	Near- & long-term	Low (lack of funding)

TABLE 23
ACTION ITEMS: AMERICAN LAKE ACCESS

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
G-1	See action no. B-8.	-	-	-

TABLE 24
ACTION ITEMS: ENVIRONMENTAL PROTECTION

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
H-1	Complete statutorily required shoreline master program update.	CA, PAB & CC	Near-term (adopt by 2011 deadline)	High

TABLE 25
ACTION ITEMS: HISTORIC PRESERVATION

NO.	WHAT	WHO	WHEN	RECOMMENDED PRIORITY
I-1	Produce a brochure on Tillicum's history.	CA & LHAB	2011	High

LONG-RANGE STRATEGIES

In addition to the specific actions suggested above, a number of strategies emerged through this plan's development that are thought to be outside of a foreseeable window. Certain actions cannot occur until a certain degree of evolution has occurred in other areas; while others may be part of broader citywide initiatives that affect Tillicum. These are included here in unranked order as potential later-phase items, once more immediate priorities have been addressed.

- Consider realignment of the main entrance to Harry Todd Park in a manner that better relates to residential areas and creates more favorable access, in order to encourage its use by the community.
- Expand the children's play area within Harry Todd Park.
- Develop a regional model, based on Harry Todd Park, for sustainable park development and maintenance.
- Support the use of green roofs, green walls, vegetated swales, and other such strategies to replace traditional detention techniques where appropriate to slow and cleanse stormwater.
- Implement low-impact development, "green streets," and targeted urban design strategies.
- Implement stronger design standards for commercial and multifamily development, including such items as location, materials, façade treatments, roof forms, pedestrian connectivity, landscaping, awnings, and signage.
- Examine where incentives may be used to encourage sustainable development employing such standards as LEED® Silver for commercial structures and BuiltGreen™ 4-star or better for multifamily development.
- Encourage street designs and plantings to increase canopy coverage, landscaping, and use of native species to beautify and enhance ecological value.
- Improve regional transit connectivity with Tillicum. If Sound Transit service is extended southward, seek placement of an additional station in Tillicum.
- Identify and encourage other community-based services that support neighborhoods and families, such as low-cost medical care providers.
- Develop a program for acquiring additional right of way along portions of Union Avenue SW in order to facilitate further improvements. In the future, expand "civic boulevard" design standards to include Portland Avenue SW between North Thorne Lane SW and West Thorne Lane SW, Union Avenue SW from Berkeley Avenue SW to Spruce Street SW, and Spruce Street SW from Union Avenue SW to Portland Avenue SW.
- As additional development occurs within Tillicum and public surveillance opportunities are improved, seek additional opportunities to enhance and expand nonmotorized transportation opportunities.

APPENDIX A

Excerpts from the *City of Lakewood Comprehensive Plan* specific to Tillicum

3.10 Isolated Areas

Lakewood has three significant areas that are geographically isolated from the rest of the city: Springbrook, American Lake Gardens, and Tillicum. The first two are separated from the rest of the city by I-5 and are bordered on several sides by fenced military installations. The third is geographically contiguous to other parts of the city, but there are no direct road connections between Tillicum and other Lakewood neighborhoods.

As a result of this isolation, all three neighborhoods exhibit signs of neglect. Both American Lake Gardens and Tillicum lack sewer systems, and most property is old, run down, and undervalued. Springbrook is dominated by a chaotic assortment of land uses arranged according to a dysfunctional street pattern. Despite relatively high-density housing, Springbrook's residents lack schools, parks, or even basic commercial services. Given the multitude of crime and health problems plaguing these areas, unique approaches are needed for each neighborhood and are presented in the goals and policies below. Additional recommendations for Tillicum are included in Chapter 4, while Chapter 5 addresses economic development in American Lake Gardens.

GOAL LU-51: Minimize the impacts of geographic isolation of the Tillicum, Springbrook, and American Lake Gardens areas and focus capital improvements there to upgrade the public environment.

Policies:

LU-51.1: Provide for commercial and service uses for the daily needs of the residents within the neighborhoods.

LU-51.2: Support the expansion of recreation and open space.

LU-51.3: Provide pedestrian and bicycle paths within the neighborhoods and which connect to other neighborhoods.

GOAL LU-52: Improve the quality of life for residents of Tillicum.

Policies:

LU-52.1: Enhance the physical environment of Tillicum through improvements to sidewalks, pedestrian-oriented lighting, street trees, and other pedestrian amenities.

LU-52.2: Promote integration of Tillicum with the American Lake shoreline through improved physical connections, protected view corridors, trails, and additional designated parks and open space.

LU-52.3: Identify additional opportunities to provide public access to American Lake within Tillicum.

LU-52.4: Seek a method of providing alternate connection between Tillicum and the northern part of the city besides I-5.

4.5.3 Tillicum

The Tillicum neighborhood functions as a separate small village within Lakewood. Accessible only by freeway ramps at the north and south end of the area, it has its own commercial sector; moderately dense residential development; and an elementary school, library, and park. Tillicum is a very walkable neighborhood with a tight street grid and relatively low speed traffic. Harry Todd Park is one of the largest City-owned parks, and Tillicum is one of the few neighborhoods in the city with public waterfront access.

In public meetings discussing alternative plans for the city, Tillicum emerged as a neighborhood viewed as having significant potential for residential growth over the next 20 years. With a traditional street grid, significant public open space and lake access, and strong regional transportation connections, there is a major opportunity for Tillicum to evolve into a more urban, pedestrian-oriented community. This is further enhanced by the long-range potential for a commuter rail station and new highway connection to the east.

A significant constraint to realizing this vision is the lack of sewers in Tillicum. Extension of the sewer to Tillicum would be very expensive, with the cost of the distribution system through the streets being the most costly aspect. The City is committed to the sewerage of Tillicum by 2017; however, sewer extension is dependent on the successful redevelopment of American Lake Gardens as an industrial area, including private development of sewers east of I-5. The development of multi-family housing in Tillicum will not be possible until sewer hookups are available. In addition to sewer development, there are other actions the City can take in support of the development of multi-family housing in Tillicum including: development of a long-range plan for Harry Todd Park and implementation of specific improvements to expand its capacity;

- development of a pedestrian connection between the park and commercial district along Maple Street, with sidewalks, curb ramps, crosswalks, lighting, and other improvements;
- improvements at the I-5 interchanges to create attractive, welcoming gateways; and
- a pedestrian/bikeway easement north along the railroad or through the country club to other portions of Lakewood.

The urban design framework plan for Tillicum is shown in Figure 4.4. Some of the specific urban design actions which could be undertaken in Tillicum include:

Landmark/Activity Nodes: The northern entrance into Tillicum, as well as the only entrance into American Lake Gardens, is at the Thorne Lane overpass and I-5. It would be improved as a civic gateway, with landscaping, road improvements, signage, and other elements as needed.

Civic Boulevards: As the main entrance road into Tillicum and the perimeter road embracing multi-family development, Thorne Lane would be improved as a civic boulevard. Development intensification in Tillicum would occur east of Thorne Lane, with W. Thorne Lane marking the initial southern boundary of the sewer extension to keep costs in check. Potential improvements of Union Street in support of commercial functions would include such elements as pedestrian improvements, parking, landscaping, lighting, and other functional items. Long-range planning would also identify site requirements for the potential future commuter rail stop and proposes strategies to fulfill these needs.

Green Streets: Maple Street would be improved as a green street to provide a pedestrian-oriented connection between the lake and Harry Todd Park at one end, and the commercial district/future rail station at the other. In between, it would also serve the school and the library. It would serve as a natural spine, gathering pedestrian traffic from the surrounding blocks of multi-family housing and providing safe access to recreation, shopping, and public transportation.

Open Space: Harry Todd Park would be improved by upgrading existing recreation facilities and constructing additional day use facilities such as picnic shelters and restrooms. A regional biking/hiking trail connecting Tillicum to the Ponders Corner area could be built along an easement granted by various landowners, principally the Tacoma Country and Golf Club and Burlington Northern Railroad.

GOAL UD-10: Promote the evolution of Tillicum into a vital higher density pedestrian-oriented neighborhood through application of urban design principles.

Policies:

UD-10.1: Identify opportunities for additional public/semi-public green space in Tillicum.

UD-10.2: Provide opportunities for pedestrian and bicycle connections from Tillicum to other portions of Lakewood.

UD-10.3: Improve identified civic boulevards, gateways, and green streets within Tillicum to provide a unifying and distinctive character.

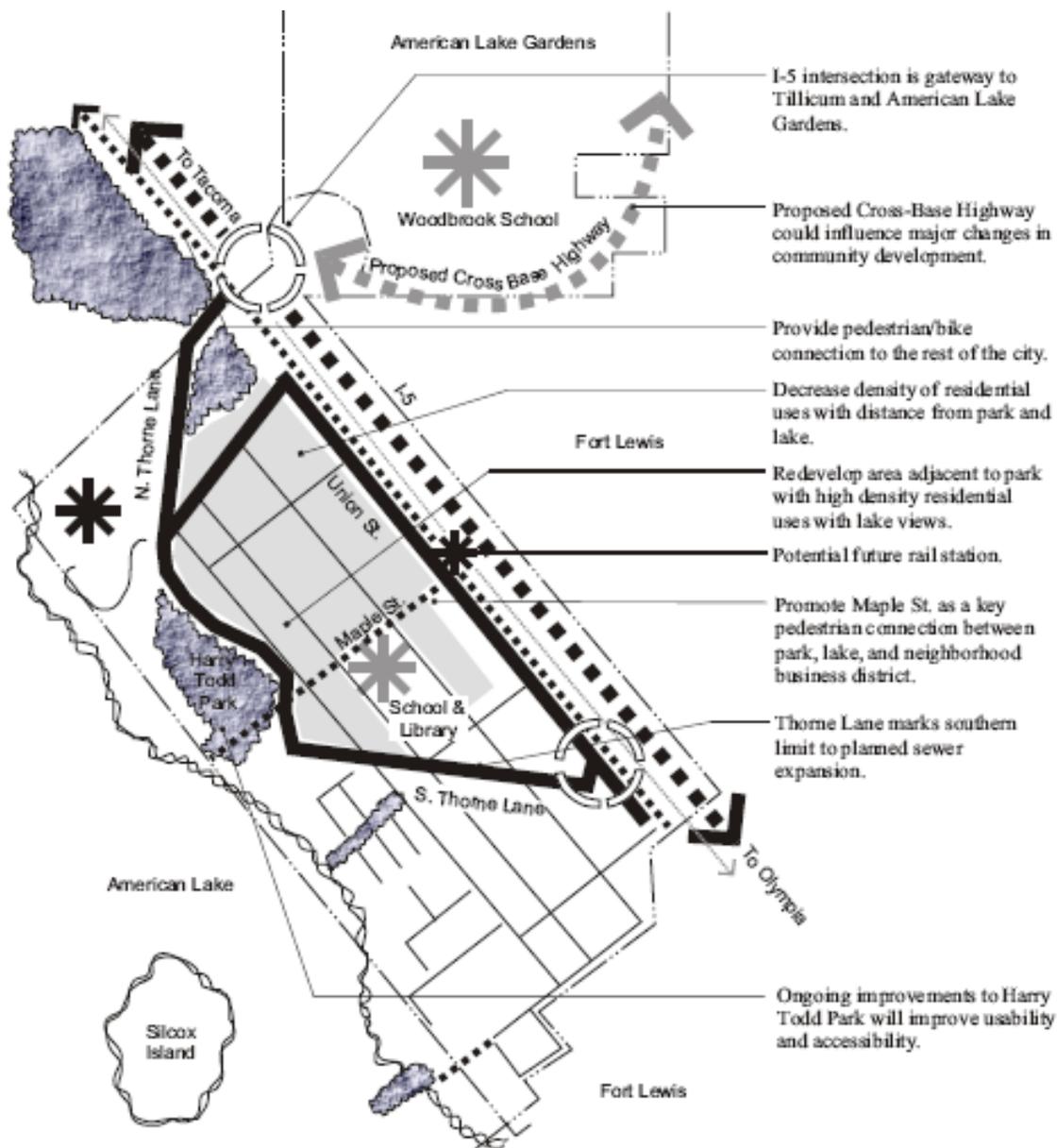
GOAL UD-12: Facilitate implementation of gateway enhancement programs in Tillicum, Springbrook, and American Lake Gardens.

Policies:

UD-12.1: Establish a program to design and implement a gateway enhancement plan at the entrances to each neighborhood.

UD-12.2: Work with private and public property owners and organizations to create and implement the gateway plans.

UD-12.3: Work with the WSDOT or successor agency to facilitate the future incorporation of sound barriers adjacent to these communities along I-5 to reduce noise impacts to residential areas.



LEGEND:

- Landmarks/Activity Node
- Gateway
- Transit Center
- Civic Boulevard
- Green Streets
- Local Collector
- Potential for Intensification of Residential Uses
- Open Space/Park/Buffer
- Framework Plan Boundary
- Shoreline



Figure 4.4
Urban Design Framework
for Tillicum

SOURCE: EDAW, Inc. 1999.

APPENDIX B

Mitigation Conditions from the American Lake Gardens (ALG)/Tillicum Sewer Extension Environmental Assessment (2007)

- The project construction must adhere to all applicable air quality regulations. Measures to minimize the impact to air quality should include covering and wetting down of soil, frequent sweeping and washing of streets, washing tires and undercarriages of vehicles, and minimizing idle times for construction trucks and machinery.
- Prior to construction a Spill Prevention, Control, and Countermeasures Plan (SPCC) and a Temporary Erosion and Sedimentation Control Plan (TESC) will be developed and implemented, to control stormwater management during construction, reduce the amount of sediment leaving the construction site, and develop a plan for prompt containment and cleanup of any spills. Construction best management practices (BMPs) will be followed to minimize erosion and sediment runoff.
- Any portion of the project located within the flood hazard area will be designed to meet flood-proofing and/or flood protection elevation requirements under local development regulations for flood hazard areas.
- When construction will occur during sensitive time for wildlife (for example, nesting months) pre-construction surveys will be performed for listed species including bald eagle and other special-status plants and species to avoid or minimize impacts during construction.
- All water, from dewatering operations, will be managed and treated in accordance with NPDES construction standards and requirements prior to discharge to minimize turbidity, sedimentation, and the potential for erosion.
- In the event that materials of cultural archaeological significance are discovered during construction, work shall be halted immediately, the site secured, and EPA, the State Historic Preservation Officer, the Department of Ecology, and the potentially affected Tribes shall be notified and consulted.
- Excavated areas will be backfilled, as soon as possible, and street segments disturbed by construction will be restored to their original condition.
- Clearing of vegetation will be kept to a minimum and disturbed areas revegetated with native species, as soon as possible.
- Temporary fencing and signs will be posted near the construction areas to notify residents of road closures and/or detours.
- EPA shall be contacted if there are any significant changes to the proposed project.

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APPENDIX C

Traffic Study³⁵

³⁵ This originally appeared as Appendix D of the American Lake Gardens Sewer Extension Environmental Assessment. To avoid confusion, the original title page for this document was deleted.

TECHNICAL MEMORANDUM

Date: April 27, 2007
To: Jenny Bailey
From: Peter Chen and Sandra Fann, P.E.
Subject: Traffic Analysis
cc: John Perlic, P.E.
Project Number: 555-3047-005
Project Name: American Lake Gardens and Tillicum Sewer Extension – Traffic Study

This technical memorandum documents the traffic impacts and potential need for mitigation to the local transportation network that could result from a sewer system extension into the American Lake Gardens and the Tillicum neighborhoods in the City of Lakewood. For the purposes of this study, it was assumed that the sewer system extension would facilitate redevelopment in the project area to support light industrial uses and other land use changes based on current zoning, as described in the City of Lakewood Comprehensive Plan. The findings of the traffic study will be used to support the American Lake Gardens and Tillicum Sewer Extension Environmental Assessment (EA).

1 PROJECT DESCRIPTION

The City of Lakewood is proposing to extend sewer service to the communities of Tillicum and American Lake Gardens, which are the two major areas within the City of Lakewood currently not served by sewer. These communities currently rely on septic systems, which, in some cases, are failing and posing potential adverse impacts to human health and the environment. Property owners and developers have been limited in their efforts to develop new systems or rehabilitate existing systems because of increasingly stringent regulations and requirements applicable to such projects. Therefore, some multi-family residences are not fully occupied and some businesses offer limited services due to septic limitations.

In connection with the sewer extension, the City's most recent Comprehensive Plan (2000) adopted revisions to the zoning designations in these communities that support a long-range vision in which a portion of American Lake Gardens would be converted to industrial use to create jobs, and Tillicum would be rejuvenated for residential growth. In addition, the new zoning would better consolidate similar land uses and remove the existing non-conforming uses that were developed prior to the existing zoning codes.

The sewer line extension and changes in zoning designations are expected to increase local traffic volumes since currently underdeveloped and underutilized properties could be built out to full potential. Based on these expected changes, the City of Lakewood identified five key locations where traffic operations would experience the most substantial effects from redevelopment. These intersections, shown on Figure 1, are analyzed in this traffic study and include:

- I-5 northbound ramps at Murray Road SW (signalized)
- I-5 southbound ramps at Thorne Lane SW (signalized)

- Murray Road SW at 150th Street SW (all-way stop-controlled)
- I-5 northbound ramps at Jackson Avenue (signalized)
- I-5 southbound ramps at Berkeley Street SW (signalized)

2 EXISTING CONDITIONS

2.1 Functional Classifications and Roadway Characteristics

Roadways within the study area that are expected to experience the majority of traffic operational effects associated with the project include:

- **I-5** is an eight-lane freeway north of the Thorne Lane SW/Murray Road SW interchange (milepost [MP] 123.58) that narrows to six lanes prior to the Berkeley Street SW/Jackson Avenue interchange (MP 122.68) to the south. This north-south freeway accommodates regional travel and provides access to the Fort Lewis Military Reservation and McChord Air Force Base. The Thorne Lane SW/Murray Road SW and Berkeley Street SW/Jackson Avenue interchanges are the primary connections between I-5 and the communities of Tillicum and American Lake Gardens.
- **Murray Road SW** is a two-lane minor collector arterial located on the east side of I-5 (opposite from Thorne Lane SW) at the Thorne Lane SW/Murray Road SW interchange. Murray Road SW is a north-south roadway with 4- to 8-foot gravel shoulders on both sides and has a speed limit of 35 mph. Murray Road SW provides a connection between the Fort Lewis Military Reservation, McChord Air Force Base, and American Lake Gardens to I-5.
- **Thorne Lane SW** is a two-lane collector arterial located on the west side of I-5 (opposite from Murray Road SW) at the Thorne Lane SW/Murray Road SW interchange. This east-west roadway has 4- to 6-foot paved shoulders on both sides and has a speed limit of 25 mph. Thorne Lane SW is one of two primary routes that provide access to and from I-5 into the Tillicum area of Lakewood.
- **Berkeley Street SW** is a two-lane collector arterial providing access to Tillicum and Washington National Guard Headquarters at Camp Murray. This east-west roadway has 4- to 6-foot gravel shoulders on both sides and has a speed limit of 25 mph. Berkeley Street SW is one of two primary routes that provide access to and from I-5 into the Tillicum area of Lakewood. East of I-5, Berkeley Street SW becomes Jackson Avenue and provides access to Fort Lewis and Madigan Hospital.
- **150th Street SW** is a two-lane minor collector arterial with 4- to 10- foot gravel shoulders on both sides of the roadway. 150th Street SW has a speed limit of 35 mph, and extends from Murray Road, continuing east to E Lincoln Drive. 150th Street provides a route from American Lake Gardens to McChord Air Force Base and Fort Lewis Military Reservation. Traffic volumes (and congestion) on 150th Street SW are also affected by traffic generated from Woodbrook Middle School, located on the corner of Spring Street and 150th Street SW.

