# AGENDA

## PLANNING COMMISSION

Connie Coleman-Lacadie • Don Daniels
Nancy Hudson-Echols • Robert Estrada
James Guerrero • Paul Wagemann
Christopher Webber

**Regular Meeting**
**Wednesday, April 18, 2018**
**City Hall Council Chambers**
6000 Main Street SW, Lakewood, Washington

1. **Call to Order**

2. **Roll Call**

3. **Approval of Minutes from April 4, 2018**

4. **Agenda Update**

5. **Public Comments**
   (Each person will be allowed 3 minutes to speak, to a total of 15 minutes per topic. Groups with a designated speaker may have a total of 10 minutes to speak.)

6. **Public Hearings**
   - None

7. **Unfinished Business**
   - None

8. **New Business**
   - Introduction to the Downtown Subarea Plan, Preferred Alternative Recommendation, Planned Action Ordinance, Comprehensive Plan Amendments and Form-Based Code
   - Sign Code Amendments

9. **Report from Council Liaison**
   - Mr. Mike Brandstetter

10. **Reports from Commission Members & Staff**
    - Written Communications
    - Future Agenda Topics
    - Area-Wide Planning / Land Use Updates
    - Other

**Enclosures**

1. Draft Meeting Minutes from April 4, 2018
2. Staff Report Downtown Subarea Plan "Packet"
3. Draft Downtown Subarea Plan (DSAP)
4. Draft Planned Action Environmental Impact Statement (DPAEIS)
5. Summary of 2017 Public Comment on draft DSAP
6. Discussion Guide PAO
7. Staff Report Sign Code Amendments
8. Sign Code Example Survey
9. Draft Sign Code EXHIBIT B

**Members Only**

Please email kdevereaux@cityoflakewood.us or call Karen Devereaux at 253.983.7767 no later than Tuesday at noon, April 17, 2018 if you are unable to attend.  Thank you.

**PLANNING COMMISSION**
**REGULAR MEETING MINUTES**
**April 4, 2018**
**City Hall Mt. Rainier Conference Room**
**6000 Main Street SW**
**Lakewood, WA 98499**

## Call to Order

The meeting was called to order at 6:30 p.m. by Mr. Robert Estrada, Vice-Chair.

## Roll Call

Planning Commission Members Present: Robert Estrada, Vice - Chair; Connie Coleman-Lacadie, Nancy Hudson-Echols, James Guerrero, and Christopher Webber
Planning Commission Members Excused: Don Daniels, Chair and Paul Wagemann
Planning Commission Members Absent: None
Staff Present: Tiffany Speir, Special Projects Planning Manager, Community Development; Weston Ott, Capital Projects Division Manager, Public Works; Courtney Brunell, Long Range Planning Manager; Community Development; Andrea Bell, Associate Planner, Community Development; and Karen Devereaux, Administrative Assistant
Council Liaison: Councilmember Mr. Michael Brandstetter

## Approval of Minutes

**The minutes of the meeting held on February 21, 2018 were approved by voice vote M/S/C Guerrero/Webber. The motion to approve these minutes passed unanimously, 5-0.**

## Agenda Update

None

## Public Comments

None

## Public Hearings

None

## Unfinished Business

None

## New Business

*6 Year Transportation Improvement Program 2019-2024 1st Draft*

Mr. Weston Ott, Capital Projects Division Manager, Public Works, presented information on the Draft 6 Year Comprehensive Transportation Improvement Program for 2019-

2014. The primary objective of the program is to produce a comprehensive program for the orderly development and preservation of the City's street system.  Only those projects identified in the adopted program are eligible for state or federal grant funding.

Mr. Ott explained the funding sources for these projects include Motor Vehicle Fuel Tax, transfers from Surface Water Management Fund for portions within the project related to surface water; grant monies secured from Community Development Block Grants, Washington State Transportation Improvement Board, Department of Transportation Safe Routes To Schools Program, Pedestrian and Bicycle Program, and City Funding Sources of Real Estate Excise Tax as well as the Transportation Benefit District.

The Planning Commission will view the final draft document at their next meeting prior to City Council holding a public hearing in late June with anticipated adoption in early July.

*Sign Code Update*
Ms. Courtney Brunell, Planning Manager, provided detailed information on expeditiously amending the sign code and reviewing it apart from the rest of Title 18A.  Ms. Brunell reiterated the June 18, 2015 Supreme Court ruling of Reed v. Town of Gilbert that regulating signs based on content is unconstitutional. There are still permissible areas for regulation. The City of Lakewood is currently using an administrative policy to evaluate sign applications.

The current task is to rewrite the sign code in order to remove content based provisions. Staff reviewed other jurisdictions sign code amendments in a power point presentation and prepared a draft ordinance for the commission to consider.

Additional discussion is scheduled in the next meetings before the public hearing to be held June 6, 2018.  Council will begin their review in late July.

**Report from Council Liaison**
Councilmember Mr. Mike Brandstetter updated the commissioners on the following Council actions:

City Council held a public hearing on the regulation of Adult Family Homes and Essential Services Facilities regarding the Resolution 2018-03 recommending licensing and zoning.  Council is scheduled to take the next action in two weeks.

In May Council will hold a public hearing regarding prohibition or allowance of marijuana retail sales. Planning commissioners recommended prohibition of marijuana retail sales in Ordinance 2018-02.  After the public hearing, Council will take action in late May or early June on this topic.

The continuation of the 2018 Chip Seal Program has been approved by Council.  Work has been scheduled for a network of streets in the Oakbrook and Lake City neighborhoods. For more than 2 years the Planning Commission and Council have been working with the Parker Property on Veterans Dr SW & Gravelly Lake Drive. The property was rezoned to R2 with intention to develop the 7 acres with 19 homes. The project has experienced delay due to staff developing a procedure for the Planned Development Process it involves.

**Reports from Commission Members and Staff**

City Council Actions

No updates from staff at this time.

Written Communications

None

Future Agenda Topics

On Monday, April 9, there is a Joint Council and Planning Commission Meeting during a study session in the Council Chambers. Council and Commissioners will discuss the Downtown Subarea Plan policy document and Environmental Impact Statement.

An additional joint study session between Commissioners and Council is scheduled for Tuesday, May 29th, to discuss the upcoming Comprehensive Plan Amendments schedule.

Area-Wide Planning / Land Use Updates

None

Other

None

**Next Meeting: Wednesday, April 18, 2018 at 6:30 p.m. in Council Chambers**

**Meeting Adjourned** at 8:29 p.m.

| | |
|---|---|
| Don Daniels, Chair | Karen Devereaux, Recording Secretary |
| Planning Commission 04/18/2018 | Planning Commission 04/18/2018 |

TO: Planning Commission

FROM: Tiffany Speir, Planning Manager, Special Projects

DATE: April 18, 2018

SUBJECT: Proposed Downtown Subarea Plan (DSAP) and Associated Documents

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**Summary:** Lakewood is on the cusp of adopting a subarea plan that realizes the vision for a downtown core voiced by Lakewood citizens since the City's incorporation. To accomplish this action, there are four parts to the "packet" that will ultimately be considered by the Council: the Downtown Subarea Plan itself, a Planned Action Ordinance that will allow future projects within the subarea to move through an expedited environmental review consistent with RCW 43.21C.440 and SEPA rules in WAC 197-11, the Downtown "hybrid form-based" Development Code, and City Comprehensive Plan amendments.

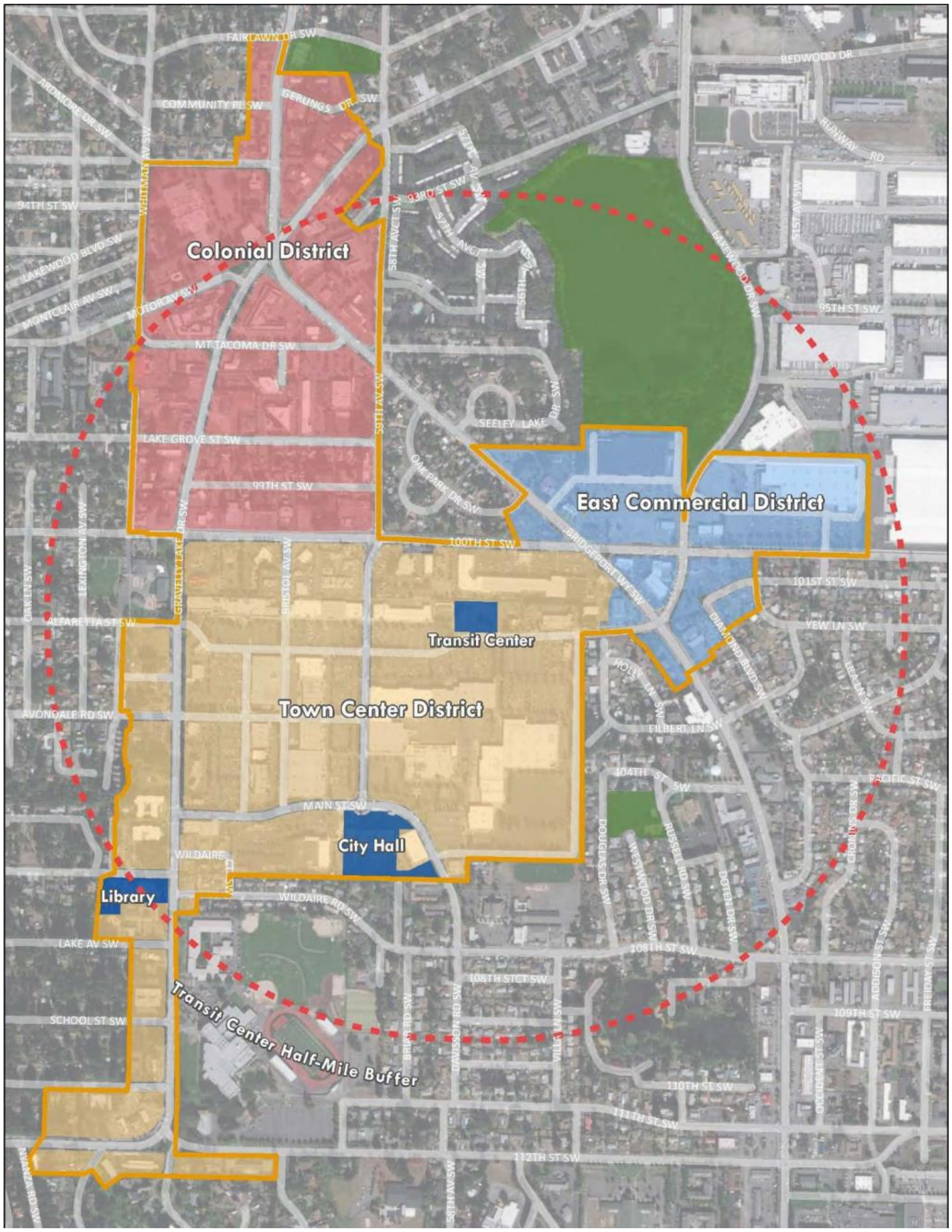
The draft Subarea Plan for Lakewood's Central Business District, or "Downtown" (DSAP), and its accompanying draft Planned Action Environmental Impact Statement (DPAEIS) have been completed and are now available for public review and are included in your packet. (Public comment on the DPAEIS closed on April 16.)

The draft Planned Action Ordinance - currently included as Appendix B of the DPAEIS - will be completed and include required mitigations for future specific projects once a preferred Alternative has been identified for inclusion in the Final PAEIS. The draft Downtown Development Code and Comprehensive Plan amendments will be available for review by the May 2nd Planning Commission meeting.

Because the DSAP is a subarea plan per the GMA, the associated Comprehensive Plan text and map amendments can be adopted by the City at any time rather than being held until a regular amendment cycle.

The DSAP is built upon Lakewood's Comprehensive Plan Vision and Policies, the 2016 Motor Avenue Urban Design Vision, the 2017 Central Business District Assessment, and extensive public outreach in 2017 and 2018.

**Summary of draft Lakewood Downtown Subarea Plan (DSAP)**:  The DSAP geographic area encompasses about 319 acres and includes three districts:




**Colonial:** This district includes colonial-style commercial buildings and the historic Lakewood Theater.

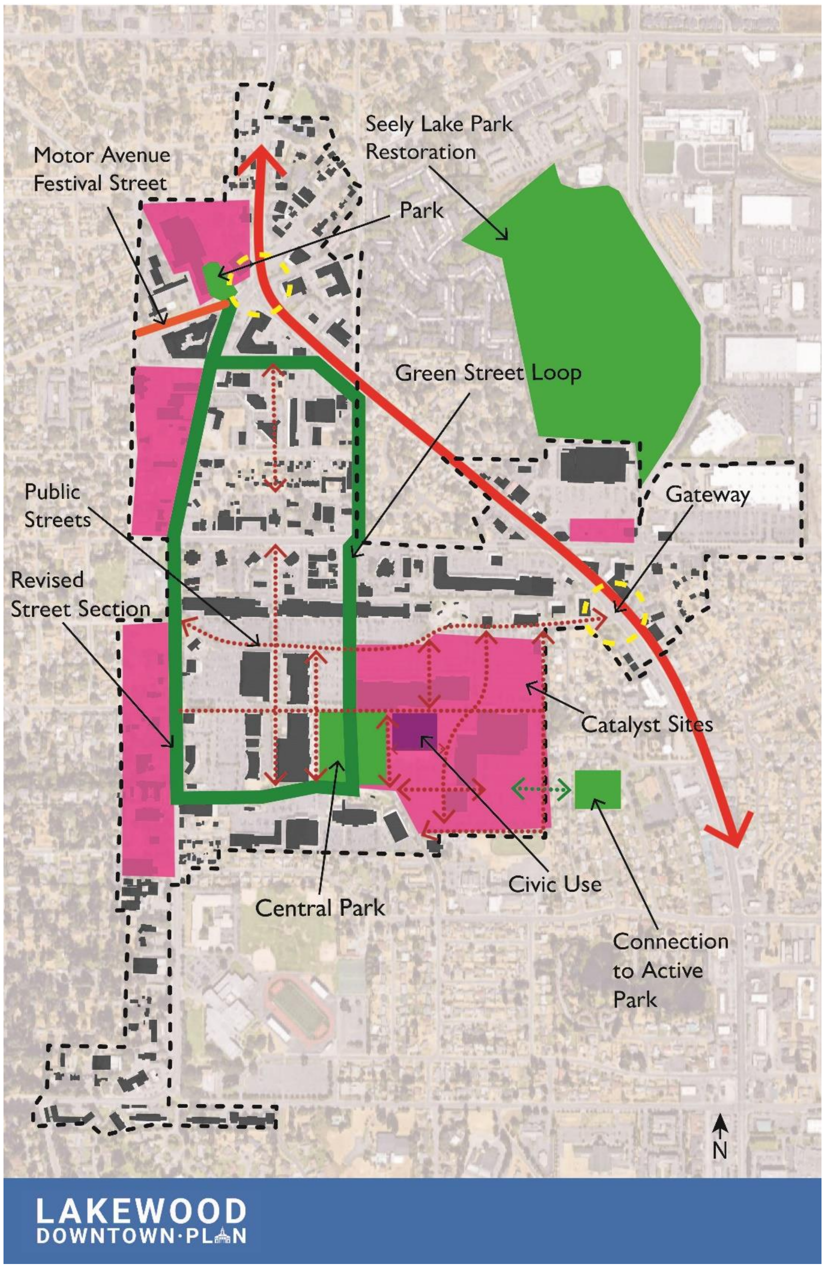
**Town Center:** This district contains the upgraded Lakewood Towne Center, the Lakewood Playhouse and City Hall.

**East Commercial:** This district at the intersection of Bridgeport Way SW and 100th Street SW has a mix of large auto-oriented commercial centers and smaller strip-commercial properties along arterials.

The Downtown Subarea Plan is proposing key public investments and changes:

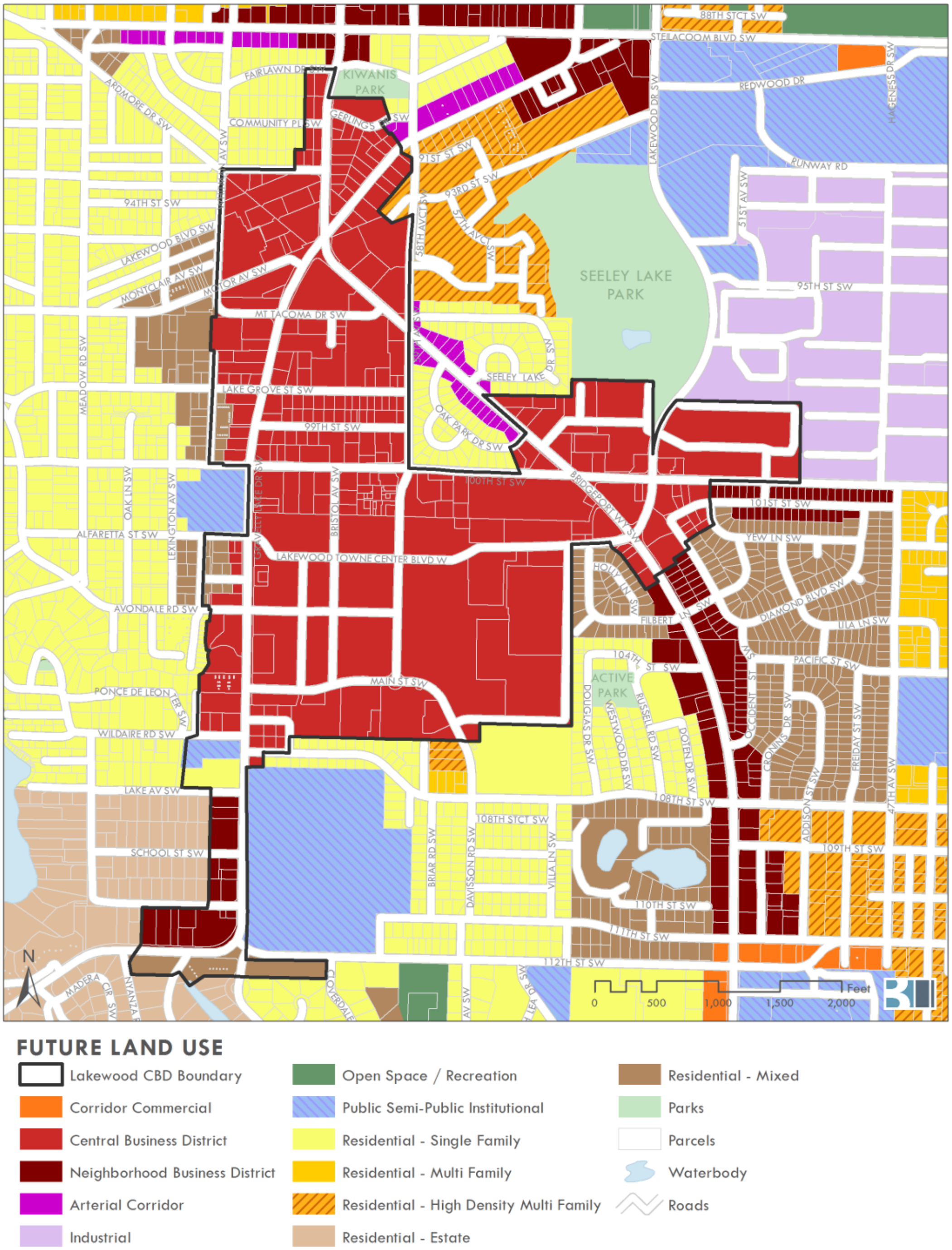
2 to 4-acre park near City Hall;
Green street loop with improved pedestrian and bicycle facilities;
Site for additional civic uses near City Hall;
Improved public street grid in the Towne Center;
Gateways along major arterials at the entrance to Downtown;
Revised plan line on Gravelly Lake Drive;
Catalyst sites for redevelopment;
Connection to Active Park;
Motor Avenue Improvements; and
Seeley Lake Park restoration

The draft Downtown Concept Plan is below:



*Framework, 2017*

The draft DSAP's proposed Future Land Use map is included here:




*BERK, 2018; City of Lakewood, 2017*

The DSAP proposes several alternate scenarios for the Downtown, each determined by the level of planned public investment and densification of commercial and residential development. The document is divided into subject-specific subsections:

Urban Design + Land Use;
Economic Development;
Housing;
Street Grids, Streetscapes & Public Spaces;
Transportation;
Parks,
Open Spaces, & Trails;
Stormwater and the Natural Environment;
Utility Infrastructure (Water, Sewer, Power);
Community Partnerships and Organization; and
an Implementation Plan.

Policies and strategies conclude each subsection that were developed from Comprehensive Plan language, consultant technical expertise, and/or public comment.

The full draft DSAP is included in your packet and is available online at www.lakewooddowntownplan.org/documents-1/.

**Summary of the draft DSAP Planned Action Environmental Impact Statement (DPAEIS)**: The DPAEIS for the Downtown Subarea Plan considers three alternatives: a "No Action" Alternative that assumes growth according to current trends and under current City Plans and development regulations; and Action Alternatives 1 and 2 that assume moderate to high levels of residential and employment growth based on targeted infrastructure and civic investments and plan and code changes.

Chapter 1 provides a summary of more detailed proposal descriptions in Chapter 2 and environmental analysis in Chapter 3. Chapter 2 describes the Lakewood Downtown Plan proposals, objectives, and alternatives that represent a range of choices that Lakewood can make about the future character, growth, and development in Downtown. Chapter 3 considers environmental consequences for each Alternative regarding the natural environment, population, employment, housing, land use, transportation, public services, and utilities. Chapter 4 identifies the background studies and information reviewed in the preparation of this EIS.

The DPAEIS' Appendix B also includes a draft SEPA Planned Action to streamline future environmental review and permitting in the Downtown area. A planned action provides more detailed environmental analysis during an area-wide planning stage rather than at the permit review stage. (See RCW 43.21C.440 and WAC 197-11-164 to -172.) If the Planned Action Ordinance (PAO) is adopted, future projects in the Downtown will not require SEPA determinations at the time of permit application if they are consistent with the type of development, traffic assumptions, and mitigation measures studied in the PAEIS. All such projects would still need to be consistent with all adopted laws and regulations, and would be reviewed pursuant to City adopted land use procedures.

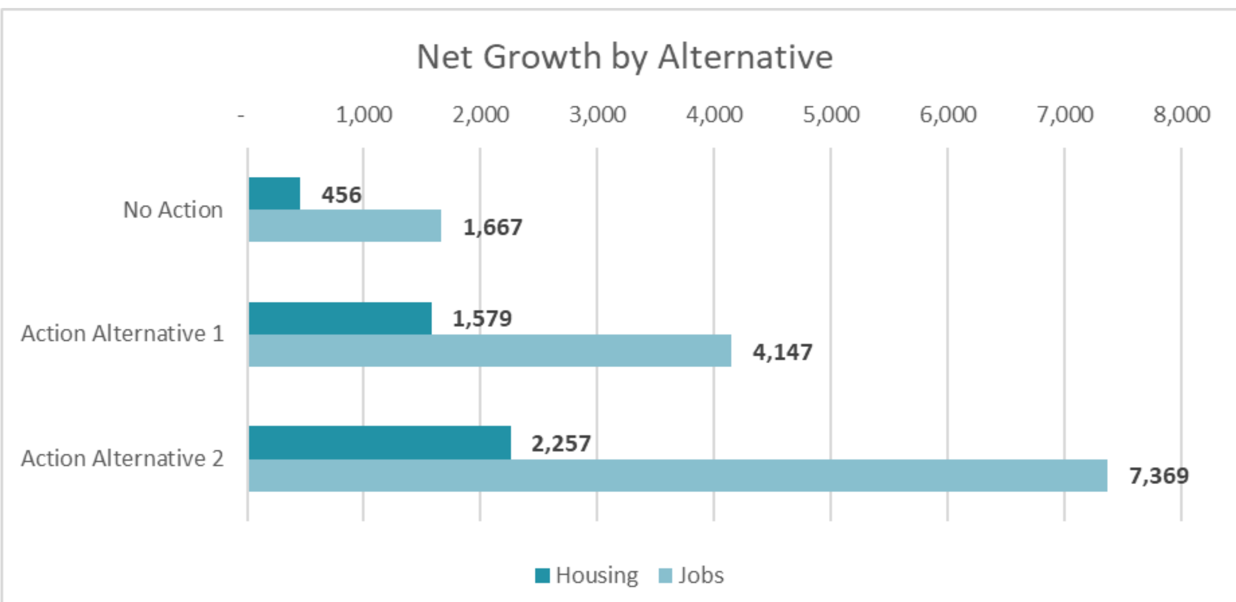
Summary tables from the DPAEIS that encapsulate the differences between the Proposed Alternatives are included below. The full DPAEIS is included in your packet and is available online at www.lakewooddowntownplan.org/documents-1/.

**Exhibit 1.5-2. Lakewood Downtown Civic and Infrastructure Investments**

| FEATURE | No Action | Action Alternative 1 | Action Alternative 2 |
|---|---|---|---|
| Catalyst Sites | Development per current plans and codes. Less transformation of catalyst areas. | Infill and integration of new mixed-use development on catalyst sites. | Fuller redevelopment of catalyst sites into mixed-use centers. |
| Civic Parks, Community Gathering | No new parks | New 2-acre Central Park, new Green Street Loop, and connections to adjacent parks | New 4-acre Central Park, new Green Street Loop, and connections to adjacent parks |
| Transportation Connectivity | Per current plan. The City's 6-year TIP (2018-2023) includes the following relevant improvement projects:<br>▪ 2.69B – Gravelly Lake Drive Road Diet b/w Bridgeport and Steilacoom (4 lanes to 3 lanes with bicycle lanes)<br>▪ 2.72 – 100th St. & Lakewood Dr. curb, gutter, sidewalks, new signal<br>▪ 2.82 – New sidewalk east side of 59th Ave from 100th St to Bridgeport Way<br>▪ 3.13 – Install a traffic signal at Gravelly Lake Drive / Avondale Road<br>▪ 5.7 – Improve non-motorized connections on Motor Ave b/w Whitman and Gravelly Lake Dr.<br>▪ 9.16 – 59th Ave pavement restoration from Main St to 100th St<br>▪ 9.22 – 100th St pavement restoration from 59th Ave to Lakeview Ave | The City's planned investments with changes/adds:<br>▪ Retain Bridgeport Way SW as primary vehicle entrance-strengthen gateway<br>▪ Retain 100th Street SW as a primary east-west vehicle connection between I-5 and subarea<br>▪ Modify cross section of Gravelly Lake Blvd. Study, 3, 4, and 5-lane cross sections between Bridgeport and Nyanza Road SW to allow for improved bicycle and pedestrian facilities*<br>▪ Conversion of Lakewood Towne Center Blvd and Bristol Ave as public streets<br>▪ Lakewood Towne Center Blvd at 59th Ave SW, consider roundabout<br>▪ Reduce 59th Avenue SW to two lanes, allowing for bicycle facilities<br>▪ Addition of new street connections to support walkability. Alternative 1 assumes fewer connections based on phasing or property owner preferences, compared with Alternative 2. Consider 400 feet as the desired maximum block lengths throughout Subarea. | |
| Ecosystem – e.g. creek daylighting, menu of stormwater requirements | No change to creek. Implement stormwater manual on site by site basis. | Consider range of options qualitatively: greater investment in green infrastructure compared with creek daylighting. | |

**Exhibit 1.5-3. Alternative Plan and Code Changes and associated Housing and Job Growth**

| FEATURE | No Action | Action ALTERNATIVE 1 | Action ALTERNATIVE 2 |
|---|---|---|---|
| Plan and Code | Current Plan and Code | New Subarea Plan<br>New Form Based Code and Parking Standards | New Subarea Plan<br>New Form Based Code and Parking Standards |
| Height | Up to 90 feet allowed, trend of 1-2 stories | Greater height in center, but stepped back on periphery.<br>Most development at 2 to 6 stories.<br>Incentives to earn up to 90 feet (e.g. office). | Greater height in center, but stepped back on periphery. More development of office and housing would create greater intensity of building form and heights up to 90 feet. |
| Housing Density | 54 units per acre | 80 units per acre | 100 units per acre |
| Housing: net growth | 456 | 1,579 | 2,257 |
| Job Trends and Building Space | Current trends continue: minor new construction and addition of jobs at existing sites. | Assume 50% of expected 3.0 million new square feet of commercial space. | Assume 95% of expected 3.0 million new square feet of commercial space. |
| Job Mix | Compared to existing job mix, lesser share of retail and less manufacturing/warehousing, and greater share of finance, insurance, real estate, and services (e.g. office). Similar share of government and education. (Per City transportation model assumptions.) | | |
| Jobs: net growth | 1,667 | 4,147 | 7,369 |




*Source: BERK Consulting 2017*

**Exhibit 1.7-1. Development Density**

| Feature | Existing | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|---|
| Maximum Building Height (feet) | 15- 35 ft. | 90 ft. | 90 ft.* | 90 ft.* |
| Maximum Dwelling Density – Buildable Lands | Not applicable | 54 du/ac | 80 du/ac | 100 du/ac |
| Assumed Jobs Density – Buildable Lands | Not applicable | 28.34 jobs/ac | FAR 1.8-3.6** | FAR 1.8-3.6** |
| ***Effective Density and Ratios (318.69 gross acres)*** | | | | |
| Persons per Acre | 2.89 | 6.03 | 13.76 | 18.43 |
| Dwelling Units per Acre | 1.33 | 2.78 | 6.34 | 8.49 |
| Jobs per Acre | 16.65 | 21.94 | 29.81 | 40.03 |
| Jobs/Housing Balance Ratio | 12.52 | 3.64 | 2.17 | 2.17 |

** Transitional heights would allow for step down in buildings along edges of the Study Area that are lower in density.*
*** Floor area ratio (FAR) refers to the relationship of the building space to the lot area, derived by dividing the gross floor area of all buildings on a lot by the area of that lot, dividing the gross floor area of all buildings on a lot by the area of that lot. The February 22, 2017 "City of Lakewood Employment Capacity Analysis" Memo applies a floor area ratio (FAR) approach to determining future land capacity and assumes that sites that have 25% of the allowed FAR under zoning are more likely to redevelop than sites with more building space. (BERK Consulting, 2017)*

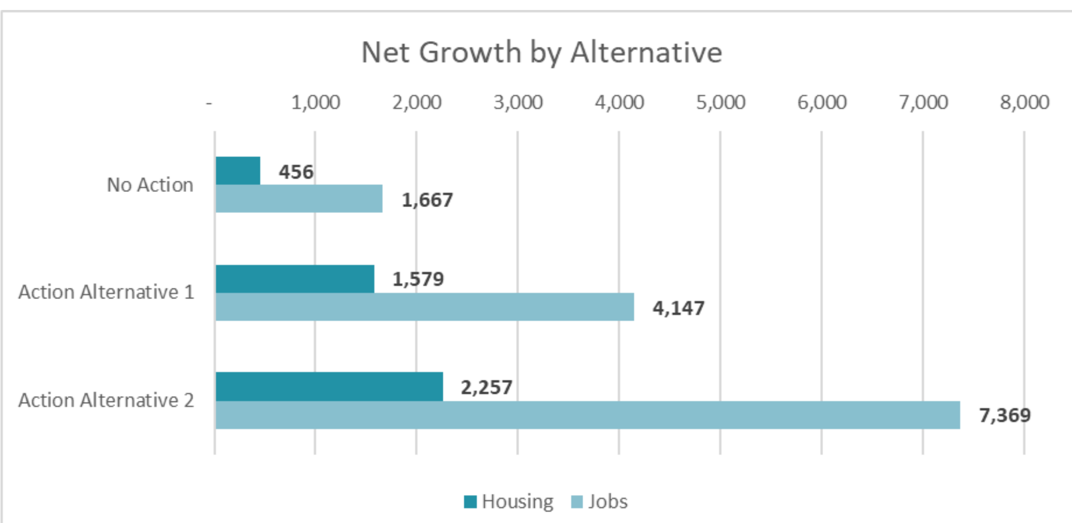
*Source: BERK 2018*

**Exhibit 1.7-2. Downtown Buildable Parcels Summary**

| Type | Parcel Count | Parcel Acres |
|---|---|---|
| Vacant – All Alternatives | 19 | 4.42 |
| Underutilized – All Alternatives | 140 | 58.44 |
| Catalyst Areas – Alternatives 1 and 2 | 86 | 85.05 |

*Source: Pierce County 2014, BERK 2017 and 2018*

**Exhibit 1.7-3. Housing and Job Growth by Alternative**




*Source: BERK 2017*

**Exhibit 1.7-4. Daily Person Trip Ends Generated by Scenario**

| | Existing | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|---|
| Vehicular Mode Trip Ends | 71,000 | 85,700 | 129,800 | 168,900 |
| Non-vehicular mode Trip Ends | 6,000 | 7,700 | 13,100 | 22,100 |
| Total Person Trip Ends | 77,000 | 93,400 | 142,900 | 191,000 |
| **Non-vehicular Mode Split** | **8%** | **8%** | **9%** | **12%** |

*Source: Fehr & Peers 2018*

**Exhibit 1.7-6. Summary of Transportation Impacts.**

| Type of Impact | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|
| Auto and Freight | 2 intersections | 5 intersections | 6 intersections |
| Transit | 2 intersections | 5 intersections | 6 intersections |
| Pedestrian | None | None | None |
| Bicycle | None | None | None |
| Parking | None | None | None |
| Safety | None | None | None |

*Source: Fehr & Peers, 2018.*

**Exhibit 1.7-7. Potential Additional Transportation Mitigation (LOS/Seconds at intersection)**

| Intersection | No Action | Alt 1 | Alt 1 Mitigated | Alt 2 | Alt 2 Mitigated |
|---|---|---|---|---|---|
| **Gravelly Lake Dr SW/59th Ave SW** | | | | | |
| Signalize intersection | E/38 | E/46 | B/19 | F/82 | B/19 |
| **100th St SW/Bridgeport Way SW** | | | | | |
| Add westbound right turn pocket, convert existing westbound through-right lane to through-only, and prohibit east and westbound left turns | E/68 | F/85 | C/34 | F/102 | D/49 |
| **100th St SW/Lakewood Dr SW** | | | | | |
| Signal timing revisions to provide more green time to protected left turn phases and reduce time for eastbound and southbound through phases | D/50 | E/56 | D/49 | E/56 | D/54 |
| **Lakewood Dr SW/Bridgeport Way SW** | | | | | |
| Convert westbound through-left lane to left only to remove split phase or move the pedestrian crossing to the north side of the intersection coincident with the WB phase* | C/34 | E/66 | D/39 | E/67 | D/48 |
| **108th St SW/Bridgeport Way SW**** | | | | | |

| Intersection | No Action | Alt 1 | Alt 1 Mitigated | Alt 2 | Alt 2 Mitigated |
|---|---|---|---|---|---|
| Add northbound right turn pocket | D/48 | D/51 | D/47 | E/58 | D/52 |
| **112th St SW/Gravelly Lake Dr SW**** | | | | | |
| Add second westbound left turn pocket and combine through and right turn movements into outside lane | C/31 | E/61 | C/34 | E/65 | C/35 |

*Notes: * The LOS results are slightly better if the split phasing is removed (D/48) than if the pedestrian crossing is relocated (D/54).*
***These intersections remain within the City's LOS standard of D if the Gravelly Lake Drive SW Revision is not implemented.*

*Source: Fehr & Peers 2018*

**2017-2018 Public Comments and Input Summary**: To develop the Draft Lakewood Downtown Plan proposals, the City engaged the diverse Lakewood community. Between September and November 2017, Lakewood hosted twelve public outreach and engagement efforts to encourage residents and business and property owners to participate in conversations about the best future for Downtown:

- Farmer's Market Outreach
- Boo Han Outreach
- Truck & Tractor Day Outreach
- Youth Council Outreach
- Charette
- Developer Forum
- JBLM Intercept
- KWA Forum
- El Mercado Intercept
- 5th Grade Survey
- Online Survey

Over 645 persons were reached through going to community markets, festivals, and classrooms, facilitating focus groups, hosting a multi-day charrette, and conducting an online survey. A summary sheet is attached for your reference; full results of the 2017 public outreach efforts can be found at https://www.lakewooddowntownplan.org/documents-1

The public review of the draft Downtown Subarea Plan (DSAP) and Draft Planned Action Environmental Impact Statement (DPAEIS), which includes the draft PAO, began March 16. Review of the form-based development code will begin in April or May.

City staff has also specifically reached out to RPAI for comment in 2018. RPAI representatives contacted city staff on March 22 to request copies of the DSAP and DPAEIS to review.

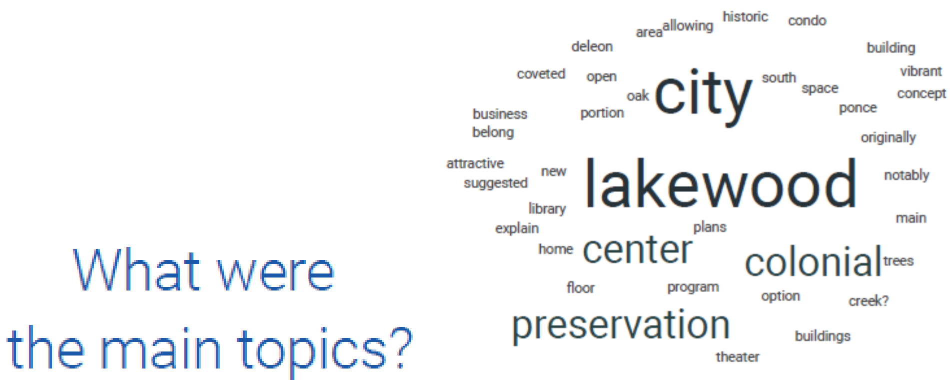
On March 21, the Lakewood Planning Commission hosted an open house regarding the draft Downtown Subarea Plan (DSAP) and associated Draft Planned Action Environmental Impact Statement (DPAEIS). Approximately 650 notices were mailed to property owners inside of, and with 300 feet of, the Central Business District. 35 public attendees signed in.

Attendees were greeted and engaged with city representatives for about 45 minutes, were provided Plan and EIS written summaries, and looked at project boards highlighting the vision, concepts, and considered alternatives for build-out in the DSAP. Project consultants presented a more detailed summary of the proposed build-out alternatives and the items currently reviewed within the DPAEIS, and encouraged public comment in writing, via the public survey, and via a live poll taken during the meeting.

Questions asked by attendees via the live poll included:

- Plans for preservation of the historic Colonial Center buildings, notably the Lakewood Theater and preservation of the oak trees around that space.
- Originally in a program with the city was new it was suggested to have a building allowing a business on the main floor and above that would be a condo home.
- Lakewood colonial center is the most attractive part of Lakewood but does not belong to the city. How can we keep it a vibrant part of our city
- Is there an option to open the covered portion of Ponce Deleon Creek?
- Would you explain the concept for the area south of the library

Live poll results are included below:




**What do you like best about the Downtown Vision Statement? (Choose up to 2)**
19 respondents

Downtown is Safe and Inviting 32 %
More Things to Do 26 %
Supports a Thriving Local Economy 16 %
Better Design for Walking and Biking 21 %
Support Cultural Diversity 5 %
Nothing 0 %

**What do you like about the Downtown Plan Concepts? Select up to 2)**
20 respondents

More Park Space 20 %
Safe and inviting places to walk 45 %
More activities Downtown 35 %
Motor Avenue Festival Street 35 %
Improved Urban Design 15 %
More retail and dining options 35 %
Nothing 0 %

**What would be your top priority for the following investments? (Choose up to 3)**
20 respondents

Green Street Loop 45 %
New Public Streets 20 %
Central Park 45 %
Modified Gravelly Lake Drive 60 %
New Uses Added on Catalyst Sites 40 %
Motor Avenue Festival 45 %
Other 0 %

After the more formal presentation by the consultant team, the remainder of the meeting was dedicated to a question and answer session. Questions were mostly focused on transportation, both inside and outside the Plan area. Other questions ranged from "is my property within the area?" to "what will happen to the residential area between the Colonial District and the East Commercial District?" to "what will happen to the existing Library building?"

Transportation questions generally concerned congestion within and in areas adjacent to Downtown. Attendees asked about running shuttles within the Downtown, as well as high capacity transit or shuttles between Downtown and the Sound Transit station and the Lakewood Park & Ride. There were comments about speed limits on $100^{th}$ and $101^{st}$ and congestion in residential areas west of the Downtown Plan area.

There were no negative comments about the Plan elements; criticism was about doing more transportational analysis in the EIS and adding greenery to the area. Questions unrelated to the DSAP or DPAEIS were focused on abatements and crime properties in the city.

**April 9 Joint City Council and Planning Commission Study Session**: At the April 9 joint City Council/Planning Commission study session, attendees participated in a discussion about the proposal and in a live poll, the results of which are included below.

**What should be the highest priorities be for Parks in Downtown?** (Choose up to 2 responses)
The Central Park 83 %
The Green Loop 58 %
More Events and Programming 42 %
Seely Park Restoration 8 %

**What should be the highest transportation priority?** (Choose up to 2 responses)
Gravelly Lake Improvements 77 %
The Green Loop 62 %
New Public Streets 23 %
Maintain Traffic Capacity 31 %

**What should be the highest priority for improvements to land use regulations?** (Choose 1)
More mixed-use development 54 %
Better site and building design 23 %
More street level retail 15 %
Reduce surface parking 8 %
Maintain and plant trees and vegetation 0 %
Limit big-box development 0%

At the session:

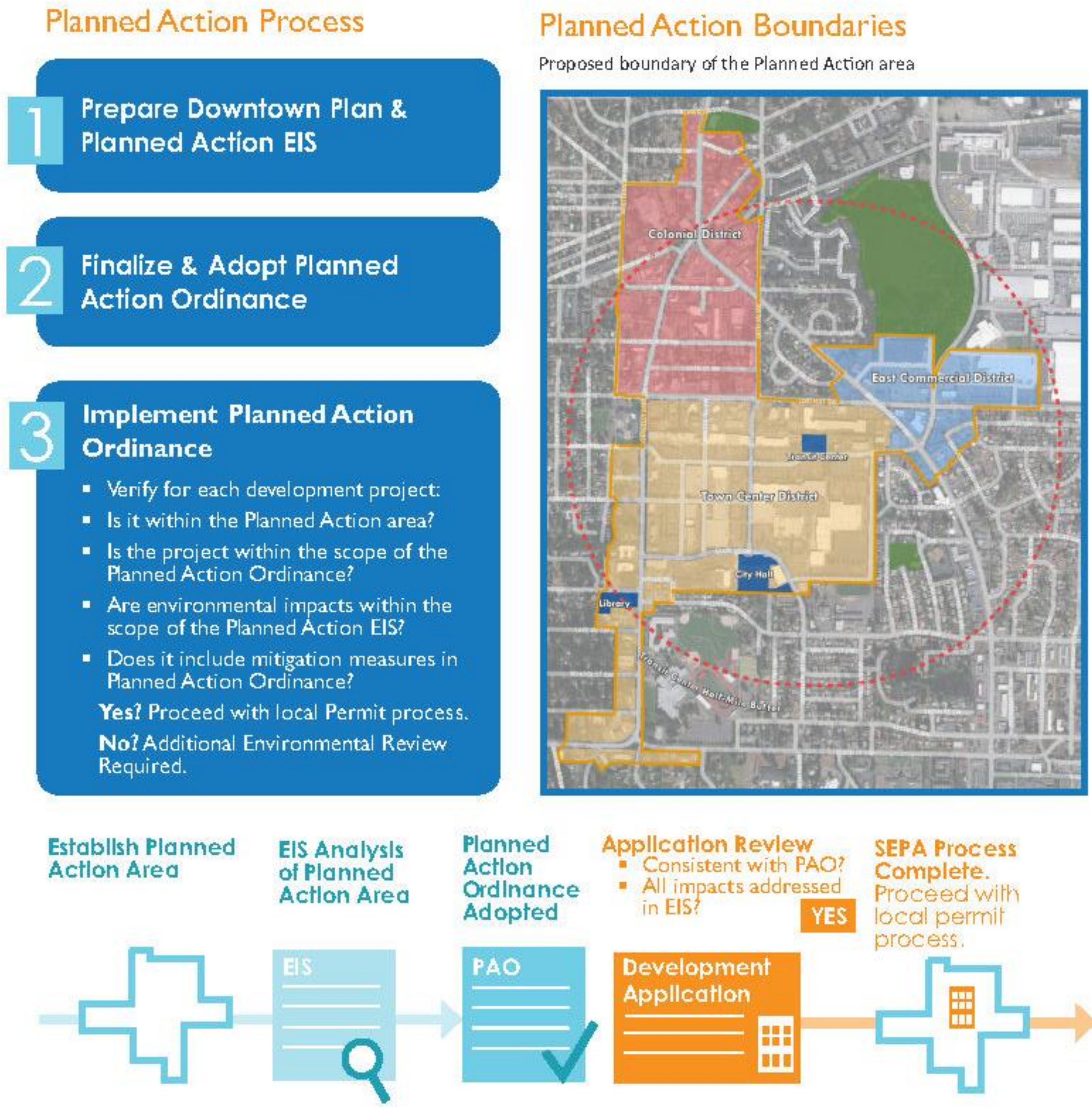
- Councilmember Brandstetter asked a question regarding the Binding Site Plan and CC&Rs governing development in the Towne Center shopping mall; the City attorney explained that the City would pursue voluntary actions and negotiations with mall operators as much as possible and then consider other actions to proceed with realization of the subarea plan.
- Councilmember Simpson expressed his agreement with the economic analysis from the 2017 Central Business District Assessment the recommends the Downtown cater to local and daily service needs.
- Councilmember Whalen asked whether the Plan anticipated the projected transition from big box retail to mixed use and smaller retail footprints in the national economy; consultants explained that it did.
- Mr. Whalen also asked whether the civic park's size (i.e., 2 acres vs. 4 acres in the presented Alternatives) would affect the success of the Downtown overall; consultants responded that a higher density of development would desire a larger park.
- Mayor Anderson expressed concern that the Plan not reduce traffic capacity while simultaneously planning for significantly more residents and jobs in the Plan area; consultants explained that the PAEIS and Plan explored a variety of options for transportation and did not assume a reduction in transportation capacity (especially on Gravelly Lake Drive.)
- Commissioner Estrada asked whether the Green Street Loop would restrict the ability for the City plan for increased auto traffic mobility; the consultants explained that the Loop was anticipated to be implemented in conjunction with related network improvements, so overall there may be little reduction in mobility with the addition of other modal mobility.

**Planned Action Ordinance:** The proposed draft Planned Action Ordinance (PAO) is included in the Draft Planned Action Environmental Impact Statement (EIS) published in March 2018 as Appendix B and includes the following sections:

- **Recitals**: The recitals identify facts and procedures the City followed in developing the PAO.
- **Purpose**. The overall purposes are to streamline and expedite the land use permit review process in the PAO and ensure that environmental analysis, land use plans, development regulations, City codes and ordinances together with the mitigation measures in the Planned Action EIS and Addendum mitigate environmental impacts.
- **Findings**: The findings indicate the PAO meets the criteria in SEPA Rules.
- **Procedures and Criteria** for Evaluating and Determining Planned Action Projects within Planned Action Area: This section establishes thresholds for growth, land use, and transportation. This section also establishes criteria by which the City would review planned action applications.
- **Monitoring and Review**: Establishes a review process to monitor the progress of the Planned Action.
- **Exhibit A**: Identifies the boundary of the Planned Action Area.

- **Exhibit B**: Identifies Planned Action EIS Mitigation Measures that apply to new development. Mitigation addresses topics such as natural environment, population/employment/housing, land use, transportation, public services, and utilities, plus topics addressed in the SEPA Checklist such as cultural resources and human health.

The graphic included below explains how the PAO would be utilized in the Downtown Plan area if adopted:



**2018 Public Outreach and Legislative Meeting Schedule (*anticipated*)**:

- March 21 through April 27, Public Workshop and Outreach Activities (website, social media, online public survey, etc.);

- April 9, Joint City Council & Planning Commission meeting to discuss the DSAP and DPAEIS and start to identify a Preferred Alternative;

- April 17, end of DPAEIS comment period;

- April 18, Planning Commission meeting to identify Preferred Plan Alternative recommendation and receive draft Planned Action Ordinance (PAO);

- April 26, Community Outreach Meeting for PAO, Downtown Developers Focus Group;

- May 2 and May 16, Planning Commission Hearings and Review/Deliberation on DSAP, PAO, Downtown Development Code (DDC), and Comprehensive Plan amendments;

- June 6, Planning Commission Action on DSAP, PAO, DDC, and Comprehensive Plan amendments;

- June 25, City Council Study Session on DSAP, PAO, DDC, and Comprehensive Plan amendments;

- July 2, Public Hearing on DSAP, PAO, DDC, and Comprehensive Plan amendments; and

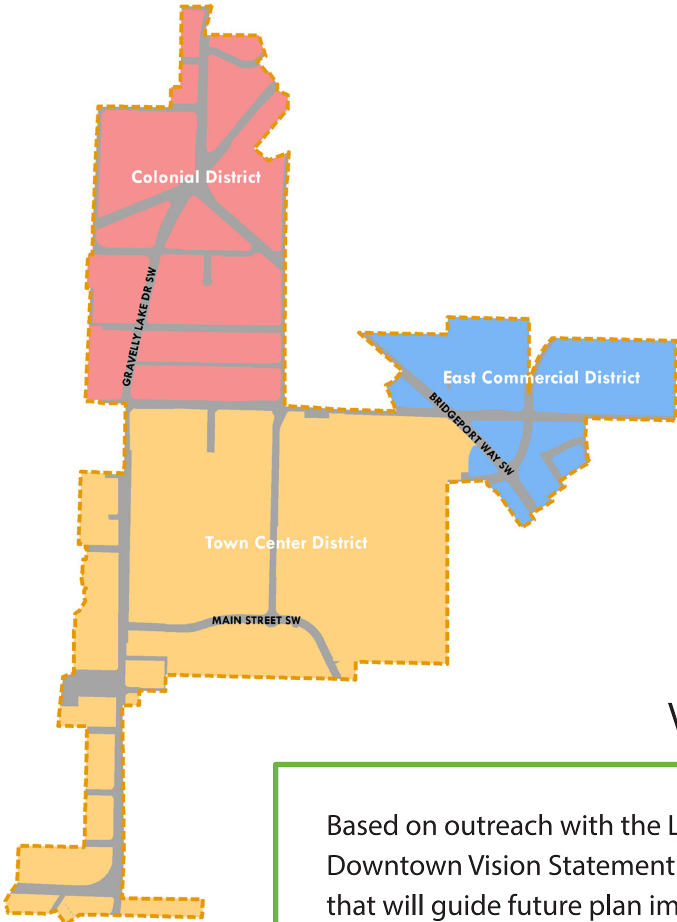
- July 16, City Council action on DSAP, PAO, DDC, and Comprehensive Plan amendments

CITY OF LAKEWOOD

# LAKEWOOD DOWNTOWN·PLAN

DRAFT MARCH 2018

Prepared by: BERK
ESA
Fehr & Peers
Framework
KPG
Seth Harry & Associates




## VISION STATEMENT

Based on outreach with the Lakewood community in fall 2017, this plan provides a Downtown Vision Statement that is a basis for policies and actions in this plan, and that will guide future plan implementation.

Our VISION FOR DOWNTOWN is that it is seen as the "heart" of Lakewood. Downtown is where people go to do fun things, see friends and neighbors, eat good food, and experience the cultural diversity of the City. Downtown brings a strong sense of pride for the community by celebrating all things Lakewood and bringing a strong sense of identity to the City and its people. Downtown is best experienced by walking or biking and is safe, inviting, and connected. The Downtown has a mix of retail, restaurant, employment, and housing options that are well-designed and support civic life and a strong economy.

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- Where people LIVE, WORK, MEET, SHOP, and EAT

# Draft Lakewood Downtown Plan

City of Lakewood | March 2018

Prepared by: Framework, BERK, ESA, Fehr & Peers, KPG, and Seth Harry & Associates


Introduction ..... 2

What We Heard ..... 7

Vision for Downtown ..... 9

Concept Plan ..... 10

Policies and Strategies ..... 14

Urban Design + Land Use ..... 14

Economic Development ..... 28

Housing ..... 30

Street Grids, Streetscapes & Public Spaces ..... 32

Transportation ..... 45

Parks, Open Spaces, & Trails ..... 51

Stormwater and the Natural Environment ..... 54

Utility Infrastructure (Water, Sewer, Power) ..... 57

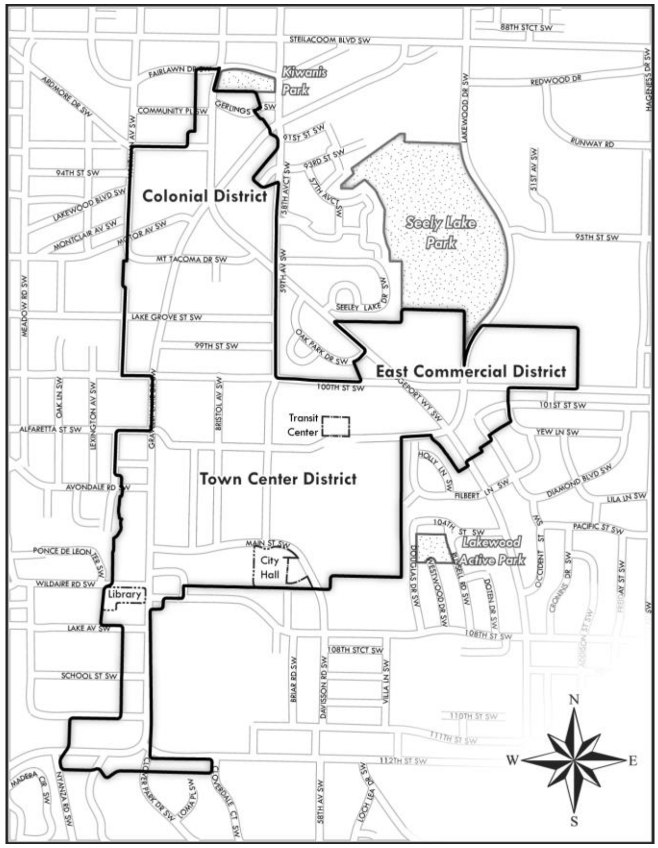
Community Partnerships and Organization ..... 58

Implementation Plan ..... 60

# Introduction

A major goal of the City of Lakewood is to create a Downtown focused in the Central Business District (CBD) zone, redeveloping it into a rich urban area with civic amenities, walkable streets, and a mix of uses including housing, entertainment, restaurants, and retail. See Figure 1. Downtown Lakewood has significant economic and cultural assets to build upon and some challenges to overcome. To help attain this ambitious goal for Downtown Lakewood, the City of Lakewood has commissioned this Lakewood Downtown Plan, considered a subarea plan under the Growth Management Act.

*Figure 1. Downtown Plan Vicinity*




*BERK Consulting 2017*

This Downtown Plan honors past planning efforts, and weaves in fresh ideas from extensive outreach efforts in fall 2017. This plan describes a vision, land use and design, gathering places, and action strategies that will help bring about desired change and development. This plan will be implemented by new design-oriented zoning standards. A proposed Planned Action Ordinance will streamline environmental review.

The Lakewood Downtown Plan encompasses over 315 parcel acres, with three districts that illustrate different characters. See Figure 1.

- Colonial: This district includes colonial-style commercial buildings. It includes the historic Lakewood Theater, which has not operated for approximately 20 years.
- Town Center: This district contains the upgraded Lakewood Towne Center, an auto-oriented shopping area with stores and restaurants, a transit center, the Lakewood Playhouse, and City Hall. Referring to the district as a whole, “town” is used. Referring to the private mall, “towne” is used.
- East District: This district at the intersection of Bridgeport Way SW and 100th Street SW has a mix of large auto-oriented commercial centers and smaller strip-commercial properties along arterials.

## History of Lakewood and the Downtown

Lakewood was a part of unincorporated Pierce County until 1996, when it officially incorporated to become the City of Lakewood. The City of Lakewood is now more than 20 years old and has a population of nearly 60,000 people. The City’s existing auto-oriented development pattern reflects the Pierce County regulations that governed development for most of the community’s history. In the last update to the City’s Comprehensive Plan, the Lakewood community said that urban design was the number one issue that the City should address.

Downtown exemplifies Lakewood's auto-oriented pattern, but is also rich with history. In 1937, Norton Clapp built part of the Lakewood Colonial Center, one of the first suburban shopping centers in the country.

The original Lakewood Towne Center development was built a short distance away almost two decades after the Colonial Center was built. The Lakewood Towne Center property started as a Catholic girls' school. It was transformed into an auto-oriented strip mall in the 1950s called the Villa Plaza Shopping Center. In 1986, it became an indoor mall called the Lakewood Mall. In 2001, the site was "demalled" and converted into a "power center" (a development type with category-dominant anchors, including discount department stores, off-price stores, wholesale clubs, with only a few small tenants[1]) combined with neighborhood and civic center elements. It was renamed the Lakewood Towne Center at that point. Over the past 60 years, the property has changed ownership at least nine times. Facing rapidly evolving economic trends, such as online retail, the center is poised to evolve again into a destination-regional center that is walkable, mixed-use, and transit supportive.

This Plan maintains the spirit of the area's history while creating a new path for redevelopment within the Downtown.

## Related planning efforts for Downtown

### *Comprehensive Plan and Community Vision*

Citywide Comprehensive Plan policies, and the standards required and encouraged by the City of Lakewood, apply to the development of the Downtown Plan area. The policies and actions in this Downtown Plan supplement citywide guidance, providing specific direction for implementing the Downtown vision.

This Downtown Plan implements the Lakewood Community Vision that calls for a dynamic future and economic prosperity:

> *Our VISION for Lakewood is a thriving, urban, South Puget Sound City, possessing the core values of family, community, education, and economic prosperity. We will advance these values by recognizing our past, taking action in the present, and pursuing a dynamic future.*

A key strategy to attaining the Lakewood Community Vision is a recognizable downtown through development of the Central Business District (CBD) as described in Section 1.4.3 of the Lakewood Comprehensive Plan:

> *The CBD is the center of commercial and cultural activity for the city. It encompasses both the Lakewood Towne Center and Colonial Center. The area in and around the Towne Center is envisioned as a magnet for intensive mixed use urban development including higher density office and residential uses. At the north end of the CBD, the Colonial Center will serve as the hub of Lakewood's cultural activity. Higher quality, denser urban redevelopment is expected within the District, noticeably increasing social, cultural, and commercial activity. Streetscape and other urban design improvements will make this area more accessible and inviting to pedestrians.*

Comprehensive Plan policies call for action to remove obstacles to mixed use development, invest in public community gathering spaces and public streets, and empower local organizations to promote the Downtown:

- Remove underlying deed restrictions and/or covenants that prohibit office development, open space, high density residential development and/or mixed-use development in the Towne Center. (LU-19.5)
- Acquire lands and construct community-gathering destinations such as plazas, open space or community facilities within the Towne Center. (LU-19.6)

[1] Sources: ICSC Research and CoStar Realty Information, Inc.

- Support the formation of a Towne Center association or similar organization to establish economic improvement strategies and to sponsor social and safety events. (LU-19.7)
- Consider the use of the City's eminent domain powers to establish public streets and public open spaces in the Towne Center. (LU-19.8)
- Revise land use and development regulations to require mixed use development within the CBD for any new development excepting standalone commercial pads and service commercial uses. (LU-19.9)

### *CBD Assessment*

A CBD Assessment developed in 2017 presents demographic, economic, and market information, as well as findings from targeted research and stakeholder engagement, to establish a shared understanding of baseline conditions in the CBD and to set realistic parameters for this Downtown Plan. Major report themes included:

- **Visioning.** Work with the community to set a realistic but aspirational Vision.
- **Place-Making** Create quality public spaces that contribute to people's health, happiness, and well-being.
- **Overcoming Lakewood's Community Challenges.** Implement strategies to overcome challenges to be successful in its subarea planning. These include: public safety, cleanliness, empty storefronts, fragmented property ownership, and a diffused, auto-oriented built environment.
- **Investing in Key Development Opportunities.** Successfully use public and private investment redevelopment opportunities to advance the community's Vision for the CBD.

The CBD Assessment shows a market potential of three million square feet of commercial growth in the City and much of that could be attracted to the Downtown through appropriate investments in amenities and infrastructure, as well as appropriate zoning and design standards. The CBD Assessment ideas and information are woven into this Downtown Plan.

### *Motor Avenue*

Motor Avenue was identified as an opportunity to create a much-desired public open space for Lakewood's Downtown, which currently lacks the urban design features desired by the community. Motor Avenue is owned by the City as public right-of-way and currently has low volumes of traffic. Its central location and adjacency to Lakewood Colonial Center offers an exciting potential to create a vibrant, welcoming community gathering space that is a key component of Lakewood's vision. The Motor Avenue Urban Design Vision (2016) creates an urban design and streetscape plan including ideas for programming the space. The Motor Avenue Urban Design Vision is integrated into this Downtown Plan.

## Existing Conditions Summary

As part of this Downtown Plan effort, an Existing Conditions Report characterizes the present status of natural systems and the built environment. This, together with the CBD Assessment, describe the current situation and are considered in this Plan. The information is also integrated into the companion Planned Action Environmental Impact Statement.

*Table 1. Top Takeaways – Lakewood Downtown Conditions*

| Topic | Summary |
|---|---|
| Natural Environment | Streams, some fish bearing, cross the Study Area in open channels and in enclosed pipes. City policies support restoration.<br>Most of the area is developed with impervious surfaces though the area is an aquifer recharge area.<br>Future redevelopment would be required to meet newer stormwater regulations and that would improve water quality. |
| Land Use | Current development is largely commercial, single story, with extensive parking, though the Comprehensive Plan Future Land Use Designation and Zoning authorize mixed-use buildings of much greater height. There is little housing. This is partly due to Covenants, Conditions & Restrictions (CC&R's) on the Lakewood Towne Center site, but is also due to the auto-oriented era in which development first occurred.<br>Considering the CBD zoning and vacant and redevelopable land, as well as parking lots, there is a large capacity for employment and housing uses with underbuilding parking. |
| Population, Housing, Employment | The Study Area contains little housing and population. Market studies show an opportunity to add quality housing in the Study Area within the planned density of the area and with an investment in amenities such as parks.<br>The Study Area is mostly in commercial use and contains over 5,000 jobs. Relatively lower-wage service sector jobs make up the bulk of this employment. Monthly wages earned would not be suffiecient to support housing costs at fair market rents. |
| Transportation | Auto congestion is minimal outside of several key intersections along routes leading to I-5.<br>Pedestrian and bicycle connections in the Study Area could be improved within and between districts to make non-motorized travel a more attractive and comfortable option.<br>Lakewood's Transit Center acts as a hub for many Pierce Transit bus routes; this resource could be enhanced with better pedestrian and bicycle connections into the surrounding areas. Likewise, improved facilities between the Study Area and Lakewood Station could help connect the Study Area with a valuable regional transit amenity. |
| Public Services | The Study Area is fully served by public safety and school services. Water and sewer service is also available though some water lines in the Study Area will require replacement due to age.<br>There are cultural facilities – a library, museum, and theater – but the primary finding in the Study Area is the lack of parks and open space. The City has developed urban design concepts for a linear park, and the CBD Assessment (BERK Consulting, 2017) has suggested placemaking as a tool to add gathering spaces and support economic development. |

*McCament & Rogers, 2014, BERK, ESA, and Fehr & Peers 2017*

## Challenges and Opportunities

Based on CBD Assessment stakeholder interviews and a Downtown Plan developer forum held in 2017, many assets, challenges, opportunities, and incentives were defined and considered in this Plans policies and strategies:

### *Assets*

- **Natural assets** that attract residents to community and by extension Downtown: natural features such as the lakes, creeks, and trees – though lakes are hidden – how to connect.
- Strengths of community and market area for Downtown: **cultural diversity and adjacent to JBLM**.
- **Attractive entertainment** and civic uses (AMC Theater stadium seating, Farmers Market).
- **Access and transit** center including informal park and ride that brings customers. Traffic patterns – customers and visibility on major roads.

### *Challenges*

- **Homelessness:** there are many homeless persons in Town Center area. Need solutions for services and housing, and will take broader effort by more than the City of Lakewood.
- **Perception of safety**, in part driven by factors unrelated to Town Center area or City conditions, that deter customers and residents.
- **Perceptions of quality of life:** Poorly maintained housing, lack of housing options, schools, and crime combine to deter new residents.

### *Opportunities*

- **Housing Options:** Adding housing options in Town Center area that is attractive to all incomes and fits community needs is important – future retirees may want luxury apartments, seniors need different housing choices including ability to age in place, young professionals want to live and work in same area provided there are amenities.
- Create a downtown that **attracts businesses with primary, high wage jobs**. For example, the City could incentivize office uses and other living-wage businesses. Encourage live/work to encourage entrepreneurs and younger households.
- **Catalyst sites for private reinvestment** on parking lots, vacant shopping centers, other possible redevelopment sites – Colonial Center, Motor Avenue, Southeast corner of Towne Center, west side of Gravelly Lake Drive SW, Bridgeport Way/Lakewood Drive, others.
- **Making more walkable and attractive** – break up blocks, add park features.
- **Cohesive and Connected Transportation and Landscaping:** Better signage, wayfinding, and beautification from highway interchanges and gateways to Downtown, and connection from Lakewood Station to Town Center.
- **Business owners work together and in collaboration with City**: e.g. form a business improvement district; incentives and funding for cleanup and maintenance (e.g. graffiti).

### *Incentives*

- **Have clear and flexible regulatory environment**: adjust zoning map and density; clear design standards and simple design review; address parking standards; other.
- Tax abatement and incentives.
- **Public and civic investments:** public spaces, art, seasonal events; streets, streetscapes, and parks; environmental remediation.

# What We Heard

Between September and November 2017, Lakewood hosted twelve public outreach and engagement efforts to encourage residents and business and property owners to participate in conversations about the best future for Downtown. Over 645 persons were reached through going to community markets, festivals, and classrooms, facilitating focus groups, hosting a multi-day charrette, and conducting an online survey. A dedicated website was created with hundreds of unique views: https://www.lakewooddowntownplan.org/.

Activities promoted meaningful dialogue within Lakewood's diverse community of businesses and residents and included: imagining places for live, work, and play at four elementary school classrooms; a visioning exercise with the Lakewood Youth Council; intercept surveys at the BooHan Market, JBLM commissary, JBLM PX, and El Mercado Latino; a focus group discussion with the Korean Women's Association; and a developer's forum. See Figure 2.

## OUTREACH THEMES

More **entertainment** venues and restaurants

More **retail choices**, both mom and pop and brand stores

**Well-designed housing** for seniors & disabled and **mixed use** with housing and commercial together, within walking distance of work, shopping, and buses

**Pedestrian friendly** street design, well-maintained and safe roads

**Family activities and gathering spaces**, including Outdoor recreation (e.g. spray park, climbing walls, skating rink, other) and indoor cultural facilities (e.g. expanded library, children's museum, etc.)

*Figure 2. Outreach Summary*


*BERK Consulting, Inc.*

# Vision for Downtown

Based on feedback gained from the outreach with the Lakewood community described above, this Plan proposes a Downtown Vision Statement that is a basis for policies and actions in this Plan, and that will guide future Plan implementation. The Downtown Vision Statement is compatible with the City's Comprehensive Plan Vision that promotes a vibrant downtown.

## Proposed Vision Statement

Our VISION FOR DOWNTOWN is that it is seen as the "heart" of Lakewood. Downtown is where people go to do fun things, see friends and neighbors, eat good food, and experience the cultural diversity of the City. Downtown brings a strong sense of pride for the community by celebrating all things Lakewood and bringing a strong sense of identity to the City and its people. Downtown is best experienced by walking or biking and is safe, inviting, and connected. The Downtown has a mix of retail, restaurant, employment, and housing options that are well-designed and support civic life and a strong economy.

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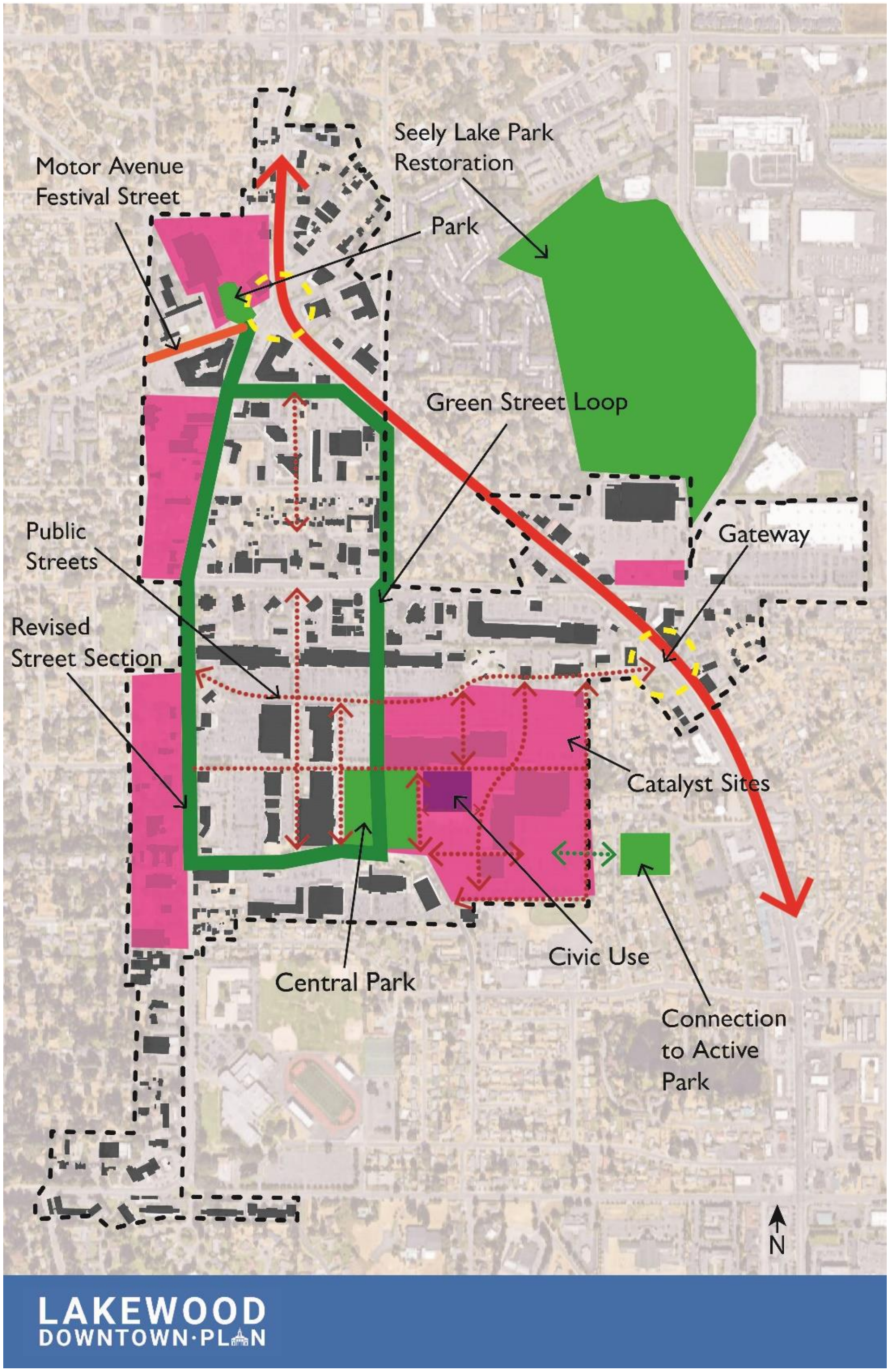
# Concept Plan

The overall concept plan was initially developed during the 2017 charrette and informed by the public design exercise, public input to date, and insights from the planning and design team based on best practices and experience on similar projects (See Figure 3). The following are highlights from the concept plan:

- Green Street Loop: To address the lack of park space, improve public streets, and improve circulation for pedestrians and bicyclists the green loop will include park like elements, green infrastructure, and support redevelopment in Downtown.
- New Public Streets: The Downtown lacks a dense and walkable street grid to support urban development, circulation, and an active public realm.
- Central Park: A new urban park of between two to four acres is proposed just north of City Hall to serve as the main gathering space for the community and to include a variety of features and programming.
- Revised Gravelly Lake Drive: As part of the Green Street Loop, a revised road design for Gravelly Lake Drive SW is proposed. The revision will allow for expanded sidewalks and a multi-use path on the east side of the street.
- Catalyst Sites: Catalyst sites are the best opportunities to weave together public improvements in infrastructure and amenities with infill and redevelopment by the private sector. The best opportunities for redevelopment based on vacant and underutilized sites, and large surface parking areas, and surrounding context have been identified as catalyst sites in the near term to further the implementation of this Plan.
- Motor Avenue Festival Street: The City intends to move forward with creating a festival street along Motor Avenue consistent with the adopted concept plan. The plan includes a large central plaza, a pedestrian promenade, a farmer's market and event structure, street trees, landscaping, and public art opportunities.

*Figure 3. Downtown Plan Concept*



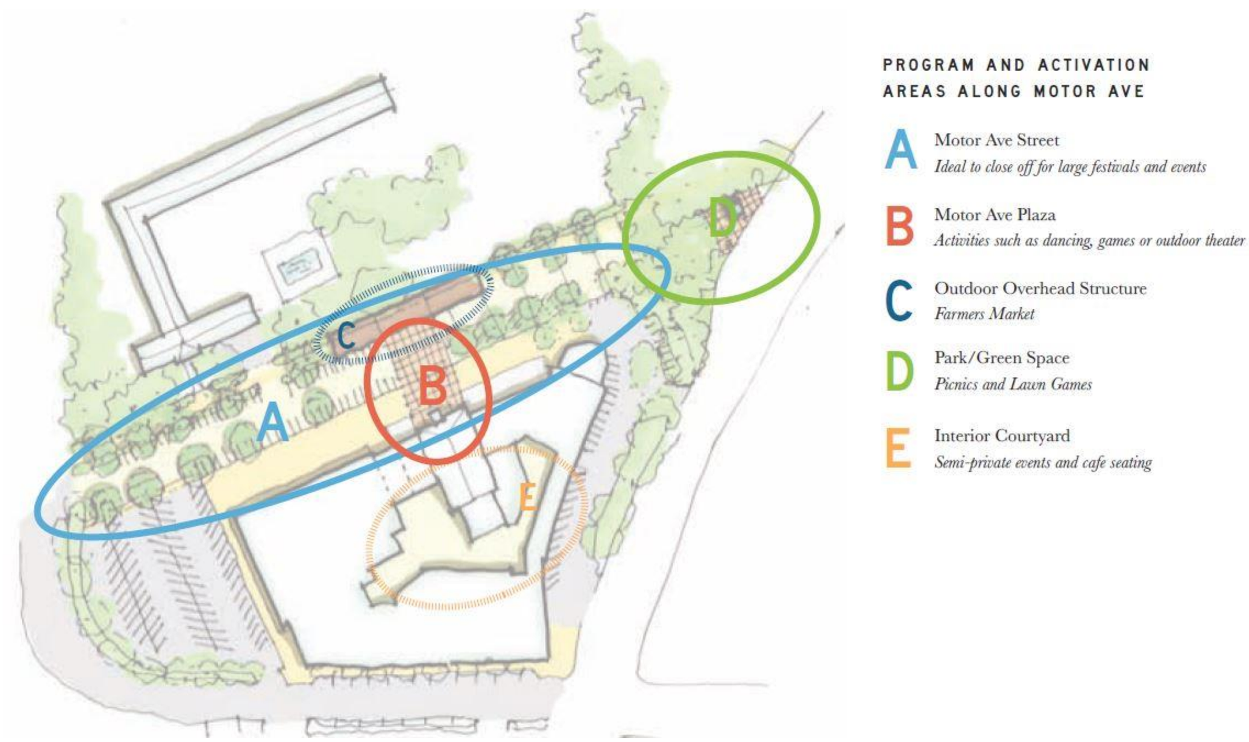

*Framework, 2017*

## Placemaking

Many of the design concepts in this plan require significant capital investments and in some cases the purchase of additional property or right-of-way. Placemaking is an opportunity to improve public spaces in the short-term through low-cost improvements that may include seating, games, events of various sizes, public art, food trucks, and other activities. These shorter-term placemaking activities are becoming more popular around the world as a strategy to begin improving places now without the long-term planning and costs associated with larger public improvement projects. The Lakewood Farmer's Market is an excellent local example of such a placemaking event that utilizes the primary public space in Downtown around City Hall.

Figure 4 shows a concept plan for programming along Motor Avenue. Placemaking activities could occur prior to the redevelopment of Motor Avenue SW into a festival street. Figure 5 and Figure 6 show programming and activation examples.

*Figure 4. Motor Avenue Programming Ideas*




*Framework, 2016*

*Figure 5. Programming and Activation Examples*


*Compiled by Framework 2018*

*Figure 6. Programming and Activation Examples*


*Compiled by Framework 2018*

# Policies and Strategies

Each of this Plan's subsections below conclude with proposed policies and strategies that then form the basis of the Implementation Plan. A "policy" is a high-level overall statement. A "strategy" is a contemplated set of steps to be used toward a specific end.

# Urban Design + Land Use

## Context

Urban Design was identified by the Lakewood Community as the most important issue to be addressed by the City during a prior comprehensive planning process. Because the Downtown mostly developed as part of the unincorporated county prior to incorporation of the City in 1996, it lacks the physical features typical of a walkable, lively Downtown. Following is a summary of the existing physical qualities in the Downtown that will be addressed in this Plan:

- Lack of a dense public street grid network, particularly in the Towne Center.
- Auto-centric street design with gaps in pedestrian facilities.
- Absence of public parks in the Downtown Study Area.
- Minimal public spaces in the Downtown.
- Auto-oriented character with primarily vehicle access design for many Downtown land uses.
- Auto-oriented, suburban site design and building architecture.
- Run-down and unusable historically and culturally significant structures in the Colonial District.
- Minimal residential and mixed-use development.

## Hybrid Form-Based Code

As part of implementing this Plan, the adoption of a hybrid form-based development code (that combines form-based code elements with traditional zoning) for the Downtown subarea is recommended.

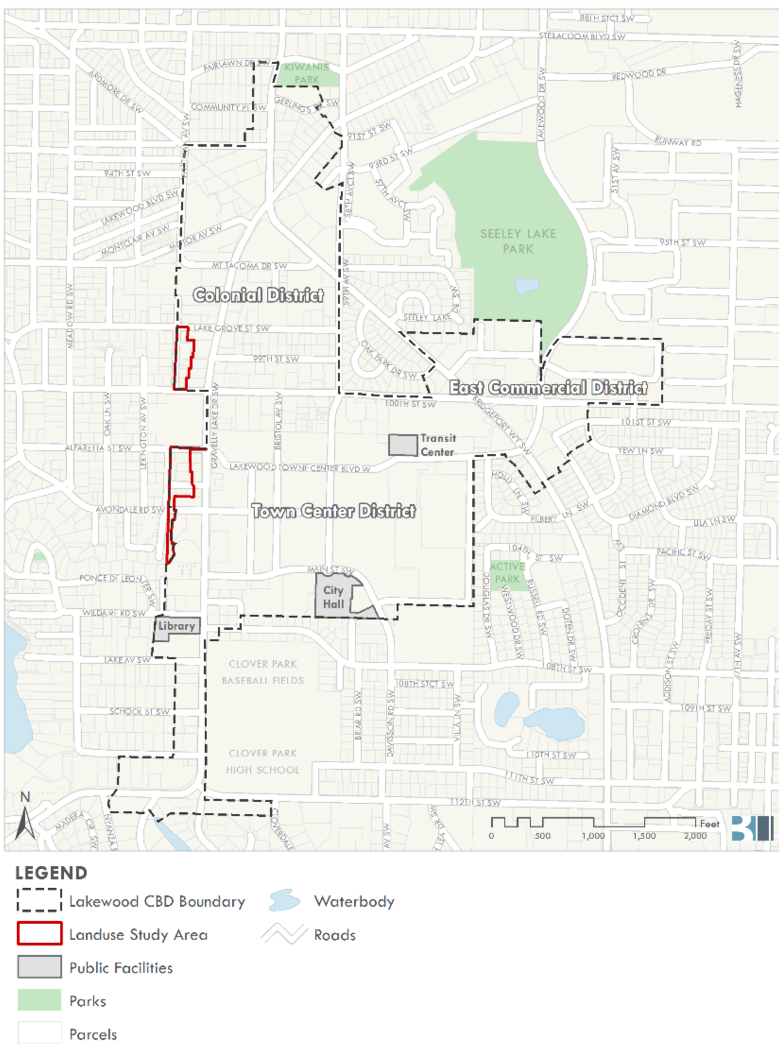
Form-based codes address the relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks. The regulations and standards in form-based codes are presented in both words and clearly drawn diagrams and other visuals. They are keyed to a regulating plan that designates the appropriate form and scale (and therefore, character) of development, rather than only distinctions in land-use types.

Most form-based codes have been applied to historic downtowns, neighborhood centers with well-established character and/or a well-defined vision, or master planned sites under consolidated ownership. By their nature, they are often very detailed and prescriptive in terms of streetscape design and development frontages. This makes them well suited to smaller targeted areas. These same features, however, make their application on a citywide basis or for areas with sloping terrain, irregular street patterns, and dispersed land ownership patterns much more challenging. Over time, various hybrid codes have been developed for unique local conditions that combine form-based code elements with traditional zoning.[2] This is the recommended approach here.

## Land Use Study Area

The land use Study Area is shown on Figure 7. Areas outlined in red are additions to the Study Area that were identified during the design charrette in November 2017. The maps and figures included in the remainder of this Plan incorporate these additional areas that have Residential Mixed designations into the Downtown Plan to resolve uneven CBD boundaries and increase residential density potential in the Downtown (see the Future Land Use discussion below.)

*Figure 7. Land Use Study Area*




*BERK, 2018*

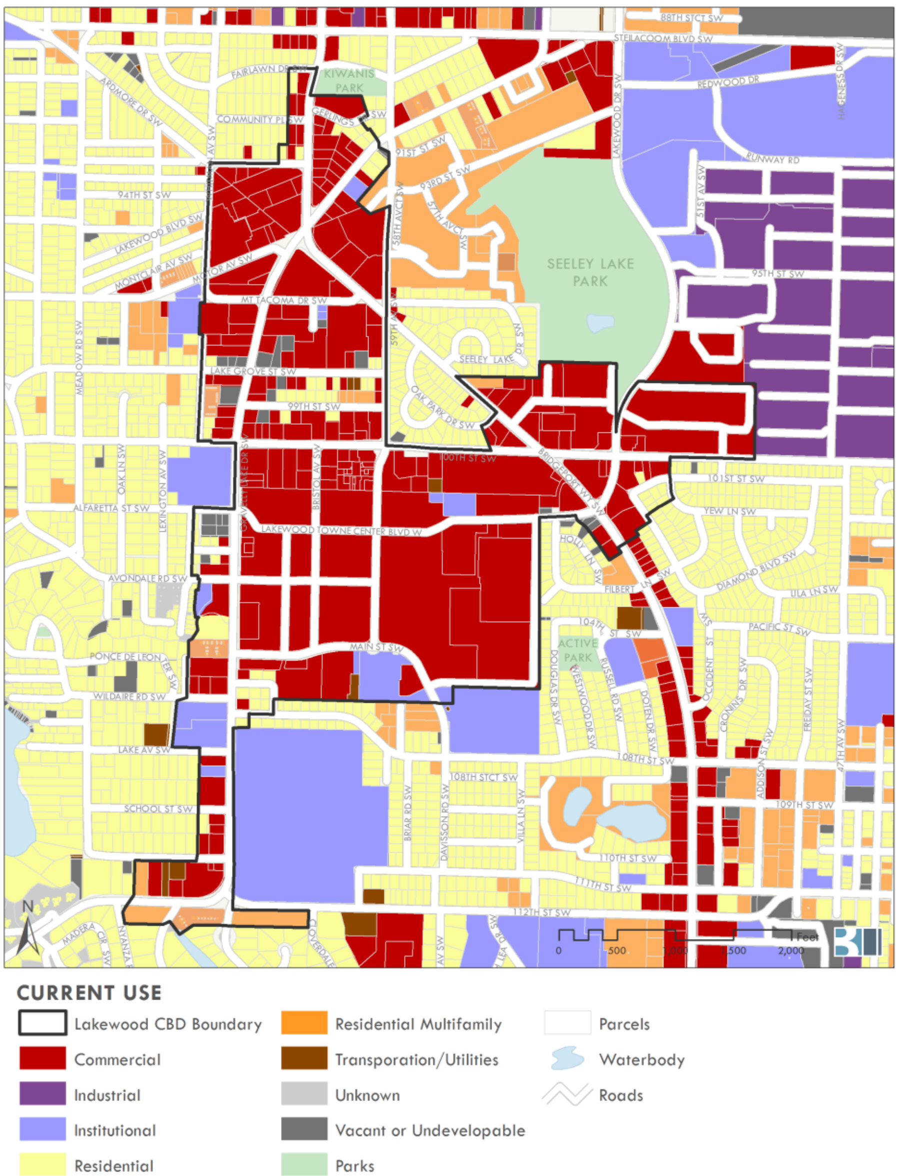
[2] Source: Form-Based Codes Institute,2018; MRSC, 2012

## Current + Future Land Use

### *Current Land Use*

As shown in Figure 8, the current land use in Downtown is primarily commercial, but also includes institutional uses and limited residential development. Mixed-use development is currently permitted with a maximum building height of 90' and a maximum residential density of 54 units per acre. Many commercial uses also have large surface parking lots, often between the building and the street.

*Figure 8. Downtown Current Land Use*

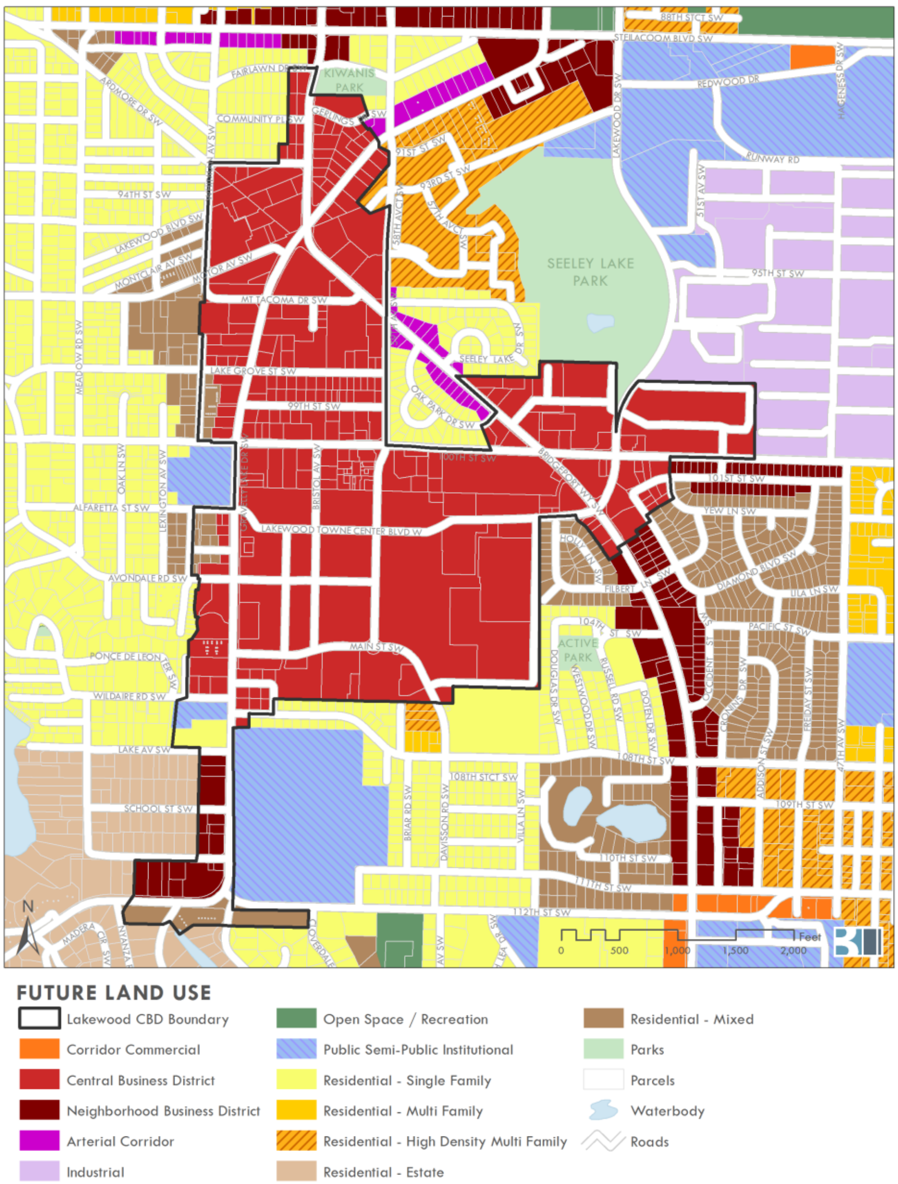



*BERK, 2018; City of Lakewood, 2017*

### *Future Land Use*

Figure 9 shows the current future land use designations for the Study Area. Most of the Study Area is designated as the Central Business District, except the area in the southeast; this area is designated Neighborhood Business and for residential uses. The proposed future land use map is shown in Figure 10.

*Figure 9. Downtown Future Land Use Designations*




*BERK, 2018; City of Lakewood, 2017*

# Proposed Future Land Use + Zoning

## *Future Land Use*

The entire Study Area will be designated as Downtown in the updated Future Land Use Map for the City and will be subject to this Plan, its street typologies, and its associated development regulations.

The Downtown designation will also include an amended westward boundary to resolve uneven block boundaries and include properties presently designated Residential-Mixed as shown in Figure 7.Transitional building height, form, and landscaping standards would ensure compatibility with adjacent areas.

*Figure 10. Proposed Future Land Use Map*

*To be determined with preferred plan.*

## *Zoning*

Plan Area development will be regulated based on a simplified list of allowed land uses, street types, building frontage types, and overlay districts to provide for more specific standards based on location and context. As discussed above, the hybrid form-based development standards will emphasize building form as well as relationships between buildings, streets, and public spaces. The development code will emphasize creating an active public realm with streets, parks, and public spaces that are welcoming, active, and fun.

*Figure 11. Proposed Zoning Map*

*To be determined with preferred plan.*

## Urban Design

Although Lakewood is a diverse community with a rich history, a strong sense of community pride, and many assets, the physical development of the City, including Downtown Lakewood, has resulted in a lack of identity. Auto-oriented development provides few opportunities for walking and biking or interacting with friends and neighbors. Most of the Lakewood Towne Center acreage is used for surface parking, and many sections of the surrounding arterials feel unsafe for walking. Buildings often have little relationship with the street and are designed to be accessed by a vehicle and through a parking lot. Many of the uses in Downtown are large national chains, reflect corporate architecture, and lack a human scale.

Figure 12 shows the Lakewood Towne Center's beautiful natural setting with Steilacoom Lake in the background. The Lakewood Towne Center was developed in 2001 to replace an enclosed shopping mall. The open-air shopping mall is dominated by surface parking between the large scale mostly one-story retail buildings. A large retail building was recently torn down and another is vacant. These large buildings may be repurposed or removed for redevelopment or other purposes.

*Figure 12. Lakewood Towne Center*


*Google Earth, 2018*

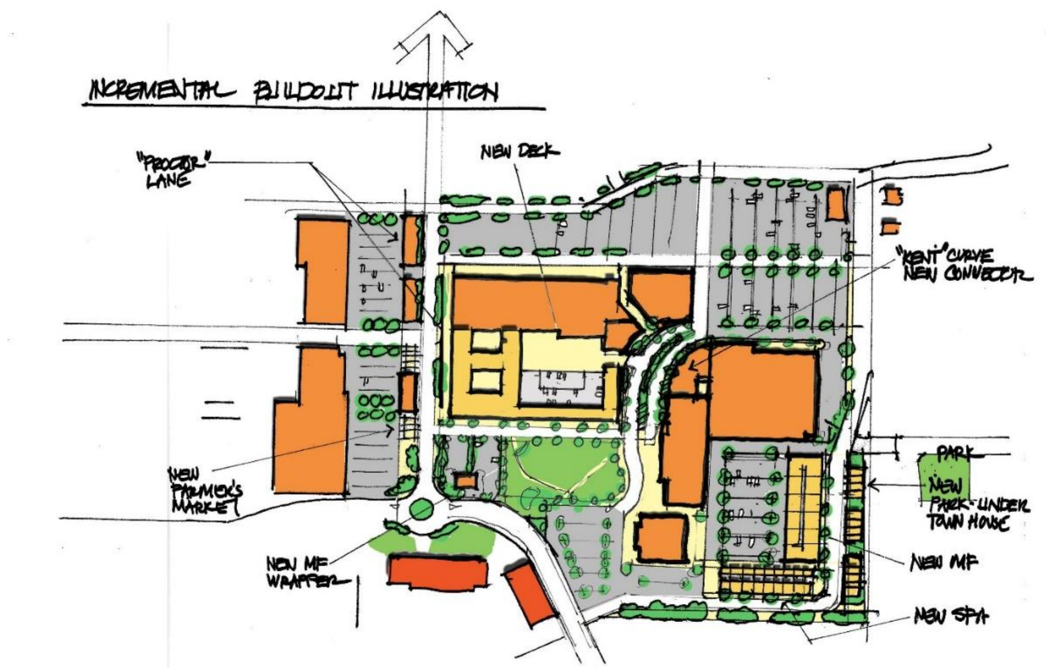
Included below are several redevelopment concepts for Lakewood Towne Center ("Incremental Build-Out" and "Reimagined"), as well as Motor Avenue ("Infill" and Redeveloped"), and Mixed-Use Housing on Gravelly Lake Drive SW.

## Lakewood Towne Center Concepts

### *Lakewood Towne Center Incremental Build-Out*

This concept works with the existing building layout and street network to provide new mixed-use infill, a centralized parking structure, multi-family housing and active uses on 59th Avenue SW. A two-acre park is shown just northeast of City hall on a currently underutilized portion of the Towne Center. Figure 13 shows an earlier concept plan developed during the design charrette, and Figure 14 and Figure 15 show an updated model of the concept with more refinement.

*Figure 13. Lakewood Towne Center Incremental Build-Out*




*Seth Harry and Associates, 2017*

*Figure 14. Lakewood Towne Center Incremental Build-Out 3D Model (View 1)*


*Seth Harry and Associates, 2017*

*Figure 15. Town Center Incremental Build-Out 3D Model (View 2)*


*Seth Harry and Associates, 2018*

Figure 16 shows the building program for concept plan #1 including land uses and building square footages.

*Figure 16. Lakewood Towne Center Incremental Build-Out Site Plan*


**PLAN 1**
PROGRAM

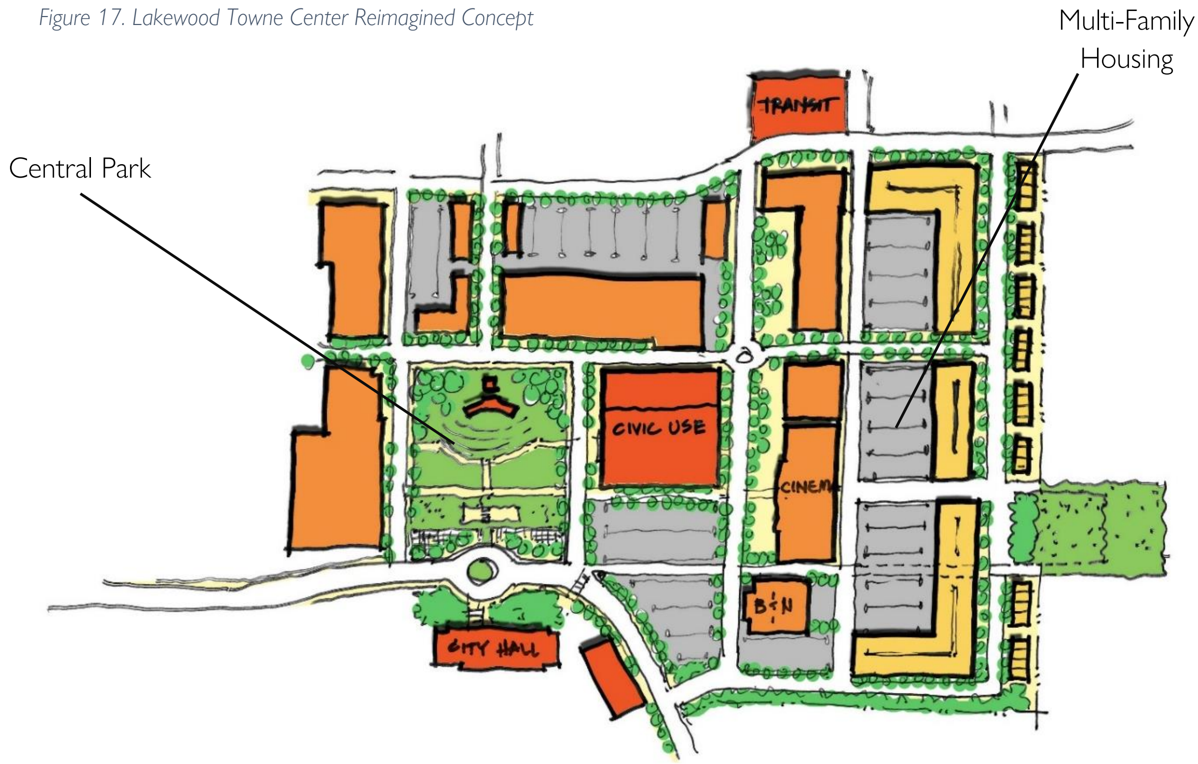
| | | |
|---|---|---|
| A1 | RETAIL (1 LEVEL) | 5,830 SQFT |
| A2 | RETAIL (1 LEVEL) | 5,830 SQFT |
| A3 | RETAIL (1 LEVEL) | 5,830 SQFT |
| A4 | RETAIL (1 LEVEL) | 6,240 SQFT |
| B | CIVIC<br>3/2 | 38,180 SQFT<br>LEVEL 1-2 LIBRARY<br>LEVEL 3-5 SENIOR LIVING<br>190,900 SQFT TOTAL |
| C | MIXED USE<br>4/1 | 16,600 SQFT<br>LEVEL 1 RETAIL<br>LEVEL 2-5 LOFTS<br>83,000 SQFT TOTAL |
| D | RETAIL<br>2 STORIES | 23,525 SQFT<br>47, 050 SQFT TOTAL |
| E | RETAIL (1 LEVEL) | 11,730 SQFT |
| F1 | MIXED USE<br>4/1 | 14,890 SQFT<br>LEVEL 1 RETAIL<br>LEVEL 2-5 LOFTS<br>74,450 SQFT TOTAL |
| F2 | MIXED USE<br>4/1 | 16,525 SQFT<br>LEVEL 1 RETAIL<br>LEVEL 2-5 LOFTS<br>82,625 SQFT TOTAL |
| G | TOWNHOUSE<br>3 STORIES<br>CARRIAGE HOUSE<br>32 TOWNHOUSE, 16 CARRIAGE HOUSES | 840 SQFT<br>2,520 SQFT EACH<br>410 SQFT EACH<br><br>87,200 SQFT GRAND TOTAL |
| P1 | PARKING DECK<br>100 CARS PER LEVEL | 32,400 SQFT<br>3 LEVELS |
| TOTAL ADDITION | | 600,685 SQFT |
| TOTAL DEMOLITION | | 0 SQFT |
| NET | | 600,685 SQFT |

*Seth Harry and Associates, 2017*

## *Lakewood Towne Center Reimagined*

This concept imagines a full redevelopment of the Lakewood Towne Center with a four-acre central park just north of City Hall, a new civic use near the park and City Hall, new pedestrian oriented mixed-use development, a reconfigured urban street grid and diverse multi-family housing to the east. Figure 17 shows an earlier concept plan developed during the design charrette, and Figure 18 shows the Lakewood Towne Center Reimagined 3D Model Close-Up. Figure 19 and Figure 20 show an updated model of the concept with more refinement.

*Figure 17. Lakewood Towne Center Reimagined Concept*



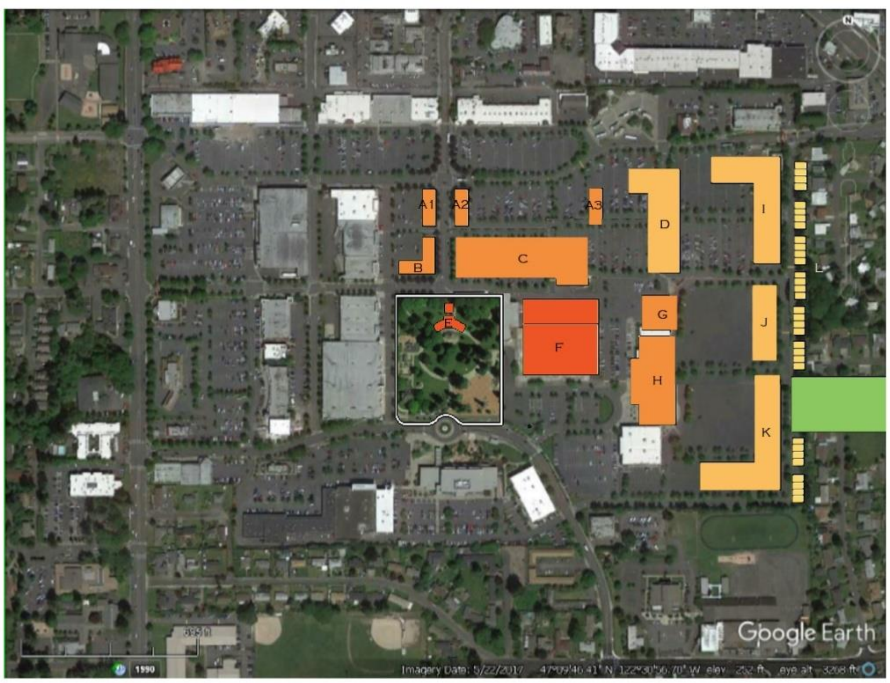

*Framework, 2017*

*Figure 18. Lakewood Towne Center Reimagined 3D Model*


*Seth Harry and Associates, 2017, Framework, 2018*

*Figure 19. Lakewood Towne Center Reimagined 3D Model Close-Up*

*Figure 20. Lakewood Towne Center Reimagined Site Plan*




## PLAN 2
PROGRAM

| | | |
|---|---|---|
| A1 | RETAIL (1 LEVEL) | 6,200 SQFT |
| A2 | RETAIL (1 LEVEL) | 6,200 SQFT |
| A3 | RETAIL (1 LEVEL) | 6,200 SQFT |
| B | RETAIL (1 LEVEL) | 10,075 SQFT |
| C | RETAIL (1 LEVEL) | 73,295 SQFT |
| D | MIXED USE 4/1 | 48,140 SQFT<br>LEVEL 1 RETAIL<br>LEVEL 2-5 LOFTS<br>240,700 SQFT TOTAL |
| E | PARK BUILDING | 3,630 SQFT |
| F | CIVIC BUILDING 3/2 | 74,000 SQFT<br>LEVEL 1-2 LIBRARY<br>LEVEL 3-5 SENIOR LIVING<br>370,000 SQFT TOTAL |
| G | RETAIL (1 LEVEL) | 15,785 SQFT |
| H | CINEMA | 47,390 SQFT |
| I | MIXED USE 4/1 | 52,050 SQFT<br>LEVEL 1 RETAIL<br>LEVEL 2-5 LOFTS<br>260,250 SQFT TOTAL |
| J | MIXED USE 4/1 | 24,150 SQFT<br>LEVEL 1 RETAIL<br>LEVEL 2-5 LOFTS<br>120,750 SQFT TOTAL |
| K | MIXED USE 4/1 | 57,590 SQFT<br>LEVEL 1 RETAIL<br>LEVEL 2-5 LOFTS<br>287,950 SQFT TOTAL |
| L | TOWNHOUSE<br>3 STORIES<br>32 HOUSES | 1020 SQFT<br>3,060 SQFT EACH<br>97,970 SQFT TOTAL |
| TOTAL ADDITION | | 1,639,728 SQFT |
| TOTAL DEMOLITION | | -300,385 SQFT |
| NET | | 1,339,343 SQFT |

*Seth Harry and Associates, 2017; Framework, 2017*

## Motor Avenue District Concepts

During the Motor Avenue Urban Design Project (now called the Lakewood Colonial Plaza Project), the design team developed concepts for infill and redevelopment around Motor Avenue in addition to the redesign of the street.

The first concept shown in Figure 21 shows the existing shopping center north of Motor Avenue remaining and being renovated with small multi-family development in the northeast corner of the district. The second district concept shows the shopping center north of Motor Avenue as being fully redeveloped with an urban street grid, higher-density mixed-use development, and neighborhood green space (see *Figure 22*).

*Figure 21. Lakewood Colonial Plaza District Infill Concept*

*Seth Harry and Associates, 2016*

*Figure 22. Lakewood Colonial Plaza District Redevelopment Concept*

*Seth Harry and Associates, 2016*

## Mixed-Use Housing Concept

The concept plan in Figure 23 shows the redevelopment of a parcel on the west side of Gravelly Lake Drive SW. The concept includes townhouses at the rear of the property, a three-story multi-family building with street level retail along Gravelly Lake Drive SW and a mix of surface, garage, and structured parking in the first floor of the mixed-use building. This concept results in approximately 100 housing units per acre.

*Figure 23. Mixed-use Housing Concept*


*Seth Harry and Associates, 2017; Framework, 2017*

## Urban Design Policies + Strategies

### *Policies*

- Policy: Promote redevelopment of the Central Business District (CBD) as a mixed-use urban center that anchors the Downtown and bolsters Lakewood's sense of identity as a City.
- Policy: Develop Downtown as not only the "heart" of the city, but a regional urban center where commerce, culture, and government flourish.
- Policy: Promote the CBD as the primary center for retail, office, public services, cultural activities, urban residential, and civic facilities of Lakewood.
- Policy: Promote office development, open space, high density residential development and/or mixed-use development in the Towne Center.
- Policy: Promote the CBD as a daytime and nighttime center for social, entertainment, cultural, business and government activity.
- Policy: Adopt new urban design approaches to raise the aesthetic standards of the Downtown.
- Policy: Continue to foster transformation of the former mall to provide better public visibility; create additional public rights-of-way; and potentially develop entertainment, housing, visitor serving, and open space uses.

### *Strategies*

- Strategy: Update the City's Future Land Use Map and Zoning Map to designate the entire Study Area as "Downtown."
- Strategy: Adopt a hybrid form-based code that combines design elements with traditional zoning to regulate Downtown development. Use Overlay Districts, Street Types, Building Frontage Standards, and a simplified list of allowed land uses in the Study Area.
- Strategy: Adopt standards to address the transition and minimize impacts from more intense development Downtown to lower-density residential neighborhoods.
- Strategy: Encourage integrated mixed-use urban development, including housing, in the Downtown.
- Strategy: Train staff on maintenance and implementation of the hybrid form-based development code.
- Strategy: Remove underlying deed restrictions and/or covenants that prohibit office, high density residential, and/or mixed-use development or open space.
- Strategy: Conduct a parking study in the Downtown to understand the existing demand for parking and identify opportunities for redevelopment of existing surface parking lots to support the implementation of this Plan.
- Strategy: Update the City's parking requirements to "right size" the requirements based on the results of the parking study and to encourage shared parking and flexibility in meeting parking requirements. The updated parking requirements should consider parking maximums.
- Strategy: Monitor the impact of the Downtown Code in implementing this Plan at least annually and amend the Plan and its associated regulations as needed to improve outcomes

# Economic Development

## Context

Surveys of business leaders and employees reveal that today's companies and employees "vote with their feet" and choose to be physically close to other knowledge workers, city infrastructure and cultural amenities. Workers in the new economy want to work in thriving locations that stimulate their creativity, along with an environment with openness and tolerance of ideas and people of all kinds. A 1998 KPMG survey of more than 1,200 high-technology workers examined the factors associated with the attractiveness of a new job. Community quality of life was second only to salary (outperforming benefits, stock options, or company stability). Given this preference, quality of life factors such as the availability of high quality public space, recreational amenities, transportation options, good schools, infrastructure, and safety are important drivers of economic development.

In terms of retail, larger trends within the industry indicate that retailers are exploring new business models given the threat of online competition and the ongoing fragmentation within the industry. One increasingly common response to these trends is the redevelopment of older retail areas as walkable, mixed-use, transit supportive neighborhoods. These redevelopments typically add housing and professional offices to the retail mix, with other non-retail uses such as parks, libraries, and town halls. This wide spectrum of uses in an attractive format work together to change the character and market perception of retail districts from generic retail areas to a distinctive place. (Seth Harry and Associates, 2017)

An unintended consequence of "placemaking" and similar quality of life investments (see further discussion of placemaking earlier in this Plan) is its potential to increase commercial rents and displace small, local businesses. Given this, economic development policies will need to address strategies around commercial affordability and support for small, local businesses.

## Economic Development Policies + Strategies

### *Policies*

- **Policy**: Develop Downtown as a destination for retail, office, public services, cultural activities (art, culture, and entertainment), urban residential, and civic facilities of Lakewood.
- **Policy.** Ensure Downtown is home to a wide spectrum of businesses that reflect the area's most competitive and desired industries.
- **Policy.** Prioritize and market catalytic sites identified through this Plan for mixed-use development.

### *Strategies*

- **Strategy:** Develop a Lakewood-specific business attraction and retention program with regional economic development partners including opportunities for incubator businesses.
- **Strategy.** Identify and implement incentives that would encourage new businesses to locate in Downtown Lakewood.
- **Strategy:** Provide resources for entrepreneurs and small businesses, including information available in multiple languages, and recruit key business services to the area.

- **Strategy:** Support a business improvement district and continue ongoing initiatives to make downtown Lakewood clean and safe.
- **Strategy:** Activate empty and underutilized places such as parking lots.
- **Strategy:** Seek neighborhood businesses that provide daily goods and services in the CBD.
- **Strategy:** Invest in civic amenities and infrastructure consistent with this Downtown Plan to attract business owners and investors who create living wage jobs.
- **Strategy.** Explore the feasibility of a business incubator in Downtown and consider incorporating economic gardening for microenterprises into it.
- **Strategy**: Work with local financial institutions on providing low interest loans for qualified small local businesses.

# Housing

## Context

Very little housing is found in the Downtown area today; there are about 419 dwelling units. Lakewood has a tight housing supply with low vacancies, and as a built-out community has few opportunities to develop new housing. Downtown presents an opportunity as a place for a mixed-use, high amenity neighborhood.

Given the changing landscape of the retail sector described under Economic Development above, as well as infill opportunities on catalyst sites, Lakewood can attract a range of quality affordable housing choices.

*Figure 24 Mixed Use Housing Examples – Rhode Island Avenue Development and Kirkland Juanita Village*


### MORE AND DIVERSE HOUSING WANTED

Over 300 respondents to an online survey about the Downtown vision showed a strong interest in:

- Housing for senior and disabled
- Mixed use with housing and commercial use on the same site or in the same building
- Transitional housing for homeless persons and families

With any housing type, the following design factors were heavily favored:

- Site design and architectural standards to ensure quality development
- Housing in walking distance of work, shopping, or bus service
- Stand-alone apartments and condominiums were not favored. Cottage housing was well liked and could serve as a transition housing type along with townhomes.

*Lakewood Downtown Survey 2017*

Adding residential to existing centers along with non-retail uses, such as civic functions, like libraries, or city halls, helps to increase the consumer base close in to the center itself, as well as changes the character and perception of the center from a generic retail experience to that of a genuine place, with amenities to match, including parks, civic, cultural, and recreational uses, along with quality dining and entertainment. (Seth Harry & Associates 2017)

## Housing Policies + Strategies

### *Policies*

- **Policy.** Encourage a diversity of housing types to ensure housing choices for current and future residents, workers, military families, and to strengthen commercial areas.
- **Policy**: Provide increased densities and regulatory flexibility in Downtown development regulations to attract diverse housing for all ages, abilities, and incomes.
- **Policy**: Create mechanisms that attract and increase multi-family development Downtown.
- **Policy:** Support hosting quality cultural, educational, and recreational activities to attract families to live Downtown.

### *Strategies*

- **Strategy:** Adopt form-based development regulations that improve the quality of attached and mixed-use housing development and create a walkable attractive Downtown.
- **Strategy:** Revise land use and development regulations to promote mixed-use development within the Central Business District (CBD).
- **Strategy:** Adopt transitional height and landscape standards to ensure compatibility with abutting lower-density areas.
- **Strategy:** Engage affordable housing organizations about opportunities and partnerships to increase housing in the Downtown.
- **Strategy:** Explore opportunities for transitional housing and services with homelessness service providers to address the health, social, and shelter needs of homeless in Lakewood.
- **Strategy:** Foster neighbor engagement and create a sense of safety through "crime prevention through environmental design" principles integrated into development designs.
- **Strategy:** Explore expanding current tax abatement programs and other incentives.

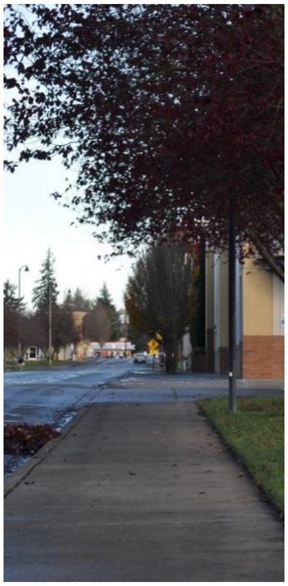
# Street Grids, Streetscapes & Public Spaces

## Context

The amount and quality of public space are two defining features of successful Downtowns. Streets are the primary public spaces in Downtowns, in some cases accounting for almost half the land depending on the size and layout of the street grid. Lakewood currently lacks an urban street grid typical of a Downtown or the types of active public spaces that attract people to come Downtown.

Figure 25 shows the existing streetscape along 59th Avenue SW, which is one of the few public streets in the Towne Center. The existing streetscape has adequate sidewalks, but is not very active or pedestrian friendly. The concept plan in Figure 26 shows 59th Street SW reimagined as a pedestrian-oriented retail street with shops, restaurants, on-street parking, and mixed-use building. Figure 27 is an example of an active streetscape with street level retail and wide sidewalks.

*Figure 25. 59th Avenue SW - Existing*



*Framework, 2017*

*Figure 26. 59th Avenue SW - Concept*

*Seth Harry and Associates, 2017*

*Figure 27. Active Retail Streetscape Example*

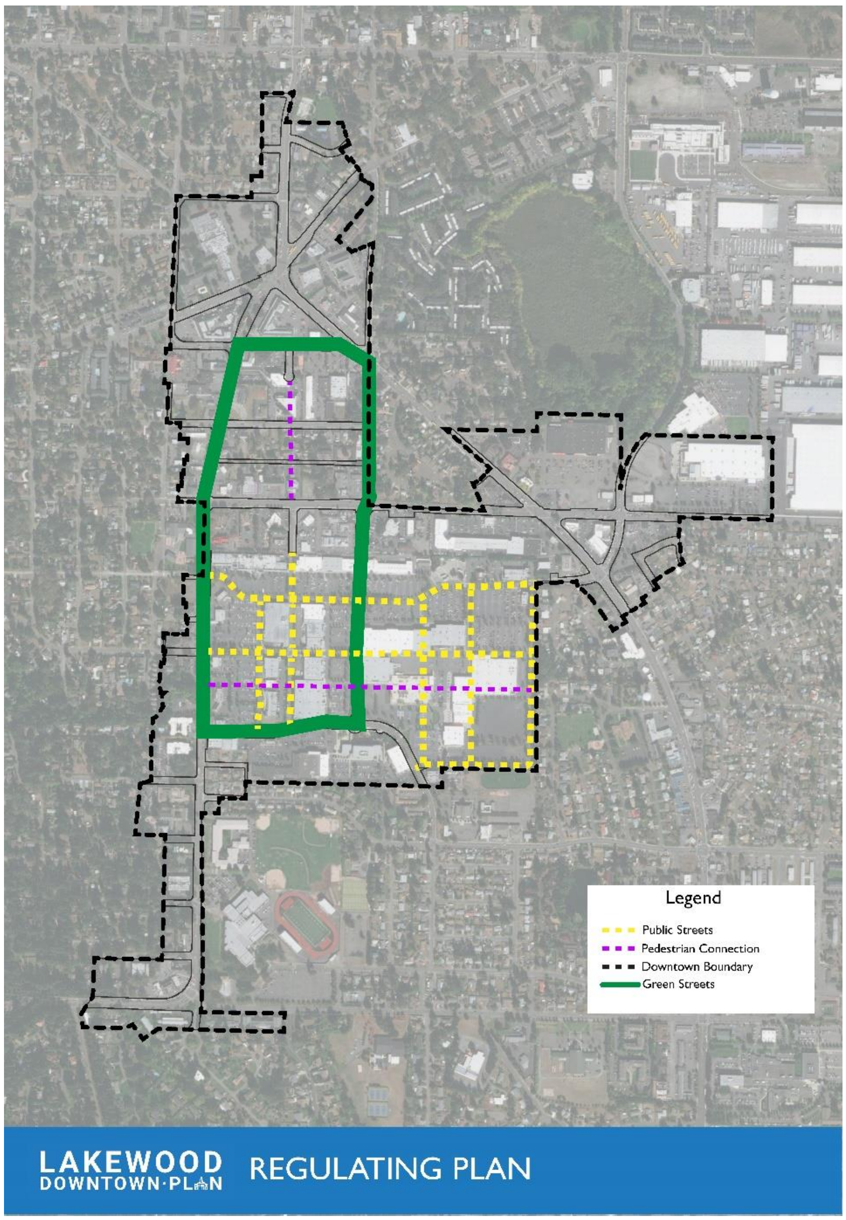
*1kfriends.org, 2018*

## Streets

Expanding the network of public streets, primarily in the Towne Center, is a primary objective for this Plan.

Figure 28 shows the proposed street network based in part on the existing circulation pattern and a goal to reduce block sizes to a maximum of about 400'. The expanded public street grid will improve connectivity, particularly for pedestrians and bicyclists, by reducing travel distances, providing greater opportunities for on-street parking, improved sidewalks, and bike facilities. It is expected that streets will be improved based on the street concepts in this Plan and existing public works standards as they become public streets.

*Figure 28. Downtown Plan Concept*



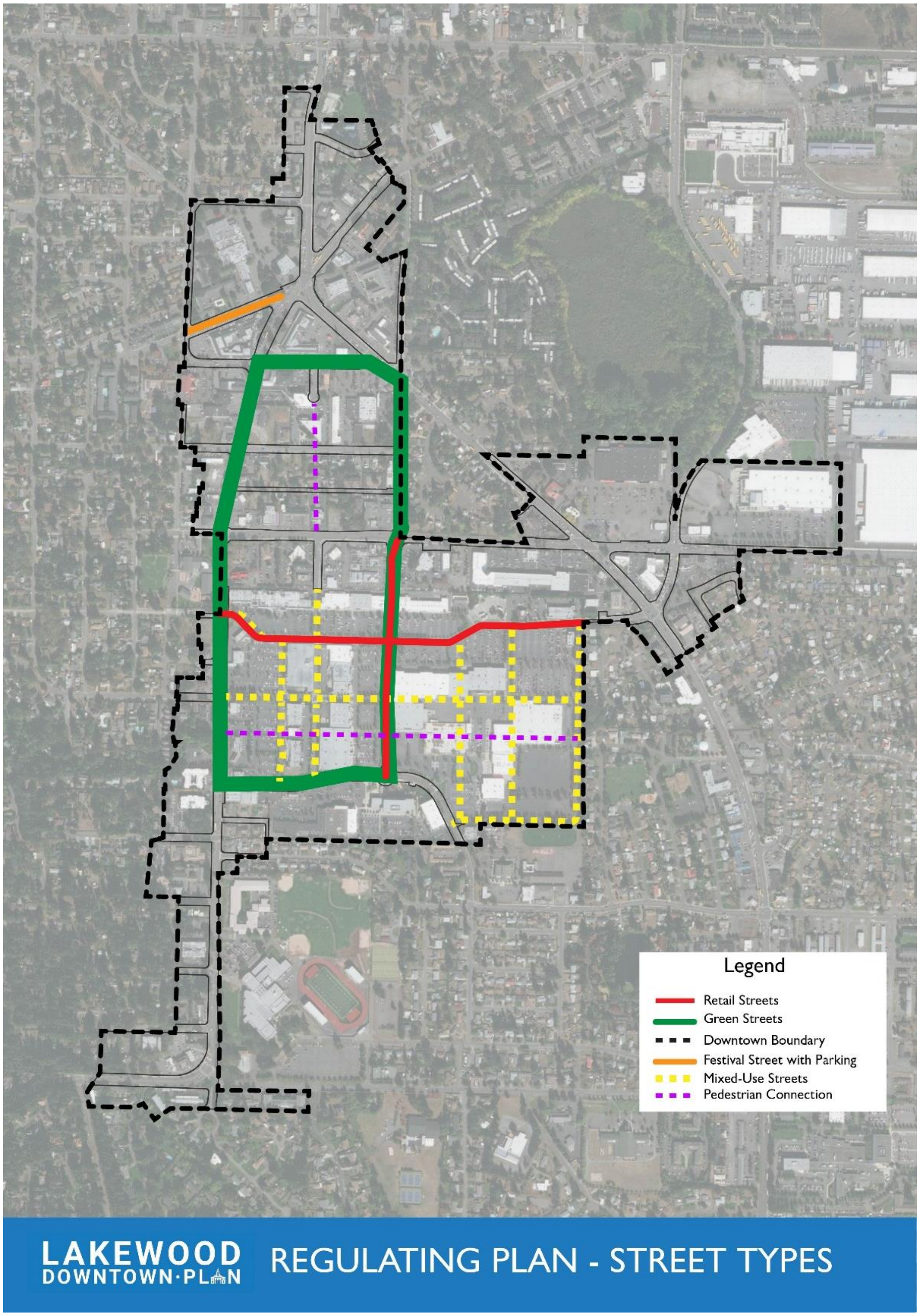

*Framework, 2018*

## Street Typologies

The relationship between streets and private development along the street edge has a major impact on the pedestrian experience. Active uses, including retail, personal services, restaurants, and cafes create pedestrian activity, make the streets lively and fun, and attract people to Downtown. Much of the existing development in the Downtown includes surface parking along the street edge and is designed for vehicular access while negatively impacting the pedestrian experience Downtown.

To implement this Plan, development in the Downtown will be regulated, in part, by street typologies that address the design and function of the street (See Figure 29). The street typologies will be paired with building or site development frontage types that are permitted along that street edge. For example, on the designated retail streets, either active first floor uses will be required with buildings primarily at the street edge, or any space between the street and building will be required to be active pedestrian space (e.g. outdoor dining, seating, public art, and other amenities.) Other street typologies will allow for a range of building frontage types and land uses to provide flexibility in design.

*Figure 29. Street Typologies*




*Framework, 2018*

*Street Concepts*

The proposed street concepts support the expansion of the public street network, the green street loop, a better pedestrian experience and connectivity, and urban mixed-use infill development.

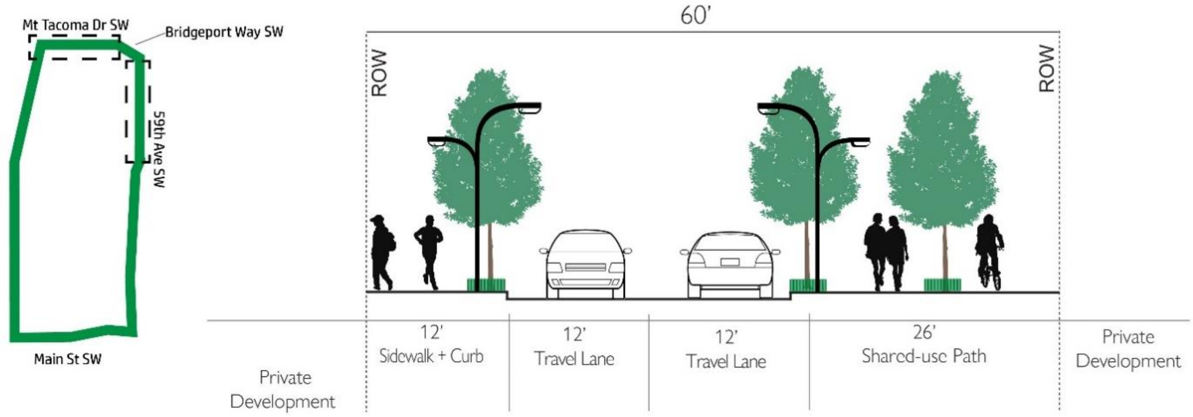
### Green Street Loop

The Green Street Loop includes Gravelly Lake Drive SW, 59th Avenue SW, Mt Tacoma Drive SW, and a small portion of Bridgeport Way SW. The Green Loop proposes continuous pedestrian and off-street protected bike facilities, street trees, landscaping, and low-impact development stormwater improvements.

### Mt Tacoma Drive SW/59th Avenue SW

The concept plan in Figure 30 for these streets is to reduce the number of travel lanes from three to two. The reduction in vehicle lanes allows for a 12' sidewalk on the west side and a 26' multi-use path on the east side.

*Figure 30. Mt. Tacoma Drive SW and 59th Avenue SW between 100th Street SW and Bridgeport Way SW*



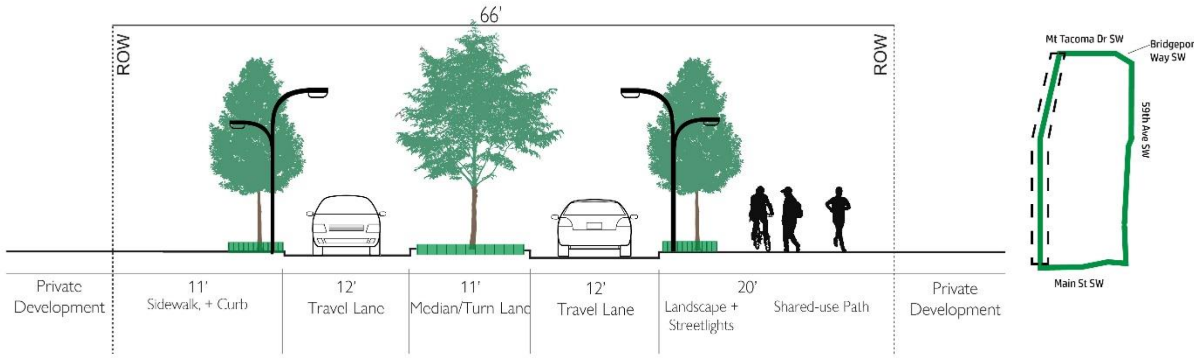

*Framework and KPG, 2018*

### Gravelly Lake Drive SW

The following three concepts for a revision  of Gravelly Lake Drive SW between 100th and 112th Streets SW were researched in the development of this Plan. The concepts would reduce the number of vehicle travel lanes from five to three or four lanes and accommodate expanded sidewalks and a shared use path on the east side with landscaping, underground utilities, street trees, street lights, and other amenities. Right-hand turn pockets would be provided at 112th Street SW, Main Street SW, and 100th Street SW in the northbound direction. No right-hand turn lanes would be provided southbound.

Figure 31 shows a three-lane concept for Gravelly Lake Road SW.

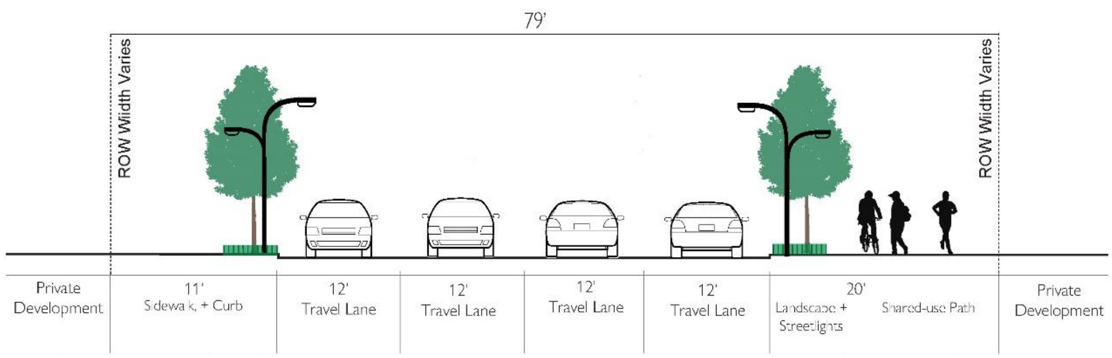
*Figure 31 Gravelly Lake Drive SW Revision– Concept #1 (looking north)*




*Framework, 2018; KPG, 2018*

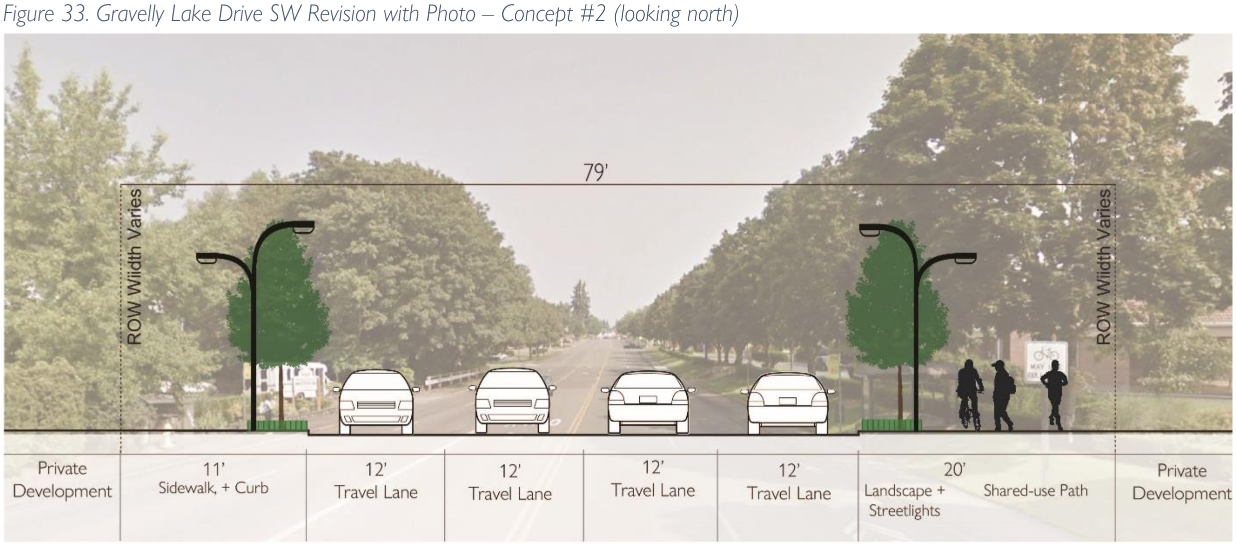
Figure 32 shows a four-lane concept for Gravelly Lake Road SW.

*Figure 32 Gravelly Lake Drive SW Revision– Concept #2 (looking north)*




*Framework, 2018; KPG, 2018*

*Figure 33. Gravelly Lake Drive SW Revision with Photo – Concept #2 (looking north)*




*Framework, 2018, KPG, 2018*

Figure 34 and Figure 35 show two options for concept 3, which both include four travel lanes and a center median with left turn pockets at public street intersections. The upper street section maintains the existing curbs and expands the sidewalks on the west side of the street through acquiring additional ROW potentially as properties redevelop. Sidewalks may be expanded on the west side as part of frontage improvements associated with private development or a City capital project.

*Figure 34. Gravelly Lake Drive SW Revision – Concept #3A (Looking north)*

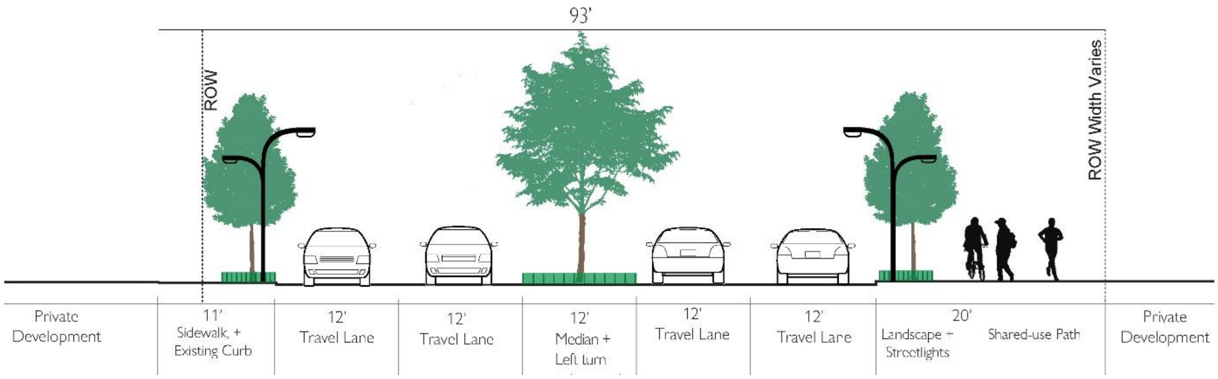
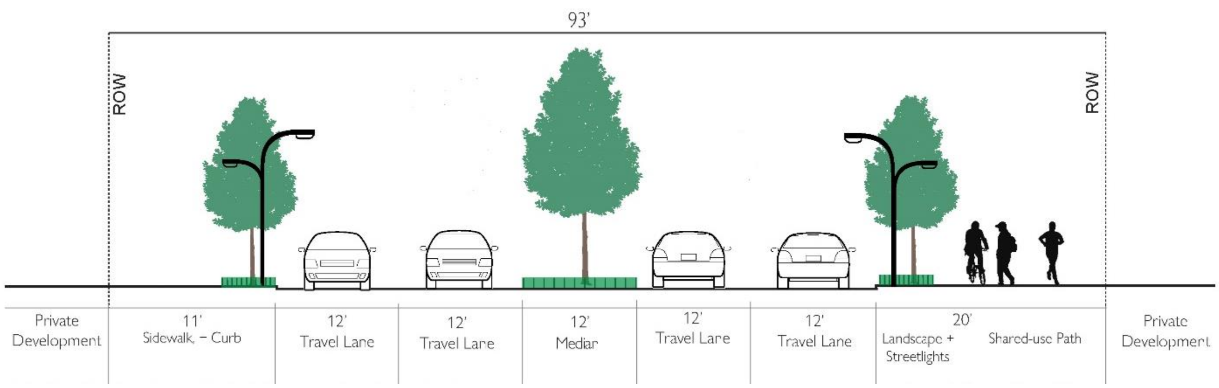



*Figure 35. Gravelly Lake Drive SW Revision – Concept #3B (Looking north)*

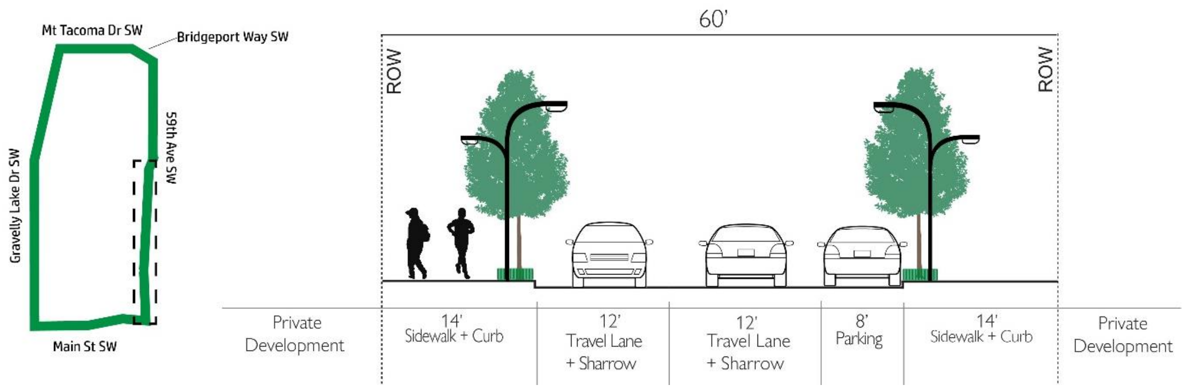


## 59th Avenue SW

*CONCEPT #1*

59th Avenue SW is one of the few public streets in the Towne Center. It currently has three vehicle lanes and sidewalks on both sides of the street within an approximately 60' right-of-way. The first concept shown in Figure 36 includes only the existing right-of-way and converts one of the travel lanes to on-street parallel parking and allows for sidewalks up to 14' in width on both sides. This concept supports the transition of 59th Street SW to a pedestrian oriented retail street.

*Figure 36. 59th Avenue NW (Existing ROW)*




*Framework and KPG, 2018*

*CONCEPT #2*

The second concept shown in Figure 37 addresses the reconfiguration of 59th Avenue SW with the addition of the Central Park north of City Hall. Each side of the park would have a single one-way vehicle travel lane, 14' sidewalks, and on-street parallel parking. The final design of the park and street improvements will depend on the location, size, and layout for the Central Park.

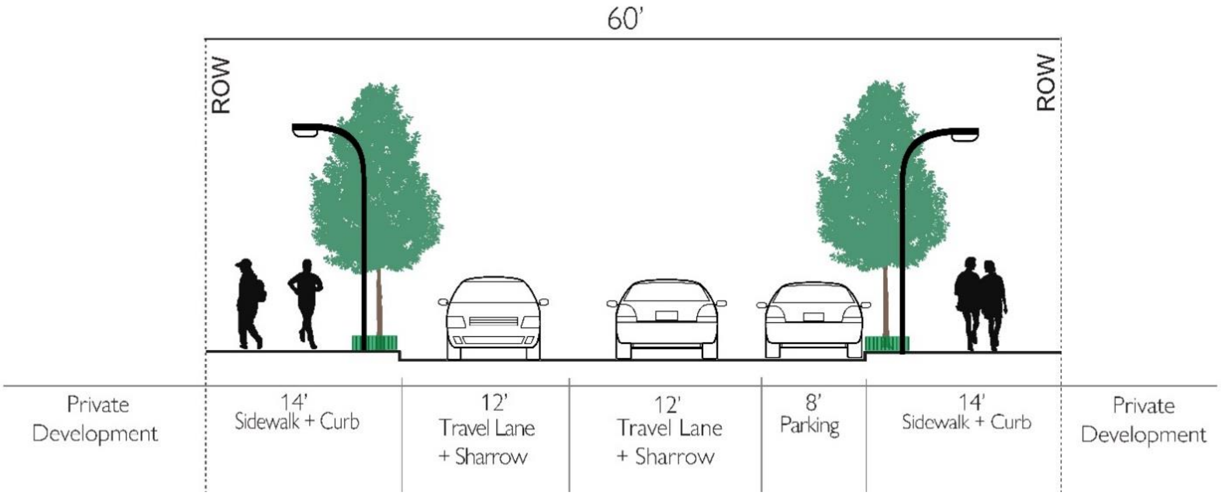
*Figure 37. 59th Avenue SW*


*Framework and KPG, 2018*

### Lakewood Towne Center Boulevard SW

Lakewood Towne Center Boulevard SW is currently a private street with three vehicle travel lanes and sidewalks on both sides of the street. Figure 38 shows two 12' vehicle travel lanes with "sharrows" (i.e., road markings used to indicate a shared lane environment for bicycles and automobiles[3]), on-street parallel parking on one side of the street, and 14' sidewalks on both sides of the street.

*Figure38. Lakewood Towne Center Boulevard between Bridgeport Way SW and Gravelly Lake Dr. SW*



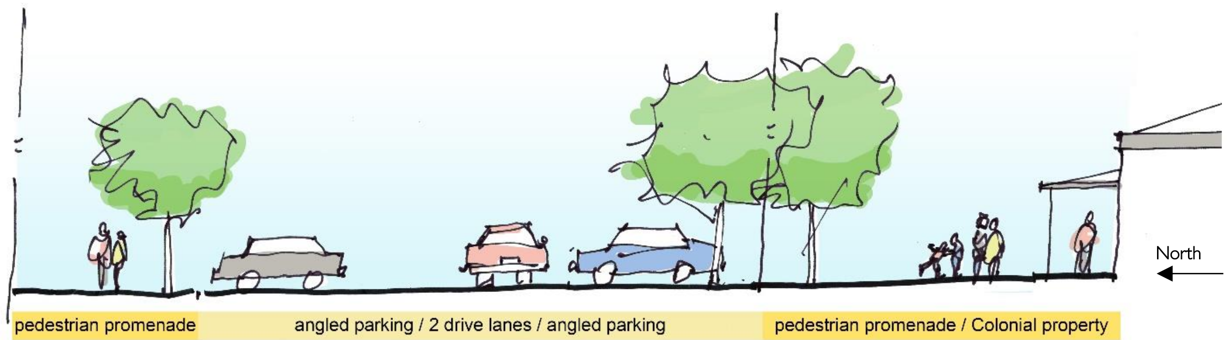

*Framework and KPG, 2018*

### Motor Avenue SW

The concepts shown in Figure 39 and Figure 40 are from the preferred alternative developed as part of the Lakewood Colonial Plaza Project. The goal for the project is to expand public space in the Downtown and private opportunities for programming, events, and to encourage redevelopment in the area. The typical section in Figure 39 shows angled parking on both sides of the street, wide sidewalks on the north side and a pedestrian promenade on the south side. The design supports programming for events with a variety of potential configurations depending on the size of the events including closing the street to vehicular traffic during major events. The concept design also includes a small structure to support a farmer's market, small concerts, and other events and a large central plaza to highlight the Lakewood Theater.

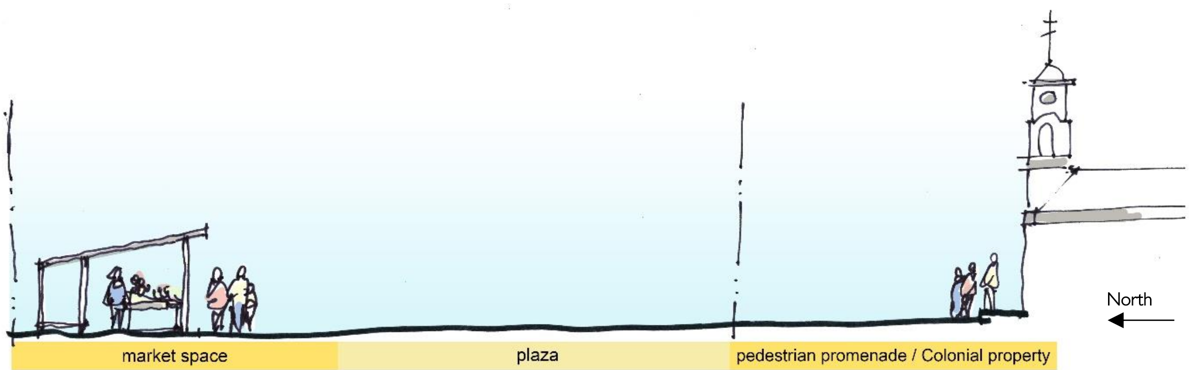
[3] *Source: NACTO Urban Bikeway Design Guide*

*Figure 39. Motor Avenue Typical Section*




*Framework, 2016; KPG, 2016*

*Figure 40. Motor Avenue Typical Section*




*Framework, 2016; KPG, 2016*

## Public Spaces

Expanding the street grid, developing a large central park, creating the green street loop, and improving existing public streets are the core elements of the streets and public space strategy. Another element of the strategy is to identify opportunities for programming, testing design concepts with low-cost temporary improvements, and holding more events in the Downtown like the successful Lakewood Farmer's Market.

In addition, there is an opportunity to expand public space and semi-public space as infill and redevelopment occur. For example, on pedestrian and retail-focused streets, buildings may be set back from the street if public space with pedestrian amenities is designed between the building and the street.  Figure 41 shows a potential Motor Avenue design.

*Figure41. Motor Avenue Design Concept*


*Framework, 2016; KPG, 2016*

# Parking

## Context

The amount, design, and management of parking has a major impact on the success and experience in downtowns. The Study Area, particularly the Towne Center, currently has large surface parking areas that often fronts along the street edge and has very limited on- or off-street public parking.

More urban downtown environments generally have more public parking, on-street parking, and shared parking options that tend to be located either behind or to the side of buildings or in parking structures. In addition, downtowns typically have a greater level of parking management such as time limits, parking pricing, permits, and other management strategies to ensure that parking is being used efficiently. As redevelopment and infill occurs in the Downtown consistent with this Plan, the City should plan to become more active in regulating, providing, and managing parking to support the Plan's goals.

## Street Grids, Streetscapes & Public Spaces Policies + Strategies

### *Policies*

- Policy: Promote the Central Business District (CBD) as a daytime and nighttime center for social, entertainment, cultural, business and government activity. (See related policy in Urban Design + Land Use section).
- Policy: Promote cultural institutions, performing arts uses, and recreational activities within the CBD.
- Policy: Consider the use of the City's eminent domain powers to establish public streets and public open spaces in the Lakewood Towne Center.
- Policy: Maintain a pedestrian-orientation in building, site, and street design and development in the CBD.
- Policy: Maintain an appropriate supply of parking in the CBD as development intensifies.
- Policy: Foster the evolution of a CBD that is compact and walkable and not defined by large expanses of parking lots.
- Policy: Consider maximum parking requirements for higher density areas to encourage alternative transportation modes.
- Policy: Confine the location of parking areas to the rear of properties to increase pedestrian safety and minimize visual impact.
- Policy: Identify places where on-street parking can be added adjacent to street-facing retail to encourage shopping and buffer sidewalks with landscaping to create a pleasant walking environment.
- Policy: Encourage the use of structured, underbuilding, or underground parking, where feasible with site conditions, to use land more efficiently.
- Policy: Encourage shared parking agreements within the Lakewood Towne Center.
- Policy: Focus investments in Downtown by promoting joint and mixed-use development and integrating shared-use parking practices.

*Strategies*

- **Strategy**: Require land uses and development to support an active, safe, and engaging public realm in Downtown streets, parks, and public spaces.
- **Strategy**: Expand the number of events held in public spaces in Downtown by building off the success of the Lakewood Farmer's Market.
- **Strategy**: Implement public and civic investment programs such as: public spaces, art, seasonal events; streets, streetscapes, and parks; and environmental remediation.
- **Strategy:** Ensure parking in the Downtown reflects urban development patterns through use of right-sized parking requirements, a larger on-street parking network, parking facilities within structures or located away from the edges of streets and public spaces, and encouraged shared parking. (See related parking strategies in Transportation section).

# Transportation

## Context

Downtown Lakewood is a predominantly auto-oriented environment. The local street network is made up of two-way streets with varying travel speeds. Auto congestion is minimal outside of several key intersections along routes leading to I-5. Bridgeport Way SW, 108th Street SW, and 100th Street SW are key access routes to Interstate 5 (I-5), so much of the traffic along the Study Area arterials is destined for I-5 rather than the Downtown itself. The arterials do not follow a typical grid pattern, and blocks vary in size considerably with smaller blocks in the Colonial District and East Commercial District and larger blocks in the Town Center District.

Pedestrian and bicycle connections in the Downtown could be improved within and between districts to make non-motorized travel a more attractive and comfortable option. Sidewalks are provided on most arterials within Downtown Lakewood, although there are some gaps, particularly along Gravelly Lake Drive SW at the north end of the Study Area. Most sidewalks are relatively narrow and do not have buffers, so pedestrians are walking alongside vehicle traffic, which can be uncomfortable for pedestrians on high speed and/or high-volume streets. Recently completed improvements, such as along Main Street SW, include more pedestrian friendly amenities such as buffered sidewalks and mid-block crossings.

While the arterial network has consistent sidewalk coverage, the adjacent residential areas generally lack sidewalks. The density of arterial connections is also a challenge for pedestrians who may have to complete out of direction travel to reach their destination. The Lakewood Towne Center at the heart of the Study Area includes wide swaths of surface parking lots. Some segments of the interior roadway network include sidewalks, but the segments are currently fragmented and would benefit from a more connected pedestrian network.

Lakewood's Transit Center acts as a hub for many Pierce Transit bus routes; this resource could be enhanced with better pedestrian and bicycle connections into the surrounding areas. Likewise, improved facilities between Downtown and Lakewood Station could help connect the Study Area with a valuable regional transit amenity.

## Proposed Improvements

The City's six-year transportation improvement program (TIP) includes a "road diet" project ((i.e., removing travel lanes from a roadway and utilizing the space for other uses and travel modes"[4]) on Gravelly Lake Drive SW between Bridgeport Way and Steilacoom Drive which will reduce the road from four lanes to three lanes and proposes other various intersection pedestrian, and bicycle improvements. This Plan includes all of the City's six-year projects for the area, considers a revision to another section of Gravelly Lake Drive SW between 100$^{th}$ and 112$^{th}$ Streets SW, and proposes new public streets and connected non-motorized features.

[4] *Source: Federal Highway Administration*

*Table 2. Proposed Transportation Improvements*

| Six-Year TIP | Downtown Subarea Plan – Additions |
|---|---|
| Per current plan. The City's 6-year TIP (2018-2023) includes the following relevant improvement projects:<br>▪ 2.69B – Gravelly Lake Drive Road Diet b/w Bridgeport and Steilacoom (4 lanes to 3 lanes with bicycle lanes)<br>▪ 2.72 – 100th St & Lakewood Dr. curb, gutter, sidewalks, new signal<br>▪ 2.82 – New sidewalk east side of 59th Ave from 100th St to Bridgeport Way<br>▪ 3.13 – Install a traffic signal at Gravelly Lake Drive / Avondale Road<br>▪ 5.7 – Improve non-motorized connections on Motor Ave b/w Whitman and Gravelly Lake Dr.<br>▪ 9.16 – 59th Ave pavement restoration from Main St to 100th St<br>▪ 9.22 – 100th St pavement restoration from 59th Ave to Lakeview Ave | In addition to the six-year TIP:<br>▪ Retain Bridgeport Way SW as primary vehicle entrance-strengthen gateway<br>▪ Retain 100th Street SW as a primary east-west vehicle connection between I-5 and subarea<br>▪ Modify cross section of Gravelly Lake Blvd. Study, 3, 4, and 5-lane cross sections between Bridgeport and Nyanza Road SW to allow for improved bicycle and pedestrian facilities*<br>▪ Conversion of Lakewood Towne Center Blvd and Bristol Ave as public streets<br>▪ Lakewood Towne Center Blvd at 59th Ave SW, consider roundabout<br>▪ Reduce 59th Avenue SW to two lanes, allowing for bicycle facilities<br>▪ Addition of new street connections to support walkability. Alternative 1 assumes fewer connections based on phasing or property owner preferences, compared with Alternative 2. Consider 400 feet as the desired maximum block lengths throughout Subarea. |

*City of Lakewood, KPG and Fehr & Peers 2017*

*Note: * For a conservative test of alternative transportation improvements, the EIS authors modeled the greatest shift in traffic for Gravelly Lake Drive SW at three lanes and then compared it to no change in the section at five lanes. The analysis provides information indicating that added public streets help distribute the traffic, but that other arterial conditions would require more mitigation. Fewer improvements on other arterials would be needed if four or five lanes is retained in the roadway. This helps the City determine what combination of capital improvements, amenities, and costs are desired.*

Housing and job growth as proposed under this Plan would increase trips and create additional congestion Downtown, though this is offset in part by a greater network of public streets. It is anticipated that more persons would use non-motorized travel, particularly under Alternative 2, due to an increase in mixed use development.

*Table 3. Land Use Assumptions and Daily Person Trip Ends Generated by Planned Action EIS Alternative*

| | Existing | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|---|
| Total Housing Existing/2035 | 357 | 813 | 1,936 | 2,614 |
| Total Jobs Existing/2035 | 5,240 | 6,907 | 9,387 | 12,609 |
| Vehicular Mode Trip Ends | 71,000 | 85,700 | 129,800 | 168,900 |
| Non-vehicular mode Trip Ends | 6,000 | 7,700 | 13,100 | 22,100 |
| Total Person Trip Ends | 77,000 | 93,400 | 142,900 | 191,000 |
| Non-vehicular Mode Split | 8% | 8% | 9% | 12% |

*City of Lakewood, BERK 2017 (Land Use); Fehr & Peers 2018 (Trips)*

## Mitigation

### *Additional Capital Improvements*

Considering proposed transportation improvements and land use together in the City's transportation model, some Plan area intersections would require additional capital improvements, or alternatively changes in programs or policies, as described below. For a conservative test of alternative transportation improvements, the EIS authors modeled the greatest shift in traffic for Gravelly Lake Drive SW at three lanes and then compared it to no change in the section (five lanes). The table below shows the full list of improvements if Gravelly Lake Drive SW were modified to a cross section of three lanes.

The results without that change are described below the table.

*Table 4. Potential Additional Transportation Mitigation*

| Intersection | No Action | Alt 1 | Alt 1 Mitigated | Alt 2 | Alt 2 Mitigated |
|---|---|---|---|---|---|
| **Gravelly Lake Dr SW/59th Ave SW** | | | | | |
| Signalize intersection | E/38 | E/46 | B/19 | F/82 | B/19 |
| **100th St SW/Bridgeport Way SW** | | | | | |
| Add westbound right turn pocket, convert existing westbound through-right lane to through-only, and prohibit east and westbound left turns | E/68 | F/85 | C/34 | F/102 | D/49 |
| **100th St SW/Lakewood Dr SW** | | | | | |
| Signal timing revisions to provide more green time to protected left turn phases and reduce time for eastbound and southbound through phases | D/50 | E/56 | D/49 | E/56 | D/54 |
| **Lakewood Dr SW/Bridgeport Way SW** | | | | | |
| Convert westbound through-left lane to left only to remove split phase or move the pedestrian crossing to the north side of the intersection coincident with the WB phase* | C/34 | E/66 | D/39 | E/67 | D/48 |
| **108th St SW/Bridgeport Way SW**** | | | | | |
| Add northbound right turn pocket | D/48 | D/51 | D/47 | E/58 | D/52 |
| **112th St SW/Gravelly Lake Dr SW**** | | | | | |
| Add second westbound left turn pocket and combine through and right turn movements into outside lane | C/31 | E/61 | C/34 | E/65 | C/35 |

*Fehr & Peers 2018*

*Notes: * The LOS results are slightly better if the split phasing is removed (D/48) than if the pedestrian crossing is relocated (D/54).*

***These intersections remain within the City's LOS standard of D if the Gravelly Lake Drive SW revision is not implemented.*

The travel demand model was also run to estimate how volumes might change under Alternative 2 land use without the Gravelly Lake Drive SW three-lane section.

If five lanes were retained, the following intersections would not require change:

- 108th St SW/Bridgeport Way SW
- 112th St SW/Gravelly Lake Dr. SW

Comparing results with three lanes and with five lanes on Gravelly Lake Drive SW suggests that volumes on a five-lane Gravelly Lake Drive SW would be approximately 200 to 500 vehicles higher in each direction with smaller differences at the north end of the corridor and larger differences at the south end of the corridor, improving the intersection of Gravelly Lake Drive SW/112th Street from LOS E to D while increasing delay at Gravelly Lake Drive SW/59th Avenue SW. The volume reductions on Bridgeport Way would be smaller, likely no more than 200 vehicles in a single direction, though it would improve the intersection of 108th Street/Bridgeport Way from LOS E to D. The other impacted intersections would remain impacted with or without the revision. This indicates that the diverted traffic is distributed among multiple alternate routes and that much of the increase in volumes on Bridgeport Way is associated with increased land use rather than the Gravelly Lake Drive SW revision.

An alternative design could be considered which limits the extent of the road to Main Street instead of 112th Street SW. This shorter section would reduce the overall cost of the project and would limit the changes to portions of Gravelly Lake Drive SW with slightly lower volumes. The area south of Main Street is not projected to see as much new development as the Study Area so reconfiguring the cross-section all the way to 112th St SW would not provide as much additional benefit.

### *Screening Transportation Improvements and Additional Mitigation*

To assist with City decision-making, the major additional improvements proposed beyond the 6-year TIP or as a result of mitigation are evaluated across criteria. Based on the testing of the land use alternatives and transportation improvements, some are interdependent with others, some advance multi-model travel, some reduce delay for automobiles, some serve to distribute traffic, and some provide opportunities to advance the linear park feature, green infrastructure, or streetscape amenities. Implementation costs will be developed for the preferred plan. However, inclusion of improvements that require implementation of other improvements would have a greater cost than improvements that can be implemented independently.

*Table 5. Transportation Improvements and Additional Mitigation Screening*

| | Improvements | Reduced Vehicle Delay or Improved Auto Mobility | Multi-modal Focus | Traffic Distribution | Recreation or Amenity Value | Independent Implementation |
|---|---|---|---|---|---|---|
| 1. | Gravelly Lake Drive SW Revised Street Section | No | Yes | No | Yes | No, 3 lanes – requires public streets (#2).<br>Yes, 4 or 5 lanes |
| 2. | Conversion of Lakewood Towne Center Blvd and Bristol Ave as public streets. Addition of new street connections to support walkability. | Yes | Yes | Yes | Yes | Yes |
| 3. | Lakewood Towne Center Blvd at 59th Ave SW, consider roundabout. | Yes | No | Yes | Yes | Yes |
| 4. | Reduce 59th Avenue SW to two lanes, allowing for bicycle facilities | No | Yes | No | Yes | Yes |
| 5. | Potential Additional Transportation Mitigation in Table 4. | Yes | No | No | No | No, 108th St SW/ Bridgeport Way SW and 112th St SW/Gravelly Lake Dr SW required with 3-lane Gravelly Lake Drive SW section<br>Yes all others |

*BERK and Fehr & Peers 2018*

### *Transportation Demand Management*

To reduce capital and mitigation costs, a more robust implementation of Transportation Demand Management (TDM) strategies could be undertaken. With such a TDM program in place, it is expected that actual trip generation in the Downtown Plan area could be lowered below the levels analyzed in this plan and associated Planned Action EIS.

TDM strategies could include subsidies or discounts for non-auto travel, education, and assistance to help travelers identify non-auto commute options, rideshare, and ride match promotion, and local incentive and reward programs.

# Transportation Policies + Strategies

## *Policies*

- Policy: Balance the need for traffic flow with providing multi-modal travel options and supporting urban development in the Downtown.
- Policy: Emphasize pedestrian and bicycle connectivity and transit use within the Central Business District (CBD).
- Policy: Accommodate automobiles in balance with pedestrian, bicycle, and transit uses within the CBD and on individual sites.

## *Strategies*

- Strategy: Amend City design and engineering standards to implement Downtown street sections.
- Strategy: Ensure development standards require new development to provide convenient pedestrian connections to bus stops.

- Strategy: Provide pedestrian facilities and amenities, local access, on-street parking, and active streets on designated retail streets in the Downtown.
- Strategy: Prioritize the design and construction of the Green Loop, including the revision on Gravelly Lake Drive SW.
- Strategy: Provide sidewalks and/or upgraded sidewalk conditions within the Downtown area along the Green Loop roadways and along connections to parks and recreational spaces.
- Strategy: Construct high quality bicycle facilities for riders of all ages, including bicycle lanes and multi-use paths to provide safe east-west and north-south routes in the Downtown.
- Strategy: Actively pursue the acquisition of the proposed public streets based on the priorities established in the Implementation Plan and as strategic opportunities arise.
- Strategy: Work with Pierce Transit, Sound Transit, and other partners to offer incentives to small employers that promote multimodal travel.
- Strategy: Provide a high level of transit stop amenities, including pads, bus shelters, and traveler information within the Plan area.
- Strategy: Conduct a parking study in the Downtown to understand the existing demand for parking and identify opportunities for redevelopment of existing surface parking lots to support the implementation of this Plan.
- Strategy: Update the City's parking requirements to "right size" the requirements based on the results of the parking study and to encourage shared parking and flexibility in meeting parking requirements.
- Strategy: Pursue opportunities to add on-street parking consistent with the street concept plans and support the redevelopment of existing surface parking lots and prioritize access to street level retail uses..

# Parks, Open Spaces, & Trails

## Context

There are cultural facilities – a library, museum, and theater – in the Plan area, but the Downtown lacks parks and open space. Per its 2014 Legacy Plan, the City's open space level of service is 0.75-mile walking distance, or a 20-minute walking time, to urban parks serving residents living in high density residential or mixed-use areas. Most of the Downtown does not meet this standard.

North of Downtown, the City manages the Kiwanis Park, which is three acres and contains a skate park. The County's Seeley Lake Park abuts Downtown to the northeast near the East Commercial District and is about 47-acres containing a loop trail, woods, and wetlands. Active Park lies to the east of the Lakewood Towne Center Mall.

Community engagement showed a keen interest in outdoor recreation such as a spray park, a linear park, entertainment venues for art, music, and food and indoor cultural facilities.

*Figure43. Outdoor Recreation: Spray Park and Linear Park*

*Lakewood Downtown Plan Survey 2017, McCament & Rogers LLC 2014*

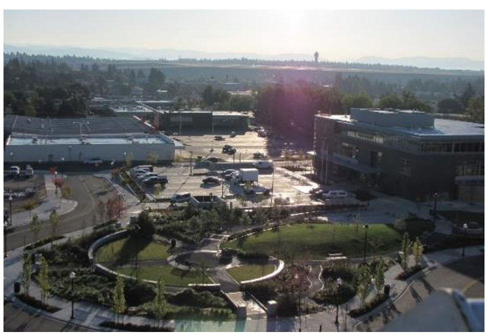
## Park Concepts

Recognizing the value of gathering spaces and active, healthy lifestyles by residents and businesses, coupled with the current lack of parks and recreation space, this Plan proposes a focal central park and a linear green street connection most of the Plan area. Connections to adjacent parks, including Active Park and Seeley Lake Park, are also proposed.

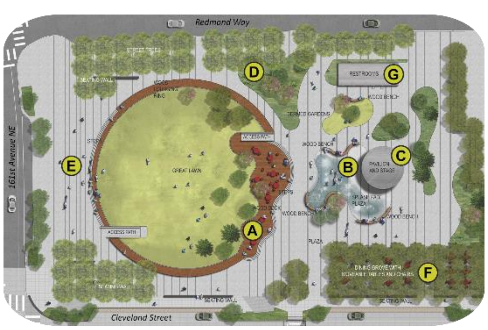
*Figure 44. Park Concepts for Downtown Lakewood*

*Central Park Case Studies*

*Downtown Puyallup – Pioneer Park – 2 acres*

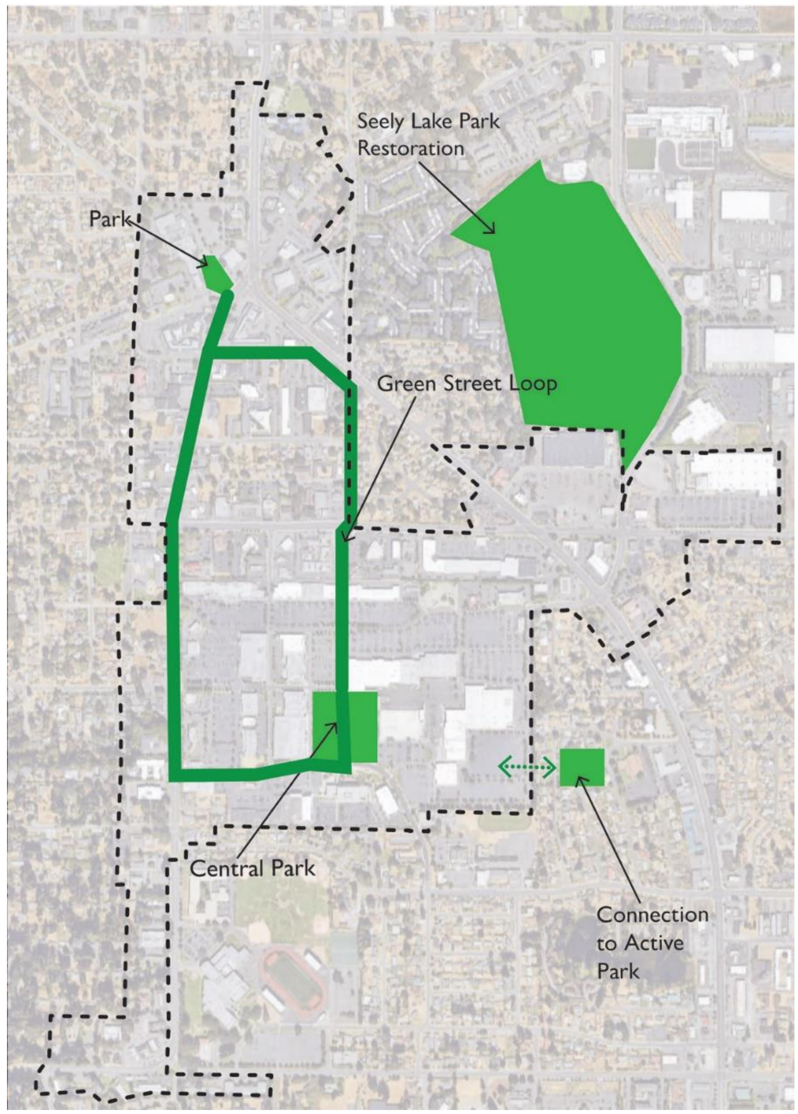


*Downtown Burien – 1 acre*



*Downtown Redmond – 2 Acres, Under Construction*

*Downtown Lakewood Park Concept*



# Park, Open Spaces & Trails Policies + Strategies

## *Policies*

- Policy:  Create public spaces and amenities in the Central Business District (CBD) to support Downtown businesses and residents
- Policy:  Acquire lands and construct community-gathering destinations such as plazas, open space or community facilities within the Towne Center.
- Policy:  Invest in a quality park and recreation system to enhance economic benefit.
- Policy:  Encourage the development of open space and recreation amenities in business parks or other commercial areas to support workers and nearby residents.
- Policy:  Increase emphasis on making Lakewood accessible and convenient for pedestrians and bicycle riders.

## *Strategies*

- Strategy: Implement the Lakewood Legacy Plan urban parks level of service standard.
- Strategy: Explore grant and other funding opportunities for public space improvements and programming.
- Strategy: Authorize partial fees-in-lieu of onsite parks and recreation facilities that would contribute to central and linear park implementation.
- Strategy: Acquire land for and develop a central park in Downtown to provide citizens with recreation and cultural features.
- Strategy: Develop the Green Loop to connect the Downtown's parks, recreation, cultural, transit, and retail assets.
- Strategy: Explore the potential to designate a cultural district within Downtown to celebrate art and creativity and to attract funding.
- Strategy: Program and host events (e.g., farmers market, parades, holiday festivals or Octoberfest) for Downtown public spaces.
- Strategy: Create streetscapes and trails that link the Downtown area to parks and recreational facilities outside of Downtown.

# Stormwater and the Natural Environment

## Context

### *Natural Environment*

Downtown is located to the west in the City and within the drainage basins of Steilacoom and Gravelly Lakes. Clover Creek flows northwest into Steilacoom Lake, crossing the southwest corner of the Town Center District. Clover Creek is a salmonid bearing stream with documented Coho salmon and presumed winter steelhead. Ponce de Leon Creek, another salmonid-bearing stream, flows to the west of the Town Center District. In addition to mapped critical areas, several streams and waterbodies are piped within the planning area.

Portions of Clover Creek are within a special flood hazard area. Special flood hazard areas are subject to flooding and have a 1% annual chance of flood (100-year food).

The entire Downtown Study Area is within an aquifer recharge area (Lakewood Water District, 2018). The soils are highly permeable and gravelly in nature, and the area is rated as highly vulnerable on the DRASTIC index range (LMC 14A.150; (Brown and Caldwell et al., 1990)). The City's sole source of drinking water is from underground aquifers and recharge (replenishing) of the aquifers comes from local rainfall in the Clover-Chambers watershed which includes the Downtown Plan Study Area.

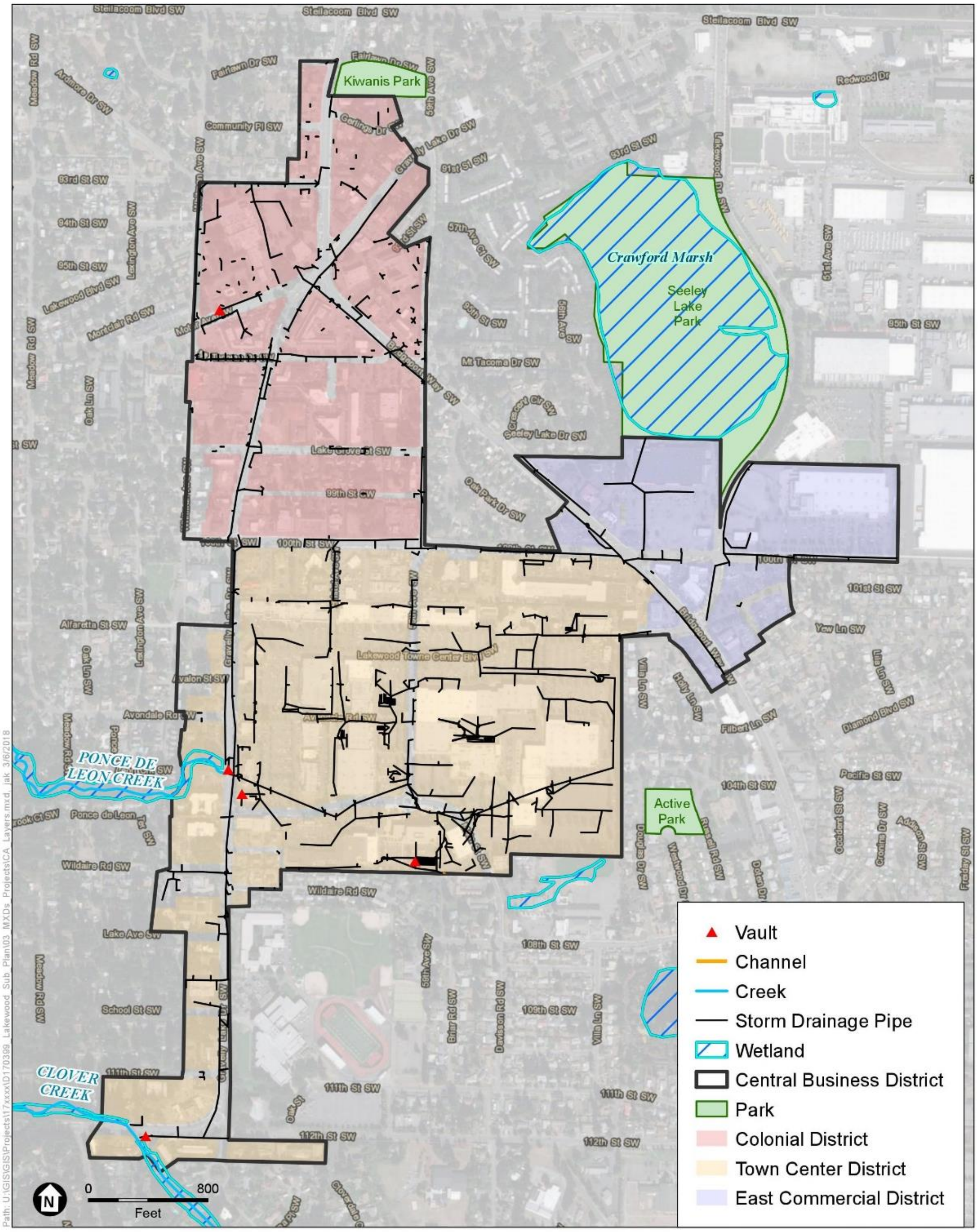
Urban adapted wildlife (e.g. rodents, raccoons, and some birds such as crows) may take advantage of the limited greenspace within Downtown Lakewood.

### *Stormwater*

The natural surface waters have been modified over time and have been integrated into the manmade stormwater system to enable development. The Downtown stormwater pipes and vaults are shown in Figure45.

Redevelopment in the Downtown will require compliance with modern stormwater standards, including which best management practices to minimize stormwater impacts on water quality and quantity.

*Figure45. Surface Water Features*




*Digital Globe, 2016, City of Lakewood, Pierce County GIS, ESA*

## Proposed Improvements

This plan supports restoration of Seeley Lake Park outside the Study Area and an option to daylight a portion of Ponce de Leon Creek per Comprehensive Plan policies.

Depending on the extent and type of restoration of Seeley Lake Park, these changes could help to improve the water quality of the wetland and improve habitat for urban wildlife.

Daylighting a portion of Ponce de Leon Creek could provide additional instream and riparian habitat along the daylighted portion of the stream. Daylighting a portion of the creek could also have a community benefit and be an opportunity for education as it would be a natural feature in an urban environment. However, daylighting a portion of the creek would not necessarily address water quality issues, which could hinder ecological benefit. The area also has a high water table, and daylighting may have an effect on groundwater. Additionally, depending upon site constraints and easements acquired, the riparian area may be too narrow to provide any ecological benefit or costs may render daylighting impractical.,

Improvements in the stormwater system, which currently has limited areas of filtration or water quality treatment, would be supported by the City's application of its stormwater standards, including:

- 2012 Stormwater Management Manual for Western Washington (as amended in 2014) (Washington Department of Ecology, 2014);
- Pierce County Stormwater Management and Site Development Manual (Pierce County, 2015); and
- Washington State Department of Transportation (WSDOT) Highway Runoff Manual (WSDOT, 2014)

## Stormwater and the Natural Environment Policies + Strategies

### *Policies*

- **Policy:** Protect the quality and quantity of groundwater.
- **Policy:** Require that development follow adopted stormwater standards that incorporate low impact development (LID) principles and standards.
  - Where onsite filtration is feasible, it should be provided.
  - Permeable surfaces should be considered for sidewalks.

### *Strategies*

- **Strategy:** Feature low impact development and green stormwater infrastructure along the Green Street Loop.
- **Strategy:** Use native and/or drought tolerant landscaping in the Downtown.
- **Strategy:** Provide educational signage at aboveground stormwater facilities and/or added natural features.
- **Strategy:** Encourage that open ponds be an amenity for the Downtown, with both natural landscape and urban access and edge treatments.
- **Strategy:** Address protection and potential restoration of piped streams in development to improve downstream function.
- **Strategy**: Require a conservation easement or other regulatory structure for piped streams to ensure the possibility of creek daylighting is not precluded by future redevelopment.
- **Strategy**: Identify types of acceptable low impact development and green stormwater infrastructure techniques for small parcels in the Plan area. Be open to emerging ideas.

# Utility Infrastructure (Water, Sewer, Power)

## Context

Water service is provided by the Lakewood Water District, and Downtown is fully served. The District began a 35-year program of replacement and rehabilitation in 1995, and some of the lines are mapped as needing replacement in the Downtown Plan area. Once these replacements are complete, water service will be sufficient for Downtown including daily use and fire suppression demand.5

Sewer service is provided by Pierce County Public Works and Utilities. Downtown is in the County's Lakewood East Sewerage Sub-basin and is fully served. Pierce County plans to increase sewer capacity in the area. Designs under consideration currently include either an increase in the size of the current interceptor (from 54" to 72") or the addition of a parallel sewer line. Any needs for additional flow can be considered and incorporated into Unified Sewer Plan updates in 2018 or beyond. (Bedi, 2018)

Power providers in the Downtown include Lakeview Light and Power and Tacoma Power.

Water and sewer lines traverse larger private properties within the Plan area such as the Lakewood Towne Center Mall. This could affect where and how public streets are added. The addition of new public streets could necessitate changes to some utility lines. Developers are responsible for the cost of these alterations, which may be identified during the design review for individual projects. The City should consider development incentives to advance public street improvements and to help offset developer responsibility for the cost of utility alteration.

## Utility Infrastructure (Water, Sewer, Power) Policies + Strategies

*Policies*

- Policy: Ensure Downtown features a connected public street grid and updated utility infrastructure to support densification.
- Policy: Encourage energy efficient development in the Downtown Study Area.

*Strategies*

- Strategy: Facilitate the creation of public streets to maximize development potential that meets the Downtown Plan vision.
- Strategy: Develop a water line replacement phasing plan in conjunction with the Lakewood Water District that dovetails with the installation of public streets to reduce the costs of utility relocation.
- Strategy: Coordinate with Pierce County on the relocation of sewer lines as public streets are developed.
- Strategy: Promote energy-saving building materials and site designs (e.g., LEED or similar ranking systems) through development regulation incentives..

[5] Water supply requirements for fire flow can be much greater than the average daily usage for single buildings. Developers are responsible for improvements needed to meet fire code requirements on their property, so additional improvements may be identified during the design review for individual projects.

# Community Partnerships and Organization

## Context

Successful Downtowns often have active community organizations to partner with the City and the community to manage and improve the Downtown. The National Main Street Association and the Washington Main Street Association are two of the best examples of national and organizations that provide guidance and resources for local communities interested in revitalizing their Downtown. There are many main street organizations in Washington and throughout the United States (see Figure 46).

*Figure 46. Map of Main Street Associations in the United States*


*Mainstreet.org, 2018; Google Maps, 2018*

The main street approach is based on the understanding that the City governments do not have the resources to take on all aspects of a downtown revitalization effort and need resources from the community. It includes creating a sustainable organization that is committed to the revitalization of the Downtown and uses the Four Point Approach (see Figure 47) that includes organization, promotion, design, and economic vitality subcommittees. Business improvement associations, merchant associations, chambers of commerce, historic preservation organizations, and arts and culture organizations can also contribute to the success of a city's Downtown. Lakewood currently has many community organizations, but none focused exclusively on the revitalization of the Downtown.

*Figure 38. Main Street Four Point Approach*


*Mainstreet.org, 2018*

## Community Partnerships and Organization Policies + Strategies

### *Policies*

- Policy: Focus on the revitalization of the Downtown through partnerships among the City, business and property owners, and the community; develop an organization whose primary function is to support implementation of this Plan.
- Policy: Support formation of business improvement organizations.
- Policy: Support the formation of a Lakewood Towne Center association or similar organization to establish economic improvement strategies and to sponsor social and safety events.

### *Strategies*

- Strategy: Create a Downtown Plan Advisory Commission with staff support to assist with implementation efforts.
- Strategy. Connect businesses to other Lakewood business support organizations' missions and programs including the Lakewood Chamber of Commerce.
- Strategy. Work with Lakewood Chamber of Commerce on a "buy local" initiative that builds on the small business movement.
- Strategy: Seek community partnerships for the programming and management of public spaces for active use.
- Strategy: Explore becoming a designated Main Street program through the State of Washington.

# Implementation Plan

During the public outreach for this Plan, the community expressed a very strong desire to see progress towards realizing their vision for the Downtown and some frustration that more has not happened to date. Therefore, the implementation plan is a critical component to advancing the Downtown vision. The implementation plan outlines the project actions, the timeline for implementation, the responsible department (See Table 5). The timeline for plan actions include short-term (0-3 years), Mid-term (3-5 years) and long-term (5+ years).

Planning level resource estimates will be developed with the preferred plan.

*Table 5. Implementation Plan*

| | Plan Action | Timeline | Department |
|---|---|---|---|
| Urban Design + Land Use | ▪ Update the City's Future Land Use Map and Zoning Map to designate the entire Study Area as "Downtown." | Short-term | Community Development |
| | ▪ Adopt a hybrid form-based code that combines design elements with traditional zoning to regulate Downtown development. Use Overlay Districts, Street Types, Building Frontage Standards, and a simplified list of allowed land uses in the subarea. | Short-term | Community Development |
| | ▪ Adopt standards to address the transition and minimize impacts from more intense development Downtown to lower-density residential neighborhoods. | Short-term | Community Development |
| | ▪ Encourage integrated mixed-use urban development, including housing, in the Downtown. | Ongoing | Community Development |
| | ▪ Train staff on maintenance and implementation of a hybrid form-based development code. | Short-term | Community Development |
| | ▪ Remove underlying deed restrictions and/or covenants that prohibit office, high density residential, and/or mixed-use development or open space. | Mid-term | Community Development |
| | ▪ Conduct a parking study in the Downtown to understand the existing demand for parking and identify opportunities for redevelopment of existing surface parking lots to support the implementation of this Plan. | Short-term | Community Development |

| | Plan Action | Timeline | Department |
|---|---|---|---|
| | ▪ Update the City's parking requirements to "right size" the requirements based on the results of the parking study and to encourage shared parking and flexibility in meeting parking requirements. The updated parking requirements should consider parking maximums. | Short-term | Community Development |
| | ▪ Monitor the impact of the Downtown Code in implementing this Plan at least annually and amend the Plan and its associated regulations as needed to improve outcomes. | Short-term; Ongoing | Community Development |
| Economic Development | ▪ Develop a Lakewood-specific business attraction and retention program with regional economic development partners including opportunities for incubator businesses. | Ongoing | Community Development, Public Works Engineering, Parks and Recreation, Economic Development |
| | ▪ Identify and implement incentives that would encourage new businesses to locate in Downtown Lakewood. | Short-term; Ongoing | Economic Development |
| | ▪ Provide resources for entrepreneurs and small businesses, including information available in multiple languages, and recruit key business services to the area. | Short-term; Ongoing | Economic Development |
| | ▪ Support a business improvement district and continue ongoing initiatives to make downtown Lakewood clean and safe. | Short-term | Economic Development |
| | ▪ Activate empty and underutilized places such as parking lots. | Short-term | Community Development, Economic Development |
| | ▪ Seek neighborhood businesses that provide daily goods and services in the CBD. | Ongoing | Economic Development |
| | ▪ Invest in civic amenities and infrastructure consistent with this Downtown Plan to attract business owners and investors who create living wage jobs. | Mid-term | Community Development, Public Works Engineering, Parks and Recreation |

| | Plan Action | Timeline | Department |
|---|---|---|---|
| | ▪ Explore the feasibility of a business incubator in Downtown and consider incorporating economic gardening for microenterprises into it. | Mid-term | Economic Development |
| | ▪ Work with local financial institutions on providing low interest loans for qualified small local businesses. | Short-term; Ongoing | Economic Development |
| Housing | ▪ Adopt form-based development regulations that improve the quality of attached and mixed-use housing development and create a walkable attractive Downtown. | Short-term | Community Development |
| | ▪ Revise land use and development regulations to promote mixed-use development within the CBD. | Short-term | Community Development |
| | ▪ Adopt transitional height and landscape standards to ensure compatibility with abutting lower-density areas. | Short-term | Community Development |
| | ▪ Engage affordable housing organizations about opportunities and partnerships to increase housing in the Downtown. | Short-term; Ongoing | Community Development, Economic Development |
| | ▪ Explore opportunities for transitional housing and services with homelessness service providers to address the health, social, and shelter needs of homeless in Lakewood. | Short term; Ongoing | Community Development, Economic Development |
| | ▪ Foster neighbor engagement and create a sense of safety through "crime prevention through environmental design" principles integrated into development designs. | Ongoing | Community Development |
| | ▪ Explore expanding current tax abatement programs and other incentives. | Long Term | Community Development |

| | Plan Action | Timeline | Department |
|---|---|---|---|
| Street Grid, Streetscapes and Public Spaces | ▪ Require land uses and development to support an active, safe, and engaging public realm in Downtown streets, parks, and public spaces. | Mind-term; Ongoing | Community Development, Economic Development, Public Works Engineering, Parks and Recreation |
| | ▪ Expand the number of events held in public spaces in Downtown by building off the success of the Lakewood Farmer's Market. | Short-term; Ongoing | Public Works Engineering, Community Development |
| | ▪ Implement public and civic investment programs such as: public spaces, art, seasonal events; streets, streetscapes, and parks; and environmental remediation. | Mid-term | Public Works Engineering, Community Development, Parks and Recreation |
| | ▪ Adopt regulations for right-sized parking requirements, a larger on-street parking network, parking facilities within in structures or located away from the edges of streets and public spaces, and encouraged shared parking. | Short-term; Ongoing | Community Development, Public Works Engineering |
| Transportation | ▪ Amend City design and engineering standards to implement Downtown street sections. | Short-term | Public Works Engineering |
| | ▪ Ensure development standards require new development to provide convenient pedestrian connections to bus stops. | Short-term | Community Development, Public Works Engineering |
| | ▪ Provide pedestrian facilities and amenities, local access, on-street parking, and active streets on designated retail streets in the Downtown. | Ongoing | Public Works Engineering |
| | ▪ Prioritize the design and construction of the Green Loop, including the revision on Gravelly Lake Drive SW. | Ongoing | Community Development, Public Works Engineering |
| | ▪ Provide sidewalks and/or upgraded sidewalk conditions within the Downtown area along the Green Loop roadways and along connections to parks and recreational spaces. | Ongoing | Community Development, Public Works Engineering |

| | Plan Action | Timeline | Department |
|---|---|---|---|
| | ▪ Construct high quality bicycle facilities for riders of all ages, including bicycle lanes and multi-use paths to provide safe east-west and north-south routes in the Downtown. | Long-term | Community Development, Public Works Engineering |
| | ▪ Actively pursue the acquisition of the proposed public streets based on the priorities established in the Implementation Plan and as strategic opportunities arise. | Short-term | Public Works Engineering |
| | ▪ Work with Pierce Transit, Sound Transit, and other partners to offer incentives to small employers that promote multimodal travel. | Short-term | Public Works Engineering |
| | ▪ Provide a high level of transit stop amenities, including pads, bus shelters, and traveler information within the Plan area. | Short-term | Pierce Transit, Public Works Engineering |
| | ▪ Conduct a parking study in the Downtown to understand the existing demand for parking and identify opportunities for redevelopment of existing surface parking lots to support the implementation of this Plan. | Short-term | Community Development |
| | ▪ Update the City's parking requirements to "right size" the requirements based on the results of the parking study and to encourage shared parking and flexibility in meeting parking requirements. | Short-term | Community Development |
| | ▪ Pursue opportunities to add on-street parking consistent with the street concept plans and support the redevelopment of existing surface parking lots and prioritize access to street level retail uses. | Short Term; Ongoing | Community Development, Public Works Engineering |
| Parks, Open Spaces, & Trails | ▪ Implement the Lakewood Legacy Plan urban parks level of service standard. | Mid-Term | Parks and Recreation, Community Development |
| | ▪ Explore grant and other funding opportunities for public space improvements and programming. | Mid-term | Parks and Recreation, Community Development, Public Works Engineering, Administrative Services |

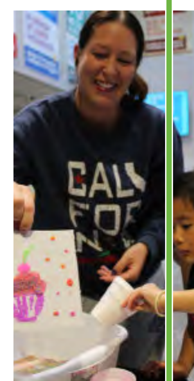
| | Plan Action | Timeline | Department |
|---|---|---|---|
| | ▪ Authorize partial fees in lieu of onsite parks and recreation facilities to contribute to central and linear park implementation. | Short-term | Parks and Recreation, Community Development |
| | ▪ Acquire land for and develop a central park in Downtown to provide citizens with recreation and cultural features. | Long-term | Community Development, Public Works Engineering |
| | ▪ Develop the Green Loop to connect the Downtown's parks, recreation, cultural, transit, and retail assets. | Short-term | Community Development, Public Works Engineering |
| | ▪ Explore the potential to designate a cultural district within Downtown to celebrate art and creativity and to attract funding. | Mid-term | Parks and Recreation |
| | ▪ Program and host events (e.g., farmers market, parades, holiday festivals or Octoberfest) for Downtown public spaces. | Short-term; Ongoing | Parks and Recreation |
| | ▪ Create streetscapes and trails that link the Downtown area to parks and recreational facilities outside of Downtown. | Mid-term | Community Development, Public Works Engineering |
| Stormwater | ▪ Feature low impact development and green stormwater infrastructure along the Green Street Loop. | Short-term | Public Works Engineering, Community Development |
| | ▪ Use native and/or drought tolerant landscaping in the Downtown. | Short-term | Community Development, Public Works Engineering |
| | ▪ Provide educational signage at aboveground stormwater facilities and/or added natural features. | Short-term | Public Works Engineering |
| | ▪ Encourage that open ponds be an amenity for the Downtown, with both natural landscape and urban access and edge treatments. | Short-term | Public Works Engineering |
| | ▪ Address protection and potential restoration of piped streams in development to improve downstream function. | Mid-term | Community Development, Public Works Engineering |

| | Plan Action | Timeline | Department |
|---|---|---|---|
| | ▪ Require a conservation easement or other regulatory structure for piped streams to ensure the possibility of creek daylighting is not precluded by future redevelopment. | Mid-term | Community Development, Public Works Engineering |
| | ▪ Identify types of acceptable low impact development and green stormwater infrastructure techniques for small parcels in the Plan area. Be open to emerging ideas. | Short-term; Ongoing | Public Works Engineering |
| Utility Infrastructure | ▪ Facilitate the creation of public streets to maximize development potential that meets the Downtown Plan vision. | Mid-term | Public Works Engineering, Community Development |
| | ▪ Develop a water line replacement phasing plan in conjunction with the Lakewood Water District that dovetails with the installation of public street to reduce the costs of utility relocation. | Short-term | Public Works Engineering |
| | ▪ Coordinate with Pierce County on the relocation of sewer lines as public streets are developed. | Short-term; Ongoing | Public Works Engineering |
| | ▪ Promote energy-saving building materials and site designs (e.g., LEED or similar ranking systems) through development regulation incentives. | Short-term; Ongoing | Community Development |
| Community Partnerships | ▪ Create a Downtown Plan Advisory Commission with staff support to assist with implementation efforts. | Mid-term | Community Development, Economic Development |
| | ▪ Connect businesses to other Lakewood business support organizations' missions and programs including the Lakewood Chamber of Commerce. | Short-term; Ongoing | Community Development, Economic Development |
| | ▪ Work with Lakewood Chamber of Commerce on a "buy local" initiative that builds on the small business movement. | Short-term | Economic Development |

| | Plan Action | Timeline | Department |
|---|---|---|---|
| | ▪ Seek community partnerships for the programming and management of public spaces for active use. | Mid-term; Ongoing | Parks and Recreation |
| | ▪ Explore becoming a designated Main Street program through the State of Washington. | Short-term | Community Development, Parks and Recreation |

CITY OF LAKEWOOD

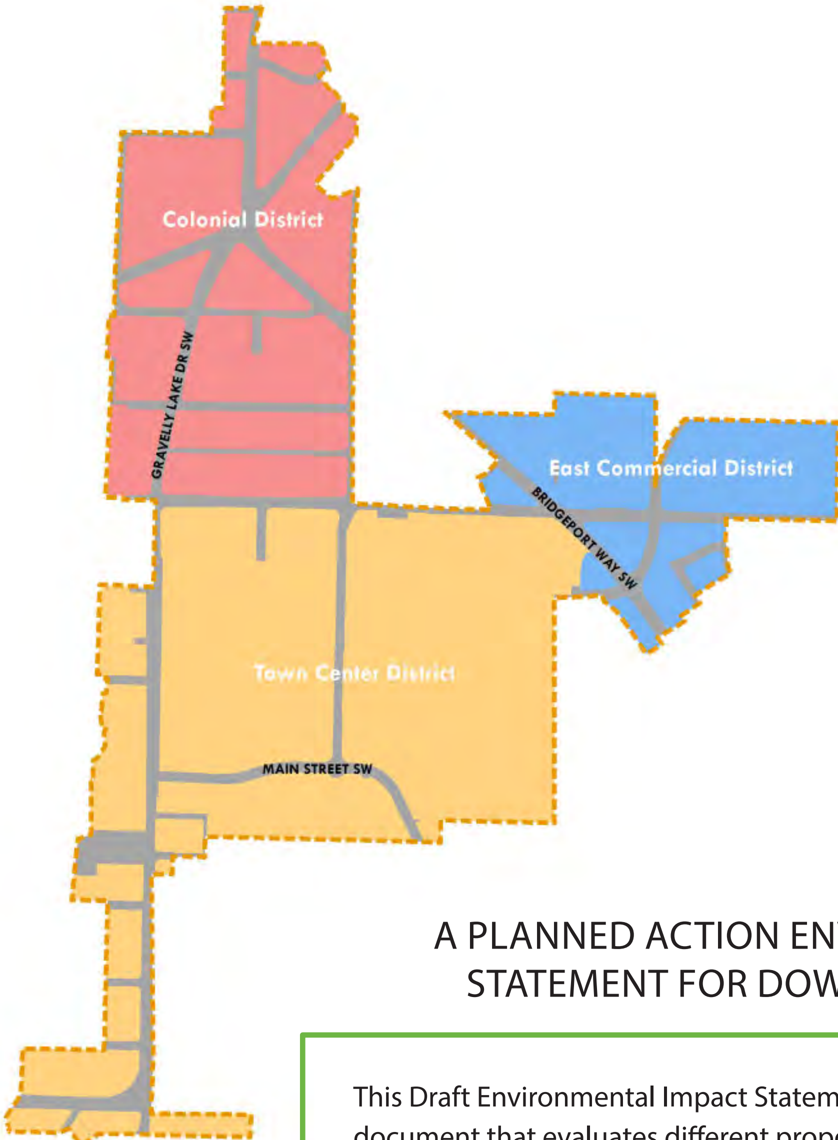
# LAKEWOOD DOWNTOWN·PLAN



## DRAFT Planned Action Environmental Impact Statement

MARCH 2018

Prepared by: BERK
ESA
Fehr & Peers
Framework
KPG
Seth Harry & Associates




# A PLANNED ACTION ENVIRONMENTAL IMPACT STATEMENT FOR DOWNTOWN LAKEWOOD

This Draft Environmental Impact Statement (Draft EIS) is an informational document that evaluates different proposals and alternatives in the Downtown including future land use, transportation, park and other investments that could be implemented between 2018 and 2035. The document identifies potential beneficial and adverse environmental impacts and potential mitigation measures that can reduce adverse impacts. This document is provided for the public and City decision makers; public comments are taken on the Draft EIS over a 30-day period from March 16 to April 16, 2018 (see the Fact Sheet for how to comment).

This EIS supports the designation of a Planned Action under the State Environmental Policy Act (SEPA) to streamline future environmental review and permitting in the study area. Future projects in the Downtown study area will not require SEPA determinations at the time of permit application if they are consistent with the type of development, traffic assumptions, and mitigation measures studied in the EIS. All such projects would still need to be consistent with all adopted laws and regulations, and would be reviewed pursuant to City adopted land use procedures.

March 16, 2018

Subject: Draft Lakewood Downtown Planned Action Environmental Impact Statement

Dear Reader:

A major goal of the City of Lakewood is to create a Downtown focused in the Central Business District (CBD) zone, redeveloping it into a rich urban area with civic amenities, walkable streets, and a mix of uses including housing, entertainment, restaurants, and retail. Downtown Lakewood has significant economic and cultural assets to build upon and some challenges to overcome. To help attain this ambitious goal for Downtown Lakewood, the City of Lakewood has commissioned the Lakewood Downtown Plan, considered a subarea plan under the Growth Management Act. The plan builds on a foundation of current plans and programs and will:

- Describe a vision, land use and design, gathering places, infrastructure investments, and other action strategies for Lakewood's central business district or "Downtown".
- Amend Comprehensive Plan land use, policy, and capital facility plan elements.
- Create new form-based zoning standards.
- Provide upfront environmental review through a Planned Action consistent with RCW 43.21c.440 and SEPA rules in WAC 197-11 are anticipated to help bring about desired change and development.

This Draft Environmental Impact Statement (Draft) EIS evaluates the environmental consequences of the proposal and alternatives that illustrate how to implement the vision for an urban area with civic amenities, walkable streets, and a mix of uses including housing, entertainment, restaurants, and retail. The Alternatives include a "No Action" Alternative that assumes growth according to current trends and under current City Plans and development regulations, and Action Alternatives 1 and 2 that assume moderate to high levels of growth based on targeted infrastructure and civic investments and plan and code changes. Investments include a green loop of street and trail improvements, more public streets, and a central park.

This Draft EIS provides a qualitative and quantitative analysis of environmental impacts associated with the Lakewood Downtown Plan. The specific purpose of this EIS is to assist the public and local government decision makers in considering future growth, infrastructure, and mitigation measures appropriate in the Downtown.

The proposal also includes the designation of a SEPA Planned Action to streamline future environmental review and permitting in the study area. A planned action provides more detailed environmental analysis during an area-wide planning stage rather than at the permit review stage. (See RCW 43.21C.440 and WAC 197-11-164 to -172.) Future projects in the proposal study area developing under the designated Planned Action will not require SEPA determinations at the time of permit application if they are consistent with the type of development, traffic assumptions, and mitigation measures studied in the EIS.

All members of the public, agencies, and tribes are invited to provide comment on the Draft EIS.

Email comments are preferred and must be sent to tspeir@cityoflakewood.us with the proposal name (Lakewood Downtown Plan EIS) in the subject line. Include your comments in the body of your email message rather than as attachments.

Alternative methods of submitting written comments are:

> Tiffany Speir, Planning Manager, Special Projects
> Community & Economic Development Department
> 6000 Main St SW, Lakewood, WA 98499

Send comments by **5 pm April 16, 2018.**

An Open House and Public Meeting hosted by Lakewood Planning Commission t is scheduled for:

> March 21, 2018
> 5:30 PM
> Lakewood City Hall
> 6000 Main St SW, Lakewood, WA 98499

The purpose of the Open House and Public Meeting is to introduce the Draft Downtown Plan and Draft EIS. All members of the public are welcome to participate in interactive displays and discussions.

The Draft Downtown Plan is being circulated at the same time as this Draft EIS, and comments are also welcome on the Draft Downtown Plan. Both documents are available at: https://www.lakewooddowntownplan.org/.

For more information, please visit the project website, https://www.lakewooddowntownplan.org/, or you may contact Tiffany Speir, Planning Manager, Special Projects, at tspeir@cityoflakewood.us or 253.983.7702.

Sincerely,

David Bugher

David Bugher
SEPA Responsible Official
Assistant City Manager for Development/Community & Economic Development Director

LAKEWOOD
DOWNTOWN·PLAN

# Draft Planned Action Environmental Impact Statement

**City of Lakewood – March 2018**

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# Fact Sheet

## *Project Title*

Downtown Lakewood Plan and Planned Action

## *Proposed Action and Alternatives*

The City has commissioned the preparation of a subarea plan for Lakewood's Central Business District, or "Downtown". The plan will build upon past planning efforts and describe a vision, land use and design, gathering places, infrastructure investments, and other action strategies for Lakewood's central business district or "Downtown". Comprehensive Plan land use, policy, and capital facility plan amendments, new form-based zoning standards, and upfront environmental review through a Planned Action consistent with RCW 43.21C.440 and SEPA rules in WAC 197-11 are anticipated to help bring about desired change and development.

This Draft Environmental Impact Statement (EIS) considers three alternatives that illustrate how to implement the vision for an urban area with civic amenities, walkable streets, and a mix of uses including housing, entertainment, restaurants, and retail:

- **No Action**, a SEPA Required Alternative. This alternative assumes growth according to current trends and under current City Plans and development regulations, including over 450 housing units, and over 1,660 jobs. There would be no additional public investments in parks or stormwater infrastructure. Current transportation plans would be implemented, the number of public streets would not increase, and block size would not decrease. The Subarea Plan and associated form based code and Planned Action Ordinance would not be adopted.
- **Action Alternative 1**, assuming a moderate level of development, with over three times the housing and over two times the jobs as the No Action Alternative, based on targeted infrastructure and civic investments and a Downtown Subarea Plan and code changes. Investments include a green loop of street and trail improvements, more public streets, and a 2-acre central park. Development evaluated includes nearly 1,580 housing units and over 4,150 jobs. The increased growth in housing and jobs is spurred by a greater investment in multi-modal transportation improvements, parks and gathering spaces, and environmental amenities and stormwater management. Infill and integration of mixed-use development would occur on catalyst sites. Amendments integrating the Subarea Plan would be made to the Lakewood Comprehensive Plan. The City may request an adjusted Regional Growth Center boundary under Vision 2040, the Puget Sound Regional Council's (PSRCs) Growth Strategy for the four-county area; the boundary proposed would match that of the Study Area evaluated in this EIS.
- **Action Alternative 2**, assuming a high level of growth, with five times the housing and jobs compared with No Action and with the greatest level of civic and infrastructure investments, including a green loop, added public streets, and a 4-acre central park. With Alternative 2, over 2,250 housing units and nearly 7,370 jobs would be developed. The plan and code would allow the greatest density and heights up to similar levels as the current code (90 feet). More redevelopment of catalyst sites

into mixed use formats would occur. Similar Lakewood Comprehensive Plan and PSRC Vision 2040 boundary amendments would be proposed as for Alternative 1.

## Proponent & Lead Agency

City of Lakewood

## Location

The Study Area is approximately 319 gross acres, and contains the central shopping area of the community including the Colonial District and Lakewood Towne Center. Major roads include Bridgeport Way SW, and Gravelly Lake Drive SW and 100th Street SW. The Study Area is bounded approximately by Fairlawn Drive SW and Kiwanis Park on the north, 59th Avenue SW and Lakewood Drive W to the east, 112th Street SW on the South, and Gravelly Lake Drive SW to the west, including property fronting on both sides of the roadway.

## Tentative Date of Implementation

Summer 2018

## Responsible Official

David Bugher, Assistant City Manager for Development/Community & Economic Development Director

City of Lakewood

Community & Economic Development Department

6000 Main St SW, Lakewood, WA 98499
DBugher@cityoflakewood.us

## Contact Person

Tiffany Speir, Planning Manager, Special Projects

City of Lakewood Community & Economic Development Department

6000 Main St SW, Lakewood, WA  98499

253.983.7702

tspeir@cityoflakewood.us

## Licenses or Permits Required

City of Lakewood

- Adoption of Downtown Plan as a subarea plan and element of the Comprehensive Plan
- Adoption of Zoning and Development Regulation Amendments

- Adoption of a Planned Action ordinance

Puget Sound Regional Council

- Centers Plan Consistency Review

Washington State Department of Commerce

- Comprehensive Plan and Development Regulation Amendments Review

## *Authors and Principal Contributors to the EIS*

This Draft Environmental Impact Statement (EIS) has been prepared under the direction of the City of Lakewood. The following consulting firms provided research and analysis associated with this EIS:

- BERK: project management, outreach and engagement, land use, Planned Action EIS
- ESA: natural environment
- Fehr & Peers: transportation
- Framework: subarea plan and form-based code, charrette and pop-up events, placemaking/activation
- KPG: streetscapes and parks
- Seth Harry: urban design and charrette

## *Draft EIS Date of Issuance and Comment Period*

**Date of Issuance:** March 16, 2018

**Method to Provide Comments:**

Email comments are preferred and must be sent to tspeir@cityoflakewood.us with the proposal name (Lakewood Downtown Plan EIS) in the subject line. Include your comments in the body of your email message rather than as attachments.