2.2 Land Use and Zoning

Existing land use in the Tillicum community is shown on Figure 2. Properties in Tillicum predominately accommodate single-family residences intermingled with multi-family uses, ranging from low- to high-density developments. Commercial/retail uses are generally concentrated along Union Avenue SW (parallel to the west side of I-5). The Harry Todd Park is located in the northwest corner of Tillicum, northwest of Woodlawn Street SW, between Maple Street SW and North Thorne Lane SW, and covers a relatively large area. Tillicum also has institutional uses, including Tillicum Elementary School and the Tillicum/Woodbrook Community Service Center.

TECHNICAL MEMORANDUM (CONTINUED)

Figure 2 also shows the existing land uses in the American Lake Gardens neighborhood. Similar to Tillicum, the majority of properties in American Lake Gardens are used for residential purposes and the density of development is considerably inconsistent between adjacent properties. A few commercial/retail properties occur on the east side of Murray Road SW, the north side of 146th Street SW, and west of Woodbrook Drive NW. One parcel on the south side of 150th Street SW is currently used for industrial purposes. American Lake Gardens has a few institutional uses, including the Woodbrook Middle School. Several properties scattered throughout the community are currently vacant.

2.3 Level of Service Conditions

A level of service (LOS) analysis was conducted for the five study intersections to determine existing operating conditions. Level of service (LOS) is an estimate of the quality and performance of the transportation system operations. One industry standard for evaluating traffic conditions is based on the Transportation Research Board's methodology outlined in the *Highway Capacity Manual (HCM), Special Report 209* (TRB 2000). Using this methodology, traffic conditions are assessed with respect to the average intersection delay (seconds/vehicle). The letter "A" is used to describe the least amount of congestion and best operations, and the letter "F" is used for the highest amount of congestion and worst operations. The 2000 HCM level of service ratings and criteria for signalized and unsignalized intersections are shown in Table 1. The City of Lakewood generally identifies LOS D or better at intersections as acceptable. Lower LOS grades at a few select locations are acceptable, including the I-5 northbound ramps at Murray Road SW intersection, which must operate at LOS F with a volume to capacity (v/c) ratio of 1.05 or less to be considered acceptable.

Table 1. Level of Service Ratings for Signalized and Unsignalized Intersections

LOS Rating	Average Delay for Signalized and AWSC Intersections (seconds/vehicle)	Average Delay for Unsignalized TWSC Intersections (seconds/vehicle)
A	0 – 10	0 – 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Source: Highway Capacity Manual (TRB 2000)

AWSC: all-way stop-controlled

TWSC: two-way stop-controlled

As described above, the following five intersections were identified by City of Lakewood staff for inclusion in this traffic analysis:

- I-5 northbound ramps at Murray Road SW (signalized)
- I-5 southbound ramps at Thorne Lane SW (signalized)
- Murray Road SW at 150th Street SW (all-way stop-controlled)
- I-5 northbound ramps at Jackson Avenue (signalized)
- I-5 southbound ramps at Berkeley Street SW (signalized)

A review of historical traffic volumes was conducted to estimate growth and a 1.5 percent growth rate was deemed appropriate at the study intersections consistent with average growth rates in general area. The 1.5 percent growth rate was applied to 2004 and 2006 PM peak hour turning movement counts collected by Trafficcount Inc. and WSDOT to estimate existing 2007 traffic volumes. Using these

TECHNICAL MEMORANDUM (CONTINUED)

volumes, the study intersections were analyzed using Trafficware’s software program, Synchro 6.0 (build 614). PM peak hour turning movement count data were provided by Trafficcount Inc. and WSDOT, and collected in 2004 and 2006. . Table 2 summarizes the existing traffic operations and Figure 3 graphically depicts current intersection traffic volumes.

Table 2. PM Peak Hour Level of Service – 2007 Existing Conditions

Intersection	2007 Existing	
	LOS	Delay (sec/veh)
I-5 Southbound Ramps/Thorne Lane SW	D	50.7
I-5 Northbound Ramps/Murray Road SW	D	35.2
Murray Road SW/150th Street SW ¹	F	71.9
I-5 Southbound Ramps/Berkeley Street SW	E	61.5
I-5 Northbound Ramps/Jackson Avenue	F	82.9

¹ Unsignalized all-way stop-controlled intersection

As shown in Table 2, both intersections at the Berkeley Street SW/Jackson Avenue interchange and the Murray Road SW/150th Street SW intersection currently exceed the City of Lakewood’s LOS D standard for these locations.

3 FUTURE CONDITIONS

3.1 Functional Classifications and Roadway Characteristics

Redevelopment of the Tillicum and American Lake Gardens communities could result in changes to the local transportation system, such as intersection channelization improvements; however the functional classifications of these roadways are not expected to change before the 2017 horizon year.

3.2 2017 Without Project – Land Use and Zoning

As described above, many properties in Tillicum and American Lake Gardens rely on septic systems, which, in some cases, are failing and posing potential adverse impacts to human health and the environment. Without the project, property owners would be precluded from redeveloping their properties to their land use potential as defined in the zoning amendments made in the 2000 Comprehensive Plan, and future land uses would be similar to current conditions.

3.3 2017 Without Project – Level of Service Conditions

As described in Section 2.3, a 1.5 percent annual growth rate was used to forecast future 2017 traffic volumes. Similar to the existing conditions evaluation, the 2017 without project analysis used Synchro 6.0 (build 614) to estimate future traffic operations at the study intersections. Table 3 provides a comparison of the existing and 2017 without project traffic operations, and Figure 4 shows the 2017 without project traffic volumes.

TECHNICAL MEMORANDUM (CONTINUED)

Table 3. PM Peak Hour Level of Service – 2007 Existing and 2017 Without Project Conditions

Intersection	2007 Existing		2017 Future without Project	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
I-5 Southbound Ramps/Thorne Lane SW	D	50.7	D	54.4
I-5 Northbound Ramps/Murray Road SW	D	35.2	D	36.2
Murray Road SW/150th Street SW ¹	F	71.9	F	134.1
I-5 Southbound Ramps/Berkeley Street SW	E	61.5	F	93.7
I-5 Northbound Ramps/Jackson Avenue	F	82.9	F	82.1 ²

¹ Unsignalized all-way stop-controlled intersection

² The operations at this intersection improve in 2017 compared to existing conditions as a result of assumed updated signal timing plans, which includes optimized phase and cycle lengths

The increase in traffic volumes at the study intersections is expected to increase delay. The Berkeley Street SW/Jackson Avenue interchange and Murray Road SW/150th Street SW intersection are expected to continue to operate unacceptably below the City's LOS D standard and with longer delays.

3.4 2017 With Project – Land Use and Zoning

Extension of the sewer line would allow properties in Tillicum and American Lake Gardens to be redeveloped according to their zoning designation as identified in the 2000 Comprehensive Plan. In Tillicum, this would allow for the expansion of the commercially-zoned area along Union Avenue SW, development of additional residential dwelling units, and geographic consolidation of similar land uses. The zoning revisions would also consolidate similar land uses in American Lake Gardens, and accommodate a large industrial area that would be used to create jobs and stimulate economic growth.

In 2017, with the project, properties in Tillicum and American Lake Gardens were assumed to be redeveloped and built-out to their full land use potential consistent with zoning designations. This assumption provides a conservative basis to estimate transportation effects associated with the project. Figure 5 shows the redevelopment potential that would be permitted with the project.

3.5 Trip Generation

Geographic information systems (GIS) data provided by the City were used to estimate the existing area and number of residential units for each type of land use in Tillicum and American Lake Gardens. Using the GIS data and methodologies provided in the Institute of Transportation Engineers' (ITE) *Trip Generation, 7th Edition* report, traffic volumes generated by the current land uses were calculated. The same methodologies were used to calculate future trips generated by full build out of the land use potential. The net difference between the calculated existing and calculated future trips generated was applied to future 2017 without project volumes at the study intersections to represent future traffic volumes with the project. Table 4 provides a summary of the calculated trip generation and future 2017 with project traffic volumes. The calculated trips in Table 4 are broken down into four quadrants within the study area, which are shown in Figure 6.

TECHNICAL MEMORANDUM (CONTINUED)

Table 4. PM Peak Hour Trip Generation and Future Year 2017 Traffic Volume Increases with Proposed Sewer Extension

Quadrant Location (see Figure 6)	Quadrant 1	Quadrant 2	Quadrant 3 ¹	Quadrant 4
	South end of Tillicum	North end of Tillicum	North end of Amer. Lake Gardens	South end of Amer. Lake Gardens
Associated Intersections	I-5/Berkeley St; I-5 Jackson Ave	I-5/Thorne Ln; I-5/Murray Rd	I-5/Thorne Ln; I-5/Murray Rd	Murray Rd/150th St
Estimated Trips Generated by Existing Land Use ²	1,085	614	894	507
Estimated Trips Generated by Full Build-Out of Future Land Use ²	1,632	1,328	3,461	1,893
Net Increase in Estimated Trips to/from Each Quadrant	547	714	2,567	1,386
Year 2017 Traffic Volumes to/from Each Quadrant - Without Sewer Extension ³	1,239	818	1,527	906
Year 2017 Traffic Volumes to/from Each Quadrant - With Sewer Extension ^{3,4}	1,786	1,532	4,094	2,292
Percent Increase in PM Peak Hour Trips to/from Each Quadrant (2017 With Project compared to 2017 Without Project)	44%	87%	168%	153%

¹ Trips generated by Quadrant 4 are included in Quadrant 3 volumes since they would utilize the same access point to the regional transportation network

² Sum total of inbound and outbound external trips does not include trips with local origins and destinations within the given quadrant

³ Sum total of applicable turning movement counts at intersections associated with the given quadrant

⁴ Sum total of 2017 traffic volumes to/from each quadrant without the sewer extension plus the net increase in trips to/from each quadrant

3.6 Distribution and Assignment

Although local travel patterns would change as a result of the sewer extension and changes to the zoning, future regional travel demand and distribution currently exhibited at the study intersections were assumed to remain similar to existing conditions.

Trips generated within each quadrant were assumed to access the regional transportation network via the closest interchange; i.e. trips generated in Quadrant 1 would use the Berkeley Street SW/Jackson Avenue interchange, and trips generated in Quadrants 2, 3, and 4 would generally use the Thorne Lane SW/Murray Road SW interchange. Additionally, only trips generated in Quadrant 4 were assumed to affect traffic volumes at the Murray Road SW/150th Street SW intersection. Figure 7 shows the future turning movement volumes at the study intersections that would result from the net change in trip generation associated with the change in land uses.

3.7 2017 With Project – Level of Service Conditions

As described above, traffic volumes would increase substantially as a result of the sewer service extension into the Tillicum and American Lake Gardens communities in concert with the zoning designations identified in the 2000 Comprehensive Plan. Accordingly, the LOS at the study intersections is also expected to degrade. Table 5 summarizes the existing, future without project, and future with project LOS conditions at the study intersections.

Table 5. PM Peak Hour Level of Service – 2007 Existing and 2017 Without and With Project Conditions

Intersection	2007 Existing Conditions		2017 Future without Project Conditions		2017 Future with Project Conditions	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
I-5 Southbound Ramps/Thorne Lane SW	D	50.7	D	54.4	F	>200
I-5 Northbound Ramps/Murray Road SW	D	35.2	D	36.2	F	>200
Murray Road SW/150th Street SW ¹	F	71.9	F	134.1	F	>200
I-5 Southbound Ramps/Berkeley Street SW	E	61.5	F	93.7	F	186.0
I-5 Northbound Ramps/Jackson Avenue	F	82.9	F	82.1	F	160.1

¹ Unsignalized all-way stop-controlled intersection

As shown in Table 5, all study intersections are expected to operate at unacceptable LOS F in the year 2017 with full buildout of the proposed land uses. Although the I-5 northbound ramps at Murray Road SW intersection has an LOS F standard, the 2017 v/c ratio is estimated to be 2.31, which exceeds the 1.05 v/c standard.

4 MITIGATION/CUMULATIVE EFFECTS

Pierce County and Washington State Department of Transportation plan to construct a new highway to connect I-5 to the east side of Pierce County. The highway, State Route (SR) 704, also known as Cross-Base Highway, would cross the southern and western portions of American Lake Gardens, connecting to I-5 in the vicinity of Tillicum. Future land use changes in Tillicum and American Lake Gardens were assumed in the traffic forecasts and analysis conducted for the Cross-Base Highway Environmental Impact Statement.

As part of the SR 704 project, the I-5/Thorne Lane SW interchange would be reconstructed as a single-point urban interchange (SPUI), and a southbound local-access roadway from SW Gravelly Lake Drive to Thorne Lane SW would be constructed. These proposed changes to the transportation system would increase future travel demand at the I-5/Thorne Lane SW interchange. However, the increased traffic volumes at this interchange would be more effectively served by the SPUI configuration compared to the existing full diamond interchange configuration, resulting in improved LOS and delay. SR 704 would connect directly to 150th Street SW and Murray Road SW, replacing the existing unsignalized intersection.

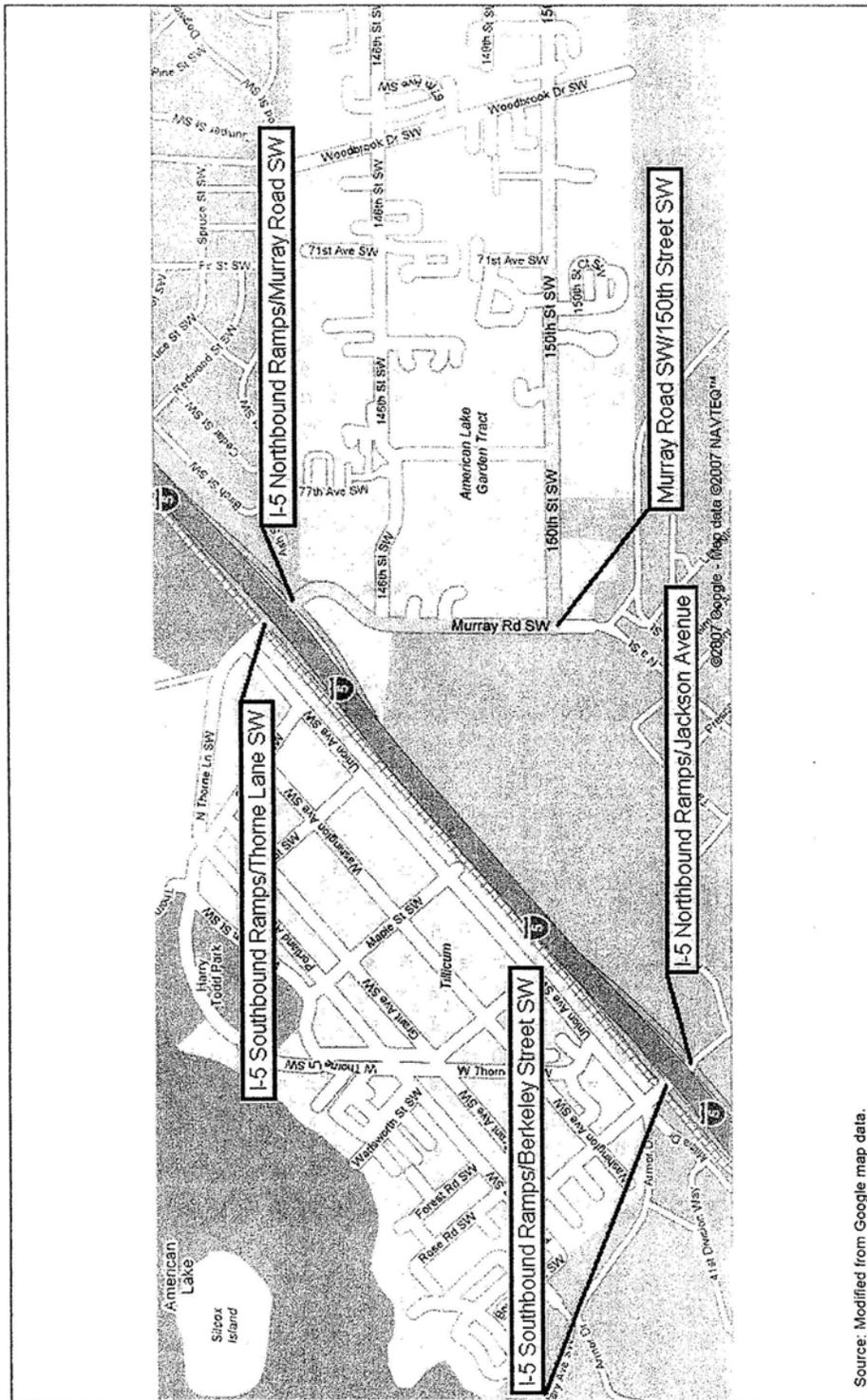
Traffic volumes at the I-5/Berkeley Street SW interchange would likely decrease as a result of the new highway connection, as some vehicles traveling between the Tillicum neighborhood and points to the north and east (via I-5 and SR 704) are expected to divert to the improved I-5/Thorne Lane SW interchange. These traffic diversions would not likely improve intersection LOS but could result in slightly reduced delays at the I-5 Southbound Ramps/Berkeley Street SW and I-5 Northbound Ramps/Jackson Avenue intersections.

No additional mitigation measures beyond those planned as part of the SR 704 project are recommended until such time that a more detailed evaluation of the effect of proposed land use and planned transportation improvements on vehicle travel demand can be performed.

5 CONCLUSION

The Berkeley Street SW/Jackson Avenue and 150th Street SW at Murray Road SW intersection currently exceed the City of Lakewood's LOS D standard for these locations and operate at LOS E and F. As a result of the increased traffic volumes associated with the land use intensification made possible by the sewer extension and allowed under the existing zoning designations, all study intersections are expected to operate at unacceptable LOS F with the project in 2017.