Alternative methods of submitting written comments are:

Tiffany Speir, Planning Manager, Special Projects

Community & Economic Development Department

6000 Main St SW, Lakewood, WA  98499

Send comments by **5 pm April 16, 2018.**

**Public Meeting:** An Open House and Public Meeting hosted by Lakewood Planning Commission is scheduled for:

March 21, 2018 5:30 PM, Lakewood City Hall

6000 Main St SW, Lakewood, WA 98499

The purpose is to introduce the Draft Downtown Plan and Draft EIS. All members of the public are welcome to participate in interactive displays and discussions.

## Date of Final Action

Summer 2018

## Location of Background Data

See relevant reports and studies associated with the Downtown Plan at: https://www.lakewooddowntownplan.org/.

## Purchase of Draft EIS

This Draft EIS has been distributed to agencies, organizations and individuals noted on the Distribution List following this Fact Sheet.

Copies of the EIS are also available for review at the Lakewood Community Development Department:

City of Lakewood

Community & Economic Development Department

6000 Main St SW, Lakewood, WA 98499

A copy is also available at the Lakewood Library at 6300 Wildaire Rd SW, Lakewood, WA 98499.

Alternatively, the Draft EIS can be reviewed and downloaded at the project website at: https://www.lakewooddowntownplan.org/.

Flash drives or a limited number of hard copies for public distribution are also available and may be purchased at the City's Community & Economic Development Department for the cost of reproduction.

# Distribution List

A notice of availability has been provided to the following distribution list. A copy has been provided to the Department of Ecology.

### Federal

Commander, Joint Base Lewis-McChord HQ

US Fish & Wildlife Office/ US Service

### Tribal

Nisqually Indian Tribe

The Puyallup Tribe

### State

Department of Agriculture

Department of Archaeology and Historic Preservation

Department of Commerce

Department of Corrections

Department of Ecology

Department of Fish and Wildlife

Department of Health

Department of Transportation

Energy Facility Site Evaluation Council (EFSEC)

Office of the Attorney General

WA Military Department

### Regional

Puget Sound Regional Council

Puget Sound Clean Air Agency

### Other Local Governments

City of Bonney Lake

City of DuPont

City of Gig Harbor

City of Lacey

City of Olympia

City of Puyallup

City of Sumner

City of Tacoma

City of University Place

Pierce County

Pierce County Assessor-Treasurer

Thurston County

Town of Steilacoom

### Ports

Port of Olympia

Port of Tacoma

### Service Providers

Clover Park School District

Lakeview Light & Power

Lakewood Library

Lakewood Refuse Service

Lakewood Water District

Pierce Transit

Puget Sound Energy

Tacoma Power

West Pierce Fire & Rescue

### Media

Tacoma News Tribune

### Civic and Business Stakeholders

American Lake Improvement Club

Associated General Contractors

Dayton Hudson Corp

Firestone Group LLC

First Interstate Bank Villa Plaza

Lake Steilacoom Improvement Club

Lakewood Players

Lakewood Towne Center - RPAI US Management, LLC

Lakewood Towne Center South LLC

LAKHA Properties

LJB Ventures LLC

LKW Associates LLC

Master Builders Assn. of Pierce County

NAIOP Washington State Chapter

Puget Sound National Bank

RPAI

St. Francis Cabrini

Starbucks Corp

# Table of Contents


**1.0 Summary ........ 1-1**

1.1. Purpose of Proposed Action ........ 1-1

1.2. Organization of this Document ........ 1-1

1.3. State Environmental Policy Act Process ........ 1-2

*1.3.1. Purpose of SEPA and Planned Action ........ 1-2*

*1.3.2. Prior SEPA Review ........ 1-2*

*1.3.3. Integrated SEPA/GMA Process ........ 1-3*

1.4. Public Involvement ........ 1-3

1.5. Objectives, Plan Concepts, and Alternatives ........ 1-4

*1.5.1. Objectives ........ 1-4*

*1.5.2. Plan Concepts ........ 1-4*

*1.5.3. Alternatives ........ 1-7*

1.6. Major Issues, Significant Areas of Controversy and Uncertainty, and Issues to be Resolved ........ 1-9

1.7. Summary of Impacts and Mitigation Measures ........ 1-10

*1.7.1. Natural Environment ........ 1-10*

*1.7.2. Population, Employment, and Housing ........ 1-11*

*1.7.1. Land Use Plans and Policies ........ 1-13*

*1.7.2. Transportation ........ 1-17*

*1.7.3. Public Services ........ 1-21*

*1.7.1. Utilities ........ 1-22*

**2.0 Proposal and Alternatives ........ 2-1**

2.1. Purpose and Introduction ........ 2-1

2.2. Description of the Study Area ........ 2-2

2.3. Objectives and Alternatives ........ 2-4

*2.3.1. Objectives ........ 2-4*

*2.3.2. Subarea Concepts ........ 2-4*

*2.3.3. Planned Action ........ 2-26*

*2.3.4. Alternatives Comparison ........ 2-27*

2.4. SEPA Comment Opportunities ........ 2-29

2.5. Benefits and Disadvantages of Delaying the Proposed Action ........ 2-30

**3.0 Affected Environment, Significant Impacts, and Mitigation Measures ................................3-31**

3.1. Natural Environment ........................................................................................................3-31

*3.1.1. Affected Environment ........................................................................................3-31*

*3.1.2. Impacts ........................................................................................................3-34*

*3.1.3. Mitigation Measures ........................................................................................3-36*

*3.1.4. Significant Unavoidable Adverse Impacts ........................................................3-37*

3.2. Population, Employment, and Housing ........................................................................3-38

*3.2.1. Affected Environment ........................................................................................3-38*

*3.2.2. Impacts ........................................................................................................3-47*

*3.2.3. Mitigation Measures ........................................................................................3-50*

*3.2.4. Significant Unavoidable Adverse Impacts ........................................................3-51*

3.3. Land Use ........................................................................................................................3-52

*3.4.1. Affected Environment ........................................................................................3-52*

*3.2.5. Impacts ........................................................................................................3-66*

*3.2.6. Significant Unavoidable Adverse Impacts ........................................................3-77*

3.4. Transportation ................................................................................................................3-79

*3.4.1. Affected Environment ........................................................................................3-79*

*3.4.2. Impacts ........................................................................................................3-94*

*3.4.3. Mitigation Measures ........................................................................................3-109*

*3.4.4. Significant Unavoidable Adverse Impacts ........................................................3-111*

3.5. Public Services ................................................................................................................3-79

*3.5.1. Affected Environment ........................................................................................3-113*

*3.5.1. Impacts ........................................................................................................3-118*

*3.5.2. Mitigation Measures ........................................................................................3-121*

*3.5.3. Significant Unavoidable Adverse Impacts ........................................................3-121*

3.6. Utilities ........................................................................................................................3-122

*3.6.1. Affected Environment ........................................................................................3-122*

*3.6.2. Impacts ........................................................................................................3-128*

*3.6.3. Mitigation Measures ........................................................................................3-132*

*3.6.4. Significant Unavoidable Adverse Impacts ........................................................3-132*

**4.0 References ........................................................................................................4-134**

# Table of Exhibits

Exhibit 1.5-1. Downtown Lakewood Concepts ........ 1-6
Exhibit 1.5-2. Lakewood Downtown Civic and Infrastructure Investments ........ 1-7
Exhibit 1.5-3. Alternative Plan and Code Changes and associated Housing and Job Growth ........ 1-8
Exhibit 1.7-1. Development Density ........ 1-12
Exhibit 1.7-2. Downtown Buildable Parcels Summary ........ 1-14
Exhibit 1.7-3. Housing and Job Growth by Alternative ........ 1-15
Exhibit 1.7-4. Daily Person Trip Ends Generated by Scenario ........ 1-17
Exhibit 1.7-5. Transportation Network Assumptions. ........ 1-18
Exhibit 1.7-6. Summary of Transportation Impacts. ........ 1-19
Exhibit 1.7-7. Potential Additional Transportation Mitigation ........ 1-19
Exhibit 2.2-1. Study Area ........ 2-3
Exhibit 2.3-1. Downtown Lakewood Concepts ........ 2-6
Exhibit 2.3-2. Catalyst Sites ........ 2-7
Exhibit 2.3-3. Existing Conditions: Lakewood Towne Center ........ 2-8
Exhibit 2.3-4. Phased Mixed-Use Option: Early Charette Concept Option A ........ 2-9
Exhibit 2.3-5. Towne Center Option A - Phased Mixed-Use Option Site Plan and 3D View ........ 2-10
Exhibit 2.3-6. Complete Redevelopment Option: Early Charette Concept Option B ........ 2-11
Exhibit 2.3-7. Towne Center Option B – New Format Option Site Plan and 3D View ........ 2-12
Exhibit 2.3-8. Towne Center Option C – Infill and Partial Redevelopment based on Option B ........ 2-13
Exhibit 2.3-9. Concept – Mixed Use West of Gravelly Lake Drive ........ 2-14
Exhibit 2.3-10. Colonial District and Motor Avenue Improvements ........ 2-15
Exhibit 2.3-11. Downtown Area Buildable Lands and Catalyst Sites ........ 2-16
Exhibit 2.3-12. Downtown Lakewood Streets and Green Loop Concepts ........ 2-17
Exhibit 2.3-13. Street Section Concepts: Green Loop Mt Tacoma Drive SW/59th Avenue SW ........ 2-18
Exhibit 2.3-14. Gravelly Lake Drive SW Revision – Concept #2 (looking north) ........ 2-19
Exhibit 2.3-15. Gravelly Lake Drive SW Revision with Photo – Concept #2 (looking north) ........ 2-19
Exhibit 2.3-16. Gravelly Lake Drive SW Revision – Concept #3-A (Looking north) ........ 2-20
Exhibit 2.3-17. Gravelly Lake Drive SW Revision – Concept #3-B (Looking north) ........ 2-20
Exhibit 2.3-18. Green Loop: 59th Avenue NW Concept 1 (Existing ROW) ........ 2-20
Exhibit 2.3-19. 59th Avenue SW Concept 2 ........ 2-21
Exhibit 2.3-20. Lakewood Towne Center Boulevard SW ........ 2-21
Exhibit 2.3-21. Motor Avenue SW – Typical Section – Travel, Parking, and Pedestrian Spaces ........ 2-22
Exhibit 2.3-22. Motor Avenue SW – Typical Section – Market Space and Plaza ........ 2-22

Exhibit 2.3-23.Future Land Use Plan ....................................................................................................2-23
Exhibit 2.3-24. Land Use Study Area....................................................................................................2-24
Exhibit 2.3-25. Downtown Area Zoning Map ........................................................................................2-25
Exhibit 2.3-26. Lakewood Downtown Civic and Infrastructure Investments..................................................2-27
Exhibit 2.3-27. Alternative Plan and Code Changes and associated Housing and Job Growth .............2-28
Exhibit 3.1-1. Surface Water Features....................................................................................................3-33
Exhibit 3.2-1. Lakewood and Pierce County Population ..........................................................................3-39
Exhibit 3.2-2. Study Area and Relationship to Census Tract 719.01 Block Group 1 ................................3-39
Exhibit 3.2-3. Race and Ethnicity: Lakewood, Town Center District Vicinity (CBD), and Pierce County...3-40
Exhibit 3.2-4. Town Center Vicinity: Population Density and Multifamily Housing ....................................3-41
Exhibit 3.2-5. Housing Tenure ...............................................................................................................3-42
Exhibit 3.2-6. Covered Employment Estimates, Lakewood Study Area: 2016............................................3-44
Exhibit 3.2-7Jobs by Worker Race, Ethnicity, and Sex 2015 Town Center Vicinity ..................................3-44
Exhibit 3.2-8. Taxable Land Value..........................................................................................................3-46
Exhibit 3.2-9. Housing and Job Growth by Alternative 2017-2035 ..........................................................3-48
Exhibit 3.2-10. Development Density .....................................................................................................3-48
Exhibit 3.2-11. Current and Future Job Sector Shares..............................................................................3-49
Exhibit 3.3-1. Current Land Use .............................................................................................................3-53
Exhibit 3.3-2. Comprehensive Plan Future Land Use Map ........................................................................3-56
Exhibit 3.3-3. Current Zoning Within Study Area, by Acres ......................................................................3-57
Exhibit 3.3-4. Current Zoning Within Study Area .....................................................................................3-58
Exhibit 3.3-5. Maximum Development Standards for Current Zoning ........................................................3-59
Exhibit 3.3-6. Lakewood Employment and Housing Capacity – Citywide and CBD Zone........................3-59
Exhibit 3.3-7. Lakewood Regional Growth Center Boundaries...................................................................3-62
Exhibit 3.3-8. Regional Centers Framework Update – Regional Growth Centers .....................................3-64
Exhibit 3.3-9. Pierce County Countywide Planning Policies Designation and Planning Criteria: 2014...3-65
Exhibit 3.3-10. Downtown Buildable Parcels Summary .............................................................................3-66
Exhibit 3.3-11. Consolidated map of Developable Land in Downtown .......................................................3-67
Exhibit 3.3-12. Housing and Job Growth by Alternative ...........................................................................3-68
Exhibit 3.3-13. Activity Units by Alternative ............................................................................................3-69
Exhibit 3.3-14. Lakewood Employment and Housing Capacity – Downtown ..............................................3-69
Exhibit 3.3-15. Lakewood Employment and Housing Capacity – Citywide including Downtown.............3-69
Exhibit 3.4-1. Study Area Intersections ...................................................................................................3-80
Exhibit 3.4-2. Existing Pedestrian Network. ..............................................................................................3-81
Exhibit 3.4-3. Existing Bicycle Network. ...................................................................................................3-83
Exhibit 3.4-4. Existing Transit Network. ....................................................................................................3-84

Exhibit 3.4-5. Existing Bus Routes. ....3-85
Exhibit 3.4-6. Functional Classification. ....3-87
Exhibit 3.4-7. LOS/Delay Thresholds for Signalized and Unsignalized Intersections. ....3-88
Exhibit 3.4-8. Existing PM Peak Hour Intersection Level of Service and Delay. ....3-89
Exhibit 3.4-9. Intersection Level of Service - Existing. ....3-90
Exhibit 3.4-10. Existing Collision Rates. ....3-92
Exhibit 3.4-11. Transportation Network Assumptions. ....3-95
Exhibit 3.4-12. Daily Person Trip Ends Generated by Scenario ....3-96
Exhibit 3.4-13. Trip Distribution. ....3-97
Exhibit 3.4-14. 2035 No Action Alternative - PM Peak Hour Intersection Level of Service and Delay..3-99
Exhibit 3.4-15. Intersection Level of Service – No Action Alternative. .... 3-100
Exhibit 3.4-16. 2035 Alternative 1 - PM Peak Hour Intersection Level of Service and Delay. .... 3-103
Exhibit 3.4-17. Intersection Level of Service – Alternative 1. .... 3-104
Exhibit 3.4-18. 2035 Alternative 2 - PM Peak Hour Intersection Level of Service and Delay. .... 3-107
Exhibit 3.4-19. Intersection Level of Service – Alternative 2. .... 3-108
Exhibit 3.4-20. Summary of Transportation Impacts. .... 3-109
Exhibit 3.4-21. Proposed Mitigation Measures. .... 3-111
Exhibit 3.5-1. West Pierce Fire & Rescue Service Area Map .... 3-114
Exhibit 3.5-2. Fire Services Effective Level of Services Standards .... 3-115
Exhibit 3.5-3. Police Services Effective Level of Services Standards .... 3-115
Exhibit 3.5-4. Cultural, Institutional, and Recreational Facilities .... 3-116
Exhibit 3.5-5. Clover Park Public School Size .... 3-117
Exhibit 3.5-6. School Services Effective Level of Services Standards .... 3-117
Exhibit 3.5-7. Fire and EMS Services .... 3-118
Exhibit 3.5-8. Police Staff Demands by Alternative .... 3-118
Exhibit 3.5-9. School Generation by Alternative .... 3-119
Exhibit 3.6-1. Water System in Study Area .... 3-123
Exhibit 3.6-2. Map of Water Mains to be Replaced .... 3-124
Exhibit 3.6-3. Sewer System in Study Area .... 3-125
Exhibit 3.6-4. Electrical Service Areas by Providers Map .... 3-127
Exhibit 3.6-5. Power Services Effective Level of Services Standards .... 3-127
Exhibit 3.6-6. Water Provider Effective Level of Service and Need .... 3-128
Exhibit 3.6-7. Sewer Treatment Gallons per Day Increase by Alternative .... 3-129
Exhibit 3.6-8. Power Demand .... 3-129

# List of Appendices

A. Scoping Notice and SEPA Checklist

B. Draft Planned Action Ordinance

C. Transportation System Description

# 1.0 Summary

## 1.1. Purpose of Proposed Action

A major goal of the City of Lakewood is to create a Downtown focused in the Central Business District (CBD) zone, redeveloping it into a rich urban area with civic amenities, walkable streets, and a mix of uses including housing, entertainment, restaurants, and retail. Downtown Lakewood has significant economic and cultural assets to build upon and some challenges to overcome. To help attain this ambitious goal for Downtown Lakewood, the City of Lakewood has commissioned the Lakewood Downtown Plan, considered a subarea plan under the Growth Management Act. The plan builds on a foundation of current plans and programs and will:

- Describe a vision, land use and design, gathering places, infrastructure investments, and other action strategies for Lakewood's central business district or "Downtown".
- Amend Comprehensive Plan land use, policy, and capital facility plan elements.
- Create new form-based zoning standards.
- Provide upfront environmental review through a Planned Action consistent with RCW 43.21c.440 and SEPA rules in WAC 197-11 are anticipated to help bring about desired change and development.

This Draft Environmental Impact Statement (Draft) EIS evaluates the environmental consequences of the proposal and alternatives that illustrate how to implement the vision for an urban area with civic amenities, walkable streets, and a mix of uses including housing, entertainment, restaurants, and retail. The Alternatives include a "No Action" Alternative that assumes growth according to current trends and under current City Plans and development regulations, and Action Alternatives 1 and 2 that assume moderate to high levels of growth based on targeted infrastructure and civic investments and plan and code changes. Investments include a green loop of street and trail improvements, more public streets, and a central park

## 1.2. Organization of this Document

This document is organized to meet the requirements of the State Environmental Policy Act and implementing rules in WAC 197-11, including WAC 197-11-440, EIS Contents, and WAC 197-11-442, Contents of EIS on Nonproject Proposals:

- **Chapter 1 Summary:** This Chapter provides a summary of more detailed proposal descriptions in Chapter 2 and environmental analysis in Chapter 3.
- **Chapter 2 Proposal and Alternatives:** Describes the Lakewood Downtown Plan proposals, objectives, and alternatives that represent a range of choices that Lakewood can make about the future character, growth, and development in Downtown.

- **Chapter 3 Affected Environment, Significant Impacts, and Mitigation Measures:** For each alternative, environmental consequences are considered regarding the natural environment, population, employment, housing, land use, transportation, public services, and utilities.
- **Chapter 4 References:** Identifies the background studies and information reviewed in the preparation of this EIS.

# 1.3. State Environmental Policy Act Process

## 1.3.1. Purpose of SEPA and Planned Action

This Draft EIS provides a qualitative and quantitative analysis of environmental impacts associated with the Lakewood Downtown Plan. The specific purpose of this EIS is to assist the public and local government decision makers in considering future growth, infrastructure, and mitigation measures appropriate in the Downtown.

The proposal also includes the designation of a SEPA Planned Action to streamline future environmental review and permitting in the study area. A planned action provides more detailed environmental analysis during an area-wide planning stage rather than at the permit review stage. (See RCW 43.21C.440 and WAC 197-11-164 to -172.) Future projects in the proposal study area developing under the designated Planned Action will not require SEPA determinations at the time of permit application if they are consistent with the type of development, traffic assumptions, and mitigation measures studied in the EIS. All such projects would still need to be consistent with all adopted laws and regulations, and would be reviewed pursuant to City adopted land use procedures.

## 1.3.2. Prior SEPA Review

Lakewood adopted its comprehensive plan EIS in June 2000. The EIS contained a preferred alternative and two other alternatives, including a no action alternative and mixed-use alternative. The principal strategy of the preferred alternative was to:

- Protect established neighborhoods;
- Develop intensification within the city's spine, which stretched north along Bridgeport Way from the Lakewood Station, past the Town Center and the colonial Center, through to the Custer Road neighborhood;
- Focused residential density in several neighborhoods, notably Springbrook, Tillicum, and Custer; and
- Increasing the employment base by converting parts of the Woodbrook Neighborhood into an industrial center.

The preferred alternative provided 'development capacity' from an estimated 17,500 new residents and 12,275 new jobs by the year 2017.

A supplemental comprehensive plan EIS was prepared in 2003. There were 10 comprehensive plan amendments proposed in 2003 that would collectively redesignate numerous sections of the City of Lakewood from their existing land use and zoning designations to new designations. The majority of these amendments were relatively minor, parcel-specific inconsistences between the adopted future land use plan and existing or intended land uses. However, one amendment along Bridgeport Way, north of 75th Street SW, reduced high-density residential development in favor of commercial development (Wal-Mart). This amendment was controversial. It was approved by the City, appealed to the growth hearings board, and superior court. Ultimately, the City's action was upheld.

Since 2003, there have been no additional substantive amendments to the City's comprehensive plan.

### 1.3.3. Integrated SEPA/GMA Process

Though the Lakewood Downtown Plan and this EIS are addressed in separate documents meeting different purposes of the Growth Management Act, State Environmental Policy Act, and Lakewood's local needs, the preparation of the Plan and EIS and community engagement process has been conducted in an integrated way.

The Draft Lakewood Downtown Plan is circulated concurrently with this Draft Environmental Impact Statement (EIS), and this EIS contains the details of the environmental analysis of the Downtown Plan proposals.

## 1.4. Public Involvement

To develop the Draft Lakewood Downtown Plan proposals, the City engaged the diverse Lakewood community. Between September and November 2017, Lakewood hosted twelve public outreach and engagement efforts to encourage residents and business and property owners to participate in conversations about the best future for Downtown. Over 645 persons were reached through going to community markets, festivals, and classrooms, facilitating focus groups, hosting a multi-day charrette, and conducting an online survey. A dedicated website was created with hundreds of unique views: https://www.lakewooddowntownplan.org/. Results of the outreach can be found at that website.

Concurrent with Plan outreach efforts, the City asked for comments on the scope of this EIS. The City issued a Determination of Significance and Scoping Notice on December 8, 2017 for a 21-day comment period that closed on December 29, 2017 (see Appendix A). No comments were received.

The Draft EIS is being issued with a 30-day comment period during which time written comments are being requested (see Fact Sheet). Following the Draft EIS issuance, the Final EIS will respond to public comments. The Draft Lakewood Downtown Plan is available for comment concurrently.

Public meetings and hearings on the Planned Action Ordinance and other code amendments (e.g. form based code) will receive legislative review by the Planning Commission and City Council. Project related meetings and comment periods are advertised at the project webpage: https://www.lakewooddowntownplan.org/.

# 1.5. Objectives, Plan Concepts, and Alternatives

## 1.5.1. Objectives

SEPA requires a statement of proposal objectives to guide the formulation of alternatives and their evaluation. For the purposes of this EIS, the proposed guiding principles of the Downtown Plan are considered objectives.

DOWNTOWN IS….

- A GREAT PLACE!
- The HEART of the COMMUNITY and CIVIC LIFE
- Designed for PEOPLE to WALK and BIKE
- SAFE and INVITING
- Where people of all ages go to do FUN things
- Rich with CULTURAL DIVERSITY
- SUSTAINABLE and connected to NATURE
- Part of a thriving LOCAL ECONOMY
- A source of PRIDE and IDENTITY for LAKEWOOD
- Where people LIVE, WORK, SHOP, and EAT

There are a variety of ways the guiding principles could be implemented to achieve an urban, mixed use, character and these are explored in alternatives.

## 1.5.2. Plan Concepts

Extensive community visioning occurred in fall 2017 with meetings, pop-up events, focus groups, an online survey, and a design charrette. In all, at least 645 participants gave their opinions and visions to support the Lakewood Downtown Plan effort. Results are found on the project website: https://www.lakewooddowntownplan.org/. Based on the outreach, participants desired:

- More entertainment venues and restaurants;
- More retail choices, both “mom and pop” and brand stores;
- Well-designed housing for seniors & disabled and mixed use with housing and commercial together, within walking distance of work, shopping, and buses;
- Pedestrian friendly street design, well-maintained and safe roads; and
- Family activities and gathering spaces, including outdoor recreation (e.g. spray park, climbing walls, skating rink, other) and indoor cultural facilities (e.g. expanded library, children’s museum, etc.)

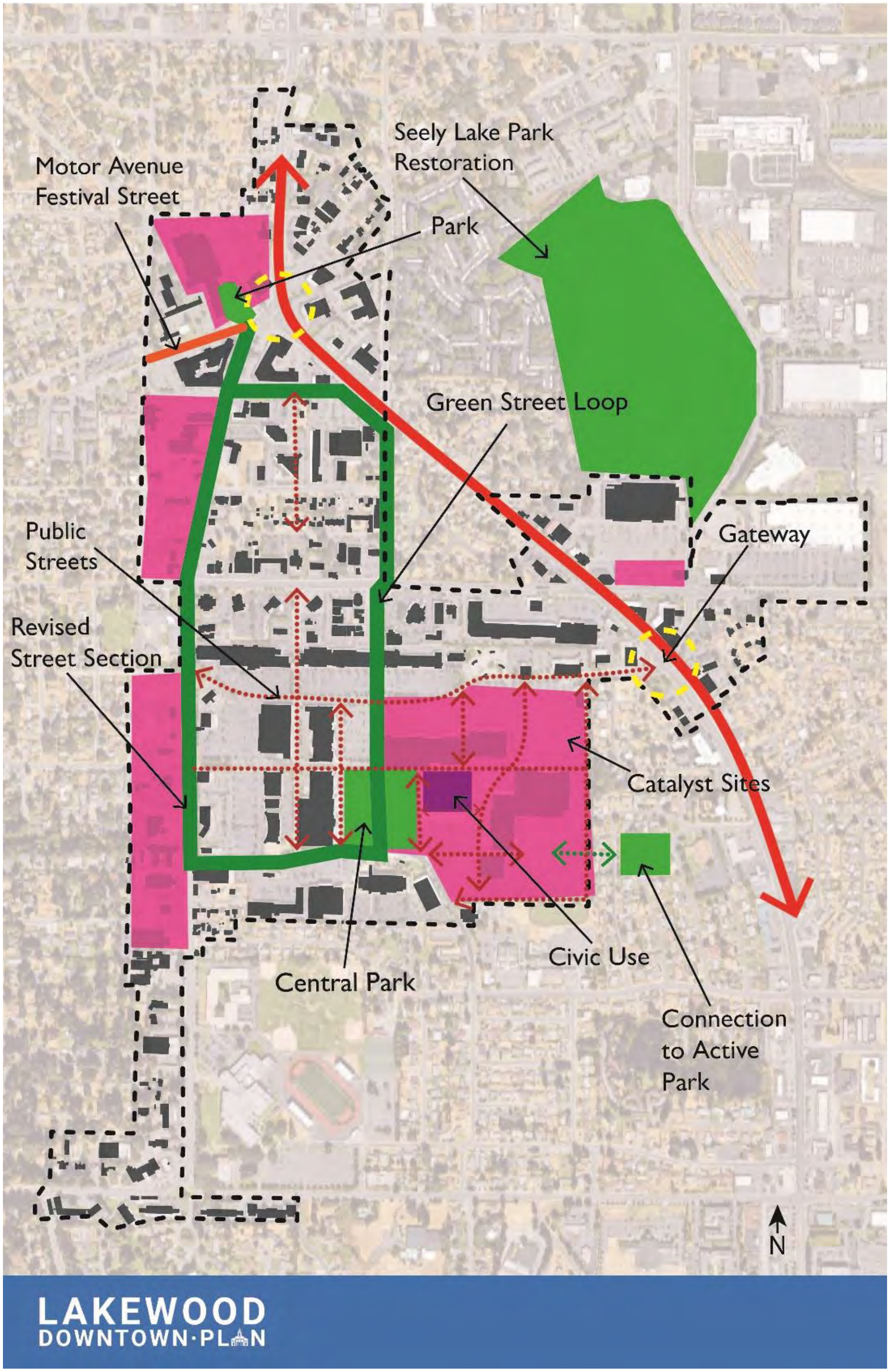
Because of the visioning efforts, the Downtown Plan is proposing key investments and changes:

- 2 to 4-acre park near City Hall;

- Green street loop with improved pedestrian and bicycle facilities;
- Site for additional civic uses near City Hall;
- Improved public street grid in the Towne Center;
- Gateways along major arterials at the entrance to Downtown;
- Revised plan line on Gravelly Lake Drive;
- Catalyst sites for redevelopment;
- Connection to Active Park;
- Motor Avenue Improvements; and
- Seeley Lake Park restoration

These concepts are illustrated in the plan map below. EIS alternatives vary the level of implementation of these features.

**Exhibit 1.5-1. Downtown Lakewood Concepts**




Source: Framework 2017

## 1.5.3. Alternatives

Considering the Downtown Subarea Plan Guiding Principles and major concepts, three alternatives are compared in this Draft EIS.

- **No Action**, a SEPA Required Alternative. This alternative assumes growth according to current trends and under current City Plans and development regulations. The No Action Alternative would assume the least housing and jobs are added based on trends. There would be no additional public investments in parks or stormwater infrastructure. Current transportation plans would be implemented, the number of public streets would not increase, and block size would not decrease. The Subarea Plan and associated form based code and Planned Action Ordinance would not be adopted.
- **Action Alternative 1**, assuming a moderate level of development, based on targeted infrastructure investments and a Downtown Subarea Plan and code changes. New housing would be added at more than three times the level of the No Action Alternative, given a greater density allowed. Jobs would more than double the level of the No Action Alternative. The job mix would see a greater number of office or entrepreneurial businesses, and households that want to live, work, shop, and play in the same area. The increased growth in housing and jobs is spurred by a greater investment in multi-modal transportation improvements, parks and gathering spaces, and environmental amenities and stormwater management. Infill and integration of mixed-use development would occur on catalyst sites. Amendments integrating the Subarea Plan would be made to the Lakewood Comprehensive Plan. The City may request an adjusted Regional Growth Center boundary under VISION 2040, the Puget Sound Regional Council's (PSRCs) Growth Strategy for the four-county area; the boundary proposed would match that of the Study Area evaluated in this EIS.
- **Action Alternative 2**, assuming a high level of growth with five times the housing and jobs compared with No Action. Alternative 2 is like Alternative 1 except that larger investments in transportation connections, parks, and green infrastructure would be made. The plan and code would allow the greatest density and heights up to similar levels as the current code (90 feet). More redevelopment of catalyst sites into mixed use formats would occur. Similar Lakewood Comprehensive Plan and PSRC Vision 2040 boundary amendments would be proposed as for Alternative 1.

Alternative civic and infrastructure investments are compared by Alternative below.

**Exhibit 1.5-2. Lakewood Downtown Civic and Infrastructure Investments**

| FEATURE | No Action | Action Alternative 1 | Action Alternative 2 |
|---|---|---|---|
| Catalyst Sites | Development per current plans and codes. Less transformation of catalyst areas. | Infill and integration of new mixed-use development on catalyst sites. | Fuller redevelopment of catalyst sites into mixed-use centers. |
| Civic Parks, Community Gathering | No new parks | New 2-acre Central Park, new Green Street Loop, and connections to adjacent parks | New 4-acre Central Park, new Green Street Loop, and connections to adjacent parks |
| Transportation Connectivity | Per current plan. The City's 6-year TIP (2018-2023) includes the following relevant improvement projects:<br>▪ 2.69B – Gravelly Lake Drive Road Diet b/w Bridgeport and | The City's planned investments with changes/adds:<br>▪ Retain Bridgeport Way SW as primary vehicle entrance-strengthen gateway<br>▪ Retain 100th Street SW as a primary east-west vehicle connection between I-5 and subarea | |

| FEATURE | No Action | Action Alternative 1 | Action Alternative 2 |
|---|---|---|---|
| | Steilacoom (4 lanes to 3 lanes with bicycle lanes)<br>▪ 2.72 – 100th St. & Lakewood Dr. curb, gutter, sidewalks, new signal<br>▪ 2.82 – New sidewalk east side of 59th Ave from 100th St to Bridgeport Way<br>▪ 3.13 – Install a traffic signal at Gravelly Lake Drive / Avondale Road<br>▪ 5.7 – Improve non-motorized connections on Motor Ave b/w Whitman and Gravelly Lake Dr.<br>▪ 9.16 – 59th Ave pavement restoration from Main St to 100th St<br>▪ 9.22 – 100th St pavement restoration from 59th Ave to Lakeview Ave | ▪ Modify cross section of Gravelly Lake Blvd. Study, 3, 4, and 5-lane cross sections between Bridgeport and Nyanza Road SW to allow for improved bicycle and pedestrian facilities*<br>▪ Conversion of Lakewood Towne Center Blvd and Bristol Ave as public streets<br>▪ Lakewood Towne Center Blvd at 59th Ave SW, consider roundabout<br>▪ Reduce 59th Avenue SW to two lanes, allowing for bicycle facilities<br>▪ Addition of new street connections to support walkability. Alternative 1 assumes fewer connections based on phasing or property owner preferences, compared with Alternative 2. Consider 400 feet as the desired maximum block lengths throughout Subarea. | |
| Ecosystem – e.g. creek daylighting, menu of stormwater requirements | No change to creek. Implement stormwater manual on site by site basis. | Consider range of options qualitatively: greater investment in green infrastructure compared with creek daylighting. | |

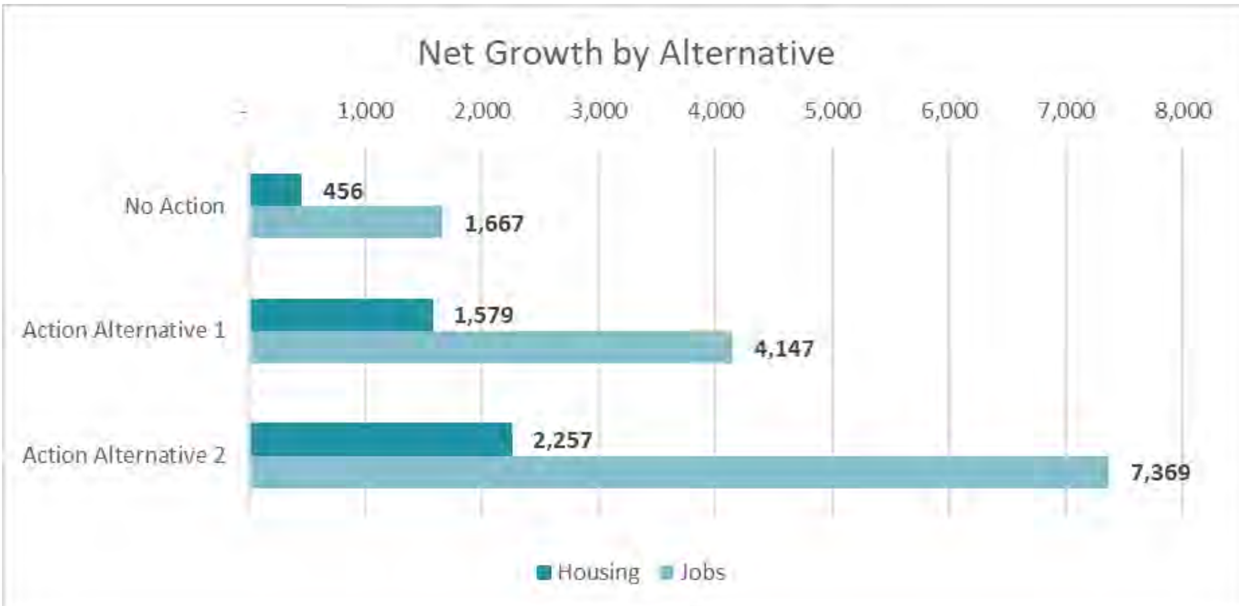
Note: * For a conservative test of alternative transportation improvements, the EIS authors modeled the greatest shift in traffic for Gravelly Lake Drive SW at three lanes and then compared it to no change in the section at five lanes. The analysis provides information indicating that added public streets help distribute the traffic, but that other arterial conditions would require more mitigation. Fewer improvements on other arterials would be needed if four or five lanes is retained in the roadway. This helps the City determine what combination of capital improvements, amenities, and costs are desired.

Due to land use, density, height, parking, and other allowances growth would vary by alternative as illustrated below.

**Exhibit 1.5-3. Alternative Plan and Code Changes and associated Housing and Job Growth**

| FEATURE | No Action | Action ALTERNATIVE 1 | Action ALTERNATIVE 2 |
|---|---|---|---|
| Plan and Code | Current Plan and Code | New Subarea Plan<br>New Form Based Code and Parking Standards | New Subarea Plan<br>New Form Based Code and Parking Standards |
| Height | Up to 90 feet allowed, trend of 1-2 stories | Greater height in center, but stepped back on periphery.<br>Most development at 2 to 6 stories.<br>Incentives to earn up to 90 feet (e.g. office). | Greater height in center, but stepped back on periphery. More development of office and housing would create greater intensity of building form and heights up to 90 feet. |
| Housing Density | 54 units per acre | 80 units per acre | 100 units per acre |
| Housing: net growth | 456 | 1,579 | 2,257 |
| Job Trends and Building Space | Current trends continue: minor new construction and addition of jobs at existing sites. | Assume 50% of expected 3.0 million new square feet of commercial space. | Assume 95% of expected 3.0 million new square feet of commercial space. |

| FEATURE | No Action | Action ALTERNATIVE 1 | Action ALTERNATIVE 2 |
|---|---|---|---|
| Job Mix | Compared to existing job mix, lesser share of retail and less manufacturing/warehousing, and greater share of finance, insurance, real estate, and services (e.g. office). Similar share of government and education. (Per City transportation model assumptions.) | | |
| Jobs: net growth | 1,667 | 4,147 | 7,369 |




Source: BERK Consulting 2017

# 1.6. Major Issues, Significant Areas of Controversy and Uncertainty, and Issues to be Resolved

The key issues facing decision makers include:

- Approval of a Subarea Plan including a vision, guiding principles, land use concept and design principles to further implement the Downtown vision and related consistency edits to the Comprehensive Plan;
- Approval of a new form-based code and associated consistency edits in the municipal code;
- Level of growth to be incentivized in a Planned Action;
- Type and location of transportation improvements including new public streets and new park investments; and
- Public and private funding strategies.

# 1.7. Summary of Impacts and Mitigation Measures

## 1.7.1. Natural Environment

### *How did we analyze Natural Environment?*

This section addresses critical areas, including wetlands, flood hazard areas, fish, and wildlife habitat areas (including streams), aquifer recharge areas, and geologically hazardous areas in the Study Area. Current inventories of natural environment conditions were collected from state, county, and city sources, particularly Geographic Information System (GIS) maps. The EIS consultant team's biologist conducted a windshield survey, reviewed aerials, and existing studies. Each alternative's growth was examined in relation to existing natural resources.

### *What outcomes or impacts did we identify?*

The area is urban in character and there is a potential for direct impacts to critical areas from groundwater contamination, wetland fill, or stream or wetland buffer loss. In areas where development is older and has not undergone redevelopment (and thus does not have stormwater treatment), there is a greater potential to affect groundwater quality. Newer (existing development) and future redevelopment will comply with the 2012 Stormwater Management Manual for Western Washington (Ecology, 2014) and the Pierce County Stormwater Management and Site Development Manual (2015), or the adopted manuals at the time development occurs.

Ponce De Leon Creek, Clover Creek and their associated wetlands are located in the southwest portion of the Study Area. If development were proposed in the vicinity, wildlife habitat conservation area (stream) and wetland regulations would apply and require avoidance and/or minimization of impacts as appropriate.

As a result of redevelopment and installation of stormwater treatment, potential indirect impacts include changes to water quality and quantity of downstream water bodies including portions of Ponce De Leon and Clover Creeks which are outside of the Study Area, Crawford Marsh, and Lake Steilacoom.

### *What is different between the alternatives?*

Action Alternatives 1 and 2 would encourage greater areas of redevelopment on catalyst sites in addition to vacant and underutilized properties, and results in more pervious areas such as the central park and green street loop. Decreases in impervious surfaces and improvements to stormwater runoff would be implemented on a project by project basis consistent with stormwater standards. These improvements are expected to be greater with Alternatives 1 or 2 and less with the No Action Alternative.

### *What are some solutions or mitigation for the impacts?*

In addition to applying critical areas regulations and stormwater standards, the following mitigation measures are proposed for consideration:

- With major redevelopment proposing activities that could involve groundwater discharge or potential changes to groundwater flow (such as underground structures), the City could require site specific evaluation of groundwater protection. The susceptibility and vulnerability of the critical aquifer recharge area should be evaluated by a licensed hydrogeologist. All stormwater should be treated appropriately to avoid any potential groundwater contamination. Stormwater improvements should be designed to improve aquifer recharge.
- The City could require a conservation easement or other regulatory structure for piped streams to ensure the possibility of creek daylighting is not precluded by future redevelopment. The ecological benefits of daylighting a portion of Ponce de Leon Creek could be evaluated by the City. An evaluation could include leaving the piped stream but identifying its historic location, as well as reviewing water quality treatments that benefit the nearby open channel stream, and serve as landscape amenities in the Study Area.
- Landscaping should consist of native species or species with low water requirements.
- The City could require educational signage for aboveground stormwater facilities and/or added natural features.
- The Downtown Plan can offer support for Pierce County efforts to address potential habitat, stormwater, and recreation improvements to Seeley Lake Park.

### *With mitigation, what is the ultimate outcome?*

There would be no significant unavoidable adverse impacts with any of the alternatives. Redevelopment of the Downtown Subarea would require stormwater best management practices (BMPs), which would result in an improvement to stormwater runoff and a benefit to the natural environment. There are limited critical areas in the Study Area, but where they exist, the City's critical areas ordinance regulations would apply, and no direct impacts to critical areas are assumed.

## 1.7.2. Population, Employment, and Housing

### *How did we analyze Population, Employment, and Housing?*

This section examines current demographic and socio-economic characteristics of residents of the Study Area. Data is from the U.S. Census Bureau and earlier studies of the Central Business District (CBD) area.

### *What outcomes or impacts did we identify?*

Under all alternatives, there would be an increase in density of population, dwellings, and jobs over existing conditions.

Existing homes and business space could redevelop but there would be sufficient space to relocate them in new developments given added heights and extensive redevelopment areas where newly designed housing and businesses could be located.

For all alternatives, the job mix would change to have more services jobs and relatively less retail though both would continue to constitute the highest share of job types in the center. Services jobs such as office and professional services may offer higher wages than typical retail jobs. An unintended consequence of investments in centers is the potential to increase commercial rents and displace small, local businesses. Economic development policies can address strategies around commercial affordability and support for small, local businesses.

## What is different between the alternatives?

All alternatives increase densities of both dwelling and jobs over current conditions, particularly Alternative 1 and 2. All alternatives improve the balance of jobs to housing in the Study Area and allow densities that support transit, particularly Alternatives 1 and 2.

**Exhibit 1.7-1. Development Density**

| Feature | Existing | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|---|
| Maximum Building Height (feet) | 15- 35 ft. | 90 ft. | 90 ft.* | 90 ft.* |
| Maximum Dwelling Density – Buildable Lands | Not applicable | 54 du/ac | 80 du/ac | 100 du/ac |
| Assumed Jobs Density – Buildable Lands | Not applicable | 28.34 jobs/ac | FAR 1.8-3.6** | FAR 1.8-3.6** |
| ***Effective Density and Ratios (318.69 gross acres)*** | | | | |
| Persons per Acre | 2.89 | 6.03 | 13.76 | 18.43 |
| Dwelling Units per Acre | 1.33 | 2.78 | 6.34 | 8.49 |
| Jobs per Acre | 16.65 | 21.94 | 29.81 | 40.03 |
| Jobs/Housing Balance Ratio | 12.52 | 3.64 | 2.17 | 2.17 |

* Transitional heights would allow for step down in buildings along edges of the Study Area that are lower in density.
** Floor area ratio (FAR) refers to the relationship of the building space to the lot area, derived by dividing the gross floor area of all buildings on a lot by the area of that lot. dividing the gross floor area of all buildings on a lot by the area of that lot. The February 22, 2017 "City of Lakewood Employment Capacity Analysis" Memo applies a floor area ratio (FAR) approach to determining future land capacity and assumes that sites that have 25% of the allowed FAR under zoning are more likely to redevelop than sites with more building space. (BERK Consulting, 2017)

Source: BERK 2018

## What are some solutions or mitigation for the impacts?

The City allows for tax exemptions for development projects including low and moderate-income housing units in "Tax Incentive Urban Use Centers" in Chapter 3.64 in the Lakewood Municipal Code. As defined in 3.64.010, such a center means "a compact, identifiable district where urban residents may obtain a variety of products and services" and which has businesses, adequate public facilities, and a mix of uses including housing, recreation, and cultural activities. The Downtown Study Area (see Exhibit 1.5-1) containing the community's Central Business District would meet this definition.

The City works with the Economic Development Board for Tacoma-Pierce County on business retention, expansion, and recruitment activities, as well as the Lakewood Chamber of Commerce. If small business relocation assistance is needed, the City could work with these agencies or others to develop strategies and solutions.

### *With mitigation, what is the ultimate outcome?*

Under all alternatives, displacement of existing residents and existing businesses in the Study Area is possible as land is redeveloped; however, there is capacity to replace housing and business space. Alternatives 1 and 2 would substantially increase the capacity for housing that could better meet demand Downtown, and would further support business investment with more flexible zoning and civic and infrastructure investments. No significant unavoidable adverse impacts are anticipated.

## 1.7.3. Land Use Plans and Policies

### *How did we analyze Land Use Plans and Policies?*

This section addresses physical land use patterns within and surrounding the Study Area, considering changes in type and intensity of land uses. Existing land use pattern conditions are based on field reconnaissance, imagery review, and Pierce County and City of Lakewood parcel data. Future conditions consider the level of growth and land use change described in Chapter 2 for the alternatives.

### *What outcomes or impacts did we identify?*

#### Land Use Patterns

New growth is expected to occur under all the alternatives, although the amount of growth and composition of the mix of land uses will vary by alternative. Activity levels would increase across the Study Area with new businesses, residents, and employees.

As redevelopment occurs within the Study Area, there is the potential for localized land use compatibility impacts to occur where newer development is of greater height and intensity than existing development. These compatibility impacts, if they occur, are temporary and will be resolved when the area is fully built, building heights and sizes would be more similar, and mixed uses more prevalent. The extent of these conflicts varies by alternative, and can be reduced by the application of City development and design standards, particularly any standards developed as part of future zoning under Alternatives 1 and 2.

All alternatives would allow development of greater height and density than abutting uses, particularly single family uses that lie to the north, east, south, and west of the Study Area. However, under all alternatives, building transition standards would require a height no greater than 40 feet when abutting single family and mixed residential districts.  Currently in LMC 18A.50.120, a building transition area limits the height of multifamily and non-residential uses adjacent to residential and mixed residential zones so that within a transitional distance of about 20 feet, the maximum 40 feet in height. When a preferred plan is selected and the form-based code prepared it is anticipated that a transitional height or other design compatibility measures would be included.

### Plans and Policies

All alternatives would meet GMA goals to focus growth in urban areas and avoid sprawl with different degrees of urban intensity. All alternatives provide for a mix of uses and denser development than exists today consistent with Puget Sound Regional Council's Vision 2040's (a regional growth strategy for Central Puget Sound) regional growth centers policies. All alternatives contribute capacity to meet the citywide growth targets developed between Pierce County and its cities. Some of the methods to calculate employment capacity should be integrated into the next update of the Buildable Lands Report consistent with Countywide Planning Policies (CWPPs).

## *What is different between the alternatives?*

### Land Use Patterns

#### Areawide

Based on vacant, underutilized, and catalyst properties and zoning densities and assumptions, both residential and employment growth would occur under each alternative, particularly the Action Alternatives, which assume growth on catalyst sites that have larger parcels and parking areas where infill could occur.

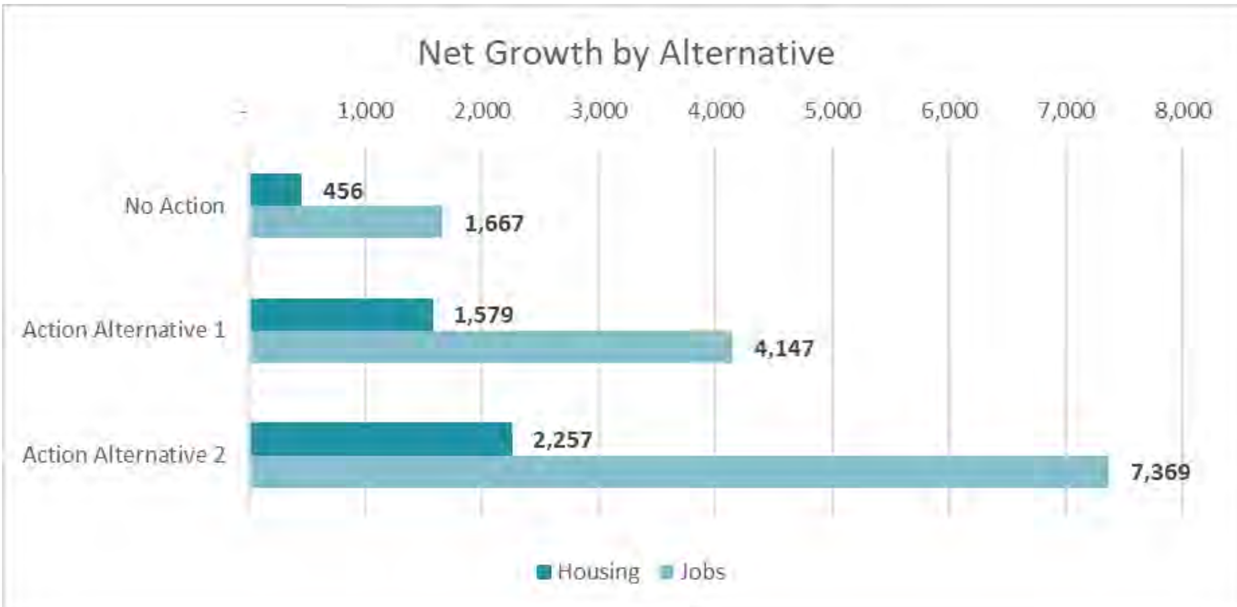
**Exhibit 1.7-2. Downtown Buildable Parcels Summary**

| Type | Parcel Count | Parcel Acres |
|---|---|---|
| Vacant – All Alternatives | 19 | 4.42 |
| Underutilized – All Alternatives | 140 | 58.44 |
| Catalyst Areas – Alternatives 1 and 2 | 86 | 85.05 |

Source: Pierce County 2014, BERK 2017 and 2018

Housing would have a greater share of building space in the future, and commercial space would increase substantially under Alternative 1 and 2, compared to the No Action Alternative.

**Exhibit 1.7-3. Housing and Job Growth by Alternative**




Source: BERK 2017

### Land Use Study Area West of Gravelly Lake Drive

West of Gravelly Lake Drive, the CBD zone boundary follows parcel boundaries in a non-linear fashion. Blocks are split between MR2, R3, and CBD zoning. Alternatives 1 and 2 study the potential for some of the partial split blocks to be rezoned to more intensive Downtown form based zoning.

Proposed new zoning under Alternative 1 and Alternative 2 would create a Downtown designation and form-based development code, allowing for a range of uses and transitional height and landscape standards. This would promote residential redevelopment to mixed use and residential development similar to the purpose of the MR2 zone, but denser than the R3 zone.

The change from MR2 to a Downtown form-based code would not result in a significant difference in density or height near existing residential areas given transitional design standards; more commercial use could occur with the form-based code, but such uses could be less desirable away from major arterials. The form-based code could improve design of attached dwellings compared to current standards.

The change from R3 to a Downtown form-based code would alter development character across from facing blocks, and potentially set a precedent for higher intensity development in an area planned long-term for single family residential.

## Plans and Policies

Action Alternatives 1 and 2 would fulfill the goals and policies of the Lakewood Comprehensive Plan and help fulfill setting target activity units and mode share[1] goals consistent with PSRC's Vision 2040.

[1] Mode split (or mode share) is a measure that describes the various means of transportation used for daily trips within the region. A mode split goal is a quantitative policy statement used to plan for and encourage a shift away from travel by private automobile, in particular driving alone, in favor of alternative modes, such as transit and non-motorized travel options like walking and biking. (Puget Sound Regional Council, 2014)

The No Action Alternative would not amend current plans or regulations applicable in the area. This would not fulfill Lakewood Comprehensive Plan policies calling for plan and code updates to further address mixed use development. Other policies call for removal of deed restrictions and push for more investment in community gathering spaces and multi-modal travel, so these items would not be addressed in a Subarea Plan or form-based code.

The No Action Alternative would also not establish a plan that sets growth targets for the Downtown portion of the designated Lakewood Urban Center. It would not address mode share goals.

## *What are some solutions or mitigation for the impacts?*

### Land Use Plan Consistency

Alternatives 1 and 2 would amend the Comprehensive Plan Land Use Designation for the Study Area and create a new implementing form-based code. If areas west of Gravelly Lake Drive currently designated/zoned Residential Mixed /MR2 or Residential 3/ R3 are modified to be included in the Downtown designation and form-based zone, this would also require Comprehensive Plan Amendments.

Further, the Subarea Plan may result in amendments to Comprehensive Plan capital facility and transportation improvements.

The 2014 Buildable Lands Report calculation methods for Lakewood should be updated at the next Buildable Lands Report Update to reflect an alternative FAR method to the jobs-per-acre approach.

### Design Standards

Alternatives 1 and 2 would require the development of new or revised zoning and development regulations for the Study Area. New regulations will need to address permitted uses, dimensional requirements, parking and circulation, landscaping, and the development of streets and sidewalks. These regulations will need to be crafted with the intent of creating land use compatibility within and adjacent to the Study Area.

Alternatives 1 and 2 will include the adoption of design standards specific to the Study Area. It is anticipated that design regulations developed to implement Alternatives 1or 2 would include standards related to: integration of the natural environment, building design, enhancement of gateway features, low-impact development surface water features, public art, pedestrian experience and streetscapes, public spaces, mixed-use building features, site planning, parking, lighting, screening, and signage.

## *With mitigation, what is the ultimate outcome?*

Under all alternatives, additional growth and development will occur in the Study Area, leading to increases in height and bulk of buildings and increased land use intensity. This transition is unavoidable, but is not considered significant or adverse within an urban area designated as the Central Business District and a regional growth center in the Comprehensive Plan.

Future growth is likely to create temporary or localized land use compatibility issues as development occurs. The potential impacts related to these changes may differ in intensity and location in each of the alternatives. However, with existing and new development regulations, zoning requirements, and design guidelines, no significant adverse impacts are anticipated.

# 1.7.4. Transportation

## *How did we analyze Transportation?*

Existing transportation conditions and future transportation conditions are documented under the three alternatives employing the use of the City's travel demand model. A supplemental tool, called MainStreet, was also applied to estimate the change in vehicle trip rates that could occur based on the variation in land use density and built environment among the alternatives. The effects of future growth on vehicle, transit, pedestrian, and bicycle modes were considered, as well as adopted levels of service for intersections.

## *What outcomes or impacts did we identify? What is different between the alternatives?*

Each alternative tests a different level of growth and a different set of transportation improvements, which shows a range of effects on trips and modes. (see Exhibit 1.7-3 regarding land use assumptions and Exhibit 1.7-5 the following page illustrating improvements)

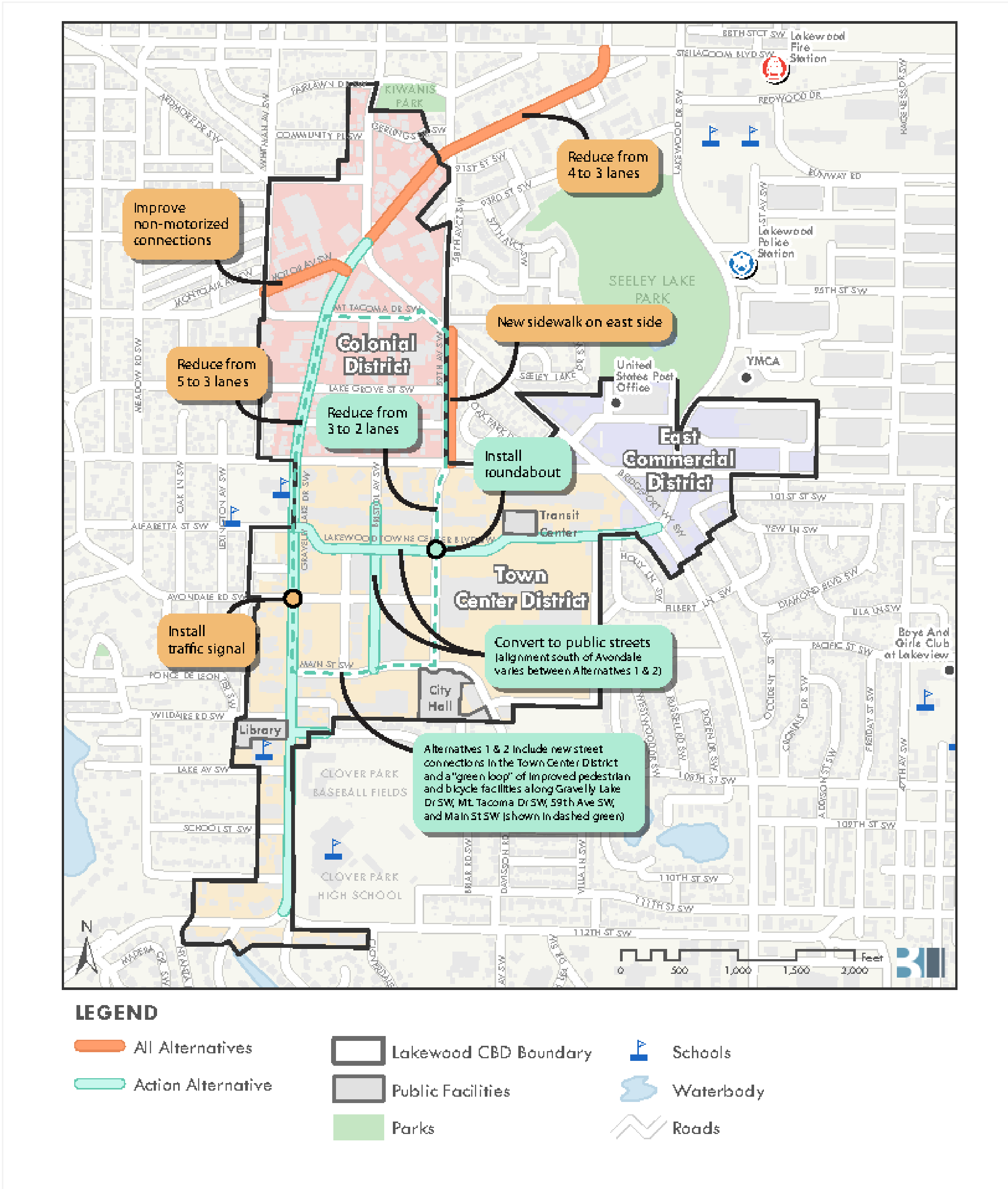
Exhibit 1.7-4 summarizes the daily person trip ends generated within the project area from the City's model. The exhibit also shows the mode split estimates from the model for automobile (SOV and HOV) and non-automobile (transit, walk, and bike) modes. Turning movement volumes were forecasted at each of the 22 study intersections and then analyzed in the Synchro traffic operations model.

**Exhibit 1.7-4. Daily Person Trip Ends Generated by Scenario**

| | Existing | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|---|
| Vehicular Mode Trip Ends | 71,000 | 85,700 | 129,800 | 168,900 |
| Non-vehicular mode Trip Ends | 6,000 | 7,700 | 13,100 | 22,100 |
| Total Person Trip Ends | 77,000 | 93,400 | 142,900 | 191,000 |
| **Non-vehicular Mode Split** | **8%** | **8%** | **9%** | **12%** |

Source: Fehr & Peers 2018

**Exhibit 1.7-5. Transportation Network Assumptions.**




Note: For a conservative test of alternative transportation improvements, the EIS authors modeled the greatest shift in traffic for Gravelly Lake Drive SW at three lanes and then compared it to no change in the section at five lanes.

Source: Fehr & Peers 2018

All alternatives would meet expected standards and improve conditions for pedestrians and bicyclists. Development under all alternatives would be expected to meet applicable parking standards. Given differences in expected growth and proposed improvements, the No Action Alternative would impact the least intersections and Alternative 2 would impact the most.

**Exhibit 1.7-6. Summary of Transportation Impacts.**

| Type of Impact | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|
| Auto and Freight | 2 intersections | 5 intersections | 6 intersections |
| Transit | 2 intersections | 5 intersections | 6 intersections |
| Pedestrian | None | None | None |
| Bicycle | None | None | None |
| Parking | None | None | None |
| Safety | None | None | None |

Source: Fehr & Peers, 2018.

## *What are some solutions or mitigation for the impacts?*

In addition to the six-year transportation improvement program (TIP) and alternative transportation improvements, additional improvements would be needed. See Exhibit 1.7-5 for initial proposed list of improvements, and Exhibit 1.7-7 for additional potential mitigation.

Considering proposed transportation improvements and land use together in the City's transportation model, some intersections would require additional capital improvements, or alternatively changes in programs or policies as described below. For a conservative test of alternative transportation improvements, the EIS authors modeled the greatest shift in traffic for Gravelly Lake Drive at three lanes and then compared it to no change in the section (five lanes). The table below shows the full list of improvements if Gravelly Lake Drive were modified to a cross section of three lanes.

The results without that change are described below the table.

**Exhibit 1.7-7. Potential Additional Transportation Mitigation**

| Intersection | No Action | Alt 1 | Alt 1 Mitigated | Alt 2 | Alt 2 Mitigated |
|---|---|---|---|---|---|
| **Gravelly Lake Dr SW/59th Ave SW** | | | | | |
| Signalize intersection | E/38 | E/46 | B/19 | F/82 | B/19 |
| **100th St SW/Bridgeport Way SW** | | | | | |
| Add westbound right turn pocket, convert existing westbound through-right lane to through-only, and prohibit east and westbound left turns | E/68 | F/85 | C/34 | F/102 | D/49 |
| **100th St SW/Lakewood Dr SW** | | | | | |
| Signal timing revisions to provide more green time to protected left turn phases and reduce time for eastbound and southbound through phases | D/50 | E/56 | D/49 | E/56 | D/54 |

| Intersection | No Action | Alt 1 | Alt 1 Mitigated | Alt 2 | Alt 2 Mitigated |
|---|---|---|---|---|---|
| **Lakewood Dr SW/Bridgeport Way SW** | | | | | |
| Convert westbound through-left lane to left only to remove split phase or move the pedestrian crossing to the north side of the intersection coincident with the WB phase* | C/34 | E/66 | D/39 | E/67 | D/48 |
| **108th St SW/Bridgeport Way SW**** | | | | | |
| Add northbound right turn pocket | D/48 | D/51 | D/47 | E/58 | D/52 |
| **112th St SW/Gravelly Lake Dr SW**** | | | | | |
| Add second westbound left turn pocket and combine through and right turn movements into outside lane | C/31 | E/61 | C/34 | E/65 | C/35 |

Notes: * The LOS results are slightly better if the split phasing is removed (D/48) than if the pedestrian crossing is relocated (D/54).
**These intersections remain within the City's LOS standard of D if the Gravelly Lake Drive SW Revision is not implemented.

Source: Fehr & Peers 2018

The travel demand model was also run to estimate how volumes might change under Alternative 2 land use without the Gravelly Lake Drive SW three-lane section.

If five lanes were retained, the following intersections would not require change:

- 108th St SW/Bridgeport Way SW
- 112th St SW/Gravelly Lake Dr SW

Comparing results with three lanes and with five lanes on Gravelly Lake Drive SW suggests that volumes on a five-lane Gravelly Lake Drive SW would be approximately 200 to 500 vehicles higher in each direction with smaller differences at the north end of the corridor and larger differences at the south end of the corridor, improving the intersection of Gravelly Lake Drive SW/112th Street from LOS E to D while increasing delay at Gravelly Lake Drive SW/59th Avenue SW. The volume reductions on Bridgeport Way would be smaller, likely no more than 200 vehicles in a single direction, though it would improve the intersection of 108th Street/Bridgeport Way from LOS E to D. The other impacted intersections would remain impacted with or without the revision. This indicates that the diverted traffic is distributed among multiple alternate routes and that much of the increase in volumes on Bridgeport Way is associated with increased land use rather than the Gravelly Lake Drive SW revision.

An alternative design could be considered which limits the extent of the revision to Main Street instead of 112th Street SW. This shorter section would reduce the overall cost of the project and would limit the changes to portions of Gravelly Lake Drive SW with slightly lower volumes. The area south of Main Street is not projected to see as much new development as the study area so reconfiguring the cross-section all the way to 112th Street SW would not provide as much additional benefit.

To reduce the potential for capital costs, the following program and policy options could be considered:

**Transportation Demand Management (TDM):** Washington state Commute Trip Reduction (CTR) law focuses on employers with 100 or more employees whose shifts begin during the typical AM commute.

This law requires employers to develop commute trip reduction plans and work toward meeting their mode share targets through internal programs and monitoring.

The City of Lakewood's Comprehensive Plan includes policies aimed at managing auto travel demand. The policies call for the City to encourage and assist employers who are not affected by the CTR law to offer TDM programs on a voluntary basis, encourage large employers to offer flexible or compressed work schedules to reduce localized congestion, and implement a public awareness and educational program to promote TDM strategies.

A more robust implementation of TDM strategies could be undertaken in the City. With such a TDM program in place, it is expected that actual trip generation in the Downtown Plan area could be lowered beyond the levels analyzed in this plan and associated Planned Action EIS.

TDM strategies could include subsidies or discounts for non-auto travel, education, and assistance to help travelers identify non-auto commute options, rideshare, and ride match promotion, and local incentive and reward programs.

**Revise Lakewood's Level of Service (LOS) Policy:** The City could also approach mitigation through revision of its LOS policy. The City's Comprehensive Plan already identifies a LOS F standard for two corridors. In recognition of Bridgeport Way SW's role as a primary vehicle gateway, the City could consider revising the LOS standard to LOS E or F along the corridor. This action would reflect the community vision of a more multimodal Gravelly Lake Drive SW corridor while accepting more congestion along the vehicle gateway of Bridgeport Way SW.

### *With mitigation, what is the ultimate outcome?*

Significant adverse impacts to auto, freight, and transit were identified under both Alternatives 1 and 2. With some combination of the potential mitigation measures outlined in the previous section, the magnitude of the intersection LOS impacts could be mitigated to meet City standards. Although the effects of additional vehicles on traffic congestion could be mitigated through implementation of the transportation improvements identified above and compliance with City codes and standards, the increases in activity Downtown and associated traffic congestion would be considered a significant unavoidable adverse impact. A significant unavoidable adverse impact could also result if one or more planned improvement projects identified to address expected growth and transportation impacts are not implemented (e.g. due to cost, feasibility, or other policy choice).

## 1.7.5. Public Services

### *How did we analyze Public Services?*

This section addresses the potential impacts associated with the alternatives on public services including police, fire/emergency medical; schools, and parks and recreation. Information considered included service provider plans and annual reports, and the City's adopted levels of service.

### What outcomes or impacts did we identify?

An increase in housing units and jobs in the Study Area will generate increased demand for public service providers, including the need for additional firefighter, police, and school personnel, depending on the phasing of growth.

### What is different between the alternatives?

Regarding parks, there are none today in the Study Area, and the current spacing standard for neighborhood parks is not met. Alternatives 1 and 2 include a two to four-acre park and another greenspace like a green street loop to create a linear park concept. The Plan would also create pedestrian connections to parks outside the Study Area.

### What are some solutions or mitigation for the impacts?

The City addresses public service levels of service in its Capital Facilities Plan Element. The element is updated periodically to ensure that proposed growth and change can be served.

The City requires private open space and recreation for new multifamily and commercial development. 18A.50.231Specific Uses Design Standards.

The City could allow developers to avoid a percentage of onsite open space requirements if providing a fee in lieu towards the central park.

### With mitigation, what is the ultimate outcome?

With the implementation of mitigation measures, no significant unavoidable adverse impacts are anticipated on public services. The growth planned for the area would be incremental, and periodic update of service provider plans would address improvements required to maintain response times, ensure access to parks, and address student growth.

## 1.7.6. Utilities

### How did we analyze Utilities?

This section addresses the potential impacts associated with the alternatives on utilities including water, wastewater, stormwater, and power. Service provider plans and standards of service were reviewed in relation to expected growth.

### What outcomes or impacts did we identify?

Under all alternatives there would be increases in development, population, and employment density. The greatest density increases would occur on the catalyst sites. The development would be incremental and Lakewood as well as the utilities are regularly updating plans to accommodate growth and maintain utilities.

The Lakewood Water District has planned for a daily demand of 9 million gallons/day currently and has identified that it can support yearly increases of up to 2 million gallons/day of demand. In addition, improvements are planned to the water system across its service area, which includes the Study Area.

## *What is different between the alternatives?*

Under the No Action Alternative, the increase in housing units is relatively limited, and any increase in population within the Study Area is not anticipated to result in substantive impacts on utilities. Alternatives 1 and 2 would more substantially increase growth in the Downtown area.

Water systems can address the full range of growth studied. Pierce County plans for sewer capacity are based on growth targets shared by the County and City; tracking of growth in relation to targets and regular updates of system plans can address impacts.

Energy codes will apply to new buildings and result in greater energy conservation compared with existing buildings.

Under Alternatives 1 and 2, the addition of new public streets could necessitate changes to some utility lines. Developers are responsible for the cost of these alterations, which may be identified during the design review for individual projects.

## *What are some solutions or mitigation for the impacts?*

In addition to adopted plans and codes, other measures could include:

- Developments may reduce water demand by using new technologies that would reduce per-capita water use (and therefore wastewater service demand) by using newer, low- or no-flow plumbing fixtures and equipment.
- Implementation of sustainable requirements including the construction and operation of LEED-compliant (or similar ranking system) buildings could reduce the increase required in power systems.
- Implementation of conservation efforts and renewable energy sources to conserve electricity in new developments, including energy efficient equipment (i.e., light bulbs, appliances, and heating and air conditioning), could reduce energy consumption.

## *With mitigation, what is the ultimate outcome?*

With the implementation of mitigation measures, no significant unavoidable adverse impacts are anticipated on utilities. The growth planned for the area would be incremental, and periodic updates of relevant plans would address improvements required to maintain levels of service, and ensure utilities can accommodate growth.

# 2.0 Proposal and Alternatives

## 2.1. Purpose and Introduction

The City has commissioned the preparation of a Subarea Plan for Lakewood's central business district, or "Downtown". The Plan builds on a foundation of current plans and programs and will:

- Describe a vision, land use and design, gathering places, infrastructure investments, and other action strategies for Lakewood's Downtown;
- Amend Comprehensive Plan land use, policy, and capital facility plan elements;
- Create new form-based zoning standards; and
- Provide upfront environmental review through a Planned Action consistent with RCW 43.21c.440 and SEPA rules in WAC 197-11 are anticipated to help bring about desired change and development.

This non-project Environmental Impact Statement (EIS) provides a qualitative and quantitative analysis of beneficial and adverse environmental impacts associated with implementation of the subarea plan and associated code across Downtown Lakewood. The specific purpose of this EIS is to assist the public and local government decision makers to consider environmental implications of future growth and investments in Downtown, together with proposed comprehensive plan and code amendments and mitigation measures that would apply to future development actions.

This Draft EIS considers three alternatives that illustrate how to implement the vision for an urban area with civic amenities, walkable streets, and a mix of uses including housing, entertainment, restaurants, and retail:

- **No Action**, a SEPA Required Alternative. This alternative assumes growth according to current trends and under current City Plans and development regulations, including over 450 housing units, and over 1,660 jobs.
- **Action Alternative 1**, assuming a moderate level of development, with over three times the housing and over two times the jobs as the No Action Alternative, based on targeted infrastructure and civic investments and plan and code changes. Investments include a "Green Loop" (see discussion following Exhibit 2.3-12) of street and trail improvements, more public streets, and a 2-acre central park. Development evaluated include nearly 1,580 housing units and over 4,150 jobs.
- **Action Alternative 2**, assuming a high level of growth, with five times the housing and jobs compared with No Action and with the greatest level of civic and infrastructure investments, (including a Green Loop, added public streets, and a 4-acre central park). With Alternative 2, over 2,250 housing units would be developed and nearly 7,370 jobs.

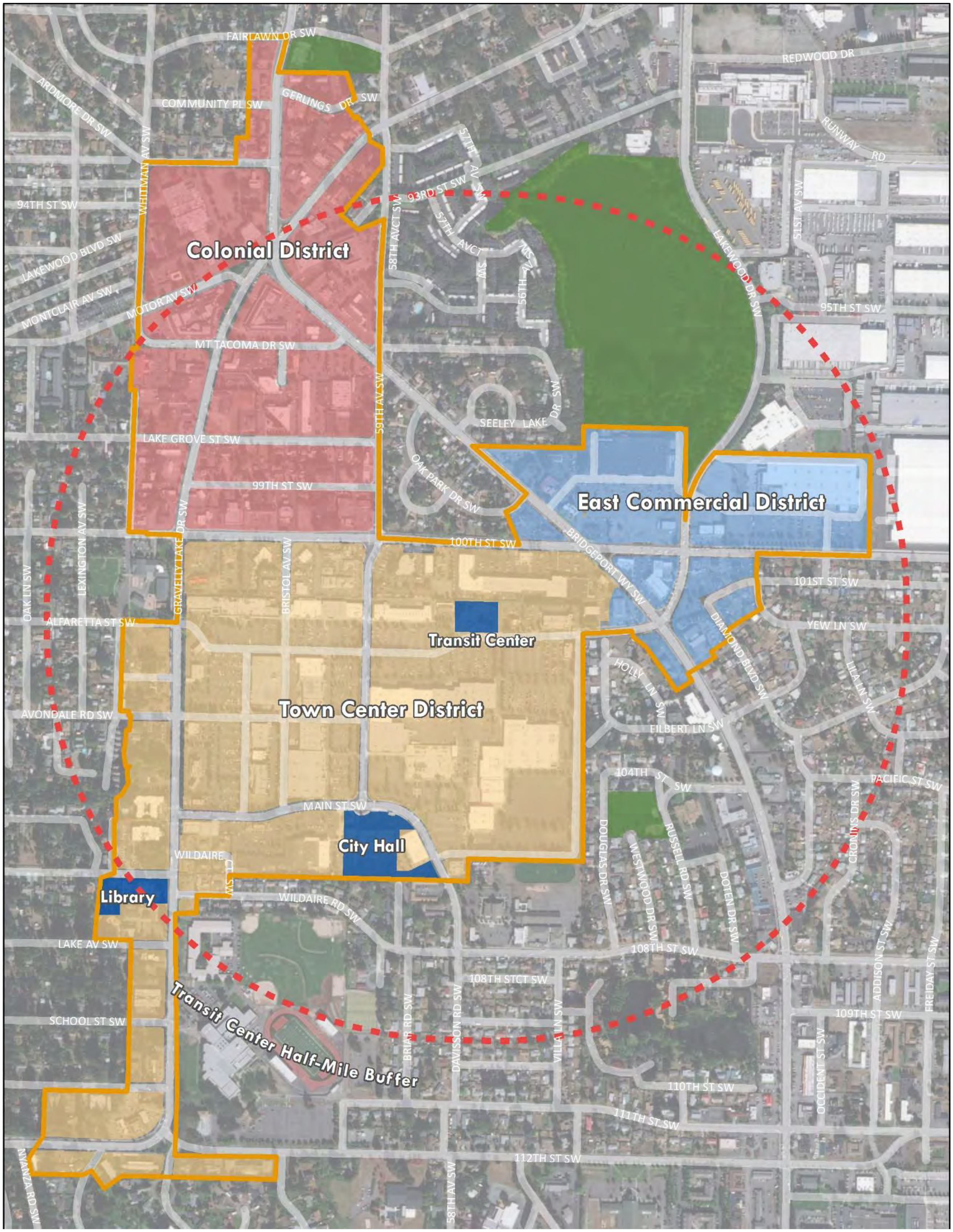
# 2.2. Description of the Study Area

The Study Area is approximately 319 gross acres, and contains the central shopping area (Central Business District) of the community. See Exhibit 2.2-1. The Study Area also contains many civic and cultural facilities such as City Hall, Lakewood Library, Transit Center, Post Office, the Lakewood Playhouse, and the Lakewood History Museum. Most of the Study Area is within a half mile of the Transit Center.

To recognize different characters and conditions, the Study Area is divided into districts:

- **Colonial:** This district includes colonial-style commercial buildings. Here in 1937 Norton Clapp built part of the Lakewood Colonial Center, one of the first suburban shopping centers in the country.
- **Town Center:** Developed in 1958 as the Villa Plaza Shopping Center, which was later renovated to become the Lakewood Mall, this district contains the upgraded Lakewood Towne Center.
- **East:** This district at the intersection of Bridgeport Way SW and 100$^{th}$ Street SW has a mix of large auto-oriented commercial centers and smaller strip-commercial properties along arterials.

**Exhibit 2.2-1. Study Area**




Source: City of Lakewood, BERK Consulting 2017

# 2.3. Objectives and Alternatives

## 2.3.1. Objectives

SEPA requires a statement of proposal objectives to guide the formulation of alternatives and their evaluation. For the purposes of this EIS, the proposed guiding principles of the subarea plan are considered objectives.

DOWNTOWN IS….

- A GREAT PLACE!
- The HEART of the COMMUNITY and CIVIC LIFE
- Designed for PEOPLE to WALK and BIKE
- SAFE and INVITING
- Where people of all ages go to do FUN things
- Rich with CULTURAL DIVERSITY
- SUSTAINABLE and connected to NATURE
- Part of a thriving LOCAL ECONOMY
- A source of PRIDE and IDENTITY for LAKEWOOD
- Where people LIVE, WORK, SHOP, and EAT

There are a variety of ways the guiding principles could be implemented to achieve an urban, mixed use, character and these are explored in alternatives.

## 2.3.2. Subarea Concepts

Extensive community visioning occurred in fall 2017 with meetings, pop-up events, focus groups, an online survey, and a design charrette. In all, at least 645 participants gave their opinions and visions to support the Lakewood Downtown Plan effort. Results are found on the project website: https://www.lakewooddowntownplan.org/. Based on the outreach, participants desired:

- More entertainment venues and restaurants;
- More retail choices, both mom and pop and brand stores;
- Well-designed housing for seniors & disabled and mixed use with housing and commercial together, within walking distance of work, shopping, and buses;
- Pedestrian friendly street design, well-maintained and safe roads; and
- Family activities and gathering spaces, outdoor recreation (e.g. spray park, climbing walls, skating rink, other), and indoor cultural facilities (e.g. expanded library, children's museum, etc.).

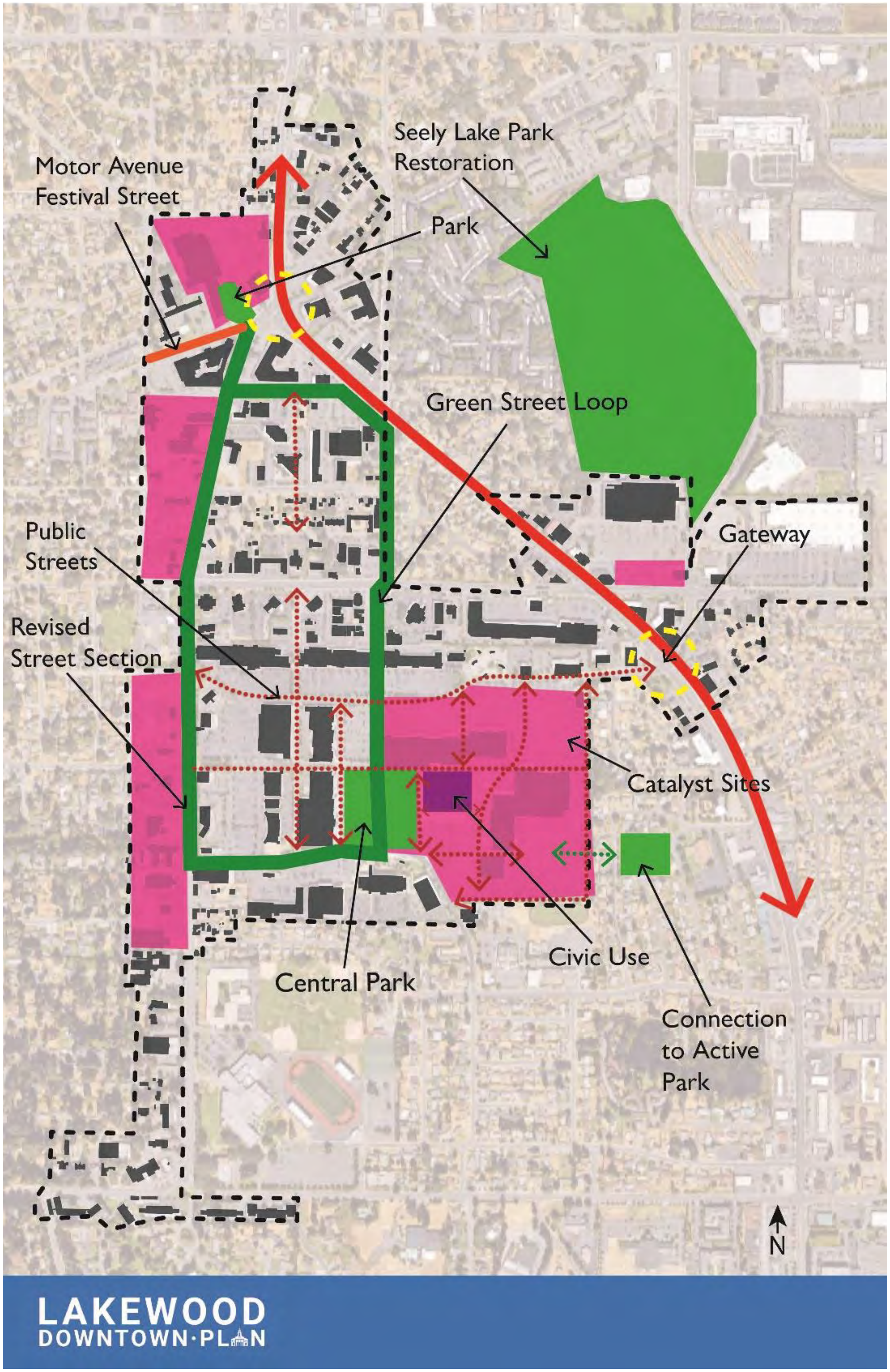
Because of the visioning efforts, the Downtown Plan is proposing key investments and changes:

- 2 to 4-acre park near City Hall;

- Green street loop with improved pedestrian and bicycle facilities;
- Site for additional civic uses near City Hall;
- Improved public street grid in the Towne Center;
- Gateways along major arterials at the entrance to Downtown;
- Revision and multi-use path on Gravelly Lake Drive;
- Catalyst sites for redevelopment;
- Connection to Active Park;
- Motor Avenue Improvements; and
- Seeley Lake Park restoration.

These concepts are illustrated in the plan map below. EIS alternatives vary the level of implementation of these features.

**Exhibit 2.3-1. Downtown Lakewood Concepts**

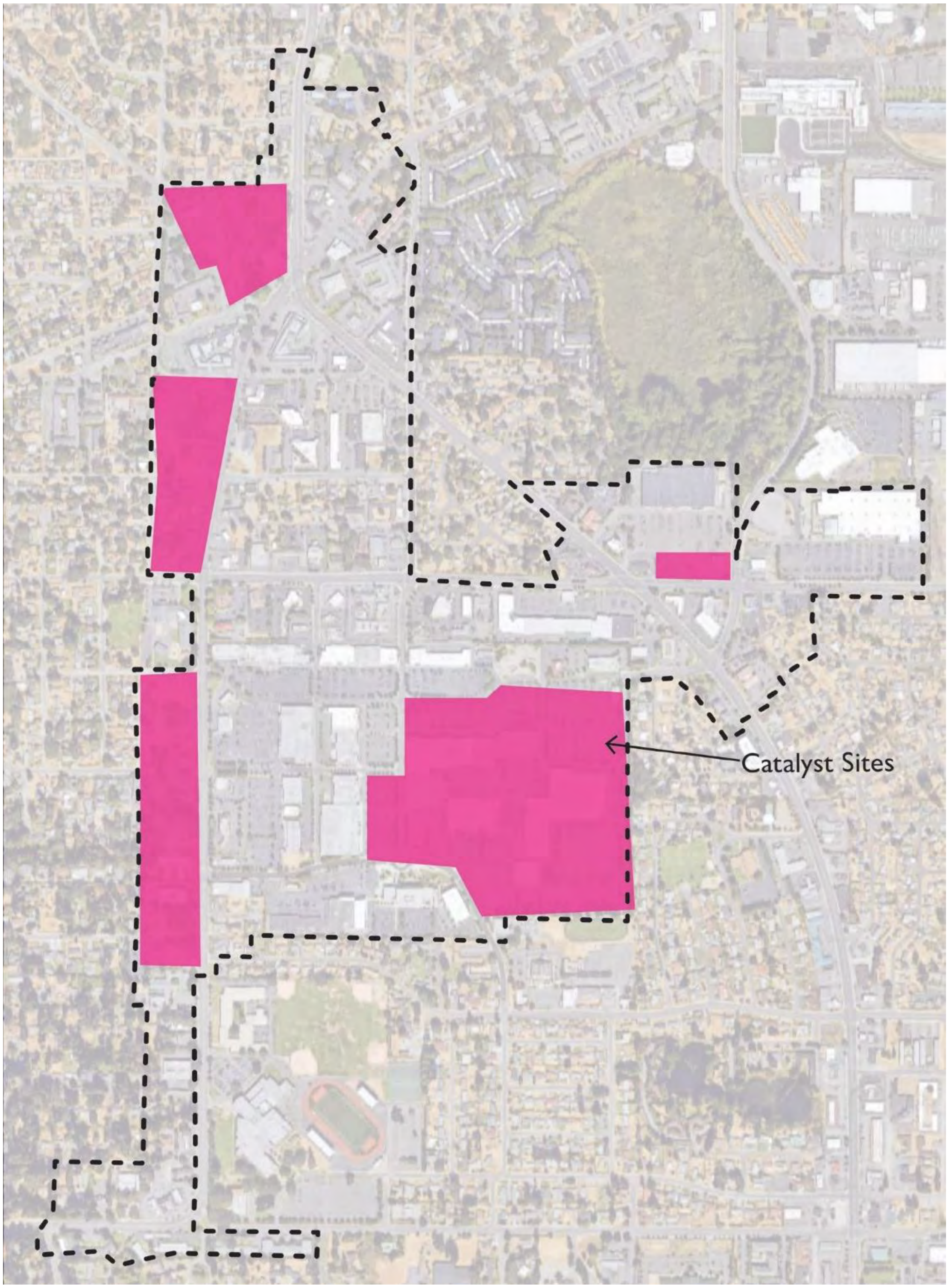



Source: Framework 2017.

## *Catalyst Sites*

The Downtown Lakewood Concepts in Exhibit 2.3-1 identify major redevelopment areas in each of the Downtown Districts, with a close up of the catalyst sites shown in Exhibit 2.3-2. Additional smaller redevelopment sites are shown in the Areawide Redevelopment Opportunities and Exhibit 2.3-11.

**Exhibit 2.3-2. Catalyst Sites**




Source: Framework 2017.

Major catalyst sites include:

- Lakewood Towne Center, which has large parking areas and a potential for infill redevelopment and more intense vertical and horizontal mixed-use building space;
- Land fronting the west side of Gravelly Lake Drive where some property depth and extent could allow for mixed use commercial and residential development at greater densities; and
- Colonial District properties where land could be consolidated and redeveloped for mixed use purposes.

Each of these major catalyst sites are addressed in greater detail below.

## Towne Center and Central Park/Civic Improvements

The Towne Center property currently consists of local and community serving retail in different formats (grocery-anchored community shopping center, big box center, entertainment, etc.). It has extensive parking lots. Given the changing nature of retail centers and competition from online retail and other economic forces, it is possible that additional housing, retail, and office uses could be integrated into the center, particularly given larger extents of surface parking.

**Exhibit 2.3-3. Existing Conditions: Lakewood Towne Center**

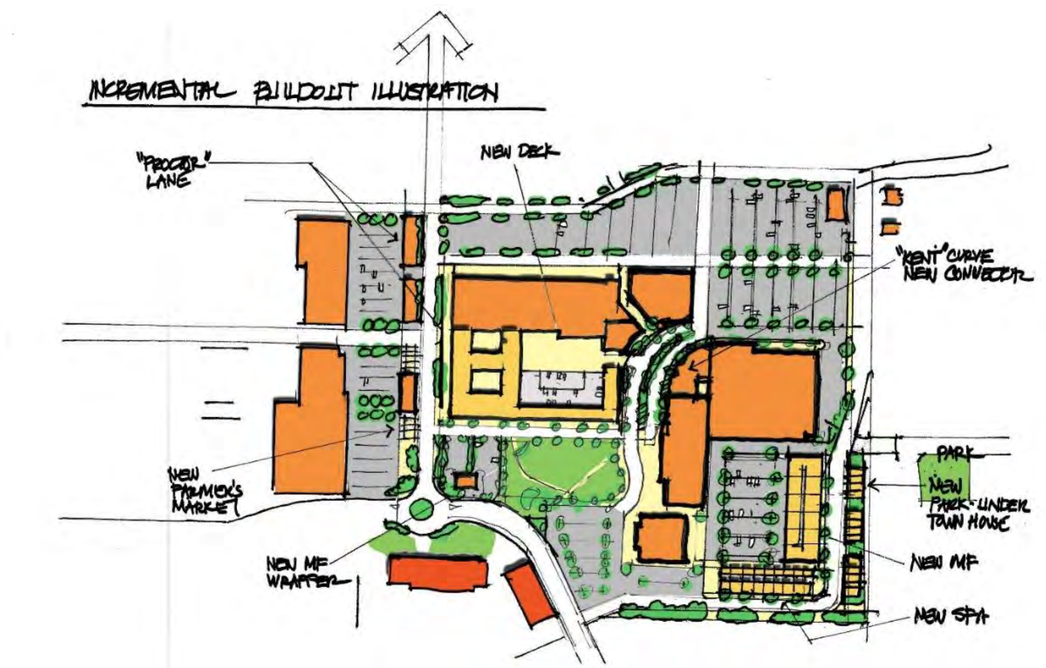

Source: Seth Harry and Associates, 2017

Two options for the Towne Center are considered in this EIS:

- Option A) a phased mixed-use redevelopment largely retaining the current retail structures and adding more intense horizontal and vertical mixed-use buildings with surface and structured parking, and moderate park and civic spaces; and
- Option B) a more complete redevelopment of the area, with newer format vertical mixed uses featuring ground floor retail and housing and offices above and a larger park and civic investment.

Exhibit 2.3-4 shows an early concept plan of Option A prepared at the fall 2017 charrette. Option A provides a mix of uses, centralized parking structure (above ground), multi-family housing and active uses on 59th Avenue SW. A two-acre park is shown just northeast of City hall on a currently underutilized portion of the Towne Center. Option A was further refined as a 3-D model was prepared.

**Exhibit 2.3-4. Phased Mixed-Use Option: Early Charette Concept Option A**




Source: Seth Harry and Associates, 2017

The site plan and 3-D in Exhibit 2.3-5 show an updated model of Option A with more refinement.

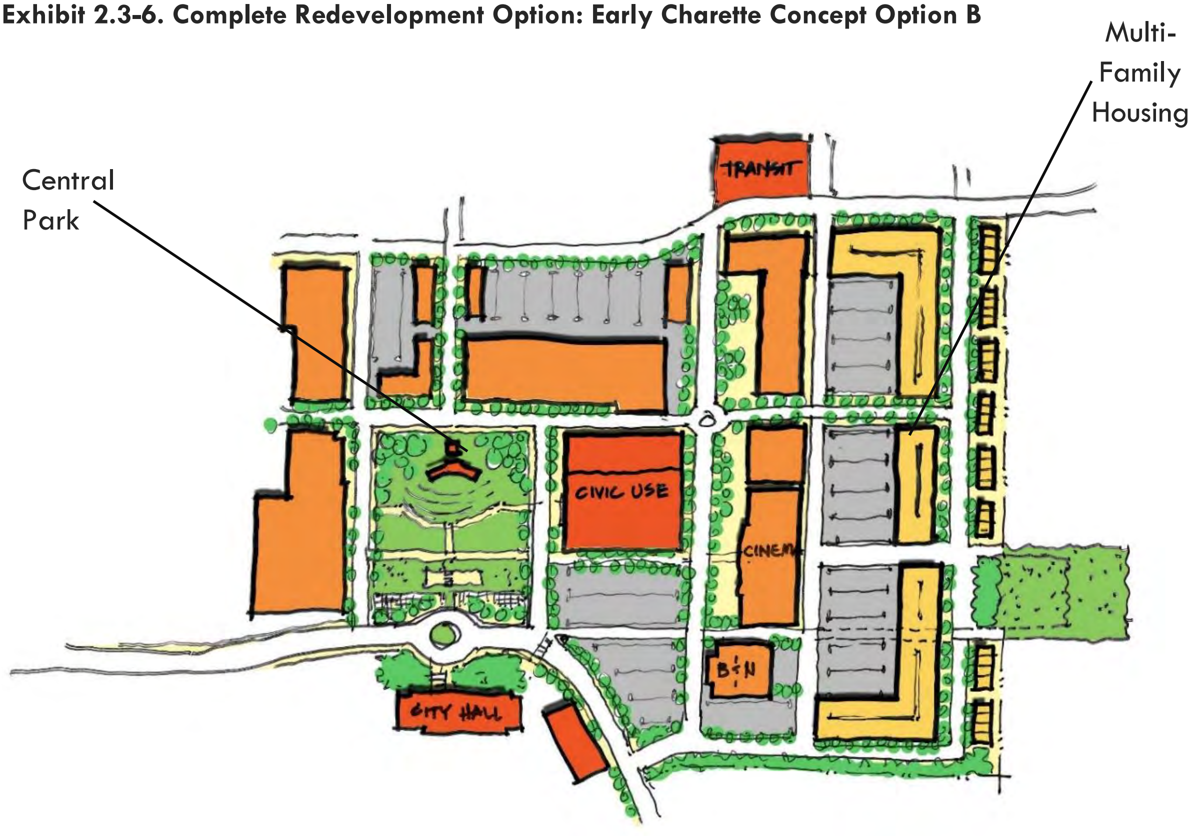
**Exhibit 2.3-5. Towne Center Option A - Phased Mixed-Use Option Site Plan and 3D View**



Seth Harry and Associates, 2017

A more complete redevelopment concept referenced as Option B was developed at the charrette in fall 2017. See Exhibit 2.3-6. Option B represents a more thorough re-imagining of the center with more opportunities for vertical mixed use commercial and residential buildings. This concept also includes a four-acre central park just north of City Hall, a new civic use near the park and City Hall, new pedestrian oriented mixed-use development, a reconfigured urban street grid and diverse multi-family housing to the east.

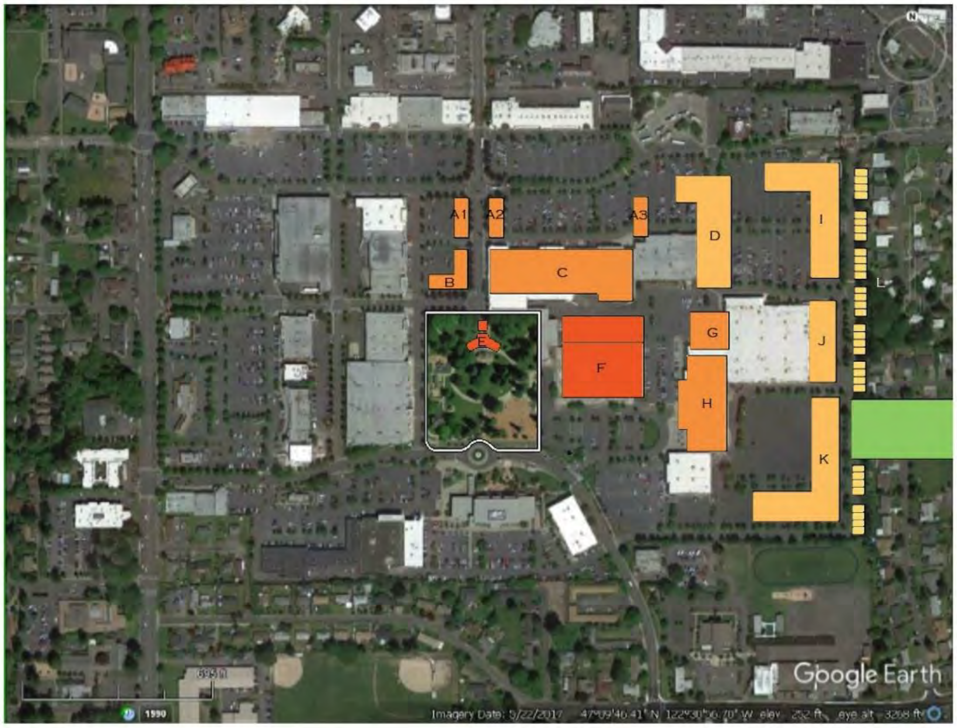
**Exhibit 2.3-6. Complete Redevelopment Option: Early Charette Concept Option B**




Source: Framework, 2017

Option B was further refined into a site plan and 3-D model. See Exhibit 2.3-7.

**Exhibit 2.3-7. Towne Center Option B – New Format Option Site Plan and 3D View**

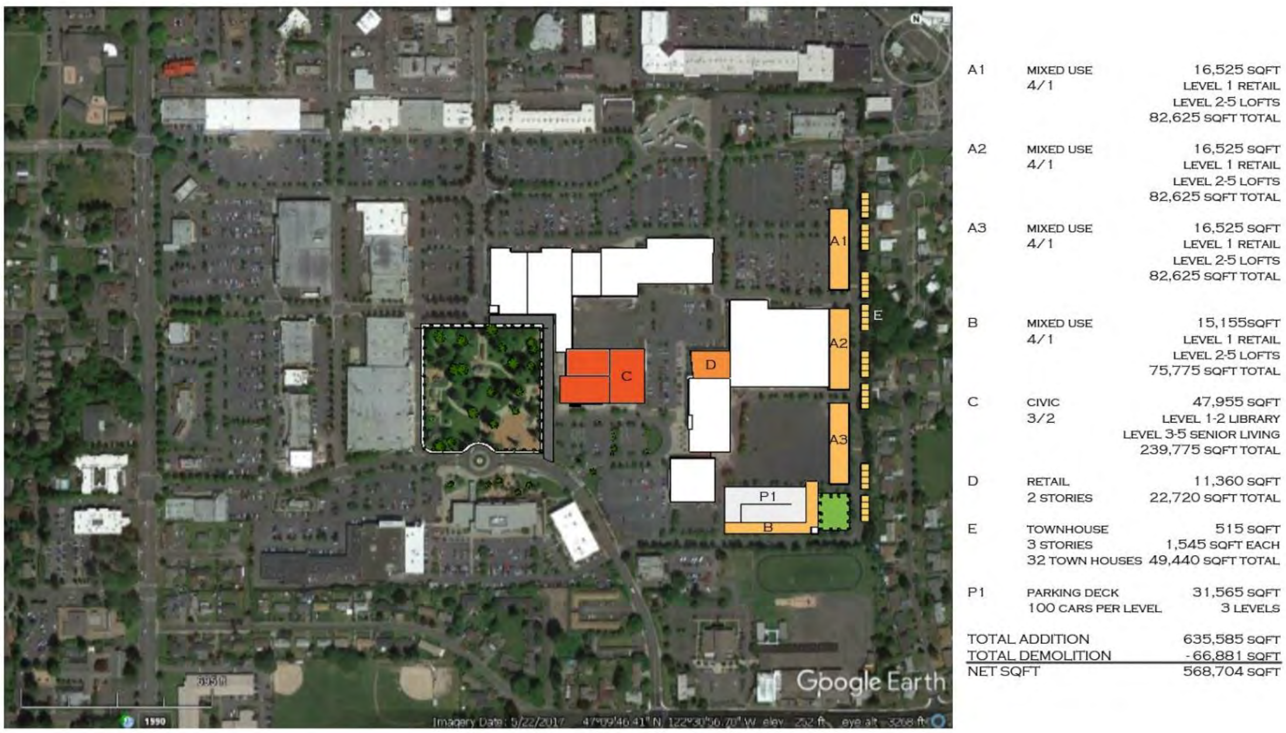



| | | |
|---|---|---|
| A1 | RETAIL (1 LEVEL) | 6,200 SQFT |
| A2 | RETAIL (1 LEVEL) | 6,200 SQFT |
| A3 | RETAIL (1 LEVEL) | 6,200 SQFT |
| B | RETAIL (1 LEVEL) | 10,075 SQFT |
| C | RETAIL (1 LEVEL) | 73,295 SQFT |
| D | MIXED USE 4/1 | 48,140 SQFT LEVEL 1 RETAIL LEVEL 2-5 LOFTS 240,700 SQFT TOTAL |
| E | PARK BUILDING | 3,630 SQFT |
| F | CIVIC BUILDING 3/2 | 74,000 SQFT LEVEL 1-2 LIBRARY LEVEL 3-5 SENIOR LIVING 370,000 SQFT TOTAL |
| G | RETAIL (1 LEVEL) | 15,785 SQFT |
| H | CINEMA | 47,390 SQFT |
| I | MIXED USE 4/1 | 52,050 SQFT LEVEL 1 RETAIL LEVEL 2-5 LOFTS 260,250 SQFT TOTAL |
| J | MIXED USE 4/1 | 24,150 SQFT LEVEL 1 RETAIL LEVEL 2-5 LOFTS 120,750 SQFT TOTAL |
| K | MIXED USE 4/1 | 57,590 SQFT LEVEL 1 RETAIL LEVEL 2-5 LOFTS 287,950 SQFT TOTAL |
| L | TOWNHOUSE 3 STORIES 32 HOUSES | 1020 SQFT 3,060 SQFT EACH 97,970 SQFT TOTAL |
| TOTAL ADDITION | | 1,639,728 SQFT |
| TOTAL DEMOLITION | | -300,385 SQFT |
| NET | | 1,339,343 SQFT |


Sources: Seth Harry and Associates and Framework, 2017

While Option B is a bolder redevelopment option, elements of it could be implemented incrementally as shown below in Option C, with retention of existing commercial buildings and addition of other housing and civic structures. However, for the purposes of a more conservative analysis of impacts, a more complete redevelopment is assumed under Option B.

**Exhibit 2.3-8. Towne Center Option C – Infill and Partial Redevelopment based on Option B**




Source: Seth Harry and Associates, 2017; Framework, 2017

## West of Gravelly Lake Drive

Several catalyst sites are considered west of Gravelly Lake Drive, where some ground floor retail could be developed with housing above and behind. An example of such development at the maximum 100 units per acre studied in this EIS appears in the figure below. The EIS Alternatives consider different levels of density in the areas west of Gravelly Lake Drive.

**Exhibit 2.3-9. Concept – Mixed Use West of Gravelly Lake Drive**


Source: Framework 2017

## Colonial District and Motor Avenue

Infill development would also occur in the Colonial District, supported by roadway and placemaking improvements to Motor Avenue under the Action Alternatives. EIS Alternatives consider different levels of housing and employment as well as infrastructure investment in this area.

**Exhibit 2.3-10. Colonial District and Motor Avenue Improvements**

Sources: KPG, Framework 2016 and 2017

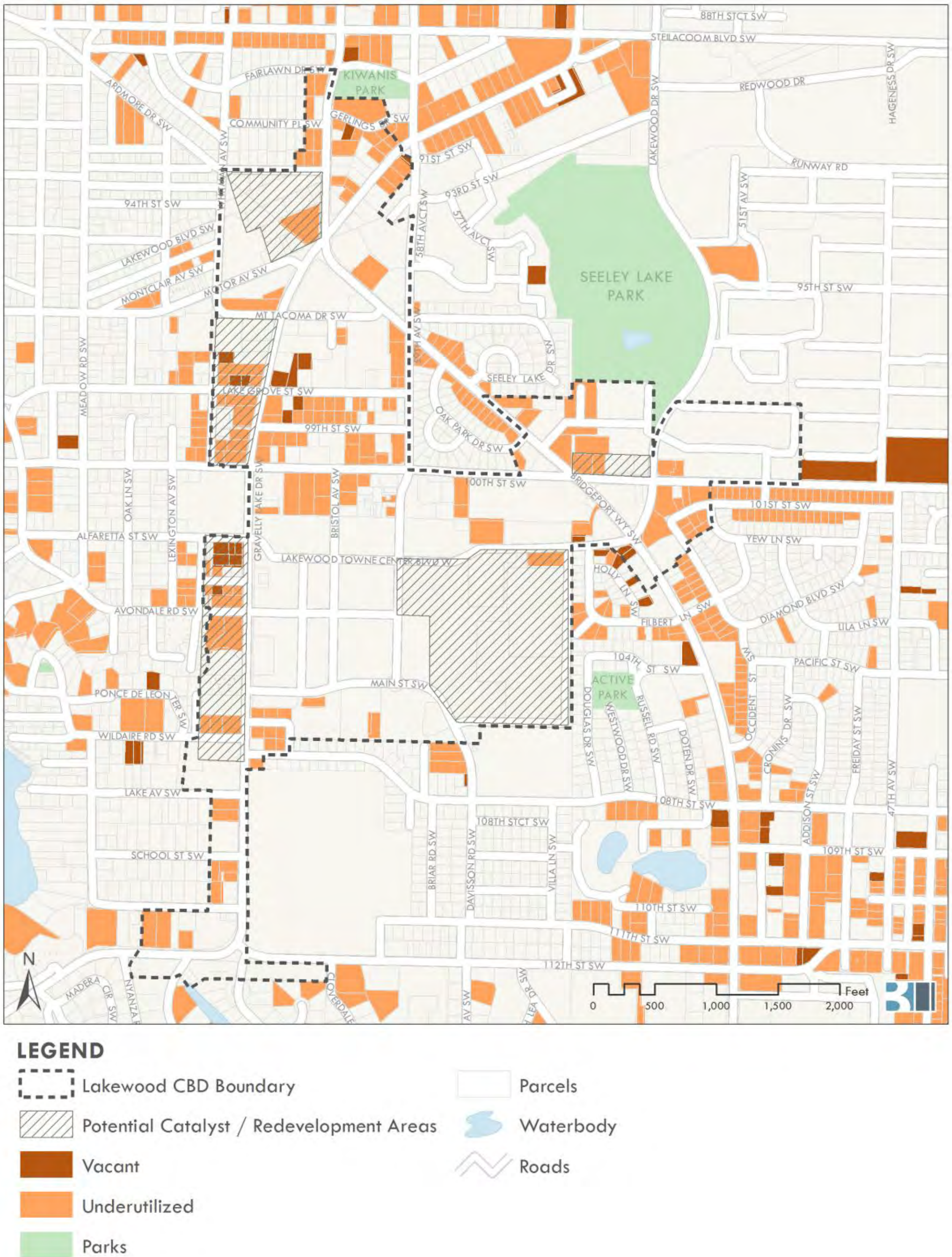
## *Areawide Redevelopment Opportunities*

A land capacity analysis reviews vacant and underutilized land (i.e., where more development is feasible on a property under the zoning or where land values are greater than building values). Buildable land is mapped in the central portion of the Study Area, and constitute portions of the larger blocks in the Town Center District. See Exhibit 2.3-11. These sites are possible places of change by 2035, and could implement the new vision for the Study Area in addition to the catalyst sites.

The catalyst sites introduced above in Exhibit 2.3-2 do not fully appear in Exhibit 2.3-11 because their land value is not markedly higher than the building value; however, the catalyst sites are potentially redevelopable, such as large parking lots where underbuilding parking could be constructed in association with new commercial or housing uses, or are places where smaller parcels can be aggregated and allow for a more economical redevelopment.

This Draft EIS examines the combined redevelopment potential of the catalyst sites and the Downtown buildable lands in Exhibit 2.3-11.

**Exhibit 2.3-11. Downtown Area Buildable Lands and Catalyst Sites**



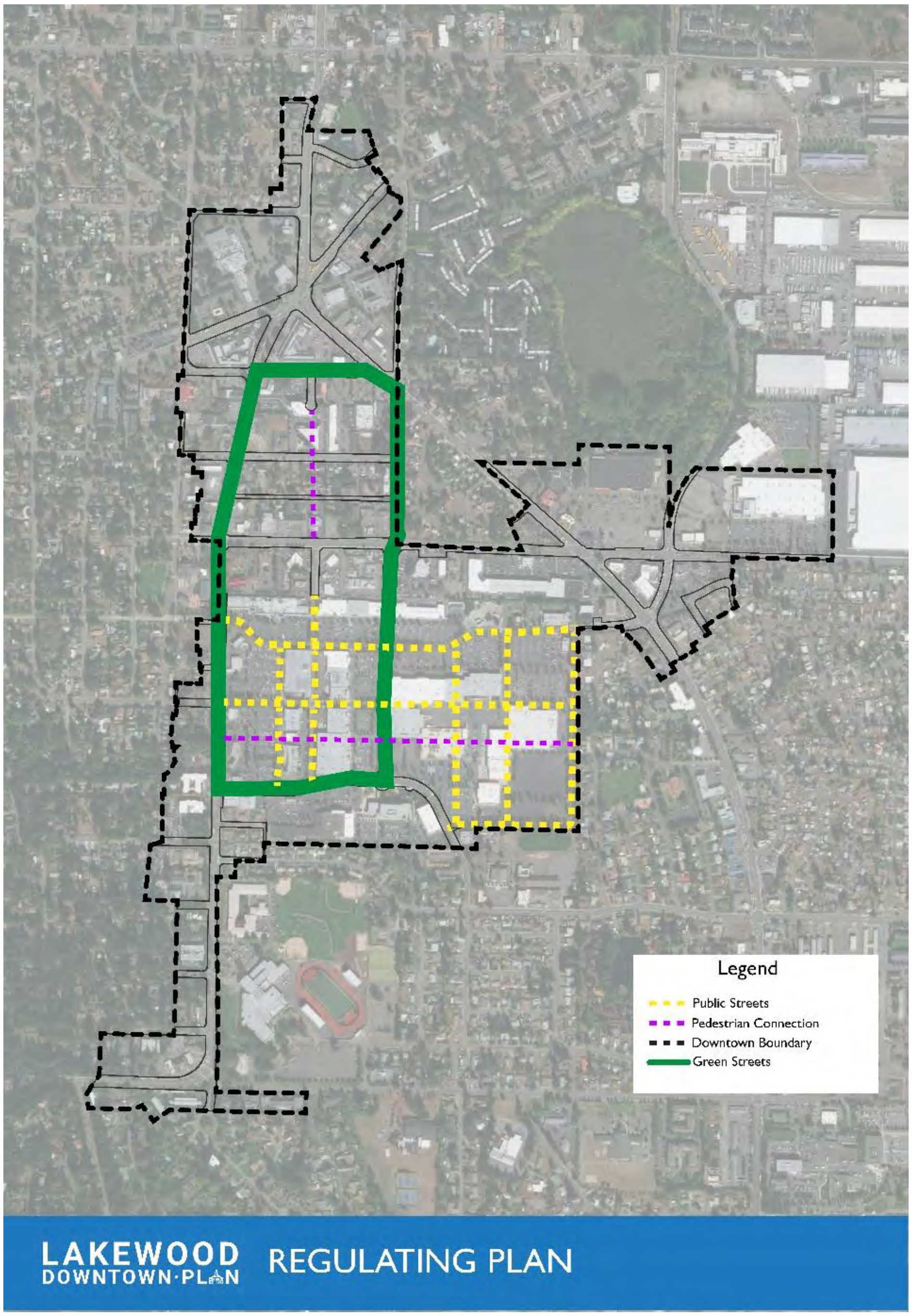

Per the County's 2014 Buildable Lands Report, underutilized lands include parcels that have an existing structure(s) or land use activity and have the ability to accommodate additional employment (jobs) or housing units. (Pierce County, 2014)

Source: Pierce County, BERK 2017

## *Streets and Green Loop*

The City's six-year transportation improvement program (TIP) includes a "road diet" project ((i.e., removing travel lanes from a roadway and utilizing the space for other uses and travel modes) on Gravelly Lake Drive, which will reduce the road from four lanes to three lanes, and proposes other various intersection, pedestrian, and bicycle improvements. Alternatives 1 and 2 include all the City's six-year projects for the area, revises another section of Gravelly Lake Drive, proposes new public streets, and connects non-motorized features. See Exhibit 2.3-12 for these concepts.

**Exhibit 2.3-12. Downtown Lakewood Streets and Green Loop Concepts**




Source: KPG, Fehr & Peers, 2017; Framework 2018

The Green Loop and new public streets would result in alternative street cross-sections with more pedestrian, bicycle, and landscaping/green infrastructure amenities.

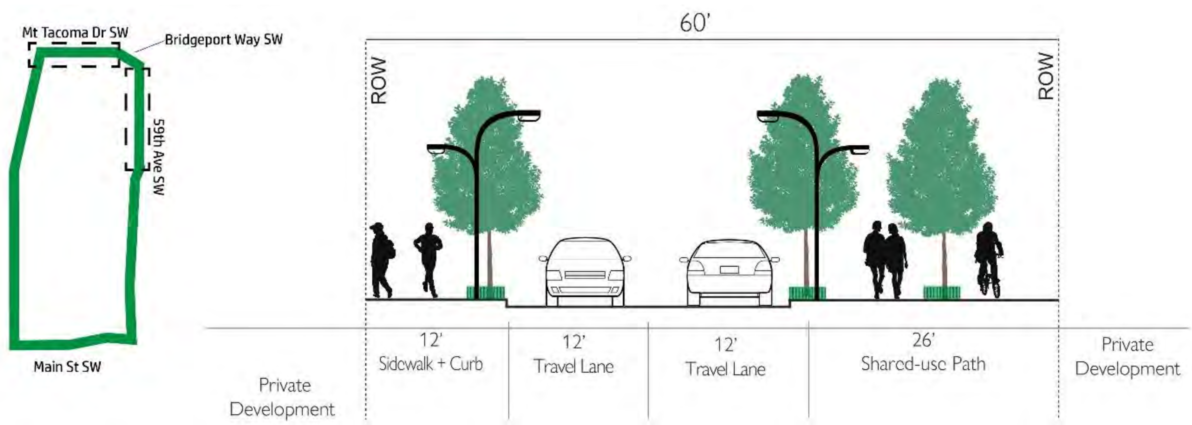
## Green Street Loop

The Green Street Loop includes Gravelly Lake Drive SW, 59th Avenue SW, Mt Tacoma Drive SW, and a small portion of Bridgeport Way SW. The Green Loop includes continuous pedestrian and off-street protected bike facilities, street trees, landscaping, and low-impact development stormwater improvements.

**Mt Tacoma Drive SW/59th Avenue SW:** The concept plan for these streets is to reduce the number of travel lanes from three to two. The reduction in vehicle lanes allows for a 12' sidewalk on the west side and a 26' multi-use path on the east side.

**Exhibit 2.3-13. Street Section Concepts: Green Loop Mt Tacoma Drive SW/59th Avenue SW**

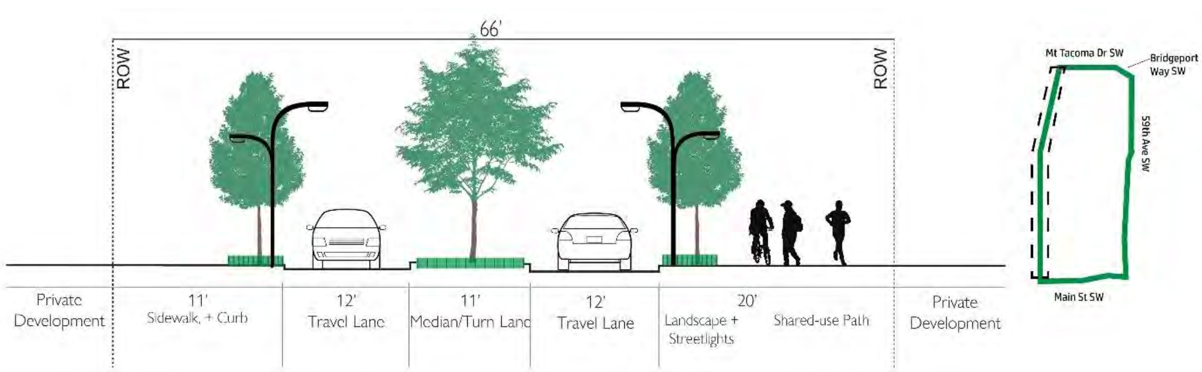
**Green Loop:**




Framework and KPG, 2018

**Green Loop: Gravelly Lake Drive SW:** The following three concepts for a revision on Gravelly Lake Drive SW would reduce the number of vehicle travel lanes from five to three or four lanes and accommodate expanded sidewalks and a shared use path on the east side with landscaping, underground utilities, street trees, street lights, and other amenities. Right-hand turn pockets would be provided at 112th Street SW, Main Street SW, and 100th Street SW in the northbound direction. No right-hand turn lanes would be provided southbound.

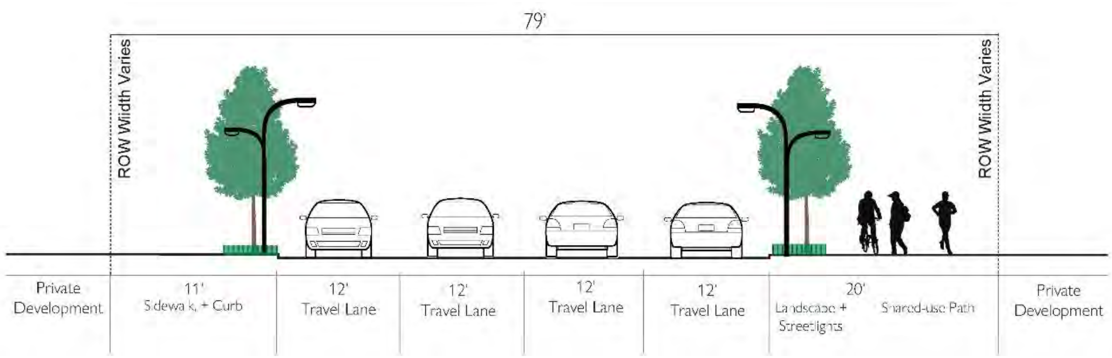
**Figure 1. Gravelly Lake Drive SW Revision – Concept #1 (looking north)**




Source: Framework and KPG, 2018

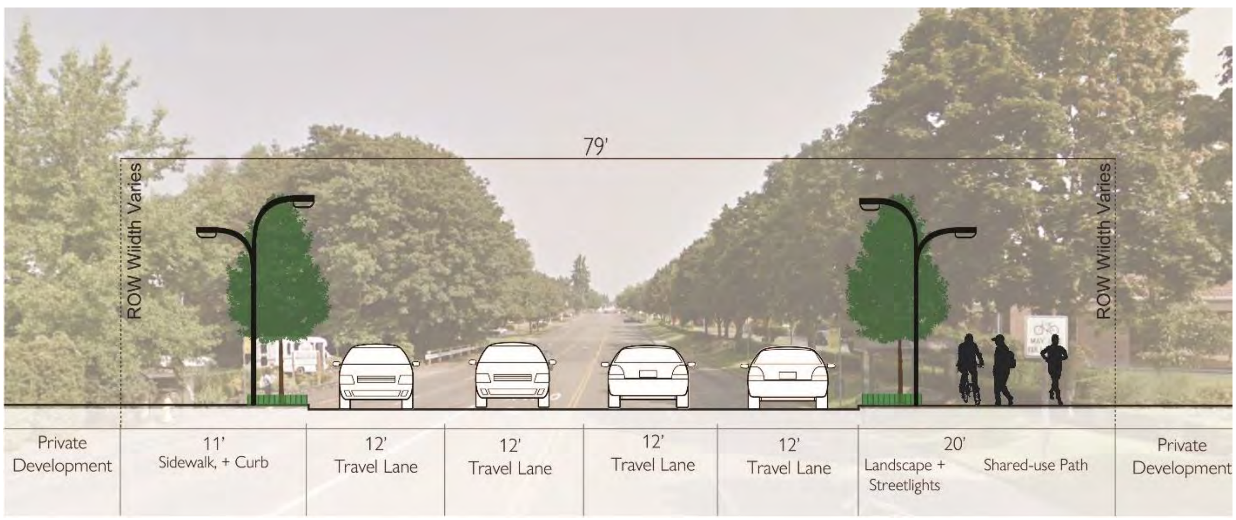
Exhibit 2.3-14 shows a four-lane concept for the Gravelly Lake Road SW road diet.

**Exhibit 2.3-14. Gravelly Lake Drive SW Revision – Concept #2 (looking north)**




Framework, 2018; KPG, 2018

**Exhibit 2.3-15. Gravelly Lake Drive SW Revision with Photo – Concept #2 (looking north)**




Source: Framework, 2018, KPG, 2018

Exhibit 2.3-16 shows two options for concept 3, which both include four travel lanes and a center median with left turn pockets at public street intersections. The upper street section maintains the existing curbs and expands the sidewalks on the west side of the street through acquiring additional ROW potentially as properties redevelop. Sidewalks may be expanded on the west side as part of frontage improvements associated with private development or a City capital project.

**Exhibit 2.3-16. Gravelly Lake Drive SW Revision – Concept #3-A (Looking north)**

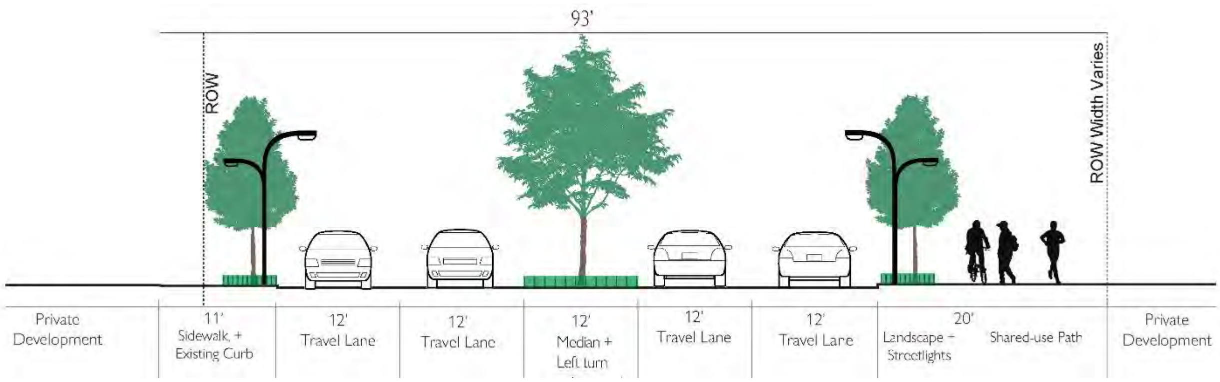
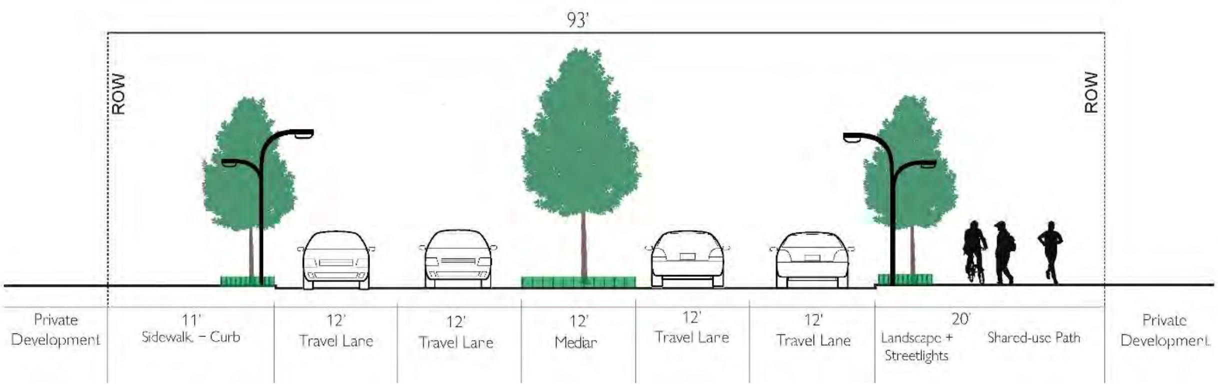



**Exhibit 2.3-17. Gravelly Lake Drive SW Revision– Concept #3-B (Looking north)**

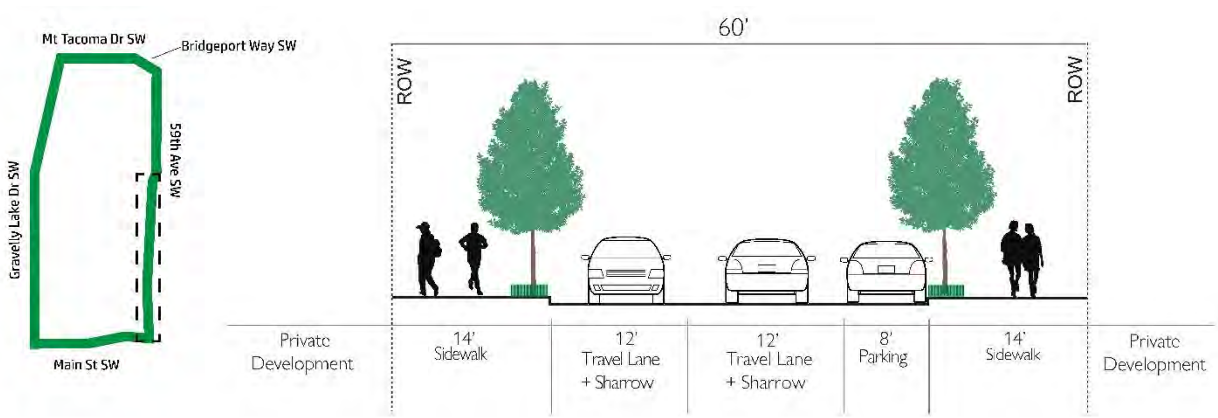



Source: Framework and KPG, 2018

## 59th Avenue SW

59th Avenue SW is one of the few public streets in the Towne Center. It currently has three vehicle lanes and sidewalks on both sides of the street within an approximately 60' right-of-way. The first concept shown in Exhibit 2.3-18 includes only the existing right-of-way and converts one of the travel lanes to on-street parallel parking and allows for sidewalks up to 14' in width on both sides. This concept supports the transition of 59th Street SW to a pedestrian oriented retail street.

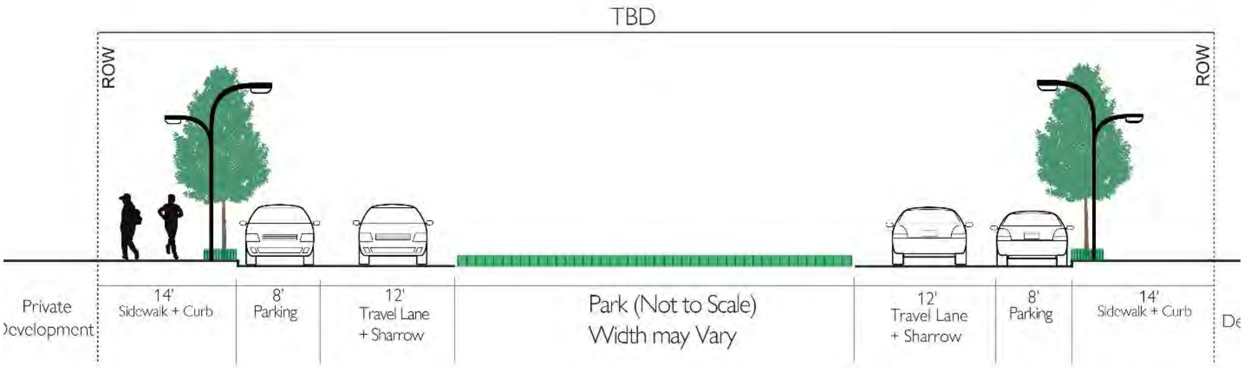
**Exhibit 2.3-18. Green Loop: 59th Avenue NW Concept 1 (Existing ROW)**




Framework and KPG, 2018

The second concept shown in Exhibit 2.3-19 addresses the reconfirmation of 59th Avenue SW with the addition of the Central Park north of City Hall. Each side of the park would have a single one-way vehicle travel lane, 14' sidewalks, and on-street parallel parking. The final design of the park and street improvements will depend on the location, size, and layout for the Central Park.

**Exhibit 2.3-19. 59th Avenue SW Concept 2**

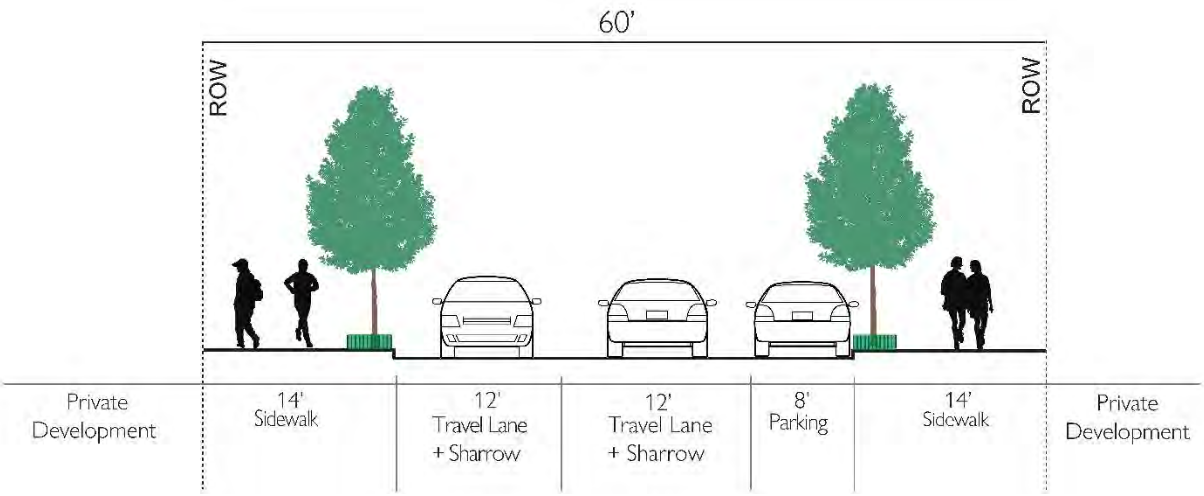



Framework and KPG, 2018

## Lakewood Towne Center Boulevard SW

Lakewood Towne Center Boulevard SW is currently a private street with three vehicle travel lanes and sidewalks on both sides of the street. The concept plan shows two 12' vehicle travel lanes with sharrows, on-street parallel parking on one side of the street, and 14' sidewalks on both sides of the street.

**Exhibit 2.3-20. Lakewood Towne Center Boulevard SW**



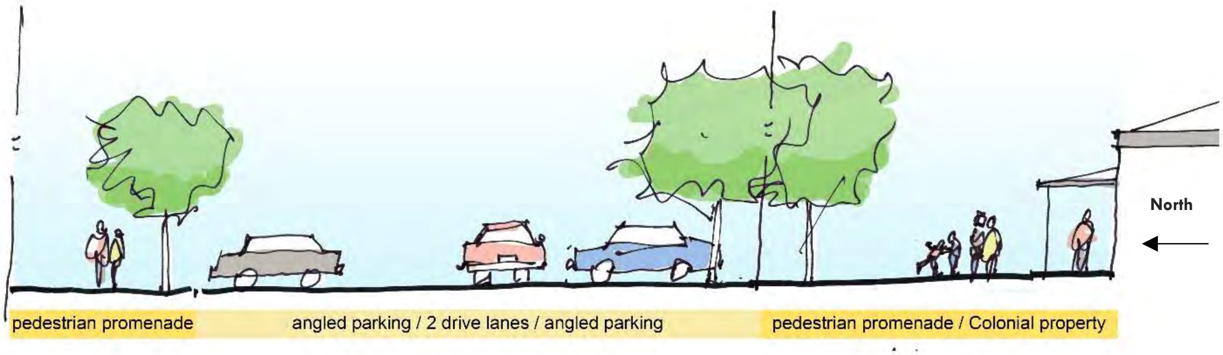

Source: KPG, Framework 2018

## Motor Avenue

The Motor Avenue Urban Design Project would also be carried forward in the Downtown Subarea Plan. The goal is to expand public space in the Downtown and private opportunities for programming, events, and to encourage redevelopment in the area.

Exhibit 2.3-21 shows angled parking on both side of the street, wide sidewalks on the north side and a pedestrian promenade on the south side.

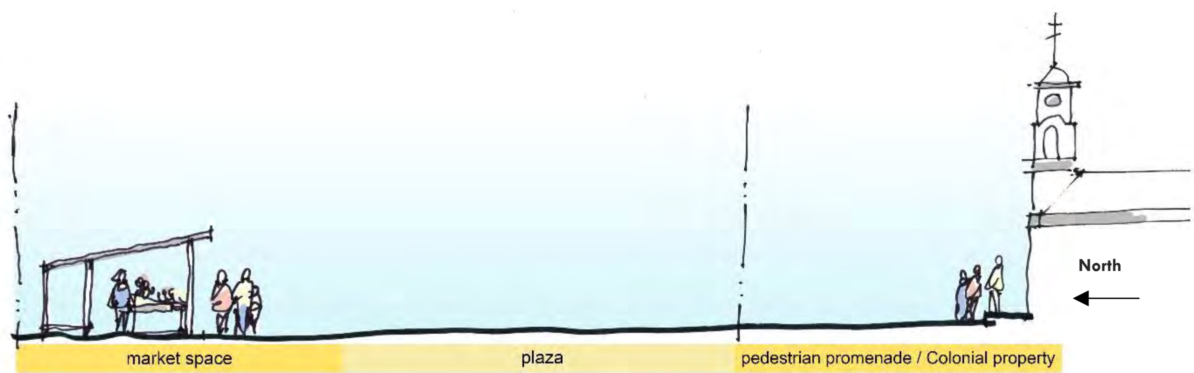
**Exhibit 2.3-21. Motor Avenue SW – Typical Section – Travel, Parking, and Pedestrian Spaces**




Source: KPG 2016

The design supports programming for events with a variety of potential configurations depending on the size of the events including closing the street to vehicular traffic during major events. The concept design also includes a small structure to support a farmer's market, small concerts, and other events, and a large central plaza to highlight the Lakewood Theater. See Exhibit 2.3-22.

**Exhibit 2.3-22. Motor Avenue SW – Typical Section – Market Space and Plaza**

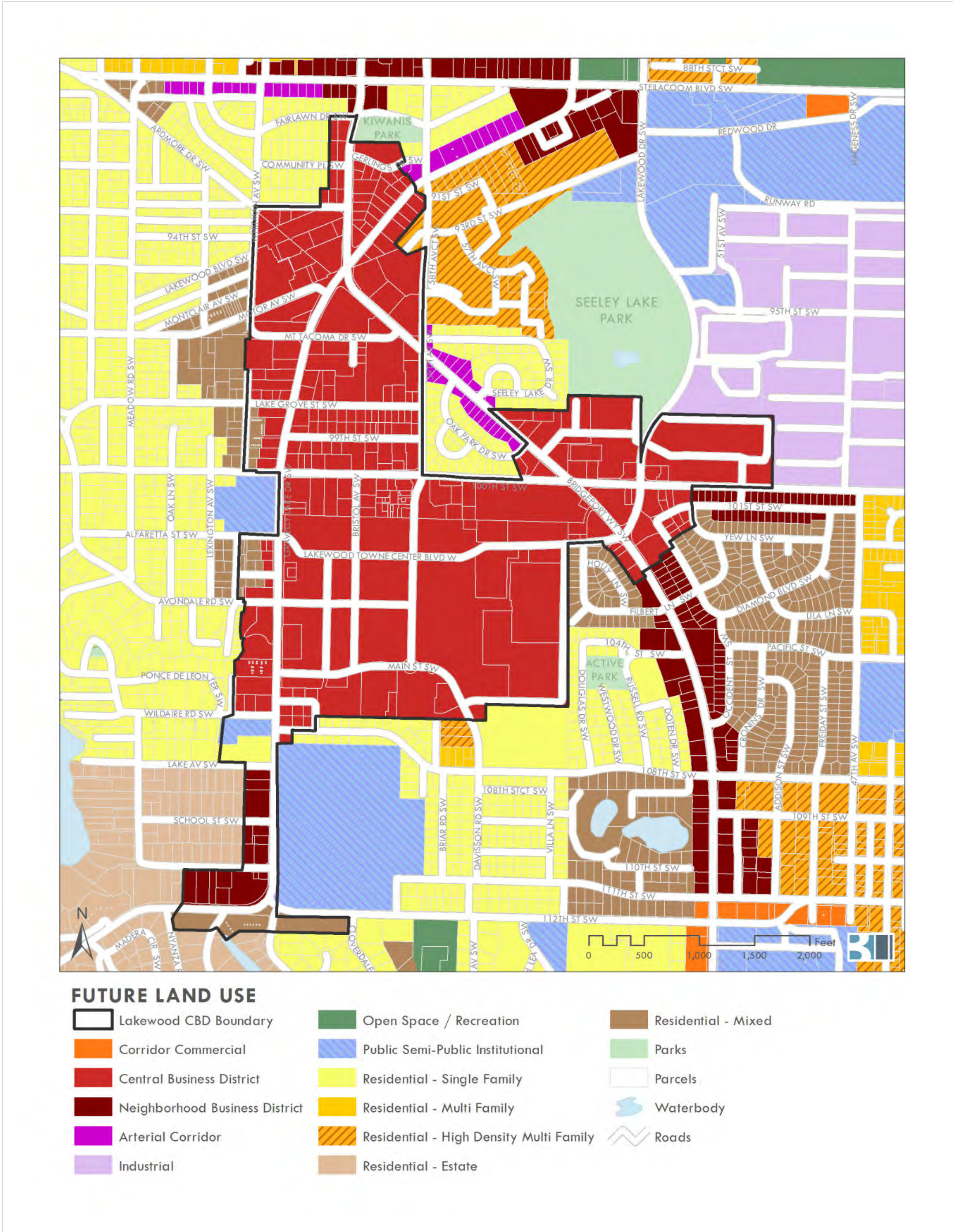



Source: KPG 2016

## *Land Use Plan and Form Based Code*

Most of the Study Area is planned as Central Business District (CBD). See Exhibit 2.3-23. Action Alternatives 1 and 2 would designate the Study Area as "Downtown" in the updated Future Land Use Map, replacing the CBD and other land use designations in the Study Area.

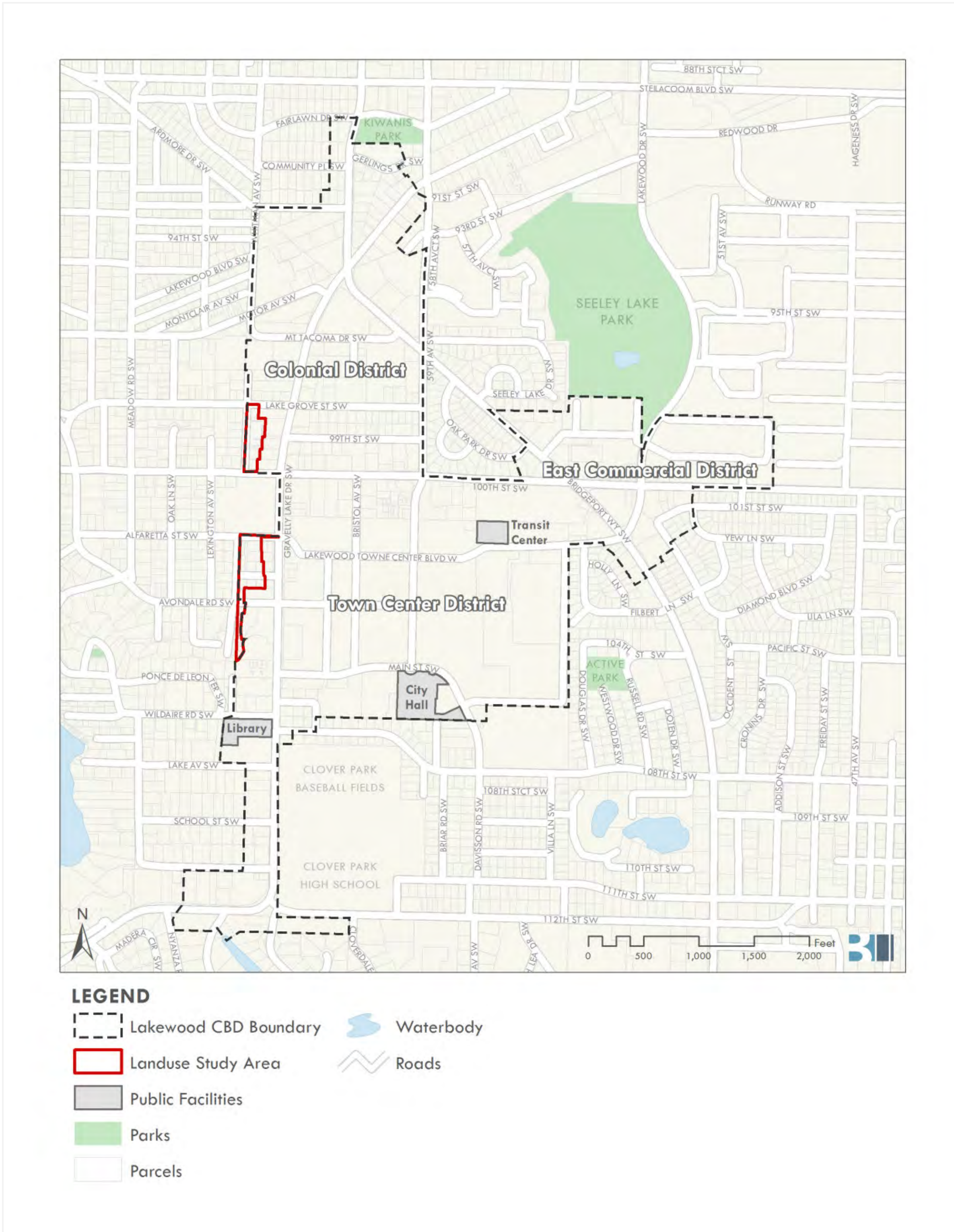
**Exhibit 2.3-23.Future Land Use Plan**




Source: Pierce County Assessor, City of Lakewood, BERK 2017

On the west edge of the Study Area, the current CBD zone splits block boundaries. To consider if the CBD zone boundary should be retained or adjusted, a land use study area is considered. Alternatives 1 and 2 assume some land use designation changes in this location. See Exhibit 2.3-24.

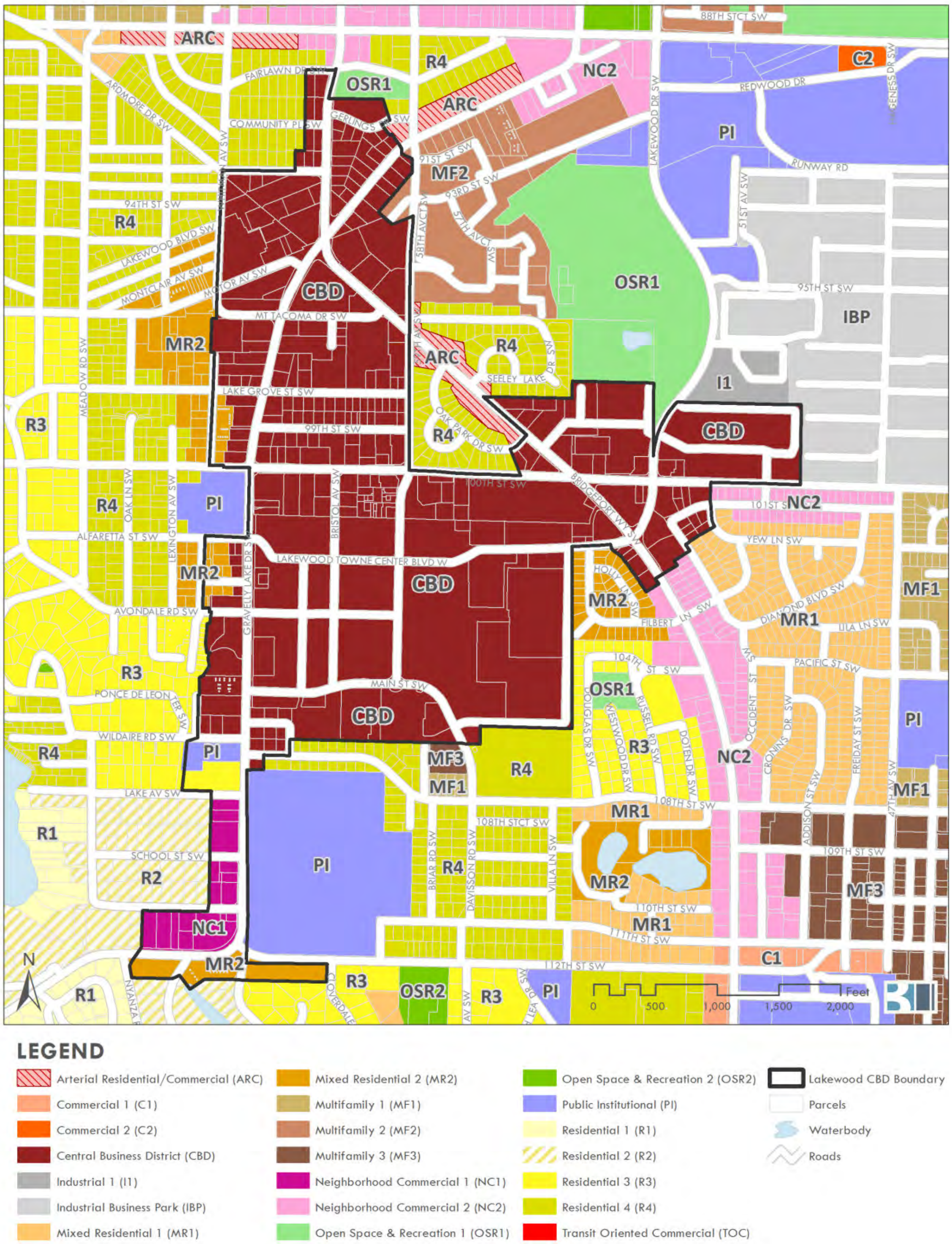
**Exhibit 2.3-24. Land Use Study Area**




Source: City of Lakewood GIS 2017, BERK Consulting 2018

Current zoning follows the Future Land Use Designations with CBD as the primary zone.

**Exhibit 2.3-25. Downtown Area Zoning Map**




Source: City of Lakewood, BERK 2017

With Action Alternatives 1 and 2, current zoning districts in the Plan Area would be replaced with a new zone called "Downtown." Properties would be regulated based on a simplified list of allowed land uses, street types (see Exhibit 2.3-12), building frontage types, and overlay districts to provide for more specific standards based on location and context. The development standards will emphasize building form, relationships between buildings, streets, and public spaces. The development code will emphasize creating an active public realm with streets, parks, and public spaces that are welcoming, active, and fun. The zoning standards would be developed with a Preferred Alternative ahead of the preparation of the Final EIS.

## 2.3.3. Planned Action

A planned action provides more detailed environmental analysis during the early formulation stages of planning proposals rather than at the project permit review stage. Future development proposals consistent with the Downtown Planned Action Ordinance do not have to undergo an environmental threshold determination, and are not subject to SEPA appeals when consistent with the PAO, including specified mitigation measures. Planned actions still need to meet the City's development regulations and to obtain necessary permits.

According to the SEPA law and rules, a planned action is defined as a project that has the following characteristics:

1. *Is designated a planned action by ordinance or resolution adopted by a GMA county/city;*
2. *Has had significant environmental impacts addressed in an EIS, though some analysis can be deferred at the project level pursuant to certain criteria specified in the law;*
3. *Has been prepared in conjunction with a comprehensive plan, subarea plan, a fully contained community, a master planned resort, master planned development, a phased project, or in conjunction with subsequent / implementing projects;*
4. *Is located within an urban growth area;*
5. *Is not an essential public facility, as defined in RCW 12.36.70A.200, unless an essential public facility is accessory to or part of a residential, office, school, commercial, recreational, service, or industrial development that is designated a planned action; and*
6. *Is consistent with a comprehensive plan or subarea plan adopted under GMA.*

The jurisdiction must include a definition of the types of development included, but has options to limit the boundaries and to establish a time during which the planned action will be effective.

Review of a planned action is intended to be simpler and more focused than for other projects. If the PAO is adopted, the City would follow the applicable procedures contained in the ordinance to determine if the proposed project impacts are consistent with the EIS. When a permit application and environmental checklist are submitted for a project that is being proposed as a planned action project, the City must first verify the following:

- The project meets the description of any project(s) designated as a planned action by ordinance or resolution;
- The probable significant adverse environmental impacts were adequately addressed in the EIS; and
- The project includes any conditions or mitigation measures outlined in the ordinance or resolution.

If the project meets the above requirements, the project qualifies as a planned action project and a SEPA threshold determination is not required. However, City actions (i.e., the permit process) are still applicable.

Appendix B contains a draft of the PAO including the information on the draft process and the parameters used to determine consistency with EIS assumptions. The PAO would be implemented with the Downtown Plan as an incentive for future development.

## 2.3.4. Alternatives Comparison

Considering the Downtown Subarea Plan Guiding Principles and major concepts, three alternatives are compared in this Draft EIS.

- **No Action**, a SEPA Required Alternative. This alternative assumes growth according to current trends and under current City Plans and development regulations. The No Action Alternative would assume the least housing and jobs are added based on trends. There would be no additional public investments in parks or stormwater infrastructure. Current transportation plans would be implemented, the number of public streets would not increase, and block size would not decrease. The Subarea Plan and associated form-based code and Planned Action Ordinance would not be adopted.
- **Action Alternative 1**, assuming a moderate level of development based on targeted infrastructure investments and plan and code changes. New housing would be added at more than three times the level of the No Action Alternative, given a greater density allowed. Jobs would more than double the level of the No Action Alternative. The job mix would see a greater number of office or entrepreneurial businesses, and households that want to live, work, shop, and play in the same area. The increased growth in housing and jobs is spurred by a greater investment in multi-modal transportation improvements, parks and gathering spaces, and environmental amenities and stormwater management. Infill and integration of mixed-use development would occur on catalyst sites.
- **Action Alternative 2**, assuming a high level of growth studied including five times the housing and jobs compared with No Action. Alternative 2 is like Alternative 1 except that larger investments in transportation connections, parks, and green infrastructure would be made. The plan and code would allow the greatest density and heights up to similar levels as the current code (90 feet). More redevelopment of catalyst sites into mixed use formats would occur.

Alternative civic and infrastructure investments are compared by Alternative below.

**Exhibit 2.3-26. Lakewood Downtown Civic and Infrastructure Investments**

| FEATURE | No Action | Action Alternative 1 | Action Alternative 2 |
|---|---|---|---|
| Catalyst Sites | Development per current plans and codes. Less transformation of catalyst areas. | Infill and integration of new mixed-use development on catalyst sites. | Fuller redevelopment of catalyst sites into mixed-use centers. |
| Civic Parks, Community Gathering | No new parks | New 2-acre Central Park, new Green Street | New 4-acre Central Park, new Green Street Loop, |

| FEATURE | No Action | Action Alternative 1 | Action Alternative 2 |
|---|---|---|---|
| | | Loop, and connections to adjacent parks | and connections to adjacent parks |
| Transportation Connectivity | Per current plan. The City's 6-year TIP (2018-2023) includes the following relevant improvement projects:<br>▪ 2.69B – Gravelly Lake Drive Road Diet b/w Bridgeport and Steilacoom (4 lanes to 3 lanes with bicycle lanes)<br>▪ 2.72 – 100th St. & Lakewood Dr. curb, gutter, sidewalks, new signal<br>▪ 2.82 – New sidewalk east side of 59th Ave from 100th St to Bridgeport Way<br>▪ 3.13 – Install a traffic signal at Gravelly Lake Drive / Avondale Road<br>▪ 5.7 – Improve non-motorized connections on Motor Ave b/w Whitman and Gravelly Lake Dr.<br>▪ 9.16 – 59th Ave pavement restoration from Main St to 100th St<br>▪ 9.22 – 100th St pavement restoration from 59th Ave to Lakeview Ave | The City's planned investments with changes/adds:<br>▪ Retain Bridgeport Way SW as primary vehicle entrance-strengthen gateway<br>▪ Retain 100th Street SW as a primary east-west vehicle connection between I-5 and subarea<br>▪ Modify cross section of Gravelly Lake Blvd. Study, 3, 4, and 5-lane cross sections between Bridgeport and Nyanza Road SW to allow for improved bicycle and pedestrian facilities*<br>▪ Conversion of Lakewood Towne Center Blvd and Bristol Ave as public streets<br>▪ Lakewood Towne Center Blvd at 59th Ave SW, consider roundabout<br>▪ Reduce 59th Avenue SW to two lanes, allowing for bicycle facilities<br>▪ Addition of new street connections to support walkability. Alternative 1 assumes fewer connections based on phasing or property owner preferences, compared with Alternative 2. Consider 400 feet as the desired maximum block lengths throughout Subarea. | |
| Ecosystem – e.g. creek daylighting, menu of stormwater requirements | No change to creek. Implement stormwater manual on site by site basis. | Consider range of options qualitatively: greater investment in green infrastructure compared with creek daylighting. | |

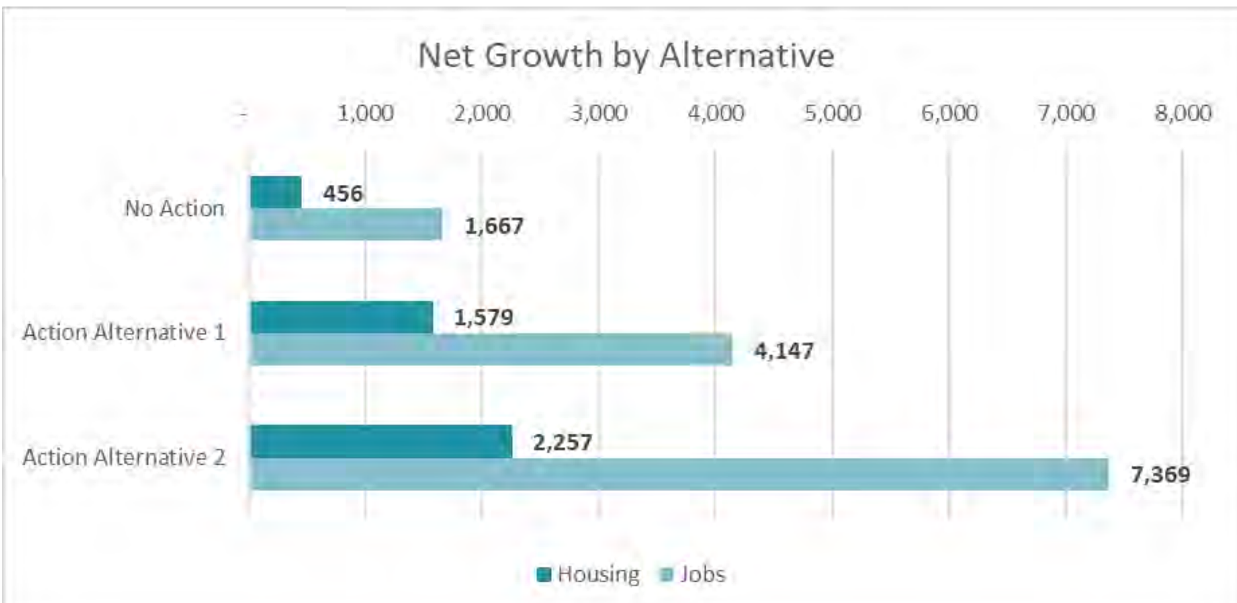
Note: * For a conservative test of alternative transportation improvements, the EIS authors modeled the greatest shift in traffic for Gravelly Lake Drive at three lanes and then compared it to no change in the section (five lanes). The analysis provides information indicating that added public streets help distribute the traffic, but that other arterial conditions would require more mitigation. Fewer improvements on other arterials would be needed if four or five lanes is retained in the roadway. This helps the City determine what combination of capital improvements, amenities, and costs are desired.

Due to land use, density, height, parking, and other allowances, growth would vary by alternative as illustrated below.

**Exhibit 2.3-27. Alternative Plan and Code Changes and associated Housing and Job Growth**

| FEATURE | No Action | Action ALTERNATIVE 1 | Action ALTERNATIVE 2 |
|---|---|---|---|
| Plan and Code | Current Plan and Code | New Subarea Plan<br>New Form-Based Code and Parking Standards | New Subarea Plan<br>New Form-Based Code and Parking Standards |

| FEATURE | No Action | Action ALTERNATIVE 1 | Action ALTERNATIVE 2 |
|---|---|---|---|
| Height | Up to 90 feet allowed, trend of 1-2 stories | Greater height in center, but stepped back on periphery.<br>Most development at 2 to 6 stories.<br>Incentives to earn up to 90 feet (e.g. office). | Greater height in center, but stepped back on periphery. More development of office and housing would create greater intensity of building form and heights up to 90 feet. |
| Housing Density | 54 units per acre | 80 units per acre | 100 units per acre |
| Housing: net growth | 456 | 1,579 | 2,257 |
| Job Trends and Building Space | Current trends continue: minor new construction and addition of jobs at existing sites. | Assume 50% of expected 3.0 million new square feet of commercial space. | Assume 95% of expected 3.0 million new square feet of commercial space. |
| Job Mix | Compared to existing job mix, lesser share of retail and less manufacturing/warehousing, and greater share of finance, insurance, real estate, and services (e.g. office). Similar share of government and education. (Per City transportation model assumptions.) | | |
| Jobs: net growth | 1,667 | 4,147 | 7,369 |




Source: BERK Consulting 2017

# 2.4. SEPA Comment Opportunities

The City provided comment opportunities with a Determination of Significance and Scoping Notice issued December 8, 2017 for a 21-day comment period that closed on December 29, 2017 (see Appendix A). The Draft EIS is being issued with a 30-day comment period during which time written comments are being requested (see Fact Sheet). Following the Draft EIS issuance, the Final EIS will respond to public comments.

Public meetings and hearings on the Planned Action Ordinance and other code amendments (e.g. form based code) will receive legislative review by the Planning Commission and City Council. Project related meetings and comment periods are advertised at the project webpage: https://www.lakewooddowntownplan.org/.

## 2.5. Benefits and Disadvantages of Delaying the Proposed Action

Delay of the proposed action would continue present trends of a lower-density single-purpose commercial center. Delay of the proposal would reduce potential for additional traffic trips and utility and service demands and costs.

The disadvantages of delaying the proposed action include a lack of economic development and housing variety, contrary to City long-range plans. Delaying redevelopment would also delay the improvement of stormwater quality and associated natural systems, and delay the addition of parks and trails in an identified gap area.

# 3.0 Affected Environment, Significant Impacts, and Mitigation Measures

## 3.1. Natural Environment

This section discusses critical areas and stormwater as it applies to the natural environment. The stormwater utility is discussed in Section 3.6 Utilities.

Critical areas reviewed include wetlands, flood hazard areas, fish and wildlife habitat areas (including streams), aquifer recharge areas, and geologically hazardous areas. Current inventories of natural environment conditions were collected from state, county, and city sources, particularly Geographic Information System (GIS) maps. The EIS consultant team's biologist conducted a windshield survey, reviewed aerials, and existing studies. Each alternative's growth was examined in relation to existing natural resources.

For the purposes of this EIS, a significant impact is defined as:

- Direct impacts to critical areas from groundwater contamination, wetland fill, or stream or wetland buffer loss, or
- Indirect impacts include changes to water quality and quantity of downstream water bodies.

### 3.1.1. Affected Environment

#### *Areawide*

The Study Area of Downtown Lakewood is in Water Resource Inventory Area (WRIA) 12, the Chambers-Clover watershed. It is developed with greenspace limited primarily to landscaping and street trees. Critical areas mapped within the Downtown Subarea are wetlands and wildlife habitat conservation areas (including streams) (LMC 14A.165). There are no active faults, geologically hazardous areas, or documented Priority Oregon White Oak Woodlands (Pierce County, 2017; WDFW, 2017b). Urban adapted wildlife (e.g. rodents, raccoons, and some birds such as crows) may take advantage of the limited greenspace within Downtown Lakewood.

In addition to mapped critical areas, several streams and waterbodies are piped within the planning area. Lakewood's Phase II Municipal Stormwater permit allows Lakewood to discharge stormwater into waters of the state. The stormwater pipes and vaults are shown on Exhibit 3.1-1.

The entire Study Area is within an aquifer recharge area (Lakewood Water District, 2018). The soils are highly permeable and gravelly in nature, and the area is rated as highly vulnerable on the DRASTIC index range (LMC 14A.150; (Brown and Caldwell, Adolfson Associates, Sweet Edwards, Robinson & Noble, and Triangle Associates., 1990). The City's sole source of drinking water is from underground aquifers, and recharge (replenishing) of the aquifers comes from local rainfall in the Clover-Chambers watershed. Additionally, the depth of the water table in the Downtown Lakewood Study Area is not known. Geotechnical reports for previous developments (Geotechnical Engineering Services, 2000 and Geopier, 2017) have shown groundwater was encountered at approximately 10 feet below ground surface. These two sites are located in the Town Center District; however, a high or perched water table may be throughout the study area. Exhibit 3.1-1shows critical areas throughout the Downtown Subarea.

## *Colonial District*

There are no mapped critical areas in the Colonial District. Stormwater pipes are primarily along the major roads. This district has less impervious surface compared to the Town Center and East Commercial districts which would allow more natural infiltration (Exhibit 3.1-1).

## *Town Center District*

The Town Center District is almost entirely paved, with little pervious surface area. The stormwater system includes areas of multiple pipes in order to retain and store stormwater. Although developed, this area serves as the headwaters to Ponce de Leon Creek. The stormwater system discharges to Clover Creek and Ponce de Leon Creek.

Clover Creek flows northwest under Gravelly-Lake Drive in the southwest corner of the Town Center District and drains to Lake Steilacoom. Clover Creek is a known salmon spawning stream with Coho salmon documented and Winter Steelhead presumed present (WDFW, 2017). Portions of Clover Creek are within a special flood hazard area (Zone AE). Special flood hazard areas are subject to flooding and have a 1% annual chance of flood (100-year food) (FEMA, 2017).

Clover Creek is listed as a Category 5 water on Ecology's 303(d) list for exceeding state water quality standards for temperature, bacteria, and dissolved oxygen. A Category 5 water requires a Total Maximum Daily Load (TMDL) or other water quality improvement project be developed. Clover Creek is also listed as a 303(d) Category 2 (water of concern) for lead.

Ponce de Leon Creek flows west from a culvert under Gravelly Lake Drive between Avondale Road SW and Main Street SW and eventually into Lake Steilacoom. The headwaters of Ponce de Leon Creek have been piped under the Town Center District and are the sole source of water flowing into Ponce de Leon Creek. Coho and Kokanee salmon are both documented to be present in Ponce de Leon Creek to the west of the Town Center District (WDFW, 2017a). Steelhead salmon are designated as threatened under the Federal Endangered Species Act, Coho salmon are a federal species of concern, and Kokanee salmon are not listed.

Ponce de Leon Creek is listed as a 303(d) Category 2 water for exceeding water quality standards for temperature and dissolved oxygen. Both creeks flow into Lake Steilacoom, which is considered a 303(d) Category 5 water for total phosphorus.

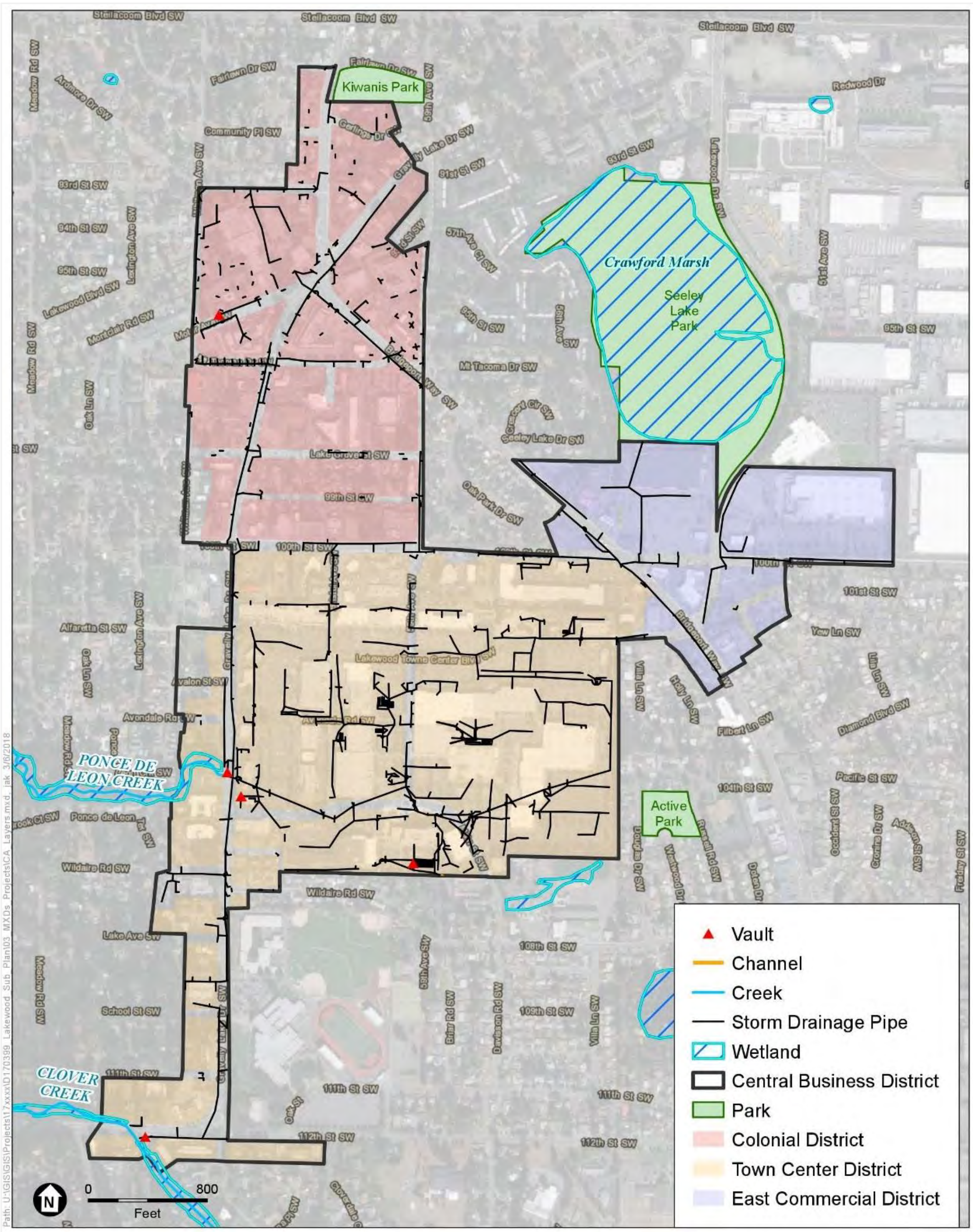
Both Clover and Ponce de Leon Creeks have associated wetlands as shown on Exhibit 3.1-1(USFWS, 2017). There are no other wetlands identified within the Town Center District.

## *East Commercial District*

There are no critical areas in the East Commercial District. Crawford Marsh, located within Seeley Lake Park, is a large forested and scrub-shrub wetland with areas of open water. Seeley Lake Park is located immediately to the north of the East Commercial District, outside of the Downtown Subarea (USFWS, 2017).

The East Commercial District is almost entirely paved and stormwater pipes are primarily along the major roads. Stormwater from this district discharges directly into Crawford Marsh/Seeley Lake Park (Exhibit 3.1-1).

**Exhibit 3.1-1. Surface Water Features**




Source: Digital Globe, 2016, City of Lakewood, Pierce County GIS, ESA 2018

# 3.1.2. Impacts

## *Impacts Common to All Alternatives*

### Direct Impacts

The area is urban in character and there is a potential for direct impacts to critical areas from groundwater contamination, wetland fill, or stream or wetland buffer loss. In areas where development is older and has not undergone redevelopment, and thus does not have stormwater treatment, there is a greater potential to affect groundwater quality. Newer (existing development) and future redevelopment will comply with the 2012 Stormwater Management Manual for Western Washington (Ecology, 2014) and the Pierce County Stormwater Management and Site Development Manual (2015), or the adopted manuals at the time development occurs. These manuals outline stormwater requirements for construction and operation of development projects, including permanent stormwater control plans, construction stormwater pollution prevention plans, and groundwater (wellhead) protection plans. As a result, infiltration, stormwater, and surface water runoff would include appropriate treatment measures to decrease the potential for groundwater contamination.

Ponce De Leon Creek, Clover Creek and their associated wetlands are located in the southwest portion of the Study Area. If development were proposed in the vicinity, wildlife habitat conservation area (stream) and wetland regulations would apply and require avoidance and/or minimization of impacts as appropriate.

### Indirect Impacts

As a result of redevelopment and installation of stormwater treatment, potential indirect impacts include changes to water quality and quantity of downstream water bodies including portions of Ponce De Leon and Clover Creeks which are outside of the Study Area, Crawford Marsh, and Lake Steilacoom.

## *No Action*

Under the No Action Alternative, there would be less change to existing conditions with the fewest dwellings and jobs added on vacant or redevelopable sites (see Exhibit 2.3-11), or catalyst sites (see Exhibit 2.3-2): about 456 dwellings and 1,667 jobs would be added on sites that are already largely urban in character (see Exhibit 2.3-27). Future public and private development would continue to comply with all applicable regulations, but no new subarea plan policies or capital projects are proposed that would improve the natural environment. Due to continuation of current land use policies and zoning and less public investment in parks and green infrastructure within the Study Area, it is anticipated that less redevelopment opportunities would allow for implementation of newer stormwater management and water quality measures. Decreases in impervious surfaces and improvements to stormwater runoff would be implemented on a project-by-project basis consistent with stormwater standards. These improvements are expected to be less than with Alternatives 1 or 2. While City policies support stream restoration and restoration of Seeley Lake Park, there is expected to be limited redevelopment in the Study Area and less potential to accomplish restoration efforts.

## Action Alternative 1

Alternative 1 would amend proposed land use and zoning regulations, allowing for more intensive mixed uses and more investments in parks and green infrastructure such as the Green Loop. Growth would include 1,579 new dwellings and about 4,147 new jobs. In addition to the vacant and redevelopable sites potentially changing, there would be larger catalyst sites where redevelopment is expected, such as the Town Center District (see Exhibit 2.3-2 and Exhibit 2.3-11). All redevelopment would require implementation of newer stormwater management and water quality measures.

Alternative 1 would include a new 2-acre park in the Town Center District (see Exhibit 2.3-5) and an increase of pervious surface areas with the removal of paved areas and the installation of more landscaping and low impact development techniques. A decrease of impervious surface area would allow for a greater degree of aquifer recharge to occur than does currently. However, greater recharge would also potentially increase the risk of groundwater contamination without appropriate treatment and best management practices (BMPs).

The Green Loop, pedestrian friendly street design, connection to Active Park, and mixed-use development would encourage modes of transportation other than driving (see Exhibit 2.3-1 and Exhibit 2.3-12). Additionally, the increase of greenspace would provide more opportunities for wildlife adapted to urban habitats.

Daylighting a portion of Ponce de Leon Creek could provide additional instream and riparian habitat along the daylighted portion of the stream. Daylighting a portion of the creek could also have a community benefit and be an opportunity for education as it would be a natural feature in an urban environment. However, daylighting a portion of the creek would not necessarily address water quality issues, which could hinder ecological benefit. The area also has a high water table, and daylighting may have an effect on groundwater. Additionally, depending upon site constraints and easements acquired, the riparian area may be too narrow to provide any ecological benefit or costs may render daylighting impractical.

Alternative 1 would also include improvements in the stormwater system, which currently has limited areas of filtration or water quality treatment due to more recent development. Stormwater system modifications would focus on improving stormwater quality and maintaining flow (water quantity) to the existing aboveground Ponce de Leon Creek. Improvements to the stormwater system, as well as the reduction in impervious surface area, would decrease the impact to water quality downstream and to groundwater. Overall, Alternative 1 would be an improvement over existing conditions to the natural environment.

Alternative 1 also supports efforts by Pierce County Parks and Recreation to address potential habitat, stormwater, and recreation improvements to Seeley Lake Park. Pierce County has an unfunded project in its 2018 six-year Capital Facility Plan to conduct a stormwater and habitat study of the park.

## Action Alternative 2

Alternative 2 would amend land use and zoning regulations and assumes greater housing density and more implementation of public park space and transportation infrastructure than Alternative 1 and could lead to the highest number of dwellings and jobs, respectively 2,257 and 7,369. Vacant, redevelopable, and catalyst sites would change to the most intensive mixed-use pattern studied. (see Exhibit 2.3-2 and

Exhibit 2.3-11). More complete redevelopment of large sites such as in the Town Center District would allow for more vertical development of housing and offices, though to the same footprint as Alternative 1. There would be the most opportunity to alter the urban environment and institute landscaping and stormwater treatment. All redevelopment would require implementation of newer stormwater management and water quality measures.

Like Alternative 1, Alternative 2 would include the Green Loop, pedestrian friendly street design, a connection to Active Park, and mixed-use development that would encourage non-driving modes of transportation (see Exhibit 2.3-1 and Exhibit 2.3-12). In addition, it would include a new four-acre park (rather than 2 acres) and more green infrastructure amenities compared to Alternative 1 (see Exhibit 2.3-7.) Alternative 2 would remove more impervious surface areas and invest more in the stormwater system, potentially further offsetting impacts groundwater and to water quality downstream. Restoration of Seeley Lake Park and the option to daylight a portion of Ponce de Leon Creek would be similar to Alternative 1. Alternative 2 would be an improvement over existing conditions and provide greater benefits to natural resources than Alternative 1.

## 3.1.3. Mitigation Measures

### *Incorporated Plan Features*

Alternatives 1 and 2 include the following features:

- Restoration of Seeley Lake Park;
- An option to daylight a portion of Ponce de Leon Creek;
- Increased greenspace and a decrease in impervious surfaces;
- Improved stormwater treatment; and
- Redevelopment's Compliance with the 2012 Stormwater Management Manual for Western Washington, which lists BMPs to minimize stormwater impacts on water quality and quantity.

Alternative 2 would invest more in these features, and thus result in a greater benefit to the natural environment compared to Alterative 1.

### *Regulations and Commitments*

The following would apply to all alternatives:

- City of Lakewood Critical Area Regulations, which includes protection of:
  - Aquifer recharge areas;
  - Fish and wildlife habitat areas (including streams) and their buffers;
  - Flood hazard areas;
  - Wetlands and their buffers;
- City of Lakewood Engineering Standards Manual (City of Lakewood, 2016);

- 2012 Stormwater Management Manual for Western Washington (as amended in 2014) (Washington Department of Ecology, 2014);
- Pierce County Stormwater Management and Site Development Manual  (Pierce County, 2015) ; and
- WSDOT Highway Runoff Manual (Washington State Department of Transportation, 2014)

### *Other Proposed Mitigation Measures*

The following measures can be applied to all alternatives, including No Action:

- With major redevelopment that would propose activities that could involve groundwater discharge or potential changes to groundwater flow (such as underground structures), the City could require site specific evaluation of groundwater protection. The susceptibility and vulnerability of the critical aquifer recharge area should be evaluated by a licensed hydrogeologist. All stormwater should be treated appropriately to avoid any potential groundwater contamination. Stormwater improvements should be designed to improve aquifer recharge.
- The City could require a conservation easement or other regulatory structure for piped streams to ensure that the possibility of creek daylighting is not precluded by future redevelopment. The ecological benefits of daylighting a portion of Ponce de Leon Creek could be evaluated by the City. An evaluation could include leaving the stream piped but identifying its historic location, as well as considering water quality treatments that benefit the nearby open channel stream, and serve as landscape amenities in the Study Area.
- Landscaping could consist of native species or species with low water requirements.
- The City could require educational signage for aboveground stormwater facilities and/or added natural features.
- The Downtown Plan can offer support for Pierce County efforts to address potential habitat, stormwater, and recreation improvements to Seeley Lake Park.

## 3.1.4. Significant Unavoidable Adverse Impacts

There would be no significant unavoidable adverse impacts with any of the alternatives. Redevelopment of the Downtown Subarea would require stormwater BMPs, which would result in an improvement to stormwater runoff and a benefit to the natural environment. There are limited critical areas in the Study Area, but where they exist, the City's critical areas ordinance regulations would apply, and no direct impacts to critical areas are assumed.

# 3.2. Population, Employment, and Housing

This section examines current demographic and socio-economic characteristics of residents of the Study Area. Data is from the U.S. Census Bureau and earlier studies of the Central Business District (CBD) area.

After describing current conditions, the Impacts analysis considers how each alternative could affect population, housing, and jobs within the Study Area. This includes the potential for population growth, housing types and densities, and job growth and mix.

For the purposes of this analysis, this section identifies significant impacts using the following threshold:

- Insufficient capacity to replace displaced dwellings and jobs

## 3.2.1. Affected Environment

This section provides demographic data at three scales: citywide, the area within a 15-minute drive of the CBD zone, which is the most extensive zone in the Downtown Lakewood Study Area, and census tract block group containing the majority of the Study Area.

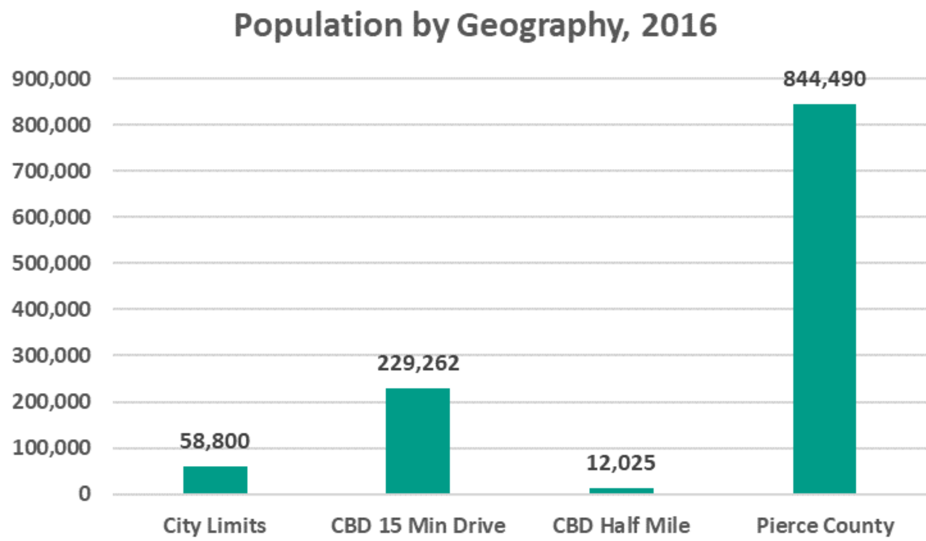
### *Population*

#### City and CBD Vicinity Population Figures

Lakewood's population is approximately 58,800 as of 2016, but has been essentially flat since 2000. From 2000 to 2016, Lakewood's population grew by 507 people. Lakewood had an average annual growth rate from 2000 to 2010 of -0.02% and an average annual growth rate from 2010 to 2016 of 0.18%. Lakewood is the second largest incorporated city in Pierce County. Its population is 7% of the county's total population.

The population of the CBD 15-minute drive geography is almost four times the population of Lakewood. However, within a half-mile, the population is only about 12,025. See Exhibit 3.2-1.

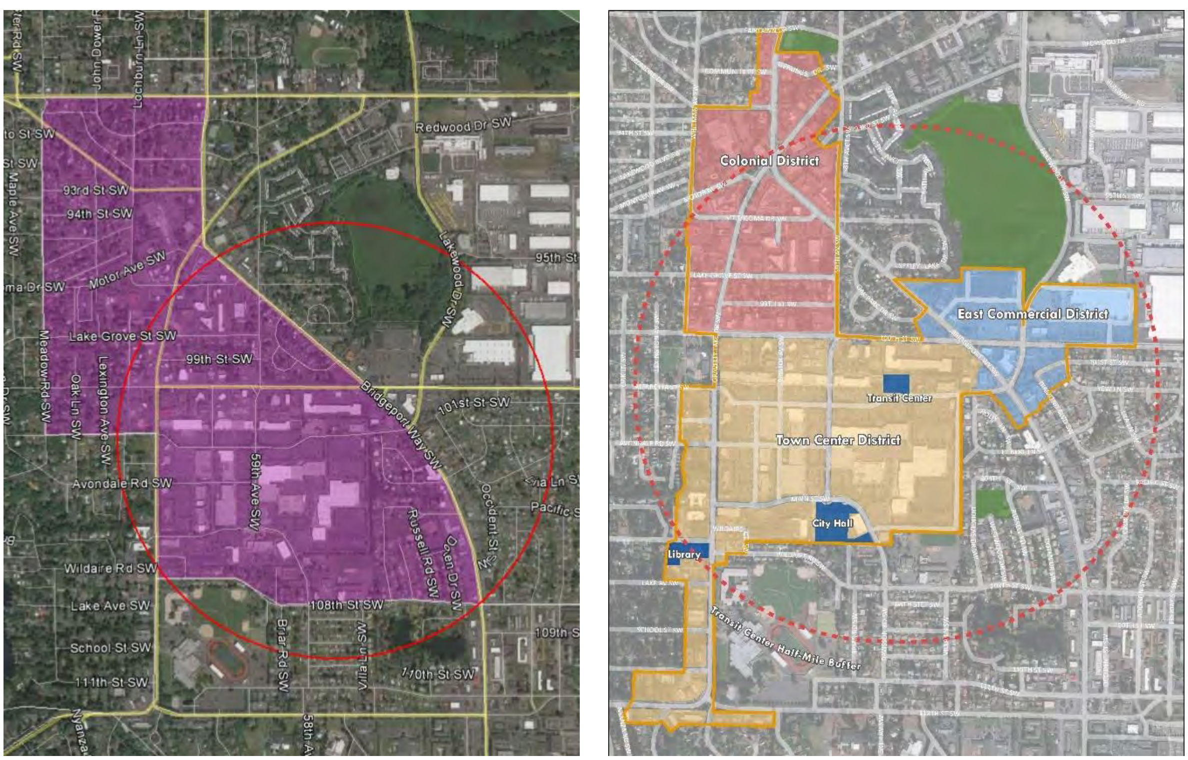
**Exhibit 3.2-1. Lakewood and Pierce County Population**




Source: OFM, 2016; ESRI, 2016.

Considering Census Tract 719.01 Block Group 1, which contains most of the Town Center District (see Exhibit 3.2-2), there was a population of about 1,663 in the year 2016. Some of this population lies outside the Study Area but within the Census Block Group boundary.

**Exhibit 3.2-2. Study Area and Relationship to Census Tract 719.01 Block Group 1**



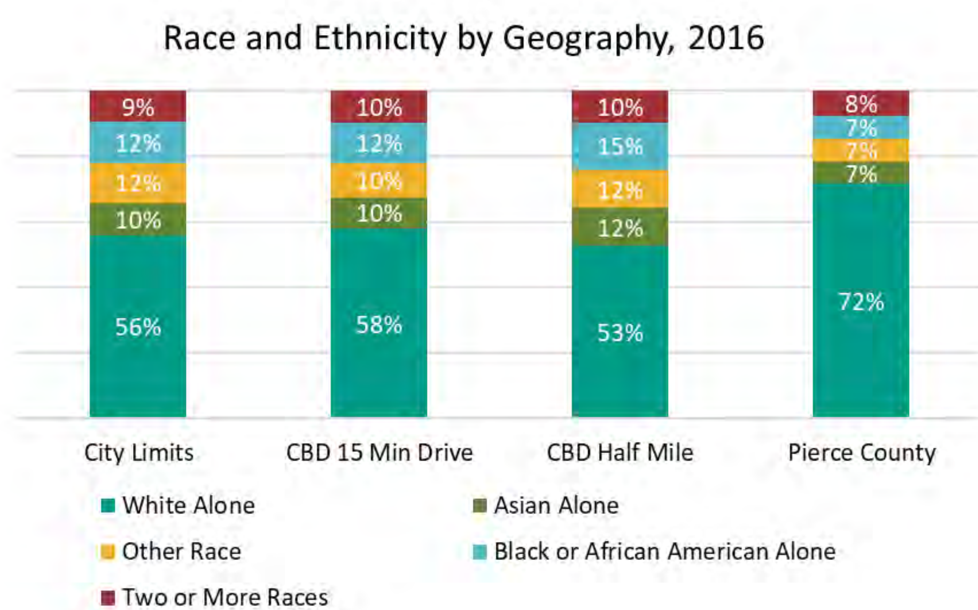

Note: Block Group 1 is the area north of 112th Street SW
Source: Washington State Office of Financial Management, Small Area Estimates, Census Tracts, 2017

## City Population Characteristics

Summarizing the February 2017 CBD Assessment (BERK Consulting, 2017) Lakewood's population characteristics are as follows:

- **Age:** Similar to Pierce County, about 48% of the City's population is under the age of 35. The City has gotten older as it has seen its share of persons aged 65 years and older increase.
- **Education:** Lakewood residents are less educated than the population of Pierce County as a whole.
- **Racial and Ethnic Diversity:** Lakewood and Pierce County are becoming more racially diverse, with Lakewood being more diverse than the county overall. See Exhibit 3.2-3.
- **Language:** Lakewood is more diverse than the county in terms of languages spoken. In 2016, 24% of the Lakewood population spoke a language other than English at home compared to 15% of the Pierce County population. 11% of the Lakewood population spoke Spanish at home compared to 6% of the Pierce County population. 9% of the Lakewood population spoke Asian and Pacific Island languages at home, compared to 5% of the County population.
- **Income:** Lakewood residents earn less than county households. 55% of Lakewood households earn less than $50,000, compared to 40% of Pierce County households. 16% of Lakewood households earn more than $100,000, compared with 26% for the County. The percent of the Lakewood population living in poverty has grown from 15% in 2000 to 20% in 2016, whereas Pierce County's population living in poverty has increased more moderately 11% to 13%.

**Exhibit 3.2-3. Race and Ethnicity: Lakewood, Town Center District Vicinity (CBD), and Pierce County**




Source: ESRI, 2016

## Study Area Population

Census Tract 719.01 Block Group 1 encompasses most of the Study Area, but includes housing that is located outside of the Study Area. The Census Tract 719.01 Block Group 1 shows a total population of

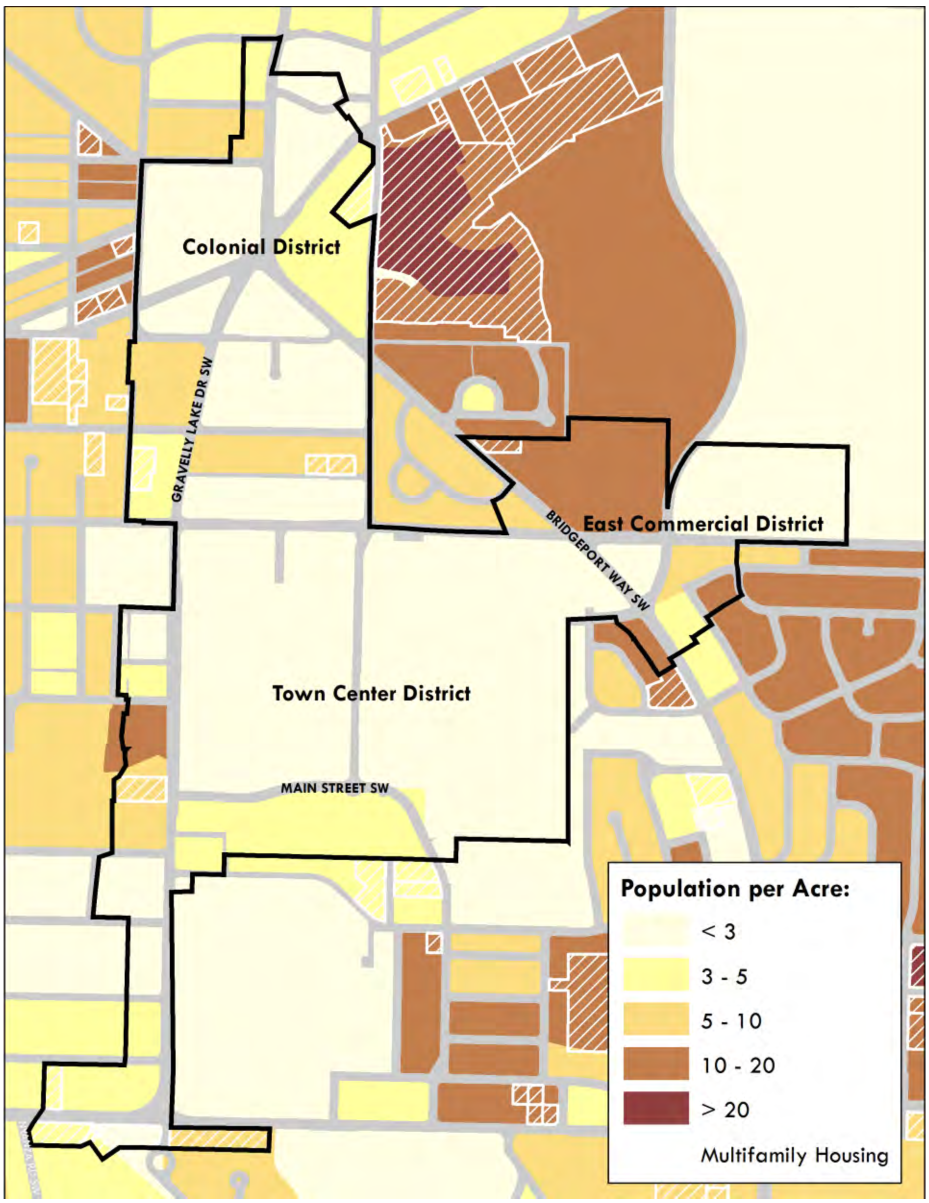
4,637. Parcel data demonstrates 419 dwelling units and a resulting potential base population of 909 within the Study Area.

## *Housing*

### City and Study Area Housing

Within the Census Track Block Group containing the majority of the Study Area (Exhibit 3.2-2), there are approximately 811 dwellings, though that overstates housing given the difference in the Block Group and Study Area boundaries. Parcel data sets show 419 dwelling units. The following map illustrates population density and location of multi-family dwellings; most of the multifamily residential dwellings abut the Downtown Study Area on the east. See Exhibit 3.2-4.

**Exhibit 3.2-4. Town Center Vicinity: Population Density and Multifamily Housing**




Source: US Census and City of Lakewood 2017

As listed in Exhibit 3.2-4, approximately, 40% of housing units in Lakewood are owner-occupied, compared to 57% of Pierce County housing units. Within a half-mile of the CBD, nearly 60% of households are renter-occupied. According to US Census sources compiled by ESRI and State OFM estimates, the share of Lakewood's housing stock that is vacant increased steadily from 6% in 2000 to 9% in 2010 and 11% in 2016. Vacant housing in the County increased from 6% to 8% over the same time.

**Exhibit 3.2-5. Housing Tenure**

| Housing (2016) | City Limits | CBD 15 Min Drive | CBD Half Mile | Pierce County |
|---|---|---|---|---|
| Housing Units | 27,539 | 96,771 | 5,866 | 345,963 |
| Owner Occupied Housing Units | 40% | 43% | 31% | 57% |
| Renter Occupied Housing Units | 49% | 47% | 58% | 35% |
| Vacant Housing Units | 11% | 9% | 11% | 8% |

Source: OFM, 2016; ESRI, 2016.

In contrast, estimates by US Housing and Urban Development (HUD) show a tighter market for the Tacoma-Lakewood area, with single-family homes vacancy at 1.4% and apartment vacancy 2.9% as of July 1, 2017 (US Department of Housing and Urban Development, Office of Policy Development and Research, July 1, 2017).

## Potential for New Housing

The City commissioned a report of the potential for housing at Lakewood Towne Center (McCament & Rogers 2014). A market survey and site planning effort examined the potential for garden style apartments, townhomes, and live-work units. Additionally, in addition to high-density urban housing, a hotel with an associated executive business center was considered. The review noted that Lakewood is perceived as a suburban residential market rather than urban location. While the zoning code allowed for greater height and density, the existing development regulations did not provide information on building form in relation to market conditions, or construction standards. The report concluded that two to three story buildings with tuck-under and/or surface parking combinations would best suited for this market area. Such a design would lower construction costs lower and provide opportunities for streetscapes.

The CBD Assessment (BERK 2017) encouraged residential development to increase the size of the close-in population and to help activate the Downtown. Some of the ideas included:

- Create mechanisms that incentive multi-family development in particular;
- Engage affordable housing organizations about opportunities and partnerships to increase housing in the Downtown;
- Consider an innovative housing pilot program to provide regulatory flexibility and incentives to develop new housing in the Downtown; and
- Consider co-locating new housing and mixed-use development with new community facilities.

### Military Housing Preferences

Per a recent on-base military survey given to both service members and DOD civilians, there were a total of 3,061 respondents; of these 3,000+ respondents, 42% were service members, 38% were DOD civilians, and 18% military retirees.

The survey reports that 12.5% live on JBLM, while 87.5% reside off base. 38% of the respondents reported renting while 60% reported home ownership. The following cities reported the highest survey response counts: 14.12% reside in Lacey, 12.55% JBLM, 8.93% Olympia, 8.87% Tacoma, 8.3% DuPont, 7.93% Spanaway, and 7.8% Lakewood.

The top three reasons given for where respondents reside included:

- ease of commute to the base,
- crime and safety within their communities, and
- adequate education for their children.

Of the respondents, the highest percentages of children were located within the North Thurston School District, reflecting the strongest growth of military population near the City of Lacey.

Other relevant information from the survey includes:

- 77% of the total respondents reported their marital status as married, and
- 77% respondents reported shopping mostly off base and at grocery/retail stores located near their home communities

Providing attractive retail offerings and quality housing close to services could help draw more of the JBLM population to live and shop in Lakewood.

## *Employment*

### Job Mix and Employment

In 2016, total employment for Pierce County was 381,336 and total employment for Lakewood was 23,313. From 2000 to 2016, Pierce County employment grew by 21%, while employment in Lakewood grew by only 1%. The Services industry from 2000 to 2016 continued to employ the largest percentage of employees in both Lakewood (47% in 2016) and Pierce County (46% in 2016).

With a job to housing ratio of 0.87, Lakewood is a net exporter of workers, with more people living in Lakewood than working in Lakewood. Lakewood's second and third largest employment sectors are Retail and Manufacturing. At 9%, Lakewood has one of the higher unemployment rates of all the shown geographies. In comparison, the Pierce County unemployment rate is 6% (BERK Consulting, 2017).

The Puget Sound Regional Council (PSRC) manages State Employment Security Department (ESD) data for the region. The 2016 data estimated 5,248 jobs (most in services and retail) within the Study Area were subject to unemployment insurance.

**Exhibit 3.2-6. Covered Employment Estimates, Lakewood Study Area: 2016**

| Sector | Jobs 2016 |
|---|---|
| Construction/Resource | 68 |
| Finance, Insurance and Real Estate (FIRE) | 469 |
| Manufacturing/Warehouse Transportation Utilities (WTU) | 68 |
| Retail | 1,356 |
| Services* | 2,896 |
| Government | 391 |
| Education | - |
| **Total** | **5,248** |

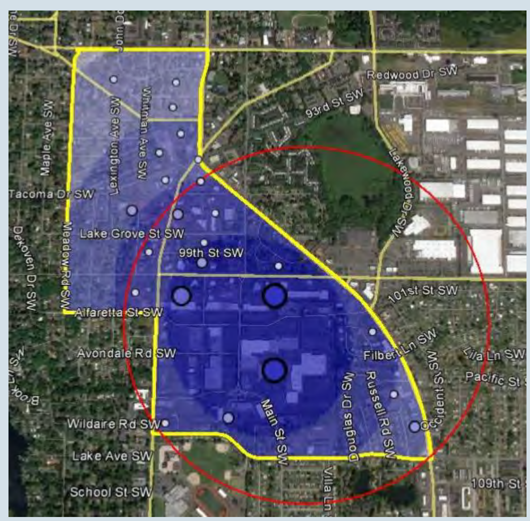
Note: 2016 PSRC Covered Employment Estimates scaled to ESD totals.
*Includes about eight jobs estimated for service uses in land use study area west of Gravelly Lake Drive
Source: PSRC 2018

Per Census "On the Map" job information for 2015 (Census Tract 719.01 Block Group 1), there are approximately 3,451 jobs. About 30% are retail trade, 35% are accommodations and food services, and 42% in other service sectors.

Workers in the Study Area tend to be less diverse than City residents and have more women as employees. The percentage of Latino workers is slightly lower than the percentage share of City residents who speak Spanish at home at 9%.

**Exhibit 3.2-7Jobs by Worker Race, Ethnicity, and Sex 2015 Town Center Vicinity**

| | Count | Share | Density of Jobs |
|---|---|---|---|
| Total Primary Jobs | 3,451 | 100.0% | |
| Race | | | |
| White Alone | 2,731 | 79.1% | |
| Black or African American Alone | 266 | 7.7% | |
| American Indian or Alaska Native Alone | 46 | 1.3% | |
| Asian Alone | 227 | 6.6% | |
| Native Hawaiian or Other Pacific Islander Alone | 24 | 0.7% | |
| Two or More Race Groups | 157 | 4.5% | |
| Hispanic or Latino Ethnicity | | | |
| Not Hispanic or Latino | 3,137 | 90.9% | |
| Hispanic or Latino | 314 | 9.1% | |
| Sex | | | |
| Male | 1,319 | 38.2% | |
| Female | 2,132 | 61.8% | |




Note: Boundaries include Census Tract 719.01 Block Group 1
Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2015).

Jobs by earnings show one-third of workers earn $1,250 or less, over one-third earn $1,251 to $3,333, and the balance earn more than $3,333 (see Exhibit 3.2-8.)

**Exhibit 3.2-8. Jobs by Monthly Earnings 2015 – Census Tract 719.01 Block Group 1**

| | Count | Share |
|---|---|---|
| $1,250 per month or less | 1,150 | 33.3% |
| $1,251 to $3,333 per month | 1,346 | 39.0% |
| More than $3,333 per month | 955 | 27.7% |

Source: Source: U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2015).

Fair market rents for Pierce County show that the wages up to $1,250 alone would not support fair market rents for 2017 when factoring in taxes, utilities, and food. Higher wages could support fair market rents.

**Fiscal Year 2017 Fair Market Rents by Bedrooms**

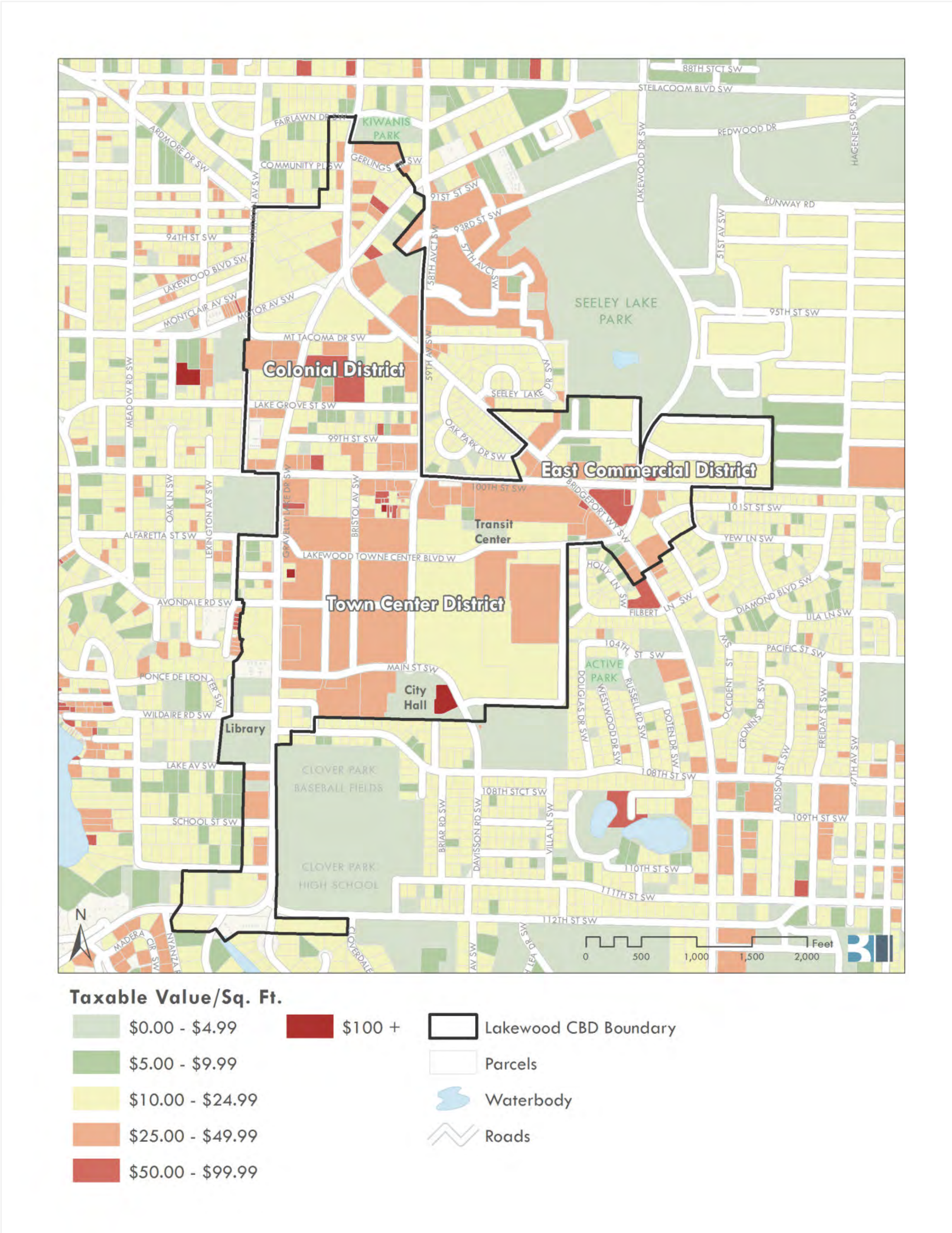
| EFFICIENCY | ONE-BEDROOM | TWO-BEDROOM | THREE-BEDROOM | FOUR-BEDROOM |
|---|---|---|---|---|
| $766 | $885 | $1,142 | $1,662 | $2,012 |

Source: (US Housing and Urban Development, 2017)

## Assessed Value

The CBD zone occupies less than 3% of the City's land area, but accounts for about 5% of Lakewood's total taxable property value (BERK Consulting, 2017). Some lower value properties are parking lots in the Lakewood Towne Center, and properties at the intersection of Bridgeport Way and Gravelly Lake Drive in the Colonial District.