With the proposed new Cross-Base Highway (SR 704) and other potential road improvements, the transportation system in the area could better accommodate the types and densities of land uses envisioned by the City. However, additional improvements would likely need to be identified to accommodate existing and future travel demand at the I-5/Berkeley Street SW interchange.



Source: Modified from Google map data.

Figure 1
Project Vicinity and
Study Intersections

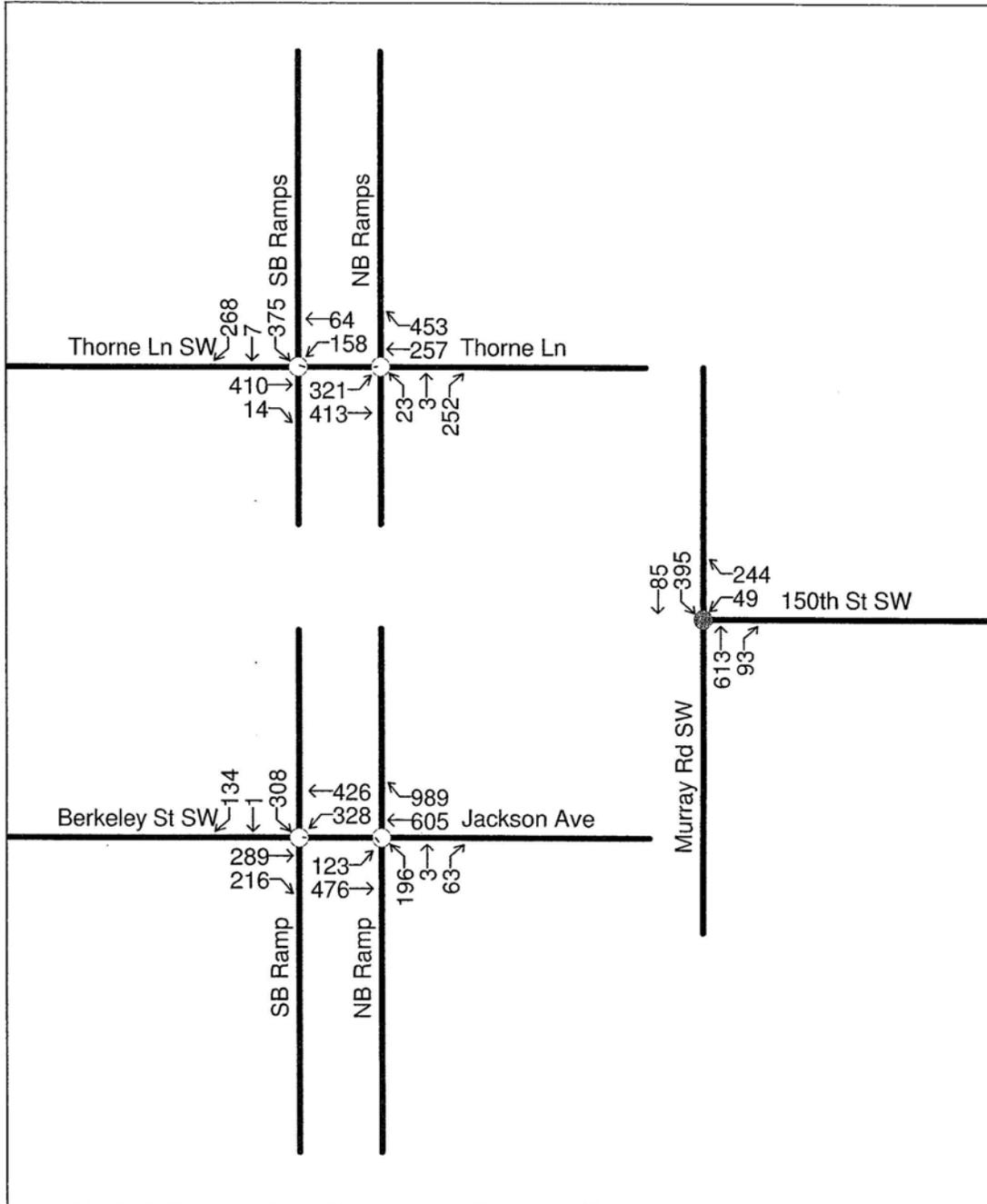


Figure 3
2007 Existing PM Peak Hour Traffic Volumes

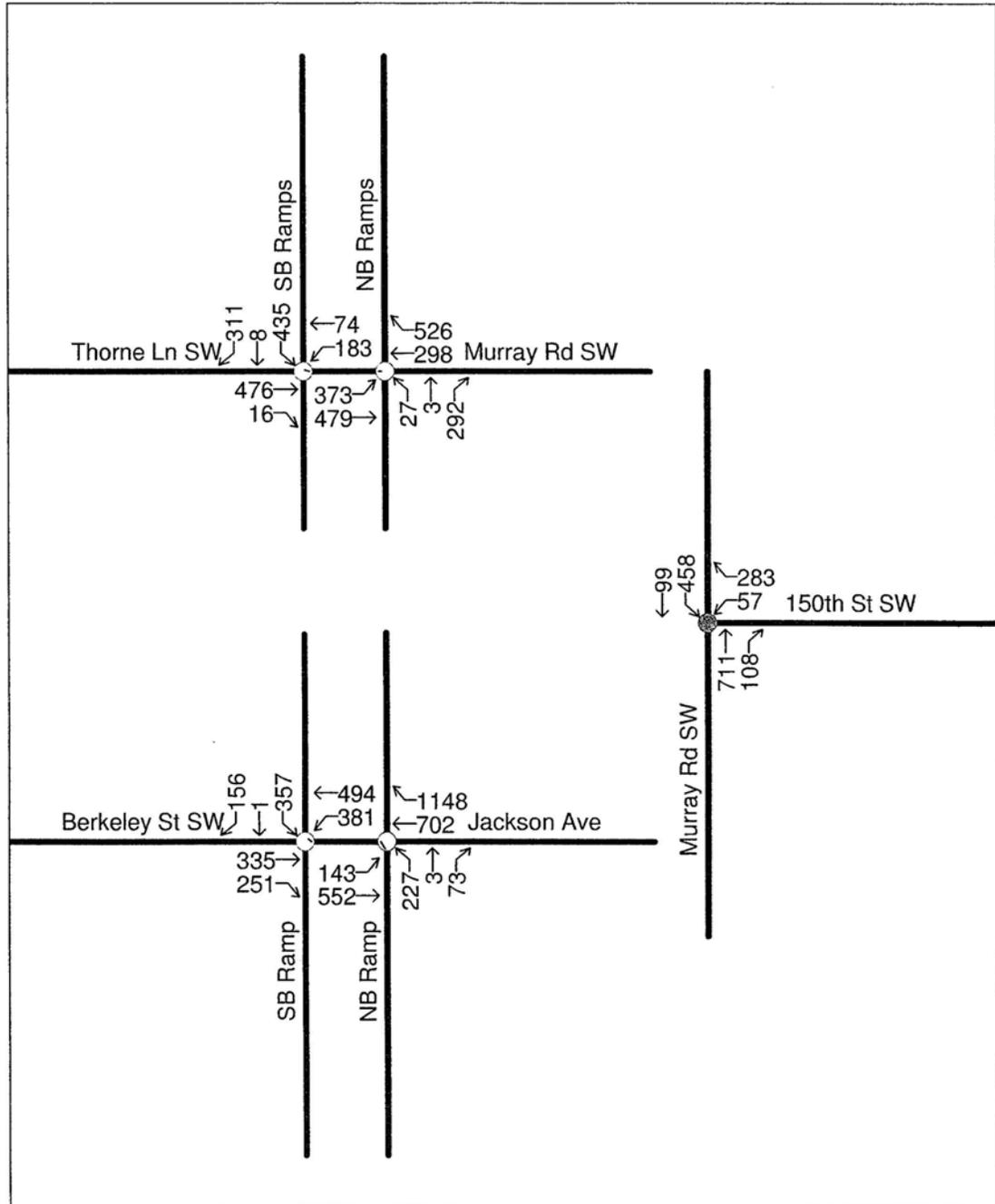
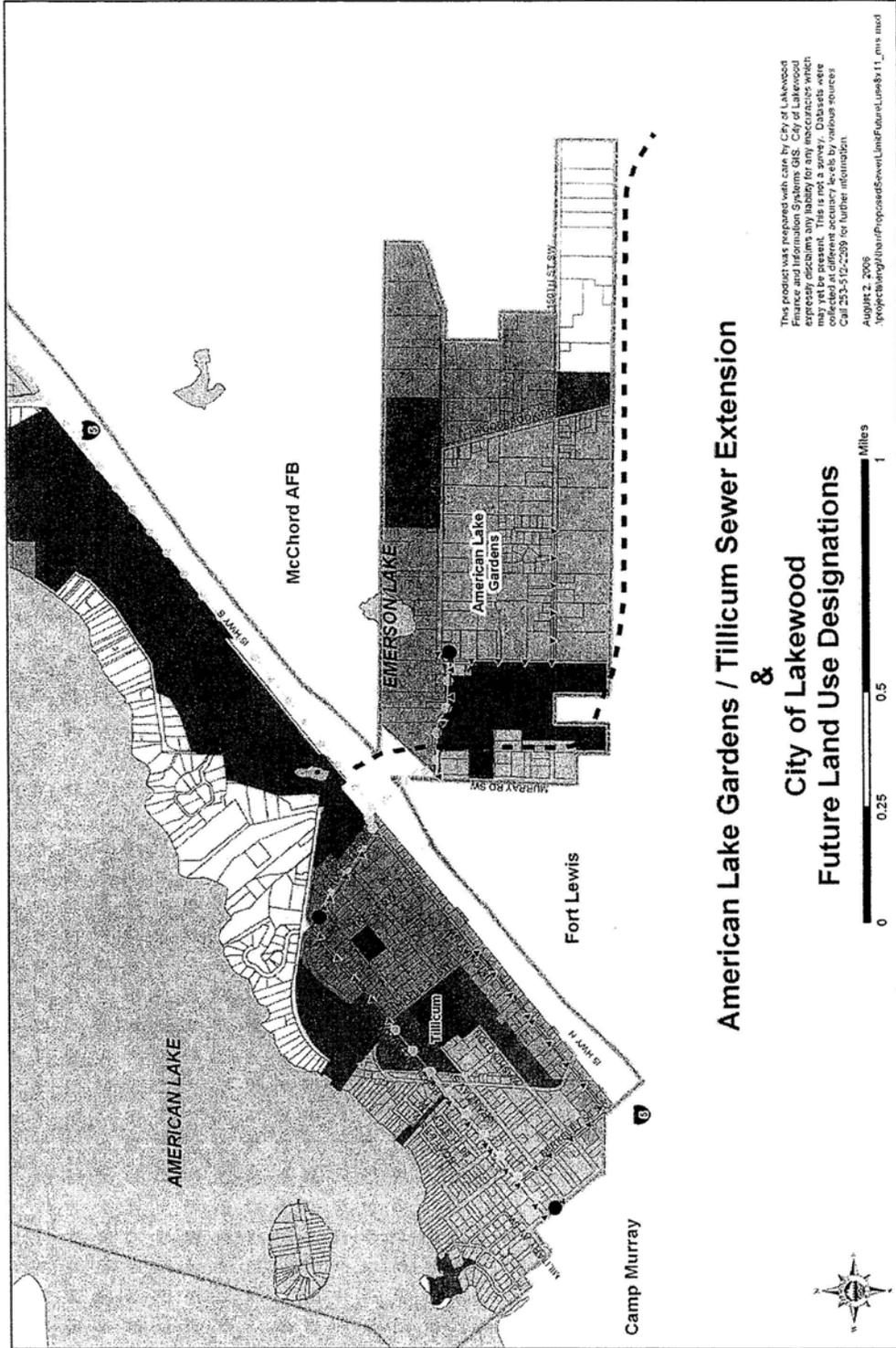


Figure 4
2017 Without Project PM Peak Hour Traffic Volumes



**Figure 5
Future Land Use**

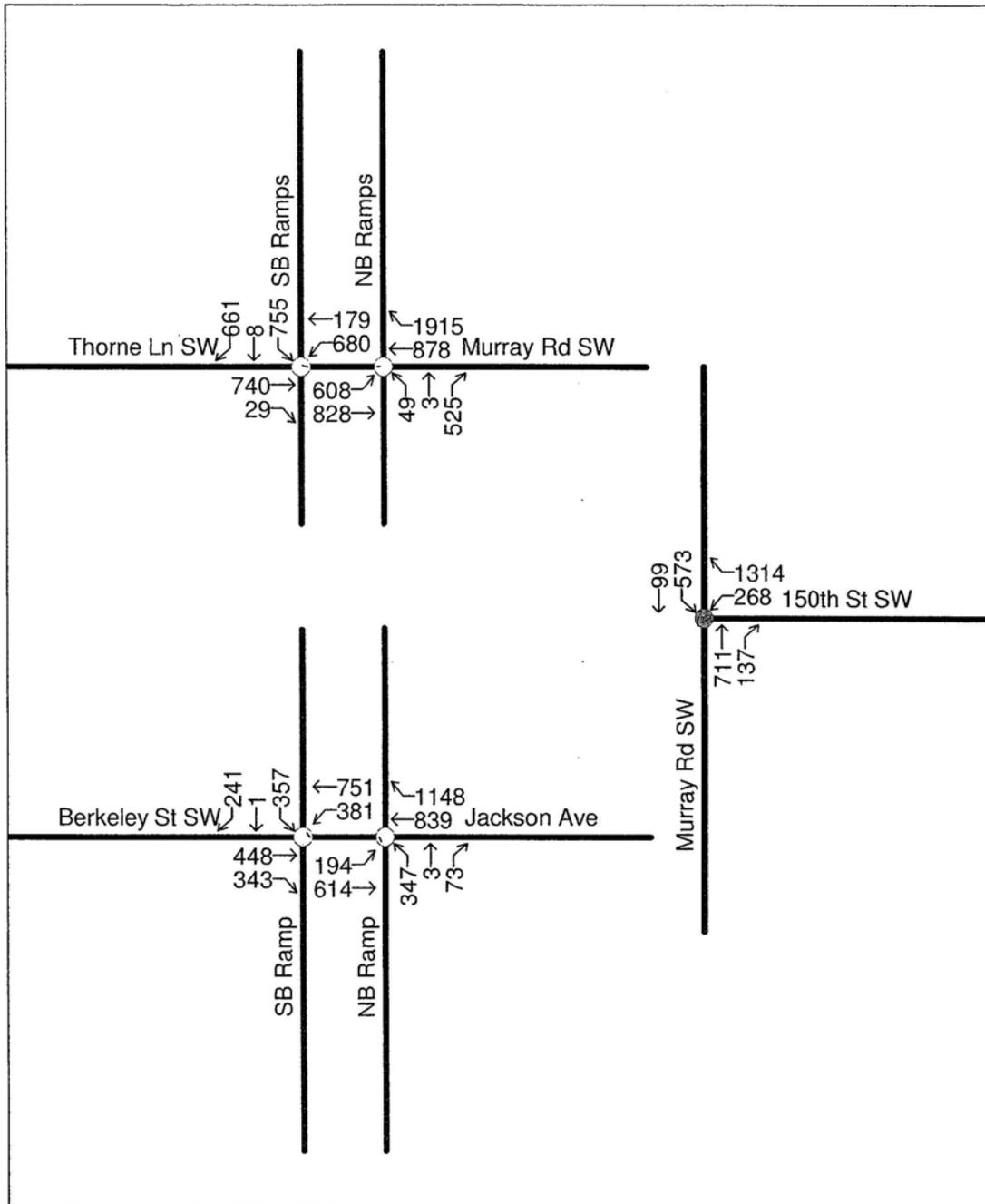


Figure 7
2017 With Project PM Peak Hour Traffic Volumes

ATTACHMENTS

Synchro LOS Summary Sheets

2007 Existing PM
1: Berkeley St SW & SB Ramp

4/23/2007

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Configurations	0	1863	1583	0	1824	0	0	0	0	1775	1583	0
Total Lost Time (s)	0	1863	1583	0	1824	0	0	0	0	1775	1583	0
Satd. Flow (prot)	0	1863	1583	0	1824	0	0	0	0	1775	1583	0
Flt Permitted	0	1863	1583	0	1824	0	0	0	0	1775	1583	0
Satd. Flow (perm)	0	289	216	328	426	0	0	0	0	308	1	134
Volume (vph)	0.97	0.97	0.94	0.94	0.94	0.99	0.99	0.99	0.99	0.84	0.84	0.84
Peak Hour Factor	0	288	223	349	453	0	0	0	0	367	1	180
Adj. Flow (vph)	0	288	223	0	802	0	0	0	0	368	180	180
Lane Group Flow (vph)	0	288	223	0	802	0	0	0	0	368	180	180
Turn Type		Perm	Split	Split	Split					Split	Perm	Perm
Protected Phases	2	7	6	4	7	6	4			1	1	1
Permitted Phases	2	7	6	4	7	6	4			1	1	1
Detector Phases	6	6	6	6	6	6	6			6	6	6
Minimum Initial (s)	22.7	22.7	22.7	22.7	22.7	22.7	22.7			20.5	20.5	20.5
Minimum Split (s)	0.0	34.7	34.7	86.7	86.7	0.0	0.0	0.0	0.0	89.5	89.5	89.5
Total Split (%)	0.0%	16.5%	16.5%	41.1%	41.1%	0.0%	0.0%	0.0%	0.0%	42.4%	42.4%	42.4%
Max Yellow Time (s)	3.0	3.0	3.0	3.7	3.7					3.5	3.5	3.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7					3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lag	Lag					Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes					Yes	Yes	Yes
Vehicle Extension (s)	4.7	4.7	4.7	4.7	4.7					3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0					0.9	0.9	0.9
Time Before Reduce (s)	6.0	6.0	6.0	6.0	6.0					30.0	30.0	30.0
Time To Reduce (s)	20.0	20.0	20.0	20.0	20.0					20.0	20.0	20.0
Recall Mode	Min	Min	Min	Min	Min					None	None	None
Walk Time (s)	6.0	6.0	6.0	6.0	6.0					6.0	6.0	6.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0					10.0	10.0	10.0
Pedestrian Calls (#/hr)	20	20	20	20	20					20	20	20
Act Effct Green (s)	30.8	30.8	30.8	30.8	30.8					43.0	43.0	43.0
Acted g/c Ratio	0.18	0.18	0.18	0.18	0.18					0.25	0.25	0.25
Control Delay	92.8	41.4	19.7	40.8	60.8					9.8	0.31	7.3
Queue Delay	0.0	0.0	0.0	40.8	60.8					0.0	0.0	0.0
Total Delay	92.8	41.4	19.7	40.8	60.8					9.8	0.31	7.3
LOS	F	D	D	E	E					E	E	A
Approach Delay	70.8	41.4	19.7	40.8	60.8					59.5	0.31	7.3
Approach LOS	E	D	D	E	E					D	D	A
90th %ile Green (s)	30.0	30.0	30.0	30.0	30.0					58.1	58.1	58.1
90th %ile Term Code	Max	Max	Max	Max	Max					Gap	Gap	Gap
70th %ile Green (s)	30.0	30.0	30.0	30.0	30.0					48.7	48.7	48.7
70th %ile Term Code	Max	Max	Max	Max	Max					Gap	Gap	Gap
50th %ile Green (s)	30.0	30.0	30.0	30.0	30.0					41.8	41.8	41.8
50th %ile Term Code	Max	Max	Max	Max	Max					Gap	Gap	Gap
30th %ile Green (s)	30.0	30.0	30.0	30.0	30.0					36.2	36.2	36.2
30th %ile Term Code	Max	Max	Max	Max	Max					Gap	Gap	Gap
10th %ile Green (s)	30.0	30.0	30.0	30.0	30.0					29.7	29.7	29.7

2007 Existing PM
1: Berkeley, SJ SW & SB Ramp

4/23/2007

Lane Group	e4	e6	e7	e8
	Max	Hold	Max	Max
10th %ile Term Code				
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap Reducin				
Spillback Cap Reducin				
Storage Cap Reducin				
Reduced v/c Ratio				

Intersection Summary

American Lake Gardens
Parametrix, Inc.