**Exhibit 3.2-8. Taxable Land Value**




Source: Pierce County Assessor, BERK 2017

### Commercial Uses

Lakewood has a history of strong retail sales and has long served a regional population larger than its own through the Lakewood Towne Center and other retailers. Year to date in August 2017, the City has reviewed permits valued at $4.2 million in the Central Business District (CBD) area. However, the City is located in an increasingly competitive retail environment, however, with many retail nodes overlapping into its market area.

Given the underlying demographics and its position away from the freeway, the CBD Assessment found that the primary niche for Lakewood's Downtown area, should be to focus on meeting the daily needs of local residents (as opposed to drawing shoppers from around the larger region for traditional retail shopping such as apparel, appliances, or electronics.) (BERK Consulting, 2017)

The kinds of sectors that would be consistent with that niche include:

- Daily goods and services, including groceries, personal care products, restaurants, coffee shops, and bars.
- Professional and healthcare services, including financial services, dental offices, and trend towards retail-based medical providers (BERK Consulting, 2017)

The CBD Assessment suggests that even if Lakewood itself continues to experience modest growth, the CBD's 15-minute market area extends into faster-growing areas, and this growth will drive increased demand for retail space. The CBD Assessment estimates a future citywide demand of approximately three million square feet of commercial development in uses that are appropriate to the Downtown (services, retail, restaurants, education). Redevelopment of existing productive commercial spaces would be in addition to this figure (BERK Consulting, 2017).

## *Character Area Conditions*

The Colonial, Town Center, and East Commercial Districts have very little housing, and therefore little population. Most of the Study Area is in commercial use, with some institutions. The greatest concentration of jobs is in the Town Center District.

# 3.2.2. Impacts

For the purposes of this analysis, this section identifies significant impacts using the following threshold:

- Insufficient capacity to replace displaced dwellings and jobs

## *Impacts Common to All Alternatives*

### Expected Growth

Under all alternatives, the population of the Study Area could grow, although by varying amounts. The amount of potential new population, housing, and jobs under each alternative is shown in Exhibit 3.2-9. This development may increase demands for public services (see Section 3.5), but would also result in incrementally more opportunities for housing at all affordability levels and for jobs with a greater mix of sectors.

**Exhibit 3.2-9. Housing and Job Growth by Alternative 2017-2035**

| Alternative | Population | Housing | Jobs |
|---|---|---|---|
| **Base Year Units** | 909 | 419 | 5,248 |
| **Net Growth** | | | |
| No Action | 990 | 456 | 1,667 |
| Action Alternative 1 | 3,426 | 1,579 | 4,147 |
| Action Alternative 2 | 4,898 | 2,257 | 7,369 |
| **Total Units 2035** | | | |
| No Action | 1,899 | 875 | 6,915 |
| Action Alternative 1 | 4,336 | 1,998 | 9,395 |
| Action Alternative 2 | 5,807 | 2,676 | 12,617 |

Notes: No Action estimates based on City of Lakewood Transportation Model; assumes limited redevelopment
Persons per Household, Census Tract 719.01, 1-Year Estimates 2016

Source: City of Lakewood 2017; BERK 2018

## Density

Under all alternatives, there would be an increase in density of population, dwellings, and jobs over existing conditions per Exhibit 3.2-10, though results vary by alternative.

**Exhibit 3.2-10. Development Density**

| Feature | Existing | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|---|
| Maximum Building Height (feet) | 15- 35 ft. | 90 ft. | 90 ft.* | 90 ft.* |
| Maximum Dwelling Density – Buildable Lands | Not applicable | 54 du/ac | 80 du/ac | 100 du/ac |
| Assumed Jobs Density – Buildable Lands | Not applicable | 28.34 jobs/ac | FAR** 1.8-3.6 | FAR** 1.8-3.6 |
| ***Effective Density and Ratios (318.69 gross acres)*** | | | | |
| Persons per Acre | 2.89 | 6.03 | 13.76 | 18.43 |
| Dwelling units per Acre | 1.33 | 2.78 | 6.34 | 8.49 |
| Jobs per Acre | 16.65 | 21.94 | 29.81 | 40.03 |
| Jobs/Housing Balance Ratio | 12.52 | 3.64 | 2.17 | 2.17 |

* Transitional heights would allow for step down in buildings along edges of the Study Area that are lower in density.
**** Floor area ratio (FAR) refers to the relationship of the building space to the lot area, derived by dividing the gross floor area of all buildings on a lot by the area of that lot. dividing the gross floor area of all buildings on a lot by the area of that lot. The February 22, 2017 "City of Lakewood Employment Capacity Analysis" Memo applies a floor area ratio (FAR) approach to determining future land capacity and assumes that sites that have 25% of the allowed FAR under zoning are more likely to redevelop than sites with more building space. (BERK Consulting, 2017)
Source: BERK 2018

Characteristics of transit-supportive communities include residential densities of 25-35 dwelling units per acres and 100-150 jobs per acre in centers, and 12-25 dwelling units per acre and 30-40 jobs per acre for corridors. (Federal Transit Administration, 2014)

All alternatives allow densities that are transit supportive; on-the-ground application of the densities to buildable lands and catalyst sites show all alternatives increase densities of both dwelling and jobs over current conditions, particularly Alternatives 1 and 2. All alternatives improve the balance of jobs to housing in the Study Area, particularly Alternatives 1 and 2.

### Job Mix

For all alternatives, the job mix would change to have more services jobs and relatively less retail though both would continue to make the highest share of job types in the center. Services jobs such as office and professional services may offer higher wages than typical retail jobs.

**Exhibit 3.2-11. Current and Future Job Sector Shares**

| Sector | Current 2016 | Growth 2017-2032 |
|---|---|---|
| Finance, Insurance, and Real Estate (FIRE) | 64% | 72% |
| Retail | 26% | 16% |
| Government | 7% | 6% |
| Warehouse, Construction, Transportation, Utilities | 1% | 4% |
| Manufacturing | 1% | 2% |
| Education | 0% | 1% |

Source: City of Lakewood 2017, PSRC 2018

An unintended consequence of investments in centers is the potential to increase commercial rents and displace small, local businesses. Economic development policies can address strategies around commercial affordability and support for small, local businesses.

## *No Action*

The No Action alternative would increase housing and population by 109%, but starting from a small base of housing means the addition, while more than double, does not produce much greater density to either support transit, increase housing variety, or provide customers for businesses.  Jobs would increase by 32% and would have a mix that incorporates more service jobs than retail jobs.

On vacant and redevelopable land, there would be sufficient space to replace current dwellings and jobs and create new space for additional jobs since building heights are at least 90 feet and upper story residential and business space is allowed.

## *Action Alternative 1*

Alternative 1 increases housing and population by 377% by adding 1,579 dwellings over 419 existing ones. Jobs would increase by 79%, and have a greater mix of service jobs. Allowed dwelling density would result in a pattern of development that helps promote transit and housing variety. The investment in amenities such as parks, trails, and streets could help attract business investment and live-work options.

There would be more than sufficient space to replace housing or commercial space that is redeveloped on catalyst sites and on vacant and redevelopable land. Densities would be higher than existing conditions though building height would remain the same, except at transitional areas next to lower density zones. Employment floor area ratios (FARs) would allow more upper story business and office uses.

## Action Alternative 2

Alternative 2 would have a similar outcome as Alternative 1, but with higher residential densities and more expected jobs. Alternative 2 increases housing and population by 539% by adding 2,676 dwellings. Jobs would increase by 140%, and have a greater mix of service jobs. The densities of dwellings and jobs would further assist with transit and supportive customers for businesses. Greater investments in civic and infrastructure amenities with more extensive parks could additionally help businesses relocate to the center, and allow for live-work options.

Existing homes and business space might be redeveloped, but there would be sufficient space to relocate residents and businesses them in new developments given the added heights and extensive redevelopment areas proposed in the Plan.  Mitigation Measures

All Alternatives could see some risk of displacement of existing residents or businesses; this risk would be higher under Alternatives 1 and 2, but so would the capacity for relocation into new housing units or business space for those displaced.

## Incorporated Plan Features

Alternatives 1 and 2 expand the capacity of the Study Area to add housing and jobs by increasing allowed densities and by providing civic and infrastructure investments such as parks and roads. Alternatives 1 and 2 also propose more flexible development regulations with a form-based code that focuses less on land uses and more on building form and design. Alternatives 1 and 2 also propose a Planned Action Ordinance that could facilitate the permitting of housing and employment development in the Study Area.

## Regulations and Commitments

The Lakewood Housing Element goals would apply to all alternatives, and are summarized as:

- Ensure sufficient land capacity to accommodate the existing and future housing needs of the community, including Lakewood's share of forecasted regional growth;
- Ensure that housing exists for all economic segments of Lakewood's population;
- Ensure that there are housing opportunities for people with special needs, such as seniors, people with chronic disabilities, and the homeless;
- Maintain, protect, and enhance the quality of life of Lakewood's residents; and
- Recognize relocation issues brought about by demolition or conversion to another use.

The City allows for tax exemptions for development projects including low and moderate-income housing units in "Tax Incentive Urban Use Centers" in Chapter 3.64 in the Lakewood Municipal Code. As defined in 3.64.010, such a center means "a compact, identifiable district where urban residents may obtain a variety of products and services" and which has businesses, adequate public facilities, and a mix of uses including housing, recreation, and cultural activities. The Downtown Study Area (see Exhibit 1.5-1) containing the community's Central Business District would meet this definition.

### *Other Proposed Mitigation Measures*

The City works with the Economic Development Board for Tacoma-Pierce County on business retention, expansion, and recruitment activities, as well as the Lakewood Chamber of Commerce. If small business relocation assistance is needed, the City could work with these agencies or others to develop strategies and solutions.

## 3.2.3. Significant Unavoidable Adverse Impacts

Under all alternatives, displacement of existing residents and existing businesses in the Study Area is possible as land is redeveloped; however, there is capacity to replace housing and business space. Alternatives 1 and 2 would substantially increase the capacity for housing that could better meet demand Downtown, and would further support business investment with more flexible zoning and civic and infrastructure investments. No significant unavoidable adverse impacts are anticipated.

# 3.3. Land Use

This section addresses physical land use patterns within and surrounding the Study Area, considering changes in type and intensity of land uses. Existing land use pattern conditions are based on field reconnaissance, imagery review, and Pierce County and City of Lakewood parcel data. Future conditions consider the level of growth and land use change described in Chapter 2 for the alternatives.

This section also addresses consistency of the alternatives with City and regional plans and policies. The Affected Environment reviews Lakewood's Comprehensive Plan policies as well as Puget Sound Regional Council's (PSRCs) centers growth strategy. Alternatives are compared to these strategies and policies.

For the purposes of this EIS, the thresholds of significance are:

- Change to land use patterns or development intensities that preclude reasonable transitions between areas of less intensive zoning and more intensive zoning;
- Differences in activity levels at boundaries of uses likely to result in incompatibilities; and
- Inconsistency with current plans and policies.

The features of the Alternatives that can mitigate impacts (e.g. proposed land use code and design standards), other City programs and regulations, and other ways to address significant land use impacts are included.

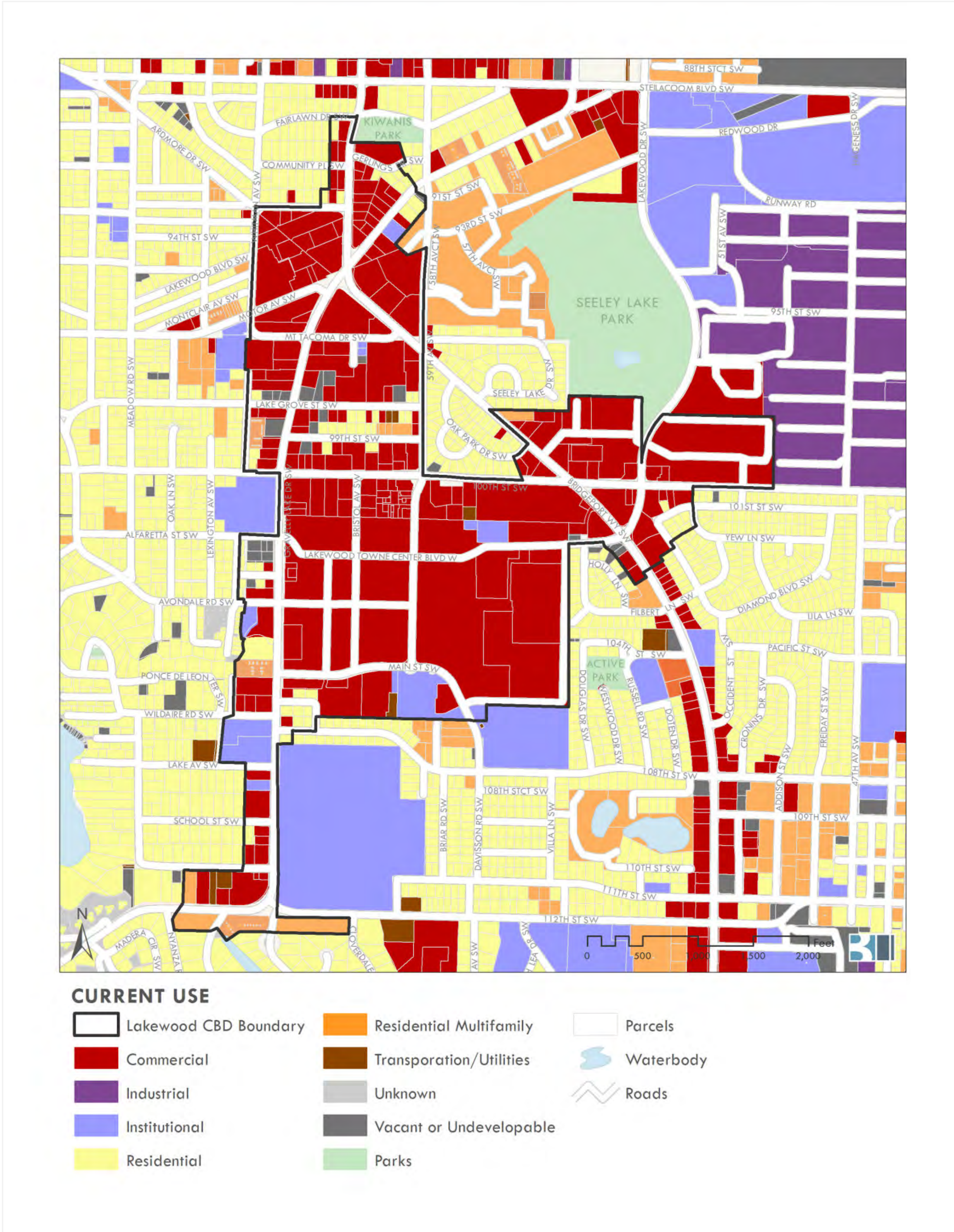
## 3.3.1. Affected Environment

### *Current Land Use Patterns in the Study Area*

#### Land Use Within the Study Area

The Study Area is approximately 319 gross acres) and contains the central shopping area of the community. It includes the Lakewood Towne Center, an auto-oriented shopping area with stores and restaurants, a transit center, the Lakewood Playhouse, and City Hall. Older commercial development to the north near the Lakewood Colonial Center includes the historic Lakewood Theater. The Study Area contains very little housing. This is partly due to Covenants, Conditions & Restrictions (CC&R's) on the Lakewood Towne Center site, as well as historic land use planning regulations that strictly separated uses. See Exhibit 3.3-1.

**Exhibit 3.3-1. Current Land Use**




Source: Pierce County Assessor, City of Lakewood, BERK 2017

Major arterial roads including Bridgeport Way and Gravelly Lake Drive carry significant amounts of traffic through the Study Area and are lined with auto-oriented strip development. In terms of character, current development across all three districts is dominated by low-intensity commercial uses, configured in a one-story, linear, suburban format, with large setbacks from the street, and surrounded by large expanses of parking and access driveways. Within shopping areas, pedestrian walkways connect the different stores to each other but not to the public sidewalk network. Walkability across the Study Area is low. Pedestrians encounter long blocks, limited connections, and an inconsistent sidewalk network.

Within the Study Area, there are three distinct districts based upon land use, parcel size and age of buildings. The three districts are Colonial, Town Center and East. See Exhibit 2.2-1.

A description of each of the districts, and recent development activity, is presented below.

- **Colonial:** The Colonial District lies north of 100th Street SW and features commercial uses on a relatively smaller lot pattern, with many colonial-style buildings. Here, in 1937, Norton Clapp built part of the Lakewood Colonial Center, one of the first suburban shopping centers in the country. A few residential lots are located between Lake Grove Street SW and 99th Street SW. Recent permit activity includes a new small restaurant on the north side of 100th Street SW, an apartment complex at the northwest corner of Lake Grove Street and 59th Street, and a pharmacy (CVS) at the intersection of Gravelly Lake Drive and Bridgeport Way SW (City of Lakewood August 2017).
- **Town Center:** The Town Center District contains commercial businesses, mostly in the Lakewood Towne Center. Institutional uses include the Transit Center, City Hall, and Library. Small areas of residential uses are west of Gravelly Lake Drive SW and 112th Street SW. Lakewood Towne Center contains larger building footprints, while smaller footprints lie along 100th Street SW and Gravelly Lake Drive SW. Recent permit activity includes new fast food chain restaurants locating within the center including Chipotle Grill, Hop Jacks, and MOD Pizza (City of Lakewood August 2017).
- **East District:** This area has larger lots and auto-oriented commercial centers with larger building footprints north of 100th Street SW and smaller lots south of the corridor with strip commercial properties. A new fast food restaurant (Chick-fil-A) is under construction in the northwest part of the district (City of Lakewood August 2017).

### Current Land Use Adjacent to Downtown

Land uses surrounding the Study Area primarily consist of single family and multifamily dwellings, some institutional and civic uses and to a lesser degree commercial uses.

- **Colonial District:** North of the Colonial District, there are single family lots and Kiwanis Park, with a small node of commercial at Steilacoom Boulevard. East of the Colonial District, there are multifamily and single family residential uses. Multifamily properties are larger, whereas single family lots are relatively smaller. West of the Colonial District are primarily single-family dwellings with some institutional and multifamily uses.
- **East Commercial District:** The East Commercial District is surrounded on the north by single-family dwellings, Seeley Lake Park, and other commercial uses. To the east lies industrial uses. To the south, there are single family uses and commercial uses along Bridgeport Way.

- **Town Center District:** East of the Town Center District are single family dwellings and Activity Park. To the south are institutional uses consisting of public and private schools, and some single family and multifamily dwellings. To the west of the Study Area are primarily single-family dwellings.

## *Land Use Designations and Zoning Districts*

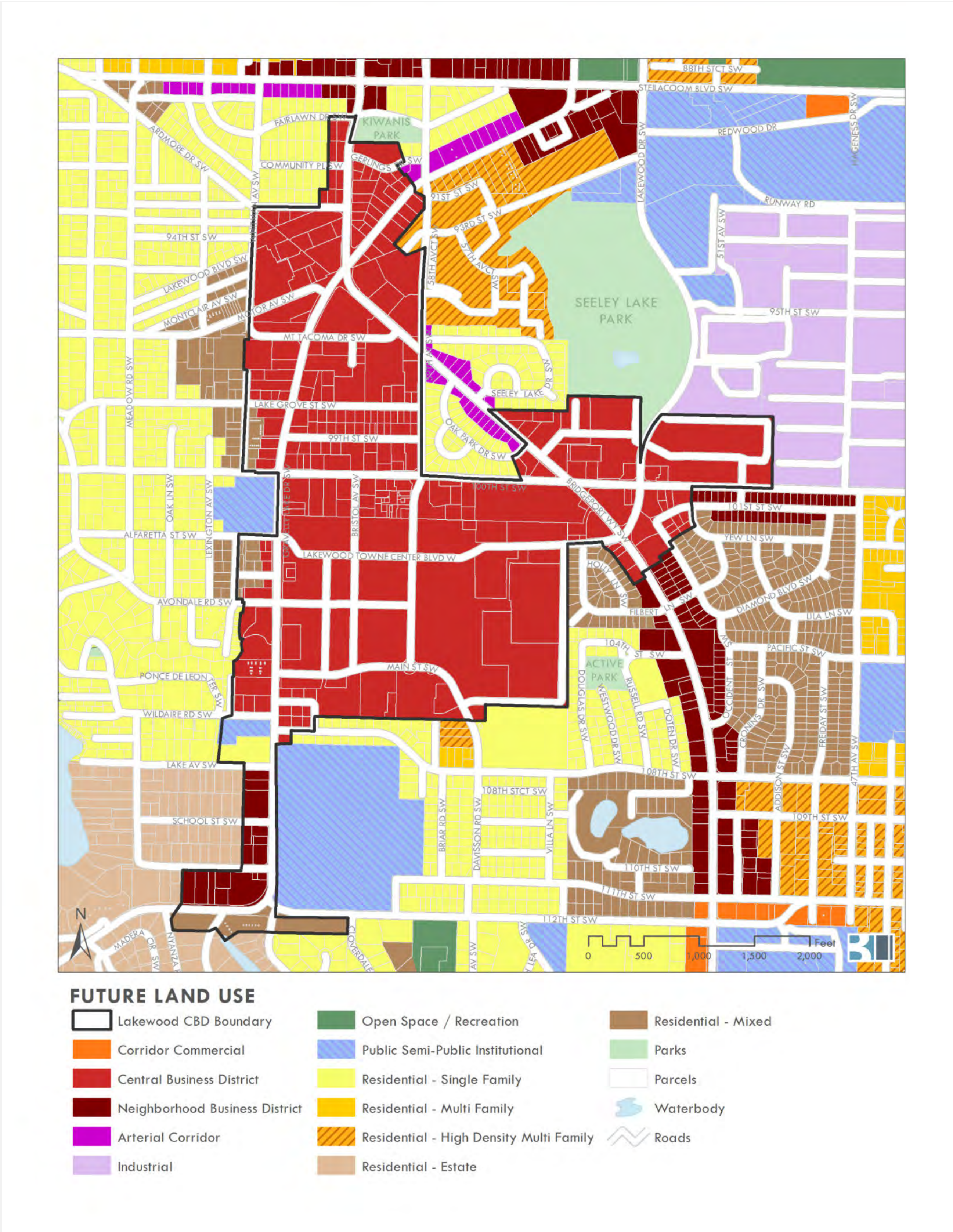
The Comprehensive Plan designates the Study Area for future land use under the Central Business District (CBD) designation that mixes retail, office, social, urban residential, and government uses.

The Comprehensive Plan describes the CBD designation as:

> *The CBD is the primary retail, office, social, urban residential, and government center of the City. The complementary, interactive mixture of uses and urban design provides for a regional intensity and viability with a local character. The regional focus and vitality of the district are evident in the urban intensity and composition of the uses in the district. Local character is reflected in the district's design, people-orientation, and connectivity, which foster a sense of community. The CBD is intended to attract significant numbers of additional office and retail jobs as well as new high-density housing. The plan anticipates that the properties within the CBD will be developed into 75 percent commercial and 25 percent residential uses.*

Other designations in the Study Area are much smaller in extent, such as Neighborhood Business District, Mixed Residential, Public Semi-Public Institutional, and Single Family.

**Exhibit 3.3-2. Comprehensive Plan Future Land Use Map**




Source: Pierce County Assessor, City of Lakewood, BERK 2018

Abutting designations are Residential-Single Family surrounding to the north, east, south, and southwest, and Residential-High Density Multifamily to the northeast and Residential-Mixed to the west.

Zoning in the Study Area implements the Land Use policies of the Comprehensive Plan. It includes primarily the commercial business district zone with roughly 290 acres of CBD zoning, and only 12.1 acres of neighborhood commercial zoning (NC-1), 6.6 acres of multi-family residential (MR-2), 3.47 acres of public institutional zoning (P1),and  2.67 acres of low density residential (R3 and R1) as shown in Exhibit 3.3-3 and Exhibit 3.3-4.

**Exhibit 3.3-3. Current Zoning Within Study Area, by Acres**

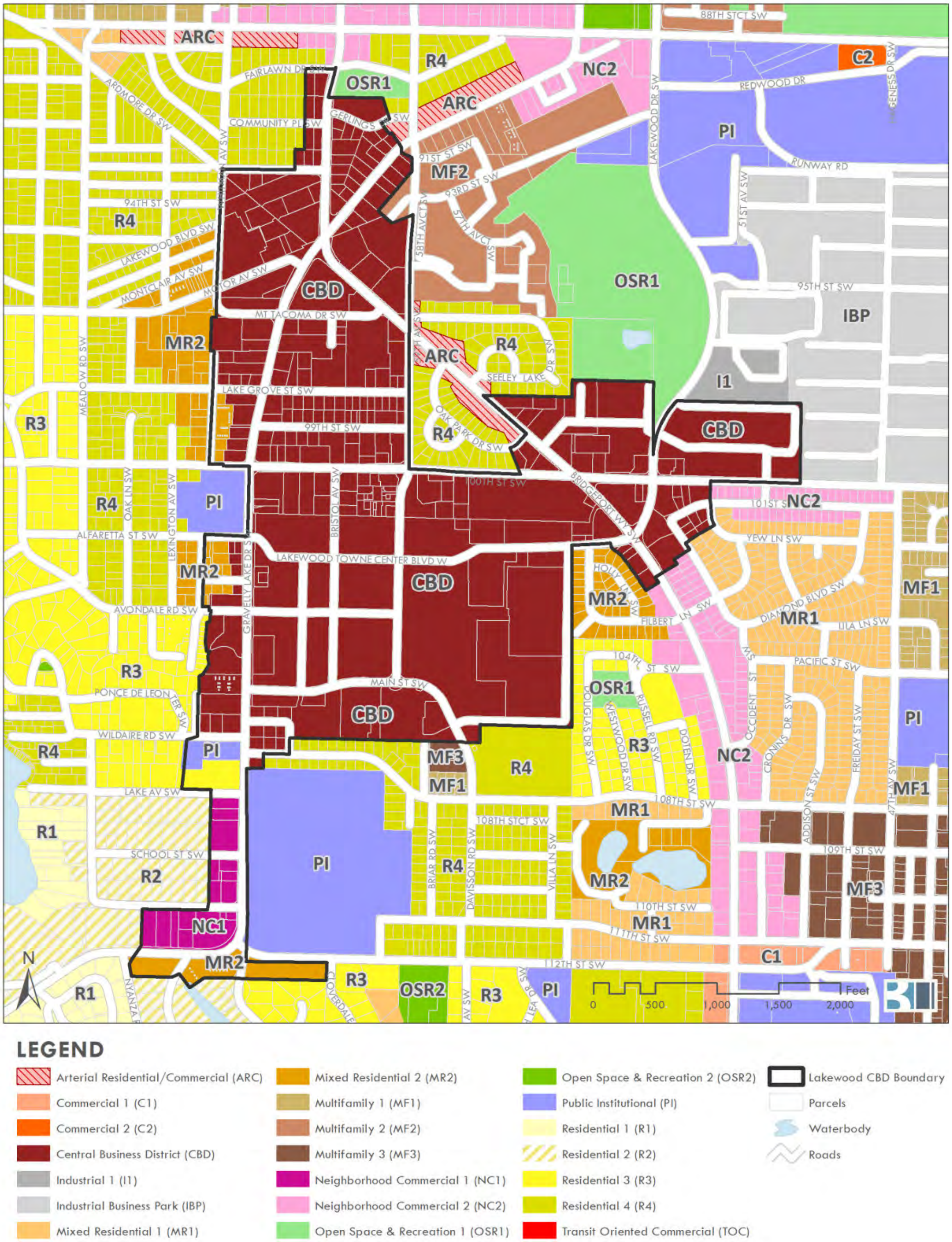
| Zone | Description | Acres | Percent |
|---|---|---|---|
| CBD | Central Business District | 290.09 | 92% |
| NC1 | Neighborhood Commercial 1 | 12.31 | 4% |
| MR2 | Mixed Residential 2 | 10.14 | 3% |
| PI | Public Institutional | 3.47 | 1% |
| R2 | Residential 2 | 0.03 | 0% |
| R3 | Residential 3 | 2.64 | 1% |
| **Total** | | **318.69** | **100%** |

Source: Lakewood Municipal Code 2017

- The CBD zone allows a wide variety of uses including multi-family housing, restaurants, and retail.
- NC1 is intended to foster a sense of neighborhood identity and provide limited services within a neighborhood. The district provides for a small-scale mix of activities, including residential, retail, office, and local services, which serve the surrounding neighborhood.
- MR2 allows small scale multi-family residential development at a moderate residential density of 14.6 dwelling units per acre using a variety of urban housing types and designs.
- PI allows moderate-scale and large-scale activities relating to state and local governmental entities, except for military uses which are separately designated and zoned; special districts; and semi-public institutions providing necessary public services.

Zoning surrounding the Study Area are R4 to the north, east, south, and northwest, and R3 to the southeast and southwest. MR2 lies to the west. PI lies to the south and west, and OSR1to the north.

**Exhibit 3.3-4. Current Zoning Within Study Area**




Source: City of Lakewood, BERK 2017

Exhibit 3.3-5 shows the maximum development standards for height, coverage, and density under current zoning. These standards give an idea of the intensity of current zoning. Except for the zoning for the residential areas (R2 and R3 zones), allowed building heights range from about three to nine stories. At 80%-100% coverage maximums in most of the Study Area, lots are allowed to be mostly covered with buildings, parking lots, and other impervious surfaces. Where residential development is allowed, it is limited to low intensities from 2.2 units per acre in the R2 zone up to 22 units per acre in the NC1 zone.

**Exhibit 3.3-5. Maximum Development Standards for Current Zoning**

| ZONE | MAXIMUM DENSITY (DWELLING UNITS/ACRE) | MAXIMUM HEIGHT (FEET) | MAXIMUM IMPERVIOUS COVERAGE (PERCENT) | MINIMUM FRONT YARD (FEET) |
|---|---|---|---|---|
| CBD | 54 | 90 | 100 | 0 |
| PI | Per master plan | Per master plan | Per master plan | Per master plan |
| MR2 | 14.6 | 50 | 75 | 5 |
| NC1 | 22 | 50 | 80 | 0 |
| R2 | 2.2 | 35 | 45 | 25 |
| R3 | 4.8 | 35 | 60 | 10 |

Source: Lakewood Municipal Code 2017

## *Development Capacity*

Exhibit 2.3-11 identifies vacant and redevelopable land potential within the Study Area based on a ratio of site improvements to land value. Properties are considered more likely to redevelop if they have a low ratio of improvement value to land value. The exhibit shows that there are a number that could redevelop in the Study Area. A citywide land capacity analysis using the current Pierce County Buildable Lands Analysis methods results in a potential for 9,284 jobs, and the CBD zone would make up only 629 jobs. However, using a floor area ratio (FAR) method and employment density model approach, the citywide capacity analysis of jobs would equal 15,436 jobs with 6,927 jobs in CBD zone (see Exhibit 3.3-8 (BERK Consulting, 2017) Of the City's capacity for nearly 11,000 dwelling units, only about 629 dwellings were identified in the CBD zone; if other FAR based methods were employed, more housing could be added. Additionally, with large parking areas, portions of the Study Area could add housing or employment development where under building parking is used.

**Exhibit 3.3-6. Lakewood Employment and Housing Capacity – Citywide and CBD Zone**

| | Pierce County Capacity Method | FAR-Based Capacity Model | Employment & Housing Needed to meet 20-year Growth Target |
|---|---|---|---|
| Total Employment Capacity | 9,284 | 15,436 | 12,907 |
| CBD Zone Capacity | 629 | 6,927 | -- |
| Total Housing Capacity | 10,919 | -- | 9,565 |
| CBD Zone Capacity | 613 | -- | -- |

Source: Pierce County 2014, BERK 2017

## *Land Use Policies – Regulatory Environment*

This section describes the Lakewood Comprehensive Plan vision, goals, and policies for the Lakewood Study Area, and also highlights relevant state and regional goals and policies under the Growth Management Act, Vision 2040 applicable to the central Puget Sound, and Pierce County Countywide Planning Policies.

### Lakewood Comprehensive Plan

Lakewood's Comprehensive plan is focused on creating a viable, functioning, and attractive community center downtown.

*LU-17.2: Promote the CBD as the primary location for businesses serving a Citywide market.*

*GOAL LU-19: Promote redevelopment of the CBD as a mixed-use urban center that creates a downtown and bolsters Lakewood's sense of identity as a City.*

*LU-19.1: Promote the CBD as the primary center for retail, office, public services, cultural activities, urban residential, and civic facilities of Lakewood.*

*LU-19.2 Encourage neighborhood businesses that provide daily goods and services in the CBD.*

*LU-19.3: Promote the CBD as a daytime and nighttime center for social, entertainment, cultural, business and government activity.*

*LU-19.4: Promote cultural institutions, performing arts uses, and recreational activities within the CBD.*

*LU-19.5: Remove underlying deed restrictions and/or covenants that prohibit office development, open space, high density residential development and/or mixed use development in the Towne Center.*

*LU-19.6: Acquire lands and construct community-gathering destinations such as plazas, open space or community facilities within the Towne Center.*

*LU-19.7: Support the formation of a Towne Center association or similar organization to establish economic improvement strategies and to sponsor social and safety events.*

*LU-19.8: Consider the use of the City's eminent domain powers to establish public streets and public open spaces in the Towne Center.*

*LU-19.9: Revise land use and development regulations to require mixed use development within the CBD for any new development excepting standalone commercial pads and service commercial uses.*

*GOAL LU-20: Emphasize pedestrian and bicycle connectivity and transit use within the CBD while accommodating automobiles.*

*GOAL LU-20: Emphasize pedestrian and bicycle connectivity and transit use within the CBD while accommodating automobiles.*

## Growth Management Act Goals

Lakewood's strategy for focusing growth in the Downtown area is consistent with the Growth Management Act (GMA), which promotes urban growth within urban areas to prevent sprawl. This is represented in the following GMA goals:

> *(1) Urban growth. Encourage development in urban areas where adequate public facilities and services exist or can be provided in an efficient manner.*
>
> *(2) Reduce sprawl. Reduce the inappropriate conversion of undeveloped land into sprawling, low-density development.*

Source: RCW 36.70A.020

Other GMA goals support having sufficient urban services to support growth, providing a range of affordable housing choices, encouraging economic development, open space and environmental protection, and others.

## Vision 2040

### Multicounty Planning Policies

The Puget Sound Regional Council's Vision 2040 plan is regionally adopted and contains Multi-County Planning Policies (MCPPs) required under the Growth Management Act. The MCPPs guide cities toward a centers strategy, in which urban growth is concentrated in designated regional and local centers, consistent with Lakewood's land use strategy. Regional centers, such as Lakewood's Downtown, are designated in the MCPPs, but local centers are also recognized as important to regional growth:

> *MPP-DP-2: Encourage efficient use of urban land by maximizing the development potential of existing urban lands, such as advancing development that achieves zoned density.*
>
> *MPP-DP-5: Focus a significant share of population and employment growth in designated regional growth centers.*
>
> *MPP-DP-6: Provide a regional framework for designating and evaluating regional growth centers.*
>
> *MPP-DP-7: Give funding priority — both for transportation infrastructure and for economic development — to support designated regional growth centers consistent with the regional vision. Regional funds are prioritized to regional growth centers. County-level and local funding are also appropriate to prioritize to regional growth centers.*

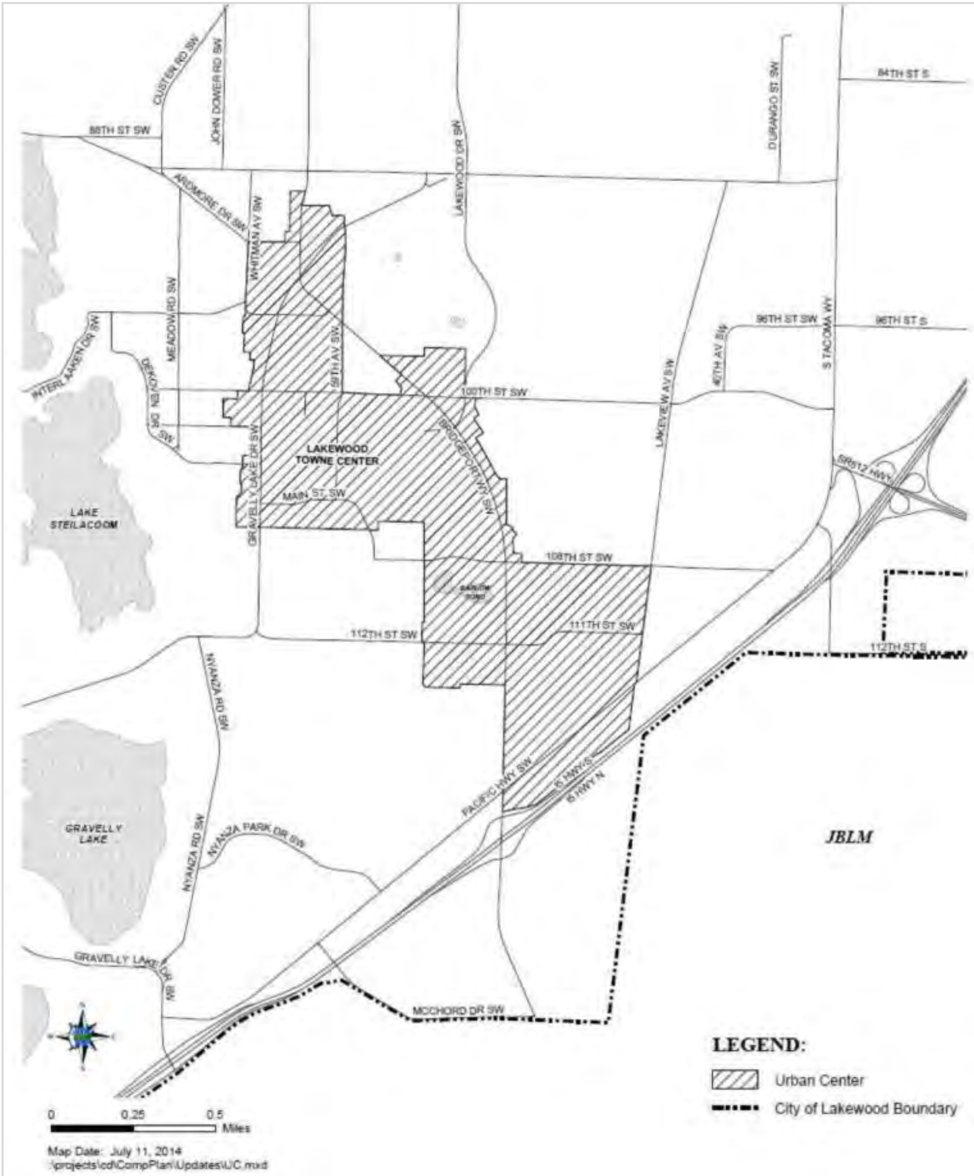
### Regional Growth Center

Within the four-county central Puget Sound Vision 2040 plan, Lakewood's downtown is part of a regionally designated regional growth center, also called the Lakewood Urban Center.

Lakewood's Urban Center includes the entire CBD zone, most of the Lakewood Station district, and a significant amount of residential and commercial land along the Bridgeport corridor. See Exhibit 3.3-7.

High-capacity transit is provided by the Pierce Transit Center in Lakewood Mall and by Sound Transit commuter rail at Lakewood Station. In addition to the commuter rail station, there is direct high occupancy vehicle (HOV) access to I-5 for bus service, as well as general vehicle on-ramps located nearby at the intersection of Bridgeport Way and I-5. (City of Lakewood 2016)

**Exhibit 3.3-7. Lakewood Regional Growth Center Boundaries**




Source: City of Lakewood 2016

Newly designated centers would need to demonstrate boundaries that are compact and walkable with a roughly uniform shape that is not elongated. The City may request boundary changes over time to PSRC, who may take the request forward to appropriate advisory and decision-making bodies.

## Centers Targets

The Lakewood Urban Center was designated in 1995 based on prior criteria. Guidance from PSRC is that center targets "must represent a significant portion of the jurisdictions' overall housing and employment growth targets for the 20-year planning period" (PSRC 2014). The Downtown Plan is an opportunity to consider how the Downtown can contribute jobs and housing opportunities within the overall Urban Center.

PSRC has provided the following guiding principles to help jurisdictions prepare centers plans that meet Vision 2040 centers targets:

- In order to maintain consistency with state, regional, and countywide requirements for growth targets, the housing and employment targets for RGCs and employment targets for MICs must represent a significant portion of the jurisdictions' overall housing and employment growth targets for the 20-year planning period.
- MPP-DP-5 and the Centers Plan Checklist, which call for a "significant" share of growth in centers, strongly suggest that the targets established for Regional Growth Centers and Manufacturing / Industrial Centers result in an increased share of the jurisdiction's overall employment and (for RGCs) housing locating in the centers. Consequently, the housing and/or employment targets for each center should exceed the center's shares of existing housing and/or jobs AND exceed the center's shares of recent growth in housing and/or jobs.
- Growth targets for centers may reflect and be informed by existing development capacity, but are not determined or limited by it. Local comprehensive plans, once revised, must provide for sufficient development capacity in each center to accommodate its growth targets.
- …For the remainder of the centers that were designated to the adoption of the Procedures, considering growth targets for centers sufficient to reach 45 AU / acre is strongly recommended.
- Regional Growth Center targets should enhance the jobs-housing balance within the jurisdiction as a whole and achieve greater jobs-housing balance within the centers individually.

As noted in guidance, the City can consider different means to set a growth target for the center. For example, based on 2011 criteria, new regional growth centers must have a minimum existing activity level (population + employment) of at least 18 activity units per gross acre. The future target is to have a minimum target activity level of 45 activity units per gross acre. The PSRC reported that in 2010 the 538-acre Lakewood Urban Center had 3,159 people, 1,574 dwellings, and 6,025 jobs (PSRC 2013). This is just over 17 activity units per gross acre, close to the base amount.

### Mode Split Goals

PSRC also suggests centers plans identify goals to promote multi-modal travel:

- For the purposes of setting mode split goals for centers, local comprehensive plans should: 1. Calculate mode split based on travel to work; as a secondary measure, mode split based on all trips, including work and non-work, could be considered 2. Calculate mode split based on trips where either trip origin and/or trip destination are located within the center.
- Mode split goals for centers should represent a *significant decrease* in SOV travel coupled with a *significant increase* in transit and non-motorized travel over the course of the 20-year planning period. Additional factors described below will help to inform what *significant* means in shifting mode shares within any particular center.
- Mode split goals for centers should achieve reductions in single-occupancy vehicle trip share that are at least consistent with and should exceed recent trends in mode share.

### Revised Centers Criteria

PSRC is revisiting centers designations and criteria as of 2017 through the Regional Centers Framework Update. After review and public outreach in 2017, the Growth Management Policy Board recommended the Centers Framework Update to the Executive Board for final action and adoption. The Executive Board will take up the recommendation in February and March 2018.

The Regional Centers Framework Update defines two distinct types of regional growth centers with tailored minimum criteria as shown in Exhibit 3.3 83.3 8. The type of regional center does not establish a distinction for PSRC's regional funding process. At this time, it is anticipated that new criteria would not apply to the Lakewood center.

**Exhibit 3.3-8. Regional Centers Framework Update – Regional Growth Centers**

| URBAN GROWTH CENTER | METRO GROWTH CENTER |
| --- | --- |
| These centers have an important regional role, with dense existing jobs and housing, high-quality transit service, and planning for significant growth. These centers may represent areas where major investments – such as high-capacity transit – offer new opportunities for growth. | These centers have a primary regional role – they have dense existing jobs and housing, high quality transit service, and are planning for significant growth. They will continue to serve as major transit hubs for the region. These centers also provide regional services, and serve as major civic and cultural centers. |
| **Urban Growth Center Criteria:** Center must meet each the following criteria:<br>▪ **Existing density.** 18 activity units per acre minimum<br>▪ **Planned target density.** 45 activity units per acre minimum | **Metro Growth Center Criteria:** Center must meet each the following criteria:<br>▪ **Existing density.** 30 activity units per acre minimum<br>▪ **Planned target density.** 85 activity units per acre minimum |
| ▪ **Size.** 200 acres minimum - 640 acres maximum (may be larger if served by an internal, high capacity transit system)<br>▪ **Transit.** Existing or planned fixed route bus, regional bus, Bus Rapid Transit, or other frequent and all-day bus service. May substitute high-capacity transit mode for fixed route bus. Service quality is defined as either frequent (< 15-minute headways) and all-day (operates at least 16 hours per day on weekdays) –or- high capacity<br>▪ **Market potential.** Evidence of future market potential to support planning target<br>▪ **Role.** Evidence of regional role<br>o Clear regional role for center (serves as important destination for the county)<br>o Jurisdiction is planning to accommodate significant residential and employment growth under Regional Growth Strategy | ▪ **Size.** 320 acres minimum - 640 acres maximum (may be larger if served by an internal, high capacity transit system)<br>▪ **Transit.** Existing or planned light rail, commuter rail, ferry, or other high capacity transit with similar service quality as light rail. Service quality is defined as either frequent (< 15-minute headways) and all day (operates at least 18 hours per day on weekdays) –or- high capacity (e.g., ferry, commuter rail, regional bus, Bus Rapid Transit). Evidence the area serves as major transit hub and has high quality/high capacity existing or planned service.<br>▪ **Market potential.** Evidence of future market potential to support planning target<br>▪ **Role.** Evidence of regional role:<br>o Clear regional role for center (for example, city center of metropolitan cities, other large and fast-growing centers; important regional destination)<br>o Jurisdiction is planning to accommodate significant residential and employment growth under Regional Growth Strategy |

Source: PSRC 2018

Implementation of the framework includes several steps. One of these is the development of new administrative procedures for monitoring of existing centers. Among other topics, these new administrative procedures will address the process to modify the size and shape of existing centers. Local jurisdictions' interest will be a key factor considered for any center boundary changes.

## Pierce County Countywide Planning Policies (CWPPs)

In the CWPPs, the overarching goal for development patterns support the designation of mixed use centers such as the Study Area.

The Lakewood Urban Center is considered a Regional Growth Center in a Core City. Designation criteria include:

> *UGA-33. Regional Growth Centers are locations that include a dense mix of business, commercial, residential and cultural activity within a compact area. Regional Growth Centers are targeted for employment and residential growth, and provide excellent transportation service, including fast, convenient high capacity transit service, as well as investment in major public amenities.*

The CWPPs have minimum criteria for designation and criteria for future planning. These would apply to newly designated centers, but can help the City determine its planning targets for the portion of the Urban Center that is made up of Downtown Lakewood.

**Exhibit 3.3-9. Pierce County Countywide Planning Policies Designation and Planning Criteria: 2014**

| | Designation Criteria | Planning Criteria |
|---|---|---|
| Employees per Gross Acre | -- | 25 |
| Households per Gross Acre | 7 | 10 |
| Minimum employees | 2,000 | 15,000 |
| Size | Up to 1.5 square miles | Up to 1.5 square miles |
| Other | served by sanitary sewers<br>serve as a focal point for regional and local transit services. | receive a significant share of the regional growth |

Source: Pierce County Countywide Planning Policies, 2014

CWPPs for Pierce County indicate that the "County and municipalities shall follow the guidelines specified in the Procedures Report for the collection, monitoring, and analysis of development activity and potential residential/employment capacity." Employment and housing capacities are determined through a coordinated set of assumptions such as jobs or dwelling units per acre consistent with zoning assumptions. However, in some cases communities work with Pierce County to adjust assumptions for unique areas such as mixed-use centers. Lakewood's chapter of the Buildable Lands Report does not identify unique assumptions in the 2014 Buildable Land Report.

As described under "Development Capacity" above, the City has developed analysis of job capacity using a FAR based method. At the next opportunity to amend the Buildable Lands Report, the City of Lakewood could work with Pierce County to adjust methods as they apply to the regional growth center or other mixed-use zones.

## Other Considerations: Lakewood Towne Center CC&Rs

The City's Comprehensive Plan includes a policy that deed restrictions or covenants preventing office, residential, mixed use, or open spaces should be eliminated to remove barriers to a mixed use, walkable Downtown:

*LU-19.5: Remove underlying deed restrictions and/or covenants that prohibit office development, open space, high density residential development and/or mixed use development in the Towne Center.*

In 2016, the Lakewood City Attorney prepared a memo reviewing private covenants, codes, and restrictions (CC&Rs) recorded for the Lakewood Towne Center area between 1957 and 2004. Some of the restrictions protect certain businesses from direct competition or related businesses, and there are other restrictions specific to that business.

## 3.3.2. Impacts

### *Impacts Common to All Alternatives*

#### Land Use Within the Study Area

New growth is expected to occur under all the alternatives, although the amount of growth and composition of the mix of land uses will vary by alternative. Activity levels would increase across the Study Area with new businesses, residents, and employees.

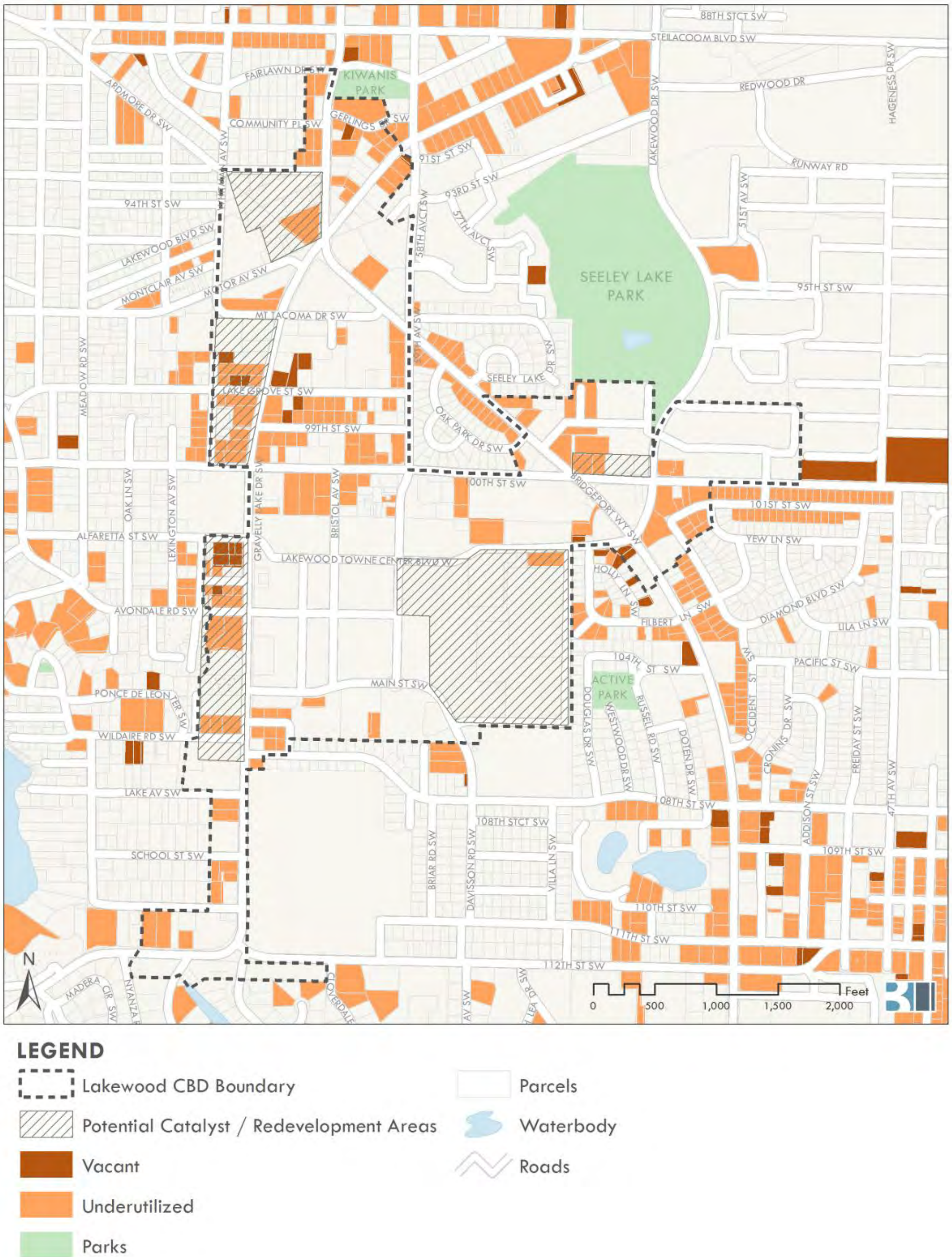
Based on vacant, underutilized, and catalyst properties and zoning densities and assumptions, both residential and employment growth would occur under each alternative, particularly the Action Alternatives, which assume infill growth on catalyst sites that have larger parcels and on current parking areas.

**Exhibit 3.3-10. Downtown Buildable Parcels Summary**

| Type | Parcel Count | Parcel Acres |
|---|---|---|
| Vacant – All Alternatives | 19 | 4.42 |
| Underutilized – All Alternatives | 140 | 58.44 |
| Catalyst Areas – Alternatives 1 and 2 | 86 | 85.05 |

Source: Pierce County 2014, BERK 2017 and 2018

**Exhibit 3.3-11. Consolidated map of Developable Land in Downtown**

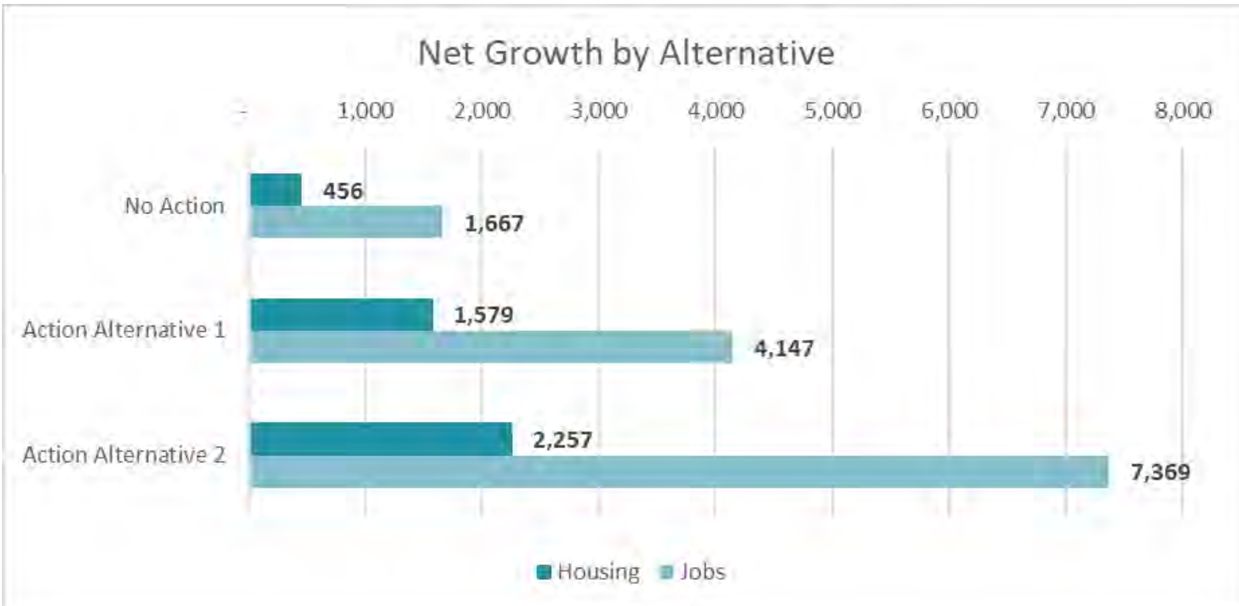



Note: Per the County's 2014 Buildable Lands Report, underutilized lands include parcels that have an existing structure(s) or land use activity and have the ability to accommodate additional employment (jobs) or housing units. (Pierce County, 2014)

Source: Pierce County 2014, BERK 2017 and 2018

Housing would have a greater share of building space in the future, and commercial space would increase substantially, compared to the No Action Alternative. Exhibit 3.3-12 shows the projected growth in housing and jobs under each of the alternatives.

**Exhibit 3.3-12. Housing and Job Growth by Alternative**




Source: BERK 2017

As redevelopment occurs within the Study Area, there is the potential for localized land use compatibility impacts to occur where newer development is of greater height and intensity than existing development. These compatibility impacts, if they occur, are temporary and will be resolved when the area is fully built; building heights and sizes would be more similar, and mixed uses more prevalent. The extent of these conflicts varies by alternative, and can be reduced by the application of City development and design standards, particularly any standards developed as part of future zoning under Alternatives 1 and 2.

## Land Use Surrounding the Study Area

All alternatives would allow development of greater height and density than abutting uses, particularly single family uses that lie to the north, east, south, and west of the Study Area. However, under all alternatives, building transition standards would require a height no greater than 40 feet when abutting single family and mixed residential districts.

## Land Use Plans and Policies

### Lakewood Comprehensive Plan

The ability to achieve City Comprehensive Plan goals and policies is addressed under each alternative.

### GMA Goals

All alternatives would meet GMA goals to focus growth in urban areas and avoid sprawl with different degrees of urban intensity.

### Vision 2040

All alternatives provide for a mix of uses and denser development than exists today consistent with regional growth centers policies.

All alternatives would increase activity units per acre within the Study Area, a portion of the overall Urban Center, helping to meet PSRC Guidance for growth in centers.

**Exhibit 3.3-13. Activity Units by Alternative**

| FEATURE | EXISTING | NO ACTION | ALTERNATIVE 1 | ALTERNATIVE 2 |
|---|---|---|---|---|
| Activity Units: Population + Jobs | 6,015 | 8,671 | 13,588 | 18,281 |
| Activity Units Per Gross Parcel Acres | 19.09 | 27.51 | 43.12 | 58.01 |

Source: Pierce County 2014, BERK 2017

### Pierce County Countywide Planning Policies

All alternatives contribute capacity to meet the citywide growth targets developed between Pierce County and its cities. Action Alternatives 1 and 2 would increase the capacity for growth in Downtown and citywide by increasing residential densities and by making investments to incentivize infill development on catalyst sites both for housing and jobs.

**Exhibit 3.3-14. Lakewood Employment and Housing Capacity – Downtown**

| SCENARIO | HOUSING | JOBS STANDARD | JOBS FAR METHOD |
|---|---|---|---|
| No Action CBD Zone Capacity | 613 | 629 | 6,927 |
| No Action Study Area Growth Assumptions | 456 | 1,667 | 1,667 |
| Action Alternative 1 Downtown Capacity | 1,579 | Not applicable | 7,533 |
| Action Alternative 1 Growth Assumption | 1,579 | 4,147 | 4,147 |
| Action Alternative 2 Downtown Capacity | 2,257 | Not Applicable | 7,369 |
| Action Alternative 2 Growth Assumptions | 2,257 | 7,369 | 7,369 |

Note: Jobs Standard capacity uses employees per acre approach in the Pierce County Buildable Lands Report 2014, whereas Jobs FAR (Floor Area Ratio) is based on a review of parcels that have developed only to 25% of their zoned capacity.

Source: Pierce County 2014, BERK 2018

**Exhibit 3.3-15. Lakewood Employment and Housing Capacity – Citywide including Downtown**

| SCENARIO | HOUSING | JOBS STANDARD | JOBS FAR METHOD |
|---|---|---|---|
| Citywide Target Net 2010-2030 | 9,565 | 12,907 | 12,907 |
| No Action Citywide Capacity | 10,919 | 9,284 | 15,436 |
| Ratio of Capacity to Target | 1.14 | 0.72 | 1.20 |
| Action Alternative 1 Citywide Capacity | 11,885 | Not applicable | 16,042 |
| Ratio of Capacity to Target | 1.24 | | 1.24 |
| Action Alternative 2 Citywide Capacity | 12,563 | Not applicable | 15,878 |
| Ratio of Capacity to Target | 1.31 | | 1.23 |

Note: Jobs Standard capacity uses employees per acre approach in the Pierce County Buildable Lands Report 2014, whereas Jobs FAR (Floor Area Ratio) is based on a review of parcels that have developed only to 25% of their zoned capacity.

Source: Pierce County 2014, BERK 2018

Using a floor area ratio (FAR) based jobs approach, all alternatives provide sufficient capacity to support citywide job targets. Alternative 2 increases the FAR Capacity as more property on catalyst sites is considered as well as on vacant and redevelopable land. The 2014 Buildable Lands Report methods for Lakewood should be updated at the next Buildable Lands Report Update to reflect use of an alternative capacity calculation method to the jobs-per-acre approach.

Because the No Action Alternative does not include changes to plans or regulations, Downtown housing capacity would not increase, but capacity is sufficient to meet growth targets.[2] Action Alternatives 1 and 2 would both increase housing densities in the Downtown and increase capacity above 2014 Buildable Lands Report estimates more than doubling or tripling the capacity, respectively.

#### Lakewood Towne Center CC&Rs

In reviewing existing CC&Rs for the Lakewood Towne Center, the 2016 Lakewood City Attorney's memo included several recommendations and considerations:

- Including the Lakewood Towne Center in the CBD Subarea Plan (known here as the Downtown Plan) would help ensure development can occur in harmony with other parts of the CBD;
- Physical considerations include that the property has some space for development and is generally flat, although there is a creek running beneath portions of the property. Other considerations are the size of the property in relation to large scale developments. The proximity of the property to freeway access should also be considered;
- Legal constraints include CC&Rs as well as existing zoning and what action can be taken to change these conditions; and
- Financial considerations and sufficient market demand.

Under Action Alternatives 1 and 2 the Lakewood Towne Center is included in the Draft Subarea Plan, which will guide the form-based zoning, and space for development is considered in the EIS and Planned Action. The City may further consider the status of CC&Rs as an implementation activity after the Downtown Plan and code adoption. Through the Downtown Plan efforts, the City has worked with the property owner to consider future uses and infrastructure.

## *No Action Alternative*

### Land Use Patterns within the Study Area

The No Action Alternative is the least intensive land use alternative. It applies future growth to existing conditions using the policies and zoning that are in place today. As a result, future land use under the No Action Alternative is consistent with Lakewood's current Comprehensive Plan, Future Land Use Map, zoning, and development regulations.

Under the No Action Alternative, the Study Area would support 466 new housing units and 1,667 new jobs, as shown in Exhibit 3.3-12.

[2] For purposes of EIS impact analysis No Action housing assumptions are lower than capacity estimates included in the Buildable Land Report, but are consistent with traffic modeling conducted for the Comprehensive Plan in 2014. Capacity is determined based on maximum allowable densities on vacant and redevelopable sites. While the EIS may test a slightly lower housing growth for No Action, it does not change its capacity.

As the area grows, the mix of land uses under the No Action Alternative will remain similar to the existing condition. There is likely to be some redevelopment, but mixed-use development and housing will be minimal. Building forms would also remain similar to the forms that exist today. Redevelopment of some areas may result in larger buildings where new construction maximizes development on parcels that are currently underutilized according to existing zoning. With a mix of land uses and building form similar to existing conditions, there are unlikely to be issues with land use incompatibility within the subarea.

### Land Use Patterns Abutting the Study Area

With the application of current Land Use Code standards that address landscaping and other site design requirements such as building height transitions at lower density zones, there are unlikely to be compatibility impacts.

### Land Use Plans and Policies

The No Action Alternative would not amend current plans or regulations applicable in the area. This would not fulfill Lakewood Comprehensive Plan policies calling for plan and code updates to further address mixed use development:

> *LU-19.9: Revise land use and development regulations to require mixed use development within the CBD for any new development excepting standalone commercial pads and service commercial uses.*

The No Action Alternative would also not fulfill other policies that call for removal of deed restrictions and push for more investment in community gathering spaces and multi-modal travel.

The No Action Alternative would also not establish a subarea plan that sets growth targets for the PSRC designated Regional Growth Center. It would not address mode split goals for the center. It would retain current boundaries

## *Alternative 1*

### Land Use Patterns within the Study Area

Alternative 1 is the medium-growth alternative, but it accounts for a change in land use from the existing condition and more density and intensity than the No Action Alternative. Under Alternative 1 it is estimated there will be up to 1,579 new housing units and 4,447 new jobs as shown in Exhibit 3.3-12.

Building heights are likely to increase from a range of about one to two stories under existing conditions to a range of about two to six stories, or a maximum of 90 feet, to accommodate additional growth and development. While 90 feet is allowed under the No Action, the Alternative 1 density of 80 units per acre is a substantive increase over the current 54 units per acre, and there may be more potential that the height would be achieved. A change in land use patterns under Alternative 1 is expected to increase activity in the Study Area. Within the Study Area, there is also the potential for temporary land use conflicts, particularly in early redevelopment phases where new areas of greater height and intensity abut areas of existing development.

Under existing conditions and the No Action Alternative, only 456 housing units will be added to the Study Area. The increase in housing units under Alternative 1 is likely to bring additional weekend and evening activity into the Study Area. In addition to housing, up to 1.5 million square feet of commercial office and retail uses will make up the bulk of the non-residential development under Alternative 1.

Under Alternative 1, mixed-use development is much more likely than under the No Action Alternative or existing conditions. Development is much more likely to include ground floor retail uses, particularly on catalyst sites in the Town Center, Colonial District and along Gravelly Lake Dr. where the greatest changes in building form is expected. Alternative 1 includes several improvements to the street network and pedestrian orientation of the Study Area. It includes an increased public street network in Town Center, including non-motorized connections to Lakewood Towne Center Blvd, improvements to north-south connection between Gravelly Lake Drive and 59th Ave, intersection reconfiguration at Gravelly Lake Drive / Bridgeport Way, intersection reconfiguration at Mt Tacoma Drive / Bridgeport Way, and the addition of a Green Street Loop. With these additions, this alternative supports transit-oriented development.

### Colonial District Catalyst Site

Alternative 1 would allow up to 80 units per acre and more properties may realize the maximum height of 90 feet compared to the No Action Alternative. Due to greater civic and infrastructure investments such as Motor Avenue, it is possible that more commercial space could be added as well.

### Town Center Catalyst Site

Exhibit 2.3-5 illustrates a prototypical development of the Lakewood Towne Center under Alternative 1. This option represents a more conservative scheme in terms of its assumptions than Alternative 2, which assumes a more thorough redevelopment. Alternative 1, Lakewood Towne Center Option A, assumes the existing building pads, and adjacent big box which is currently vacant, are available for redevelopment. This option shows the pad as a structured parking deck and lighter building offering small loft apartments, and the big box redeveloped as multi-unit senior housing above a two-story civic facility. Both buildings provide retail or other active uses on the ground floor.

Improvements such as a new connecting street and plaza anchor the north side of the proposed new park, the cinema to the east and the city hall to the south. Connecting this park to the northeast corner of the property, including the existing Target, is a new curved boulevard with restaurants and additional retail tenants, with loft apartments and or shared workspaces above. This area will be further connected by a new pedestrian street and plaza, allowing for a mix of smaller specialty type retail and fast casual/ sit down restaurants in the plaza. On the south, along the eastern edge south of the existing Target box, the existing underutilized parking lot will be redeveloped into a combination of housing types including new three-story apartment buildings, and townhomes with small backyards and roof decks.

This housing will begin to define a network of street frontages and blocks providing supplemental parking for the cinema through an enhanced connection, replacing parking lost to the new park, and provide a more appropriate frontage/back to the existing residential adjoining the property to the east. Northeast of the new park will be a number of one story, linear retail buildings to complement the new retail on the ground floors of civic buildings and the retail within mixed-use housing buildings on the east side of the street. This takes advantage of currently under-utilized parking space in this area to create a more walkable, mixed-use district. This relatively conservative approach maintains or replaces all existing parking and provides new parking to support any proposed uses. It can be a template for the development of the entire property into a network of new walkable neighborhoods. (Seth Harry and Associates, 2017)

### West of Gravelly Lake Drive Land Use Designations and Catalyst Sites

Alternative 1 proposes 80 units per acre for residential and mixed uses, greater than the 54 units per acre. This allowed density would allow more development to create a typical mixed-use building of five stories over one story of retail, still within the current adopted height of 90 feet. Development would be similar to, but a little less intense than, Alternative 2 at 100 units per acre.

West of Gravelly Lake Drive, the CBD zone boundary follows parcel boundaries in a non-linear fashion. Blocks are split between MR2, R3 and CBD zoning. Alternative 1 studies the potential for some of the partial split blocks to be rezoned to more intensive Downtown form based zoning.

Within the "land use study areas" west of the Downtown Plan Study Area (see Exhibit 2.3-24) are 3.54 acres zoned MR2 and 0.93 acres zoned R3. Proposed new zoning under Alternative 1 would create a Downtown designation and form-based code, allowing for a range of uses and transitional height and landscape standards. This would promote residential renewal to mixed use and residential development similar to the purpose of the MR2 zone, but denser than the R3 zone. The typical development on these parcels under Alternative 1could include a three-story mixed-use building with ground floor retail and residential above and behind. A typical format for attached residential units is townhomes with underground parking and roof decks.

While the proposed zone adds more density than the current zone, urban design standards under the form-based zone would regulate new buildings to fit well within the existing residential context. Standards will emphasize scale, building form, relationships between buildings, streets, and public spaces. The form-based code can also explicitly focus on urban design compatibility in locations such as this where higher intensity mixed-use development interfaces with single-family residential development nearby or across the street. Development standards that improve compatibility could include limits on floorplate sizes, fenestration and transparency requirements, active ground floor use requirements as well as upper story step backs to ensure small-scale character and a residential street environment.

Since proposed development is at the edge of the existing single-family neighborhood, and abuts an arterial, it is not likely to produce through traffic. Additional activity can also improve the security and walkability of the area with "eyes on the street."

Nevertheless, the change from R3 to a Downtown form-based code would alter development character across from facing blocks, and potentially set a precedent for higher intensity development in an area planned long-term for single family residential. The change from MR2 to a Downtown form-based code would not result in a significant difference in density or height near residential uses given transitional design standards. More commercial use could occur with the form-based code, but such uses could be less desirable away from major arterials. The form-based code could improve design of attached dwellings compared to current standards.

### Land Use Patterns Abutting the Study Area

Compatibility conflicts could occur due to changes in the mix of land use and changes related to the increased intensity and height of new development. Development just outside the Study Area boundary at certain locations is primarily residential development, where the height transition standards would apply, or is institutional development that is less sensitive to impacts. However, careful attention in the creation of zoning, development regulations, and design standards could limit potential for land use compatibility conflicts both within the Study Area and in adjacent areas.

### Land Use Plans and Policies

The Comprehensive Plan acknowledges the Study Area as a business district, and Alternative 1 is consistent with policy language in the Land Use Element that promotes redevelopment of the CBD as a mixed-use urban center that creates a downtown and bolsters Lakewood's sense of identity as a city. The CBD is intended to attract significant numbers of additional office and retail jobs as well as new high-density housing. Policies that refer to the creation of a recognizable downtown through redevelopment of the CBD are described in Section 1.4.3 of the Lakewood Comprehensive Plan:

> *The CBD is the center of commercial and cultural activity for the city. It encompasses both the Lakewood Towne Center and Colonial Center. The area in and around the Towne Center is envisioned as a magnet for intensive mixed use urban development including higher density office and residential uses. At the north end of the CBD, the Colonial Center will serve as the hub of Lakewood's cultural activity. Higher quality, denser urban redevelopment is expected within the District, noticeably increasing social, cultural, and commercial activity. Streetscape and other urban design improvements will make this area more accessible and inviting to pedestrians. (City of Lakewood, 2016; City of Lakewood, 2016)*

Downtown goals and policies promote a multi-modal mixed use urban center with commercial, cultural, residential, and civic uses. Alternative 1 projects strategic increases in office, retail, housing, and civic uses, which gives a general sense of future building height and intensity. These increases are expected to add higher quality, denser urban development to the area and are consistent with the policies in the current Comprehensive Plan.

Since land use designations and zoning have not been fully defined at this stage of planning for Alternative 1, a direct comparison of current and proposed plans and codes is not possible. However, Alternative 1 would amend the Comprehensive Plan Land Use Designation for the Study Area and create a new implementing form-based code. If areas west of Gravelly Lake Drive currently designated/zoned Residential Mixed /MR2 are modified to be included in the Downtown designation and form-based zone, this would require Comprehensive Plan Amendments.

Higher-density, mixed use development is also consistent with policies in the both the Puget Sound Regional Council's MCPPs and the Pierce County CWPPs, which direct cities toward a centers strategy greater housing and employment density. Alternative 1 would significantly increase housing units and jobs over current conditions and the No Action Alternative, and together result in activity units that approach 45 units /acre. Alternative 1 illustrates a modest improvement in non-motorized mode split goals but would increase density surrounding the transit center that could increase use of that mode. The boundary of the regional growth center boundary could be made more compact and organized around the commercial and civic center of the community with a roughly half-mile radius.

## *Alternative 2*

### Land Use Patterns Within the Study Area

Alternative 2 presents the highest growth alternative. It represents a more intense mixed-use transformation with a civic and housing focus. Under Alternative 2, there will be 2,257 new housing units and 7,369 jobs as shown in Exhibit 3.3-12. Building heights may reach as high as 90 feet under Alternative 2, but the vast majority of development is expected to develop at a height of two to six stories. A change in land use patterns under Alternative 2 is expected to increase activity in the Study Area. Within the Study Area there is also the potential for temporary land use conflicts, particularly in early redevelopment phases where new areas of greater height and intensity abut areas of existing development.

### Colonial District Catalyst Site

Development would be similar to that proposed under Alternative 1 in the Colonial District. However, Alternative 2 would allow up to 100 units per acre and more properties may realize the maximum height of 90 feet.

Due to greater civic and infrastructure investments such as Motor Avenue, it is possible that more commercial space could be added as well.

### Town Center Catalyst Site

Alternative 2 represents a more ambitious plan than the No Action Alternative or Alternative 1. It takes retail trends and the desire for a significant new central park into account. It imagines a full redevelopment of the site with a vertical mixed-use format, and the transformation of the mall area into a walkable, new downtown with new public streets and a large central park.

Exhibit 2.3-7 illustrates a prototypical development under Alternative 2. The main feature of this alternative is the central park. In addition, a new freestanding signature cultural and civic building and plaza will occupy the existing building pad and the existing city hall to the south. The existing cinema and the bookstore remain, while new lifestyle retail and food and beverage tenants are added to the mix. All other existing retail in the east side of the property is reconfigured into new multi-story mixed use buildings with ground floor retail. Similar to Alternative 1, these buildings redefine the existing parking lots into a network of walkable streets and blocks. The Target box is relocated to help provide and balance parking and support the new eastside developments as part of a line of new mixed-use buildings. Remaining surface parking lots are expected to be lined with new liner, retail buildings. As in alternative 1, this alternative also allows and anticipates the long-term redevelopment of existing and reconfigured surface lots as future parking decks with additional infill development above. This alternative also assumes a new enhanced park connection to the existing east side residential neighborhood providing an amenity for the new residential uses. (Seth Harry and Associates, 2017)

### West of Gravelly Lake Drive Land Use Designations and Catalyst Sites

West of Gravelly Lake Drive, densities could increase to up to 100 units per acre, the highest studied, though the example catalyst development illustrated in Exhibit 2.3-9 shows that the number of stories would be about six, less than the maximum 90 feet allowed today.

West of Gravelly Lake Drive, the CBD zone boundary follows parcel boundaries in a non-linear fashion. Under Alternative 2, the potential impacts of rezoning the area currently zoned MR2 and R3 are similar to those described for Alternative 1.

## Land Use Patterns Abutting the Study Area

While having the same maximum 90-foot heights as the No Action Alternative and Alternative 1, Alternative 2 would also increase residential density to 100 units per acre. Compatibility conflicts could occur due to changes in the mix of land use and changes related to the increased intensity and height of new development. Development just outside the Study Area boundary at certain locations is either primarily residential development, where the height transition standards would apply, or is institutional development that is less sensitive to impacts. As with Alternative 1, careful attention in the creation of zoning, development regulations, and design standards could limit potential for land use compatibility conflicts both within the Study Area and in adjacent areas.

### Land Use Plans and Policies

Like Alternative 1, Alternative 2 is consistent with the Comprehensive Plan policies that designate the Study Area as a mixed-use center and recognize its potential growth.

Downtown goals and policies promote a multi-modal mixed use urban center with commercial, cultural, residential, and civic uses. Alternative 2 projects the most increases in office, retail, housing and civic uses, which gives a general sense of future building height and intensity. These increases are expected to add higher-quality, denser urban development to the area, and are consistent with the policies in the current Comprehensive Plan.

Since land use designations and zoning have not been fully defined at this stage of planning for Alternative 2, a direct comparison of current and proposed plans and codes is not possible. However, Alternative 2 would amend the Comprehensive Plan Land Use Designation for the Study Area and create a new implementing form-based code. If areas west of Gravelly Lake Drive current designated/zoned Residential Mixed /MR2 are modified to be included in the Downtown designation and form-based zone, this would require Comprehensive Plan Amendments.

Higher-density, mixed use development is also consistent with policies in the both the Puget Sound Regional Council's MCPPs and the Pierce County CWPPs, which direct cities toward a centers strategy and greater housing and employment density. Alternative 2 would significantly increase housing units and jobs over current conditions and the No Action Alternative, and would result in activity units exceeding 58 units /acre. Alternative 2 illustrates a greater improvement in non-motorized mode shares. This alternative would more substantially increase density surrounding the transit center that could increase use of that mode. The boundary of the regional growth center boundary could be made more compact and organized around the commercial and civic center of the community with a roughly half-mile radius.

## 3.3.3. Mitigation Measures

### *Incorporated Plan Features*

The Lakewood Comprehensive Plan designates the Downtown as the City's main commercial center. The Comprehensive Plan, includes policies and plans for improvements to support the development of the land use under the No Action Alternative.

Increases in land use intensity under Alternatives 1 and 2 could be partially mitigated through the development of new green spaces and other public spaces. These potential features include non-motorized transportation connections that support new development. The integration of public open space into the Study Area helps to soften potential impacts of more intensive land use. Open space is an amenity that can be used for recreation, community gathering, access to nature, a visual break, and a variety of environmental benefits.

## Regulations and Commitments

Lakewood's City Code contains regulations that help to ensure land use compatibility. A summary of these regulations, which would mitigate impacts associated with the alternatives, is presented below.

**Development Regulations.** Title 18A contains Lakewood's Land Use Code, which establishes zoning and development regulations. These development regulations contain provisions governing the design of buildings, site planning, and provisions to minimize land use incompatibilities. Commercial and mixed-use zones generally contain provisions relating to building form and design, such as standards related to height, bulk, scale, density, setbacks, floor area ration (FAR), screening, floor plate size, landscaping, etc. Regulations are in place to address such issues related to the implementation of the No Action Alternative.

## Other Proposed Mitigation Measures

### Land Use Plan Consistency

Alternatives 1 and 2 would amend the Comprehensive Plan Land Use Designation for the Study Area and create a new implementing "form-based code" (keyed to a regulating plan that designates the appropriate form and scale (and therefore, character) of development, rather than only distinctions in land-use types. If areas west of Gravelly Lake Drive currently designated/zoned Residential Mixed /MR2 or Residential 3/ R3 are modified to be included in the Downtown designation and form-based zone, this would require Comprehensive Plan Amendments.

Further, the Subarea Plan may result in amendments to Comprehensive Plan capital facility and transportation improvements.

The 2014 Buildable Lands Report methods for Lakewood should be updated at the next Buildable Lands Report Update to reflect an alternative method to the jobs per acre approach.

### Design Standards

Alternatives 1 and 2 would require the development of new or revised zoning and development regulations for the Study Area. New regulations will need to address permitted uses, dimensional requirements, parking and circulation, landscaping, and the development of streets and sidewalks. These regulations will need to be crafted with the intent of creating land use compatibility within and adjacent to the Study Area.

Alternatives 1 and 2 will include the adoption of design standards specific to the Study Area. It is anticipated that design regulations developed to implement Alternatives 1or 2 would include standards related to: integration of the natural environment, building design, enhancement of gateway features, low-impact development surface water features, public art, pedestrian experience and streetscapes, public spaces, mixed-use building features, site planning, parking, lighting, screening, and signage.

# 3.3.4. Significant Unavoidable Adverse Impacts

Under all alternatives, additional growth and development will occur in the Study Area, leading to increases in height and bulk of buildings and increased land use intensity. This transition is unavoidable, but is not considered significant or adverse within an urban area designated as the Central Business District and a regional growth center in the Comprehensive Plan.

Future growth is likely to create temporary or localized land use compatibility issues as development occurs. The potential impacts related to these changes may differ in intensity and location in each of the alternatives. However, with existing and new development regulations, zoning requirements, and design guidelines, no significant adverse impacts are anticipated.

# 3.4. Transportation

This section presents a multimodal transportation analysis to evaluate the potential impacts from enacting proposed zoning and transportation network changes in Downtown Lakewood. Existing transportation conditions are documented, as well as future transportation conditions under three alternatives—the No Action Alternative that represents the condition if zoning and the transportation network remain the same, and Alternatives 1 and 2 that analyze potential changes of zoning provisions and transportation network modifications that could be implemented. The analysis identifies significant impacts for the following modes: vehicle, transit, pedestrian, and bicycle. Safety and parking impacts are also considered. Potential capital and programmatic mitigation measures are identified for Alternatives 1 and 2.

## 3.4.1. Affected Environment

Downtown Lakewood includes facilities for pedestrians, bicycles, automobiles, and transit. This section describes the existing types and locations of those transportation facilities. The Study Area is shown in Exhibit 3.4-1.

### *Areawide*

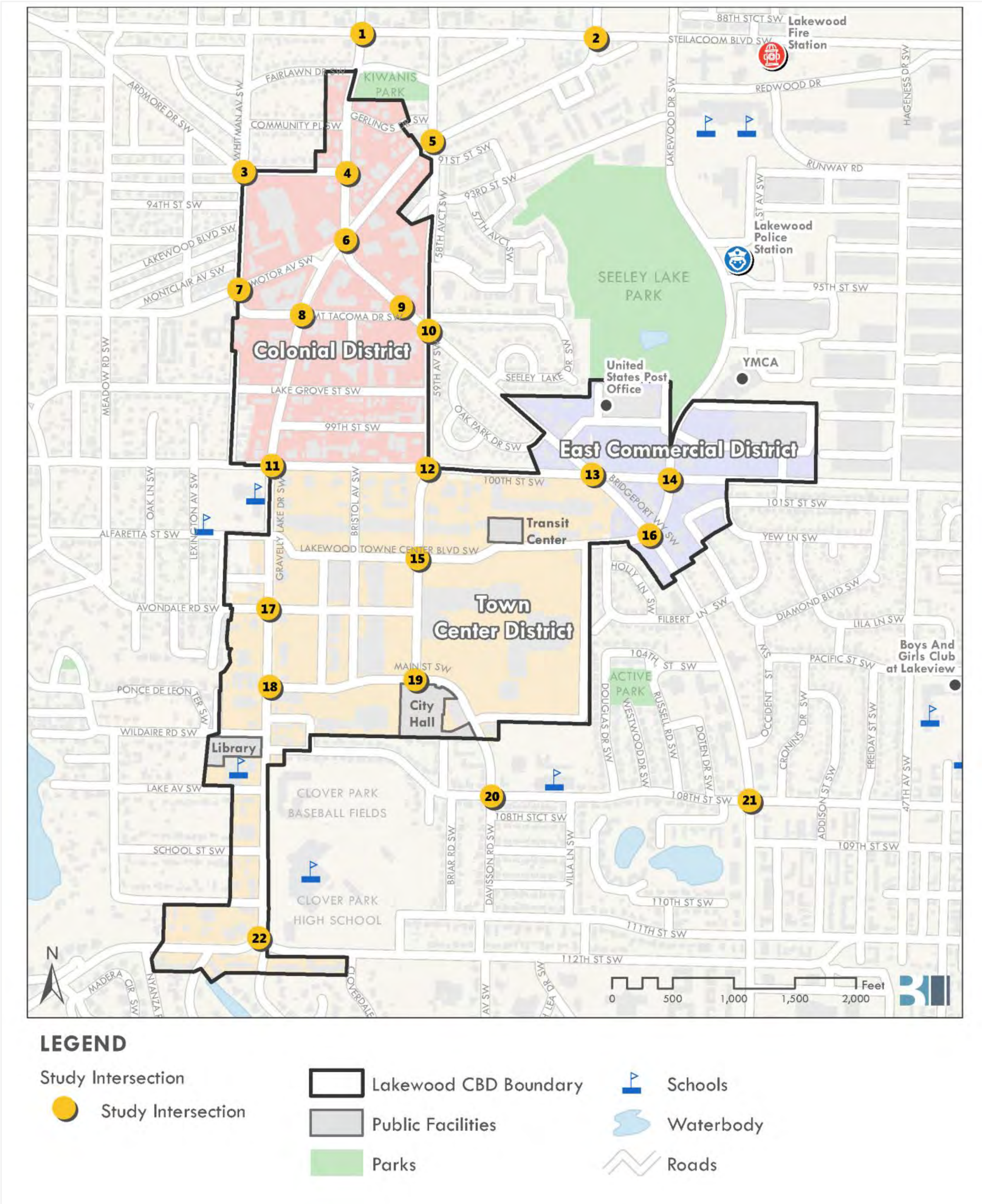
#### Pedestrian Network

Sidewalks are provided on most arterials within Downtown Lakewood, although there are some gaps, particularly along Gravelly Lake Drive at the north end of the Study Area. Most sidewalks are relatively narrow and do not have buffers, so pedestrians are walking alongside vehicle traffic, which can be uncomfortable for pedestrians on high speed and/or high-volume streets. Recently completed improvements, such as along Main Street SW, include more pedestrian friendly amenities such as buffered sidewalks and mid-block crossings.

As shown in Exhibit 3.4-2, while the arterial network has consistent sidewalk coverage, the adjacent residential areas generally lack sidewalks. The density of arterial connections is also a challenge for pedestrians who may have to complete out of direction travel to reach their destination. The Lakewood Towne Center at the heart of the Study Area includes wide swaths of surface parking lots. Some segments of the interior roadway network include sidewalks, but the segments are currently fragmented and would benefit from a more connected pedestrian network.

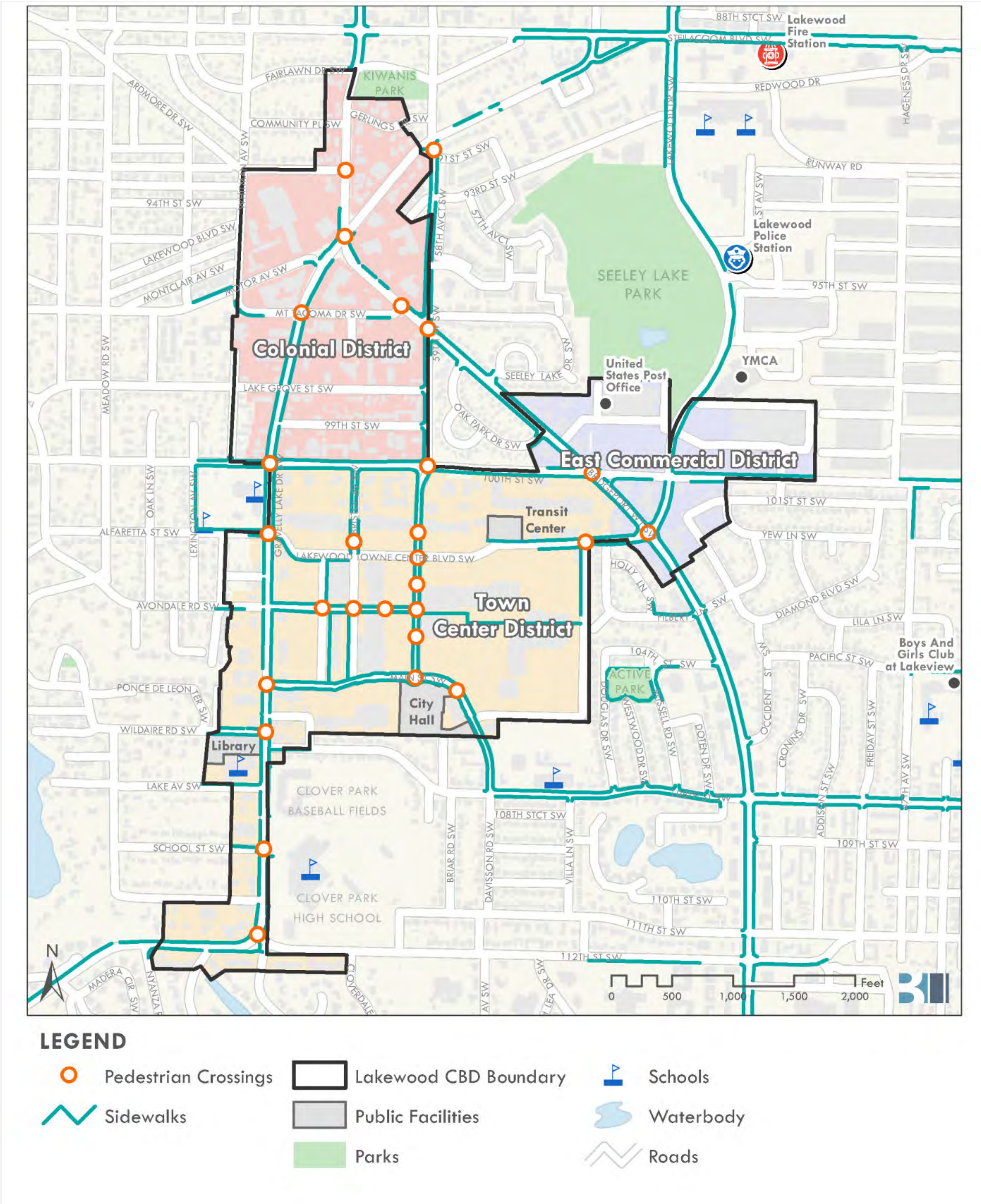
While there are marked crossings at all the signalized intersections in the Study Area except Lakewood Drive SW and 100$^{th}$ Street SW, large blocks, a lack of mid-block crossings, and large intersections make it difficult to cross the street as a pedestrian in many areas. The distance between marked crossings varies widely, ranging from 175 to 1,200 feet. Pedestrian activity is relatively low throughout the Study Area due to an auto-oriented and dispersed land use.

**Exhibit 3.4-1. Study Area Intersections**




Source: Fehr & Peers 2018

**Exhibit 3.4-2. Existing Pedestrian Network.**




Source: Fehr & Peers 2018

## Bicycle Network

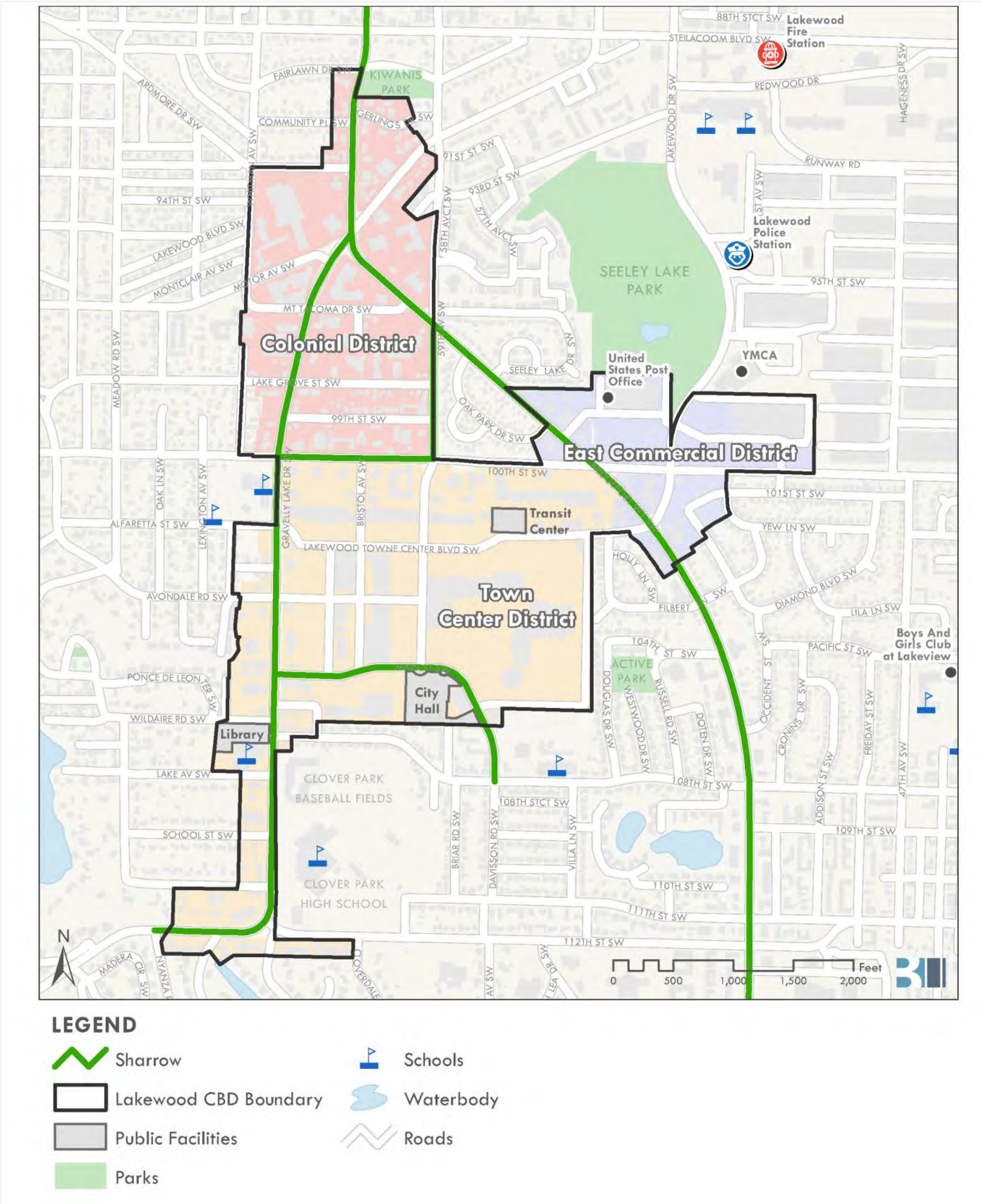
Bicycle infrastructure is limited within the Study Area. As shown in Exhibit 3.4-3, shared lane markings, also called "sharrows", are painted along key arterials through the Study Area including Gravelly Lake Drive, Bridgeport Way, Main Street SW, and portions of 100th Street SE and 59th Avenue SW. Sharrows are used to remind drivers that they must share the road, but do not provide dedicated space for bicycles. Because many of the arterials in the Study Area carry large amounts of vehicular traffic, bicycling within auto traffic is uncomfortable for many cyclists, particularly along higher speed stretches of roadway. Striped shoulders are provided on several roadways on the southern end of the Study Area. Outside of the shared arterial facilities, the adjacent residential neighborhoods do not provide dedicated bicycle facilities. However, due to their low-volume and low-speed character, some of those streets may be more comfortable for cyclists who wish to avoid arterial roadways. Bicycle volumes in Downtown Lakewood are relatively low likely due in part to the lack of bicycle facilities, auto oriented land uses, and high motor vehicle speeds and volumes.

## Transit Network

Downtown Lakewood is served by Pierce Transit and includes the Lakewood Transit Center in the northeast corner of Lakewood Towne Center. The Lakewood Transit Center is the terminus for eight routes, generally serving Tacoma, Puyallup, Steilacoom, Joint Base Lewis McChord, and Seattle. Bus stops are present along many of the Study Area's arterials including Gravelly Lake Drive, Bridgeport Way, 100th Street SE, 108th Street SEW, and Lakewood Drive SE, as shown in Exhibit 3.4-4. Most bus routes run at 30-minute headways (frequencies) throughout the peak periods, with Route 2 running at 20-minute headways. Off-peak headways range between 30 and 60 minutes. The bus routes serving the Study Area are summarized in Exhibit 3.4-5.

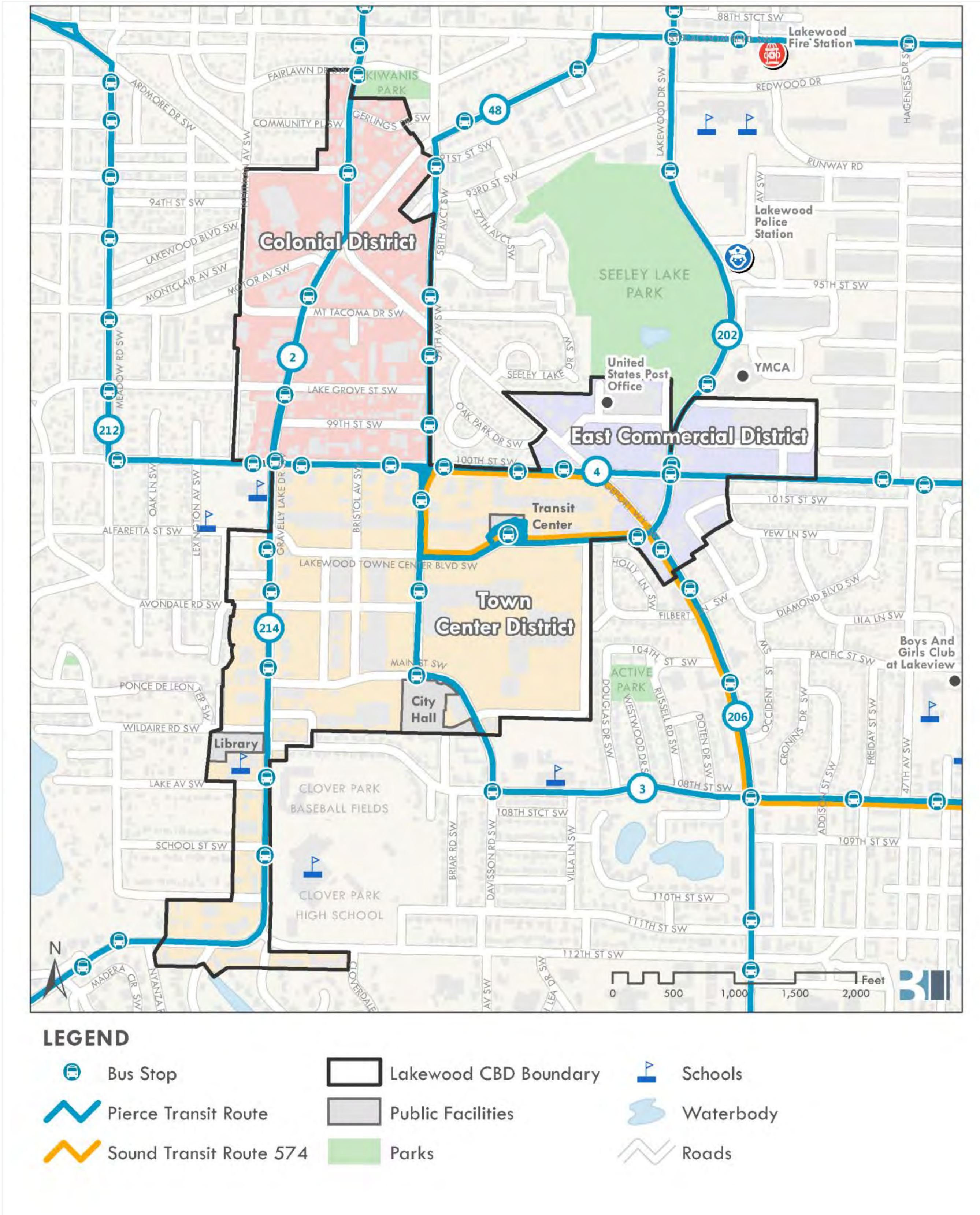
Sound Transit's commuter train, the Sounder, has a stop at Lakewood Station to the southeast of the Study Area. The Sounder provides a regional transit connection between Lakewood, Tacoma, and Seattle. Although this is an excellent regional transit service, the station is roughly a mile away from Downtown core, providing a challenge for travelers to make the final connection into the Study Area. Lakewood Station is also served by regional bus routes operated by Sound Transit and Intercity Transit.