2007 Existing PM
2: Berkeley & NB Ramp

4/23/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	0	1844	0	0	1863	1553	0	1775	1563	0	0	0
Satd. Flow (prot)	0	1844	0	0	1863	1553	0	1775	1563	0	0	0
Flt Permitted	0	1844	0	0	1863	1553	0	1775	1563	0	0	0
Satd. Flow (perm)	123	476	0	0	605	889	196	3	63	0	0	0
Minimum Flow (vph)	0.97	0.97	0.97	0.93	0.93	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Peak Hour Factor	127	491	0	0	651	1063	213	3	68	0	0	0
Adj. Flow (vph)	0	618	0	0	651	1063	0	216	68	0	0	0
Lane Group Flow (vph)	Split	126	126	8	Free	Free	Split	7	7	7	7	7
Turn Type	Split	126	126	8	Free	Free	Split	7	7	7	7	7
Protected Phases												
Permitted Phases	126	126		8	Free	Free	7	7	7	7	7	7
Detector Phases												
Minimum Initial (s)												
Minimum Split (s)												
Total Split (s)	136.7	136.7	0.0	0.0	44.7	0.0	29.5	29.5	29.5	0.0	0.0	0.0
Total Split (%)	64.8%	64.8%	0.0%	0.0%	21.2%	0.0%	14.0%	14.0%	14.0%	0.0%	0.0%	0.0%
Maximum Green (s)	40.0	40.0	0.0	0.0	25.0	25.0	25.0	25.0	25.0	0.0	0.0	0.0
Yellow Time (s)	3.7	3.7	0.0	0.0	3.5	3.5	3.5	3.5	3.5	0.0	0.0	0.0
All-Red Time (s)	1.0	1.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Lead/Lag												
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Precedence (s)	20	20	20	20	20	20	20	20	20	20	20	20
Act-Elct Green (s)	40.8	168.8			40.8	168.8			40.8	168.8		
Accuated g/C Ratio	0.24	1.00			0.24	1.00			0.24	1.00		
v/c Ratio	0.63	1.44	0.67		0.80	0.23			0.80	0.23		
Control Delay	255.7	2.3	2.3		91.8	16.1			91.8	16.1		
Queue Delay	1.7	37.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.9	293.6	2.3		91.8	16.1			91.8	16.1		
LOS	A	F	A		F	A			F	A		
Approach Delay	3.9	112.9	73.7		73.7				73.7			
Approach LOS	A	F	E		E				E			
90th %ile Green (s)	40.0	40.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
90th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	40.0	40.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
70th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	40.0	40.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
50th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
30th %ile Green (s)	40.0	40.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
30th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
10th %ile Green (s)	40.0	40.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
10th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max

American Lake Gardens
Parametrix, Inc.

2007 Existing PM
2: Berkeley & NB Ramp

4/23/2007

Lane Group	e1	e2	e4	e6
Lane Configurations				
Total Lost Time (s)				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Satd. Flow (RTOR)				
Volume (vpp)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type	1	2	4	6
Protected Phases				
Permitted Phases				
Detector Phases				
Minimum Initial (s)	6.0	6.0	4.0	4.0
Minimum Spill (s)	20.5	22.7	10.5	10.5
Total Split (s)	89.5	34.7	12.5	12.5
Total Split (%)	42%	16%	6%	6%
Maximum Green (s)	85.0	30.0	8.0	8.0
Yellow Time (s)	3.5	3.7	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes		
Vehicle Extension (s)	3.0	4.7	3.0	3.0
Minimum Gap (s)	0.9	3.0	0.2	0.2
Time Before Reduce (s)	30.0	6.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	0.0	0.0
Recall Mode	None	Min	Min	Min
Walk Time (s)	6.0	6.0		
Flash Dont Walk (s)	10.0	12.0		
Pedestrian Calls (#/hr)	20	20		
Act Elct Green (s)				
Act Elct Green (s)				
g/C Ratio				
Queue Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				
90th %ile Green (s)	59.1	30.0	8.0	8.0
90th %ile Term Code	Gap	Max	Max	Hold
70th %ile Green (s)	48.7	30.0	8.0	8.0
70th %ile Term Code	Gap	Max	Max	Hold
50th %ile Green (s)	41.8	30.0	8.0	8.0
50th %ile Term Code	Gap	Max	Max	Hold
30th %ile Green (s)	36.2	30.0	8.0	8.0
30th %ile Term Code	Gap	Max	Max	Hold
10th %ile Green (s)	29.7	30.0	8.0	8.0

2007 Existing PM
2: Berkeley & NB Ramp

4/23/2007

Lane Group	e1	e2	e4	e6
10th %ile Term Code	Gap	Max	Max	Hold
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap Reductn				
Spillback Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				

2007 Existing PM
2: Berkeley & NB Ramp

4/23/2007

Lane Group	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR
10th %ile Term Code	24										
Queue Length 50th (ft)	-966						233	1			
Queue Length 95th (ft)	#1368						#420	52			
Internal Link Dist (ft)	780						920				588
Turn Bay Length (ft)											
Base Capacity (vph)	1005			451	1583		269	287			
Starvation Cap Reductn	226			0	0		0	0			
Spillback Cap Reductn	0			25	0		0	0			
Storage Cap Reductn	0			0	0		0	0			
Reduced v/c Ratio	0.79			1.53	0.67		0.80	0.23			

Intersection Summary
Cycle Length: 210.9
Actuated Cycle Length: 168.8
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.44
Intersection Signal Delay: 82.9
Intersection Capacity Utilization: 84.7%
Analysis Period (min): 15
90th %ile Actuated Cycle: 184
70th %ile Actuated Cycle: 174.6
50th %ile Actuated Cycle: 167.7
30th %ile Actuated Cycle: 162.1
10th %ile Actuated Cycle: 155.6

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70th %ile Actuated Cycle: 174.6
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10th %ile Actuated Cycle: 155.6



2007 Existing PM
3: Thorne Ln SW & SB Ramp

4/23/2007

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1863	1583	0	1765	0	0	0	0	0	1758	1588
Flt Permitted					0.966						0.953	
Satd. Flow (perm)	0	1863	1385	0	1765	0	0	0	0	0	1758	1352
Satd. Flow (RTOR)	0	410	14	158	64	0	0	0	0	0	375	7
Volume (vph)												
Conit. Peds. (#/hr)	0.93	0.93	0.93	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.97
Peak Hour Factor	2%	2%	2%	4%	4%	4%	2%	2%	2%	3%	3%	3%
Heavy Vehicles (%)	0	441	15	203	82	0	0	0	0	43	8	308
Adj. Flow (vph)	0	441	15	203	82	0	0	0	0	43	8	308
Lane Group Flow (vph)	0	441	15	203	82	0	0	0	0	43	8	308
Turn Type		Perm	Split	Split	Split					Split	custom	
Protected Phases	2	2	2	7	7	7	4	4	4	1	1	1
Permitted Phases												
Reflection Phases	2	2	2	7	7	7	4	4	4	1	1	1
Minimum Yellow (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	6.0	6.0	6.0
Minimum Split (s)	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	21.5	21.5	21.5
Total Split (s)	0.0	44.5	44.5	80.0	80.0	80.0	0.0	0.0	0.0	79.5	79.5	79.5
Total Spill (%)	0.0%	21.8%	21.8%	39.2%	39.2%	39.2%	0.0%	0.0%	0.0%	39.0%	39.0%	39.0%
Maximum Green (s)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	75.0	75.0	75.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min	Min	None	None	None
Walk Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flash Dont Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	20	20	20	20	20	20	20	20	20	49.3	49.3	49.3
Act Effct Green (s)	0.28	0.28	0.28	0.37	0.37	0.37	0.37	0.37	0.37	0.30	0.30	0.30
Actuated g/C Ratio	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.85	0.85	0.85
VC Ratio	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	70.5	70.5	70.5
Control Delay	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0
Queue Delay	87.9	87.9	87.9	43.2	43.2	43.2	43.2	43.2	43.2	70.5	70.5	70.5
LOS	F	F	F	D	D	D	D	D	D	E	E	A
Approach Delay	86.4	86.4	86.4	7.5	7.5	7.5	7.5	7.5	7.5	45.5	45.5	45.5
Approach LOS	F	F	F	A	A	A	A	A	A	D	D	D
90th %ile Green (s)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	75.0	75.0	75.0
90th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	65.7	65.7	65.7
70th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Gap	Gap	Gap
50th %ile Green (s)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	56.2	56.2	56.2
50th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Gap	Gap	Gap
30th %ile Green (s)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	36.2	36.2	36.2

2007 Existing PM
3: Thorne Ln SW & SB Ramp

4/23/2007

Lane Group	e4	e6	e7	e8
Lane Configurations				
Total Lost Time (s)				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Satd. Flow (RTOR)				
Volume (vph)				
Confl. Peds. (#/hr)				
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type	4	6	7	8
Predicted Phases				
Permitted Phases				
Detour Phases				
Minimum Initial (s)	1.0	1.0	4.0	6.0
Minimum Split (s)	6.0	6.0	22.5	22.5
Total Split (s)	11.0	11.0	24.5	44.5
Total Split (%)	5%	5%	12%	22%
Maximum Green (s)	6.0	6.0	20.0	40.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.0	1.0
Lead/Lag			Lead	Lag
Lead-Lag Optimize?			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	20.0	20.0
Recall Mode	None	None	None	None
Walk Time (s)	12.0	6.0	6.0	6.0
Flash Dont Walk (s)				
Pedestrian Calls (#/hr)				
Act Elicit Green (s)				
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				
90th %ile Green (s)	6.0	6.0	20.0	40.0
90th %ile Term Code	Max	Max	Max	Max
70th %ile Green (s)	6.0	6.0	20.0	40.0
70th %ile Term Code	Max	Hold	Max	Max
50th %ile Green (s)	6.0	6.0	18.0	40.0
50th %ile Term Code	Max	Hold	Ped	Max
30th %ile Green (s)	6.0	6.0	10.1	26.1

2007 Existing PM
3: Thorne Ln SW & SB Ramp

4/23/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	GBR
30th %ile Green (s)	Max											
10th %ile Green (s)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
10th %ile Term Code	Max											
Queue Length 50th (ft)	-585	8	8	8	8	8	8	8	8	8	8	8
Queue Length 95th (ft)	#950	35	35	35	35	35	35	35	35	35	35	35
Internal Lnk. Dist (ft)	920	186	186	186	186	186	420	420	420	420	420	420
Turn Bay Length (ft)	478	380	380	478	380	380	765	765	765	765	765	765
Base Capacity (Veh)	0	0	0	0	0	0	195	195	195	195	195	195
Starvation Cap. Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap. Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap. Reduction	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.04	0.04	0.92	0.04	0.04	0.50	0.50	0.50	0.52	0.35	0.35
Intersection Summary												
Cycle Length: 204												
Actuated Cycle Length: 166.9												
Natural Cycle: 130												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.96												
Intersection Signal Delay: 50.7												
Intersection Capacity Utilization: 64.8%												
Analysis Period (min): 15												
90th %ile Actuated Cycle: 194.7												
50th %ile Actuated Cycle: 183.2												
10th %ile Actuated Cycle: 143.4												
100th %ile Actuated Cycle: 109												
- Volume exceeds capacity, queue is theoretically infinite.												
- Queue shown is maximum after two cycles.												
# 95th percentile volume exceeds capacity, queue may be longer.												
- Queue shown is maximum after two cycles.												
Spits and Phases: 3: Thorne Ln SW & SB Ramp												

2007 Existing PM
3: Thorne Ln SW & SB Ramp

4/23/2007

Lane Group	e4	e6	e7	e8
30th %ile Term Code	Max	Hold	Gap	Gap
10th %ile Green (s)	6.0	6.0	4.0	14.6
10th %ile Term Code	Max	Hold	Min	Gap
Queue Length 50th (ft)				
Queue Length 85th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap Reductn				
Spillback Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				
Intersection Summary				

2007 Existing PM
4: Thorne Ln & NB Ramp

4/23/2007

Lane Group	EBL	EBT	EBR	WBL	WBR	NBL	NBT	SBL	SBT	SSR
Lane Configurations	4	4	4	4	4	4	4	4	4	4
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1824	0	0	1853	1583	1770	1587	0	0
Flt Permitted	0	0.979	0	0	0.950	0.950	0.950	0	0	0
Satd. Flow (perm)	0	1824	0	0	1853	1583	1770	1587	0	0
Satd. Flow (RTOR)	321	413	0	0	257	453	23	3	252	0
Volume (vph)	0.95	0.95	0.95	0.90	0.90	0.90	0.82	0.82	0.82	0.95
Peak Hour Factor	338	435	0	0	286	503	58	44	307	0
Adj. Flow (vph)	0	773	0	0	286	503	58	311	0	0
Lane Group Flow (vph)	0	773	0	0	286	503	58	311	0	0
Turn Type	Spill	Spill	Spill	Spill	Spill	Spill	Spill	Spill	Spill	Spill
Protected Phases	1, 2, 6	1, 2, 6	8	8	8	7	7	7	7	7
Detector Phases	1, 2, 6	1, 2, 6	8	8	8	7	7	7	7	7
Minimum Initial (s)	6.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	135.0	135.0	0.0	0.0	44.5	44.5	24.5	24.5	0.0	0.0
Total Split (%)	66.2%	66.2%	0.0%	0.0%	21.8%	21.8%	12.0%	12.0%	0.0%	0.0%
Maximum Green (s)	40.0	40.0	20.0	20.0	40.0	40.0	20.0	20.0	0.0%	0.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimizae?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Recall Mode	None	None	None	None	None	None	None	None	None	None
Walk Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Pedestrian Calls (#/hr)	107.9									
Act Effct Green (s)	0.65									
Actuated g/C Ratio	0.86									
v/c Ratio	3.1									
Control Delay	4.6									
Queue Delay	4.4									
Total Delay	4.4									
LOS	F									
Approach Delay	69.4									
Approach LOS	A									
90th %ile Green (s)	40.0	40.0	20.0	20.0	40.0	40.0	20.0	20.0	40.0	40.0
90th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	40.0	40.0	20.0	20.0	40.0	40.0	20.0	20.0	40.0	40.0
70th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	40.0	40.0	18.0	18.0	40.0	40.0	18.0	18.0	40.0	40.0
50th %ile Term Code	Max	Max	Ped	Ped	Max	Max	Ped	Ped	Max	Max
30th %ile Green (s)	28.1	28.1	10.1	10.1	28.1	28.1	10.1	10.1	28.1	28.1
30th %ile Term Code	Gap	Gap	Gap	Gap	Gap	Gap	Gap	Gap	Gap	Gap
10th %ile Green (s)	14.6	14.6	4.0	4.0	14.6	14.6	4.0	4.0	14.6	14.6

2007 Existing PM
4: Thorne Ln & NB Ramp

4/23/2007

Lane Group	e1	e2	e4	e6
Lane Configurations				
Total Lost Time (s)				
Start Flow (gph)				
Permitted Phases				
Satd. Flow (norm)				
Satd. Flow (RTOR)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type	1	2	4	6
Protected Phases				
Permitted Phases				
Detector Phases				
Minimum Initial (s)	6.0	8.0	1.0	1.0
Minimum Spill (s)	21.5	23.5	6.0	6.0
Total Spill (s)	79.5	44.5	11.0	11.0
Total Spill (%)	39%	22%	5%	5%
Maximum Green (s)	75.0	40.0	6.0	6.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.5	1.5
Lead/Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes		
Vehicle Extension (s)	4.7	4.7	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	20.0	20.0
Recall Mode	None	Min	None	None
Walk Time (s)	6.0	6.0		
Pedestrian Calls (phr)	11.0	13.0		
Act/Elctd Green (s)	0	0		
Act/Elctd G/C Ratio				
Vic Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				
90th %ile Green (s)	75.0	40.0	6.0	6.0
90th %ile Term Code	Max	Max	Max	Max
70th %ile Green (s)	65.7	40.0	6.0	6.0
70th %ile Term Code	Gap	Max	Max	Hold
50th %ile Green (s)	56.2	40.0	6.0	6.0
50th %ile Term Code	Gap	Max	Max	Hold
30th %ile Green (s)	36.2	40.0	6.0	6.0
30th %ile Term Code	Gap	Max	Max	Hold
10th %ile Green (s)	21.4	40.0	6.0	6.0

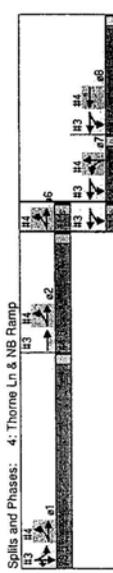
2007 Existing PM
4: Thorne Ln & NB Ramp

4/23/2007

Lane Group	ø1	ø2	ø4	ø6
10th %ile Term Code	Gap	Max	Max	Hold
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap. Reductn				
Spillback Cap. Reductn				
Storage Cap. Reductn				
Reduced v/c Ratio				

Intersection Summary

Cycle Length: 204
 Actuated Cycle Length: 166.9
 Natural Cycle: 130
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 35.2
 Intersection Capacity Utilization: 93.3%
 Analysis Period (min): 15
 50th %ile Actuated Cycle: 204
 70th %ile Actuated Cycle: 194.7
 50th %ile Actuated Cycle: 183.2
 30th %ile Actuated Cycle: 143.4
 10th %ile Actuated Cycle: 109
 # 95th percentile volume exceeds capacity, queue may be longer.
 m Queue shows maximum after two cycles.
 n Volume for 95th percentile queue is metered by upstream signal.