**Exhibit 3.4-3. Existing Bicycle Network.**




Source: Fehr & Peers 2018

**Exhibit 3.4-4. Existing Transit Network.**




Source: Fehr & Peers 2018

**Exhibit 3.4-5. Existing Bus Routes.**

| Route | Destinations | Peak Headway (in Minutes) | Off-Peak Headway (in Minutes) |
|---|---|---|---|
| 2 | Downtown Tacoma – 10th & Commerce Transit Center via University Place | 20 | 30-60 |
| 3 | Downtown Tacoma – 10th & Commerce Transit Center via Tacoma Mall | 30 | 30-60 |
| 4 | Pierce College – Puyallup | 30 | 30 |
| 48 | Downtown Tacoma – 10th & Commerce Transit Center | 30 | 60 |
| 202 | Tacoma – 72nd Street Transit Center | 30 | 60 |
| 206 | Pacific Hwy, Tillicum, JBLM | 30 | 60 |
| 212 | Steilacoom | 30 | 60 |
| 214 | Pierce College – Steilacoom | 30 | 60 |
| 574 | Tacoma – Sea-Tac Airport | 30 | 60 |

Source: Pierce Transit, 2017 and Sound Transit, 2018.

According to 2015 American Community Survey (ACS) 5-year data (Census Tract 719.01 Block Group 1), 78% of workers over the age of 16 living in the Study Area drive alone to work. In contrast, 15% carpool and 7% take public transit to work. No residents reported working from home, walking, or biking to work.


## Roadway Network

The Study Area is a predominantly auto-oriented environment. The local street network is made up of two-way streets with varying travel speeds. Bridgeport Way SW, 100th Street SW, and Lakewood Drive SW have a speed limit of 35 miles per hour (MPH). Gravelly Lake Drive SW, Mt Tacoma Drive SW, and 93rd Street SW have a speed limit of 30 MPH. Main Street has a speed limit of 25 MPH. Signals exist at all intersections of arterials. The Gravelly Lake Drive SW and Bridgeport Way SW corridors have coordinated signals, which facilitate the flow of traffic traveling along these corridors.

Bridgeport Way SW, 108th Street SW, and 100th Street SW are key access routes to Interstate 5 (I-5), so much of the traffic along the Study Area arterials is destined for I-5 rather than Downtown Lakewood itself. The arterials do not follow a typical grid pattern, and blocks vary in size considerably with smaller blocks in the Colonial District and East Commercial District and larger blocks in the Town Center District.

### Functional Classification of Streets

Downtown Lakewood's street functional classification is shown in Exhibit 3.4-6. The key north-south arterials through the Study Area are Gravelly Lake Drive SW and Bridgeport Way SW, both of which have a five-lane cross-section (two lanes in each direction with a center turn lane or turn pockets at key intersections). These two streets are parallel to one another at the south end of the Study area, but intersect in the Colonial District. Most east-west roadways are minor arterials ranging from three to five lanes wide. Lakewood Towne Center Blvd SW and Bristol Avenue SW are privately owned through the mall area.

Complete descriptions of principal arterials, minor arterials, and collector arterials in the Study Area may be found in Appendix C.

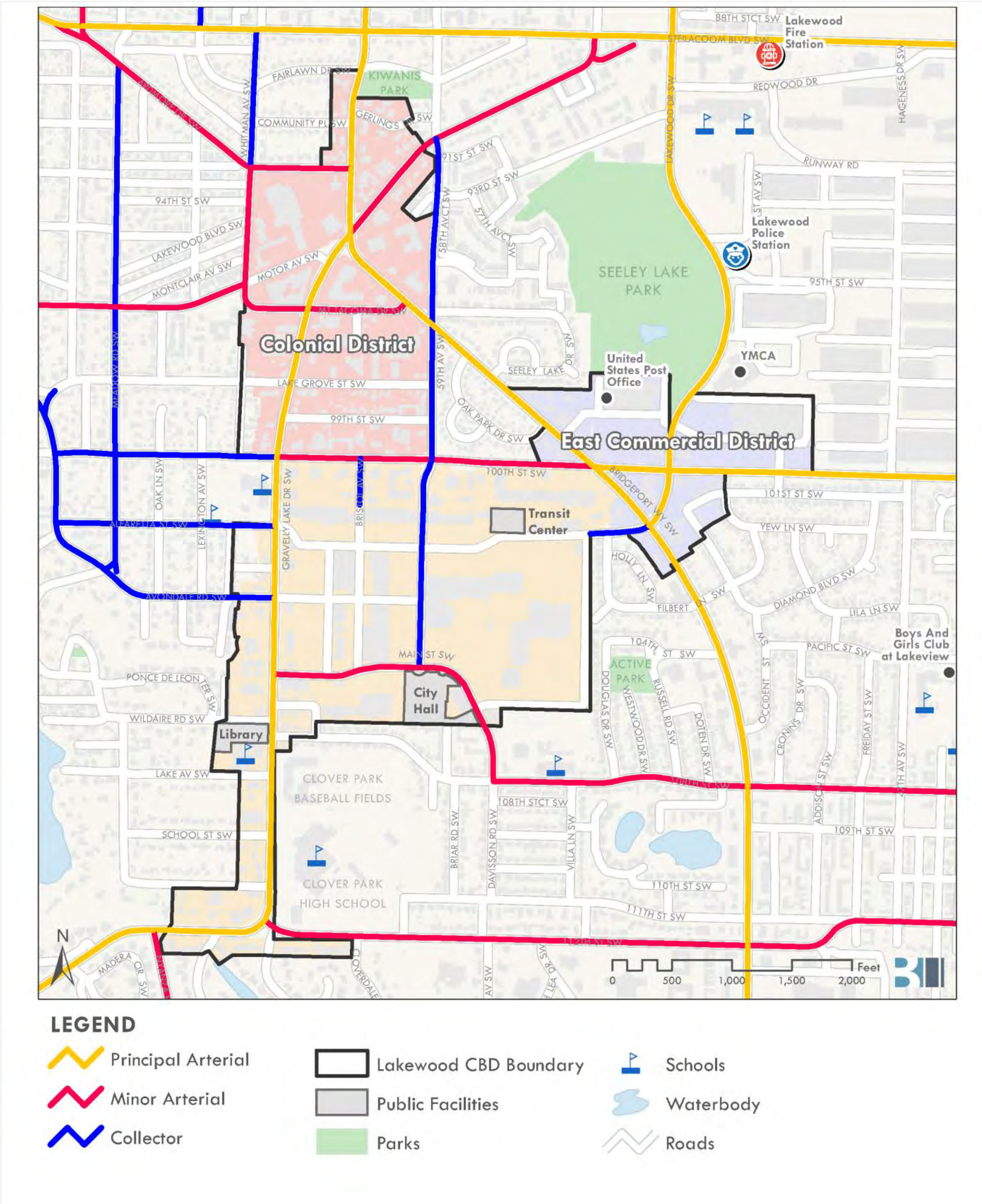
### Freight Network

The City's 2016 Comprehensive Plan identifies designating truck routes for freight as a transportation goal. Designated major truck streets are primary routes for goods movement throughout the city. Designation as a major truck street helps Lakewood's Public Works Transportation Division determine street design, traffic management plans, and pavement improvement projects that allow and facilitate the movement and more frequent use of larger vehicles along the designated street. $100^{th}$ Street SW, Bridgeport Way, S Tacoma Way, and Steilacoom Boulevard SW are designated as truck routes in WSDOT's Freight and Good Transportation System (FGTS) 2015 Update (Washington State Department of Transportation, 2015).

### Parking

There is very little on-street parking on arterials in the Study Area, but on-street parking exists on Mt Tacoma Drive SW west of Gravelly Lake Drive SW NE as well as several other local streets. Commercial uses in the Colonial District and East Commercial District tend to have dedicated parking lots adjacent to their buildings, frequently buffering the building from the street. In the Town Center District, there is an abundance of off-street parking available throughout the mall. Field observations reflected that the off-street parking supply is ample for the demand.

**Exhibit 3.4-6. Functional Classification.**




Source: Fehr & Peers 2018

## *Intersection Level of Service*

The City uses PM peak hour average delay to evaluate traffic operations level of service (LOS) at its intersections. The City sets a level of service standard of LOS D for the intersections and arterials within the Study Area.

Traffic operations were analyzed using the Synchro software package. The Synchro network reflects the Study Area's existing roadway network including segment and intersection geometry, signal timings, and recent traffic counts (2015-2017). For signalized, roundabout, and all-way stop controlled intersections, the LOS is based on the average delay for all approaches. For minor street stop controlled intersections, the movement with the highest delay is used. Exhibit 3.4-7 summarizes the LOS and delay thresholds specified in the 2010 Highway Capacity Manual (HCM), which is a standard methodology for measuring intersection performance. Five intersections—Gravelly Lake Drive & Bridgeport Way, Gravelly Lake Drive & Mt. Tacoma Drive, Gravelly Lake Drive & 100th Street, and Gravelly Lake Drive & 112th Street—required the use of HCM 2000 methodology for all scenarios, due to non-standard traffic signal phasing associated with Alternative Scenario 1 and 2 network changes and proposed mitigations.

**Exhibit 3.4-7. LOS/Delay Thresholds for Signalized and Unsignalized Intersections.**

| LOS | Signalized Intersections (Delay in Seconds) | Unsignalized Intersections (Delay in Seconds) |
|---|---|---|
| A | $\leq$ 10 | $\leq$ 10 |
| B | > 10 to 20 | > 10 to 15 |
| C | > 20 to 35 | > 15 to 25 |
| D | > 35 to 55 | > 25 to 35 |
| E | > 55 to 80 | > 35 to 50 |
| F | > 80 | > 50 |

Source: Highway Capacity Manual (Transportation Research Board, 2010).

This study considers 22 intersections, 18 of which are signalized. Exhibit 3.4-8 and Exhibit 3.4-9 summarize the existing intersection LOS at the study intersections. The level of service analysis suggests that automobiles move through the Study Area with relatively little delay during the PM peak period. All but one of the intersections meet the City's LOS D standard. The exception is Avondale Rd SW/Gravelly Lake Dr SW which currently has two-way stop control. Vehicles on the minor street, Avondale Rd SW, can experience lengthy delays as they wait for a gap in traffic along Gravelly Lake Dr SW. The City has plans to install a signal at this location to remedy this condition.

Most intersections operate at LOS C or higher, which represents stable conditions with moderate congestion levels for an urban area. Four intersections operate at LOS D during the PM peak period, which indicates traffic conditions are approaching unstable flow:

- Bridgeport Way SW/Steilacoom Boulevard SW
- Bridgeport Way SW/100th Street SW
- Bridgeport Way SW/108th Street SW
- Lakewood Drive SW/100th Street SW

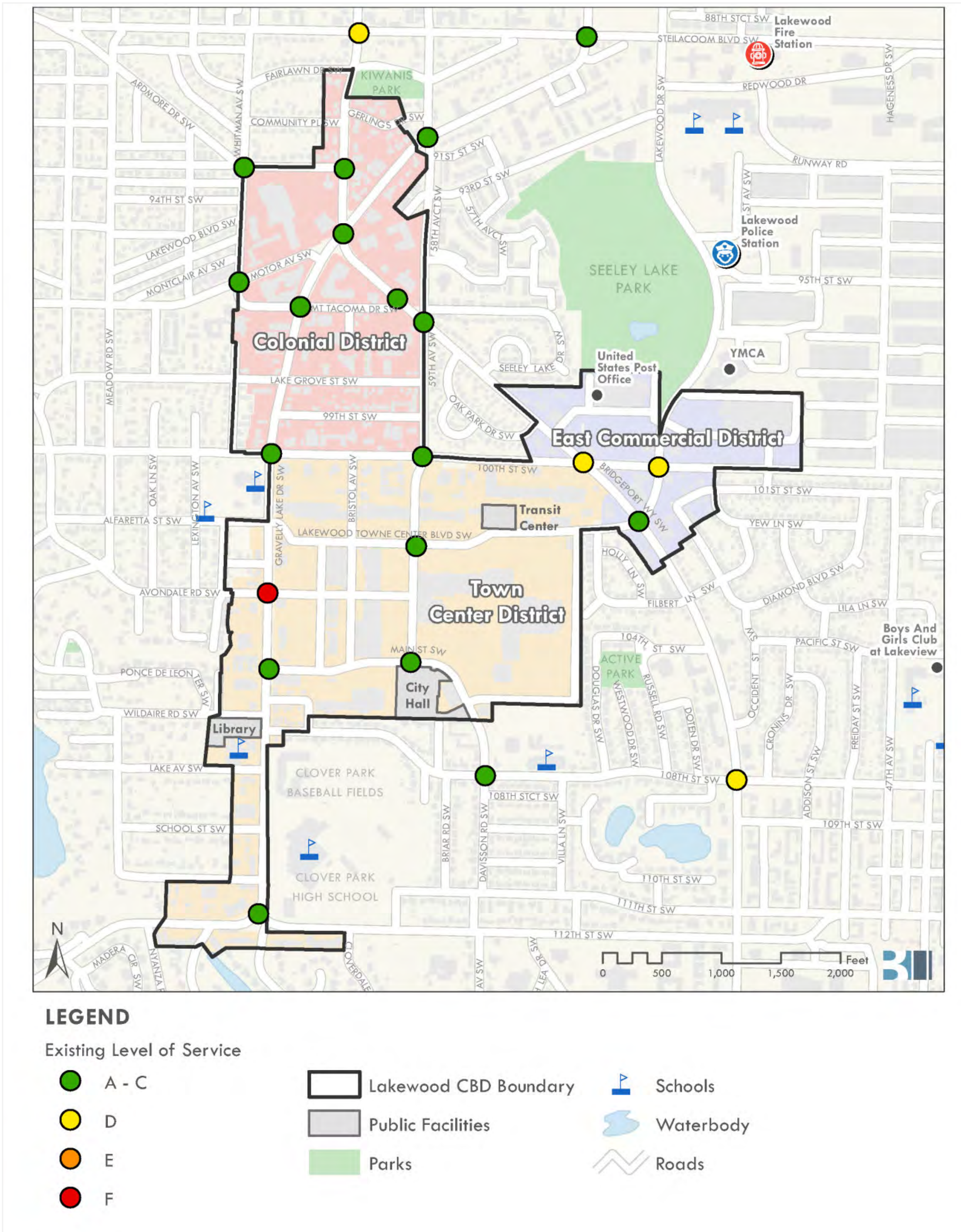
As mentioned above, these are intersections that are affected by regional travel patterns, such as afternoon commute congestion stemming from I-5. Note that LOS D conditions are relatively common in the AM and PM peak periods throughout the urban areas of the Puget Sound region.

**Exhibit 3.4-8. Existing PM Peak Hour Intersection Level of Service and Delay.**

| ID | Intersection | Traffic Control | LOS/Delay |
|---|---|---|---|
| 1 | Steilacoom Blvd SW/Bridgeport Way SW | Signal | D/39 |
| 2 | Steilacoom Blvd SW/Gravelly Lake Dr SW | Signal | C/25 |
| 3 | Ardmore Dr SW/93rd St SW/Whitman Ave SW | Signal | B/19 |
| 4 | 93rd St SW/Bridgeport Way SW | Signal | A/9 |
| 5 | Gravelly Lake Dr SW/59th Ave SW | Minor street stop control | C/17 |
| 6 | Gravelly Lake Dr SW/Bridgeport Way SW | Signal | C/28 |
| 7 | Motor Ave SW/Whitman Ave SW | Signal | A/8 |
| 8 | Mt Tacoma Dr SW/Gravelly Lake Dr SW | Signal | C/25 |
| 9 | Mt Tacoma Dr SW/Bridgeport Way SW | Signal | B/13 |
| 10 | Bridgeport Way SW/59th Ave SW | Signal | B/20 |
| 11 | 100th St SW/Gravelly Lake Dr SW | Signal | B/17 |
| 12 | 100th St SW/59th Ave SW | Signal | B/16 |
| 13 | 100th St SW/Bridgeport Way SW | Signal | D/41 |
| 14 | 100th St SW/Lakewood Dr SW | Signal | D/39 |
| 15 | Lakewood Towne Center Blvd SW/59th Ave SW | All-way stop control | B/13 |
| 16 | Lakewood Dr SW/Bridgeport Way SW | Signal | C/31 |
| 17 | Avondale Rd SW/Gravelly Lake Dr SW | Minor street stop control | F/>150 |
| 18 | Main St SW/Gravelly Lake Dr SW | Signal | B/13 |
| 19 | Main St SW/59th Ave SW | Roundabout | A/8 |
| 20 | 108th St SW/Main St SW | Signal | B/12 |
| 21 | 108th St SW/Bridgeport Way SW | Signal | D/40 |
| 22 | 112th St SW/Gravelly Lake Dr SW | Signal | B/16 |

Source: Fehr & Peers, 2018.

**Exhibit 3.4-9. Intersection Level of Service - Existing.**




Source: Fehr & Peers 2018

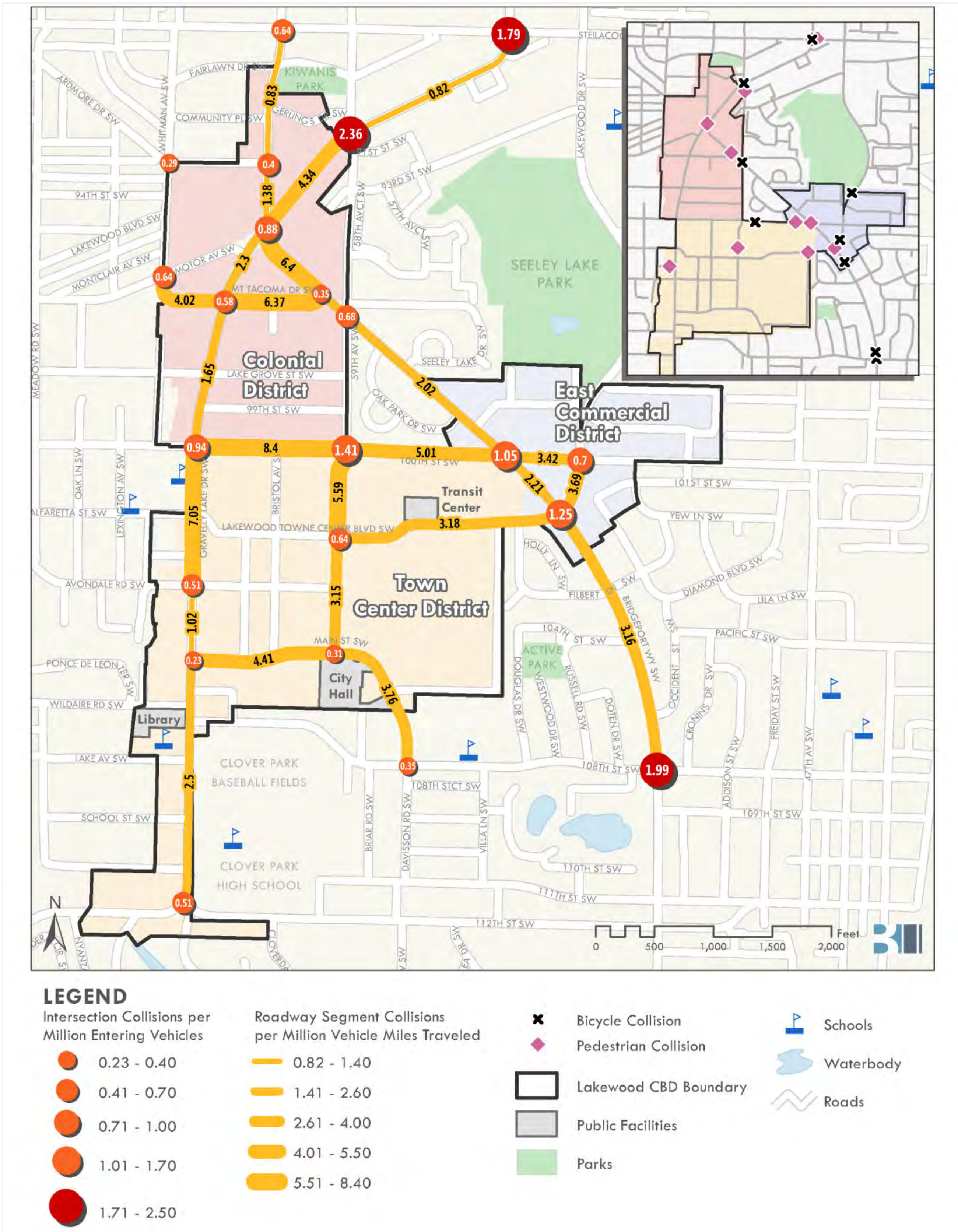
## Safety

Collision rates were analyzed at 22 intersections and along 25 corridors, as shown in Exhibit 3.4-10. To allow comparisons among the study facilities, collision rates are calculated by normalizing against the number of entering vehicles for intersections and number of vehicle miles travelled for segments. Of these intersections, Gravelly Lake Drive SW at 59th Avenue SE, 108th Street SW at Bridgeport Way SW and Gravelly Lake Drive SW at Steilacoom Boulevard SW had the highest crash rates. The roadway segments with the highest crash rates include:

- 100th Street SW from Gravelly Lake Drive SW to 59th Avenue SW
- Gravelly Lake Drive SW from 100th Street SW to Avondale Road SW
- Bridgeport Way SW from Gravelly Lake Drive SW to Mount Tacoma Drive SW
- Mount Tacoma Drive SW from Bridgeport Way SW to Gravelly Lake Drive SW
- 59th Avenue SW from 100th Street SW to Avondale Road SW

There were eight severe injury collisions in the Study Area during the three-year analysis period. Two of the severe collisions involved a pedestrian at an intersection: one at Bridgeport Way SW/Gravelly Lake Drive SW and the other at Bridgeport Way SW/Lakewood Drive SW. Three other severe crashes involved a motorcycle or a moped: the locations included Gravelly Lake Drive SW/59th Avenue, Gravelly Lake Drive SW/Steilacoom Blvd SW, and on Gravelly Lake Drive SW between Main Street SW and Avondale Road SW. The three vehicle-vehicle severe collisions were at intersections along Gravelly Lake Drive SW: at 100th Street SW, 111th Street SW, and Steilacoom Boulevard SW.

**Exhibit 3.4-10. Existing Collision Rates.**




Source: Fehr & Peers 2018

## *Relevant Studies*

### Lakewood Comprehensive Plan

Last revised in 2016, the Comprehensive Plan articulates the City's vision for its future for the next 20 years. The City envisions Downtown Lakewood, designated an Urban Center under Puget Sound Regional Council's VISION 2040, as a commercial and cultural hub. In particular, the Plan specifies an intensive mixed-use and high-density zone for the area around the Towne Center. Development and growth should adhere to the City's core community values:

- friendly and welcoming community
- high quality public services, educational systems, parks, and facilities
- vibrant connected community places unique to Lakewood
- strong local economy
- sustainable and responsible practices

### Transportation Element

The transportation element of the Comprehensive Plan provides policy direction to address local and regional mobility. It integrates land use planning with transportation planning to support the City's land use vision by providing options for people to get to the city and travel within it. The transportation element acknowledges the increase of traffic congestion within Lakewood and seeks to mitigate it by developing a balanced multimodal system that effectively moves people, goods, and services without compromising community character. The Plan specifically strategizes for more pedestrian overlay zones within Downtown Lakewood and seeks to make walking and cycling viable alternative options to driving.

The Transportation Element also designates level of service guidelines for the city's arterial streets and intersections. Within the Study Area, that City sets a standard of LOS D during the weekday PM peak hour at all arterial street intersections. However, according to Policy T-20.5, the City may allow minor street stop-controlled intersections to operate below that LOS standard if those instances are thoroughly analyzed from an operational and safety perspective.

### Lakewood Non-Motorized Transportation Plan

The Non-Motorized Transportation Plan addresses the aspects of the City's Comprehensive Plan that pertain to non-motorized travel. The focus of the Non-Motorized Transportation Plan is to identify and fix critical gaps in the existing pedestrian and bicycle network to provide residents with safe access throughout the city. Other objectives include a 'complete streets' implementation policy, coordination with the Americans with Disabilities Act (ADA) standards, doubling the number of pedestrian work-trips, and providing education services to promote pedestrian safety.

### Motor Avenue Urban Design Project

This Motor Avenue Urban Design Project (now called the Lakewood Colonial Plaza Project) is a revitalization project for Motor Avenue, a street within the Colonial District that holds historical relevance for residents. The proposal seeks to create a vibrant space that is both welcoming and accessible. Focus is on mixed-use design, with planned tie-ins to cultural and historical community amenities. The impacts of this project, specifically those pertaining to community accessibility, traffic movements, and local businesses are of relevance towards other development within the Study Area. Design of the project was approved in July 2016.

## 3.4.2. Impacts

### *Analysis Methodology-Planning Scenarios Evaluated*

This section describes the planning scenarios that are evaluated as well as the methodology and assumptions used to analyze the alternatives. Three alternatives are evaluated under future year 2035 conditions: The No Action Alternative and two Action Alternatives (Alternatives 1 and 2). The No Action Alternative maintains the Study Area's current zoning and modifies the transportation network only according to assumptions currently in City plans. The Action Alternatives would increase the amount of growth with a moderate level of development under Alternative 1 and a higher level of growth under Alternative 2. A full description of the land use assumptions may be found in Chapter 2.

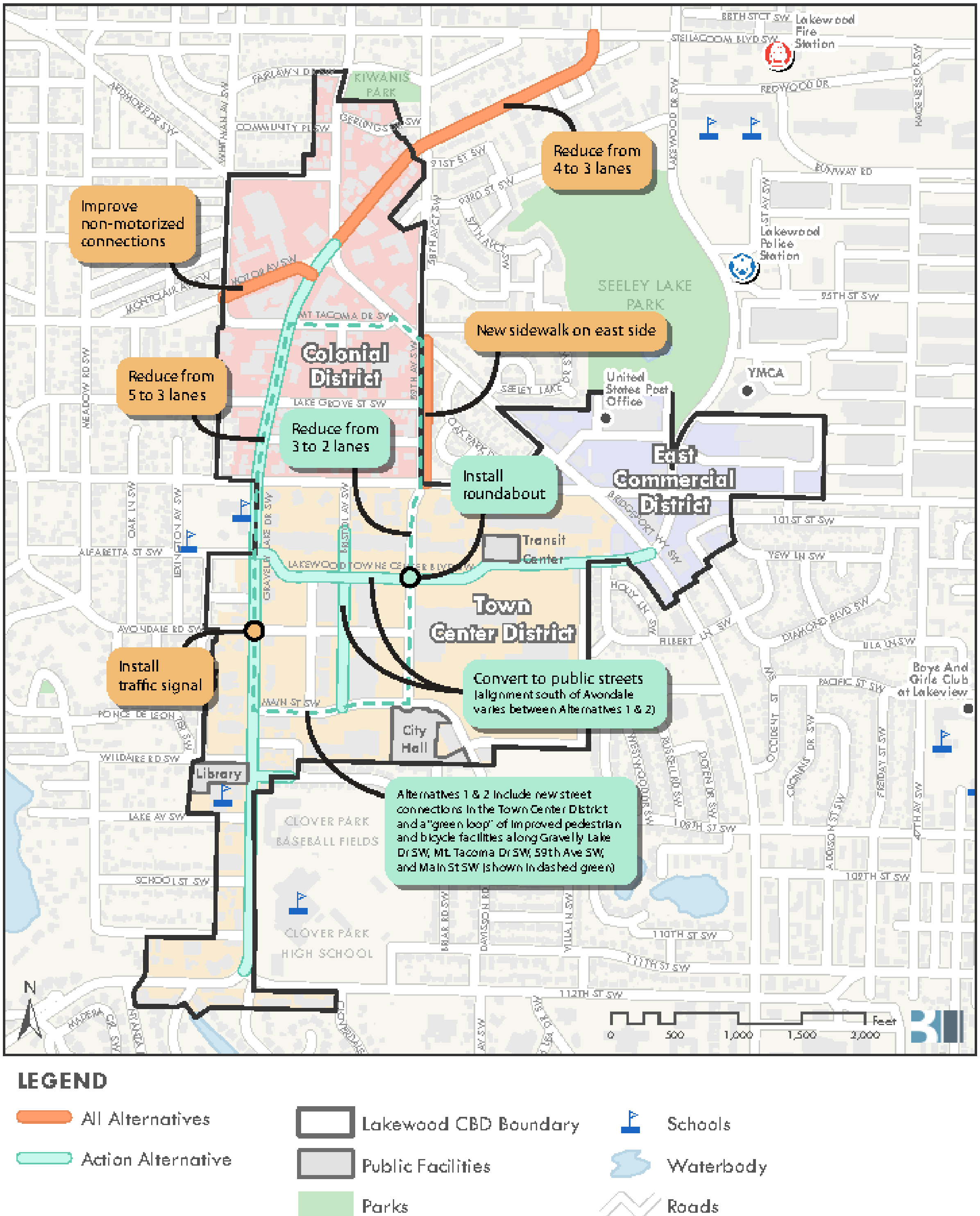
Exhibit 3.4-11 summarizes the transportation network assumptions for the future year alternatives. All alternatives assume improvements that are already included in City plans. Transportation network changes under the No Action Alternative include:

- 2.69B – Reduce Gravelly Lake Drive SW from four lanes to three lanes (with bicycle lanes) between Bridgeport Way SW to Steilacoom Blvd SW;
- 3.13 – Install a traffic signal at the Gravelly Lake Drive SW/Avondale Road SW intersection;
- 5.7 – Improve non-motorized connections on Motor Avenue SW between Whitman Avenue SW and Gravelly Lake Drive SW; and
- 2.82 – Construct sidewalk on the eastern side of 59th Avenue SW between Bridgeport Way SW and 100th Street SW.
- 2.72 – 100th St. & Lakewood Dr. curb, gutter, sidewalks, new signal
- 9.16 – 59th Ave pavement restoration from Main Street to 100th St
- 9.22 – 100th Street pavement restoration from 59th Ave to Lakeview Ave

In addition to these improvements, Alternatives 1 and 2 include the following network changes:

- Consideration of reducing Gravelly Lake Drive SW from five lanes to three lanes between Bridgeport Way SW and 112th Street SW and construct improved pedestrian and bicycle facilities (extending the three-lane section south of the currently planned project);
- Convert Lakewood Towne Center Blvd SW and Bristol Avenue SW to public streets within Lakewood Towne Center;
- Reduce 59th Avenue SW from three lanes to two lanes between Main Street SW and 100th Street SW and construct bicycle facilities;
- Install a one-lane roundabout at the 59th Avenue SW/Lakewood Towne Center Blvd SW intersection; and
- Construct more street connections to support walkability (Alternative 2 would have more street connections than Alternative 1).

**Exhibit 3.4-11. Transportation Network Assumptions.**




Note: For a conservative test of alternative transportation improvements, the EIS authors modeled the greatest shift in traffic for Gravelly Lake Drive at three lanes and then compared it to no change in the section at five lanes.

Source: Fehr & Peers 2018Source: Fehr & Peers 2018

Under Alternative 2, a park would be built directly north of the 59th Avenue SW/Main Street SW intersection, replacing the portion of 59th Avenue SW south of Avondale Road SW. Under this alternative, a new roadway would run along the eastern and western edges of the park, creating two new intersections with Main Street SW on either side of the existing roundabout.

The City's travel demand model, which is built on the Visum software platform, was used to forecast traffic volumes for each alternative. The travel demand model takes into account both the land use variation and the transportation network assumptions to forecast traffic growth. A supplemental tool, called MainStreet, was also applied to estimate the change in vehicle trip rates that could occur based on the variation in land use density and built environment among the alternatives.

MainStreet suggested that vehicle trip rates (i.e. the number of vehicle trips generated per new household or job) under Alternative 1 would be one percent lower than under the No Action Alternative and vehicle trip rates under Alternative 2 would be four percent lower than under the No Action Alternative. This is because the increased land use density and improved transportation network within the Study Area would shift some trips that would otherwise be made by vehicle to transit, walking, or biking. Exhibit 3.4-12 summarizes the daily person trip ends generated within the project area from the City's model. The exhibit also shows the mode split estimates from the model for automobile (SOV and HOV) and non-automobile (transit, walk, and bike) modes. Turning movement volumes were forecasted at each of the 22 study intersections and then analyzed in the Synchro traffic operations model.

**Exhibit 3.4-12. Daily Person Trip Ends Generated by Scenario**

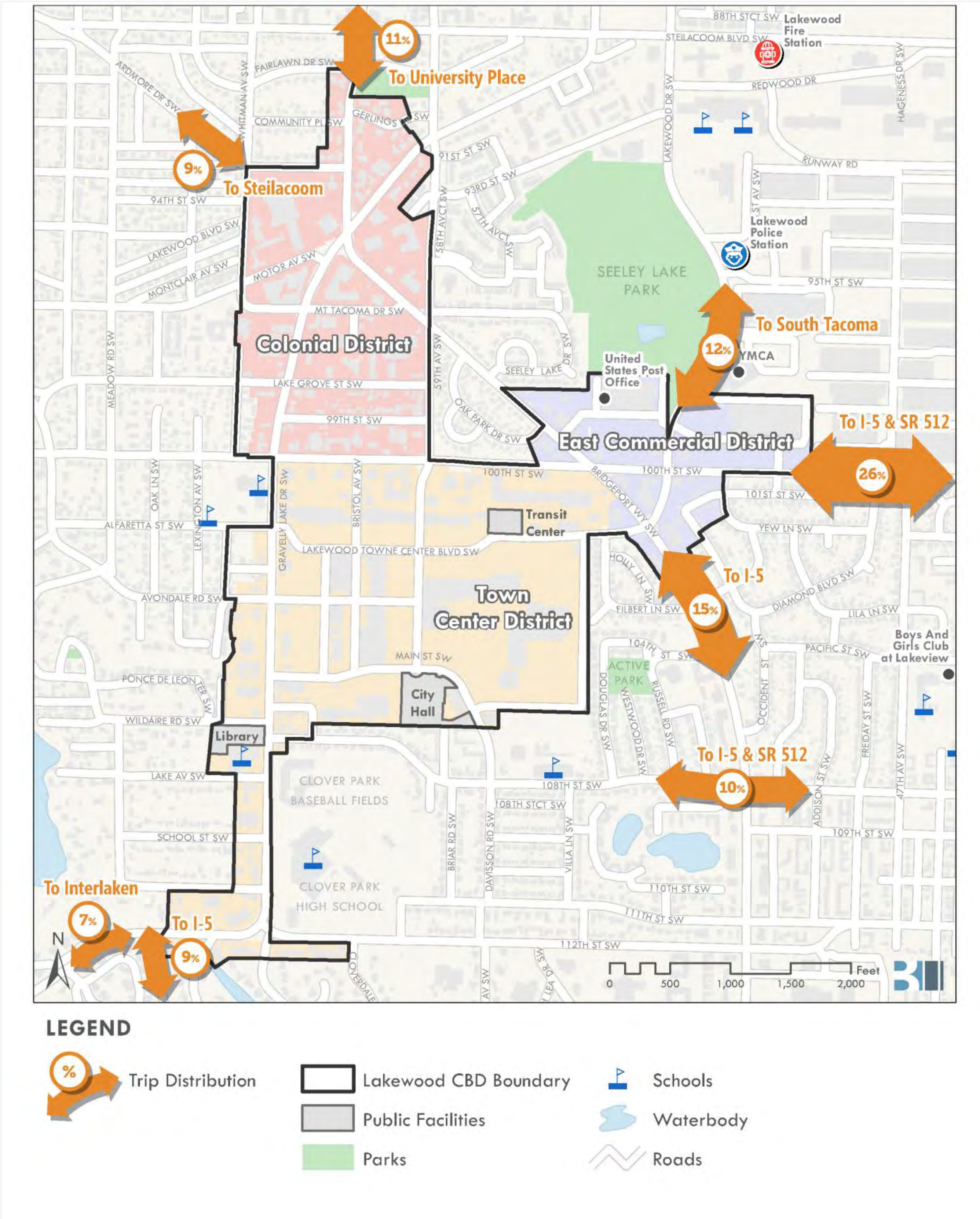
| | Existing | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|---|
| Vehicular Mode Trip Ends | 71,000 | 85,700 | 129,800 | 168,900 |
| Non-vehicular mode Trip Ends | 6,000 | 7,700 | 13,100 | 22,100 |
| Total Person Trip Ends | 77,000 | 93,400 | 142,900 | 191,000 |
| **Non-vehicular Mode Split** | **8%** | **8%** | **9%** | **12%** |

Source: Fehr & Peers 2018

## Trip Distribution

The travel demand model distributes projected vehicle trips originating from and destined to the Study Area as well as background traffic from other areas of the city and region. Exhibit 3.4-13 displays the model's general distribution pattern for vehicle trips to and from the Study Area during the PM peak period in 2035.

**Exhibit 3.4-13. Trip Distribution.**




Source: Fehr & Peers 2018

### Traffic Operations Analysis

As with existing conditions, traffic operations were analyzed using Synchro software. The existing Synchro network was updated to reflect roadway modifications planned to be in place by 2035 as well as the vehicle volumes forecasted using the City of Lakewood model. Signal timings were optimized to maximize the efficiency of the system based upon the projected future year vehicle volumes. For the revision and two-way bicycle path along the east side of Gravelly Lake Drive SW proposed for Alternatives 1 and 2, traffic operations analysis was conducted assuming that the revision would include northbound right turn pockets to allow a separate protected phase for cyclists traveling north or south along the new path. Southbound access to and from the termini of the bicycle path at Gravelly Lake Drive SW & Bridgeport Way SW and Gravelly Lake Drive SW & 112$^{th}$ Street SW was modeled with two-stage left turns for cyclists. This planning level analysis should be supplemented at a later date with a more detailed corridor study analysis along Gravelly Lake Drive SW and Bridgeport Way SW to determine optimal signal phasing and coordination for the two corridors.

## *Impacts Common to All Alternatives*

Some areas of current parking supply would be redeveloped under any of the three alternatives. However, it is anticipated that developers would maintain or build adequate supply for their new needs and comply with City parking requirements. Because it is expected that developers will continue to provide parking supply as dictated by market need and given the current abundance of parking supply, no significant adverse parking impacts are expected under any of the three future year alternatives.

## *No Action*

The No Action Alternative serves as the baseline for the impact analysis of the Action Alternatives (Alternatives 1 and 2). It represents the operation of the transportation system if no zoning or network changes were made in the Study Area. However, some growth would continue to occur under the No Action Alternative.

This section summarizes analysis results and environmental impacts of the No Action Alternative. Specifically, the following definitions are used to identify impacts under the No Action Alternative:

- **Auto and Freight**: average vehicle delay below LOS D at a study intersection.
- **Transit**: average vehicle delay below LOS D at a study intersection through which transit routes travel.

Pedestrian, bicycle, and parking impacts are discussed qualitatively. As defined above, this EIS identifies impacts if future transportation operations are not expected to meet the City's adopted level of service standards.

### Analysis Results

Exhibit 3.4-14 and Exhibit 3.4-15 summarize the average vehicle delay for each study intersection. By 2035, traffic volumes would increase due to the land use growth that would occur within the Study Area itself and citywide and regional growth not associated with Downtown Lakewood. Therefore, delay at individual intersections is expected to moderately increase. Of the 22 study intersections, eight are expected to drop by at least one LOS grade compared to existing conditions. The Avondale Road

SW/Gravelly Lake Drive SW intersection is expected to improve from LOS F to LOS B with the installation of a traffic signal.

Two intersections are expected to operate below the City's LOS D standard, constituting an impact:

- Intersection 5 - Gravelly Lake Drive SW/59th Avenue SW at LOS E
- Intersection 13 - 100th Street SW/Bridgeport Way SW at LOS E

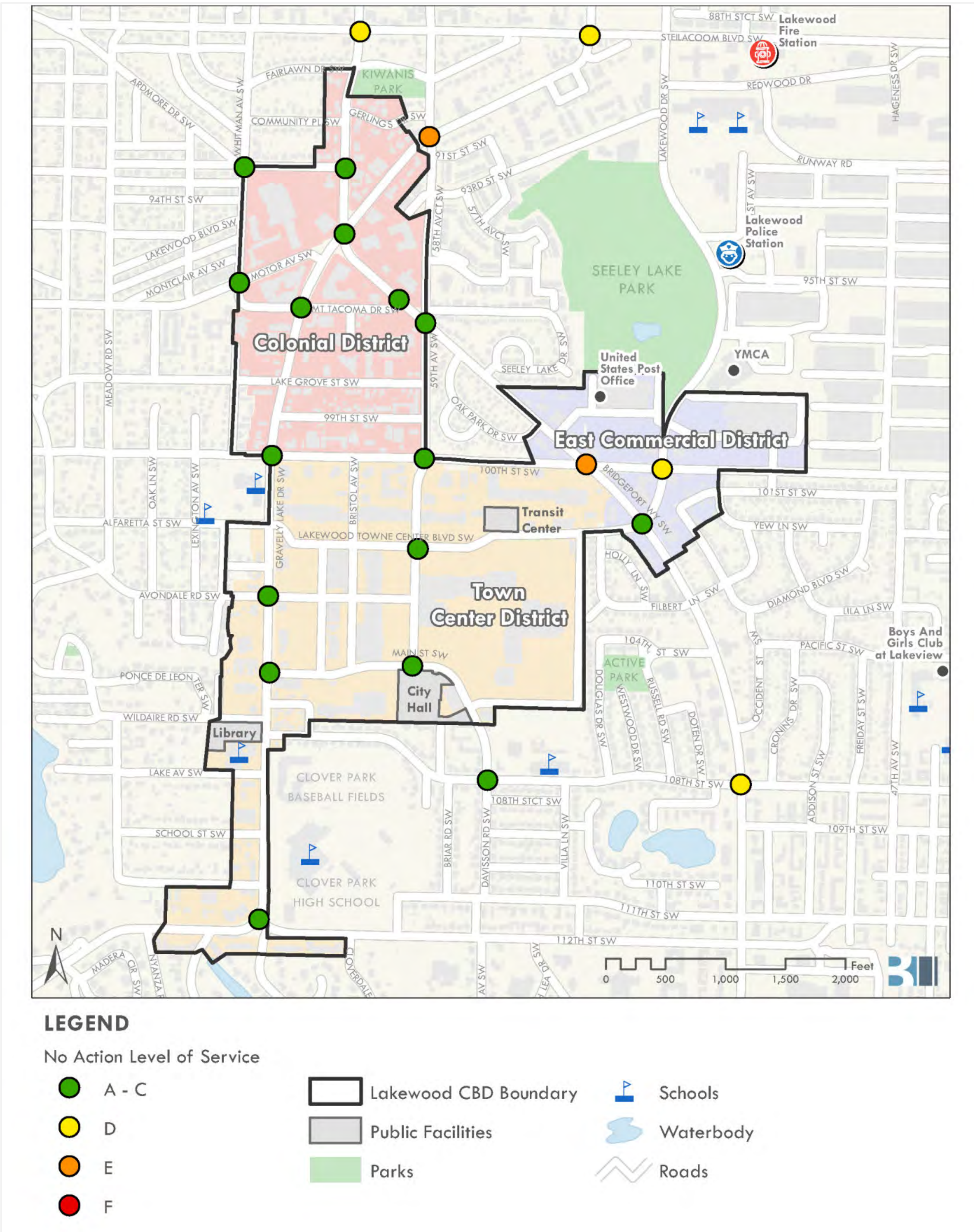
Because a bus route (Route 48) passes through this study intersection, this also constitutes a transit impact. However, it should be noted that the City has a policy stating that it may allow minor street stop-controlled intersections (such as this intersection) to operate below the LOS D standard if they are thoroughly analyzed from an operational and safety perspective.

**Exhibit 3.4-14. 2035 No Action Alternative - PM Peak Hour Intersection Level of Service and Delay.**

| ID | Intersection | Traffic Control | Existing | 2035 No Action |
|---|---|---|---|---|
| 1 | Steilacoom Blvd SW/Bridgeport Way SW | Signal | D/39 | D/50 |
| 2 | Steilacoom Blvd SW/Gravelly Lake Dr SW | Signal | C/25 | D/40 |
| 3 | Ardmore Dr SW/93rd St SW/Whitman Ave SW | Signal | B/19 | C/21 |
| 4 | 93rd St SW/Bridgeport Way SW | Signal | A/9 | B/12 |
| 5 | Gravelly Lake Dr SW/59th Ave SW | Minor street stop control | C/17 | E/38 |
| 6 | Gravelly Lake Dr SW/Bridgeport Way SW | Signal | C/28 | C/32 |
| 7 | Motor Ave SW/Whitman Ave SW | Signal | A/8 | B/10 |
| 8 | Mt Tacoma Dr SW/Gravelly Lake Dr SW | Signal | C/25 | C/30 |
| 9 | Mt Tacoma Dr SW/Bridgeport Way SW | Signal | B/13 | B/15 |
| 10 | Bridgeport Way SW/59th Ave SW | Signal | B/20 | C/20 |
| 11 | 100th St SW/Gravelly Lake Dr SW | Signal | B/17 | B/19 |
| 12 | 100th St SW/59th Ave SW | Signal | B/16 | B/17 |
| 13 | 100th St SW/Bridgeport Way SW | Signal | D/41 | E/68 |
| 14 | 100th St SW/Lakewood Dr SW | Signal | D/39 | D/50 |
| 15 | Lakewood Towne Center Blvd SW/59th Ave SW | All-way stop control | B/13 | C/17 |
| 16 | Lakewood Dr SW/Bridgeport Way SW | Signal | C/31 | C/34 |
| 17 | Avondale Rd SW/Gravelly Lake Dr SW | See notes at right | F/>150 (Minor street stop controlled) | A/8 (Signalized) |
| 18 | Main St SW/Gravelly Lake Dr SW | Signal | B/13 | C/28 |
| 19 | Main St SW/59th Ave SW | Roundabout | A/8 | A/9 |
| 20 | 108th St SW/Main St SW | Signal | B/12 | B/14 |
| 21 | 108th St SW/Bridgeport Way SW | Signal | D/40 | D/48 |
| 22 | 112th St SW/Gravelly Lake Dr SW | Signal | B/16 | C/31 |

Source: Fehr & Peers, 2018.

**Exhibit 3.4-15. Intersection Level of Service – No Action Alternative.**




Source: Fehr & Peers 2018

### Pedestrian and Bicycle

Under the No Action Alternative, the pedestrian and bicycle network would remain similar to its current state. The City plans to implement three projects that would benefit pedestrian and/or bicycle travel in the Study Area: the Motor Avenue SW non-motorized improvements, new sidewalk on the eastern side of 59th Avenue SW between Bridgeport Way SW and 100th Street SW, and the Gravelly Lake Dr SW reconfiguration from four lanes to three lanes with bicycle lanes between Bridgeport Way SW to Steilacoom Blvd SW. Development is expected to meet the City design standards related to bicycle and pedestrian facility accommodations so no significant adverse impacts to pedestrians or bicycles are identified under the No Action Alternative.

### Safety

Traffic volumes in the Study Area are projected to increase by 2035. With higher volumes, there is potential for an increased number of collisions. However, there is no indication that collision rates at intersections or along segments would increase. Moreover, the planned signal at Gravelly Lake Drive SW/Avondale Rd SW and the revision along Gravelly Lake Drive SW between Bridgeport Way SW and Steilacoom Blvd SW could provide safety benefits at those locations. Therefore, no safety impacts are identified under the No Action Alternative.

## *Action Alternative 1*

This section summarizes analysis results and environmental impacts of Alternative 1. Specifically, the following definitions are used to identify impacts Alternative 1:

- **Auto and Freight**: average vehicle delay below LOS D at a study intersection that operated acceptably under the No Action Alternative or an increase in delay of at least 5 seconds at a study intersection already expected to operate below LOS D under the No Action Alternative.
- **Transit (applicable to study intersections through which transit routes travel)**: average vehicle delay below LOS D at a study intersection that operated acceptably under the No Action Alternative or an increase in delay of at least 5 seconds at a study intersection already expected to operate below LOS D under the No Action Alternative.

Pedestrian, bicycle, and parking impacts are discussed qualitatively in comparison to the No Action Alternative. An impact is defined if a project would preclude or fail to implement a City-identified bicycle or pedestrian improvement.

### Analysis Results

Exhibit 3.4-16 and Exhibit 3.4-17 summarize the average vehicle delay for each study intersection. Alternative 1's proposed land use growth would result in increased volumes compared to the No Action Alternative. The largest roadway network change relates to the revision on Gravelly Lake Drive SW. Because of the reduced capacity along that corridor, some traffic would divert to alternative parallel corridors, based on the results of the City's travel demand forecasting model. As defined above, impacts are evaluated in comparison to the No Action Alternative. The following significant auto/freight impacts are expected under Alternative 1(and shown in bold in Exhibit 3.4-16):

- Intersection 5 - Gravelly Lake Drive SW/59th Avenue SW – adding 8 seconds of delay to an intersection already operating below LOS D (note this is for the southbound movement as this is minor street stop-controlled)
- Intersection 13 - 100th Street SW/Bridgeport Way SW – falling from LOS E to LOS F
- Intersection 14 - 100th Street SW/Lakewood Drive SW – falling from LOS D to LOS E
- Intersection 16 - Lakewood Drive SW/Bridgeport Way SW – falling from LOS C to LOS E
- Intersection 22 - 112th Street SW/Gravelly Lake Drive SW – falling from LOS C to LOS E

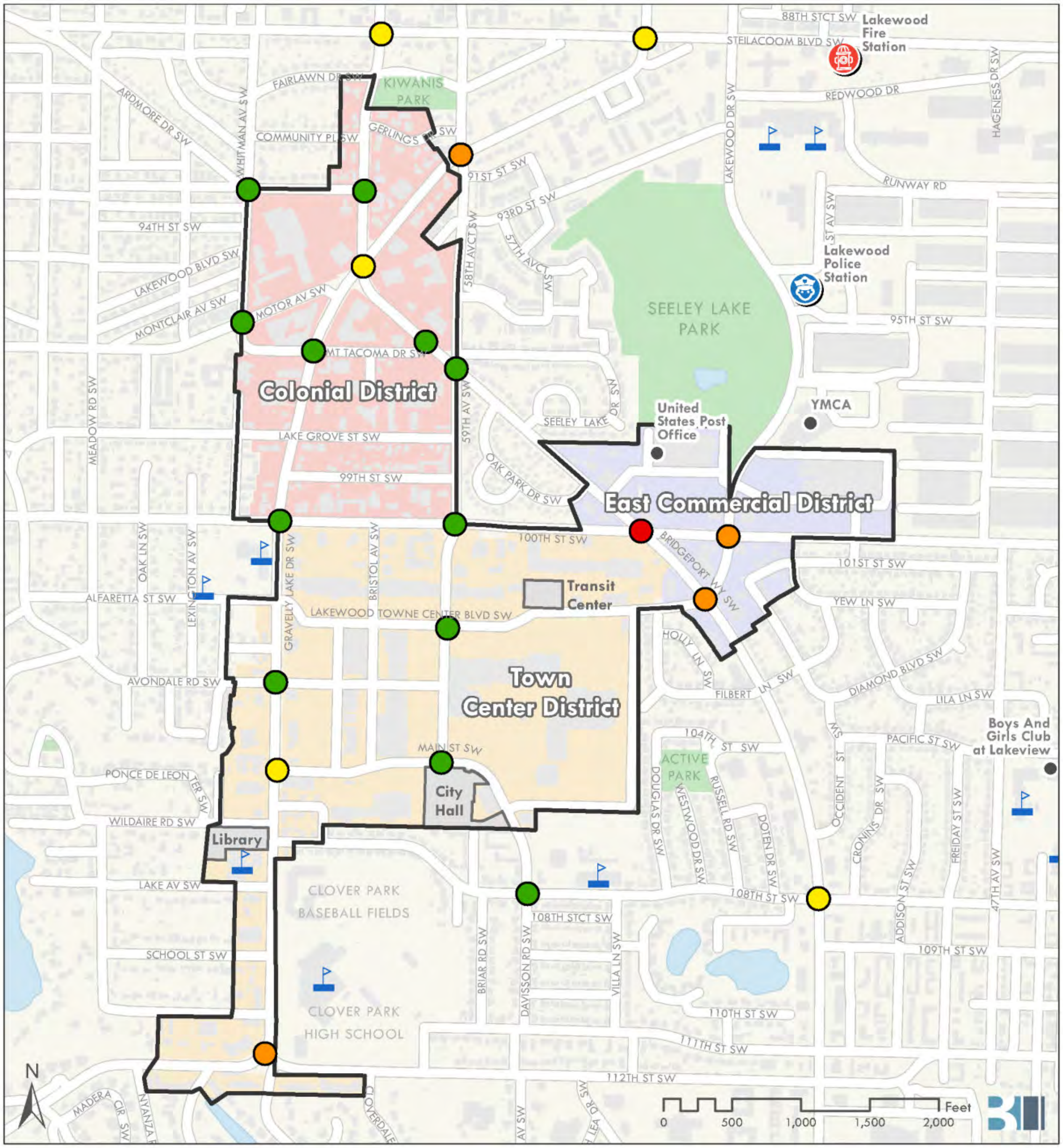
Because bus routes pass through all of the aforementioned intersections, these intersections are also considered as significant transit impacts. Potential measures to mitigate the impacts on these intersections are presented in the Mitigation Measures section.

**Exhibit 3.4-16. 2035 Alternative 1 - PM Peak Hour Intersection Level of Service and Delay.**

| ID | Intersection | Traffic Control | 2035 No Action | 2035 Alt 1 |
|---|---|---|---|---|
| 1 | Steilacoom Blvd SW/Bridgeport Way SW | Signal | D/50 | D/50 |
| 2 | Steilacoom Blvd SW/Gravelly Lake Dr SW | Signal | D/40 | D/42 |
| 3 | Ardmore Dr SW/93rd St SW/Whitman Ave SW | Signal | C/21 | C/22 |
| 4 | 93rd St SW/Bridgeport Way SW | Signal | B/12 | B/13 |
| **5** | **Gravelly Lake Dr SW/59th Ave SW** | **Minor street stop control** | **E/38** | **E/46** |
| 6 | Gravelly Lake Dr SW/Bridgeport Way SW | Signal | C/32 | D/45 |
| 7 | Motor Ave SW/Whitman Ave SW | Signal | B/10 | B/10 |
| 8 | Mt Tacoma Dr SW/Gravelly Lake Dr SW | Signal | C/30 | D/40 |
| 9 | Mt Tacoma Dr SW/Bridgeport Way SW | Signal | B/15 | B/16 |
| 10 | Bridgeport Way SW/59th Ave SW | Signal | C/20 | C/26 |
| 11 | 100th St SW/Gravelly Lake Dr SW | Signal | B/19 | C/28 |
| 12 | 100th St SW/59th Ave SW | Signal | B/17 | C/22 |
| **13** | **100th St SW/Bridgeport Way SW** | **Signal** | **E/68** | **F/85** |
| **14** | **100th St SW/Lakewood Dr SW** | **Signal** | **D/50** | **E/56** |
| 15 | Lakewood Towne Center Blvd SW/59th Ave SW | See notes at right | C/17 (All-way stop controlled) | C/17 (Roundabout) |
| **16** | **Lakewood Dr SW/Bridgeport Way SW** | **Signal** | **C/34** | **E/66** |
| 17 | Avondale Rd SW/Gravelly Lake Dr SW | Signalized | A/8 | B/14 |
| 18 | Main St SW/Gravelly Lake Dr SW | Signal | C/28 | C/27 |
| 19 | Main St SW/59th Ave SW | Roundabout | A/9 | B/10 |
| 20 | 108th St SW/Main St SW | Signal | B/14 | C/23 |
| 21 | 108th St SW/Bridgeport Way SW | Signal | D/48 | D/51 |
| **22** | **112th St SW/Gravelly Lake Dr SW** | **Signal** | **C/31** | **E/61** |

Source: Fehr & Peers, 2018.

**Exhibit 3.4-17. Intersection Level of Service – Alternative 1.**




## LEGEND

Alternative 1 Level of Service

- A - C
- D
- E
- F

Lakewood CBD Boundary

Public Facilities

Parks

Schools

Waterbody

Roads

Source: Fehr & Peers 2018

### Pedestrian and Bicycle

Alternative 1 includes a variety of projects that would improve the pedestrian and bicycle network in the Study Area. The "green street loop" would include enhancements for pedestrian and bicycle travel along the loop formed by Gravelly Lake Drive SW, Main Street SW, 59th Avenue SW, and Mt Tacoma Drive SW. In particular, the Gravelly Lake Drive SW revision would allow room for a two-way bicycle path and enhanced pedestrian zone. Alternative 1 would also include new street connections in the Town Center area which would improve the pedestrian and bicycle experience by providing routes that are more direct and more comfortable than traveling on high speed, high volume corridors. Due to these improvements to the network in Downtown Lakewood and that development is expected to meet the City design standards related to bicycle and pedestrian facility accommodations, no significant adverse impacts to pedestrian or bicycle travel are identified under Alternative 1.

### Safety

Traffic volumes in the Study Area are projected to increase under Alternative 1 compared to the No Action Alternative. With higher volumes, there is potential for an increased number of collisions. However, there is no indication that collision rates at intersections or along segments would increase meaningfully compared to the No Action Alternative. In fact, some of the projects planned under Alternative 1, such as the Gravelly Lake Drive SW revision and improved pedestrian and bicycle facilities, may result in a safety benefit. The proposed two-way bicycle path and associated revision will require more detailed design study to appropriately design the path crossings at key intersections. No significant adverse impacts to safety are identified under Alternative 1.

## *Action Alternative 2*

This section summarizes analysis results and environmental impacts of Alternative 2. The same impact thresholds are used for Alternative 1 and 2:

- **Auto and Freight**: average vehicle delay below LOS D at a study intersection that operated acceptably under the No Action Alternative or an increase in delay of at least 5 seconds at a study intersection already expected to operate below LOS D under the No Action Alternative.
- **Transit (applicable to study intersections through which transit routes travel)**: average vehicle delay below LOS D at a study intersection that operated acceptably under the No Action Alternative or an increase in delay of at least 5 seconds at a study intersection already expected to operate below LOS D under the No Action Alternative.

Pedestrian, bicycle, and parking impacts are discussed qualitatively in comparison to the No Action Alternative. An impact is defined if a project would preclude or fail to implement a City-identified bicycle or pedestrian improvement.

### Analysis Results

Exhibit 3.4-18 and Exhibit 3.4-19 summarize the average vehicle delay for each study intersection. Alternative 2 has the highest proposed land use growth of the future year alternatives and therefore the highest growth in traffic volumes. Again, diversion from the Gravelly Lake Drive SW revision to other routes is reflected in the traffic operations results. As defined above, impacts are evaluated in comparison to the No Action Alternative. The following significant auto/freight impacts are expected under Alternative 2 (and shown in bold in Exhibit 3.4-18):

- Intersection 5 - Gravelly Lake Drive SW/59th Avenue SW – adding 44 seconds of delay to an intersection already operating below LOS D (note this is for the southbound movement as this is minor street stop-controlled)
- Intersection 13 - 100th Street SW/Bridgeport Way SW – falling from LOS E to LOS F
- Intersection 14 - 100th Street SW/Lakewood Drive SW – falling from LOS D to LOS E
- Intersection 16 - Lakewood Drive SW/Bridgeport Way SW – falling from LOS C to LOS E
- Intersection 21 - 108th Street SW/Bridgeport Way SW – falling from LOS D to LOS E
- Intersection 22 - 112th Street SW/Gravelly Lake Drive SW – falling from LOS C to LOS E

Because bus routes pass through all of the aforementioned intersections, these intersections are also considered as significant transit impacts. Potential measures to mitigate the impacts on these intersections are presented in the Mitigation Measures section.

The addition of a city park north of City Hall would replace the existing north leg of the Main Street SW/59th Avenue SW intersection. New roadways would be constructed along the east and west edges of the park, intersecting with Main Street SW to the south and Avondale Road to the north on either side of the existing roundabout. At those intersections, minor-street stop control would be implemented, allowing for free flow along Avondale Road and Main Street. All of the new minor-street stop controlled intersections would have LOS of D or better under Alternative 2 travel demand assumptions.

The travel demand model was also run to estimate how volumes might change under Alternative 2 land use without the Gravelly Lake Drive SW revision. This evaluation suggested that volumes on a five-lane Gravelly Lake Drive SW would be approximately 200 to 500 vehicles higher in each direction with smaller differences at the north end of the corridor and larger differences at the south end of the corridor, improving the intersection of Gravelly Lake Drive SW/112$^{th}$ Street from LOS E to D while increasing delay at Gravelly Lake Drive SW/59th Avenue SW. The volume reductions on Bridgeport Way would be smaller, likely no more than 200 vehicles in a single direction, though it would improve the intersection of 108$^{th}$ Street/Bridgeport Way from LOS E to D. The other impacted intersections would remain impacted with or without the revision. This indicates that the diverted traffic is distributed among multiple alternate routes and that much of the increase in volumes on Bridgeport Way is associated with increased land use rather than the Gravelly Lake Drive SW revision.

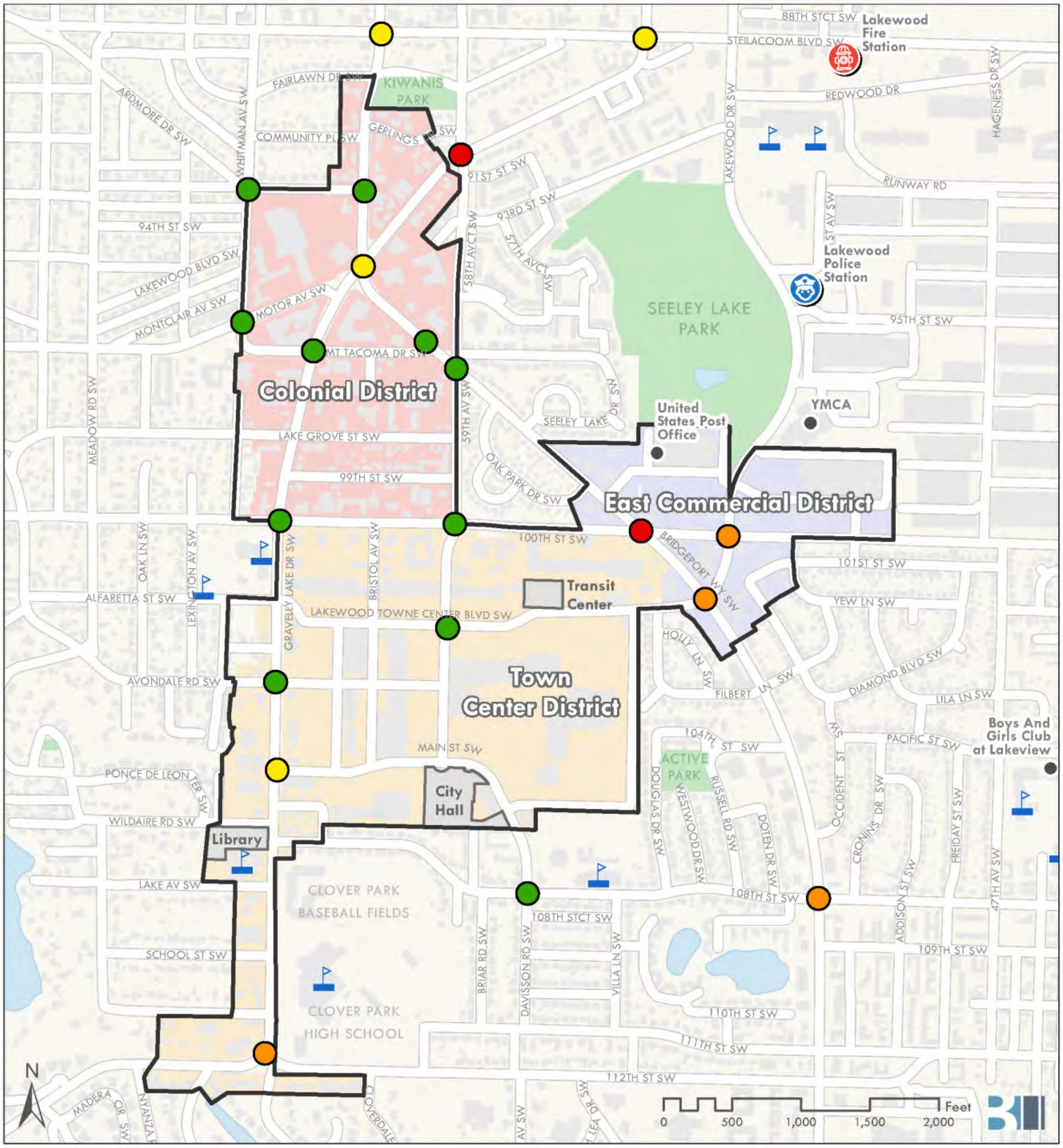
An alternative design could be considered which limits the extent of the road to Main Street instead of 112$^{th}$ Street SW. This shorter section would reduce the overall cost of the project and would limit the changes to portions of Gravelly Lake Drive with slightly lower volumes. The area south of Main Street is not projected to see as much new development as the study area so reconfiguring the cross-section all the way to 112$^{th}$ St SW would not provide as much additional benefit.

**Exhibit 3.4-18. 2035 Alternative 2 - PM Peak Hour Intersection Level of Service and Delay.**

| ID | Intersection | Traffic Control | 2035 No Action | 2035 Alt 2 |
|---|---|---|---|---|
| 1 | Steilacoom Blvd SW/Bridgeport Way SW | Signal | D/50 | D/51 |
| 2 | Steilacoom Blvd SW/Gravelly Lake Dr SW | Signal | D/40 | D/52 |
| 3 | Ardmore Dr SW/93rd St SW/Whitman Ave SW | Signal | C/21 | C/23 |
| 4 | 93rd St SW/Bridgeport Way SW | Signal | B/12 | B/13 |
| **5** | **Gravelly Lake Dr SW/59th Ave SW** | **Minor street stop control** | **E/38** | **F/82** |
| 6 | Gravelly Lake Dr SW/Bridgeport Way SW | Signal | C/32 | D/49 |
| 7 | Motor Ave SW/Whitman Ave SW | Signal | B/10 | B/11 |
| 8 | Mt Tacoma Dr SW/Gravelly Lake Dr SW | Signal | C/30 | D/42 |
| 9 | Mt Tacoma Dr SW/Bridgeport Way SW | Signal | B/15 | B/18 |
| 10 | Bridgeport Way SW/59th Ave SW | Signal | C/20 | C/28 |
| 11 | 100th St SW/Gravelly Lake Dr SW | Signal | B/19 | D/41 |
| 12 | 100th St SW/59th Ave SW | Signal | B/17 | C/24 |
| **13** | **100th St SW/Bridgeport Way SW** | **Signal** | **E/68** | **F/102** |
| **14** | **100th St SW/Lakewood Dr SW** | **Signal** | **D/50** | **E/56** |
| 15 | Lakewood Towne Center Blvd SW/59th Ave SW | See notes at right | C/17 (All-way stop controlled) | C/24 (Roundabout) |
| **16** | **Lakewood Dr SW/Bridgeport Way SW** | **Signal** | **C/34** | **E/67** |
| 17 | Avondale Rd SW/Gravelly Lake Dr SW | Signalized | A/8 | B/18 |
| 18 | Main St SW/Gravelly Lake Dr SW | Signal | C/28 | C/27 |
| 19 | Main St SW/59th Ave SW | Roundabout | A/9 | N/A |
| 20 | 108th St SW/Main St SW | Signal | B/14 | C/29 |
| **21** | **108th St SW/Bridgeport Way SW** | **Signal** | **D/48** | **E/58** |
| **22** | **112th St SW/Gravelly Lake Dr SW** | **Signal** | **C/31** | **E/65** |

Source: Fehr & Peers, 2018.

**Exhibit 3.4-19. Intersection Level of Service – Alternative 2.**




**LEGEND**

Alternative 2 Level of Service

- A - C
- D
- E
- F

- Lakewood CBD Boundary
- Public Facilities
- Parks
- Schools
- Waterbody
- Roads

Source: Fehr & Peers 2018

### Pedestrian and Bicycle

Alternative 2 includes the same pedestrian and bicycle network in the Study Area as Alternative 2. The "Green Street Loop" would include enhancements for pedestrian and bicycle travel along the loop formed by Gravelly Lake Drive SW, Main Street SW, 59th Avenue SW, and Mt Tacoma Drive SW. The Gravelly Lake Drive SW revision would allow room for a two-way bicycle path and enhanced pedestrian zone. Although potentially different than Alternative 1, Alternative 2 would also include new street connections in the Town Center area which would improve the pedestrian and bicycle experience by providing routes that are more direct and more comfortable than traveling on high speed, high volume corridors. Due to these improvements to the network in Downtown Lakewood and that development is expected to meet the City design standards related to bicycle and pedestrian facility accommodations, no significant adverse impacts to pedestrian or bicycle travel are identified under Alternative 2.

### Safety

Among the future year alternatives, traffic volumes in the Study Area are projected to be highest under Alternative 2. With higher volumes, there is potential for an increased number of collisions. However, there is no indication that collision rates at intersections or along segments would increase meaningfully compared to the No Action Alternative. In fact, some of the projects planned under Alternative 2, such as the Gravelly Lake Drive SW revision and improved pedestrian and bicycle facilities, may result in a safety benefit. The proposed two-way bicycle path and associated revision will require more detailed design study to appropriately design the path crossings at key intersections. No significant adverse impacts to safety are identified under Alternative 2.

## *Summary of Impacts*

Exhibit 3.4-20 summarizes the significant impacts for each alternative.

**Exhibit 3.4-20. Summary of Transportation Impacts.**

| Type of Impact | No Action | Alternative 1 | Alternative 2 |
|---|---|---|---|
| Auto and Freight | 2 intersections | 5 intersections | 6 intersections |
| Transit | 2 intersections | 5 intersections | 6 intersections |
| Pedestrian | None | None | None |
| Bicycle | None | None | None |
| Parking | None | None | None |
| **Safety** | **None** | **None** | **None** |

Source: Fehr & Peers, 2018.

# 3.4.3. Mitigation Measures

This section identifies a range of potential mitigation strategies that could be implemented to help reduce the significance of the adverse impacts identified for Alternatives 1 and 2 in the previous section. These include significant adverse impacts at five intersections under Alternative 1 and six intersections under Alternative 2.

## Incorporated Plan Features

All alternatives include improvements to multiple modes in the six-year TIP, and Alternatives 1 and 2 offer additional transportation and circulation improvements. Several cross-sections are under consideration regarding the Gravelly Lake Drive proposal to create a Green Street Loop, and adding more public streets.

## Regulations and Commitments

Managing demand for auto travel is an important part of mitigating the traffic congestion impacts identified in this EIS. Transportation demand management (TDM) strategies could include subsidies or discounts for non-auto travel, education, and assistance to help travelers identify non-auto commute options, rideshare, and ride match promotion, and local incentive and reward programs.

Washington state Commute Trip Reduction (CTR) law focuses on employers with 100 or more employees whose shifts begin during the typical AM commute. This law requires employers to develop commute trip reduction plans and work toward meeting their mode share targets through internal programs and monitoring.

The City of Lakewood included policies aimed at managing auto travel demand in its Comprehensive Plan. The policies call for the City to encourage and assist employers who are not affected by the CTR law to offer TDM programs on a voluntary basis, encourage large employers to offer flexible or compressed work schedules to reduce localized congestion, and implement a public awareness and educational program to promote TDM strategies.

## Other Proposed Mitigation Measures

The City could make capital improvements to increase the capacity of impacted intersections and roadways in the Study Area. Exhibit 3.4-21 describes potential improvements to the impacted study intersections. Implementation could occur through a SEPA fair share fee program such that new development contributes its share of the cost for these projects.

For a conservative test of alternative transportation improvements, the EIS authors modeled the greatest shift in traffic for Gravelly Lake Drive at three lanes and then compared it to no change in the section (five lanes). The table of mitigation measures below shows the full list of improvements if Gravelly Lake Drive were modified to a cross section of three lanes.

If five lanes were retained, the following intersections would not require change:

- 108th St SW/Bridgeport Way SW
- 112th St SW/Gravelly Lake Drive SW

See the discussion of Analysis Results regarding the volumes with and without the three lanes of Gravelly Lake Drive.

**Exhibit 3.4-21. Proposed Mitigation Measures.**

| Intersection | No Action | Alt 1 | Alt 1 Mitigated | Alt 2 | Alt 2 Mitigated |
|---|---|---|---|---|---|
| **Gravelly Lake Dr SW/59th Ave SW** | | | | | |
| Signalize intersection | E/38 | E/46 | B/19 | F/82 | B/19 |
| **100th St SW/Bridgeport Way SW** | | | | | |
| Add westbound right turn pocket, convert existing westbound through-right lane to through-only, and prohibit east and westbound left turns | E/68 | F/85 | C/34 | F/102 | D/49 |
| **100th St SW/Lakewood Dr SW** | | | | | |
| Signal timing revisions to provide more green time to protected left turn phases and reduce time for eastbound and southbound through phases | D/50 | E/56 | D/49 | E/56 | D/54 |
| **Lakewood Dr SW/Bridgeport Way SW** | | | | | |
| Convert westbound through-left lane to left only to remove split phase or move the pedestrian crossing to the north side of the intersection coincident with the WB phase * | C/34 | E/66 | D/39 | E/67 | D/48 |
| **108th St SW/Bridgeport Way SW**** | | | | | |
| Add northbound right turn pocket | D/48 | D/51 | D/47 | E/58 | D/52 |
| **112th St SW/Gravelly Lake Dr SW**** | | | | | |
| Add second westbound left turn pocket and combine through and right turn movements into outside lane | C/31 | E/61 | C/34 | E/65 | C/35 |

Notes: * The LOS results are slightly better if the split phasing is removed (D/48) than if the pedestrian crossing is relocated (D/54)
**These intersections remain within the City's LOS standard of D if the Gravelly Lake Drive SW Revision is not implemented.

Source: Fehr & Peers, 2018.

The City could also approach mitigation through revision of its LOS policy. The City's Comprehensive Plan already identifies a LOS F standard for two corridors. In recognition of Bridgeport Way SW's role as a primary vehicle gateway, the City could consider revising the LOS standard to LOS E or F along the corridor. This action would reflect the community vision of a more multimodal Gravelly Lake Drive SW corridor while accepting more congestion along the vehicle gateway of Bridgeport Way SW.

## 3.4.4. Significant Unavoidable Adverse Impacts

Significant adverse impacts to auto, freight, and transit were identified under both Alternatives 1 and 2. With some combination of the potential mitigation measures outlined in the previous section, the magnitude of the intersection LOS impacts could be mitigated to meet City standards.

Although the effects of additional vehicles on traffic congestion could be mitigated through implementation of the transportation improvements identified in the EIS and compliance with City codes and standards, the increases in activity Downtown and associated traffic congestion would be considered a significant unavoidable adverse impact. A significant unavoidable adverse impact could also result if one or more planned improvement projects identified to address expected growth and transportation impacts are not implemented (e.g. due to cost, feasibility, or other policy choice).

# 3.5. Public Services

This section addresses the potential impacts associated with the alternatives on public services including police, fire/emergency medical, schools, and parks and recreation. After providing information on the affected environment, the impacts analysis considers how the alternatives could affect demand for public services. Measures to address potential impacts are included.

Impacts on public services would be significant under one or more of the following thresholds:

- Negatively affect levels of service for police and/or fire and emergency medical services;
- Increase demand for special emergency services beyond current operational capabilities of service providers;
- Result in increases in students and lack of facilities; and
- Reduce access to park and open space facilities.

## 3.5.1. Affected Environment

### *Fire Protection and Emergency Medical Services*

#### Existing Service

West Pierce Fire & Rescue (WPFR) is responsible for providing fire services in the Study Area. WPFR was formed in 2011. WPFR fully serves the communities of Lakewood and University Place, and provides contracted services to Steilacoom. WPFR public services includes fire prevention and suppression, motor vehicle collisions, medical aid calls, technical and water rescues, hazardous materials response, and other calls for service. They also provide services for building permitting and code enforcement.

In 2016, WPFR responded to 15,904 calls for service. (West Pierce Fire & Rescue, 2017) This is higher than 2015 calls for service at 15,477. (West Pierce Fire & Rescue, 2016) Over 70% of total call volumes are medical in nature.

In 2016, WPFR employed 176 full-time personnel and managed an additional 29 employees in Fire Comm, the regional dispatch center. Of the full-time personnel, WPFR had 133 personal employed for fire suppression. District personnel are trained for medical aid with 89 emergency medical technicians and 53 paramedics.

WPFR has service area encompassing 31 square miles, and serves a population of over 97,000. The district has six stations, and two stations lie close to the Study Area north east of Seeley Lake Park at 5000 Steilacoom Blvd SW (Station 21) and 10928 Pacific Highway SW (Station 20). See Exhibit 3.5-1.

**Exhibit 3.5-1. West Pierce Fire & Rescue Service Area Map**


Source: West Pierce Fire & Rescue Annual Report, 2016.

## Level of Service Standards

Lakewood has adopted policies setting level of service standards for WPFR:

- PS-1.1: Maintain a Washington Surveying and Rating Bureau (or successor agency) rating of ISO Class 3 or better; and
- PS-4.2: Provide a four-minute initial time standard for EMS calls.

WPFR has met the PS-1.1 LOS standard with a class 3 WSRB every year through 2017 since it was first rated in 2012. In 2016, the goal of a four-minute response time for the arriver of a unit with a first responder at an emergency medical incident was met 43% of the time. (2016 annual report).

A common effective level of service standard is to look at fire response personal per 1,000 capita. This helps compare service capabilities over-time and across jurisdictions. Fire suppression personnel are often trained in emergency medical services, and there is overlap in the number of full time equivalents (FTEs) for each activity.

**Exhibit 3.5-2. Fire Services Effective Level of Services Standards**

| Year | District Population | Firefighters / EMT/Medics | Firefighters Per 1,000 Residents |
|---|---|---|---|
| 2016 | 97,259 | 133 | 1.4 |
| 2016 | 97,259 | 142 | 1.5 |

Source: Washington Office of Financial Management, BERK 2018.

# Police

## Existing Service

The City of Lakewood Police Department (LPD) provides policing and other relates services. LPD services include patrol operations, criminal investigations, traffic incidents, other patrol specialty services, and other policing services. LPD operates out of one station, located northeast of the Study Area across from Seeley Lake Park at 9401 Lakewood Drive SW.

In 2015, citywide total crime incidents totaled 6,738, and a nearly similar 6,752 in 2016 (City of Lakewood Police Department, 2018).[3] In 2016, there were 1,563 person-crimes reported in the National-Incident Based Reporting System (NIBRS), slightly lower than 2015 at 1,590.

## Level of Service

Comprehensive Plan Policy P-5.1 establishes response time objectives:

> *PS-5.1: Provide police protection with a three-minute response time for life-threatening emergencies (Priority 1), a six-minute response time for crimes in progress or just completed (Priority 2), and a routine/non-emergency response time of 20 minutes (Priority 3).*

The status of response times is unknown.

The department 101 commissioned officers that service the City, and in 2016 responded to 49,569 calls for service. (City of Lakewood, 2018) With this information, an effective level of service can be calculated, resulting in about 1.72 officers per 1,000 residents.

**Exhibit 3.5-3.** Police Services Effective Level of Services Standards

| Year | Population | Officers | Officers Per 1,000 Residents |
|---|---|---|---|
| 2016 | 58,800 | 101 | 1.72 |

Source: (City of Lakewood, 2018)

# School

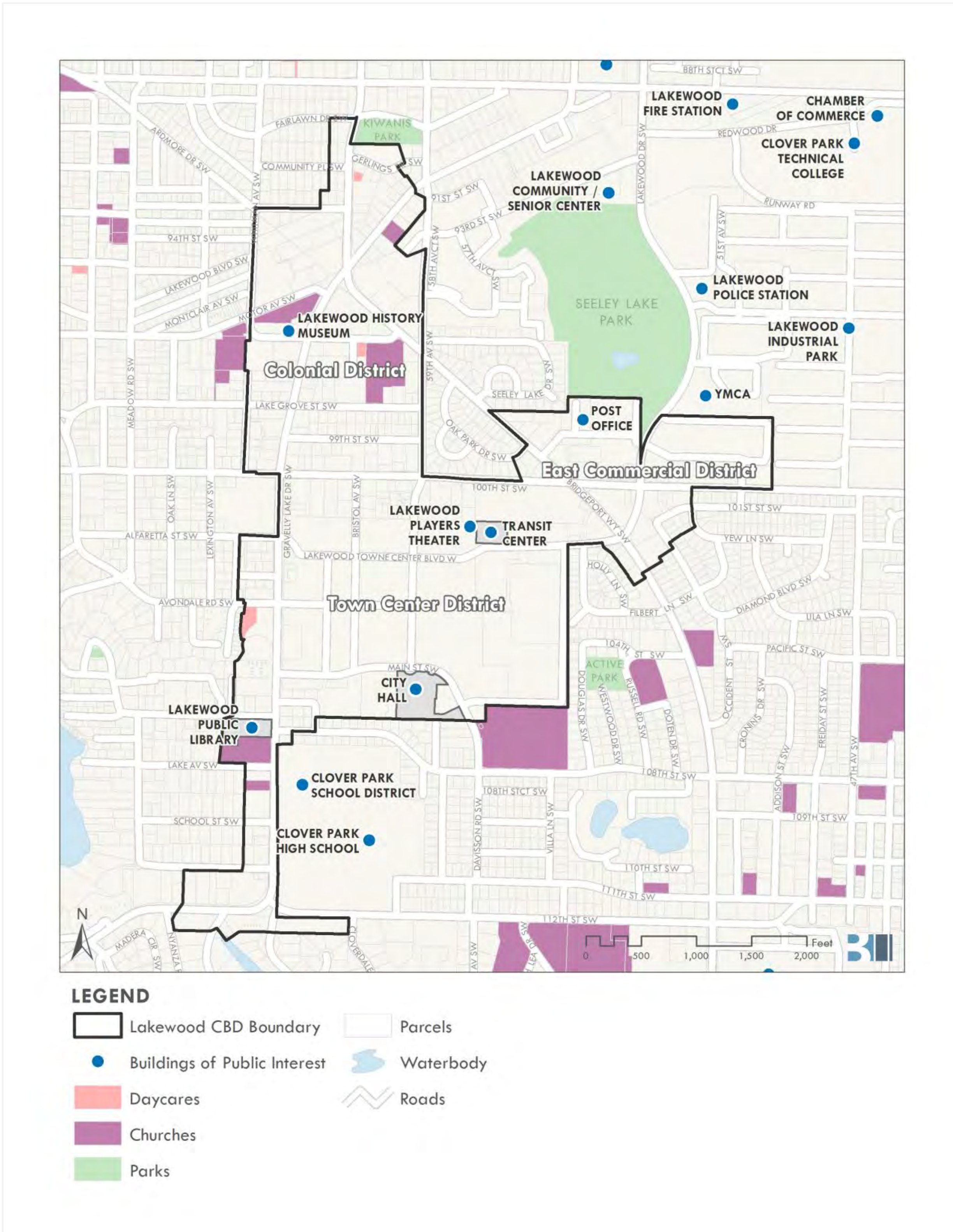
## Existing Service

Public school services are provided by the Clover Park School District (CPSD), It operates 23 schools, with four schools that serve the Study Area. District-wide there are 12,885 students and 1,667 staff members.

[3] An "incident" is defined as one or more offenses committed by the same offender, or group of offenders acting in concert, at the same time and place.

St. Francis Cabrini also provides private school services to grades K-8, and abuts the Study Area to the south. See Exhibit 3.5-4.

**Exhibit 3.5-4. Cultural, Institutional, and Recreational Facilities**




Source: City of Lakewood, BERK 2017

### Level of Service Standards

The City of Lakewood recognizes the Clover Park Capital Facilities Master Plan, and school sizes in the City's Capital Facilities Element as a level of service.

**Exhibit 3.5-5. Clover Park Public School Size**

| School size | # Students |
|---|---|
| K-5 | 450-475 |
| Middle | 650-700 |
| High | 1,500- 1,600 |

Source: City of Lakewood 2016

CPSD sets level of service standards in its Clover Park Capital Facilities Master Plan. As of January 2017, the master plan is being updated. Under a Facilities Advisory Committee report, the school board is recommending that the district maintain Lake City property for a possible future school site and is developing a long-term master plan which may use sequential bonds in 2018, 2014, and 2032. (Clover Park School District, 2017)

A common effective level of service standard is to look at the number of per teacher. Schools often set student/teacher ratios which can also identify the number of future classrooms needed, which may be housed in permanent or temporary portable capacity.

To estimate student generation, it is also possible to consider the number of households in the district in relation to the number of students. The number of households in the Clover Park School district is 13,157 based on State of Washington Office of Financial Management (OFM) small area estimates. There are 29,453 students in the district as of 2016. Thus, the effective student per household ratio is 0.45.

**Exhibit 3.5-6. School Services Effective Level of Services Standards**

| Facility | Student Count (May 2017) | Classroom Teachers (2016-17) | Student to Teacher Ratio |
|---|---|---|---|
| **Clover Park School District** | **12,834** | **729** | **17.6** |
| Lakeview Hope Academy | 1,153 | 62 | 18.6 |
| Park Lodge Elementary School | 465 | 28 | 16.6 |
| Lochburn Middle School | 710 | 45 | 15.8 |
| Clover Park High School | 465 | 28 | 16.6 |

Source: Washington Office of the Superintendent of Public Instruction, BERK, 2018.

## *Parks and Recreation*

There are no public parks in the Study Area. See Exhibit 3.5-4. The City manages the Kiwanis Park abutting the Colonial District, which is three acres and contains a skate park. The County's Seeley Lake Park abuts the Study Area to the northeast near the East Commercial District. It is about 47 acres and has a loop trail, woods, and wetlands.

The Study Area is included in two park planning areas six and seven. There are no specific Lakewood capital projects planned to the parks abutting the Study Area.

The City's adopted park level of service (LOS) standard is 0.75-mile walking distance to neighborhood parks equipped with playground facilities. This LOS is met near portions of the Study Area in the northern Colonial District, but most of the Study Area would not meet this standard.

## 3.5.1. Impacts

### *Impacts Common to All Alternatives*

Impacts are projected based on the effective level of service standards as discussed in the Affected Environment applied to projected population by alternative described in Chapter 2.

An increase in housing units and jobs in the Study Area will generate increased demand for public service providers.

Additional trained fire fighter/emergency medical trained staff are needed under each alternative though the level of need differs. The personnel may fulfil both duties of fire suppression and emergency medical technical services.

**Exhibit 3.5-7. Fire and EMS Services**

| Alternative | Study Area Population Net Growth | Current Effective LOS per 1,000 Population | Staff Need |
|---|---|---|---|
| Fire | | | |
| No Action | 990 | 1.4 | 1.4 |
| Action Alternative 1 | 3,426 | 1.4 | 4.7 |
| Action Alternative 2 | 4,898 | 1.4 | 6.7 |
| EMS | | | |
| No Action | 990 | 1.5 | 1.4 |
| Action Alternative 1 | 3,426 | 1.5 | 5.0 |
| Action Alternative 2 | 4,898 | 1.5 | 7.2 |

Source: BERK 2018

Additional police officers are also needed under each alternative to maintain the same ratio of officers per 1,000. Number of staff need is estimated by each alternative's population.

**Exhibit 3.5-8. Police Staff Demands by Alternative**

| Alternative | Study Area Population Net Growth | Current Effective LOS | Need |
|---|---|---|---|
| No Action | 990 | 1.7 | 1.7 |
| Action Alternative 1 | 3,426 | 1.7 | 5.9 |
| Action Alternative 2 | 4,898 | 1.7 | 8.4 |

Source: BERK 2018

In terms of schools, added residential growth would include households with children and greater number of teachers or classrooms; the table shows a maximum number. The Subarea Plan is a 20-year plan and it's possible that the number of students would increase gradually and not require a change in facilities.

**Exhibit 3.5-9. School Generation by Alternative**

| Alternative | Study Area Household Net Growth | Student Generation per Household | Study Area Students Net Growth | Teacher to Student Ratio | Teachers |
|---|---|---|---|---|---|
| No Action | 456 | 0.45 | 204 | 17.6 | 12 |
| Alt 1 | 1579 | 0.45 | 705 | 17.6 | 40 |
| Alt 2 | 2257 | 0.45 | 1,008 | 17.6 | 57 |

Source: BERK 2018

Regarding parks, there are none today, and the current spacing standard for neighborhood parks is not met. The ability of each alternative to provide parks to support greater population is reported under each alternative.

## *No Action*

Baseline growth in the Study Area is set by the Lakewood Comprehensive Plan. Under the No Action Alternative, Lakewood will develop to a lesser degree.

### Fire Protection and Emergency Services

West Pierce Fire and Rescue currently has 1.4 firefighters and 1.5 EMS personnel per 1,000 capita that are serving the City of Lakewood as a part of the fire protection district. Under the No Action Alternative, 1.4 firefighters and 1.4 EMS personal are needed to continue to provide this level of service under projected population growth in the Study Area.

### Police

The Lakewood Police Department currently has 4.7 officers per 1,000 capita. Under the No Action Alternative, 1.7 officers are needed to continue to provide this level of service under projected population growth in the Study Area.

### School

The Clover Park School District currently provides a student to teacher ratio of 17.6 Under the No Action Alternative, 12 additional teachers/classrooms are needed to continue to provide this level of service under projected population growth in the Study Area.

### Parks and Recreation

Growth would occur under the No Action Alternative, and a park facility would not be added, allowing service levels to degrade.

## *Action Alternative 1*

### Fire Protection and Emergency Services

WPFR currently has 1.4 firefighters and 1.5 EMS personnel per 1,000 capita that are serving the City of Lakewood. Under Alternative 1, 4.7 firefighters and 5.0 EMS personal are needed each to continue to provide this level of service under projected population growth in the Study Area.

Alternative 1 would produce trips and associated traffic congestion; road and intersection improvements identified in Chapter 3.3 would address congestion and help WPFR meet its response time goals.

### Police

The Lakewood Police Department currently has 4.7 officers per 1,000 capita. Under Alternative 1, 5.9 officers are needed to continue to provide this level of service under projected population growth in the Study Area. There are similar issues regarding congestion as noted for Fire Protection.

### School

The Clover Park School District currently provides a student to teacher ratio of 17.6 Under Alternative 1, 40 additional classrooms/teachers are needed to continue to provide this level of service under projected population growth in the Study Area.

### Parks and Recreation

Growth would occur under Alternative 1, and a 2-acre park facility would be added. This would allow the neighborhood to meet the distance standard together with the overlapping service provided by Kiwanis Park to the north.

## *Action Alternative 2*

### Fire Protection and Emergency Services

WPFR currently has 1.4 firefighters and 1.5 EMS personnel per 1,000 capita that are serving the City of Lakewood. Under Alternative 2, 6.7 firefighters and 7.2 EMS personnel are each needed to continue to provide this level of service under projected population growth in the Study Area.

### Police

The Lakewood Police Department currently has 4.7 officers per 1,000 capita. Under Alternative 2, 8.4 officers are needed to continue to provide this level of service under projected population growth in the Study Area.

### School

The Clover Park School District currently provides a student to teacher ratio of 17.6 Under Alternative 2, 57 additional teachers are needed to continue to provide this level of service under projected population growth in the Study Area.

### Parks and Recreation

Per its 2014 Legacy Plan, the City's open space level of service (LOS) is 0.75-mile walking distance, or a 20-minute walking time, to urban parks serving residents living in high density residential or mixed-use areas. Growth would occur under Alternative 2, and a four-acre central park facility would be added in the Town Center district. This would allow the neighborhood to meet the distance LOS standard together with the overlapping service provided by Kiwanis Park to the north.

## 3.5.2. Mitigation Measures

### *Incorporated Plan Features*

Alternatives 1 and 2 include a two to four-acre park and a Green Street Loop to create a linear park concept. The Plan alternatives would also create pedestrian connections to parks outside the Study Area.

### *Regulations and Commitments*

The City addresses public service levels of service in its Capital Facilities Plan Element. The element is updated periodically to ensure that proposed growth and change can be served.

The City requires private open space and recreation for new multifamily and commercial development. 18A.50.231Specific Uses Design Standards.

### *Other Proposed Mitigation Measures*

The City can adopt a level of service specifically for urban parks in the Downtown. The City could allow developers to avoid a percentage of onsite open space requirements if providing a fee in lieu towards the central park.

## 3.5.3. Significant Unavoidable Adverse Impacts

With the implementation of mitigation measures, no significant unavoidable adverse impacts are anticipated on public services. The growth planned for the area would be incremental, and periodic update of service provider plans would address improvements required to maintain response times, ensure access to parks, and address student growth.

# 3.6. Utilities

This section addresses the potential impacts associated with the alternatives on utilities including water, wastewater, stormwater, and power. After providing information on the affected environment, the impacts analysis considers how the alternatives could affect increases in demand for utilities. Measures to address potential impacts are included.

Impacts on utilities would be significant under one or more of the following thresholds:

- Inconsistency with utility system planned growth and capital plans.
- Potential to require major new projects or initiatives for energy system upgrades to accommodate redevelopment.

## 3.6.1. Affected Environment

### *Areawide*

#### Water

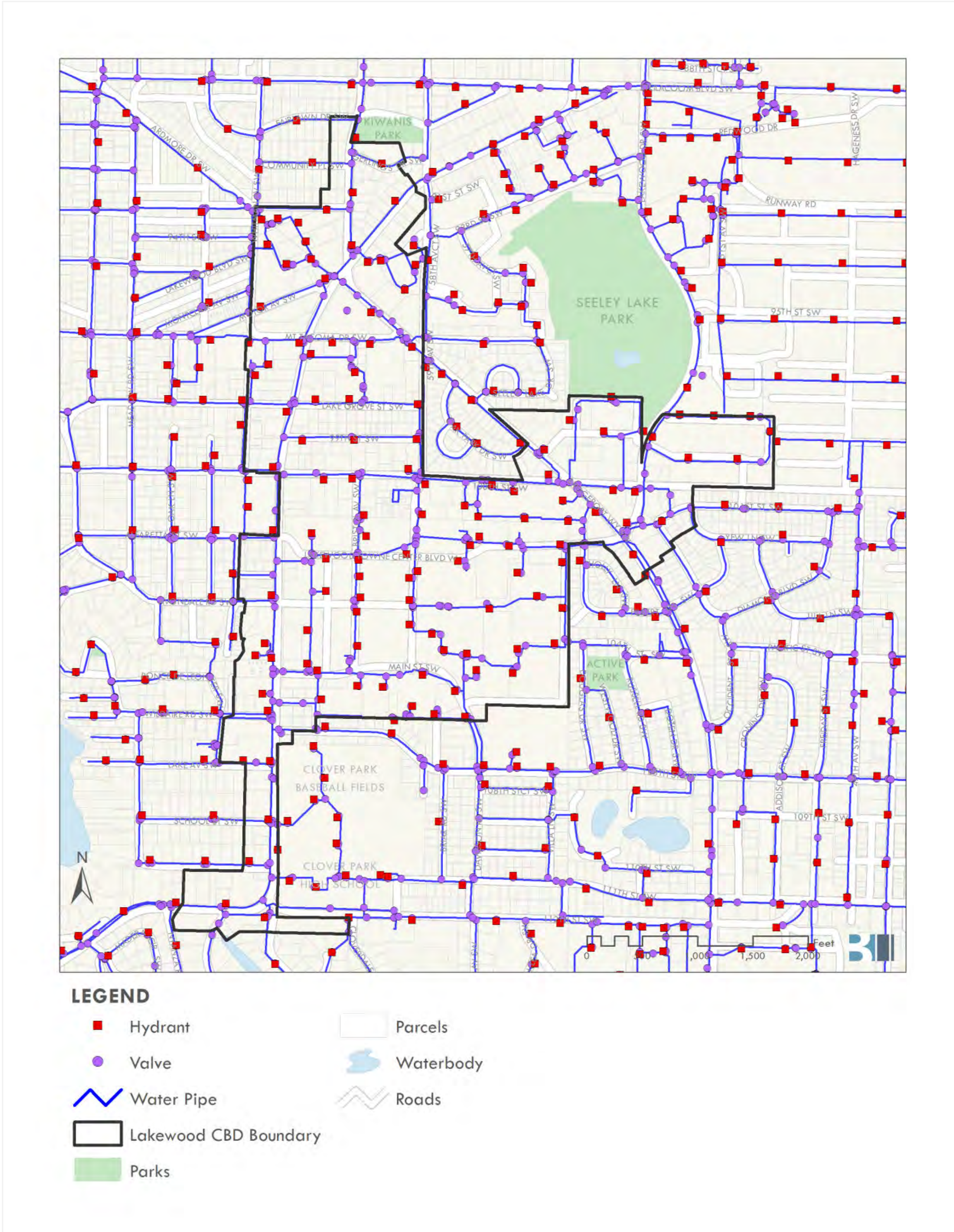
Water service is provided by the Lakewood Water District, and the Study Area is fully served. See Exhibit 3.6-1.

The Lakewood Water District has a current daily demand of 8.3 million/gallon/day. The District has sufficient water availability for demand within its service area. Currently, the District has more capacity than there is demand within its service area. As a result, the District sells its extra capacity to other regional Water Districts such as Rainier Water, Summit Water, and Firgrowth Water.

The District has planned for a daily demand of 9 million gallons/day and has identified that it can support yearly increases of up to 2 million gallons/day of demand. In addition to this planned capacity, the District has pending water rights that can be accessed in case of unanticipated need beyond planned capacity.

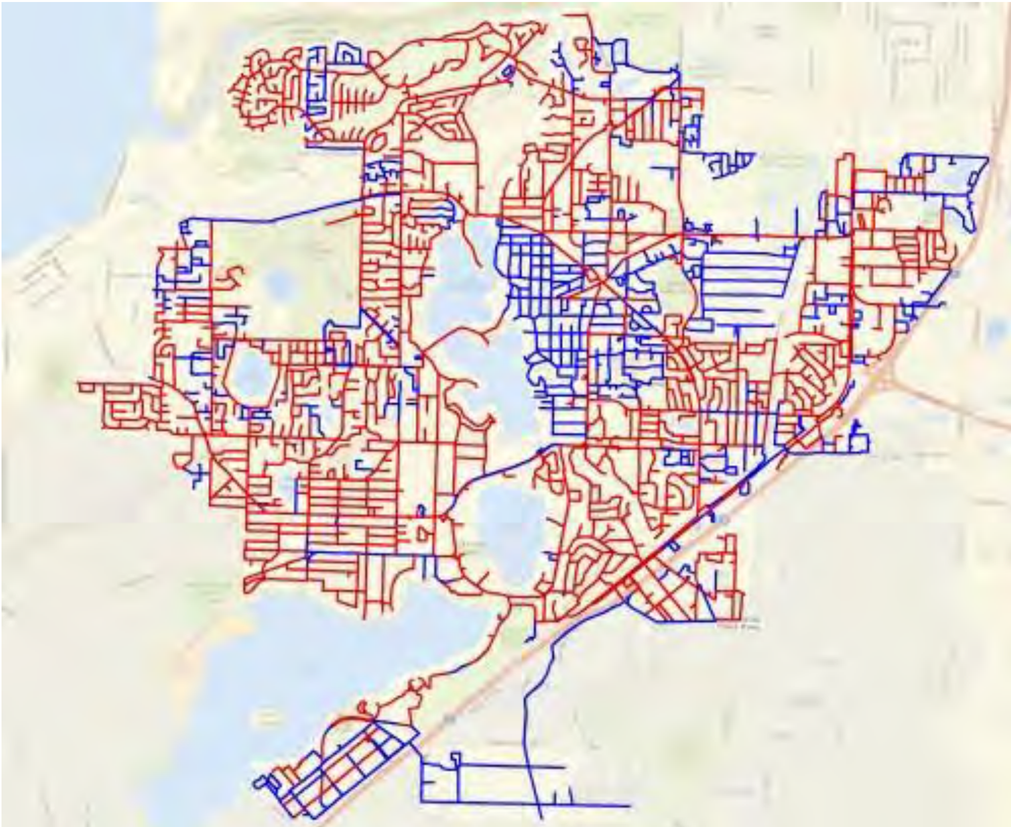
The District began a 35-year program of replacement and rehabilitation in 1995. Some of the lines are mapped as needing replacement in the Study Area. See Exhibit 3.6-2. The City's level of service is related to sufficient fire flow and current usage per capita: "Min. pressure- 40 psi. Fire flow- 1,500 gpm. Current usage: 139 gal/person/day. LWD Capital Improvement Program." (City of Lakewood, 2016) More recent information from the Lakewood Water District illustrates current usage has dropped to 136 gallons per person per day. (Black, 2017)

**Exhibit 3.6-1. Water System in Study Area**




Source: Lakewood Water District 2017

**Exhibit 3.6-2. Map of Water Mains to be Replaced**



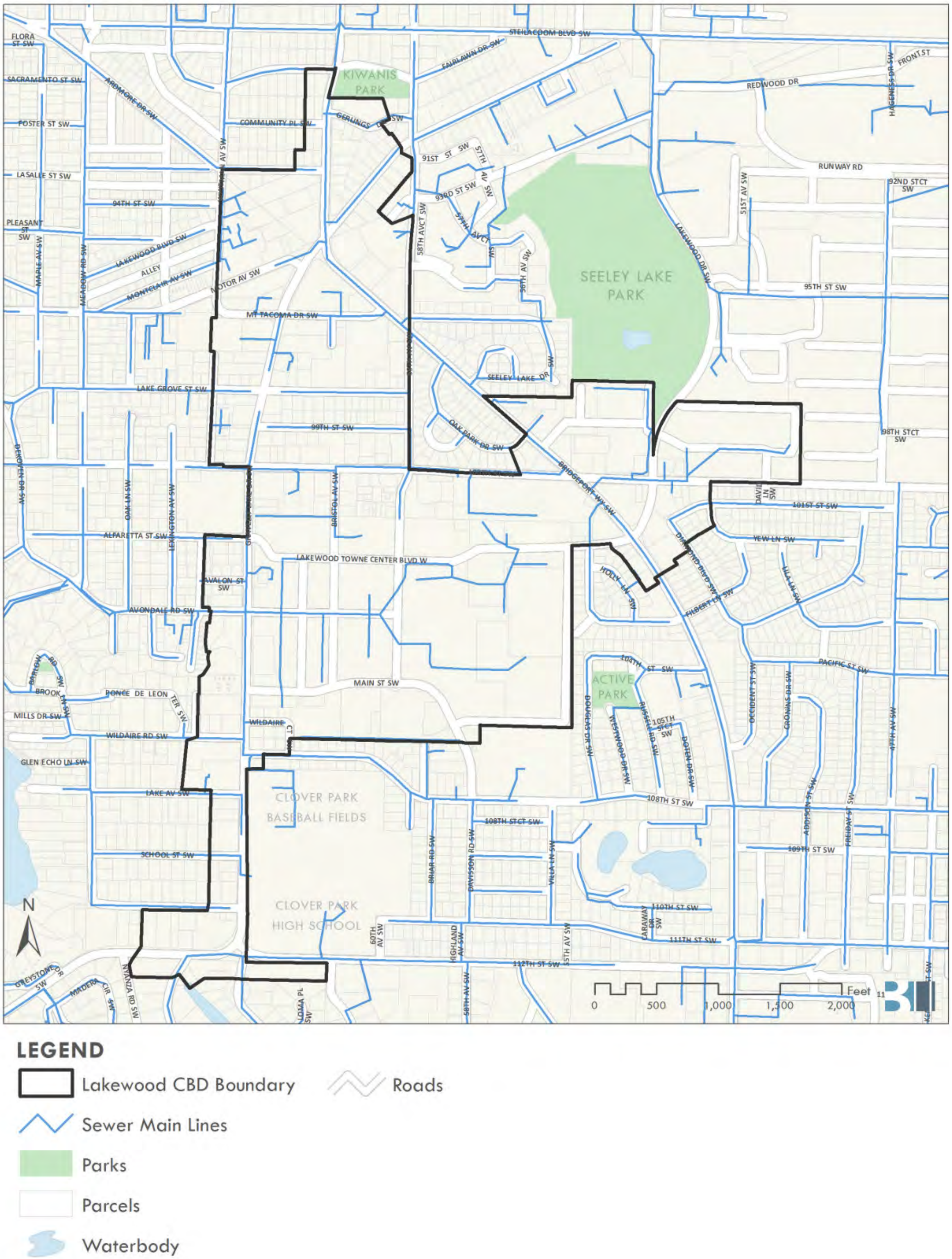
RED = Pipe in need of replacement    BLUE = Replaced pipe
Source: (Lakewood Water District, 2017)

## Sewer

Sewer service is provided by Pierce County Public Works and Utilities. The Study Area is in the County's Lakewood East Sewerage Sub-basin and is fully served; see Exhibit 3.6-3. The City's level of service is:

- 220 gallons per day equals one residential equivalent. Flow projections assume 0.83 RE for multifamily units. Pierce County Consolidated Sewer Plan Section 2.6.3. (City of Lakewood, 2016)

**Exhibit 3.6-3. Sewer System in Study Area**




Source: City of Lakewood, Pierce County 2017

The County's 2010 Unified Sewer Plan anticipates a population of 72,000 within Lakewood by 2030, consistent with county growth allocations to Lakewood. The Unified Sewer Plan identifies several system improvements including major conveyance projects through Lakewood, though mainly outside the Study Area. The Chambers Creek Wastewater Treatment Plant considers regional growth projections through 2040.

### Stormwater

Lakewood manages manmade and natural surface water systems; the current condition of the stormwater system as it relates to the natural environment and application of standards to development is covered in Chapter 2. This section describes operations of the City's municipal stormwater utility.

The City implements a stormwater operations and maintenance program addressing the stormwater system mapped in Exhibit 3.1-1. Activities include:

- All City-owned catch basins are inspected and cleaned as needed once every two years. The City has responsibility for numerous water quality vaults; these are inspected annually and cleaned as needed;
- The City contracts for vactoring and street sweeping. Vactoring and street sweeping are done by private contractors. The vactor contractor inspects storm lines and structures;
- The City performs spot checks of stormwater facilities after major storm events; and
- Work performed by City maintenance staff includes shoulder, ditch, and pond maintenance, vegetation management, infiltration system installation, sidewalk maintenance, asphalt patching, and snow and ice removal. (City of Lakewood, 2017)

Stormwater is regulated through LMC 12A.11. The City of Lakewood updated its Stormwater Management Program in early 2017 in compliance with the Western Washington Phase II Municipal Stormwater Permit. The City describes the requirements as follows in the 2017 Stormwater Management Program:

> *The City adopted the DOE manual as the primary manual but also allows the use of the Pierce County Stormwater Management and Site Development Manual and the WSDOT Highway Runoff Manual (current editions). LMC Chapter 12A.11 was revised in 2016 to incorporate Low Impact Development principles and standards.*

The Comprehensive Plan LOS for stormwater states: On-site infiltration expected. Treatment As required by DOE Stormwater manual.

The stormwater system currently has limited areas of filtration or water quality treatment; the City's stormwater system would be supported by the City's application of its stormwater standards.

While City manuals require implementation of low impact development / green stormwater infrastructure techniques, Downtown zoning district allow 100% lot coverage.

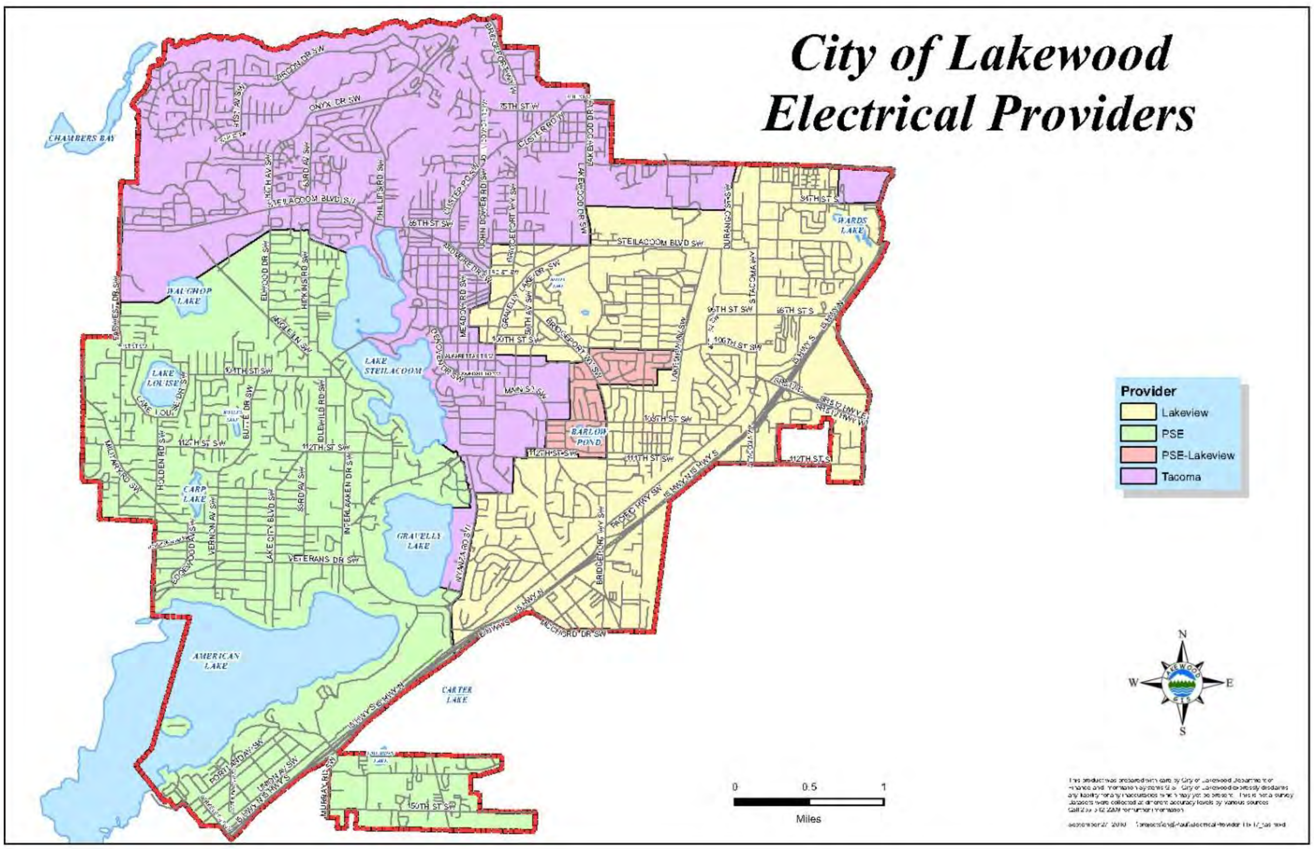
### Power

Two private utility providers supply power to the Study Area, Tacoma Public Utilities (TPU) and Lakewood Light and Power (LLP). As a larger provider, TPU is required to have an Integrated Resource Plan (IRP), while Lakeview as a smaller provider is required to have Resource Plan (RP). (Washington

Department of Commerce, 2014) Tacoma Public Utilities generates its own power and receives some power from other providers, while Lakeview is a provider of power supplied from the federal Bonneville Power Administration.

Lakeview's fuel comes from 87% hydroelectric power (Lakeview Power and Light, 2017) and Tacoma Public Utilities' power is 90% generated by hydro. (Tacoma Public Utilities, 2017)

**Exhibit 3.6-4. Electrical Service Areas by Providers Map**




Source: (City of Lakewood, 2016)

For electric utility providers, an effective level of service standard is power resources able to be provided per customer. As of 2014, TPU served over 169,000 customers and provided an annual megawatt load of 572 megawatts, and Lakeview served over 11,000 while providing 30.8 megawatts. Electric resource is how much power can be supplied to utility customers, either through providers generating their own power, or through contracts with other resource generating providers.

**Exhibit 3.6-5. Power Services Effective Level of Services Standards**

| Provider | Customers (2014) | Annual Megawatt Load | Total Resources Megawatts |
|---|---|---|---|
| Tacoma Public Utilities | 169,018 | 572 | 762.1 |
| Lakeview Light and Power | 11,434 | 30.8 | 30.8 |

Source: Washington Department of Commerce Electric Utility Resource Planning Report, 2014.

## 3.6.2. Impacts

### *Impacts Common to All Alternatives*

Under all alternatives there would be increases in development and increases in population and employment density. The greatest density increases would occur on the catalyst sites. The development would be incremental and Lakewood as well as the utilities are regularly updating plans to accommodate growth and maintain utilities.

#### Water

As described under the Affected Environment, the Lakewood Water District has planned for a daily demand of 9 million gallons/day currently and has identified that it can support yearly increases of up to 2 million gallons/day of demand. In addition, improvements are planned to the water system across its service area, which includes the Study Area. Current water availability and these improvements are expected to be sufficient to serve this area, including demand for daily use and fire suppression. Water supply requirements for fire flow can be much greater than the average daily usage for single buildings. Developers are responsible for improvements needed to meet fire code requirements on their property, so additional improvements may be identified during the design review for individual projects. All alternatives could result in an increase in water demand per the City's LOS, although use of higher efficiency and low-flow fixtures could reduce per-capita demand. The usage has further dropped to 136 gallons per person per day, but the order of magnitude difference among the alternatives would be similar to that shown in the table below. The Water System Plan is updated on a six-year cycle to address aging infrastructure, expansion to accommodate development, and recommended improvements.

The addition of new public streets could necessitate changes to some utility lines. Developers are responsible for the cost of these alteration which may be identified during the design review for individual projects.

**Exhibit 3.6-6. Water Provider Effective Level of Service and Need**

| Alternative | Net Population Growth in Study Area | Effective LOS (gal/person/day) | Need (gal/day) |
|---|---|---|---|
| No Action Alternative | 990 | 139 | 137,543 |
| Alternative 1 | 3,426 | 139 | 476,274 |
| Alternative 2 | 4,898 | 139 | 680,779 |

Source: BERK, 2018.

#### Sewer

The Study Area is in Pierce County's Lakewood East Sewerage Sub-basin and is fully served.

Applying Pierce County's level of service, each alternative would increase flow. Treatment capacity would be monitored in relation to state regulations, and capital planning would be updated periodically by Pierce County.

**Exhibit 3.6-7. Sewer Treatment Gallons per Day Increase by Alternative**

| Alternative | Net Population Growth in Study Area | Effective LOS (gal/person/day) | Need (gal/day) |
|---|---|---|---|
| No Action Alternative | 990 | 182.6 | 180,686 |
| Alternative 1 | 3,426 | 182.6 | 625,666 |
| Alternative 2 | 4,898 | 182.6 | 894,318 |

Source: BERK 2018

All alternatives provide housing capacity within adopted City growth targets, which are used as the underlying basis for the County's Unified Sewer Plan capacity needs. Alternatives 1 and 2 would increase housing capacity in Downtown, and promote a mixed use urban format in area with existing sewer service. Tracking growth in relation to capacity and needed capital improvements is accomplished through County and City coordination via the Pierce County Regional Council, consideration of Countywide Planning Policies, and periodic updates to Comprehensive Plans and system plans.

Pierce County plans to increase sewer capacity in the area. Designs under consideration currently include either an increase in the size of the current interceptor (from 54" to 72") or the addition of a parallel sewer line. Any needs for additional flow can be considered and incorporated into Unified Sewer Plan updates in 2018 or beyond. (Bedi, 2018)

### Stormwater

Given that much of the Downtown developed before current stormwater standards, it is expected that redevelopment projects would likely result in an improvement of runoff and recharge flow rates and water quality over existing conditions. The degree of redevelopment varies among alternatives with No Action the least and Alternative 2 the most.

### Power

All alternatives would increase demand for power. Development may occur anywhere in the Study Area, and estimates of potential demand within each district is not determined. However, TCU has the larger service area within Downtown. Thus, it is likely that the higher power demand would apply.

**Exhibit 3.6-8. Power Demand**

| Scenario | Study Area Housing Net Growth | Current Effective LOS (MW per 1,000 customers) | Annual Need (MW) |
|---|---|---|---|
| TCU | | | |
| No Action | 456 | 3.4 | 1.5 |
| Alt 1 | 1579 | 3.4 | 5.3 |
| Alt 2 | 2257 | 3.4 | 7.6 |
| Lakeview | | | |
| No Action | 456 | 2.7 | 1.2 |
| Alt 1 | 1579 | 2.7 | 4.3 |
| Alt 2 | 2257 | 2.7 | 6.1 |

Source: BERK 2018

## *No Action Alternative*

Under the No Action Alternative, the increase in housing units is relatively limited, and any increase in population within the Study Area is not anticipated to result in substantive impacts on utilities.

### Water

The Lakewood Water District has sufficient water availability and has planned for a daily demand of 9 million gallons/day currently. It has identified that it can support yearly increases of up to 2 million gallons/day of demand. The increase in water demand from residential use under the No Action Alternative could be accommodated by current plans by the Lakewood Water District. The No Action Alternative is consistent with the expected growth in current water and wastewater system plans, which incorporate a more intense mixed-use development pattern with residential use.

### Sewer

The No Action Alternative would generate the least effluent of the studied alternatives: 180,686 gallons/day. It would allow a small housing capacity within the County's east basin.

### Stormwater

Though No Action development standards assume 100% impervious area in the Downtown, developments would need to address low impact development / green stormwater infrastructure per City manuals. There would be a small increase in city staff duties for review and inspection of new stormwater facilities. All new and redevelopment projects that trigger thresholds per the City's stormwater code would be required to incorporate low impact development (LID) best management practices where feasible, such as biofiltration, permeable sidewalks, and other infiltration and flow reduction techniques.

### Power

Under the No Action Alternative, the range of power demand increase due to growth would be 1.2-1.5 megawatts. Energy codes will apply to new buildings and result in greater energy conservation compared with existing buildings.

## *Action Alternative 1*

### Water

Alternative 1 would have a greater potential demand for fire and emergency medical services, police, schools, and parks because of the forecasted growth in population and employment in the Study Area compared to No Action Alternative. The impacts would be the same as those described under Impacts Common to All Alternatives. The increase in water demand under Alternative 1could be accommodated by current plans by the Lakewood Water District. Alternative 1 is consistent with the expected growth in current water and wastewater system plans, which incorporate a more intense mixed-use development pattern with residential use.

### Sewer

Alternative 1 would generate a moderately increased amount of effluent: 625,666 gallons/day. It would particularly add housing capacity within the County's east basin as well as nearly double the number of jobs. See the discussion of growth monitoring and capital planning under Impacts Common to All Alternatives.

### Stormwater

Potential beneficial effects and requirements identified under Impacts Common to All Alternatives apply to Alternative 1. Similar to the No Action Alternative, there would be implementation of low impact development / green stormwater infrastructure and consistency with water quality requirements. Alternative 1 assumes catalyst sites redevelop (Exhibit 2.3-2) as well as sites considered vacant and underutilized (Exhibit 2.3-11), which would mean more sites implementing modern stormwater standards. With greater extent of redevelopment there would be greater demand on staff resources to review and inspect facilities compared to the No Action Alternative.

### Power

Under Alternative 1, the range of power demand increase due to growth would be 4.2-5.3. megawatts, greater than No Action and less than Alternative 2. Energy codes will apply to new buildings and result in greater energy conservation compared with existing buildings.

## *Action Alternative 2*

### Water

Because anticipated growth in population and employment would be highest, as would the potential height of new buildings, there would be greater demands on utilities under Alternative 2. The impacts would be same as those described under Impacts Common to All Alternatives. The increase in water demand under Alternative 2 could be accommodated by current plans by the Lakewood Water District. Alternative 2 is consistent with the expected growth in current water and wastewater system plans, which incorporate a more intense mixed-use development pattern with residential use.

### Sewer

Alternative 2 would generate the highest amount of effluent studied:  894,318 gallons/day. It would particularly add housing capacity within the County's east basin and more than double jobs. See the discussion of growth monitoring and capital planning under Impacts Common to All Alternatives.

### Stormwater

Potential beneficial effects and requirements identified under Impacts Common to All Alternatives apply to Alternative 2. Alternative 2 would have a similar redevelopment extent as Alternative 1 with the same potential catalyst sites and vacant/underutilized sites, and a similar likelihood of beneficial effects from application of low impact development / green stormwater infrastructure. Though there is greater residential and employment space planned under Alternative 2, the footprint of redevelopment and the potential increase in need for staff review and inspection resources is likely to be similar as for Alternative 1.

**Power**

Under Alternative 2, the range of power demand increase due to growth would be 6.1-7.6. megawatts, the greatest studied due to the greatest proposed growth. Energy codes will apply to new buildings and result in greater energy conservation compared with existing buildings.

## 3.6.3. Mitigation Measures

### *Incorporated Plan Features*

Alternative 1 and 2 include policies promoting green stormwater infrastructure and opportunities to integrate them into the Green Street Loop and Central Park features.

### *Regulations and Commitments*

- City of Lakewood Comprehensive Plan including the Capital Facilities and Utilities element that set levels of service and coordination policies with service providers.
- The Lakewood Municipal Code includes standards for water, sewer, and stormwater infrastructure for new development. (LMC Title 12A)
- The Lakewood Municipal Code requires application of the national energy code (LMC Chapter 15A.25).
- Ongoing updates to Comprehensive Water System Plan by the Lakewood Water District and the Unified Sewer Plan by Pierce County would address the increases in density in the Study Area and ensure services are in place to meet the growing demand.
- Power service providers conduct regular electric utility resource planning to address service demand and conservation.

### *Other Proposed Mitigation Measures*

- Developments may reduce water demand by using new technologies that would reduce per-capita water use (and therefore wastewater service demand) by using newer, low- or no-flow plumbing fixtures and equipment.
- Implementation of sustainable requirements including the construction and operation of LEED-compliant (or similar ranking system) buildings could reduce the increase required in power systems.
- Implementation of conservation efforts and renewable energy sources to conserve electricity in new developments, including energy efficient equipment (i.e., light bulbs, appliances, and heating and air conditioning), could reduce energy consumption.

## 3.6.4. Significant Unavoidable Adverse Impacts

With the implementation of mitigation measures, no significant unavoidable adverse impacts are anticipated on utilities. The growth planned for the area would be incremental, and periodic updates of relevant plans would address improvements required to maintain levels of service, and ensure utilities can accommodate growth.

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# A. Scoping Notice and SEPA Checklist

# DETERMINATION OF SIGNIFICANCE AND REQUEST FOR COMMENTS ON SCOPE OF EIS

## Description of Proposal

The City has commissioned the preparation of a subarea plan for Downtown Lakewood. The plan will build up past planning efforts and describe a vision, land use and design, gathering places, infrastructure investments, and other action strategies for Lakewood's central business district or "Downtown". Comprehensive Plan land use, policy, and capital facility plan amendments, new form-based zoning standards, and upfront environmental review through a Planned Action consistent with RCW 43.21c.440 and SEPA rules in WAC 197-11 are anticipated to help bring about desired change and development.

## Proponent

City of Lakewood

## Location of Proposal

The Downtown Plan Study Area is approximately 315 acres (parcel area), and contains the central shopping area of the community including the Colonial District and Towne Center Mall. Major roads include Bridgeport Way SW and Gravelly Lake Drive SW, and 100th Street SW. The Study Area is bounded approximately by Fairlawn Drive SW and Kiwanis Park on the north, 59th Avenue SW and Lakewood Drive W to the east, 112th Street SW on the South, and Gravelly Lake Drive SW to the west, including property fronting on both sides of the roadway.

## Lead Agency

**EIS REQUIRED.** The lead agency has determined this proposal is likely to have a significant adverse impact on the environment. An environmental impact statement (EIS) is required under RCW 43.21C.030 (2)(c) and will be prepared. An environmental checklist or other materials indicating likely environmental impacts can be reviewed at our offices and the project website: https://www.lakewooddowntownplan.org/.

The lead agency has identified the following areas for discussion in the EIS: Natural Environment; Population, Employment, and Housing; Transportation; Land Use and Plans and Policies; and Public Services and Utilities. Alternatives are anticipated to include a No Action alternative required by SEPA assuming the current plans and codes remain, and two action alternatives that address different levels of growth and infrastructure investment options. A project website (https://www.lakewooddowntownplan.org/) contains background information about the proposal and schedule.

**SCOPING.** Agencies, affected tribes, and members of the public are invited to comment on the scope of the EIS. You may comment on alternatives, mitigation measures, probable significant adverse impacts, and licenses or other approvals that may be required.

The method and deadline for giving us your comments is: **Submit comments by 5 pm, December 29, 2017** to the Responsible Official.

## Responsible Official

David Bugher, Assistant City Manager for Development/Community Development Director
Community Development Department | 6000 Main St SW, Lakewood, WA 98499
DBugher@cityoflakewood.us

Date **12/8/17** Signature David Bugher

# Lakewood Downtown Plan

## WAC 197-11-960 ENVIRONMENTAL CHECKLIST

### Purpose of checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

### Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

For nonproject proposals complete this checklist and the supplemental sheet for nonproject actions (Part D). The lead agency may exclude any question for the environmental elements (Part B) which they determine do not contribute meaningfully to the analysis of the proposal.

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

## A. BACKGROUND

**1. Name of proposed project, if applicable:**

Lakewood Downtown Plan

**2. Name of applicant:**

City of Lakewood

**3. Address and phone number of applicant and contact person:**

David Bugher, Assistant City Manager for Development/Community Development Director
Community Development Department
6000 Main St SW, Lakewood, WA 98499
(253) 983-7739 • Fax (253) 512-2268 •
DBugher@cityoflakewood.us

**4. Date checklist prepared:**

December 7, 2017

**5. Agency requesting checklist:**

City of Lakewood

**6. Proposed timing or schedule (including phasing, if applicable):**

Summer 2018

**7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.**

The plan may be updated every eight years with the City's periodic Comprehensive Plan review or as otherwise deemed appropriate by the City.

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

Lakewood Downtown Plan Existing Conditions Report, pending December 2017

**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.**

This is a non-project action and the proposed actions are legislative. There may be private permits under review in the study area.

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

City Council approval, Puget Sound Regional Council consistency review, Washington Department of Commerce review under the Growth Management Act.

**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.)**

A major goal of the City of Lakewood is to create a Downtown focused in the Central Business District (CBD) zone, redeveloping it into a rich urban area with civic amenities, walkable streets, and a mix of uses including housing, entertainment, restaurants, and retail. Downtown has significant economic and cultural assets and some challenges to achieve this goal.

The City has commissioned the preparation of a subarea plan for Downtown Lakewood. The plan will build up past planning efforts and describe a vision, land use and design, gathering places, and action strategies for Lakewood's central business district or "Downtown". New design-oriented zoning standards and upfront environmental review will be part of the plan and will help bring about desired change and development.

This SEPA Checklist supports a Determination of Significance and Scoping Notice for a Planned Action Environmental Impact Statement as allowed in RCW 43.21c.440. This SEPA Checklist addresses topics that are not otherwise proposed to be addressed in the EIS. For topics that would be covered in the EIS, a summary of the intended scope is provided.

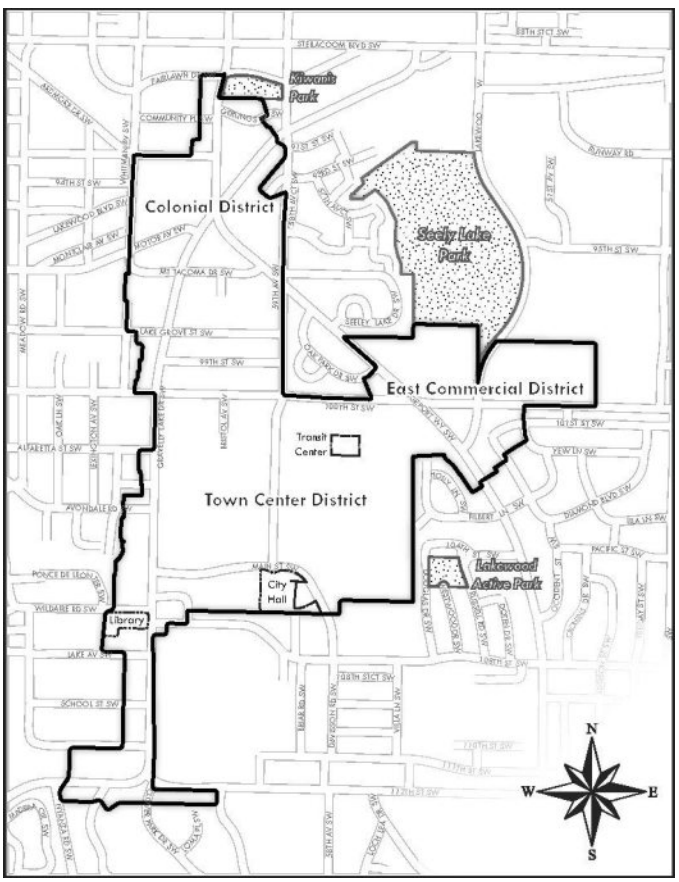
**12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the 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 Downtown Plan Study Area is approximately 315 acres (parcel area), and contains the central shopping area of the community. See map below. The Study Area also contains many civic and cultural facilities such as City Hall, Lakewood Library, Transit Center, Post Office, the Lakewood Players Theater, and the Lakewood History Museum. Most of the Study Area is within a half mile of the Transit Center.

To recognize different characters and conditions, the Downtown Plan Study Area is divided into districts:

- **Colonial:** This district includes colonial-style commercial buildings.
- **Town Center:** Developed in 1958 as the Villa Plaza Shopping Center, which was later renovated to become the Lakewood Mall, this district contains the upgraded Lakewood Towne Center.
- **East:** This district at the intersection of Bridgeport Way SW and 100th Street SW has a mix of large auto-oriented commercial centers and smaller strip-commercial properties along arterials.

**Exhibit 1. Study Area**




Source: City of Lakewood, BERK Consulting 2017

## B. ENVIRONMENTAL ELEMENTS

**1. Earth**

**a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other......**

Flat.

**b. What is the steepest slope on the site (approximate percent slope)?**

Soils map indicates Spanaway gravelly sandy loam with slopes of 0 to 6%.

**c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.**

Spanaway gravelly sandy loam is the soil type in the study area. Outside the study area in Seely Lake Park soils are Dupont muck.

**d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.**

The Study Area is quite flat and no geologically hazardous areas are located within the Study Area. There are no active faults within the Study Area but the Tacoma fault zone is located to the north and Olympia structure to the south.

**e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.**

Not applicable to this non-project action. Future development would be required to prepare appropriate geotechnical and soils studies where required by the International Building Code. With future development, there would be fill and grade proposals, and limited existing vegetation may be removed. However, all development is subject to City building, grading, and erosion control regulations.

**f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.**

See “e” above.

**g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?**

The CBD zone applies to most of the study area and allows up to 100% impervious coverage. This is a regional growth center with the majority of the City’s business-focused area.

**h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:**

Application of International Building Code (Title 15A ICC Performance Code for Buildings and Facilities), Stormwater Management regulations (Chapter 12A.11 Stormwater Management), Critical Areas regulations (Title 14A Environmental Protection), and Site Development Regulations (see Chapter 12A.10).

No new impacts of a nature or severity that will not be adequately addressed by applicable regulations and existing mitigating measures are anticipated. No further review will be conducted in the EIS apart from documenting critical areas including geologic hazards.

## 2. Air

### a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Development proposals within the study area are anticipated to follow adoption of the plan and associated development regulations. Short-term air emissions including construction equipment exhaust and fugitive dust may occur during the construction phase for new development projects in the study area. Hauling routes and local streets could be impacted by dust if mitigation measures are not implemented, but all construction projects would be consistent with the City's erosion control development standards.

The intent of the plan is to encourage a mixture of residential and commercial uses to reduce the need for daily-needs vehicle trips and create opportunities for living and working in close proximity. Further, the plan envisions pedestrian improvements to encourage walking. Mixed use development has been shown to reduce vehicle miles travelled (VMT) which can reduce greenhouse gas emissions compared to traditional business-as-usual development (US EPA March 2010 draft paper Smart Growth: A Guide to Development and Implementing Greenhouse Reduction Programs).[1] [2] Per capita reductions in VMT are a primary goal of WDOT established through RCW 47.41.440.

### b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

There are no known sources of emissions or odor in the vicinity of the study area that may affect the plan.

### c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Development is subject to applicable federal (EPA), regional (PSCAA), and State (DOE) air quality regulations. Washington DOE air quality regulations applicable to the study area are found at Chapter 173-400 WAC. Particularly relevant air quality regulations relating to redevelopment are included below:

- Construction activity must comply with Puget Sound Clean Air Agency (PSCAA) regulations requiring reasonable precautions to minimize dust emissions (Regulation I, Section 9.15).
- Stationary equipment used for the construction activities must comply with PSCAA regulations requiring the best available measures to control the emissions of odor-bearing air contaminants (Regulation I, Section 9.11).
- Commercial facilities could use stationary equipment that emits air pollutants (e.g., fumes from gas stations, ventilation exhaust from restaurants, and emissions from dry cleaners). These facilities would be required to register their pollutant-emitting equipment with PSCAA (Regulation I and Regulation II). PSCAA requires all commercial and industrial facilities to use the Best Available Control Technology (BACT) to minimize emissions. The agency may require applicants for high-emission facilities to conduct an air quality assessment to demonstrate that the proposed emissions would not expose offsite areas to odors or air quality concentrations exceeding regulatory limits.
- Transportation roadway projects must be included in the Regional Transportation Plan (RTP) or TIP prior to start of construction to show that they conform to the Puget Sound region's Air Quality Maintenance Plans and

[1] As quoted in the US EPA 2011 paper Smart Growth: A Guide to Development and Implementing Greenhouse Reduction Programs, "[c]ompact development reduces the need to drive by putting destinations closer together and making walking, biking, and using mass transit easier. Any given increment of compact development could reduce VMT [vehicle miles traveled] up to 20 to 40 percent compared to dispersed development on the outer fringe of an urban area."

[2] Transportation Research Board, Special Report 298, Driving and the Built Environment; The effects of compact Development on Motorized Travel, Energy Use and CO2 Emissions, 2009.

would not cause or contribute to regional exceedances of the federal standards. Once included in the RTP or TIP, the projects must meet all transportation conformity requirements and demonstrate regional conformity.

- Project-Level Transportation Conformity Analyses for Future Roadway and Intersection Improvements: As part of future project-specific NEPA documentation for individual new roadway improvement projects, the City would be required to conduct CO hot-spot modeling (as required under WAC 173-420) to demonstrate that the projects would not cause localized impacts related to increased CO emissions from vehicle tailpipes at congested intersections.

No new impacts of a nature or severity that will not be adequately addressed by applicable regulations and existing mitigating measures are anticipated. No further review will be conducted in the EIS.

**3. Water**

The EIS will address readily available critical area mapping and review City stormwater management efforts. A programmatic discussion of potential direct and indirect effects on critical areas (e.g. wetlands, stream water quality) and the ability of the subarea plan and existing critical area and stormwater regulations to mitigate them will be described.

**a. Surface:**

**1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**

See 3 above.

**2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

See 3 above.

**3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

See 3 above.

**4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.**

See 3 above.

**5) Does the proposal lie within a 100-year flood plain? If so, note location on the site plan.**

See 3 above.

**6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

See 3 above.

**b. Ground:**

**1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well? Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.**

See 3 above.

**2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

See 3 above.

**c. Water runoff (including stormwater):**

1) **Describe the source of runoff (including stormwater) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.**

   See 3 above.

2) **Could waste materials enter ground or surface waters? If so, generally describe.**

   See 3 above.

3) **Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.**

   See 3 above.

**Proposed measures to reduce or control surface, ground, runoff water, and drainage pattern impacts, if any:**

See 3 above.

**4. Plants**

See Section B.3 for the EIS contents that would address the natural environment including wetlands and critical areas.

**a. Check the types of vegetation found on the site:**

**X Deciduous tree: Alder, maple, aspen, other**

**X Evergreen tree: Fir, cedar, pine, other**

**X Shrubs**

**X Grass**

**— Pasture**

**— Crop or grain**

**— Orchards, vineyards or other permanent crops.**

**X Wet soil plants: Cattail, buttercup, bullrush, skunk cabbage, other**

**— Water plants: Water lily, eelgrass, milfoil, other**

**— Other types of vegetation**

Both Clover and Ponce de Leon Creeks have associated wetlands (USFWS, 2017).

**b. What kind and amount of vegetation will be removed or altered?**

Most of the area is urbanized and has a majority impervious area. Most landscaping is ornamental and may be removed due to redevelopment. Some streams traverse the study area and would be protected by critical areas regulations.

**c. List threatened and endangered species known to be on or near the site.**

No listed plant species are known. In terms of priority species, there are no documented Priority Oregon White Oak Woodlands in the Study Area (WDFW, 2017). There may be individual trees scattered are throughout the Study Area, but none are documented (Pierce County, 2017).

**d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:**

The Downtown Plan will address riparian areas along streams and streetscape improvements including landscaping.

**e. List all noxious weeds and invasive species known to be on or near the site.**

The area is urban and has street trees, shrubs, and lawns common to a suburban and urban setting.

**5. Animals**

See Section B.3 for the EIS contents that would address the natural environment including streams and other critical areas.

**a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. Examples include:**

**X Birds: Hawk, heron, eagle, songbirds, other:**

**X Mammals: Deer, bear, elk, beaver, other:**

**X Fish: Bass, salmon, trout, herring, shellfish, other:**

Birds and mammals are present but would be adapted to an urban environment. Fish species including salmonids are found in the streams in the study area. Clover Creek flows northwest under Gravelly-Lake Drive in the southwest corner of the Town Central District. Clover Creek is a known salmon spawning stream with Coho documented and Winter Steelhead presumed present (WDFW, 2017). Coho and Kokanee are both documented to be present in Ponce de Leon Creek (WDFW, 2017). Steelhead are Federal Threatened, Coho are Federal species of Concern, and Kokanee are not listed.

**b. List any threatened and endangered species known to be on or near the site.**

See a above.

**c. Is the site part of a migration route? If so, explain.**

See a above.

**d. Proposed measures to preserve or enhance wildlife, if any:**

Application of critical area regulations. The Downtown Plan will explore the potential to implement City policies that promote daylighting of piped streams.

**e. List any invasive animal species known to be on or near the site.**

None known.

**6. Energy and natural resources**

**a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.**

The study area is served by electricity and in part with natural gas.

**b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.**

The proposal will not directly affect the potential use of solar energy by adjacent properties. However, the proposal may facilitate development consistent with zoned heights that are taller than present structures.

**c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:**

The City has adopted the current edition of the International Energy Conservation Code in Chapter 15A.05.

No new impacts of a nature or severity that will not be adequately addressed by applicable regulations and existing mitigating measures are anticipated. No further review will be conducted in the EIS.

**7. Environmental health**

**a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.**

**1) Describe any known or possible contamination at the site from present or past uses.**

Five sites in the Downtown CBD zone have been used for auto-oriented businesses and have underground storage tanks or other sources of hazardous materials contamination. Sites have a status of awaiting clean-up or clean up started.

**Clean-Up Sites in Downtown Study Area**

| SITE NAME | ADDRESS | CONTAMINANTS | SITE STATUS |
|---|---|---|---|
| BG Olson NW LLC | 9152 Gravelly Lake Dr | Petroleum-Diesel | Awaiting Cleanup |
| Ken's Tire Service (UST) | 9601 Gravelly Lake Dr SW | Petroleum-Other | Awaiting Cleanup |
| Chevron USA (UST) | 10202 Gravelly Lake Dr SW | Arsenic, Metals Priority Pollutants, Non-Halogenated Solvents, Petroleum Products-Unspecified, Petroleum-Other, Polycyclic Aromatic Hydrocarbons | Cleanup Started |
| Lakewood Towne Center | Main St & 59th Ave | Halogenated Organics, Petroleum Products-Unspecified | Cleanup Started |

Source: City of Lakewood 2017

**2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.**

See 1) above.

**3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.**

New development of specific parcels will be subject to City zoning for allowable uses and activities, and City codes for handling hazardous materials as well as State and Federal hazardous materials regulations.

**4) Describe special emergency services that might be required.**

Increased intensity of land use in the study area that may occur following adoption of the plan and associated development regulations may increase the overall demand for police and fire services.

**5) Proposed measures to reduce or control environmental health hazards, if any:**

The State Model Toxics Control Act (MTCA) sets standards for cleanup of lower levels of contaminants that are incorporated into new development and redevelopment parcels noted to have contamination potential. The City applies relevant standards regarding hazardous materials handling in the International Fire Code and Zoning Codes.

It is recommended that the Planned Action Ordinance incorporate the following mitigation measure:

- Applicants for development shall conduct a site assessment to determine if contamination is present from past use.

Based on adopted policies and regulations, and the above mitigation measure, impacts to environmental health hazards can be mitigated to a level of insignificance. No further review will be conducted in the EIS.

**b. Noise**

**1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?**

Traffic noise.

**2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.**

Land development that may occur following adoption of the plan and associated development regulations will create short-term noise impacts to land uses in the vicinity.

**3) Proposed measures to reduce or control noise impacts, if any:**

City Municipal Code Chapter 8.36 Noise Control.

**8. Land and shoreline use**

The EIS will compare and evaluate the proposed amount, types, scale, and pattern of uses in comparison with the existing land use pattern and adjacent development. The EIS will also describe the overall aesthetic character of the study area in terms of the quality of the urban environment, the design and character of existing buildings, and building height, bulk, and scale. The EIS evaluation will consider the nature and magnitude of change envisioned by the subarea plan. The visual character analysis will rely primarily on narrative description, photographs of existing conditions, a map identifying areas where height is likely to change in comparison to adopted regulations, and the renderings and materials developed for the subarea plan. The EIS will analyze the consistency of the subarea plan with the Comprehensive Plan and regional plans and indicate the potential for policy amendments.

**a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.**

See 8 above.

**b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of**

**the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?**

See 8 above.

**1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:**

Not applicable.

**c. Describe any structures on the site.**

See 8 above.

**d. Will any structures be demolished? If so, what?**

See 8 above.

**e. What is the current zoning classification of the site?**

See 8 above.

**f. What is the current comprehensive plan designation of the site?**

See 8 above.

**g. If applicable, what is the current shoreline master program designation of the site?**

See 8 above.

**h. Has any part of the site been classified as a critical area by the city or county? If so, specify.**

See 8 above.

**i. Approximately how many people would reside or work in the completed project?**

See 8 above.

**j. Approximately how many people would the completed project displace?**

See 8 above.

**k. Proposed measures to avoid or reduce displacement impacts, if any:**

See 8 above.

**l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:**

See 8 above.

**m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:**

See 8 above.

**9. Housing**

The EIS will describe current demographic conditions based on the CBD assessment. The EIS will compare the alternatives' effects on population, employment, and housing mix and capacity including relationship to growth targets (per Buildable Lands Report update).

**a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.**

See 9 above.

**b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.**

See 9 above.

**c. Proposed measures to reduce or control housing impacts, if any:**

See 9 above.

**10. Aesthetics**

**a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?**

See 8 above.

**b. What views in the immediate vicinity would be altered or obstructed?**

See 8 above.

**c. Proposed measures to reduce or control aesthetic impacts, if any:**

See 8 above.

**11. Light and glare**

**a. What type of light or glare will the proposal produce? What time of day would it mainly occur?**

See 8 above.

**b. Could light or glare from the finished project be a safety hazard or interfere with views?**

See 8 above.

**c. What existing offsite sources of light or glare may affect your proposal?**

See 8 above.

**d. Proposed measures to reduce or control light and glare impacts, if any:**

See 8 above.

**12. Recreation**

**a. What designated and informal recreational opportunities are in the immediate vicinity?**

See 15 below.

**b. Would the proposed project displace any existing recreational uses? If so, describe.**

See 15 below.

**c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:**

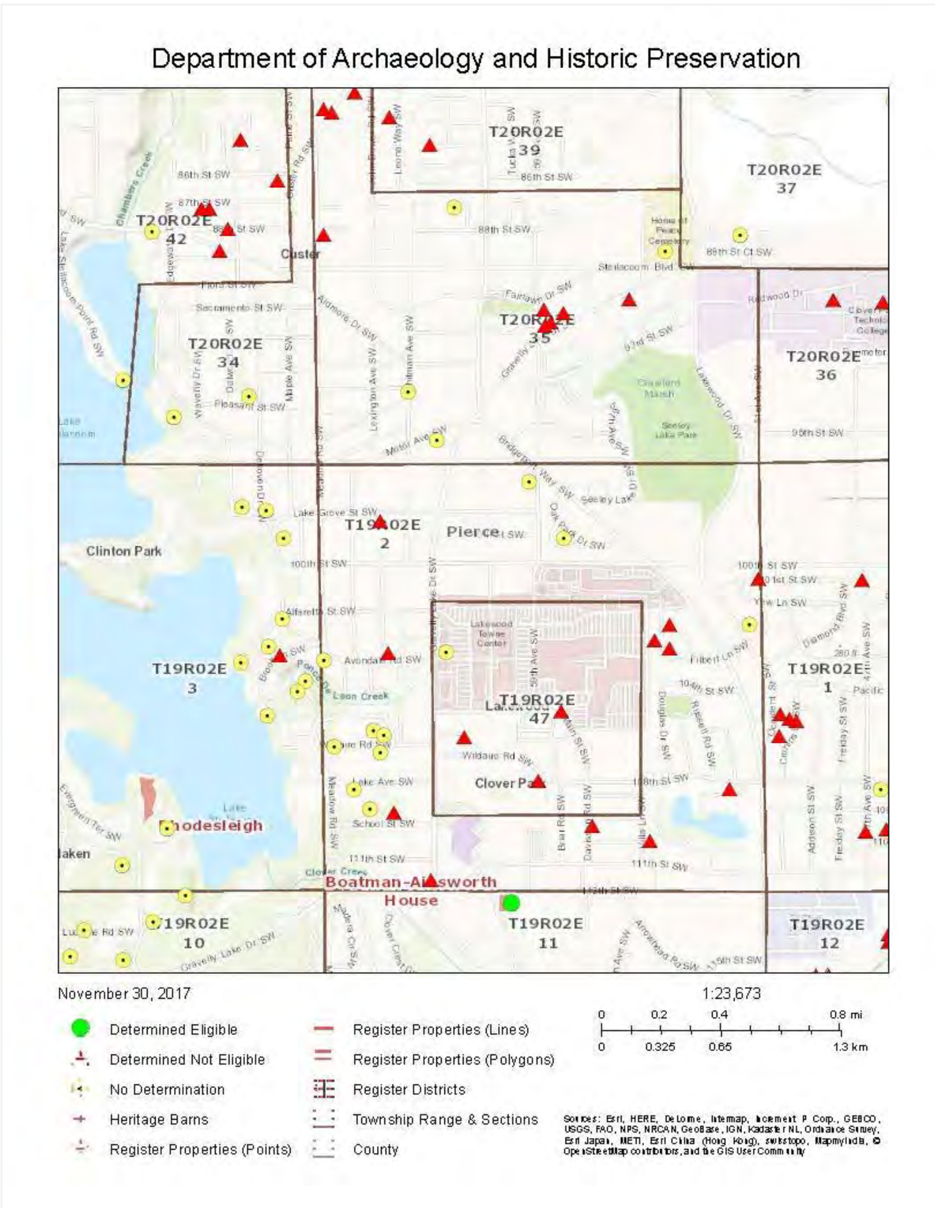
See 15 below.

### 13. Historic and cultural preservation

**a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.**

Some sites have been inventoried in a 1999 inventory prepared for the City. The Washington Department of Archeology and Historic Preservation (DAHP) maintains a database of such studies. Eligibility has not been determined for some structures. For others, they are ineligible. None have been determined eligible in the study area to date. See map below.

**Exhibit 2. Historic Structures Eligibility Federal and State Registers**



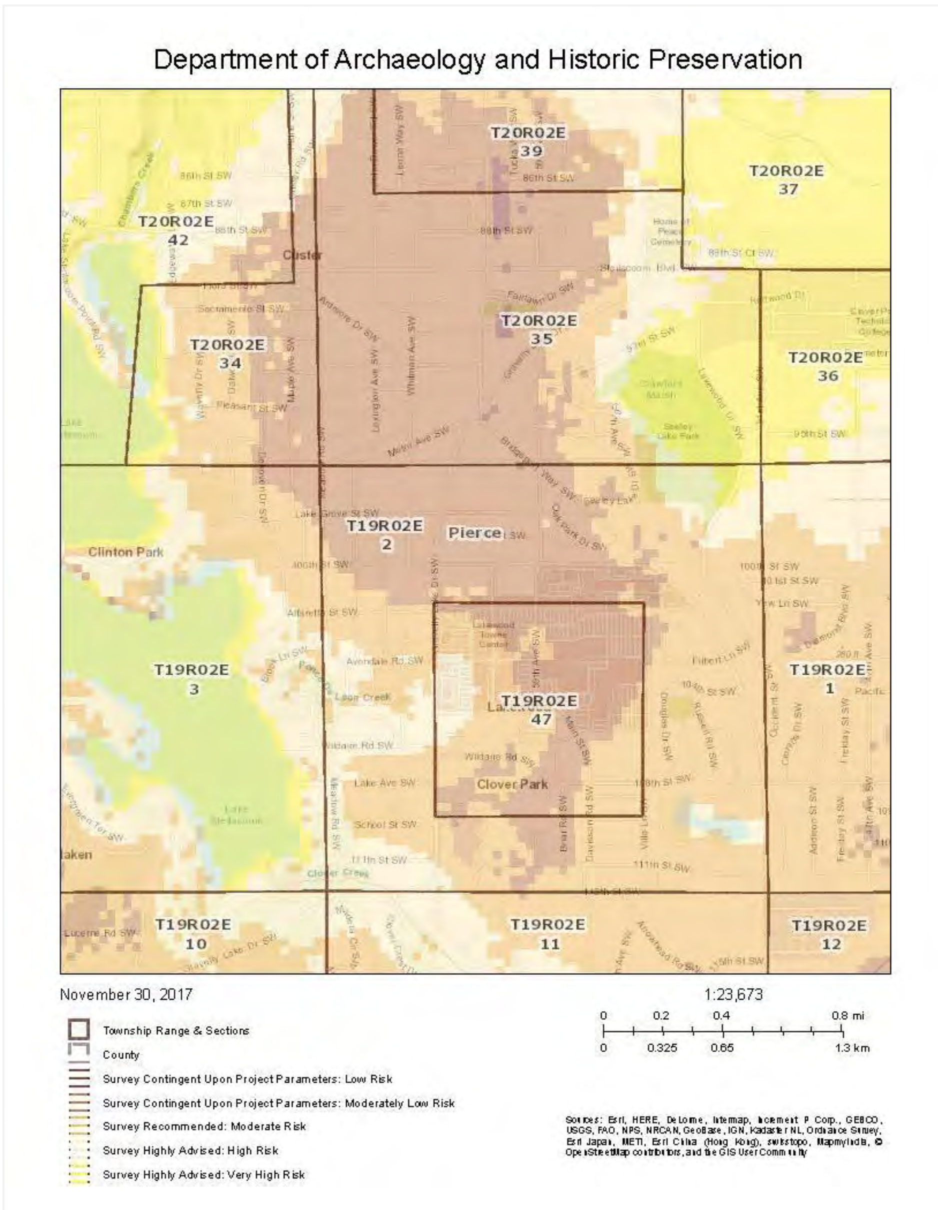

There are structures that are over 45 years old. The Colonial district includes colonial-style commercial buildings. Here in 1937 Norton Clapp built part of the Lakewood Colonial Center, one of the first suburban shopping centers in the country.

The City maintains a designated landmarks list and none are found in the study area.[3]

**b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation. This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.**

See "a" regarding historic use. DAHP has a predictive model of whether there is a low or high risk of finding cultural resources during disturbance of sites. The study area is generally considered to have moderate to low risk. See map below.

**Exhibit 3. Potential for Cultural Resources Discovery**




[3] https://www.cityoflakewood.us/home/community-services/14-community-development/1418-lakewood-history

**c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.**

The City has a 1999 Historic Property Inventory. See: https://www.cityoflakewood.us/community-development/lakewood-history.

**d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.**

Washington State has a number of laws that oversee the protection and proper excavation of archaeological sites (RCW 27.53, WAC 25-48), human remains (RCW 27.44), and historic cemeteries or graves (RCW 68.60). The Governor's Executive Order 05-05 requires state agencies to integrate DAHP, the Governor's Office of Indian Affairs, and concerned tribes into their capital project planning process. This executive order affects any capital construction projects and any land acquisitions for purposes of capital construction not undergoing Section 106 review under the National Historic Preservation Act of 1966.

Under RCW 27.53, DAHP regulates the treatment of archaeological sites on both public and private lands and has the authority to require specific treatment of archaeological resources. All precontact resources or sites are protected, regardless of their significance or eligibility for local, state, or national registers. Historic archaeological resources or sites are protected unless DAHP has made a determination of "not-eligible" for listing on the state and national registers.

The City applies Lakewood Municipal Code Chapter 2.48 Protection and Preservation of Landmarks.

No new impacts of a nature or severity that will not be adequately addressed by applicable regulations and existing mitigating measures are anticipated. No further review will be conducted in the EIS.

**14. Transportation**

The EIS will include conditions for autos/freight, transit, walking, bicycling, parking, and safety. Level of service will be analyzed for the PM peak hour at up to twenty-one (21) study facilities (intersections or segments) to be defined in consultation with City staff. The EIS will quantitatively evaluate a low and high growth alternative for the EIS. A mid-growth alternative will be discussed qualitatively. Travel demand forecasts will be developed using a combination of the City's most recently developed travel demand model and a MainStreet trip generation tool. Quantitative level of service results will be prepared for the 21 study facilities. For all alternatives, walking, bicycling, parking, and safety will be addressed qualitatively. The EIS will suggest potential mitigation measures for any identified transportation impacts.

**a. Identify public streets and highways serving the site or affected geographic area, and describe proposed access to the existing street system. Show on site plans, if any.**

See 14 above.

**b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?**

See 14 above.

**c. How many additional parking spaces would the completed project or nonproject proposal have? How many would the project or proposal eliminate?**

See 14 above.

**d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).**

See 14 above.

**e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.**

See 14 above.

**f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?**

See 14 above.

**g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.**

See 14 above.

**h. Proposed measures to reduce or control transportation impacts, if any:**

See 14 above.

**15. Public services**

The EIS will review existing levels of service, estimated needs and demand for service, and projected levels of service under each alternative for police and fire protection, parks and recreation, schools, water, and wastewater. The EIS will describe available plans and population-based estimates of demand and reflect the Subarea Plan capital facility plan.

**a. Would the project result in an increased need for public services (for example: Fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.**

See 15 above.

**b. Proposed measures to reduce or control direct impacts on public services, if any.**

See 15 above.

**16. Utilities**

**a. Circle utilities currently available at the site: Electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.**

See 15 above.

**b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.**

See 15 above.

## 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:** ______Lisa Grueter, BERK Consulting________________

**Date Submitted** _____December 7, 2017___________________

## D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

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

See Part B.

**Proposed measures to avoid or reduce such increases are:**

See Part B.

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

See Part B.

**Proposed measures to protect or conserve plants, animals, fish, or marine life are:**

See Part B.

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

See Part B.

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

See Part B.

**4. 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, flood plains, or prime farmlands?**

See Part B.

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

See Part B.

**5. 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?**

See Part B.

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

See Part B.

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

See Part B.

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

See Part B.

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

See Part B.

# B. Draft Planned Action Ordinance

APPENDIX B

ORDINANCE NO. ____

AN ORDINANCE of the City Council of the City of Lakewood, Washington, establishing a planned action for Downtown Lakewood pursuant to the State Environmental Policy Act.

WHEREAS, the State Environmental Policy Act (SEPA) and its implementing regulations provide for the integration of environmental review with land use planning and project review through the designation of planned actions by jurisdictions planning under the Growth Management Act (GMA), such as the City of Lakewood ("City"); and

WHEREAS, Section 43.21C.440 of the Revised Code of Washington (RCW), Sections 197-11-164 through 172 of the Washington Administrative Code (WAC) allow for and govern the adoption and application of a planned action designation under SEPA, and Section 14.02.030 of the Lakewood Municipal Code (LMC) adopts Chapter 197-11 WAC by reference as amended; and

WHEREAS, the designation of a planned action expedites the permitting process for projects of which the impacts have been previously addressed in an environmental impact statement (EIS); and

WHEREAS, a subarea of the City commonly referred to as the "Downtown", as depicted on the map attached hereto as Exhibit A and incorporated herein by this reference, has been identified as a planned action area for future redevelopment to a mixed-use center ("Planned Action Area"); and

WHEREAS, the City has developed and adopted a subarea plan complying with the GMA (RCW 36.70A), dated ___________ 2018, to guide the redevelopment of the Planned Action Area ("Downtown Plan"); and

WHEREAS, after extensive public participation and coordination with all affected parties, the City, as lead SEPA agency, issued the Downtown Planned Action Final Environmental Impact Statement ("FEIS") dated ___________ 2018, which identifies the impacts and mitigation measures associated with planned development in the Planned Action Area as identified in the Downtown Plan; the FEIS includes by incorporation the Downtown Planned Action Draft Environmental Impact Statement issued on ___________ 2018 (collectively referred to herein as the "Planned Action EIS"); and

WHEREAS, the City desires to designate a planned action under SEPA for the Downtown ("Planned Action"); and

WHEREAS, adopting a Planned Action for the Downtown with appropriate standards and procedures will help achieve efficient permit processing and promote environmental quality protection; and

WHEREAS, the City has adopted development regulations and ordinances that will help protect the environment and will adopt regulations to guide the allocation, form, and quality of development in the Downtown; and

WHEREAS, the City Council finds that adopting this Ordinance is in the public interest and will advance the public health, safety, and welfare;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF LAKEWOOD, WASHINGTON DO ORDAIN as follows:

**Section I. *Purpose*.** The purpose of this Ordinance is to:

**A.** Combine environmental analysis, land use plans, development regulations, and City codes and ordinances together with the mitigation measures in the Planned Action EIS to mitigate environmental impacts and process Planned Action development applications in the Planned Action Area;

**B.** Designate the Downtown shown in Exhibit A as a Planned Action Area for purposes of environmental review and permitting of designated Planned Action Projects pursuant RCW 43.21C.440;

**C.** Determine that the Planned Action EIS meets the requirements of a planned action EIS pursuant to SEPA;

**D.** Establish criteria and procedures for the designation of certain projects within the Planned Action Area as "Planned Action Projects" consistent with RCW 43.21C.440;

**E.** Provide clear definition as to what constitutes a Planned Action Project within the Planned Action Area, the criteria for Planned Action Project approval, and how development project applications that qualify as Planned Action Projects will be processed by the City;

**F.** Streamline and expedite the land use permit review process by relying on the Planned Action EIS; and

**G.** Apply applicable regulations within the City's development regulations and the mitigation framework contained in this Ordinance for the processing of Planned Action Project applications and to incorporate the applicable mitigation measures into the underlying project permit conditions in order to address the impacts of future development contemplated by this Ordinance.

**Section II. *Findings*.** The City Council finds as follows:

**A.** The Recitals above are adopted herein as Findings of the City Council.

**B.** The City is subject to the requirements of the GMA.

**C.** The City has adopted a Comprehensive Plan complying with the GMA and is amending the Comprehensive Plan to incorporate text and policies specific to the Downtown.

**D.** The City is adopting zoning and development regulations concurrent with the Downtown Plan to implement said Plan, including this Ordinance.

**E.** The Planned Action EIS adequately identifies and addresses the probable significant environmental impacts associated with the type and amount of development planned to occur in the designated Planned Action Area.

**F.** The mitigation measures identified in the Planned Action EIS, attached to this Ordinance as Exhibit B and incorporated herein by reference, together with adopted City development regulations are adequate to mitigate significant adverse impacts from development within the Planned Action Area.

**G.** The Downtown Plan and Planned Action EIS identify the location, type, and amount of development that is contemplated by the Planned Action.

**H.** Future projects that are implemented consistent with the Planned Action will protect the environment, benefit the public, and enhance economic development.

**I.** The City provided several opportunities for meaningful public involvement and review in the Downtown Plan and Planned Action EIS processes, including a community meeting consistent with RCW

43.21C.440; has considered all comments received; and, as appropriate, has modified the proposal or mitigation measures in response to comments.

**J.** Essential public facilities as defined in RCW 36.70A.200 are excluded from the Planned Action as designated herein and are not eligible for review or permitting as Planned Action Projects unless they are accessory to or part of a project that otherwise qualifies as a Planned Action Project.

**K.** The designated Planned Action Area is located entirely within a UGA.

**L.** Implementation of the mitigation measures identified in the Planned Action EIS will provide for adequate public services and facilities to serve the proposed Planned Action Area.

**Section III. *Procedures and Criteria for Evaluating and Determining Planned Action Projects within the Planned Action Area.***

**A. Planned Action Area.** This "Planned Action" designation shall apply to the area shown in Exhibit A of this Ordinance.

**B. Environmental Document.** A Planned Action Project determination for a site-specific project application within the Planned Action Area shall be based on the environmental analysis contained in the Planned Action EIS. The mitigation measures contained in Exhibit B of this Ordinance are based upon the findings of the Planned Action EIS and shall, along with adopted City regulations, provide the framework the City will use to apply appropriate conditions on qualifying Planned Action Projects within the Planned Action Area.

**C. Planned Action Project Designated.** Land uses and activities described in the Planned Action EIS, subject to the thresholds described in Subsection III.D of this Ordinance and the mitigation measures contained in Exhibit B of this Ordinance, are designated "Planned Action Projects" pursuant to RCW 43.21C.440. A development application for a site-specific project located within the Planned Action Area shall be designated a Planned Action Project if it meets the criteria set forth in Subsection III.D of this Ordinance and all other applicable laws, codes, development regulations, and standards of the City, including this Ordinance, are met.

**D. Planned Action Qualifications.** The following thresholds shall be used to determine if a site-specific development proposed within the Planned Action Area was contemplated as a Planned Action Project and has had its environmental impacts evaluated in the Planned Action EIS:

(1) Qualifying Land Uses.

(a) Planned Action Categories: The following general categories/types of land uses are defined in the Downtown Plan and can qualify as Planned Actions:

i. Townhome dwelling units

ii. Multi-family dwelling units

iii. Commercial Office

iv. Services,

v. Medical

vi. Hotel and Lodging

vii. Retail and Eating and Drinking Establishments

viii. Open Space, Parks, Plazas, Trails, Gathering Spaces, Recreation

ix. Cultural Facilities

x. Governmental Facilities

(b) Planned Action Project Land Uses: A primary land use can qualify as a Planned Action Project land use when:

i. it is within the Planned Action Area as shown in Exhibit A of this Ordinance;

ii. it is within one or more of the land use categories described in Subsection III.D(1)(a) above; and

iii. it is listed in development regulations applicable to the zoning classifications applied to properties within the Planned Action Area.

A Planned Action Project may be a single Planned Action land use or a combination of Planned Action land uses together in a mixed-use development. Planned Action land uses may include accessory uses.

(c) Public Services: The following public services, infrastructure, and utilities can also qualify as Planned Actions: onsite roads, utilities, parks, trails, and similar facilities developed consistent with the Planned Action EIS mitigation measures, City and special district design standards, critical area regulations, and the Lakewood Municipal Code.

(2) Development Thresholds:

(a) Land Use: The following thresholds of new land uses are contemplated by the Planned Action:

| FEATURE | ALTERNATIVE 1 | ALTERNATIVE 2 |
|---|---|---|
| Residential Dwellings (units): Net 2018-2035 | 1,579 | 2,257 |
| Commercial Square Feet: Net 2018-2035 | 1.5 million square feet | 2.85 million square feet |
| Jobs: Net 2018-2035 | 4,147 | 7,369 |

(b) Shifting development amounts between land uses in identified in Subsection III.D(2)(a) may be permitted when the total build-out is less than the aggregate amount of development reviewed in the Planned Action EIS; the traffic trips for the preferred alternative are not exceeded; and, the development impacts identified in the Planned Action EIS are mitigated consistent with Exhibit B of this Ordinance.

(c) Further environmental review may be required pursuant to WAC 197-11-172, if any individual Planned Action Project or combination of Planned Action Projects exceeds the development thresholds specified in this Ordinance and/or alter the assumptions and analysis in the Planned Action EIS.

(3) Transportation Thresholds:

(a) Trip Ranges & Thresholds. The number of new PM peak hour trips anticipated in the Planned Action Area and reviewed in the Planned Action EIS for 2035 is as follows:

| | | QUANTITY | | | ITE GROSS PM PEAK HOUR TRIPS | | |
|---|---|---|---|---|---|---|---|
| Land Use | Existing | No Action | Alternative 1 | Alternative 2 | No Action | Alternative 1 | Alternative 2 |
| Total Dwelling Units | | | | | | | |
| Total Commercial Sq. Ft. (ksf) | | | | | | | |
| **Mainstreet Adjustments** | | | | | | | |
| Internal Capture (% / % / %) | | | | | | | |
| **External Trips - All Modes** | | | | | | | |
| External Walk/Bike (% / % / %) | | | | | | | |
| External Transit (% / % / %) | | | | | | | |
| External Vehicle Trips | | | | | | | |
| **Total Reduction Applied to Travel Model** | | | | | | | |

Source: Fehr & Peers, 2018

(b) Concurrency. All Planned Action Projects shall meet the transportation concurrency requirements and the Level of Service (LOS) thresholds established in LMC 18A.50.195.

(c) Traffic Impact Mitigation. Transportation mitigation shall be provided consistent with mitigation measures in Exhibit B, Attachment B-1 of this Ordinance, attached hereto and incorporated by this reference.

(d) The responsible City official shall require documentation by Planned Action Project applicants demonstrating that the total trips identified in Subsection III.D(3)(a) are not exceeded, that the project meets the concurrency and intersection standards of Subsection III.D(3)(b), and that the project has mitigated impacts consistent with Subsection III.D (3)(c).

(e) Discretion.

i. The responsible City official shall have discretion to determine incremental and total trip generation, consistent with the Institute of Traffic Engineers (ITE) Trip Generation Manual (latest edition) or an alternative manual accepted by the City's Public Works Director at his or her sole discretion, for each project permit application proposed under this Planned Action.

ii. The responsible City official shall have discretion to condition Planned Action Project applications to meet the provisions of this Planned Action Ordinance and the Lakewood Municipal Code.

iii. The responsible City official shall have the discretion to adjust the allocation of responsibility for required improvements between individual Planned Action Projects based upon their identified impacts.

(4) Elements of the Environment and Degree of Impacts. A proposed project that would result in a significant change in the type or degree of adverse impacts to any element(s) of the environment analyzed in the Planned Action EIS would not qualify as a Planned Action Project.

(5) Changed Conditions. Should environmental conditions change significantly from those analyzed in the Planned Action EIS, the City's SEPA Responsible Official may determine that the Planned Action Project designation is no longer applicable until supplemental environmental review is conducted.

**E. Planned Action Project Review Criteria.**

(1) The City's SEPA Responsible Official, or authorized representative, may designate as a Planned Action Project, pursuant to RCW 43.21C.440, a project application that meets all of the following conditions:

(a) the project is located within the Planned Action Area identified in Exhibit A of this Ordinance;

(b) the proposed uses and activities are consistent with those described in the Planned Action EIS and Subsection III.D of this Ordinance;

(c) the project is within the Planned Action thresholds and other criteria of Subsection III.D of this Ordinance;

(d) the project is consistent with the Lakewood Comprehensive Plan including the policies of the Downtown Plan incorporated into the Comprehensive Plan and the regulations of the Downtown Plan integrated into the Lakewood Municipal Code;

(e) the project's significant adverse environmental impacts have been identified in the Planned Action EIS;

(f) the project's significant impacts have been mitigated by application of the measures identified in Exhibit B of this Ordinance and other applicable City regulations, together with any conditions, modifications, variances, or special permits that may be required;

(g) the project complies with all applicable local, state and/or federal laws and regulations and the SEPA Responsible Official determines that these constitute adequate mitigation; and

(h) the project is not an essential public facility as defined by RCW 36.70A.200, unless the essential public facility is accessory to or part of a development that is designated as a Planned Action Project under this Ordinance.

(2) The City shall base its decision to qualify a project as a Planned Action Project on review of the SEPA Checklist form in WAC 197-11 and review of the Planned Action Project submittal and supporting documentation, provided on City required forms.

**F. Effect of Planned Action Designation.**

(1) Designation as a Planned Action Project by the City's SEPA Responsible Official means that a qualifying project application has been reviewed in accordance with this Ordinance and found to be consistent with the development parameters and thresholds established herein and with the environmental analysis contained in the Planned Action EIS.

(2) Upon determination by the City's SEPA Responsible Official that the project application meets the criteria of Subsection III.D and qualifies as a Planned Action Project, the project shall not require a SEPA threshold determination, preparation of an EIS, or be subject to further review pursuant to SEPA. Planned Action Projects will still be subject to all other applicable City, state, and federal regulatory requirements. The Planned Action Project designation shall not excuse a project from meeting the City's code and ordinance requirements apart from the SEPA process.

**G. Planned Action Project Permit Process.** Applications submitted for qualification as a Planned Action Project shall be reviewed pursuant to the following process:

(1) Development applications shall meet all applicable requirements of the Lakewood Municipal Code

and this Ordinance in place at the time of the Planned Action Project application. Planned Action Projects shall not vest to regulations required to protect public health and safety.

(2) Applications for Planned Action Projects shall:

(a) be made on forms provided by the City;

(b) include the SEPA checklist in WAC 197-11;

(c) meet all applicable requirements of the Lakewood Municipal Code and this Ordinance.

(3) The City's SEPA Responsible Official shall determine whether the application is complete and shall review the application to determine if it is consistent with and meets all of the criteria for qualification as a Planned Action Project as set forth in this Ordinance.

(4) (a) If the City's SEPA Responsible Official determines that a proposed project qualifies as a Planned Action Project, he/she shall issue a "Determination of Consistency" and shall mail or otherwise verifiably deliver said Determination to the applicant; the owner of the property as listed on the application; and federally recognized tribal governments and agencies with jurisdiction over the Planned Action Project, pursuant to Chapter 1, Laws of 2012 (Engrossed Substitute Senate Bill (ESSB) 6406).

(b) Upon issuance of the Determination of Consistency, the review of the underlying project permit(s) shall proceed in accordance with the applicable permit review procedures specified in Chapter 18A.02 LMC, except that no SEPA threshold determination, EIS, or additional SEPA review shall be required.

(c) The Determination of Consistency shall remain valid and in effect as long as the underlying project application approval is also in effect.

(d) Public notice and review for qualified Planned Action Projects shall be tied to the underlying project permit(s). If notice is otherwise required for the underlying permit(s), the notice shall state that the project qualifies as a Planned Action Project. If notice is not otherwise required for the underlying project permit(s), no special notice is required by this Ordinance.

(5) (a) If the City's SEPA Responsible Official determines that a proposed project does not qualify as a Planned Action Project, he/she shall issue a "Determination of Inconsistency" and shall mail or otherwise verifiably deliver said Determination to the applicant; the owner of the property as listed on the application; and federally recognized tribal governments and agencies with jurisdiction over the Planned Action Project, pursuant to Chapter 1, Laws of 2012 (Engrossed Substitute Senate Bill (ESSB) 6406).

(b) The Determination of Inconsistency shall describe the elements of the Planned Action Project application that result in failure to qualify as a Planned Action Project.

(c) Upon issuance of the Determination of Inconsistency, the City's SEPA Responsible Official shall prescribe a SEPA review procedure for the non-qualifying project that is consistent with the City's SEPA regulations and the requirements of state law.

(d) A project that fails to qualify as a Planned Action Project may incorporate or otherwise use relevant elements of the Planned Action EIS, as well as other relevant SEPA documents, to meet the non-qualifying project's SEPA requirements. The City's SEPA Responsible Official may limit the scope of SEPA review for the non-qualifying project to those issues and environmental impacts not previously addressed in the Planned Action EIS.

(6) To provide additional certainty about applicable requirements, the City or applicant may request consideration and execution of a development agreement for a Planned Action Project, consistent with RCW 36.70B.170 et seq.

(7) A Determination of Consistency or Inconsistency is a Process I land use decision and may be appealed pursuant to the procedures established in Chapter 18A.02 LMC. An appeal of a Determination of Consistency shall be consolidation with any pre-decision or appeal hearing on the underlying project application.

**Section IV. *Monitoring and Review*.**

**A.** The City should monitor the progress of development in the designated Planned Action area as deemed appropriate to ensure that it is consistent with the assumptions of this Ordinance and the Planned Action EIS regarding the type and amount of development and associated impacts and with the mitigation measures and improvements planned for the Planned Action Area.

**B.** This Planned Action Ordinance shall be reviewed by the SEPA Responsible Official no later than five (5) years from its effective date in conjunction with the City's regular Comprehensive Plan review cycle, as applicable. The timing of subsequent reviews after the first review shall be determined with the completion of the first review. The review shall determine the continuing relevance of the Planned Action assumptions and findings with respect to environmental conditions in the Planned Action Area, the impacts of development, and required mitigation measures (Exhibit B) and Public Agency Actions and Commitments (Exhibit C). Based upon this review, the City may propose amendments to this Ordinance or may supplement or revise the Planned Action EIS.

**Section V. *Conflict*.** In the event of a conflict between this Ordinance or any mitigation measures imposed thereto, and any ordinance or regulation of the City, the provisions of this Ordinance shall control.

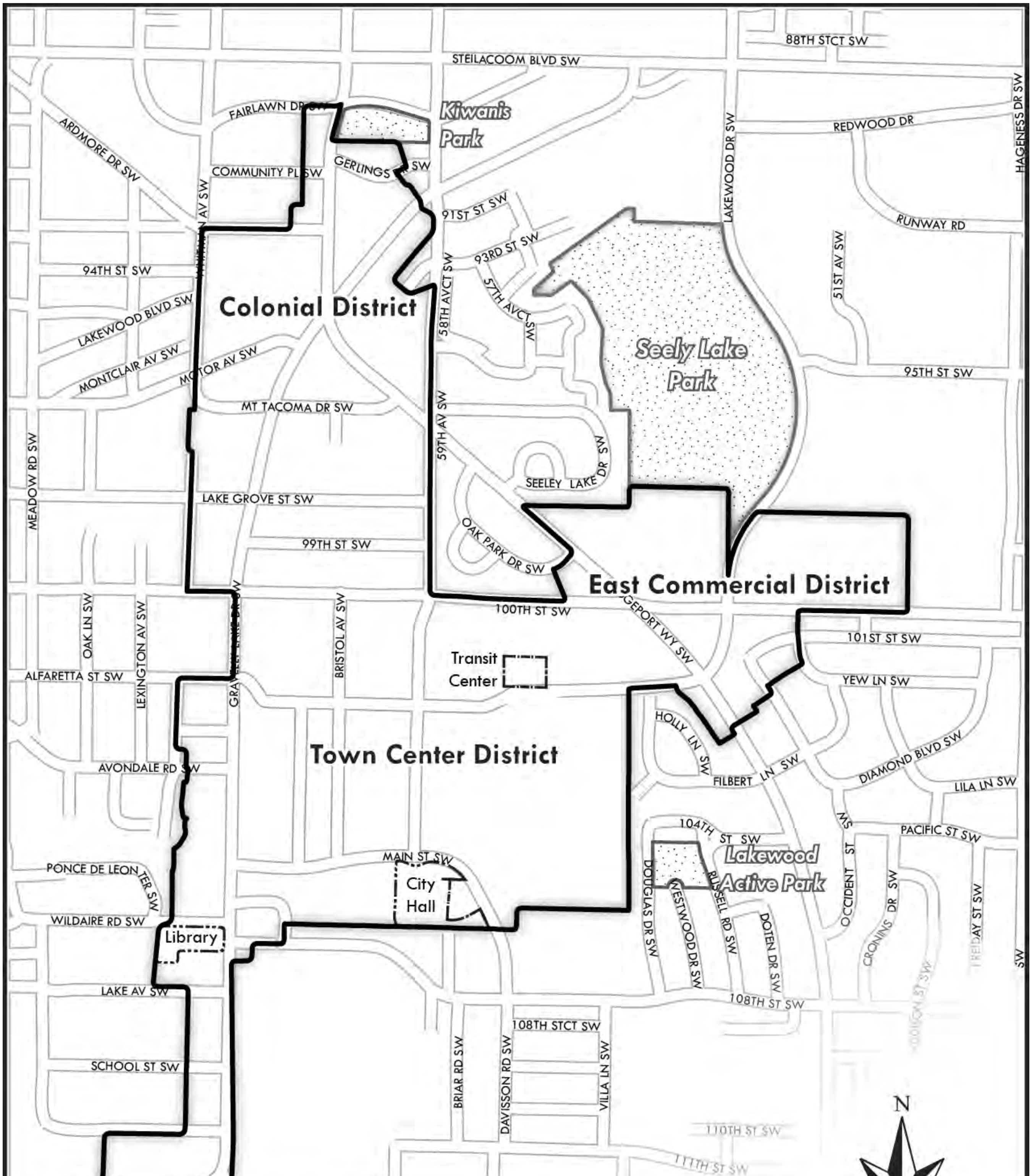
**Section VI. *Severability*.** If any one or more sections, subsections, or sentences of this Ordinance are held to be unconstitutional or invalid such decision shall not affect the validity of the remaining portions of this Ordinance and the same shall remain in full force and effect.

**Section VII. *Effective Date*.** This Ordinance shall take effect and be in force ten (10) days after publication as provided by law.

ADOPTED by the City Council this ____ day of _________________, 2018. CITY OF LAKEWOOD.

| | |
|---|---|
| | ______________________________<br>Don Anderson, Mayor |
| Attest:<br><br>______________________________<br>Alice M. Bush, MMC, City Clerk | |
| | |
| Approved as to Form:<br><br>______________________________<br>Heidi A. Wachter City Attorney | |

**Exhibit A. Planned Action Area**



# EXHIBIT B. MITIGATION DOCUMENT

## Section B-1. Mitigation Required for Development Applications

See Chapter 1 and 3 of the Planned Action EIS for potential mitigation measures.

Example:

- With major redevelopment that would propose activities that could involve groundwater discharge or potential changes to groundwater flow (such as underground structures), the City could require site specific evaluation of groundwater protection. The susceptibility and vulnerability of the critical aquifer recharge area should be evaluated by a licensed hydrogeologist. All stormwater should be treated appropriately to avoid any potential groundwater contamination. Stormwater improvements should be designed to improve aquifer recharge.

## Section B-2. Advisory Notes to Applicants: Applicable Regulations and Commitments

See Chapter 1 and 3 of the Planned Action EIS for Regulations and Commitments.

Example:

- City of Lakewood Critical Area Regulations includes protection of:
    - Aquifer recharge areas;
    - Fish and wildlife habitat areas (including streams) and their buffers;
    - Flood hazard areas;
    - Wetlands and their buffers;

# EXHIBIT C. PUBLIC AGENCY ACTIONS AND COMMITMENTS

See Chapter 1 and 3 of the Planned Action EIS and Downtown Plan.

Example:

The City works with the Economic Development Board for Tacoma-Pierce County on business retention, expansion, and recruitment activities, as well as the Lakewood Chamber of Commerce. If small business relocation assistance is needed, the City could work with these agencies or others to develop strategies and solutions.

# EXHIBIT D. TRANSPORTATION COST ESTIMATES

To be developed with Preferred Alternative.

# C. Transportation System Description

# Appendix C

This appendix describes the corridors studied in the EIS.

## *North-South Corridors*

The following corridors run north-south in the Study Area and have been listed from the west side to the east side of the Study Area. Roadways in Lakewood do not follow a regular grid, so some of these streets are curvilinear.

**Gravelly Lake Drive SW** is a principal arterial southwest of Bridgeport Way SW and a minor arterial northeast of Bridgeport Way SW. It is a two-way street with two northbound travel lanes, two southbound travel lanes, and a center turn lane. However, there is no center turn lane north of Bridgeport Way SW. Signalized intersections include Bridgeport Way SW, Mt Tacoma Drive SW, 100th Street SW, Alfaretta Street SW/Lakewood Towne Center Boulevard SW, Main Street SW, Wildaire Road SW, School Street SW, and 112th Street SW. Local street intersections are side-street stop controlled.

Northeast of Bridgeport Way SW, the land use is predominantly residential. Southwest of Bridgeport Way SW, the land use is predominantly commercial and institutional. Lakewood Towne Center is located on the east side of Gravelly Lake Drive SW between 100th Street SW and Main Street SW. There are two schools located along the roadway, with Park Lodge Elementary School just northwest of the Towne Center and Clover Park High School to the southeast, both just outside of the study area.

**Bridgeport Way SW** is a principal arterial. It is a two-way street with two northbound travel lanes, two southbound travel lanes, and a center turn lane. Signalized intersections in the study area include 93rd Street SW, Gravelly Lake Drive SW, MT Tacoma Drive SW, 59th Avenue SW, 100th Street SW, and Lakewood Towne Center Boulevard SW. Local street intersections are side-street stop controlled.

This corridor is lined with a mixture of retail, restaurants, offices, medical facilities, and both single family and multi-family residences.

**59th Avenue SW** is a collector street. It is a two-way street with one northbound travel lane, one southbound travel lane, and a center turn lane. Signalized intersections include Bridgeport Way SW and 100th Street SW. Local street intersections are side-street stop controlled.

North of 100th Street SW, the land use is a mixture of residential, restaurants, retail, offices, and medical facilities, with the residences on the east side of 59th Avenue SW. South of 100th Street SW, 59th Avenue SW bisects the Towne Center and is exclusively lined with retail, restaurants, and parking.

**Lakewood Drive SW** is a principal arterial. It is a two-way street with two northbound travel lanes, two southbound travel lanes, and a center turn lane. Signalized intersections in the study area include 100th Street SW and Bridgeport Way SW. Local street intersections are side-street stop controlled.

A majority of one side of the roadway borders Seeley Lake Park while the other side runs along a mix of institutional, commercial, and industrial facilities. Harrison Preparatory School is located at the north end.

## *East-West Corridors*

The following corridors run east-west in the Study Area and are listed from the north side to south side of the Study Area. Roadways in Lakewood do not follow a regular grid, so some of these streets are curvilinear.

**93rd Street SW** is a minor arterial that runs between the signalized intersections at Whitman Avenue SW and Bridgeport Way SW. There is one eastbound lane, one westbound lane, and one center turn lane. The north side of the roadway is residential while the south side is retail and office.

**Mt Tacoma Drive SW** is a minor arterial that runs from the signalized intersection at Motor Avenue SW to Bridgeport Way SW. There is another signalized intersection at Gravelly Lake Drive SW. The roadway consists of one eastbound lane, one westbound lane, and a center turn lane. Retail and offices, the Lakewood Historical Society being an example, can be found on each side of the road.

**100th Street SW** is a minor arterial. It is a two-way street with two eastbound travel lanes, two westbound travel lanes. A center turn lane or left turn lane is present except at Bristol Avenue SW. West of Gravelly Lake Drive SW, the roadway becomes one eastbound lane and one westbound lane with an eastbound left turn lane included at the intersection of Gravelly Lake Drive SW. Signalized intersections in the study area include Gravelly Lake Drive SW, 59th Avenue SW, Bridgeport Way SW, and Lakewood Drive SW. Local street intersections are side-street stop controlled.

Both sides of the roadway run along a mix of commercial and residential land usage. West of Bridgeport Way SW, the north side of 100 Street SW is primarily residential, retail, offices, medical, and restaurants. The south side is a mix of various retail. East of Bridgeport Way SW, the north side of 100 Street SW is solely retail while the south is primarily residential.

**Main Street SW** is a minor arterial. It is a two-way streets with one eastbound travel lanes, one westbound travel lanes, and a center turn lane. Signalized intersections in the study area include Gravelly Lake Drive SW and 108th Street SW. Local street intersections are side-street stop controlled and one roundabout exists in the study area.

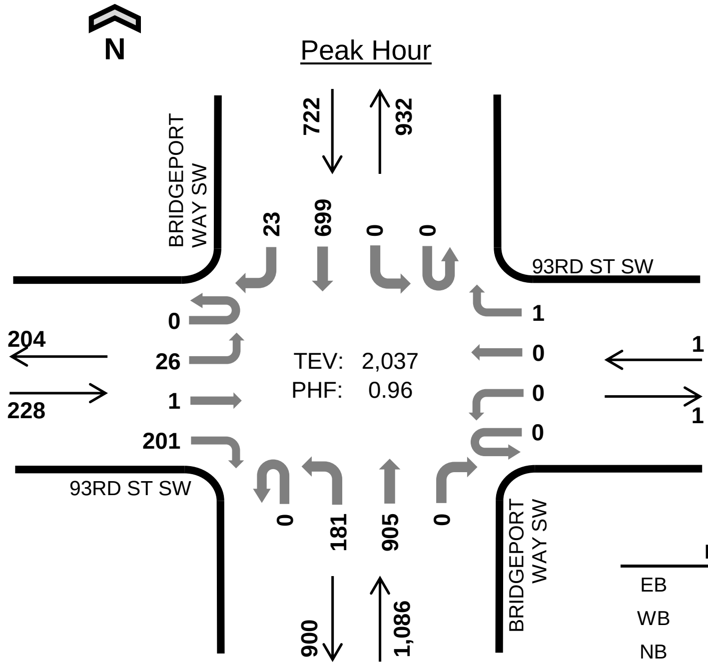
The roadway runs through a retail hub. Correspondingly, land use is primarily commercial although there are some residential lots near 108th Street SW. The Lakewood Towne Center can be accessed through this corridor.

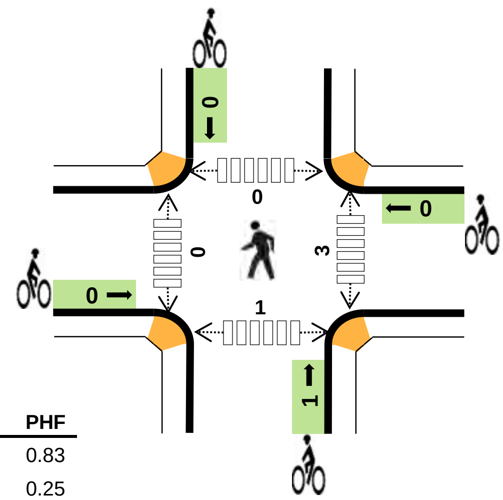
**Gravelly Lake Drive SW** is a principal arterial. It is a two-way street with two eastbound travel lanes, two westbound travel lanes, and a center turn lane. Within the study area, the majority of this corridor runs north-south. However, the portion located within the southwest section runs east-west. Within this stretch, there was one signalized intersection at Nyanza Road SW. Immediate usage adjacent to the roadway is commercial but transitions to residential quickly. Local street intersections are side-street stop controlled.

# BRIDGEPORT WAY SW
# 93RD ST SW

Date: Tue, Nov 14, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM

Peak Hour




| | HV %: | PHF |
|---|---|---|
| EB | 1.3% | 0.83 |
| WB | 0.0% | 0.25 |
| NB | 0.7% | 0.93 |
| SB | 1.7% | 0.96 |
| TOTAL | 1.1% | 0.96 |

## Two-Hour Count Summaries

| Interval Start | 93RD ST SW | | | | 93RD ST SW | | | | BRIDGEPORT WAY SW | | | | BRIDGEPORT WAY SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 5 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 56 | 202 | 0 | 0 | 1 | 157 | 3 | 474 | 0 |
| 4:15 PM | 0 | 4 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 45 | 243 | 0 | 0 | 0 | 163 | 5 | 510 | 0 |
| 4:30 PM | 0 | 8 | 1 | 39 | 0 | 0 | 0 | 0 | 0 | 57 | 205 | 0 | 0 | 0 | 161 | 2 | 473 | 0 |
| **4:45 PM** | **0** | **7** | **1** | **40** | **0** | **0** | **0** | **0** | **0** | **43** | **229** | **0** | **0** | **0** | **171** | **7** | **498** | 1,955 |
| **5:00 PM** | **0** | **4** | **0** | **44** | **0** | **0** | **0** | **1** | **0** | **52** | **239** | **0** | **0** | **0** | **186** | **3** | **529** | 2,010 |
| **5:15 PM** | **0** | **7** | **0** | **56** | **0** | **0** | **0** | **0** | **0** | **46** | **229** | **0** | **0** | **0** | **177** | **6** | **521** | 2,021 |
| **5:30 PM** | **0** | **8** | **0** | **61** | **0** | **0** | **0** | **0** | **0** | **40** | **208** | **0** | **0** | **0** | **165** | **7** | **489** | **2,037** |
| 5:45 PM | 0 | 7 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 51 | 194 | 0 | 0 | 0 | 163 | 0 | 453 | 1,992 |
| Count Total | 0 | 50 | 2 | 378 | 0 | 0 | 0 | 1 | 0 | 390 | 1,749 | 0 | 0 | 1 | 1,343 | 33 | 3,947 | 0 |
| **Peak Hour** | **0** | **26** | **1** | **201** | **0** | **0** | **0** | **1** | **0** | **181** | **905** | **0** | **0** | **0** | **699** | **23** | **2,037** | **0** |

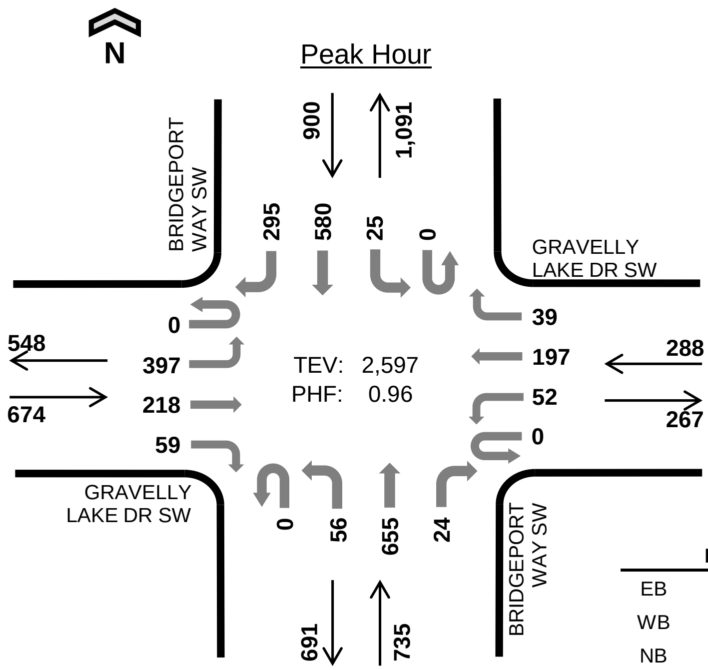
*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

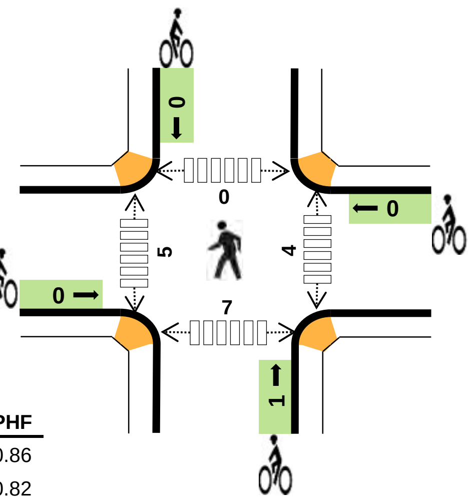
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 0 | 0 | 3 | 3 | *6* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 4:15 PM | 1 | 0 | 5 | 2 | *8* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 4:30 PM | 1 | 0 | 3 | 2 | *6* | 0 | 0 | 0 | 0 | *0* | 1 | 2 | 0 | 0 | *3* |
| **4:45 PM** | **1** | **0** | **4** | **5** | ***10*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **0** | **0** | **1** | *3* |
| **5:00 PM** | **1** | **0** | **0** | **3** | ***4*** | **0** | **0** | **1** | **0** | ***1*** | **1** | **0** | **0** | **0** | *1* |
| **5:15 PM** | **0** | **0** | **3** | **2** | ***5*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | *0* |
| **5:30 PM** | **1** | **0** | **1** | **2** | ***4*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** |
| 5:45 PM | 1 | 0 | 4 | 3 | *8* | 0 | 0 | 0 | 0 | *0* | 0 | 3 | 0 | 0 | *3* |
| Count Total | 6 | 0 | 23 | 22 | *51* | 0 | 0 | 1 | 0 | *1* | 4 | 5 | 0 | 1 | *10* |
| **Peak Hour** | **3** | **0** | **8** | **12** | ***23*** | **0** | **0** | **1** | **0** | ***1*** | **3** | **0** | **0** | **1** | ***4*** |

**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# BRIDGEPORT WAY SW
# GRAVELLY LAKE DR SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:45 PM to 5:45 PM




| | HV % | PHF |
|---|---|---|
| EB | 0.7% | 0.86 |
| WB | 1.0% | 0.82 |
| NB | 0.3% | 0.91 |
| SB | 1.7% | 0.99 |
| TOTAL | 1.0% | 0.96 |

## Two-Hour Count Summaries

| Interval Start | GRAVELLY LAKE DR SW Eastbound | | | | GRAVELLY LAKE DR SW Westbound | | | | BRIDGEPORT WAY SW Northbound | | | | BRIDGEPORT WAY SW Southbound | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 85 | 63 | 19 | 0 | 10 | 55 | 8 | 0 | 17 | 159 | 8 | 0 | 2 | 147 | 51 | 624 | 0 |
| 4:15 PM | 0 | 107 | 48 | 13 | 0 | 6 | 51 | 7 | 0 | 10 | 175 | 11 | 0 | 9 | 136 | 78 | 651 | 0 |
| 4:30 PM | 0 | 93 | 56 | 20 | 0 | 16 | 44 | 6 | 0 | 14 | 148 | 6 | 0 | 6 | 117 | 80 | 606 | 0 |
| **4:45 PM** | **0** | **87** | **54** | **14** | **0** | **11** | **51** | **8** | **0** | **11** | **185** | **6** | **0** | **6** | **153** | **69** | **655** | 2,536 |
| **5:00 PM** | **0** | **120** | **61** | **15** | **0** | **15** | **43** | **12** | **0** | **21** | **160** | **8** | **0** | **7** | **127** | **89** | **678** | 2,590 |
| **5:15 PM** | **0** | **97** | **44** | **16** | **0** | **11** | **68** | **9** | **0** | **12** | **155** | **3** | **0** | **8** | **141** | **73** | **637** | 2,576 |
| **5:30 PM** | **0** | **93** | **59** | **14** | **0** | **15** | **35** | **10** | **0** | **12** | **155** | **7** | **0** | **4** | **159** | **64** | **627** | **2,597** |
| 5:45 PM | 0 | 90 | 42 | 12 | 0 | 10 | 55 | 12 | 0 | 10 | 145 | 10 | 0 | 6 | 129 | 69 | 590 | 2,532 |
| Count Total | 0 | 772 | 427 | 123 | 0 | 94 | 402 | 72 | 0 | 107 | 1,282 | 59 | 0 | 48 | 1,109 | 573 | 5,068 | 0 |
| **Peak Hour** | **0** | **397** | **218** | **59** | **0** | **52** | **197** | **39** | **0** | **56** | **655** | **24** | **0** | **25** | **580** | **295** | **2,597** | **0** |

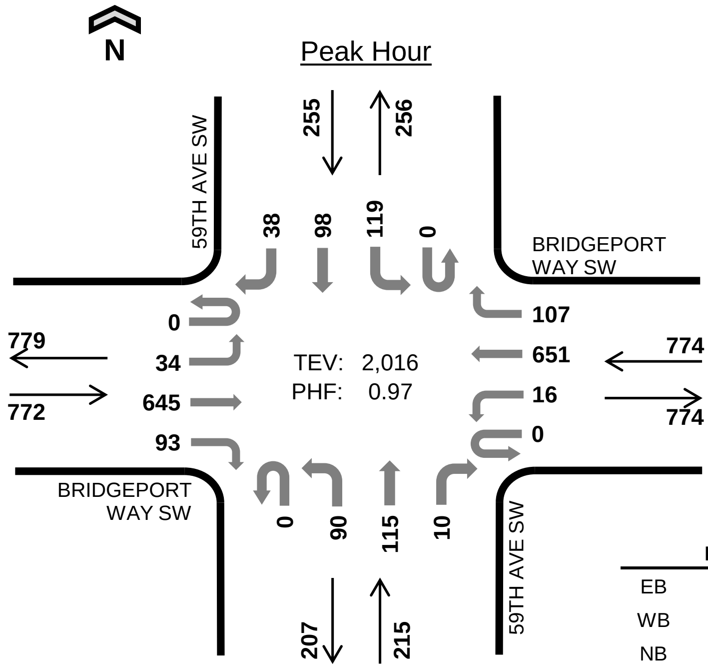
*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

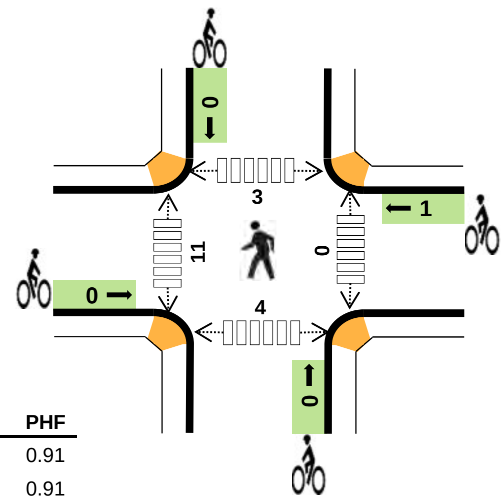
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 2 | 0 | 1 | 3 | *6* | 0 | 0 | 0 | 0 | *0* | 1 | 0 | 0 | 1 | *2* |
| 4:15 PM | 1 | 1 | 6 | 3 | *11* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 1 | *1* |
| 4:30 PM | 1 | 2 | 1 | 3 | *7* | 0 | 0 | 0 | 0 | *0* | 1 | 1 | 0 | 2 | *4* |
| **4:45 PM** | **3** | **2** | **1** | **6** | ***12*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **0** | **1** | *2* |
| **5:00 PM** | **0** | **0** | **0** | **5** | ***5*** | **0** | **0** | **1** | **0** | ***1*** | **0** | **4** | **0** | **4** | *8* |
| **5:15 PM** | **1** | **1** | **1** | **2** | ***5*** | **0** | **0** | **0** | **0** | ***0*** | **3** | **1** | **0** | **2** | *6* |
| **5:30 PM** | **1** | **0** | **0** | **2** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** |
| 5:45 PM | 2 | 1 | 3 | 3 | *9* | 0 | 0 | 0 | 0 | *0* | 1 | 0 | 0 | 0 | *1* |
| Count Total | 11 | 7 | 13 | 27 | *58* | 0 | 0 | 1 | 0 | *1* | 7 | 6 | 0 | 11 | *24* |
| **Peak Hour** | **5** | **3** | **2** | **15** | ***25*** | **0** | **0** | **1** | **0** | ***1*** | **4** | **5** | **0** | **7** | ***16*** |


**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# 59TH AVE SW
# BRIDGEPORT WAY SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:45 PM to 5:45 PM




| | HV %: | PHF |
|---|---|---|
| EB | 0.9% | 0.91 |
| WB | 0.6% | 0.91 |
| NB | 1.4% | 0.83 |
| SB | 1.2% | 0.68 |
| TOTAL | 0.9% | 0.97 |

## Two-Hour Count Summaries

| Interval Start | BRIDGEPORT WAY SW Eastbound UT | LT | TH | RT | BRIDGEPORT WAY SW Westbound UT | LT | TH | RT | 59TH AVE SW Northbound UT | LT | TH | RT | 59TH AVE SW Southbound UT | LT | TH | RT | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4:00 PM | 0 | 16 | 160 | 21 | 0 | 6 | 177 | 20 | 0 | 31 | 23 | 11 | 0 | 31 | 26 | 11 | 533 | 0 |
| 4:15 PM | 0 | 6 | 153 | 15 | 0 | 10 | 170 | 20 | 0 | 25 | 30 | 4 | 0 | 16 | 23 | 11 | 483 | 0 |
| 4:30 PM | 0 | 7 | 154 | 16 | 0 | 6 | 172 | 25 | 0 | 25 | 23 | 2 | 0 | 21 | 25 | 7 | 483 | 0 |
| **4:45 PM** | **0** | **10** | **152** | **25** | **0** | **6** | **178** | **28** | **0** | **20** | **31** | **1** | **0** | **23** | **22** | **13** | **509** | 2,008 |
| **5:00 PM** | **0** | **7** | **156** | **18** | **0** | **5** | **158** | **28** | **0** | **27** | **25** | **4** | **0** | **51** | **30** | **13** | **522** | 1,997 |
| **5:15 PM** | **0** | **10** | **157** | **24** | **0** | **2** | **152** | **22** | **0** | **23** | **39** | **3** | **0** | **26** | **25** | **6** | **489** | 2,003 |
| **5:30 PM** | **0** | **7** | **180** | **26** | **0** | **3** | **163** | **29** | **0** | **20** | **20** | **2** | **0** | **19** | **21** | **6** | **496** | **2,016** |
| 5:45 PM | 0 | 5 | 134 | 15 | 0 | 4 | 156 | 25 | 0 | 10 | 24 | 4 | 0 | 17 | 16 | 5 | 415 | 1,922 |
| Count Total | 0 | 68 | 1,246 | 160 | 0 | 42 | 1,326 | 197 | 0 | 181 | 215 | 31 | 0 | 204 | 188 | 72 | 3,930 | 0 |
| **Peak Hour** | **0** | **34** | **645** | **93** | **0** | **16** | **651** | **107** | **0** | **90** | **115** | **10** | **0** | **119** | **98** | **38** | **2,016** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