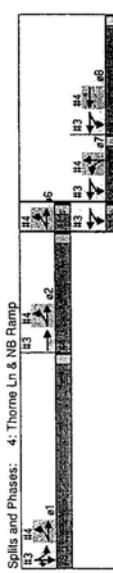
2007 Existing PM
4: Thorne Ln & NB Ramp

4/23/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
10th %ile Term Code											
Queue Length 50th (ft)	0			321	306	31	4				
Queue Length 95th (ft)	m99			483	#601	67	61				
Internal Link Dist (ft)	186			768			420				920
Turn Bay Length (ft)					150	320	473				
Base Capacity (vph)	1179			478	607	230	473				
Starvation Cap. Reductn	234			0	0	0	0				
Spillback Cap. Reductn	0			0	0	0	0				
Storage Cap. Reductn	0			0	0	0	0				
Reduced v/c Ratio	0.82			0.60	0.83	0.12	0.66				

Intersection Summary

Cycle Length: 204
 Actuated Cycle Length: 166.9
 Natural Cycle: 130
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 35.2
 Intersection Capacity Utilization: 93.3%
 Analysis Period (min): 15
 50th %ile Actuated Cycle: 204
 70th %ile Actuated Cycle: 194.7
 50th %ile Actuated Cycle: 183.2
 30th %ile Actuated Cycle: 143.4
 10th %ile Actuated Cycle: 109
 # 95th percentile volume exceeds capacity, queue may be longer.
 m Queue shows maximum after two cycles.
 n Volume for 95th percentile queue is metered by upstream signal.



2007 Existing PM
S: 150th St SW & Murray Rd SW

4/23/2007

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	1673	1497	1829	0	0	1773
Satd. Flow (prot)	0.950					0.961
Flt Permitted	1673	1497	1829	0	0	1773
Satd. Flow (perm)	49	244	613	93	395	85
Volume (vph)	0.96	0.96	0.96	0.96	0.96	0.96
Peak Hour Factor	7%	7%	2%	2%	3%	3%
Heavy Vehicles (%)	2	2	0	0	0	0
Bus Blockages (#/hr)	51	254	639	97	411	89
Adj. Flow (vph)	51	254	639	97	411	89
Lane Group Flow (vph)	51	254	639	97	411	89
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop

Intersection Summary
Control Type: Unsignalized
Intersection Capacity Utilization 77.6%
Analysis Period (min) 15
ICU Level of Service D

2007 Existing PM
S: 150th St SW & Murray Rd SW

4/23/2007

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	51	254	639	97	411	89
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Volume (vph)	49	244	613	93	395	85
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	51	254	639	97	411	89
Direction, Lane #	WB 1	WB 2	NB 1	NB 1	SB 1	SB 1
Volume Total (vph)	51	254	735	500		
Volume Left (vph)	51	0	0	0	411	
Volume Right (vph)	0	254	97	0		
Had (s)	0.52	-0.58	-0.05	0.22		
Departure Headway (s)	8.0	5.8	5.8	6.1		
Degree Utilization, x	0.11	0.48	1.19	0.85		
Capacity (veh/h)	433	511	625	579		
Control Delay (s)	10.3	14.8	121.1	34.8		
Approach Delay (s)	14.2	12.1	34.8			
Approach LOS	B	F	F	D		

Intersection Summary
Delay 71.9
HCM Level of Service F
Intersection Capacity Utilization 77.6%
Analysis Period (min) 15
ICU Level of Service D

2017 Without Project PM
 1: Berkeley St SW & SB Ramp

4/23/2007

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	0	1863	1553	0	1824	0	0	0	0	1773	1583	0
Satd. Flow (prot)	0	1863	1553	0	1824	0	0	0	0	1773	1583	0
Flt Permitted	0	1863	1553	0	1824	0	0	0	0	1773	1583	0
Satd. Flow (perm)	0	335	251	381	484	0	0	0	0	357	1	186
Volume (vph)	0	335	251	381	484	0	0	0	0	357	1	186
Peak Hour Factor	0.97	0.97	0.94	0.94	0.94	0.99	0.99	0.99	0.99	0.84	0.84	0.84
Adj. Flow (vph)	0	345	259	405	526	0	0	0	0	425	1	186
Lane Group Flow (vph)	0	345	259	0	531	0	0	0	0	426	186	0
Turn Type	Perm	Split	Split	Split	Split	Perm	Split	Split	Split	Split	Perm	Perm
Protected Phases	2	7	8	4	7	8	4	7	8	4	7	8
Permitted Phases	2	2	7	8	4	7	8	4	7	8	4	7
Detector Phases	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Initial (s)	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7
Minimum Split (s)	0.0	30.5	30.5	85.5	95.5	0.0	0.0	0.0	0.0	34.0	34.0	34.0
Total Split (s)	0.0%	20.3%	20.3%	57.0%	57.0%	0.0%	0.0%	0.0%	0.0%	22.7%	22.7%	22.7%
Maximum Green (s)	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.5	29.5	29.5
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.5	3.5	3.5
Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead	Lead	Lead	Lead	Lead	Lead	Lead	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes											
Vehicle Extension (s)	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	0.9	0.9	0.9
Time Before Reduce (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	30.0	30.0	30.0
Time To Reduce (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Recall Mode	Min	None	None	None								
Walk Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	10.0	10.0	10.0
Pedestrian Calls (#/hr)	20	20	20	20	20	20	20	20	20	20	20	20
Act Elct Green (s)	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	30.0	30.0	30.0
Act Elct Green (s)	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.20	0.20	0.20
Act Elct Green (s)	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.20	1.20	1.20
Act Elct Green (s)	120.9	120.9	120.9	120.9	120.9	120.9	120.9	120.9	120.9	163.7	163.7	163.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	13.4	13.4
Control Delay	120.9	120.9	120.9	120.9	120.9	120.9	120.9	120.9	120.9	177.2	177.2	177.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	177.2	177.2	177.2
Control Delay	120.9	120.9	120.9	120.9	120.9	120.9	120.9	120.9	120.9	126.1	126.1	126.1
LOS	F	F	F	C	C	F	F	F	F	E	E	A
Approach Delay	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2	82.2
Approach LOS	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
90th %ile Green (s)	Max											
90th %ile Term Code	Max											
70th %ile Green (s)	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
70th %ile Term Code	Max											
50th %ile Green (s)	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
50th %ile Term Code	Max											
30th %ile Green (s)	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
30th %ile Term Code	Max											
10th %ile Green (s)	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
10th %ile Term Code	Max											

2017 Without Project PM
1: Berkeley St SW & SB Ramp

4/23/2007

Lane Group	a4	a6	a7	a8
Lane Configurations				
Total Lost Time (s)				
Satd. Flow (prot)				
Flt P Permitted				
Satd. Flow (perm)				
Satd. Flow (RTOR)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type				
Protected Phases	4	6	7	8
Permitted Phases				
Detector Phases				
Minimum Initial (s)	4.0	4.0	6.0	6.0
Minimum Split (s)	10.5	10.5	22.5	22.7
Total Split (s)	17.5	10.5	23.0	52.0
Maximum Green (s)	7%	7%	15%	35%
Yellow Time (s)	6.0	6.0	18.5	47.3
All-Red Time (s)	3.5	3.5	3.5	3.7
Lead/Lag	1.0	1.0	1.0	1.0
Lead-Lag Optimize?			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	Min	Min	None	None
Walk Time (s)				
Flash Dont Walk (s)				
Pedestrian Calls (#/hr)				
Act Elctc Green (s)				
Actualized g/C Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				
90th %ile Term Code	6.0	6.0	18.5	47.3
70th %ile Green (s)	Max	Max	Max	Max
50th %ile Green (s)	6.0	6.0	18.5	47.3
30th %ile Green (s)	Max	Max	Max	Max
10th %ile Green (s)	6.0	6.0	18.5	47.3

2017 Without Project PM
1: Berkeley St SW & SB Ramp

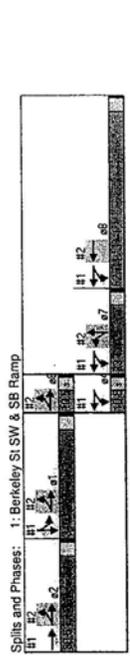
4/23/2007

Lane Group	EBL	EET	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
10th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Queue Length 50th (ft)	-366	96		128								
Queue Length 95th (ft)	#571	198		ms2						#649		52
Internal Link Dist (ft)	920			186			920					
Turn Bay Length (ft)												
Base Capacity (vph)	329	406		981						355		370
Shrinkage Cap Reduction	0	0		0						0		0
Shrinkage Cap Reduction	0	0		176						9		0
Shrinkage Cap Reduction	0	0		0						0		0
Reduced v/c Ratio	1.05	0.64		1.14						1.23		0.40

Intersection Summary
 Cycle Length: 150
 Actuated Cycle Length: 150
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.27
 Intersection Signal Delay: 93.7
 Intersection Capacity Utilization: 94.5%
 Analysis Period (min): 150
 70th %ile Actuated Cycle: 150
 50th %ile Actuated Cycle: 150
 30th %ile Actuated Cycle: 150
 10th %ile Actuated Cycle: 150

Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Intersection LOS: F
 ICU Level of Service F



2017 Without Project PM
1: Berkeley St SW & SB Ramp

4/23/2007

Lane Group	e4	e6	e7	e8
	Max	Hold	Max	Max
10th %ile Term Code				
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap Reduction				
Stallback Cap Reduction				
Storage Cap Reduction				
Reduced v/c Ratio				
Intersection Summary				

2017 Without Project PM
2: Berkeley & NB Ramp

4/23/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	0	1844	0	0	1863	1583	0	1775	1583	0	0	0
Satd. Flow (prot)	0	0.990	0	0	0.953	0	0	0.953	0	0	0	0
Flt Permitted	0	1844	0	0	1863	1583	0	1775	1583	0	0	0
Satd. Flow (perm)	143	552	0	0	702	1148	227	3	73	0	0	0
Volume (vph)	0.97	0.97	0.97	0.93	0.93	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Peak Hour Factor	147	569	0	0	755	1234	247	3	79	0	0	0
Adj. Flow (vph)	0	716	0	0	755	1234	0	250	79	0	0	0
Lane Group Flow (vph)	Split	Split	Free	Free	Split	Split	Free	Split	Perm	Perm	Perm	Perm
Turn Type	1 2 6	1 2 6	8	8	7	7	7	7	7	7	7	7
Protected Phases	1 2 6	1 2 6	8	8	7	7	7	7	7	7	7	7
Permitted Phases	1 2 6	1 2 6	8	8	7	7	7	7	7	7	7	7
Detector Phases												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Minimum Split (%)	75.0	75.0	0.0	0.0	52.0	0.0	23.0	23.0	23.0	0.0	0.0	0.0
Total Split (s)	50.0%	50.0%	0.0%	0.0%	34.7%	0.0%	15.3%	15.3%	15.3%	0.0%	0.0%	0.0%
Total Split (%)												
Maximum Green (s)	47.3	47.3	3.7	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Yellow Time (s)	3.7	3.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
All-Red Time (s)	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lead/Lag	Lag											
Lead-Lag Optimize?	Yes											
Vehicle Extension (s)	0.2	0.2	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Minimum Gap (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to Reduce (s)	None											
Prestart Modes	12.0	12.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Walk Time (s)	12.0	12.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flash Dont Walk (s)	20	20	20	20	20	20	20	20	20	20	20	20
Pedestrian Calls (#/hr)	48.0	150.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Act Effct Green (s)	0.47	0.32	1.00	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Actuated g/C Ratio	0.82	1.27	0.78	1.11	0.29	1.11	0.29	1.11	0.29	1.11	0.29	1.11
v/c Ratio	9.8	174.7	3.9	150.7	14.5	150.7	14.5	150.7	14.5	150.7	14.5	150.7
Control Delay	29.2	58.4	0.0	5.8	0.0	5.8	0.0	5.8	0.0	5.8	0.0	5.8
Queue Delay	39.1	233.1	3.9	156.5	14.5	156.5	14.5	156.5	14.5	156.5	14.5	156.5
Total Delay	D	D	F	A	F	A	F	F	F	F	F	F
LOS	D	D	D	A	F	A	F	F	F	F	F	F
Approach Delay	39.1	90.9	122.4	122.4	122.4	122.4	122.4	122.4	122.4	122.4	122.4	122.4
Approach LOS	D	D	F	F	F	F	F	F	F	F	F	F
90th %ile Green (s)	47.3	47.3	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
90th %ile Term Code	Max											
70th %ile Green (s)	47.3	47.3	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
70th %ile Term Code	Max											
50th %ile Green (s)	47.3	47.3	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
50th %ile Term Code	Max											
30th %ile Green (s)	47.3	47.3	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
30th %ile Term Code	Max											
10th %ile Green (s)	47.3	47.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
10th %ile Term Code	Max											

2017 Without Project PM
 2: Berkeley & NB Ramp

4/23/2007

	e1	e2	e4	e6
Lane Group				
Lane Configurations				
Total Lost Time (s)				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Satd. Flow (RTOR)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type				
Permitted Phases	1	2	4	6
Detector Phases				
Minimum Initial (s)	6.0	6.0	4.0	4.0
Minimum Split (s)	20.5	22.7	10.5	10.5
Total Split (s)	34.0	30.5	10.5	10.5
Total Split (%)	23%	20%	7%	7%
Maximum Green (s)	29.5	25.8	6.0	6.0
Yellow Time (s)	3.5	3.7	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		
Vehicle Extension (s)	3.0	4.7	3.0	3.0
Minimum Gap (s)	0.9	3.0	0.2	0.2
Time Before Reduce (s)	30.0	6.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	0.0	0.0
Recall Mode	None	Min	Min	Min
Walk Time (s)	6.0	6.0		
Flash Dont Walk (s)	10.0	12.0		
Act Effic Green (s)				
Act Effic G/C Ratio	20	20		
Queue Delay				
Control Delay				
LOS				
Approach Delay				
Approach LOS				
90th %ile Green (s)	29.5	25.8	6.0	6.0
90th %ile Term Code	Max	Max	Max	Max
70th %ile Green (s)	29.5	25.8	6.0	6.0
70th %ile Term Code	Max	Max	Max	Max
50th %ile Green (s)	29.5	25.8	6.0	6.0
50th %ile Term Code	Max	Max	Max	Max
30th %ile Green (s)	29.5	25.8	6.0	6.0
30th %ile Term Code	Max	Max	Max	Max
10th %ile Green (s)	29.5	25.8	6.0	6.0
10th %ile Term Code	Max	Max	Max	Max

Lane Group	ø1	ø2	ø4	ø6
10th %ile Term Code	Max	Max	Max	Hold
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Storage Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
10th %ile Term Code	105											
Queue Length 50th (ft)	m38											
Queue Length 95th (ft)	186											
Internal Link Dist (ft)	873											
Turn Bay Length (ft)	188											
Base Capacity (vph)	0											
Storage Cap Reductn	0											
Storage Cap Reductn	0											
Reduced v/c Ratio	1.05											

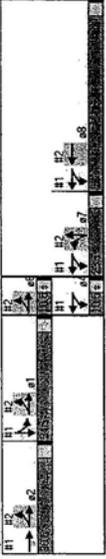
Intersection Summary

Intersection Summary

Cycle Length: 150
 Actuated Cycle Length: 150
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.27
 Intersection Signal Delay: 82.1
 Intersection Capacity Utilization 95.6%
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 150
 70th %ile Actuated Cycle: 150
 50th %ile Actuated Cycle: 150
 30th %ile Actuated Cycle: 150
 10th %ile Actuated Cycle: 150
 - Volume exceeds capacity, queue is theoretically infinite.
 # Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 m Volume shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Cycle Length: 150
 Actuated Cycle Length: 150
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.27
 Intersection Signal Delay: 82.1
 Intersection Capacity Utilization 95.6%
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 150
 70th %ile Actuated Cycle: 150
 50th %ile Actuated Cycle: 150
 30th %ile Actuated Cycle: 150
 10th %ile Actuated Cycle: 150
 - Volume exceeds capacity, queue is theoretically infinite.
 # Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 m Volume shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Berkeley & NB Ramp



2017 Without Project PM
3: Thorne Ln SW & SB Ramp

4/23/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	0	4	4	4	4	4	4	4	4	4	4
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1863	1583	0	1765	0	0	0	0	0	1758	1568
Flt Permitted	0	1863	1429	0	1966	0	0	0	0	0	1758	1401
Satd. Flow (perm)	0	476	16	183	74	0	0	0	0	0	435	8
Volume (vph)	0	476	16	183	74	0	0	0	0	0	435	8
Confl. Feeds: (#/hr)	0.93	0.93	0.93	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87	0.87
Peak Hour Factor	2%	2%	2%	4%	4%	2%	2%	2%	3%	3%	3%	3%
Heavy Vehicles (%)	0	512	17	235	95	0	0	0	0	0	509	357
Adj. Flow (vph)	0	512	17	235	95	0	0	0	0	0	509	357
Lane Group Flow (vph)	0	512	17	235	95	0	0	0	0	0	509	357
Turn Time (s)	2	Perm	2	784	784	2	2	2	2	2	784	784
Permitted Phases	2	2	2	784	784	2	2	2	2	2	784	784
Detector Phases	2	2	2	784	784	2	2	2	2	2	784	784
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5
Total Split (s)	0.0	44.2	44.2	59.2	59.2	0.0	0.0	0.0	0.0	0.0	42.1	42.1
Total Split (%)	0.0%	29.5%	29.5%	39.5%	39.5%	0.0%	0.0%	0.0%	0.0%	0.0%	31.1%	31.1%
Maximum Green (s)	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flash Dont Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)	20	20	20	20	20	20	20	20	20	20	20	20
Act Elct Green (s)	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3
Act Elct Red (s)	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Act Elct G/C Ratio	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Cyc Ratio	87.6	25.4	87.6	25.4	87.6	25.4	87.6	25.4	87.6	25.4	87.6	25.4
Control Delay	0.0	0.0	0.0	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay	0.0	0.0	0.0	5.9	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.0	0.0	0.0	5.9	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS	F	F	F	C	C	F	F	F	F	F	F	F
Approach Delay	85.6	85.6	85.6	53.8	53.8	85.6	85.6	85.6	85.6	85.6	85.6	85.6
Approach LOS	F	F	F	A	A	F	F	F	F	F	F	F
90th %ile Green (s)	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7
90th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
70th %ile Green (s)	38.7	38.7	38.7	38.7	38.7	38.7	38.7	38.7	38.7	38.7	38.7	38.7
70th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
50th %ile Green (s)	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7	35.7
50th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
30th %ile Green (s)	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7

2017 Without Project PM
3: Thorne Ln SW & SB Ramp

4/23/2007

Lane Group	e4	e6	e7	e8
Lane Configurations				
Total Lost Time (s)	4	6	7	8
Satd. Flow (prot)	1.0	4.0	6.0	6.0
Flt Permitted	6.0	6.0	22.5	22.5
Satd. Flow (perm)	4%	4%	15%	20%
Satd. Flow (RTOR)	1.0	1.0	18.0	26.2
Volume (vph)	3.5	3.5	3.5	3.5
Contnl. Peds. (#/hr)	1.5	1.5	1.0	1.0
Peak Hour Factor				
Heavy Vehicles (%)				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Protected Phases				
Detector Phases				
Minimum Initial (s)	1.0	4.0	6.0	6.0
Minimum Split (s)	6.0	6.0	22.5	22.5
Total Split (s)	4%	4%	15%	20%
Maximum Green (s)	1.0	1.0	18.0	26.2
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.0	1.0
Lead/Lag			Lag	Lead
Lead-Lag Optimize?			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	20.0	20.0
Recall Mode	None	None	None	None
Walk Time (s)	6.0	6.0	6.0	6.0
Flash Don't Walk (s)	12.0	12.0	12.0	12.0
Pedestrian Callt (#/hr)	20	20	20	20
Act Elctd Green (s)				
Actuated g/C Ratio				
Approach Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				
90th %ile Green (s)	1.0	1.0	18.0	26.2
90th %ile Term Code	Max	Max	Ped	Max
70th %ile Green (s)	1.0	1.0	18.0	26.2
70th %ile Term Code	Max	Max	Ped	Max
50th %ile Green (s)	1.0	1.0	18.0	26.2
50th %ile Term Code	Max	Max	Ped	Max
30th %ile Green (s)	1.0	1.0	4.0	26.2

2017 Without Project PM
3: Thorne Ln SW & SB Ramp

4/23/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
30th %ile Term Code	Max											
10th %ile Green (s)	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7
10th %ile Term Code	Max											
Queue Length 50th (ft)	5	5	5	5	5	5	5	5	5	5	5	5
Queue Length 95th (ft)	#761	26	#761	26	#761	26	#761	26	#761	26	#761	26
Internal Link Dist (ft)	920	920	920	920	920	920	920	920	920	920	920	920
Turn Bay Length (ft)	200	200	200	200	200	200	200	200	200	200	200	200
Base Capacity (vph)	520	406	520	406	520	406	520	406	520	406	520	406
Starvation Cap Reducin	0	0	0	0	0	0	0	0	0	0	0	0
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.04	0.98	0.04	0.98	0.04	0.98	0.04	0.98	0.04	0.98	0.04

Intersection Summary
 Cycle Length: 150
 Actuated Cycle Length: 144.4
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.99
 Intersection LOS: D
 ICU Level of Service D
 Intersection Capacity Utilization 73.6%
 Analysis Period (min): 15
 90th %ile Actuated Cycle: 150
 70th %ile Actuated Cycle: 150
 50th %ile Actuated Cycle: 150
 30th %ile Actuated Cycle: 136
 10th %ile Actuated Cycle: 136
 ~ Volume exceeds capacity, queue is theoretically infinite.
 # Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 # Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.



2017 Without Project PM
3: Thorne Ln SW & SB Ramp

4/23/2007

Lane Group	e4	e6	e7	e8
30th %ile Term Code	Max	Max	Min	Max
10th %ile Green (s)	1.0	1.0	4.0	26.2
10th %ile Term Code	Max	Max	Min	Max
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap Reduction				
Spillback Cap Reduction				
Storage Cap Reduction				
Reduced v/c Ratio				

Intersection Summary

2017 Without Project PM
4: Thorne Ln SW & NB Ramp

4/23/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	0	1824	0	0	1863	1583	170	1587	0	0	0	0
Std. Flow (prot)	0	0.979	0	0	1.0	0.950	0.550	0.950	0	0	0	0
Flt Permitted	0	1824	0	0	1863	1583	1770	1587	0	0	0	0
Satd. Flow (perns)	373	479	0	0	298	526	27	3	292	0	0	0
Yellow (s) (RTOR)	0.65	0.95	0.95	0.90	0.90	0.90	0.82	0.82	0.82	0.95	0.95	0.95
Peak Hour Factor	383	504	0	0	331	584	33	4	355	0	0	0
Adj. Flow (vph)	0	897	0	0	331	584	33	360	0	0	0	0
Lane Group Flow (vph)	Split	897	0	0	331	584	33	360	0	0	0	0
Turn Type	Split	897	0	0	331	584	33	360	0	0	0	0
Protected Phases	1, 2, 6	1, 2, 6			8	8	7	7				
Permitted Phases	1, 2, 6	1, 2, 6			8	8	7	7				
Detector Phases					8	8	7	7				
Minimum Initial (s)					6.0	6.0	4.0	4.0				
Minimum Spill (s)					22.5	22.5	22.5	22.5				
Total Spill (s)	96.8	96.8	0.0	0.0	30.7	30.7	22.5	22.5	0.0	0.0	0.0	0.0
Total Spill (%)	64.5%	64.5%	0.0%	0.0%	20.5%	20.5%	15.0%	15.0%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)					26.2	26.2	18.0	18.0				
Yellow Time (s)					3.5	3.5	3.5	3.5				
All-Red Time (s)					1.0	1.0	1.0	1.0				
Lead/Lag					Lead	Lead	Lag	Lag				
Lead-Lag Optimize?					Yes	Yes	Yes	Yes				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Minimum Gap (s)					0.2	0.2	0.2	0.2				
Time Before Reduce (s)					0.0	0.0	0.0	0.0				
Time To Reduce (s)					20.0	20.0	20.0	20.0				
Recall Mode					None	None	None	None				
Walk Time (s)					6.0	6.0	6.0	6.0				
Flash Dont Walk (s)					12.0	12.0	12.0	12.0				
Pedestrian Calls (fln/r)					25	25	20	20				
Act Effic Green (s)	83.0				26.8	26.8	12.6	12.6				
Act Effic Red (s)	0.64				0.19	0.19	0.01	0.09				
v/c Ratio	0.76				0.96	0.99	0.21	0.28				
Control Delay	2.2				97.1	57.9	63.1	18.4				
Queue Delay	3.5				0.0	0.0	0.0	0.0				
Total Delay	5.9				97.1	57.9	63.1	18.4				
LOS	A				F	E	E	B				
Approach Delay	5.9				72.1			22.1				
Approach LOS	A				E			C				
90th %ile Green (s)					26.2	26.2	18.0	18.0				
90th %ile Term Code					Max	Max	Ped	Ped				
70th %ile Green (s)					26.2	26.2	18.0	18.0				
70th %ile Term Code					Max	Max	Ped	Ped				
50th %ile Green (s)					26.2	26.2	18.0	18.0				
50th %ile Term Code					Max	Max	Ped	Ped				
30th %ile Green (s)					26.2	26.2	4.0	4.0				
30th %ile Term Code					Max	Max	Min	Min				
10th %ile Green (s)					26.2	26.2	4.0	4.0				

2017 Without Project PM
 4: Thorne Ln SW & NB Ramp

4/23/2007

Lane Group	e1	e2	e4	e6
Lane Configurations				
Total Lost Time (s)				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (perm)				
Satd. Flow (RTOR)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type	1	2	4	6
Protected Phases				
Permitted Phases				
Detector Phases				
Minimum Initial (s)	6.0	8.0	1.0	1.0
Minimum Split (s)	21.5	23.5	6.0	6.0
Total Split (s)	46.6	44.2	6.0	6.0
Total Split (%)	31%	29%	4%	4%
Maximum Green (s)	42.1	39.7	1.0	1.0
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.5	1.5
Lead/Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	3.0	3.0
Vehicle Extension (s)	4.7	4.7	0.2	0.2
Minimum Gap (s)	0.2	0.2	0.0	0.0
Time Base Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	20.0	20.0
Recall Mode	None	Min	None	None
Walk Time (s)	6.0	6.0		
Flash Dont Walk (s)	11.0	13.0		
Pedestrian Calls (#/hr)	0	20		
Act Effct Green (s)				
Actuated g/C Ratio				
w/C Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				
80th %ile Green (s)	42.1	39.7	1.0	1.0
90th %ile Green (s)	Max	Max	Max	Max
70th %ile Term Code	42.1	39.7	1.0	1.0
80th %ile Term Code	Max	Max	Max	Max
90th %ile Green (s)	42.1	39.7	1.0	1.0
70th %ile Term Code	Max	Max	Max	Max
80th %ile Green (s)	42.1	39.7	1.0	1.0
90th %ile Green (s)	Max	Max	Max	Max
70th %ile Term Code	42.1	39.7	1.0	1.0
80th %ile Green (s)	Max	Max	Max	Max
90th %ile Green (s)	42.1	39.7	1.0	1.0
70th %ile Term Code	Max	Max	Max	Max

2017 With Project PM
1: Berkeley St SW & SB Ramp

8/25/2004

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4	4	4	4	4	4	4	4	4	4	4	4
Total Lost Time (s)	0	1863	1583	0	1831	0	0	0	0	0	1773	1583
Satd. Flow (prot)	0	1863	1583	0	1831	0	0	0	0	0	1773	1583
Flt Permitted	0	1863	1583	0	1831	0	0	0	0	0	1773	1583
Satd. Flow (perm)	0	448	343	381	751	0	0	0	0	0	357	241
Volume (vph)	0.37	0.37	0.37	0.34	0.34	0.94	0.99	0.99	0.84	0.84	0.84	0.84
Peak Hour Factor	0	482	354	405	799	0	0	0	0	0	425	287
Adj. Flow (vph)	0	482	354	405	799	0	0	0	0	0	425	287
Lane Group Flow (vph)	0	482	354	405	799	0	0	0	0	0	425	287
Turn Type Phases	2	2	2	2	2	2	2	2	2	2	2	2
Protected Phases	2	2	2	2	2	2	2	2	2	2	2	2
Permitted Phases	2	2	2	2	2	2	2	2	2	2	2	2
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Spill (s)	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7
Total Spill (s)	0.0	33.5	33.5	87.5	87.5	0.0	0.0	0.0	0.0	0.0	19.3	19.3
Total Spill (%)	0.0%	22.3%	22.3%	58.3%	58.3%	0.0%	0.0%	0.0%	0.0%	0.0%	19.3%	19.3%
Maximum Green (s)	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Yellow Time (s)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead											
Lead-Lag Optimize?	Yes											
Vehicle Extension (s)	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Time To Reduce (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Recall Mode	Min											
Walk Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flash Don't Walk (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Pedestrian Call (flhr)	20	20	20	20	20	20	20	20	20	20	20	20
Act Elct Green (s)	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3
Actuated G/C Ratio	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
v/c Ratio	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Control Delay	185.7	45.8	45.8	101.7	101.7	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Queue Delay	4.6	0.0	0.0	105.3	105.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Delay	190.3	45.8	45.8	207.0	207.0	45.8	45.8	45.8	45.8	45.8	45.8	45.8
LOS	F	D	D	F	F	F	F	F	F	F	F	F
Approach Delay	127.6	207.0	207.0	207.0	207.0	207.0	207.0	207.0	207.0	207.0	207.0	207.0
Approach LOS	F	F	F	F	F	F	F	F	F	F	F	F
90th %ile Green (s)	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
90th %ile Term Code	Max											
70th %ile Green (s)	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
70th %ile Term Code	Max											
50th %ile Green (s)	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
50th %ile Term Code	Max											
30th %ile Green (s)	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
30th %ile Term Code	Max											
10th %ile Green (s)	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
10th %ile Term Code	Max											

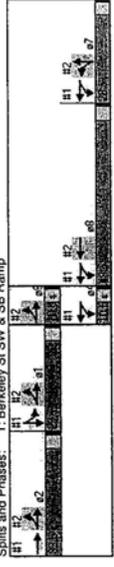
Lane Group	e4	e6	e7	e8
Lane Configurations				
Total Lost Time (s)				
Satd. Flow (prot)				
Flt Permitted				
Satd. Flow (piem)				
Satd. Flow (RTOR)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type				
Protected Phases	4	6	7	8
Detector Phases				
Minimum Initial (s)	4.0	4.0	6.0	6.0
Minimum Split (s)	10.5	10.5	22.5	22.7
Total Split (s)	10.5	10.5	28.0	49.0
Initial Split (%)	7%	7%	19%	33%
Max Yellow Time (s)	6.0	6.0	23.5	44.3
Yellow Time (s)	3.5	3.5	3.5	3.7
All-Red Time (s)	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lead
Lead-Lag Optimize?			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	Min	Min	None	None
Walk Time (s)				6.0
Flash Dont Walk (s)				12.0
Pedestrian Calls (#/hr)				20
Act Elct Green (s)				
Actuated g/C Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				
90th %ile Term Code	6.0	6.0	23.5	44.3
70th %ile Green (s)	Max	Max	Max	Max
50th %ile Green (s)	6.0	6.0	23.5	44.3
30th %ile Green (s)	Max	Max	Max	Max
10th %ile Green (s)	6.0	6.0	23.5	44.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
10th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Queue Length 50th (ft)	-566	190		-1363							-564	0
Queue Length 95th (ft)	#789	#343		m90							#709	60
Internal Link Dist (ft)	920	186		920							920	
Turn Bay Length (ft)	366	440		1019							296	503
Starvation Cap. Reductn	0	0		0							0	0
Starvation Cap. Reductn	0	0		0							0	0
Storage Cap. Reductn	0	0		0							0	0
Reduced v/c Ratio	1.27	0.80		1.42							1.66	0.57

Intersection Summary
 Cycle Length: 150
 Actuated Cycle Length: 150
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.61
 Intersection Signal Delay: 186.0
 Intersection Capacity Utilization 114.0%
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 150
 70th %ile Actuated Cycle: 150
 50th %ile Actuated Cycle: 150
 30th %ile Actuated Cycle: 150
 10th %ile Actuated Cycle: 150

Intersection LOS: F
 ICU Level of Service H

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volumes for 95th percentile queue is metered by upstream signal.



2017 With Project PM
1: Berkeley St SW & SB Ramp

8/25/2004

Lane Group	g4	g6	g7	g8
	Max	Max	Max	Max
10th %ile Term Code				
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap Reductin				
Spillback Cap Reductin				
Storage Cap Reductin				
Reduced v/c Ratio				
Intersection Summary				
Permitted Phases	8	Free	7	7
Detector Phases	8	Free	7	7
Minimum Initial (s)	6.0	6.0	6.0	6.0
Minimum Split (s)	22.7	22.5	22.5	22.5
Total Split (s)	73.0	0.0	49.0	0.0
Total Split (%)	48.7%	0.0%	32.7%	0.0%
Maximum Green (s)	44.3	0.0%	18.7%	18.7%
Yellow Time (s)	3.7	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None
Walk Time (s)	16.0	16.0	16.0	16.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0
Perception Calls (#/hr)	69.0	45.0	150.0	24.0
Act/Blk Green (s)	0.46	0.30	1.00	0.16
Act/Blk G/C Ratio	0.98	1.81	0.78	1.34
Control Delay	23.6	318.6	3.9	220.4
Queue Delay	112.3	0.0	0.0	153.1
Total Delay	135.9	318.6	3.9	373.5
LOS	F	F	A	F
Approach Delay	135.9	135.8	312.5	312.5
Approach LOS	F	F	F	F
80th %ile Green (s)	44.3	44.3	23.5	23.5
90th %ile Term Code	Max	Max	Max	Max
70th %ile Green (s)	44.3	44.3	23.5	23.5
70th %ile Term Code	Max	Max	Max	Max
50th %ile Green (s)	44.3	44.3	23.5	23.5
50th %ile Term Code	Max	Max	Max	Max
30th %ile Green (s)	44.3	44.3	23.5	23.5
30th %ile Term Code	Max	Max	Max	Max
10th %ile Green (s)	44.3	44.3	23.5	23.5

2017 With Project PM
2: Berkeley St NB Ramp

8/25/2004

Lane Group	EBL	EET	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR
Lane Configurations	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	0	1840	0	0	1863	1583	0	1775	1583	0	0
Stall. Flow (prot)	0	0.868	0	0	0.868	0.952	0	0.952	0.952	0	0
Flt Permitted	0	1840	0	0	1863	1583	0	1775	1583	0	0
Satd. Flow (perm)	184	614	0	0	839	1148	347	3	73	0	0
Volumes (vph)	0.87	0.97	0.97	0.83	0.93	0.92	0.92	0.92	0.95	0.95	0.85
Peak Hour Factor	200	833	0	0	902	1234	377	3	79	0	0
Adj. Flow (vph)	0	833	0	0	902	1234	0	380	79	0	0
Group Flow (vph)	Split	Free	Free	Split	Free	Split	Free	Split	Free	Split	Free
Turn Time	12.6	12.6	8	Free	8	Free	7	7	7	7	7
Permitted Phases	12.6	12.6	8	Free	8	Free	7	7	7	7	7
Detector Phases	12.6	12.6	8	Free	8	Free	7	7	7	7	7
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	22.7	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	73.0	0.0	0.0	49.0	0.0	28.0	28.0	28.0	0.0	0.0	0.0
Total Split (%)	48.7%	0.0%	0.0%	32.7%	0.0%	18.7%	18.7%	18.7%	0.0%	0.0%	0.0%
Maximum Green (s)	44.3	0.0%	0.0%	18.7%	0.0%	23.5	23.5	23.5	0.0%	0.0%	0.0%
Yellow Time (s)	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lead	Lag									
Lead-Lag Optimize?	Yes										
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None										
Walk Time (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Flash Dont Walk (s)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Perception Calls (#/hr)	69.0	45.0	150.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Act/Blk Green (s)	0.46	0.30	1.00	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Act/Blk G/C Ratio	0.98	1.81	0.78	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34
Control Delay	23.6	318.6	3.9	220.4	18.8	18.8	18.8	18.8	18.8	18.8	18.8
Queue Delay	112.3	0.0	0.0	153.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	135.9	318.6	3.9	373.5	18.8	18.8	18.8	18.8	18.8	18.8	18.8
LOS	F	F	A	F	F	F	F	F	F	F	F
Approach Delay	135.9	135.8	312.5	312.5	312.5	312.5	312.5	312.5	312.5	312.5	312.5
Approach LOS	F	F	F	F	F	F	F	F	F	F	F
80th %ile Green (s)	44.3	44.3	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5
90th %ile Term Code	Max										
70th %ile Green (s)	44.3	44.3	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5
70th %ile Term Code	Max										
50th %ile Green (s)	44.3	44.3	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5
50th %ile Term Code	Max										
30th %ile Green (s)	44.3	44.3	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5
30th %ile Term Code	Max										
10th %ile Green (s)	44.3	44.3	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5

Lane Group	a1	a2	a4	a6
Lane Configurations				
Total Lost Time (s)				
Satd. Flow (prot)				
Fl. Permitted				
Satd. Flow (term)				
Satd. Flow (RTOR)				
Volume (vph)				
Peak Hour Factor				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type	1	2	4	6
Protected Phases				
Permitted Phases				
Detector Phases				
Minimum Initial (s)	6.0	6.0	4.0	4.0
Minimum Split (s)	20.5	22.7	10.5	10.5
Total Split (s)	19%	22%	7%	7%
Maximum Green (s)	24.5	28.8	6.0	6.0
Yellow Time (s)	3.5	3.7	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		
Vehicle Extension (s)	3.0	4.7	3.0	3.0
Minimum Gap (s)	0.9	3.0	0.2	0.2
Time Before Reduce (s)	30.0	6.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	0.0	0.0
Recall Mode	None	Min	Min	Min
Walk Time (Walk (s)	6.0	6.0		
Push Button Calls (#/hr)	10.0	12.0		
Act. Effct Green (s)	20	20		
Actuated g/C Ratio				
v/c Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS	24.5	28.8	6.0	6.0
90th %ile Green (s)	Max	Max	Max	Max
70th %ile Green (s)	24.5	28.8	6.0	6.0
50th %ile Green (s)	24.5	28.8	6.0	6.0
30th %ile Green (s)	24.5	28.8	6.0	6.0
10th %ile Green (s)	24.5	28.8	6.0	6.0

Lane Group	e1	e2	e4	e6
10th %ile Term Code	Max	Max	Max	Max
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap Reductn				
Spillback Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				

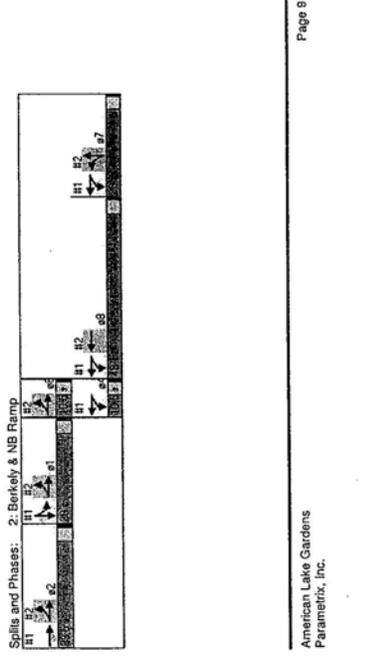
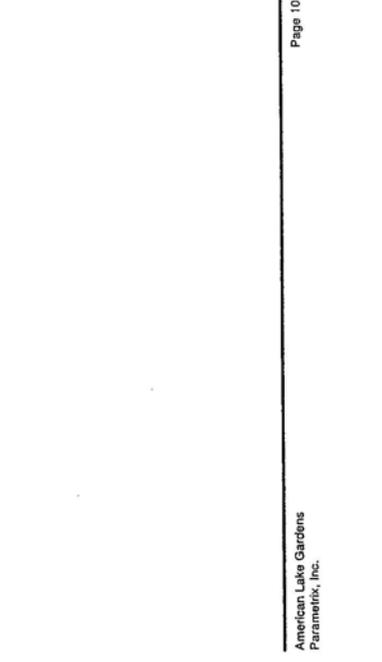
Lane Group	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR
10th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Queue Length 50th (ft)	201										
Queue Length 95th (ft)	m61										
Internal Link Dist (ft)	186										568
Turn Bay Length (ft)											
Base Capacity (vph)	846			559	1553		284	308			
Starvation Cap Reductn	191			0	0		0	0			
Spillback Cap Reductn	0			0	0		56	0			
Storage Cap Reductn	0			0	0		0	0			
Reduced v/c Ratio	1.27			1.61	0.78		1.08	0.26			

Intersection Summary

Intersection Summary

Cycle Length: 150
 Actuated Cycle Length: 150
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.61
 Intersection Signal Delay: 160.1
 Intersection LOS: F
 ICU Level of Service H
 Intersection Capacity Utilization 116.6%
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 150
 70th %ile Actuated Cycle: 150
 50th %ile Actuated Cycle: 150
 30th %ile Actuated Cycle: 150
 10th %ile Actuated Cycle: 150
 - Volume exceeds capacity, queue is theoretically infinite.
 # Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 m Volume for 95th percentile queue is metered by upstream signal.

Cycle Length: 150
 Actuated Cycle Length: 150
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.61
 Intersection Signal Delay: 160.1
 Intersection LOS: F
 ICU Level of Service H
 Intersection Capacity Utilization 116.6%
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 150
 70th %ile Actuated Cycle: 150
 50th %ile Actuated Cycle: 150
 30th %ile Actuated Cycle: 150
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 # 95th percentile volume exceeds capacity, queue may be longer.
 m Volume for 95th percentile queue is metered by upstream signal.



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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
Lane Configurations	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	0	1863	1583	0	1757	0	0	0	0	0	1758	1586
Satd. Flow (prot)		0.962									0.953	
Flt Permitted	0	1863	1429	0	1757	0	0	0	0	0	1758	1401
Satd. Flow (perm)		0	740	29	660	179	0	0	0	0	755	661
Volume (vph)		0.93	0.33	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Confl. Peds. (#/hr)	2%	2%	4%	4%	4%	2%	2%	2%	2%	3%	3%	3%
Peak Hour Factor	0	796	311	872	293	0	0	0	0	868	9	760
Adj. Flow (vph)	0	796	311	872	293	0	0	0	0	868	9	760
Lane Group Flow (vph)	0	796	311	872	293	0	0	0	0	868	9	760
Turn Type Phases	2	Perm	784	784	784	784	784	784	784	Split	custom	Split
Protected Phases	2	2	784	784	784	784	784	784	784	1	1	1
Permitted Phases	2	2	784	784	784	784	784	784	784	1	1	1
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	6.0	6.0	6.0
Minimum Spill (s)	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	21.5	21.5	21.5
Total Spill (s)	0.0	34.0	34.0	78.0	78.0	0.0	0.0	0.0	0.0	38.0	38.0	38.0
Total Spill (%)	0.0%	22.7%	22.7%	52.0%	52.0%	0.0%	0.0%	0.0%	0.0%	25.3%	25.3%	25.3%
Maximum Green (s)	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	33.5	33.5	33.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag	Lag	Lead	Lead	Lead								
Lead-Lag Optimize?	Yes	Yes										
Vehicle Extension (s)	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Recall Mode	Min	None	None	None								
Walk Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flash Dont Walk (s)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	20	20	20	20	20	20	20	20	20	0	0	0
Act Effect Green (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	34.0	34.0	34.0
Actuated G/C Ratio	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	0.23	0.23	0.23
Vehicle Delay	547.4	547.4	547.4	547.4	547.4	547.4	547.4	547.4	547.4	576.6	576.6	576.6
Vehicle Delay	162.0	162.0	162.0	162.0	162.0	162.0	162.0	162.0	162.0	130.9	130.9	130.9
Vehicle Delay	708.3	708.3	708.3	708.3	708.3	708.3	708.3	708.3	708.3	707.5	707.5	707.5
LOS	F	F	D	F	F	F	F	F	F	F	F	F
Approach Delay	684.1	684.1	684.1	684.1	684.1	684.1	684.1	684.1	684.1	436.2	436.2	436.2
Approach LOS	F	F	F	F	F	F	F	F	F	F	F	F
90th %ile Green (s)	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	33.5	33.5	33.5
90th %ile Term Code	Max	Max										
70th %ile Green (s)	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	33.5	33.5	33.5
70th %ile Term Code	Max	Max										
50th %ile Green (s)	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	33.5	33.5	33.5
50th %ile Term Code	Max	Max										
30th %ile Green (s)	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	33.5	33.5	33.5

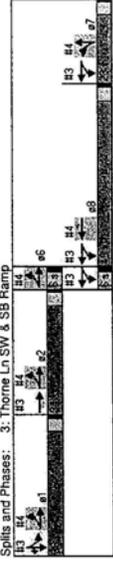
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	e4	e6	e7	e8
Lane Group				
Left Configurations				
Total Lost Time (s)	1.0	1.0	4.0	6.0
Satd. Flow (prot)	6.0	6.0	22.5	22.5
Flt Permitted				
Satd. Flow (perm)	6.0	6.0	23.0	49.0
Satd. Flow (RTOR)	4%	4%	15%	33%
Volume (vph)	1.0	1.0	18.5	44.5
Confl. Peds. (#/hr)	3.5	3.5	3.5	3.5
Peak Hour Factor	1.5	1.5	1.0	1.0
Heavy Vehicles (%)				
Adj. Flow (vph)				
Lane Group Flow (vph)				
Turn Type	4	6	7	8
Protected Phases				
Permitted Phases				
Detector Phases				
Minimum Spill (s)	1.0	1.0	4.0	6.0
Total Spill (s)	6.0	6.0	23.0	49.0
Total Spill (%)	4%	4%	15%	33%
Maximum Green (s)	1.0	1.0	18.5	44.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1.5	1.5	1.0	1.0
Lead/Lag			Lag	Lead
Lead-Lag Optimize?			Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0.0	0.0	0.0	0.0
Time To Reduce (s)	20.0	20.0	20.0	20.0
Recall Mode	None	None	None	None
Walk Time (s)	6.0	6.0	6.0	6.0
Pedestrian Calls (#/hr)				
Act Elicit Green (s)				
Actuated g/C Ratio				
Control Delay				
Queue Delay				
Total Delay				
LOS				
Approach Delay				
Approach LOS				
90th %ile Green (s)	1.0	1.0	18.5	44.5
90th %ile Term Code	Max	Max	Max	Max
70th %ile Green (s)	1.0	1.0	18.5	44.5
70th %ile Term Code	Max	Max	Max	Max
50th %ile Green (s)	1.0	1.0	18.5	44.5
50th %ile Term Code	Max	Max	Max	Max
30th %ile Green (s)	1.0	1.0	18.5	44.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
30th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
10th %ile Green (s)	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
10th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Queue Length 50th (ft)	-1237	16	16	-1387	16	16	420	16	16	16	16	16
Queue Length 95th (ft)	#1490	47	47	m82	47	47	420	47	47	47	47	47
Internal Link Dist (ft)	920	920	920	920	920	920	920	920	920	920	920	920
Turn Bay Length (ft)	373	295	295	373	295	295	373	295	295	373	295	295
Starvation Cap. Reducin	0	0	0	0	0	0	0	0	0	0	0	0
Starvation Cap. Reducin	135	0	0	135	0	0	135	0	0	135	0	0
Starvation Cap. Reducin	0	0	0	0	0	0	0	0	0	0	0	0
Starvation Cap. Reducin	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	3.34	0.11	0.11	1.46	0.11	0.11	3.34	0.11	0.11	3.34	0.11	0.11

Intersection Summary
 Cycle Length: 150
 Actuated Cycle Length: 150
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 2.84
 Intersection Signal Delay: 430.1
 Intersection Capacity Utilization: 138.2%
 Analysis Period (min): 15
 90th %ile Actuated Cycle: 150
 70th %ile Actuated Cycle: 150
 50th %ile Actuated Cycle: 150
 30th %ile Actuated Cycle: 150
 10th %ile Actuated Cycle: 150
 - Volume exceeds capacity, queue is theoretically infinite.
 # Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 m Volume shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.



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Lane Group	e4	e6	e7	e8
30th %ile Term Code	Max	Max	Max	Max
10th %ile Green (s)	1.0	1.0	18.5	44.5
10th %ile Term Code	Max	Max	Max	Max
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap Reductin				
Spillback Cap Reductin				
Reduced v/c Ratio				

Intersection Summary

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2017 With Project PM
4: Thorne Ln SW & NB Ramp

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	0	1824	0	0	1863	1583	1720	1585	0	0	0	0
Satd. Flow (prot)	0	0379	0	0	1863	1583	1720	1585	0	0	0	0
Pk Permitted	0	1824	0	0	1863	1583	1720	1585	0	0	0	0
Satd. Flow (perm)	608	828	0	0	878	1915	49	3	525	0	0	0
Volume (vph)	0.85	0.95	0.95	0.90	0.90	0.82	0.82	0.82	0.82	0.95	0.95	0.85
Peak Hour Factor	640	872	0	0	976	2128	60	4	640	0	0	0
Adj. Flow (vph)	0	1512	0	0	976	2128	60	644	0	0	0	0
Lane Group Flow (vph)	Split											
Turn Type	8	8	8	8	8	8	8	8	8	8	8	8
Protected Phases	12.6	12.6										
Permitted Phases	12.6	12.6										
Detector Phases	8	8										
Minimum Initial (s)	6.0	6.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	78.0	78.0	0.0	0.0	49.0	49.0	23.0	23.0	0.0	0.0	0.0	0.0
Total Split (%)	52.0%	52.0%	0.0%	0.0%	32.7%	32.7%	15.3%	15.3%	0.0%	0.0%	0.0%	0.0%
Maximum Green (s)	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5
Maximum Green (%)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Yellow Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
All-Red Time (s)	Lead											
Lead/Lag	Yes											
Lead-Lag Optimize?	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Vehicle Extension (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Minimum Gap (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time Before Reductin	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Time To Reductin (s)	None											
Recall Mode	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Walk Time (s)	20	20	20	20	20	20	20	20	20	20	20	20
Flash Dont Walk (s)	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0
Pedestrian Calls (#/hr)	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Act. Effct Green (s)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Ratio g/c Ratio	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68
Control Delay	323.5	323.5	323.5	323.5	323.5	323.5	323.5	323.5	323.5	323.5	323.5	323.5
Queue Delay	141.6	141.6	141.6	141.6	141.6	141.6	141.6	141.6	141.6	141.6	141.6	141.6
Total Delay	465.1	465.1	465.1	465.1	465.1	465.1	465.1	465.1	465.1	465.1	465.1	465.1
LOS	F	F	F	F	F	F	F	F	F	F	F	F
Approach Delay	807.1	807.1	807.1	807.1	807.1	807.1	807.1	807.1	807.1	807.1	807.1	807.1
Approach LOS	D	D	D	D	D	D	D	D	D	D	D	D
90th %ile Green (s)	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5
90th %ile Term Code	Max											
70th %ile Green (s)	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5
70th %ile Term Code	Max											
50th %ile Green (s)	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5
50th %ile Term Code	Max											
30th %ile Green (s)	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5
30th %ile Term Code	Max											
10th %ile Green (s)	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5

American Lake Gardens
Parametrix, Inc.

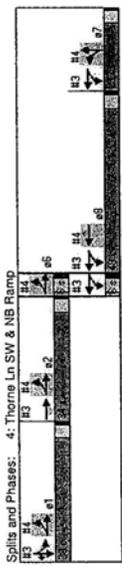
Page 16

Lane Group	a1	a2	a4	a6
10th %ile Term Code	Max	Max	Max	Max
Queue Length 50th (ft)				
Queue Length 95th (ft)				
Internal Link Dist (ft)				
Turn Bay Length (ft)				
Base Capacity (vph)				
Starvation Cap Reductn				
Spillback Cap Reductn				
Storage Cap Reductn				
Reduced v/c Ratio				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
10th %ile Term Code	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
Queue Length 50th (ft)	-1662			-1413	-3312	54	162					
Queue Length 95th (ft)	m0			#1575	#3562	92	#286					
Internal Link Dist (ft)	186			768			420					920
Turn Bay Length (ft)	900			559	748	224	645					
Base Capacity (vph)	142			0	0	0	0					
Starvation Cap Reductn	0			198	0	70	0					
Spillback Cap Reductn	0			0	0	0	0					
Storage Cap Reductn	0			0	0	0	0					
Reduced v/c Ratio	1.99			2.70	2.84	0.41	1.00					

Intersection Summary
 Cycle Length: 150
 Actuated Cycle Length: 150
 Natural Cycle: 150
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 2.84
 Intersection Signal Delay: 609.7
 Intersection Capacity Utilization: 238.5%
 Analysis Period (min): 15
 90th %ile Actuated Cycle: 150
 70th %ile Actuated Cycle: 150
 50th %ile Actuated Cycle: 150
 30th %ile Actuated Cycle: 150
 10th %ile Actuated Cycle: 150
 - Volume exceeds capacity, queue is theoretically infinite.
 - Queue shown in red, volume exceeds capacity, queue may be longer.
 # Queue shown in maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Intersection LOS: F
 ICU Level of Service H



2017 With Project PM
5: 150th St SW & Murray Rd SW

8/25/2004

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	1673	1487	1822	0	0	1769
Satd. Flow (prot)	0.950					0.959
Ft Permitted	1673	1487	1822	0	0	1769
Satd. Flow (perm)	268	1314	711	137	573	99
Volume (vph)	0.96	0.96	0.96	0.96	0.96	0.96
Peak Hour Factor	7%	7%	2%	2%	3%	3%
Heavy Vehicles (%)	2	2	0	0	0	0
Bus Blockages (#/hr)	279	1369	741	143	597	103
Adj. Flow (vph)	279	1369	741	143	597	103
Lane Group Flow (vph)	279	1369	741	143	597	103
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop

Intersection Summary
Control Type: Unsignalized
Intersection Capacity Utilization 133.8%
Analysis Period (min) 15
ICU Level of Service H

2017 With Project PM
5: 150th St SW & Murray Rd SW

8/25/2004

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Stop	Stop	Stop	Stop	Stop	Stop
Sign Control	268	1314	711	137	573	99
Volume (vph)	0.96	0.96	0.96	0.96	0.96	0.96
Peak Hour Factor	279	1369	741	143	597	103
Hourly flow rate (vph)	WB 1		WB 2		NB 1	
Direction, Lane #	279	1369	741	143	597	103
Volume Total (vph)	279	1369	741	143	597	103
Volume Left (vph)	0	0	0	0	0	0
Volume Right (vph)	0	0	0	0	0	0
Hadj (s)	0.62	-0.58	-0.06	0.22		
Departure Headway (s)	8.2	7.0	6.9	7.2		
Degree Utilization, x	0.64	2.66	1.69	1.40		
Capacity (veh/h)	429	517	527	513		
Control Delay (s)	23.3	768.1	338.5	211.7		
Approach Delay (s)	641.9		338.5	211.7		
Approach LOS	F	F	F	F		

Intersection Summary
Delay 465.8
HCM Level of Service F
Intersection Capacity Utilization 133.8%
Analysis Period (min) 15
ICU Level of Service H

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APPENDIX D

PLAN REVIEW UNDER THE STATE ENVIRONMENTAL POLICY ACT (SEPA)

CITY OF LAKEWOOD
COMMUNITY DEVELOPMENT DEPARTMENT

ENVIRONMENTAL CHECKLIST APPLICATION FORM

A. BACKGROUND

1. Name of proposed project, if applicable: *Tillicum Neighborhood Plan*
2. Name of applicant: *City of Lakewood*
3. Address and phone number of applicant and contact person: *Deborah Johnson, Senior Planner, Lakewood Community Development Department, 6000 Main St. SW, 2nd floor, Lakewood, WA 98499-5027; 253.512.2261.*
4. Date checklist prepared: *April 15, 2009*
5. Agency requesting checklist: *City of Lakewood*
6. Proposed timing or schedule (including phasing, if applicable): *Although a firm schedule has not been established, adoption of the plan is expected to occur no later than July 31, 2009.*
7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

Yes. The plan identifies and is intended to guide a series of implementing actions which, along with general time frames, are set out in implementation tables included in the document. The implementing actions include some that are currently programmed and already in various stages of being carried out, such as the installation of sewer trunk lines to serve Tillicum. They also include a combination of infrastructure improvements and other such "on the ground" projects and actions that are in the realm of policy or community/interagency involvement. Further, some implementing actions are unprogrammed, unfunded, and not directly under the City's purview so will undoubtedly take longer to come about. For major actions already underway, environmental review has already been completed or is in process. Where required, project-level environmental review will occur at the time specific implementing actions are undertaken.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

City of Lakewood: City of Lakewood Comprehensive Plan Final Environmental Impact Statement (2000); City of Lakewood Comprehensive Plan Supplemental Environmental Impact Statement (2003);

SEPA checklist/DNS for Parks & Recreation Master Plan (2005); American Lake Gardens (ALG)/Tillicum Sewer Extension Environmental Assessment (2007)

External: NEPA Documented Categorical Exclusion (WSDOT Pt. Defiance Rail Bypass project); FEIS & FHWA Record of Decision (WSDOT Cross-Base Highway/SR 704)

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No project-level permits are known to be pending related to any of the implementation actions included in the proposed plan. Project-level permits have already been acquired for some of the implementing actions included within the plan, as they predated the subarea planning effort.

10. List any government approvals or permits that will be needed for your proposal, if known.

Some elements of the implementing actions will require governmental approvals or permits related to general land use/construction, shoreline uses, etc. Depending on the outcome of key decisions posed within the plan, such as the future of Tillicum Elementary School, a public vote may be required to authorize capital funds via levy. Where required, project-level permits and approvals will be acquired prior to carrying out specific implementing actions.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

Adoption is proposed of a subarea plan for Tillicum, entitled the Tillicum Neighborhood Plan. Per RCW 36.70A.080(2), a subarea plan is considered to be an optional element of a comprehensive plan. In this sense, the document under consideration is a "proposed GMA action" under WAC 197-11-220(3). The Tillicum Neighborhood Plan is complementary to and is generally consistent with the City of Lakewood Comprehensive Plan and is intended to further improvements, both "on the ground" and to the overall quality of life, in the Tillicum neighborhood of Lakewood. As part of its implementing actions, the plan is expected to result in subsequent adjustments to zoning and development regulations for portions of Tillicum, as well as future capital investment. As the City is statutorily required to review and, if necessary, update its comprehensive plan by the end of 2011, certain adjustments may also be made to the overall plan that reflect the more precise nature of the subarea plan.

This SEPA document, together with the resultant threshold determination and any other relevant documentation, is intended to be merged with the proposed plan to form an "integrated non-EIS document" under WAC 197-11-235(3). In the end, the adoption action would consider an integrated SEPA/GMA document under WAC 197-11-210 through -238 (generally).

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist. *The proposed plan applies specifically to the Tillicum neighborhood of Lakewood. The plan's Figure 1, Neighborhood Plan Area, is appended to this document.*

13. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

The proposed comprehensive plan and development code changes are expected to work in concert with local, state, and federal laws to protect the environment. No conflicts are known at this time. Any conflicts identified would be corrected in an appropriate manner.

B. ENVIRONMENTAL ELEMENTS

This section is not included per WAC 197-11-235(3)(b).

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: /s/ *Deborah Johnson*

Deborah Johnson

Title: Senior Planner, City of Lakewood

Date: April 15, 2009

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

1. How would the proposal be likely to increase discharge to water; emission to air; production, storage, or release of toxic or hazardous substances; or production of noise?

The proposed plan would not result in increased discharges to water; emissions to air; production, storage or release of toxic or hazardous substances; or noise production.

The Point Defiance Bypass project, which is discussed in but is not a product of this plan, and is not a project of the City's, has a strong relationship with Tillicum and is likely to increase transient noise and vibration within the plan area. The Washington State Department of Transportation has conducted environmental review relative to this project and has issued a NEPA Documented Categorical Exclusion following issuance of a SEPA DNS. Effectively, noise impacts are dismissed although the City continues to be concerned about them.

The document contains information relative to stormwater facilities that, once installed, are intended to improve stormwater handling capability within the area and reduce surface water runoff to American Lake.

Generally, in that the plan is intended to provide for the development of additional neighborhood services, it aims to diminish carbon emissions by curtailing the need for area residents to travel to other parts of the city for services. Further, it is hoped that improving the neighborhood's sense of security and image will stimulate a renaissance in housing interest within Tillicum, which could in turn lead to decreased commuting distances should military members and civilian employees locate there.

2. Proposed measures to avoid or reduce such increases are:

No negative impacts have been identified as a result of the plan, so no measures are proposed. Any project-level impacts that may arise in the future will be avoided and reduced by implementation of existing regulations. Unless exempt, individual projects will be required to conduct project-specific SEPA review and evaluate impacts on water, air, noise, and toxics production.

3. How would the proposal be likely to affect plants, animals, fish, or marine life?

The adopted City of Lakewood Comprehensive Plan and development regulations seek to protect biotic resources. The proposed subarea plan makes no changes to these protections.

4. Proposed measures to protect or conserve plants, animals, fish, or marine life?

Specific measures to protect and conserve biotic resources include federal and state endangered species regulations, site-specific SEPA reviews, the Critical Areas and Resource Lands Ordinance, shoreline management regulations, and tree retention provisions of the adopted development regulations. None of the proposed plan's implementing actions are expected to affect the City's efforts in these subject areas. Any project-level impacts that may arise in the future will be avoided and reduced by implementation of existing regulations. Unless categorically exempt, individual projects will be required to conduct project-specific SEPA review and evaluate impacts on plants, animals, fish and marine life.

5. How would the proposal be likely to deplete energy or natural resources?

The proposed amendments are not expected to deplete natural resources. Any increased energy demand would be incidental to neighborhood revitalization, in order to serve housing and commercial uses within the area.

6. Proposed measures to protect or conserve energy and natural resources are:

No negative impacts have been identified as a result of the plan, so no measures are proposed. Any project-level impacts that may arise in the future will be avoided and reduced by implementation of existing regulations. Unless categorically exempt, individual projects will be required to conduct project-specific SEPA review and evaluate impacts on energy and natural resources.

7. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

The proposed amendments are not expected to use or affect environmentally sensitive areas or areas designated or eligible for governmental protection. Improvements to Harry Todd Park and shoreline access are discussed within the plan and are a product of the earlier Parks and Recreation Master Plan; and are intended to enhance the utility of the existing park and public shoreline access. Historic/ landmark sites are also discussed within the plan but are not sought to be changed.

8. Proposed measures to protect such resources or to avoid or reduce impacts are:

Specific measures to protect and conserve environmentally sensitive or other protected areas include federal and state endangered species regulations, site-specific SEPA reviews, the Critical Areas and

Resource Lands Ordinance, shoreline management regulations, historic designation, and tree retention provisions of the adopted development regulations. None of the proposed plan's implementing actions are expected to affect the City's efforts in these subject areas. Any project-level impacts that may arise in the future will be avoided and reduced by implementation of existing regulations. Unless categorically exempt, individual projects will be required to conduct project-specific SEPA review and evaluate impacts on environmentally sensitive and other protected areas.

9. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

The plan's implementing actions include reevaluation of the commercial zoning along Union Avenue SW, with a goal of directing freeway-serving commercial uses to the side of Union adjacent to I-5, while placing neighborhood-serving commercial on the other side, adjacent to the residential areas. Together with road improvements both suggested separately and as a part of the pending sewer project, this should improve the availability of services for neighborhood residents, while meeting demand for retail uses more likely to appeal to freeway passersby and inbound commuters (particularly military). Another goal of this action would be to stimulate redevelopment of the commercial area as much of it is older and run-down, making it more appealing to users and contributing to an improved sense of neighborhood identity. This action would be fundamentally consistent with the existing comprehensive plan future land-use designation for the area, while "fine tuning" it somewhat.

Implementing actions also include mechanisms to make it easier and less expensive to situate housing in Tillicum. This is intended to stimulate redevelopment of existing low-value sites while resulting in development that is in harmony with the existing neighborhood.

Shoreline uses addressed within the plan are generally existing, although it does encourage examination of where additional public access to American Lake could be provided.

10. Proposed measures to avoid or reduce shoreline and land use impacts are:

No negative impacts have been identified as a result of the plan, so no measures are proposed. Any project-level impacts that may arise in the future will be avoided and reduced by implementation of existing regulations. Unless categorically exempt, individual projects will be required to conduct project-specific SEPA review and evaluate impacts on land and shoreline use.

11. How would the proposal be likely to increase demands on transportation or public services and utilities?

As noted above, it is hoped that implementation of the plan will diminish carbon emissions by curtailing the need for area residents to travel to other parts of the city for services. Further, improving the neighborhood's sense of security and image is intended to stimulate improved housing interest, which could in turn lead to decreased commuting distances should military members and civilian employees locate there.

The plan references other initiatives, such as the Cross-Base Highway, that may affect and pose a significant relationship with transportation demands in the area. However, these are not a direct result of the plan itself but are merely accounted for within the document as having an influence on the area.

The most significant transportation influence is thought to be the presence of the adjacent military base, which impacts a number of I-5 interchanges in Lakewood, but particularly the Berkeley interchange at peak. Again this is an external condition which is discussed in, but is not a product of, the proposed plan. The City is separately undertaking joint planning with WSDOT and others related to transportation impacts of base growth, funded in part by the Dept. of Defense Office of Economic Adjustment (OEA). The outcome of the work to be performed under the OEA grant, which is just getting underway, may offer future adjustments in terms of connectivity and transportation planning for Tillicum.

In terms of public services, a primary goal of the subarea plan is to revitalize the Tillicum neighborhood by increasing public involvement and community leadership in order to inspire an increased sense of identity and belonging. Although nebulous, such social aspects tend to bear a relationship to draw on services such as policing, code enforcement, and assistance with basic needs. If the goal of neighborhood improvement is met, it should decrease such public services demands in this area.

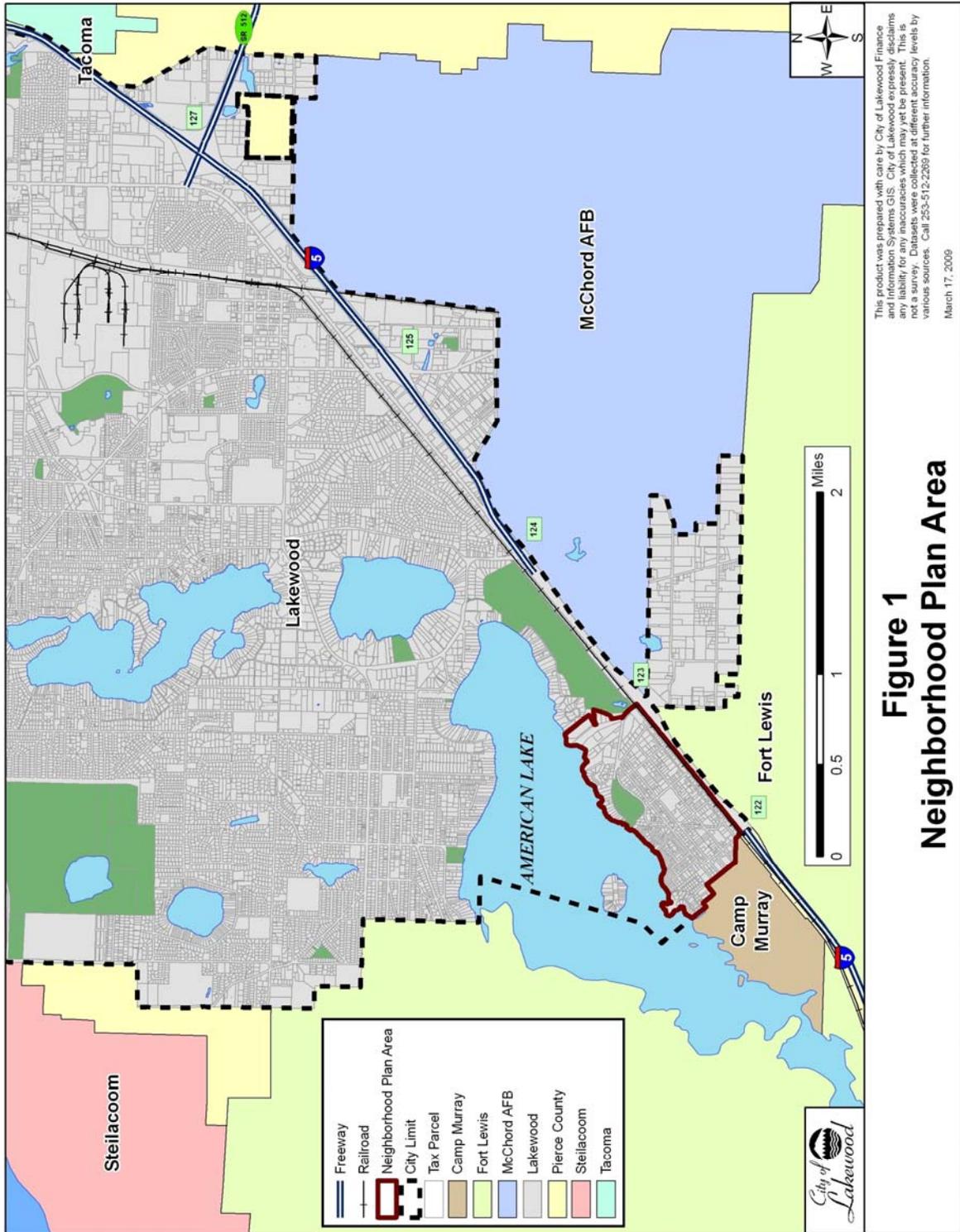
Planned sewer extension is, by design, intended to heighten demand for sewer services. This project is already proceeding irrespective of the plan. At the same time, this will lessen the use of individual septic systems and eventually will improve wastewater handling in the area. No other increases in utilities demand have been identified.

12. Proposed measures to reduce or respond to such demand(s) are:

Since no unplanned-for demand increases have been identified, no measures are proposed. Individual projects will be required to conduct project-specific SEPA review and evaluate impacts on transportation, public services, and utilities.

14. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

The proposed comprehensive plan and development code changes are expected to work in concert with local, state, and federal laws to protect the environment. No conflicts are known at this time. Any conflicts identified would be corrected in an appropriate manner.



This product was prepared with care by City of Lakewood Finance and Information Systems GIS. City of Lakewood expressly disclaims any liability for any inaccuracies which may yet be present. This is not a survey. Datasets were collected at different accuracy levels by various sources. Call 253-512-2269 for further information.

March 17, 2009

Figure 1
Neighborhood Plan Area

CITY OF LAKEWOOD DETERMINATION OF NONSIGNIFICANCE

Project: Tillicum Neighborhood Plan

Description of Project: The City of Lakewood is considering adoption of a subarea plan for Tillicum, entitled the *Tillicum Neighborhood Plan*. The plan identifies and is intended to guide a series of implementing actions which, along with general time frames, are set out in implementation tables included in the document. These implementing actions include the following:

- Actions that are currently programmed and already in various stages of being carried out, such as the installation of sewer trunk lines to serve Tillicum. For major actions already underway, environmental review has already been completed or is in process.
- Future infrastructure improvements and other such “on the ground” projects, which may or may not have identified funding at this time.
- Actions that are in the realm of policy or community/interagency involvement.
- Actions that are unprogrammed, unfunded, and not directly under the City’s purview.

The *Tillicum Neighborhood Plan* is complementary to and is generally consistent with the *City of Lakewood Comprehensive Plan* and is intended to further improvements, both “on the ground” and to the overall quality of life, in the Tillicum neighborhood of Lakewood. As part of its implementing actions, the plan is expected to result in subsequent adjustments to zoning and development regulations for portions of Tillicum, as well as future capital investment. As the City is statutorily required to review and, if necessary, update its comprehensive plan by the end of 2011, certain adjustments may also be made to the overall plan that reflect the more precise nature of the subarea plan.

Per RCW 36.70A.080(2), a subarea plan is considered to be an optional element of a comprehensive plan. In this sense, the document under consideration is a “proposed GMA action” under WAC 197-11-220(3). At the same time, it is also a “nonproject action” as defined in WAC 197-11-704((2)(b)). Where required, project-level environmental review will occur at the time specific implementing actions are undertaken.

This threshold determination, together with the environmental checklist and any other relevant documentation, is intended to be merged with the proposed plan to form an “integrated non-EIS document” under WAC 197-11-235(3). In the end, the adoption action would consider an integrated SEPA/GMA document under WAC 197-11-210 through -238 (generally).

Proponent: City of Lakewood

Lead Agency: City of Lakewood

The lead agency has determined that this proposal does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was based on staff review of the environmental checklist

and application materials, and other information on file with the lead agency. This Determination of Nonsignificance (DNS) is supported by plans, policies, and regulations adopted by the City of Lakewood for the exercise of substantive authority under SEPA, and is specifically conditioned with the conditions.

_____ There is no comment period for this DNS.

___XXX___ This DNS is issued under WAC 197-11-340(2)(a)(v). The lead agency will not act on this proposal for 14 days beginning on April 24, 2009, and ending on May 8, 2009. Comments, if any, must be submitted within this time period. Written comments are encouraged and may be e-mailed to <djohnson@cityoflakewood.us>.

Responsible Official: M. David Bugher
Position/Title: Community Development Director/Asst. City Manager
Address: Lakewood Community Development Dept., 6000 Main Street SW,
Lakewood, WA 98499-5027
Phone: 253.512.2261

Dated: April 24, 2009 **Signature:** /s/ *M. David Bugher*

APPEAL PROCESS: The proposed plan constitutes a Type V application under Title 18A LMC. No administrative appeal is allowed of environmental determinations for this type of application. The determination of the environmental official shall be considered final per LMC 14.02.200.

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