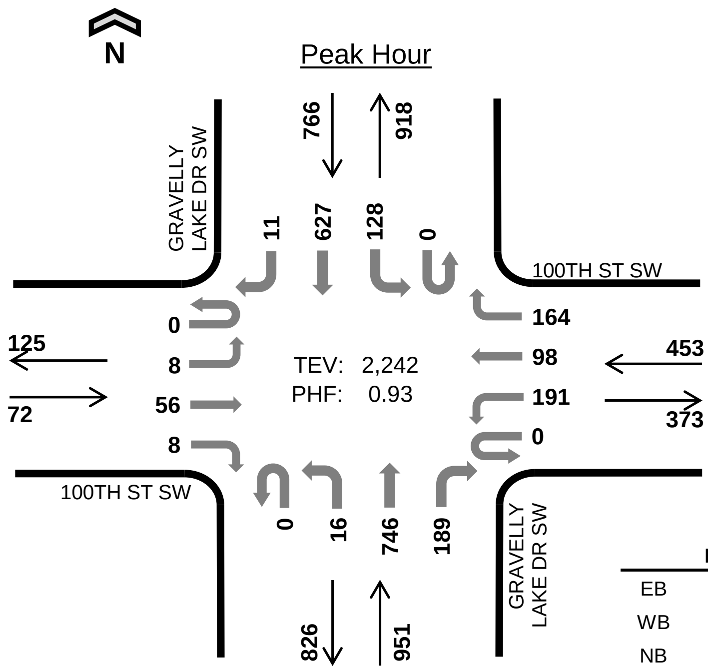
| Interval Start | Heavy Vehicle Totals EB | WB | NB | SB | Total | Bicycles EB | WB | NB | SB | Total | Pedestrians (Crossing Leg) East | West | North | South | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4:00 PM | 2 | 3 | 0 | 2 | *7* | 0 | 0 | 0 | 0 | *0* | 0 | 7 | 4 | 0 | *11* |
| 4:15 PM | 4 | 4 | 2 | 0 | *10* | 1 | 0 | 0 | 0 | *1* | 0 | 1 | 2 | 0 | *3* |
| 4:30 PM | 4 | 1 | 1 | 2 | *8* | 0 | 0 | 0 | 0 | *0* | 0 | 7 | 4 | 0 | *11* |
| **4:45 PM** | **4** | **3** | **2** | **0** | ***9*** | **0** | **1** | **0** | **0** | ***1*** | **0** | **2** | **0** | **0** | *2* |
| **5:00 PM** | **0** | **1** | **0** | **2** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **5** | **2** | **0** | *7* |
| **5:15 PM** | **2** | **1** | **1** | **0** | ***4*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **2** | **1** | **0** | *3* |
| **5:30 PM** | **1** | **0** | **0** | **1** | ***2*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **2** | **0** | **4** | ***6*** |
| 5:45 PM | 3 | 4 | 1 | 0 | *8* | 0 | 0 | 0 | 0 | *0* | 0 | 2 | 2 | 0 | *4* |
| Count Total | 20 | 17 | 7 | 7 | *51* | 1 | 1 | 0 | 0 | *2* | 0 | 28 | 15 | 4 | *47* |
| **Peak Hour** | **7** | **5** | **3** | **3** | ***18*** | **0** | **1** | **0** | **0** | ***1*** | **0** | **11** | **3** | **4** | ***18*** |

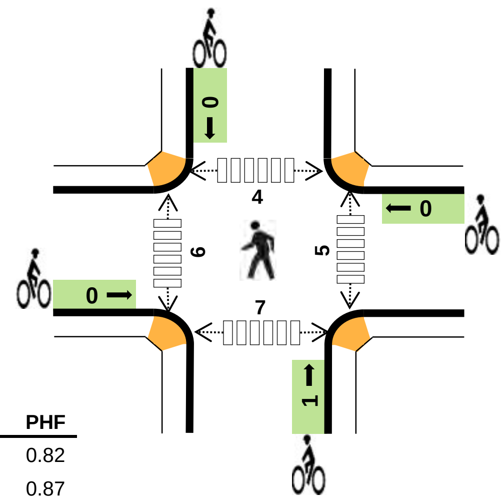


**Mark Skaggs:** (425) 250-0777
mark.skaggs@idaxdata.com

# GRAVELLY LAKE DR SW
# 100TH ST SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:30 PM to 5:30 PM




| | HV %: | PHF |
|---|---|---|
| EB | 5.6% | 0.82 |
| WB | 1.8% | 0.87 |
| NB | 0.6% | 0.95 |
| SB | 0.7% | 0.94 |
| TOTAL | 1.0% | 0.93 |

## Two-Hour Count Summaries

| Interval Start | 100TH ST SW Eastbound | | | | 100TH ST SW Westbound | | | | GRAVELLY LAKE DR SW Northbound | | | | GRAVELLY LAKE DR SW Southbound | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 5 | 10 | 5 | 0 | 39 | 25 | 40 | 0 | 2 | 165 | 43 | 0 | 35 | 120 | 3 | 492 | 0 |
| 4:15 PM | 0 | 3 | 15 | 2 | 0 | 37 | 21 | 43 | 0 | 6 | 172 | 49 | 0 | 40 | 134 | 5 | 527 | 0 |
| **4:30 PM** | **0** | **3** | **12** | **1** | **0** | **45** | **24** | **43** | **0** | **5** | **158** | **53** | **0** | **28** | **166** | **3** | **541** | 0 |
| **4:45 PM** | **0** | **1** | **18** | **3** | **0** | **44** | **25** | **45** | **0** | **4** | **195** | **49** | **0** | **26** | **148** | **1** | **559** | 2,119 |
| **5:00 PM** | **0** | **2** | **13** | **4** | **0** | **56** | **26** | **48** | **0** | **5** | **206** | **38** | **0** | **41** | **159** | **4** | **602** | 2,229 |
| **5:15 PM** | **0** | **2** | **13** | **0** | **0** | **46** | **23** | **28** | **0** | **2** | **187** | **49** | **0** | **33** | **154** | **3** | **540** | **2,242** |
| 5:30 PM | 0 | 4 | 7 | 2 | 0 | 39 | 27 | 38 | 0 | 7 | 149 | 48 | 0 | 31 | 124 | 2 | 478 | 2,179 |
| 5:45 PM | 0 | 3 | 11 | 2 | 0 | 44 | 11 | 33 | 0 | 4 | 153 | 34 | 0 | 23 | 141 | 6 | 465 | 2,085 |
| Count Total | 0 | 23 | 99 | 19 | 0 | 350 | 182 | 318 | 0 | 35 | 1,385 | 363 | 0 | 257 | 1,146 | 27 | 4,204 | 0 |
| **Peak Hour** | **0** | **8** | **56** | **8** | **0** | **191** | **98** | **164** | **0** | **16** | **746** | **189** | **0** | **128** | **627** | **11** | **2,242** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 0 | 1 | 4 | 2 | *7* | 1 | 0 | 0 | 0 | *1* | 4 | 1 | 0 | 0 | *5* |
| 4:15 PM | 2 | 4 | 3 | 0 | *9* | 0 | 0 | 0 | 0 | *0* | 1 | 6 | 5 | 3 | *15* |
| **4:30 PM** | **1** | **1** | **1** | **1** | ***4*** | **0** | **0** | **1** | **0** | ***1*** | **2** | **1** | **3** | **2** | *8* |
| **4:45 PM** | **1** | **3** | **2** | **0** | ***6*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **2** | **1** | **1** | *5* |
| **5:00 PM** | **1** | **1** | **3** | **4** | ***9*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **2** | **0** | **3** | *7* |
| **5:15 PM** | **1** | **3** | **0** | **0** | ***4*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **1** | **0** | **1** | ***2*** |
| 5:30 PM | 0 | 1 | 4 | 1 | *6* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 1 | *1* |
| 5:45 PM | 2 | 4 | 2 | 2 | *10* | 0 | 0 | 0 | 0 | *0* | 1 | 2 | 2 | 1 | *6* |
| Count Total | 8 | 18 | 19 | 10 | *55* | 1 | 0 | 1 | 0 | *2* | 11 | 15 | 11 | 12 | *49* |
| **Peak Hour** | **4** | **8** | **6** | **5** | ***23*** | **0** | **0** | **1** | **0** | ***1*** | **5** | **6** | **4** | **7** | ***22*** |

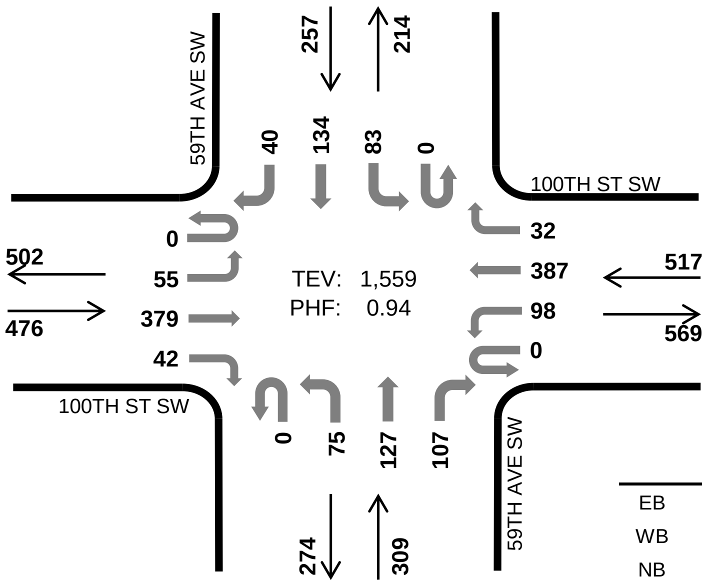

**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

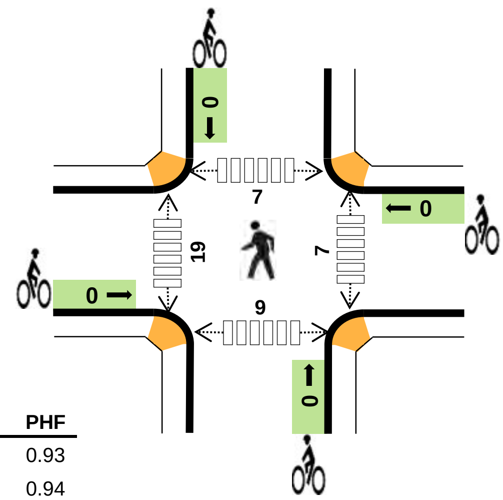
# 59TH AVE SW
# 100TH ST SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:15 PM to 5:15 PM

N

Peak Hour




| | HV %: | PHF |
|---|---|---|
| EB | 2.9% | 0.93 |
| WB | 1.2% | 0.94 |
| NB | 4.9% | 0.90 |
| SB | 1.6% | 0.82 |
| TOTAL | 2.5% | 0.94 |

## Two-Hour Count Summaries

| Interval Start | 100TH ST SW | | | | 100TH ST SW | | | | 59TH AVE SW | | | | 59TH AVE SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 16 | 88 | 11 | 0 | 28 | 90 | 13 | 0 | 10 | 36 | 24 | 0 | 16 | 34 | 11 | 377 | 0 |
| **4:15 PM** | **0** | **14** | **85** | **10** | **0** | **26** | **98** | **10** | **0** | **17** | **37** | **30** | **0** | **24** | **24** | **13** | **388** | 0 |
| **4:30 PM** | **0** | **11** | **107** | **10** | **0** | **19** | **102** | **11** | **0** | **11** | **27** | **28** | **0** | **11** | **33** | **10** | **380** | 0 |
| **4:45 PM** | **0** | **17** | **90** | **7** | **0** | **27** | **85** | **2** | **0** | **25** | **32** | **29** | **0** | **19** | **37** | **8** | **378** | 1,523 |
| **5:00 PM** | **0** | **13** | **97** | **15** | **0** | **26** | **102** | **9** | **0** | **22** | **31** | **20** | **0** | **29** | **40** | **9** | **413** | **1,559** |
| 5:15 PM | 0 | 11 | 95 | 8 | 0 | 22 | 86 | 7 | 0 | 18 | 37 | 34 | 0 | 18 | 32 | 13 | 381 | 1,552 |
| 5:30 PM | 0 | 9 | 84 | 8 | 0 | 23 | 88 | 5 | 0 | 12 | 22 | 23 | 0 | 18 | 31 | 9 | 332 | 1,504 |
| 5:45 PM | 0 | 15 | 67 | 6 | 0 | 23 | 74 | 7 | 0 | 11 | 24 | 22 | 0 | 10 | 33 | 6 | 298 | 1,424 |
| Count Total | 0 | 106 | 713 | 75 | 0 | 194 | 725 | 64 | 0 | 126 | 246 | 210 | 0 | 145 | 264 | 79 | 2,947 | 0 |
| **Peak Hour** | **0** | **55** | **379** | **42** | **0** | **98** | **387** | **32** | **0** | **75** | **127** | **107** | **0** | **83** | **134** | **40** | **1,559** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 3 | 2 | 1 | 3 | *9* | 0 | 0 | 0 | 0 | *0* | 2 | 5 | 3 | 1 | *11* |
| **4:15 PM** | **4** | **2** | **6** | **0** | ***12*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **3** | **3** | **4** | *11* |
| **4:30 PM** | **4** | **1** | **2** | **2** | ***9*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **9** | **0** | **2** | *13* |
| **4:45 PM** | **2** | **1** | **7** | **1** | ***11*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **3** | **1** | **3** | *8* |
| **5:00 PM** | **4** | **2** | **0** | **1** | ***7*** | **0** | **0** | **0** | **0** | ***0*** | **3** | **4** | **3** | **0** | ***10*** |
| 5:15 PM | 2 | 1 | 7 | 0 | *10* | 0 | 0 | 0 | 0 | *0* | 3 | 3 | 1 | 0 | *7* |
| 5:30 PM | 4 | 0 | 0 | 1 | *5* | 0 | 0 | 0 | 0 | *0* | 0 | 2 | 0 | 0 | *2* |
| 5:45 PM | 4 | 2 | 6 | 0 | *12* | 0 | 0 | 0 | 0 | *0* | 0 | 2 | 1 | 0 | *3* |
| Count Total | 27 | 11 | 29 | 8 | *75* | 0 | 0 | 0 | 0 | *0* | 12 | 31 | 12 | 10 | *65* |
| **Peak Hour** | **14** | **6** | **15** | **4** | ***39*** | **0** | **0** | **0** | **0** | ***0*** | **7** | **19** | **7** | **9** | ***42*** |

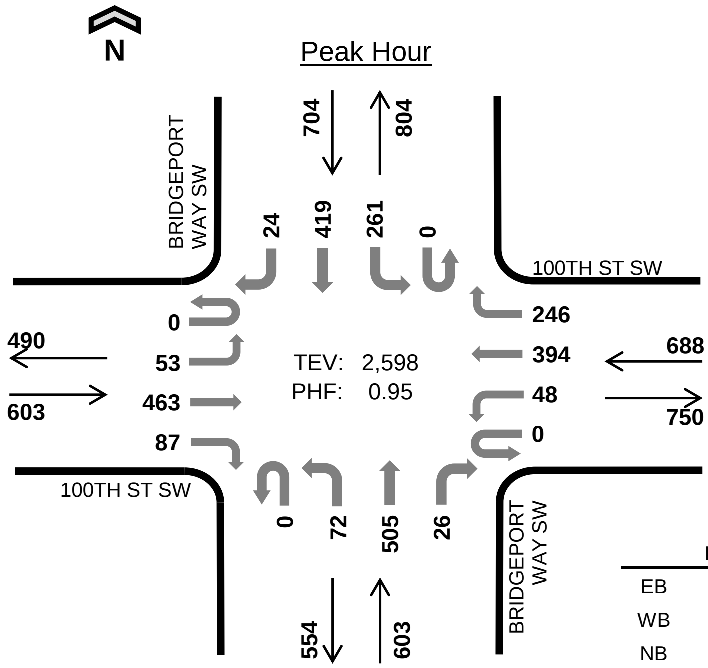


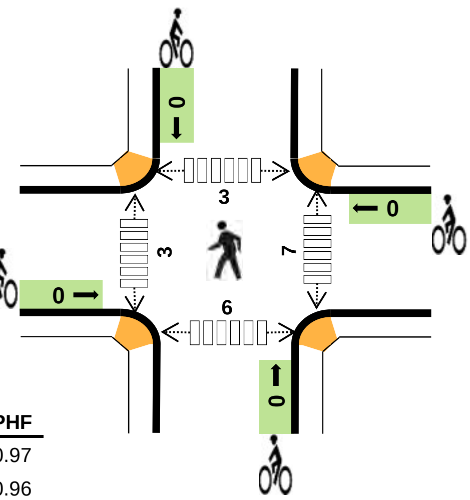
**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# BRIDGEPORT WAY SW
# 100TH ST SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:00 PM to 5:00 PM

Peak Hour




| | HV %: | PHF |
|---|---|---|
| EB | 1.7% | 0.97 |
| WB | 1.0% | 0.96 |
| NB | 1.0% | 0.93 |
| SB | 0.9% | 0.87 |
| TOTAL | 1.1% | 0.95 |

## Two-Hour Count Summaries

| Interval Start | 100TH ST SW Eastbound UT | LT | TH | RT | 100TH ST SW Westbound UT | LT | TH | RT | BRIDGEPORT WAY SW Northbound UT | LT | TH | RT | BRIDGEPORT WAY SW Southbound UT | LT | TH | RT | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **4:00 PM** | **0** | **7** | **118** | **26** | **0** | **13** | **99** | **57** | **0** | **17** | **140** | **5** | **0** | **62** | **132** | **9** | **685** | 0 |
| **4:15 PM** | **0** | **16** | **109** | **23** | **0** | **15** | **97** | **57** | **0** | **17** | **119** | **11** | **0** | **67** | **102** | **4** | **637** | 0 |
| **4:30 PM** | **0** | **16** | **118** | **14** | **0** | **9** | **103** | **68** | **0** | **16** | **123** | **4** | **0** | **72** | **84** | **8** | **635** | 0 |
| **4:45 PM** | **0** | **14** | **118** | **24** | **0** | **11** | **95** | **64** | **0** | **22** | **123** | **6** | **0** | **60** | **101** | **3** | **641** | **2,598** |
| 5:00 PM | 0 | 10 | 126 | 27 | 0 | 14 | 110 | 64 | 0 | 15 | 115 | 4 | 0 | 64 | 118 | 6 | 673 | 2,586 |
| 5:15 PM | 0 | 5 | 110 | 23 | 0 | 8 | 84 | 46 | 0 | 17 | 137 | 5 | 0 | 64 | 133 | 6 | 638 | 2,587 |
| 5:30 PM | 0 | 8 | 91 | 17 | 0 | 6 | 83 | 55 | 0 | 16 | 128 | 5 | 0 | 54 | 118 | 11 | 592 | 2,544 |
| 5:45 PM | 0 | 4 | 99 | 13 | 0 | 4 | 80 | 47 | 0 | 22 | 124 | 2 | 0 | 54 | 92 | 5 | 546 | 2,449 |
| Count Total | 0 | 80 | 889 | 167 | 0 | 80 | 751 | 458 | 0 | 142 | 1,009 | 42 | 0 | 497 | 880 | 52 | 5,047 | 0 |
| **Peak Hour** | **0** | **53** | **463** | **87** | **0** | **48** | **394** | **246** | **0** | **72** | **505** | **26** | **0** | **261** | **419** | **24** | **2,598** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

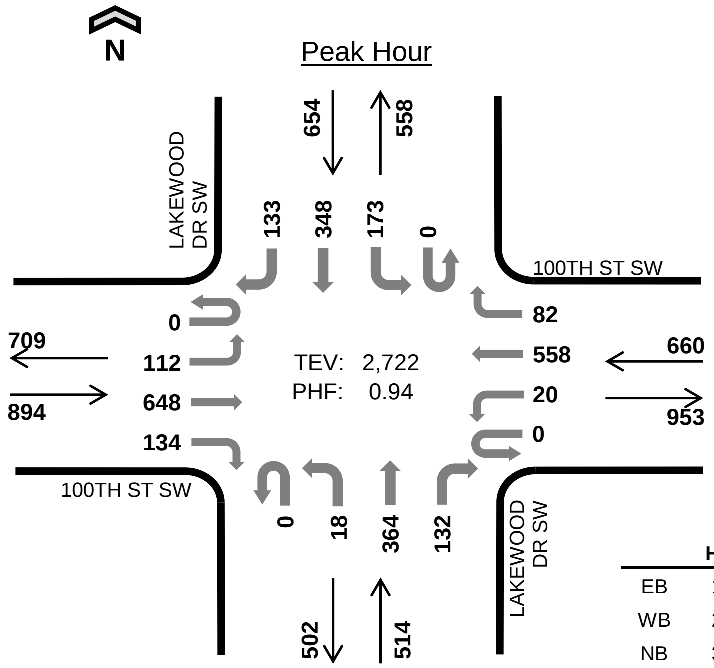
| Interval Start | Heavy Vehicle Totals EB | WB | NB | SB | Total | Bicycles EB | WB | NB | SB | Total | Pedestrians (Crossing Leg) East | West | North | South | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **4:00 PM** | **0** | **2** | **2** | **2** | ***6*** | **0** | **0** | **0** | **0** | ***0*** | **3** | **0** | **0** | **5** | *8* |
| **4:15 PM** | **4** | **3** | **3** | **2** | ***12*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **1** | **3** | **1** | *7* |
| **4:30 PM** | **2** | **1** | **0** | **2** | ***5*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **2** | **0** | **0** | *4* |
| **4:45 PM** | **4** | **1** | **1** | **0** | ***6*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** |
| 5:00 PM | 1 | 2 | 0 | 4 | *7* | 0 | 0 | 0 | 0 | *0* | 0 | 1 | 1 | 0 | *2* |
| 5:15 PM | 2 | 1 | 1 | 2 | *6* | 0 | 0 | 0 | 0 | *0* | 1 | 0 | 0 | 1 | *2* |
| 5:30 PM | 1 | 0 | 0 | 1 | *2* | 0 | 0 | 0 | 0 | *0* | 0 | 2 | 1 | 0 | *3* |
| 5:45 PM | 5 | 3 | 1 | 2 | *11* | 0 | 1 | 0 | 0 | *1* | 0 | 1 | 1 | 0 | *2* |
| Count Total | 19 | 13 | 8 | 15 | *55* | 0 | 1 | 0 | 0 | *1* | 8 | 7 | 6 | 7 | *28* |
| **Peak Hour** | **10** | **7** | **6** | **6** | ***29*** | **0** | **0** | **0** | **0** | ***0*** | **7** | **3** | **3** | **6** | ***19*** |

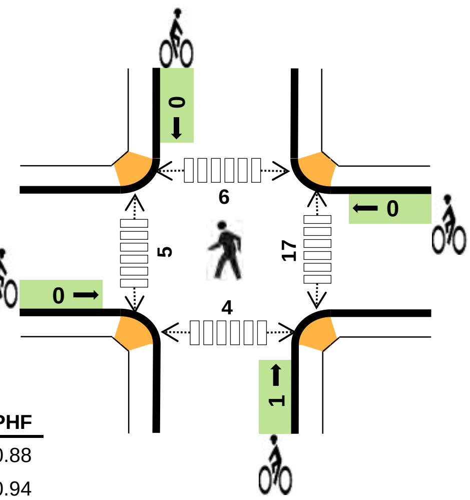


**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# LAKEWOOD DR SW
# 100TH ST SW

Date: Tue, Nov 14, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM




| | HV %: | PHF |
|---|---|---|
| EB | 1.3% | 0.88 |
| WB | 2.0% | 0.94 |
| NB | 3.1% | 0.83 |
| SB | 2.0% | 0.86 |
| TOTAL | 2.0% | 0.94 |

## Two-Hour Count Summaries

| Interval Start | 100TH ST SW | | | | 100TH ST SW | | | | LAKEWOOD DR SW | | | | LAKEWOOD DR SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 38 | 152 | 31 | 0 | 3 | 135 | 19 | 0 | 7 | 115 | 47 | 0 | 28 | 76 | 24 | 675 | 0 |
| **4:15 PM** | **0** | **18** | **172** | **28** | **0** | **5** | **140** | **14** | **0** | **5** | **113** | **37** | **0** | **35** | **82** | **31** | **680** | 0 |
| **4:30 PM** | **0** | **27** | **147** | **32** | **0** | **1** | **148** | **27** | **0** | **3** | **85** | **32** | **0** | **43** | **87** | **27** | **659** | 0 |
| **4:45 PM** | **0** | **32** | **146** | **38** | **0** | **8** | **133** | **20** | **0** | **6** | **80** | **36** | **0** | **44** | **83** | **32** | **658** | 2,672 |
| **5:00 PM** | **0** | **35** | **183** | **36** | **0** | **6** | **137** | **21** | **0** | **4** | **86** | **27** | **0** | **51** | **96** | **43** | **725** | **2,722** |
| 5:15 PM | 0 | 13 | 165 | 25 | 0 | 5 | 119 | 34 | 0 | 6 | 102 | 37 | 0 | 47 | 78 | 16 | 647 | 2,689 |
| 5:30 PM | 0 | 26 | 124 | 23 | 0 | 6 | 134 | 21 | 0 | 3 | 81 | 26 | 0 | 36 | 87 | 25 | 592 | 2,622 |
| 5:45 PM | 0 | 28 | 113 | 25 | 0 | 4 | 92 | 31 | 0 | 5 | 82 | 22 | 0 | 36 | 70 | 18 | 526 | 2,490 |
| Count Total | 0 | 217 | 1,202 | 238 | 0 | 38 | 1,038 | 187 | 0 | 39 | 744 | 264 | 0 | 320 | 659 | 216 | 5,162 | 0 |
| **Peak Hour** | **0** | **112** | **648** | **134** | **0** | **20** | **558** | **82** | **0** | **18** | **364** | **132** | **0** | **173** | **348** | **133** | **2,722** | **0** |

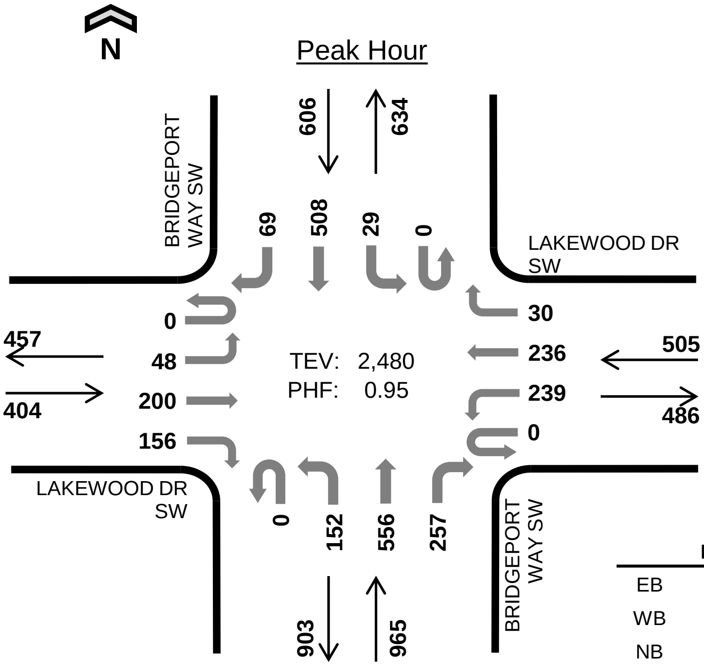
*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 2 | 5 | 16 | 4 | *27* | 0 | 0 | 0 | 0 | *0* | 1 | 1 | 2 | 1 | *5* |
| **4:15 PM** | **3** | **3** | **11** | **6** | ***23*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **0** | **1** | **0** | *3* |
| **4:30 PM** | **2** | **3** | **2** | **2** | ***9*** | **0** | **0** | **0** | **0** | ***0*** | **3** | **0** | **4** | **2** | *9* |
| **4:45 PM** | **2** | **4** | **3** | **2** | ***11*** | **0** | **0** | **1** | **0** | ***1*** | **6** | **1** | **0** | **0** | *7* |
| **5:00 PM** | **5** | **3** | **0** | **3** | ***11*** | **0** | **0** | **0** | **0** | ***0*** | **6** | **4** | **1** | **2** | ***13*** |
| 5:15 PM | 2 | 2 | 2 | 2 | *8* | 0 | 0 | 1 | 0 | *1* | 4 | 2 | 0 | 2 | *8* |
| 5:30 PM | 1 | 2 | 5 | 0 | *8* | 0 | 0 | 0 | 0 | *0* | 0 | 2 | 0 | 0 | *2* |
| 5:45 PM | 4 | 4 | 2 | 1 | *11* | 0 | 0 | 0 | 0 | *0* | 1 | 0 | 2 | 0 | *3* |
| Count Total | 21 | 26 | 41 | 20 | *108* | 0 | 0 | 2 | 0 | *2* | 23 | 10 | 10 | 7 | *50* |
| **Peak Hour** | **12** | **13** | **16** | **13** | ***54*** | **0** | **0** | **1** | **0** | ***1*** | **17** | **5** | **6** | **4** | ***32*** |

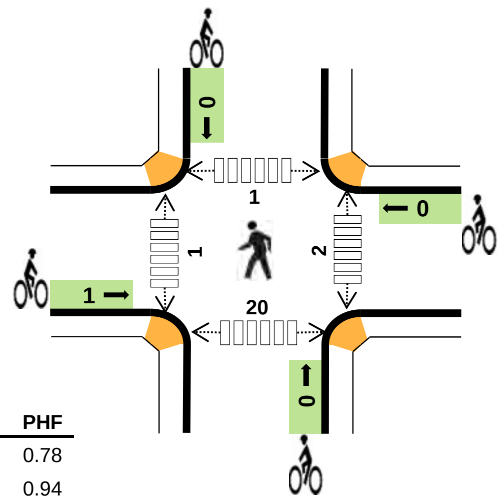

**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# BRIDGEPORT WAY SW
# LAKEWOOD DR SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:45 PM to 5:45 PM




| | HV %: | PHF |
|---|---|---|
| EB | 1.2% | 0.78 |
| WB | 1.2% | 0.94 |
| NB | 1.1% | 0.97 |
| SB | 1.0% | 0.86 |
| TOTAL | 1.1% | 0.95 |




## Two-Hour Count Summaries

| Interval Start | LAKEWOOD DR SW | | | | LAKEWOOD DR SW | | | | BRIDGEPORT WAY SW | | | | BRIDGEPORT WAY SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 11 | 57 | 48 | 0 | 54 | 47 | 6 | 0 | 39 | 133 | 89 | 0 | 14 | 136 | 20 | 654 | 0 |
| 4:15 PM | 0 | 18 | 56 | 37 | 0 | 64 | 59 | 3 | 0 | 42 | 120 | 83 | 0 | 9 | 115 | 13 | 619 | 0 |
| 4:30 PM | 0 | 20 | 60 | 33 | 0 | 59 | 59 | 6 | 0 | 34 | 131 | 66 | 0 | 7 | 94 | 10 | 579 | 0 |
| **4:45 PM** | **0** | **9** | **50** | **37** | **0** | **47** | **73** | **12** | **0** | **37** | **143** | **56** | **0** | **6** | **108** | **12** | **590** | 2,442 |
| **5:00 PM** | **0** | **15** | **67** | **48** | **0** | **76** | **54** | **5** | **0** | **36** | **136** | **59** | **0** | **3** | **135** | **17** | **651** | 2,439 |
| **5:15 PM** | **0** | **13** | **45** | **34** | **0** | **55** | **46** | **7** | **0** | **36** | **143** | **71** | **0** | **14** | **144** | **19** | **627** | 2,447 |
| **5:30 PM** | **0** | **11** | **38** | **37** | **0** | **61** | **63** | **6** | **0** | **43** | **134** | **71** | **0** | **6** | **121** | **21** | **612** | **2,480** |
| 5:45 PM | 0 | 17 | 56 | 40 | 0 | 55 | 61 | 3 | 0 | 32 | 137 | 51 | 0 | 7 | 105 | 17 | 581 | 2,471 |
| Count Total | 0 | 114 | 429 | 314 | 0 | 471 | 462 | 48 | 0 | 299 | 1,077 | 546 | 0 | 66 | 958 | 129 | 4,913 | 0 |
| **Peak Hour** | **0** | **48** | **200** | **156** | **0** | **239** | **236** | **30** | **0** | **152** | **556** | **257** | **0** | **29** | **508** | **69** | **2,480** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

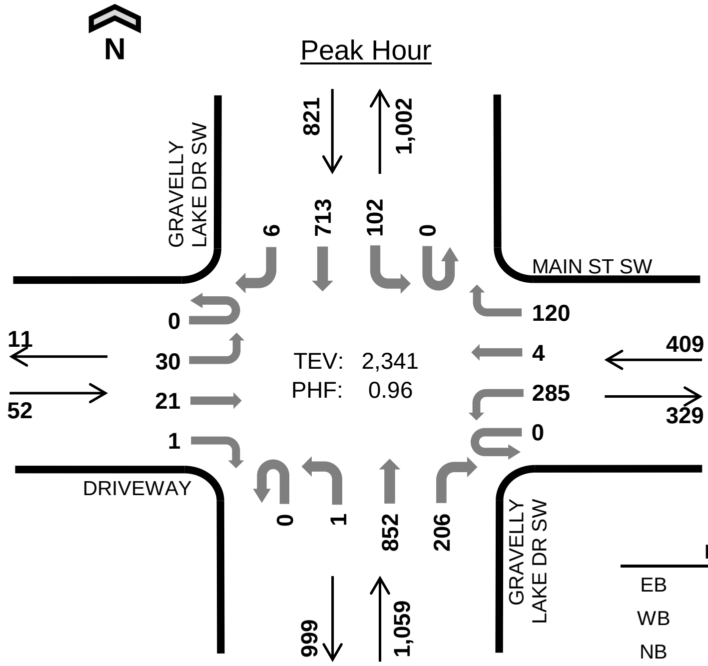
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 1 | 4 | 19 | 1 | *25* | 0 | 0 | 0 | 0 | *0* | 0 | 6 | 0 | 3 | *9* |
| 4:15 PM | 2 | 5 | 11 | 3 | *21* | 0 | 0 | 0 | 0 | *0* | 4 | 0 | 0 | 5 | *9* |
| 4:30 PM | 1 | 1 | 2 | 1 | *5* | 0 | 0 | 0 | 0 | *0* | 1 | 2 | 0 | 7 | *10* |
| **4:45 PM** | **2** | **2** | **1** | **2** | ***7*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **0** | **3** | *4* |
| **5:00 PM** | **1** | **2** | **3** | **0** | ***6*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **1** | **1** | **9** | *11* |
| **5:15 PM** | **2** | **2** | **2** | **3** | ***9*** | **1** | **0** | **0** | **0** | ***1*** | **1** | **0** | **0** | **4** | *5* |
| **5:30 PM** | **0** | **0** | **5** | **1** | ***6*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **4** | *4* |
| 5:45 PM | 2 | 1 | 4 | 2 | *9* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 5 | *5* |
| Count Total | 11 | 17 | 47 | 13 | *88* | 1 | 0 | 0 | 0 | *1* | 7 | 9 | 1 | 40 | *57* |
| **Peak Hour** | **5** | **6** | **11** | **6** | ***28*** | **1** | **0** | **0** | **0** | ***1*** | **2** | **1** | **1** | **20** | ***24*** |



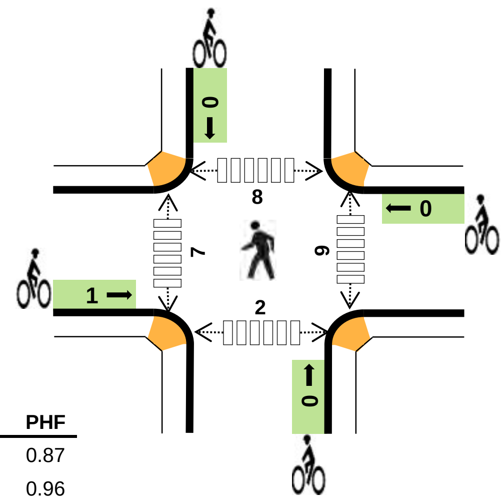
**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# GRAVELLY LAKE DR SW
# MAIN ST SW

Date: Tue, Nov 14, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM




| | HV %: | PHF |
|---|---|---|
| EB | 0.0% | 0.87 |
| WB | 0.5% | 0.96 |
| NB | 0.6% | 0.96 |
| SB | 0.5% | 0.92 |
| TOTAL | 0.5% | 0.96 |




## Two-Hour Count Summaries

| Interval Start | DRIVEWAY | | | | MAIN ST SW | | | | GRAVELLY LAKE DR SW | | | | GRAVELLY LAKE DR SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 6 | 0 | 1 | 0 | 59 | 0 | 26 | 0 | 1 | 188 | 46 | 0 | 21 | 149 | 6 | 503 | 0 |
| 4:15 PM | 0 | 3 | 0 | 1 | 0 | 59 | 2 | 31 | 0 | 1 | 214 | 56 | 0 | 23 | 137 | 6 | 533 | 0 |
| **4:30 PM** | **0** | **7** | **4** | **0** | **0** | **75** | **2** | **30** | **0** | **0** | **191** | **58** | **0** | **20** | **168** | **2** | **557** | 0 |
| **4:45 PM** | **0** | **8** | **4** | **0** | **0** | **73** | **1** | **23** | **0** | **1** | **224** | **46** | **0** | **21** | **169** | **2** | **572** | 2,165 |
| **5:00 PM** | **0** | **8** | **6** | **0** | **0** | **70** | **0** | **33** | **0** | **0** | **227** | **50** | **0** | **28** | **189** | **0** | **611** | 2,273 |
| **5:15 PM** | **0** | **7** | **7** | **1** | **0** | **67** | **1** | **34** | **0** | **0** | **210** | **52** | **0** | **33** | **187** | **2** | **601** | **2,341** |
| 5:30 PM | 0 | 2 | 5 | 0 | 0 | 63 | 0 | 28 | 0 | 0 | 163 | 48 | 0 | 19 | 143 | 1 | 472 | 2,256 |
| 5:45 PM | 0 | 0 | 1 | 0 | 0 | 60 | 0 | 27 | 0 | 0 | 162 | 64 | 0 | 30 | 157 | 0 | 501 | 2,185 |
| Count Total | 0 | 41 | 27 | 3 | 0 | 526 | 6 | 232 | 0 | 3 | 1,579 | 420 | 0 | 195 | 1,299 | 19 | 4,350 | 0 |
| **Peak Hour** | **0** | **30** | **21** | **1** | **0** | **285** | **4** | **120** | **0** | **1** | **852** | **206** | **0** | **102** | **713** | **6** | **2,341** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 0 | 0 | 4 | 1 | *5* | 0 | 0 | 0 | 0 | *0* | 6 | 4 | 0 | 6 | *16* |
| 4:15 PM | 0 | 0 | 3 | 3 | *6* | 0 | 0 | 1 | 0 | *1* | 6 | 4 | 2 | 1 | *13* |
| **4:30 PM** | **0** | **0** | **2** | **0** | ***2*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **0** | **0** | *1* |
| **4:45 PM** | **0** | **0** | **2** | **1** | ***3*** | **1** | **0** | **0** | **0** | ***1*** | **3** | **4** | **3** | **1** | *11* |
| **5:00 PM** | **0** | **1** | **2** | **1** | ***4*** | **0** | **0** | **0** | **0** | ***0*** | **5** | **3** | **5** | **1** | *14* |
| **5:15 PM** | **0** | **1** | **0** | **2** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** |
| 5:30 PM | 0 | 0 | 3 | 0 | *3* | 0 | 1 | 0 | 0 | *1* | 3 | 0 | 0 | 1 | *4* |
| 5:45 PM | 0 | 0 | 1 | 2 | *3* | 0 | 0 | 0 | 0 | *0* | 0 | 1 | 1 | 2 | *4* |
| Count Total | 0 | 2 | 17 | 10 | *29* | 1 | 1 | 1 | 0 | *3* | 24 | 16 | 11 | 12 | *63* |
| **Peak Hour** | **0** | **2** | **6** | **4** | ***12*** | **1** | **0** | **0** | **0** | ***1*** | **9** | **7** | **8** | **2** | ***26*** |

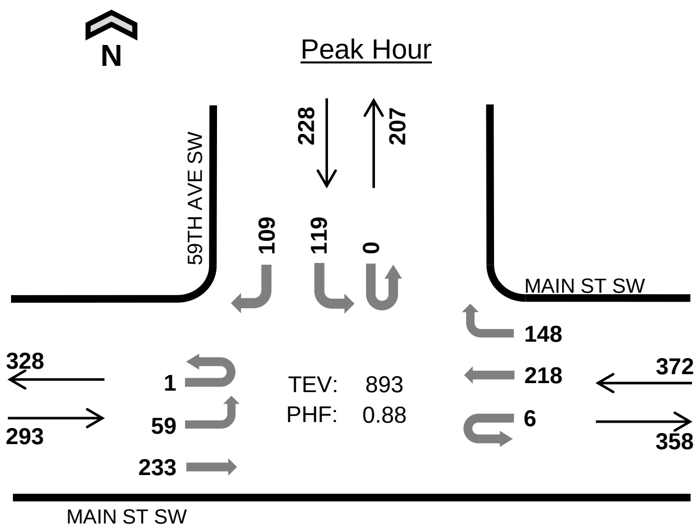

**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

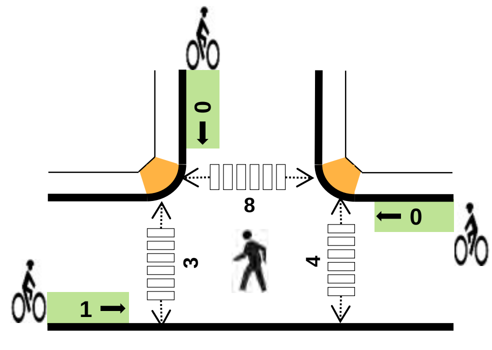
# 59TH AVE SW
# MAIN ST SW

idax

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:00 PM to 5:00 PM

Peak Hour




| | HV %: | PHF |
|---|---|---|
| EB | 0.3% | 0.93 |
| WB | 1.3% | 0.81 |
| NB | - | - |
| SB | 2.2% | 0.88 |
| TOTAL | 1.2% | 0.88 |

## Two-Hour Count Summaries

| Interval Start | MAIN ST SW | | | | MAIN ST SW | | | | 0 | | | | 59TH AVE SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| **4:00 PM** | **0** | **14** | **56** | **0** | **0** | **0** | **61** | **37** | **0** | **0** | **0** | **0** | **0** | **36** | **0** | **18** | **222** | 0 |
| **4:15 PM** | **1** | **18** | **60** | **0** | **1** | **0** | **50** | **36** | **0** | **0** | **0** | **0** | **0** | **26** | **0** | **29** | **221** | 0 |
| **4:30 PM** | **0** | **15** | **60** | **0** | **4** | **0** | **66** | **45** | **0** | **0** | **0** | **0** | **0** | **30** | **0** | **35** | **255** | 0 |
| **4:45 PM** | **0** | **12** | **57** | **0** | **1** | **0** | **41** | **30** | **0** | **0** | **0** | **0** | **0** | **27** | **0** | **27** | **195** | **893** |
| 5:00 PM | 0 | 16 | 63 | 0 | 0 | 0 | 51 | 33 | 0 | 0 | 0 | 0 | 0 | 36 | 0 | 23 | 222 | 893 |
| 5:15 PM | 1 | 34 | 53 | 0 | 0 | 0 | 49 | 27 | 0 | 0 | 0 | 0 | 0 | 35 | 0 | 19 | 218 | 890 |
| 5:30 PM | 0 | 15 | 60 | 0 | 0 | 0 | 44 | 21 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 23 | 187 | 822 |
| 5:45 PM | 0 | 12 | 68 | 0 | 0 | 0 | 39 | 28 | 0 | 0 | 0 | 0 | 0 | 33 | 0 | 15 | 195 | 822 |
| Count Total | 2 | 136 | 477 | 0 | 6 | 0 | 401 | 257 | 0 | 0 | 0 | 0 | 0 | 247 | 0 | 189 | 1,715 | 0 |
| **Peak Hour** | **1** | **59** | **233** | **0** | **6** | **0** | **218** | **148** | **0** | **0** | **0** | **0** | **0** | **119** | **0** | **109** | **893** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

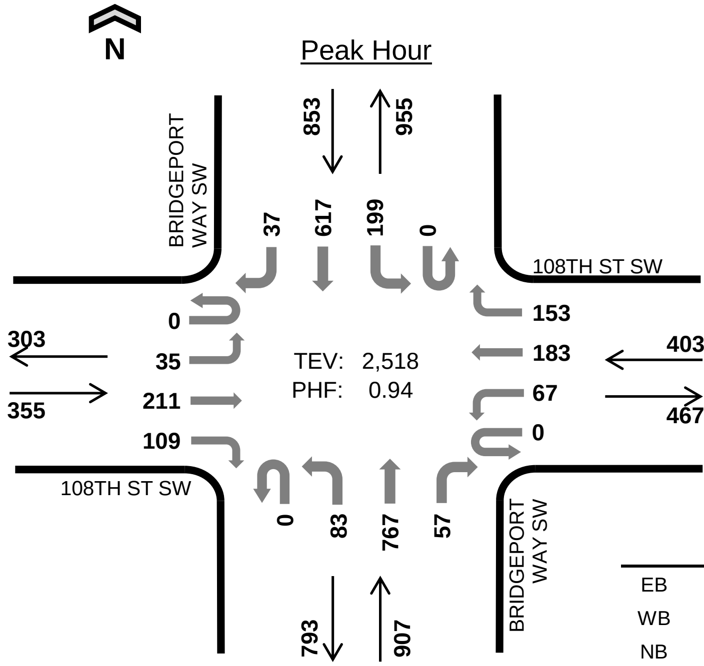
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| **4:00 PM** | **1** | **2** | **0** | **1** | ***4*** | **1** | **0** | **0** | **0** | ***1*** | **2** | **0** | **1** | **0** | *3* |
| **4:15 PM** | **0** | **0** | **0** | **2** | ***2*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **1** | **1** | **0** | *2* |
| **4:30 PM** | **0** | **2** | **0** | **0** | ***2*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **2** | **3** | **0** | *6* |
| **4:45 PM** | **0** | **1** | **0** | **2** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **3** | **0** | ***4*** |
| 5:00 PM | 0 | 1 | 0 | 0 | *1* | 0 | 0 | 0 | 0 | *0* | 3 | 1 | 3 | 0 | *7* |
| 5:15 PM | 0 | 0 | 0 | 1 | *1* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 2 | 0 | *2* |
| 5:30 PM | 0 | 1 | 0 | 0 | *1* | 0 | 1 | 0 | 0 | *1* | 0 | 0 | 1 | 0 | *1* |
| 5:45 PM | 0 | 0 | 0 | 1 | *1* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| Count Total | 1 | 7 | 0 | 7 | *15* | 1 | 1 | 0 | 0 | *2* | 7 | 4 | 14 | 0 | *25* |
| **Peak Hr** | **1** | **5** | **0** | **5** | ***11*** | **1** | **0** | **0** | **0** | ***1*** | **4** | **3** | **8** | **0** | ***15*** |

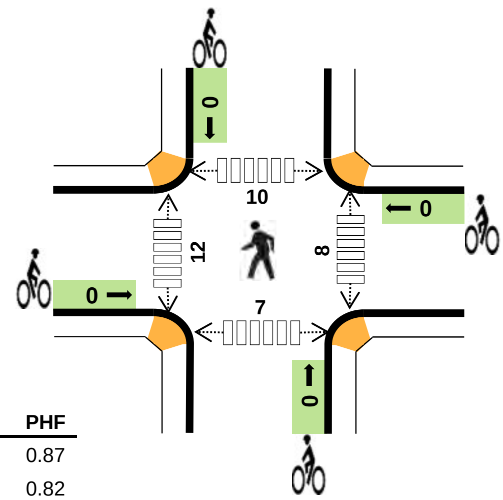


**Mark Skaggs**: (425) 250-0777 mark.skaggs@idaxdata.com

# BRIDGEPORT WAY SW
# 108TH ST SW

Date: Tue, Nov 14, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM




| | HV %: | PHF |
|---|---|---|
| EB | 0.8% | 0.87 |
| WB | 2.0% | 0.82 |
| NB | 1.0% | 0.84 |
| SB | 1.4% | 0.91 |
| TOTAL | 1.3% | 0.94 |

## Two-Hour Count Summaries

| Interval Start | 108TH ST SW | | | | 108TH ST SW | | | | BRIDGEPORT WAY SW | | | | BRIDGEPORT WAY SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 12 | 58 | 23 | 0 | 16 | 42 | 33 | 0 | 30 | 228 | 10 | 0 | 52 | 178 | 6 | 688 | 0 |
| 4:15 PM | 0 | 4 | 45 | 23 | 0 | 15 | 47 | 34 | 0 | 21 | 206 | 16 | 0 | 46 | 159 | 7 | 623 | 0 |
| 4:30 PM | 0 | 13 | 48 | 25 | 0 | 17 | 59 | 32 | 0 | 22 | 180 | 13 | 0 | 30 | 141 | 7 | 587 | 0 |
| **4:45 PM** | **0** | **6** | **53** | **30** | **0** | **22** | **42** | **29** | **0** | **21** | **171** | **10** | **0** | **52** | **136** | **7** | **579** | 2,477 |
| **5:00 PM** | **0** | **11** | **61** | **28** | **0** | **17** | **46** | **40** | **0** | **18** | **175** | **12** | **0** | **55** | **172** | **7** | **642** | 2,431 |
| **5:15 PM** | **0** | **8** | **63** | **31** | **0** | **18** | **60** | **45** | **0** | **19** | **191** | **20** | **0** | **49** | **161** | **8** | **673** | 2,481 |
| **5:30 PM** | **0** | **10** | **34** | **20** | **0** | **10** | **35** | **39** | **0** | **25** | **230** | **15** | **0** | **43** | **148** | **15** | **624** | **2,518** |
| 5:45 PM | 0 | 4 | 39 | 24 | 0 | 12 | 44 | 31 | 0 | 20 | 168 | 18 | 0 | 31 | 155 | 8 | 554 | 2,493 |
| Count Total | 0 | 68 | 401 | 204 | 0 | 127 | 375 | 283 | 0 | 176 | 1,549 | 114 | 0 | 358 | 1,250 | 65 | 4,970 | 0 |
| **Peak Hour** | **0** | **35** | **211** | **109** | **0** | **67** | **183** | **153** | **0** | **83** | **767** | **57** | **0** | **199** | **617** | **37** | **2,518** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

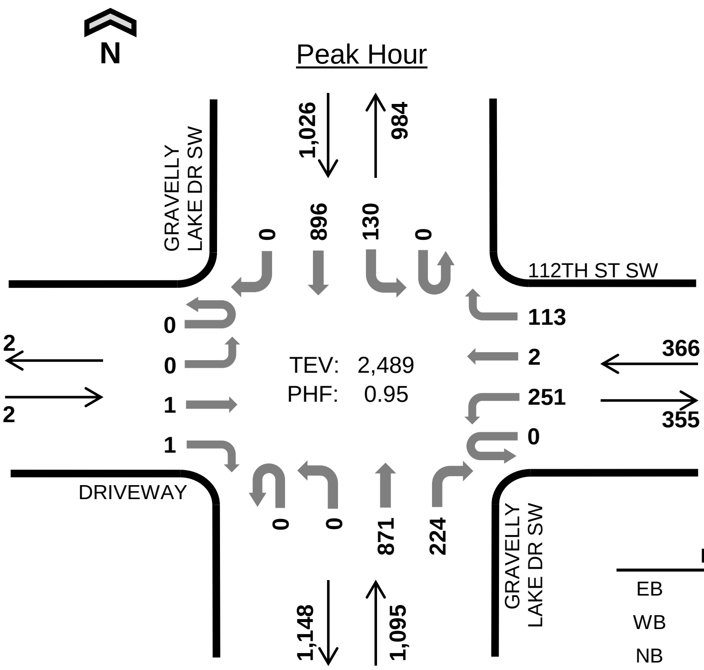
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 1 | 4 | 17 | 6 | *28* | 0 | 0 | 0 | 0 | *0* | 2 | 1 | 3 | 3 | *9* |
| 4:15 PM | 3 | 0 | 12 | 9 | *24* | 0 | 0 | 0 | 0 | *0* | 1 | 5 | 5 | 0 | *11* |
| 4:30 PM | 0 | 2 | 2 | 1 | *5* | 0 | 0 | 0 | 0 | *0* | 1 | 3 | 2 | 1 | *7* |
| **4:45 PM** | **2** | **3** | **2** | **4** | ***11*** | **0** | **0** | **0** | **0** | ***0*** | **4** | **3** | **2** | **1** | *10* |
| **5:00 PM** | **0** | **1** | **1** | **3** | ***5*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **4** | **5** | **0** | *9* |
| **5:15 PM** | **1** | **2** | **1** | **4** | ***8*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **2** | **3** | **3** | *10* |
| **5:30 PM** | **0** | **2** | **5** | **1** | ***8*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **3** | **0** | **3** | ***8*** |
| 5:45 PM | 1 | 1 | 6 | 3 | *11* | 0 | 0 | 0 | 0 | *0* | 0 | 1 | 0 | 1 | *2* |
| Count Total | 8 | 15 | 46 | 31 | *100* | 0 | 0 | 0 | 0 | *0* | 12 | 22 | 20 | 12 | *66* |
| **Peak Hour** | **3** | **8** | **9** | **12** | ***32*** | **0** | **0** | **0** | **0** | ***0*** | **8** | **12** | **10** | **7** | ***37*** |

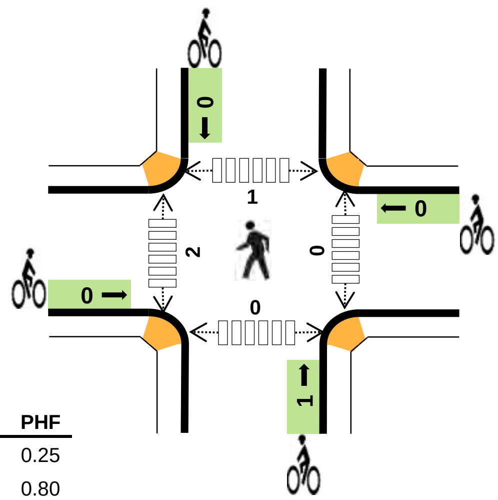


**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# GRAVELLY LAKE DR SW
# 112TH ST SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:30 PM to 5:30 PM




| | HV %: | PHF |
|---|---|---|
| EB | 0.0% | 0.25 |
| WB | 1.1% | 0.80 |
| NB | 0.9% | 0.96 |
| SB | 0.5% | 0.95 |
| TOTAL | 0.8% | 0.95 |

## Two-Hour Count Summaries

| Interval Start | DRIVEWAY Eastbound | | | | 112TH ST SW Westbound | | | | GRAVELLY LAKE DR SW Northbound | | | | GRAVELLY LAKE DR SW Southbound | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 2 | 1 | 0 | 0 | 57 | 1 | 22 | 0 | 0 | 192 | 47 | 0 | 39 | 170 | 0 | 531 | 0 |
| 4:15 PM | 0 | 1 | 1 | 0 | 0 | 55 | 0 | 20 | 0 | 1 | 213 | 50 | 0 | 29 | 182 | 0 | 552 | 0 |
| **4:30 PM** | **0** | **0** | **0** | **0** | **0** | **58** | **1** | **20** | **0** | **0** | **223** | **55** | **0** | **28** | **223** | **0** | **608** | 0 |
| **4:45 PM** | **0** | **0** | **1** | **1** | **0** | **60** | **0** | **30** | **0** | **0** | **227** | **57** | **0** | **33** | **206** | **0** | **615** | 2,306 |
| **5:00 PM** | **0** | **0** | **0** | **0** | **0** | **59** | **0** | **24** | **0** | **0** | **211** | **51** | **0** | **38** | **231** | **0** | **614** | 2,389 |
| **5:15 PM** | **0** | **0** | **0** | **0** | **0** | **74** | **1** | **39** | **0** | **0** | **210** | **61** | **0** | **31** | **236** | **0** | **652** | **2,489** |
| 5:30 PM | 0 | 0 | 2 | 0 | 0 | 55 | 0 | 29 | 0 | 2 | 169 | 49 | 0 | 29 | 163 | 2 | 500 | 2,381 |
| 5:45 PM | 0 | 0 | 0 | 0 | 0 | 51 | 0 | 20 | 0 | 1 | 195 | 41 | 0 | 22 | 212 | 0 | 542 | 2,308 |
| Count Total | 0 | 3 | 5 | 1 | 0 | 469 | 3 | 204 | 0 | 4 | 1,640 | 411 | 0 | 249 | 1,623 | 2 | 4,614 | 0 |
| **Peak Hour** | **0** | **0** | **1** | **1** | **0** | **251** | **2** | **113** | **0** | **0** | **871** | **224** | **0** | **130** | **896** | **0** | **2,489** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

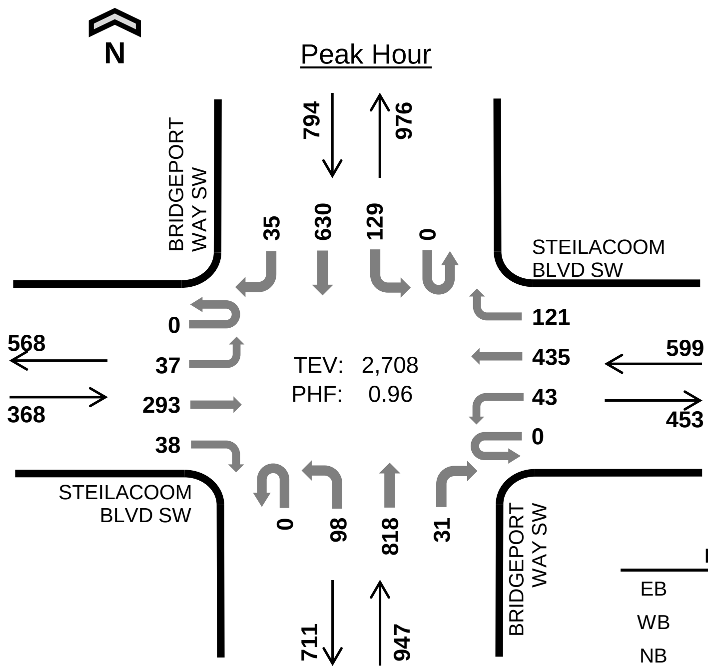
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 0 | 1 | 6 | 3 | *10* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 4:15 PM | 1 | 2 | 4 | 3 | *10* | 0 | 0 | 0 | 0 | *0* | 0 | 1 | 1 | 0 | *2* |
| **4:30 PM** | **0** | **3** | **2** | **0** | ***5*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | *0* |
| **4:45 PM** | **0** | **1** | **3** | **1** | ***5*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **1** | **1** | **0** | *2* |
| **5:00 PM** | **0** | **0** | **2** | **3** | ***5*** | **0** | **0** | **1** | **0** | ***1*** | **0** | **1** | **0** | **0** | *1* |
| **5:15 PM** | **0** | **0** | **3** | **1** | ***4*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** |
| 5:30 PM | 0 | 1 | 3 | 0 | *4* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 5:45 PM | 0 | 0 | 3 | 1 | *4* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| Count Total | 1 | 8 | 26 | 12 | *47* | 0 | 0 | 1 | 0 | *1* | 0 | 3 | 2 | 0 | *5* |
| **Peak Hour** | **0** | **4** | **10** | **5** | ***19*** | **0** | **0** | **1** | **0** | ***1*** | **0** | **2** | **1** | **0** | ***3*** |

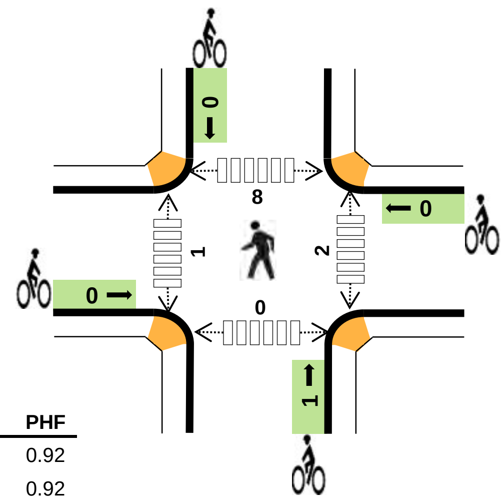


**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# BRIDGEPORT WAY SW
# STEILACOOM BLVD SW

Date: Tue, Nov 14, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:45 PM to 5:45 PM




| | HV %: | PHF |
|---|---|---|
| EB | 1.9% | 0.92 |
| WB | 1.5% | 0.92 |
| NB | 0.7% | 0.88 |
| SB | 1.5% | 0.97 |
| TOTAL | 1.3% | 0.96 |

## Two-Hour Count Summaries

| Interval Start | STEILACOOM BLVD SW Eastbound | | | | STEILACOOM BLVD SW Westbound | | | | BRIDGEPORT WAY SW Northbound | | | | BRIDGEPORT WAY SW Southbound | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 5 | 92 | 10 | 0 | 6 | 90 | 22 | 0 | 23 | 180 | 6 | 0 | 21 | 139 | 6 | 600 | 0 |
| 4:15 PM | 0 | 6 | 106 | 15 | 0 | 15 | 115 | 23 | 0 | 34 | 198 | 6 | 0 | 27 | 138 | 13 | 696 | 0 |
| 4:30 PM | 0 | 5 | 85 | 8 | 0 | 5 | 104 | 26 | 0 | 20 | 180 | 5 | 0 | 22 | 148 | 8 | 616 | 0 |
| **4:45 PM** | **0** | **9** | **74** | **8** | **0** | **8** | **87** | **26** | **0** | **28** | **201** | **7** | **0** | **30** | **161** | **8** | **647** | 2,559 |
| **5:00 PM** | **0** | **8** | **65** | **9** | **0** | **12** | **122** | **24** | **0** | **22** | **244** | **3** | **0** | **28** | **160** | **10** | **707** | 2,666 |
| **5:15 PM** | **0** | **10** | **76** | **9** | **0** | **13** | **113** | **37** | **0** | **22** | **195** | **9** | **0** | **37** | **157** | **10** | **688** | 2,658 |
| **5:30 PM** | **0** | **10** | **78** | **12** | **0** | **10** | **113** | **34** | **0** | **26** | **178** | **12** | **0** | **34** | **152** | **7** | **666** | **2,708** |
| 5:45 PM | 0 | 6 | 56 | 12 | 0 | 4 | 85 | 23 | 0 | 30 | 170 | 7 | 0 | 31 | 149 | 6 | 579 | 2,640 |
| Count Total | 0 | 59 | 632 | 83 | 0 | 73 | 829 | 215 | 0 | 205 | 1,546 | 55 | 0 | 230 | 1,204 | 68 | 5,199 | 0 |
| **Peak Hour** | **0** | **37** | **293** | **38** | **0** | **43** | **435** | **121** | **0** | **98** | **818** | **31** | **0** | **129** | **630** | **35** | **2,708** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

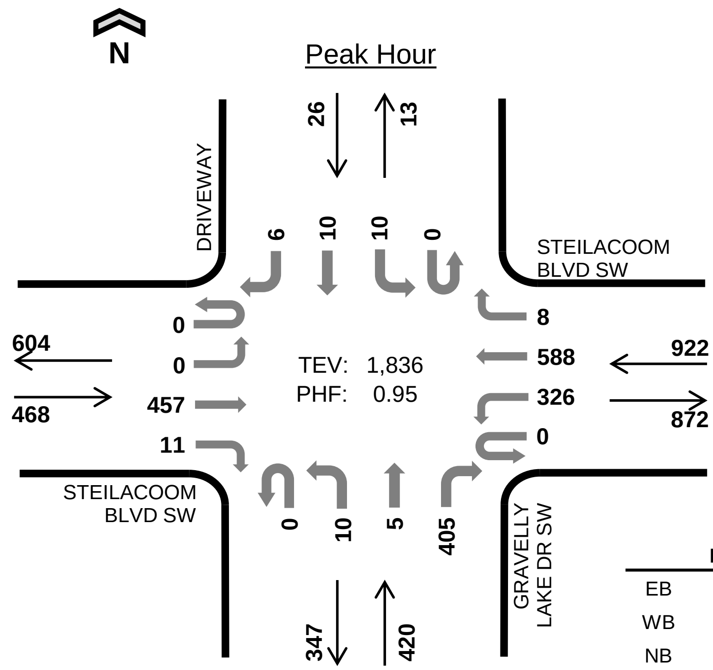
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 7 | 1 | 1 | 3 | *12* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 3 | 1 | *4* |
| 4:15 PM | 6 | 1 | 5 | 2 | *14* | 0 | 0 | 0 | 0 | *0* | 1 | 0 | 1 | 0 | *2* |
| 4:30 PM | 2 | 3 | 2 | 2 | *9* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| **4:45 PM** | **1** | **1** | **2** | **4** | ***8*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **1** | **0** | **0** | *2* |
| **5:00 PM** | **0** | **3** | **0** | **3** | ***6*** | **0** | **0** | **1** | **0** | ***1*** | **0** | **0** | **0** | **0** | *0* |
| **5:15 PM** | **2** | **4** | **4** | **3** | ***13*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **3** | **0** | *4* |
| **5:30 PM** | **4** | **1** | **1** | **2** | ***8*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **5** | **0** | ***5*** |
| 5:45 PM | 1 | 1 | 3 | 3 | *8* | 0 | 0 | 0 | 0 | *0* | 2 | 3 | 1 | 1 | *7* |
| Count Total | 23 | 15 | 18 | 22 | *78* | 0 | 0 | 1 | 0 | *1* | 5 | 4 | 13 | 2 | *24* |
| **Peak Hour** | **7** | **9** | **7** | **12** | ***35*** | **0** | **0** | **1** | **0** | ***1*** | **2** | **1** | **8** | **0** | ***11*** |

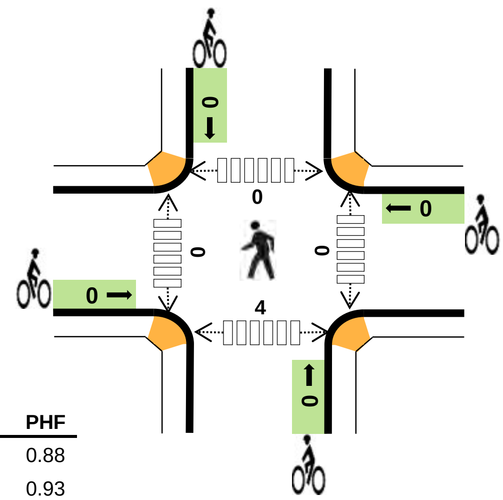


**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# GRAVELLY LAKE DR SW
# STEILACOOM BLVD SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:45 PM to 5:45 PM




| | HV %: | PHF |
|---|---|---|
| EB | 1.5% | 0.88 |
| WB | 1.3% | 0.93 |
| NB | 2.1% | 0.88 |
| SB | 3.8% | 0.72 |
| TOTAL | 1.6% | 0.95 |

## Two-Hour Count Summaries

| Interval Start | STEILACOOM BLVD SW | | | | STEILACOOM BLVD SW | | | | GRAVELLY LAKE DR SW | | | | DRIVEWAY | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 0 | 121 | 2 | 0 | 74 | 125 | 3 | 0 | 4 | 0 | 115 | 0 | 2 | 2 | 0 | 448 | 0 |
| 4:15 PM | 0 | 3 | 143 | 2 | 0 | 76 | 137 | 6 | 0 | 2 | 2 | 93 | 0 | 6 | 2 | 6 | 478 | 0 |
| 4:30 PM | 0 | 3 | 105 | 3 | 0 | 76 | 119 | 6 | 0 | 2 | 2 | 74 | 0 | 11 | 2 | 4 | 407 | 0 |
| **4:45 PM** | **0** | **0** | **110** | **2** | **0** | **82** | **117** | **4** | **0** | **3** | **1** | **97** | **0** | **3** | **1** | **1** | **421** | 1,754 |
| **5:00 PM** | **0** | **0** | **110** | **2** | **0** | **84** | **164** | **1** | **0** | **1** | **1** | **117** | **0** | **1** | **2** | **1** | **484** | 1,790 |
| **5:15 PM** | **0** | **0** | **128** | **5** | **0** | **82** | **158** | **2** | **0** | **2** | **1** | **97** | **0** | **3** | **5** | **1** | **484** | 1,796 |
| **5:30 PM** | **0** | **0** | **109** | **2** | **0** | **78** | **149** | **1** | **0** | **4** | **2** | **94** | **0** | **3** | **2** | **3** | **447** | **1,836** |
| 5:45 PM | 0 | 0 | 98 | 4 | 0 | 74 | 103 | 4 | 0 | 1 | 0 | 74 | 0 | 1 | 0 | 1 | 360 | 1,775 |
| Count Total | 0 | 6 | 924 | 22 | 0 | 626 | 1,072 | 27 | 0 | 19 | 9 | 761 | 0 | 30 | 16 | 17 | 3,529 | 0 |
| **Peak Hour** | **0** | **0** | **457** | **11** | **0** | **326** | **588** | **8** | **0** | **10** | **5** | **405** | **0** | **10** | **10** | **6** | **1,836** | **0** |

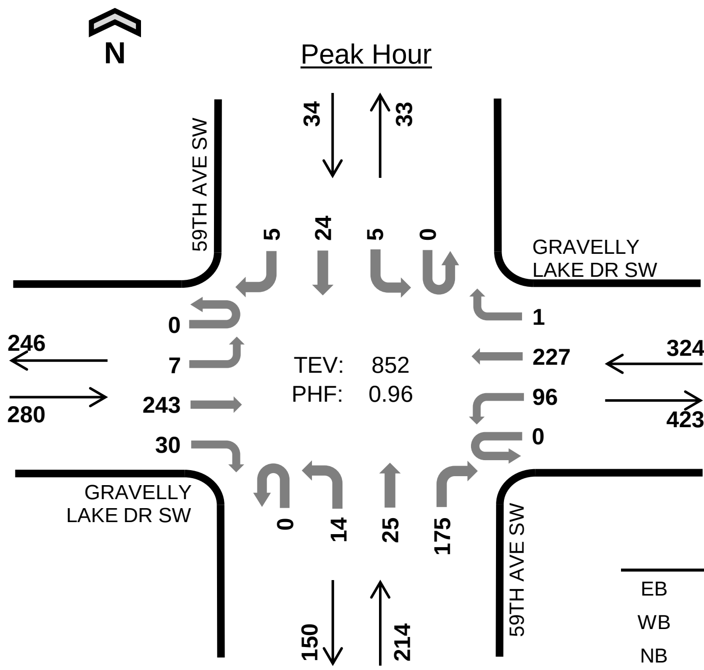
*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

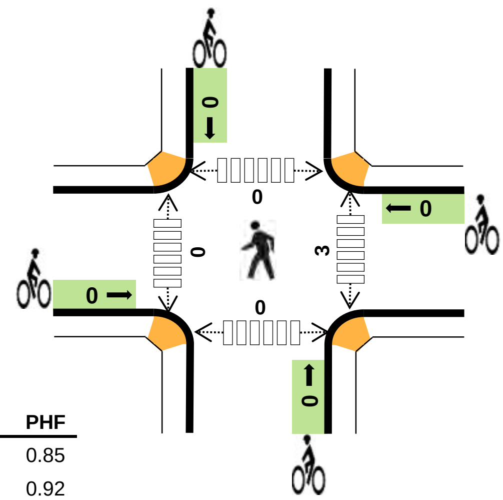
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 7 | 5 | 1 | 0 | *13* | 0 | 0 | 0 | 0 | *0* | 0 | 1 | 0 | 2 | *3* |
| 4:15 PM | 3 | 3 | 3 | 0 | *9* | 0 | 0 | 0 | 0 | *0* | 0 | 1 | 1 | 0 | *2* |
| 4:30 PM | 1 | 4 | 1 | 2 | *8* | 0 | 0 | 0 | 0 | *0* | 0 | 3 | 0 | 1 | *4* |
| **4:45 PM** | **1** | **1** | **3** | **0** | ***5*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **1** | *1* |
| **5:00 PM** | **0** | **6** | **2** | **0** | ***8*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **2** | *2* |
| **5:15 PM** | **2** | **3** | **3** | **1** | ***9*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **1** | *1* |
| **5:30 PM** | **4** | **2** | **1** | **0** | ***7*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** |
| 5:45 PM | 1 | 0 | 1 | 0 | *2* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| Count Total | 19 | 24 | 15 | 3 | *61* | 0 | 0 | 0 | 0 | *0* | 0 | 5 | 1 | 7 | *13* |
| **Peak Hour** | **7** | **12** | **9** | **1** | ***29*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **4** | ***4*** |


**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# 59TH AVE SW
# GRAVELLY LAKE DR SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:45 PM to 5:45 PM




| | HV %: | PHF |
|---|---|---|
| EB | 1.8% | 0.85 |
| WB | 1.2% | 0.92 |
| NB | 3.3% | 0.78 |
| SB | 0.0% | 0.85 |
| TOTAL | 1.9% | 0.96 |

## Two-Hour Count Summaries

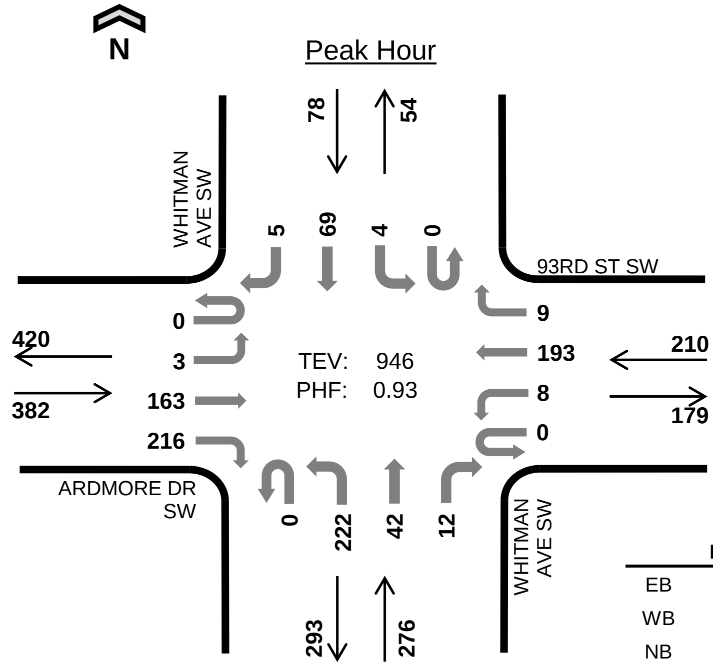
| Interval Start | GRAVELLY LAKE DR SW Eastbound | | | | GRAVELLY LAKE DR SW Westbound | | | | 59TH AVE SW Northbound | | | | 59TH AVE SW Southbound | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 7 | 71 | 9 | 0 | 30 | 43 | 1 | 1 | 3 | 8 | 42 | 0 | 0 | 7 | 2 | 224 | 0 |
| 4:15 PM | 0 | 0 | 61 | 5 | 0 | 29 | 56 | 1 | 0 | 3 | 4 | 35 | 0 | 0 | 5 | 6 | 205 | 0 |
| 4:30 PM | 0 | 2 | 58 | 8 | 0 | 24 | 59 | 1 | 0 | 4 | 7 | 26 | 0 | 0 | 2 | 1 | 192 | 0 |
| **4:45 PM** | **0** | **1** | **61** | **7** | **0** | **25** | **56** | **1** | **0** | **4** | **5** | **41** | **0** | **2** | **6** | **2** | **211** | 832 |
| **5:00 PM** | **0** | **2** | **74** | **6** | **0** | **28** | **52** | **0** | **0** | **4** | **1** | **44** | **0** | **1** | **7** | **1** | **220** | 828 |
| **5:15 PM** | **0** | **2** | **46** | **11** | **0** | **20** | **68** | **0** | **0** | **4** | **11** | **54** | **0** | **0** | **5** | **1** | **222** | 845 |
| **5:30 PM** | **0** | **2** | **62** | **6** | **0** | **23** | **51** | **0** | **0** | **2** | **8** | **36** | **0** | **2** | **6** | **1** | **199** | **852** |
| 5:45 PM | 0 | 3 | 50 | 5 | 0 | 21 | 58 | 1 | 0 | 3 | 5 | 22 | 0 | 2 | 5 | 1 | 176 | 817 |
| Count Total | 0 | 19 | 483 | 57 | 0 | 200 | 443 | 5 | 1 | 27 | 49 | 300 | 0 | 7 | 43 | 15 | 1,649 | 0 |
| **Peak Hour** | **0** | **7** | **243** | **30** | **0** | **96** | **227** | **1** | **0** | **14** | **25** | **175** | **0** | **5** | **24** | **5** | **852** | **0** |

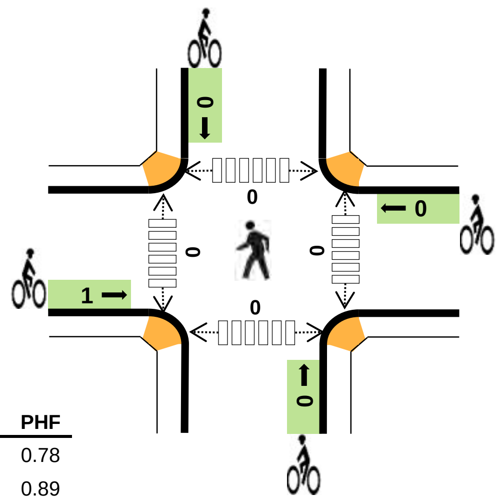
*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 1 | 3 | 0 | 0 | *4* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 4:15 PM | 0 | 0 | 3 | 0 | *3* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 4:30 PM | 2 | 2 | 2 | 0 | *6* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 1 | 0 | *1* |
| **4:45 PM** | **2** | **0** | **4** | **0** | ***6*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **0** | **0** | **0** | *2* |
| **5:00 PM** | **2** | **2** | **1** | **0** | ***5*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | *0* |
| **5:15 PM** | **1** | **1** | **2** | **0** | ***4*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | *0* |
| **5:30 PM** | **0** | **1** | **0** | **0** | ***1*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **0** | **0** | ***1*** |
| 5:45 PM | 1 | 0 | 2 | 0 | *3* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 1 | *1* |
| Count Total | 9 | 9 | 14 | 0 | *32* | 0 | 0 | 0 | 0 | *0* | 3 | 0 | 1 | 1 | *5* |
| **Peak Hour** | **5** | **4** | **7** | **0** | ***16*** | **0** | **0** | **0** | **0** | ***0*** | **3** | **0** | **0** | **0** | ***3*** |

# WHITMAN AVE SW
# ARDMORE DR SW

Date: Tue, Nov 14, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM




| | HV %: | PHF |
|---|---|---|
| EB | 0.8% | 0.78 |
| WB | 1.9% | 0.89 |
| NB | 1.1% | 0.92 |
| SB | 1.3% | 0.67 |
| TOTAL | 1.2% | 0.93 |

## Two-Hour Count Summaries

| Interval Start | ARDMORE DR SW | | | | 93RD ST SW | | | | WHITMAN AVE SW | | | | WHITMAN AVE SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| **4:00 PM** | **0** | **0** | **40** | **54** | **0** | **3** | **54** | **2** | **0** | **59** | **10** | **4** | **0** | **2** | **9** | **1** | **238** | 0 |
| **4:15 PM** | **0** | **1** | **48** | **73** | **0** | **4** | **39** | **4** | **0** | **48** | **7** | **2** | **0** | **0** | **28** | **1** | **255** | 0 |
| **4:30 PM** | **0** | **0** | **38** | **47** | **0** | **1** | **49** | **2** | **0** | **60** | **9** | **2** | **0** | **0** | **17** | **1** | **226** | 0 |
| **4:45 PM** | **0** | **2** | **37** | **42** | **0** | **0** | **51** | **1** | **0** | **55** | **16** | **4** | **0** | **2** | **15** | **2** | **227** | **946** |
| 5:00 PM | 0 | 1 | 39 | 52 | 0 | 1 | 52 | 1 | 0 | 55 | 10 | 3 | 0 | 1 | 13 | 0 | 228 | 936 |
| 5:15 PM | 0 | 0 | 54 | 30 | 0 | 2 | 40 | 5 | 0 | 42 | 12 | 1 | 0 | 2 | 15 | 0 | 203 | 884 |
| 5:30 PM | 0 | 0 | 51 | 34 | 0 | 2 | 41 | 2 | 0 | 37 | 14 | 3 | 0 | 1 | 9 | 0 | 194 | 852 |
| 5:45 PM | 0 | 0 | 38 | 26 | 0 | 2 | 46 | 3 | 0 | 32 | 7 | 2 | 0 | 2 | 6 | 0 | 164 | 789 |
| Count Total | 0 | 4 | 345 | 358 | 0 | 15 | 372 | 20 | 0 | 388 | 85 | 21 | 0 | 10 | 112 | 5 | 1,735 | 0 |
| **Peak Hour** | **0** | **3** | **163** | **216** | **0** | **8** | **193** | **9** | **0** | **222** | **42** | **12** | **0** | **4** | **69** | **5** | **946** | **0** |

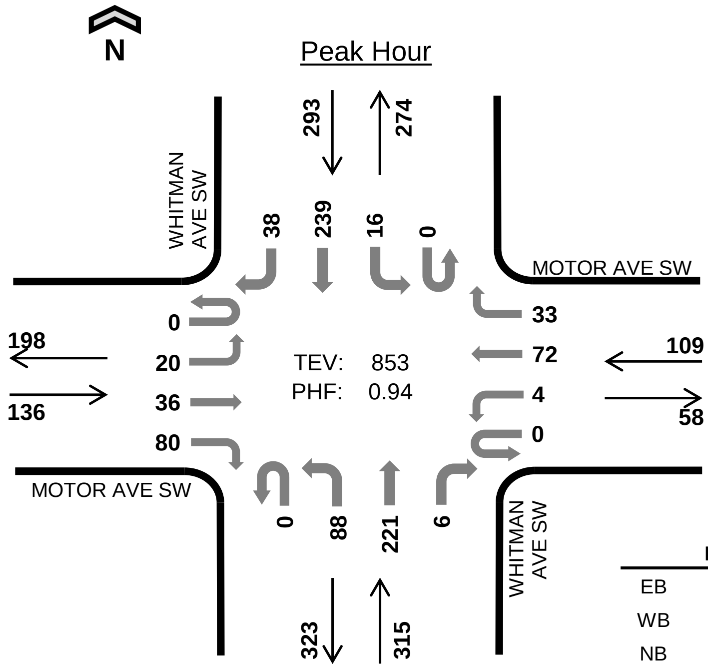
*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

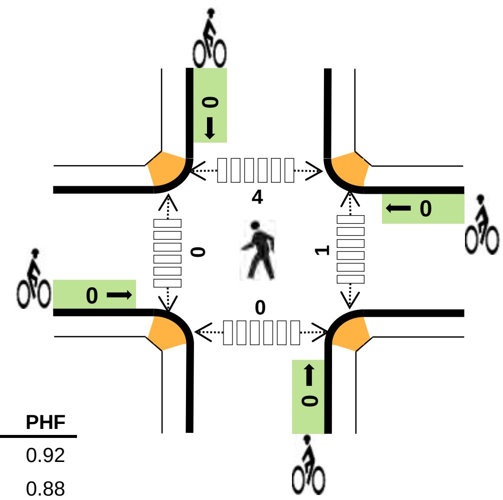
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| **4:00 PM** | **1** | **1** | **2** | **0** | ***4*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | *0* |
| **4:15 PM** | **1** | **1** | **0** | **0** | ***2*** | **1** | **0** | **0** | **0** | ***1*** | **0** | **0** | **0** | **0** | *0* |
| **4:30 PM** | **0** | **1** | **1** | **1** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | *0* |
| **4:45 PM** | **1** | **1** | **0** | **0** | ***2*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** |
| 5:00 PM | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 5:15 PM | 1 | 0 | 0 | 0 | *1* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 5:30 PM | 1 | 1 | 0 | 0 | *2* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 5:45 PM | 0 | 1 | 0 | 0 | *1* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| Count Total | 5 | 6 | 3 | 1 | *15* | 1 | 0 | 0 | 0 | *1* | 0 | 0 | 0 | 0 | *0* |
| **Peak Hour** | **3** | **4** | **3** | **1** | ***11*** | **1** | **0** | **0** | **0** | ***1*** | **0** | **0** | **0** | **0** | ***0*** |


**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# WHITMAN AVE SW
# MOTOR AVE SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:15 PM to 5:15 PM




| | HV %: | PHF |
|---|---|---|
| EB | 0.7% | 0.92 |
| WB | 0.0% | 0.88 |
| NB | 0.0% | 0.85 |
| SB | 0.0% | 0.71 |
| TOTAL | 0.1% | 0.94 |

## Two-Hour Count Summaries

| Interval Start | MOTOR AVE SW | | | | MOTOR AVE SW | | | | WHITMAN AVE SW | | | | WHITMAN AVE SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 1 | 7 | 14 | 0 | 1 | 14 | 13 | 0 | 15 | 55 | 3 | 0 | 3 | 57 | 6 | 189 | 0 |
| **4:15 PM** | **0** | **3** | **10** | **24** | **0** | **1** | **17** | **5** | **0** | **16** | **48** | **1** | **0** | **8** | **80** | **15** | **228** | 0 |
| **4:30 PM** | **0** | **6** | **11** | **20** | **0** | **1** | **19** | **8** | **0** | **14** | **58** | **1** | **0** | **6** | **52** | **7** | **203** | 0 |
| **4:45 PM** | **0** | **7** | **7** | **15** | **0** | **0** | **16** | **11** | **0** | **29** | **60** | **4** | **0** | **1** | **47** | **12** | **209** | 829 |
| **5:00 PM** | **0** | **4** | **8** | **21** | **0** | **2** | **20** | **9** | **0** | **29** | **55** | **0** | **0** | **1** | **60** | **4** | **213** | **853** |
| 5:15 PM | 0 | 3 | 8 | 12 | 0 | 1 | 22 | 8 | 0 | 11 | 39 | 2 | 0 | 2 | 34 | 10 | 152 | 777 |
| 5:30 PM | 0 | 7 | 5 | 15 | 0 | 0 | 19 | 7 | 0 | 19 | 42 | 4 | 0 | 2 | 34 | 2 | 156 | 730 |
| 5:45 PM | 0 | 2 | 7 | 14 | 0 | 1 | 11 | 4 | 0 | 12 | 35 | 0 | 0 | 2 | 33 | 2 | 123 | 644 |
| Count Total | 0 | 33 | 63 | 135 | 0 | 7 | 138 | 65 | 0 | 145 | 392 | 15 | 0 | 25 | 397 | 58 | 1,473 | 0 |
| **Peak Hour** | **0** | **20** | **36** | **80** | **0** | **4** | **72** | **33** | **0** | **88** | **221** | **6** | **0** | **16** | **239** | **38** | **853** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

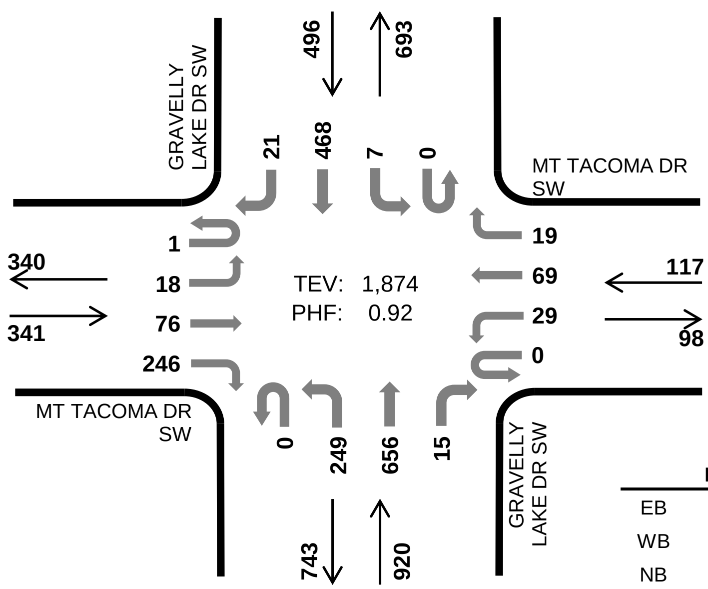
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 0 | 0 | 1 | 1 | *2* | 0 | 0 | 0 | 0 | *0* | 0 | 2 | 0 | 0 | *2* |
| **4:15 PM** | **1** | **0** | **0** | **0** | ***1*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | *0* |
| **4:30 PM** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **2** | **0** | *3* |
| **4:45 PM** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | *0* |
| **5:00 PM** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **2** | **0** | ***2*** |
| 5:15 PM | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 1 | *1* |
| 5:30 PM | 0 | 0 | 0 | 1 | *1* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 1 | 0 | *1* |
| 5:45 PM | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 1 | 0 | *1* |
| Count Total | 1 | 0 | 1 | 2 | *4* | 0 | 0 | 0 | 0 | *0* | 1 | 2 | 6 | 1 | *10* |
| **Peak Hour** | **1** | **0** | **0** | **0** | ***1*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **4** | **0** | ***5*** |

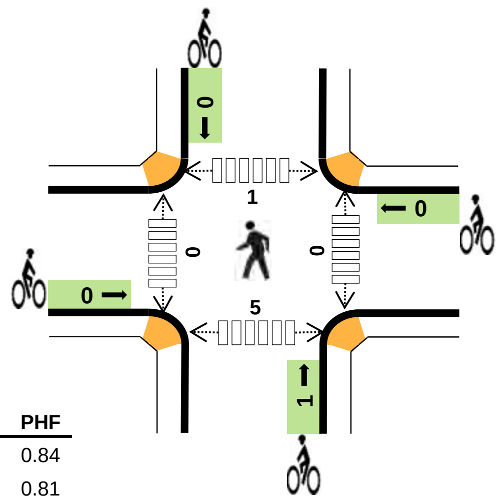

**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# GRAVELLY LAKE DR SW
# MT TACOMA DR SW

Date: Tue, Nov 14, 2017
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:15 PM to 5:15 PM

Peak Hour




| | HV %: | PHF |
|---|---|---|
| EB | 0.6% | 0.84 |
| WB | 0.0% | 0.81 |
| NB | 0.5% | 0.87 |
| SB | 1.0% | 0.94 |
| TOTAL | 0.6% | 0.92 |

## Two-Hour Count Summaries

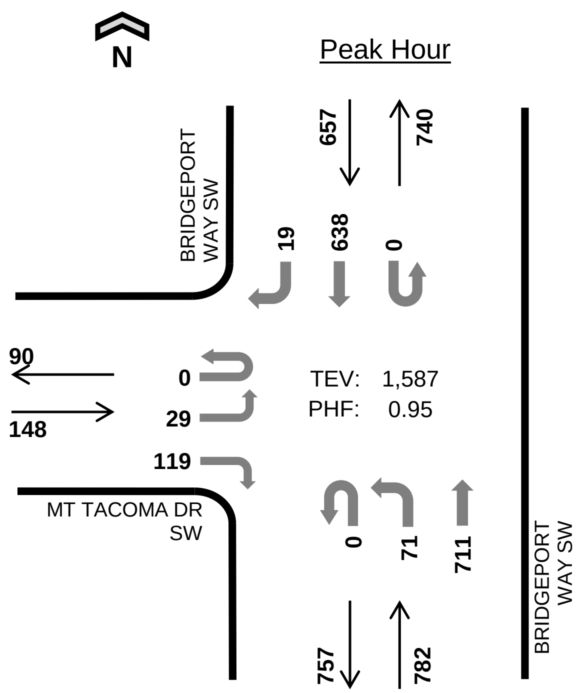
| Interval Start | MT TACOMA DR SW | | | | MT TACOMA DR SW | | | | GRAVELLY LAKE DR SW | | | | GRAVELLY LAKE DR SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 6 | 13 | 55 | 0 | 7 | 13 | 2 | 0 | 65 | 152 | 9 | 0 | 1 | 103 | 4 | 430 | 0 |
| **4:15 PM** | **0** | **4** | **24** | **73** | **0** | **8** | **17** | **5** | **0** | **51** | **154** | **3** | **0** | **1** | **115** | **8** | **463** | 0 |
| **4:30 PM** | **0** | **6** | **25** | **52** | **0** | **10** | **12** | **7** | **0** | **63** | **140** | **7** | **0** | **1** | **107** | **4** | **434** | 0 |
| **4:45 PM** | **1** | **4** | **14** | **55** | **0** | **5** | **16** | **1** | **0** | **71** | **166** | **2** | **0** | **4** | **124** | **4** | **467** | 1,794 |
| **5:00 PM** | **0** | **4** | **13** | **66** | **0** | **6** | **24** | **6** | **0** | **64** | **196** | **3** | **0** | **1** | **122** | **5** | **510** | **1,874** |
| 5:15 PM | 0 | 3 | 11 | 41 | 0 | 11 | 8 | 4 | 0 | 42 | 161 | 6 | 0 | 4 | 135 | 1 | 427 | 1,838 |
| 5:30 PM | 0 | 3 | 20 | 44 | 0 | 5 | 13 | 2 | 0 | 53 | 143 | 5 | 0 | 3 | 95 | 2 | 388 | 1,792 |
| 5:45 PM | 0 | 1 | 6 | 41 | 0 | 8 | 5 | 2 | 0 | 42 | 132 | 3 | 0 | 2 | 119 | 3 | 364 | 1,689 |
| Count Total | 1 | 31 | 126 | 427 | 0 | 60 | 108 | 29 | 0 | 451 | 1,244 | 38 | 0 | 17 | 920 | 31 | 3,483 | 0 |
| **Peak Hour** | **1** | **18** | **76** | **246** | **0** | **29** | **69** | **19** | **0** | **249** | **656** | **15** | **0** | **7** | **468** | **21** | **1,874** | **0** |

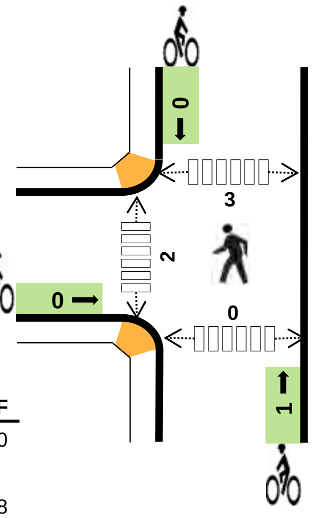
*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 0 | 0 | 4 | 1 | *5* | 0 | 0 | 0 | 0 | *0* | 1 | 0 | 0 | 2 | *3* |
| **4:15 PM** | **2** | **0** | **0** | **1** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **1** | **0** | *1* |
| **4:30 PM** | **0** | **0** | **1** | **1** | ***2*** | **0** | **0** | **1** | **0** | ***1*** | **0** | **0** | **0** | **1** | *1* |
| **4:45 PM** | **0** | **0** | **3** | **1** | ***4*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **1** | *1* |
| **5:00 PM** | **0** | **0** | **1** | **2** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **3** | ***3*** |
| 5:15 PM | 0 | 0 | 1 | 0 | *1* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 5:30 PM | 0 | 0 | 1 | 1 | *2* | 0 | 0 | 0 | 0 | *0* | 0 | 1 | 0 | 0 | *1* |
| 5:45 PM | 0 | 0 | 2 | 2 | *4* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| Count Total | 2 | 0 | 13 | 9 | *24* | 0 | 0 | 1 | 0 | *1* | 1 | 1 | 1 | 7 | *10* |
| **Peak Hour** | **2** | **0** | **5** | **5** | ***12*** | **0** | **0** | **1** | **0** | ***1*** | **0** | **0** | **1** | **5** | ***6*** |

# BRIDGEPORT WAY SW
# MT TACOMA DR SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:45 PM to 5:45 PM




| | HV %: | PHF |
|---|---|---|
| EB | 0.0% | 0.70 |
| WB | - | - |
| NB | 0.3% | 0.98 |
| SB | 1.1% | 0.90 |
| TOTAL | 0.6% | 0.95 |

## Two-Hour Count Summaries

| Interval Start | MT TACOMA DR SW | | | | 0 | | | | BRIDGEPORT WAY SW | | | | BRIDGEPORT WAY SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 7 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | 20 | 202 | 0 | 0 | 0 | 172 | 3 | 432 | 0 |
| 4:15 PM | 0 | 4 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 24 | 183 | 0 | 0 | 0 | 138 | 7 | 386 | 0 |
| 4:30 PM | 0 | 8 | 0 | 36 | 0 | 0 | 0 | 0 | 0 | 19 | 180 | 0 | 0 | 0 | 141 | 3 | 387 | 0 |
| **4:45 PM** | **0** | **3** | **0** | **19** | **0** | **0** | **0** | **0** | **0** | **16** | **184** | **0** | **0** | **0** | **153** | **6** | **381** | 1,586 |
| **5:00 PM** | **0** | **10** | **0** | **43** | **0** | **0** | **0** | **0** | **0** | **24** | **171** | **0** | **0** | **0** | **137** | **5** | **390** | 1,544 |
| **5:15 PM** | **0** | **7** | **0** | **25** | **0** | **0** | **0** | **0** | **0** | **14** | **181** | **0** | **0** | **0** | **167** | **6** | **400** | 1,558 |
| **5:30 PM** | **0** | **9** | **0** | **32** | **0** | **0** | **0** | **0** | **0** | **17** | **175** | **0** | **0** | **0** | **181** | **2** | **416** | **1,587** |
| 5:45 PM | 0 | 2 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 11 | 149 | 0 | 0 | 0 | 141 | 7 | 324 | 1,530 |
| Count Total | 0 | 50 | 0 | 227 | 0 | 0 | 0 | 0 | 0 | 145 | 1,425 | 0 | 0 | 0 | 1,230 | 39 | 3,116 | 0 |
| **Peak Hour** | **0** | **29** | **0** | **119** | **0** | **0** | **0** | **0** | **0** | **71** | **711** | **0** | **0** | **0** | **638** | **19** | **1,587** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

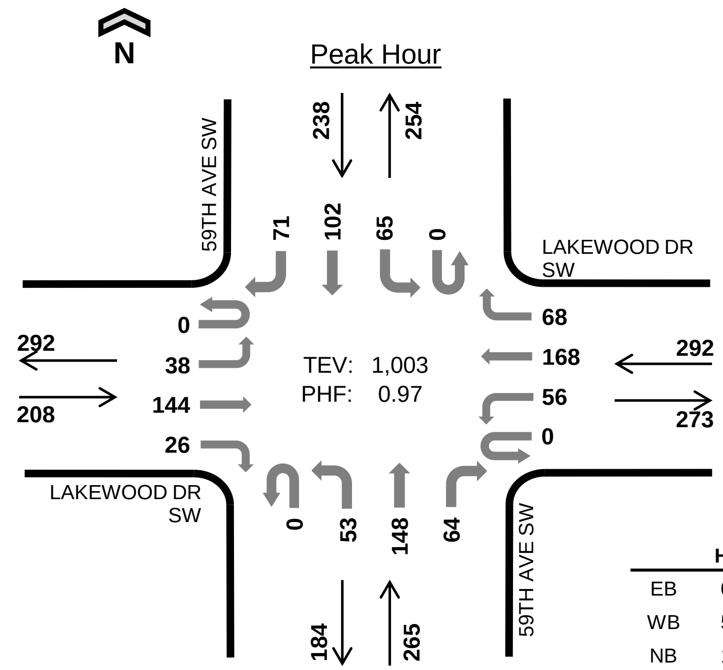
| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 0 | 0 | 1 | 2 | *3* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| 4:15 PM | 1 | 0 | 4 | 3 | *8* | 1 | 0 | 0 | 0 | *1* | 0 | 0 | 1 | 0 | *1* |
| 4:30 PM | 1 | 0 | 1 | 3 | *5* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| **4:45 PM** | **0** | **0** | **1** | **3** | ***4*** | **0** | **0** | **1** | **0** | ***1*** | **0** | **0** | **0** | **0** | *0* |
| **5:00 PM** | **0** | **0** | **0** | **1** | ***1*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **3** | **0** | *3* |
| **5:15 PM** | **0** | **0** | **1** | **2** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **2** | **0** | **0** | *2* |
| **5:30 PM** | **0** | **0** | **0** | **1** | ***1*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** |
| 5:45 PM | 0 | 0 | 3 | 3 | *6* | 0 | 0 | 0 | 0 | *0* | 0 | 1 | 1 | 0 | *2* |
| Count Total | 2 | 0 | 11 | 18 | *31* | 1 | 0 | 1 | 0 | *2* | 0 | 3 | 5 | 0 | *8* |
| **Peak Hr** | **0** | **0** | **2** | **7** | ***9*** | **0** | **0** | **1** | **0** | ***1*** | **0** | **2** | **3** | **0** | ***5*** |

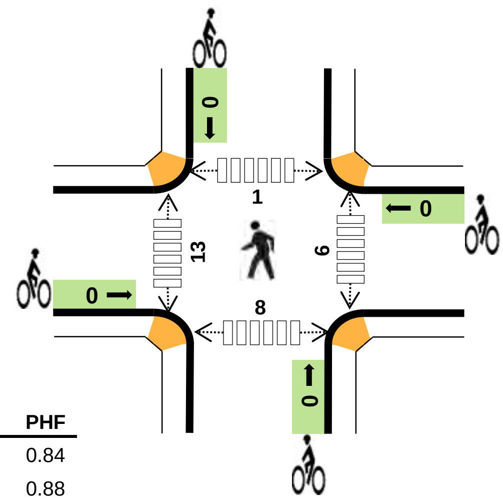


**Mark Skaggs**: (425) 250-0777 mark.skaggs@idaxdata.com

# 59TH AVE SW
# LAKEWOOD DR SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:30 PM to 5:30 PM




| | HV %: | PHF |
|---|---|---|
| EB | 0.0% | 0.84 |
| WB | 5.1% | 0.88 |
| NB | 1.5% | 0.91 |
| SB | 6.3% | 0.85 |
| TOTAL | 3.4% | 0.97 |

## Two-Hour Count Summaries

| Interval Start | LAKEWOOD DR SW Eastbound UT | LT | TH | RT | LAKEWOOD DR SW Westbound UT | LT | TH | RT | 59TH AVE SW Northbound UT | LT | TH | RT | 59TH AVE SW Southbound UT | LT | TH | RT | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4:00 PM | 0 | 14 | 37 | 9 | 0 | 21 | 32 | 10 | 0 | 19 | 39 | 20 | 0 | 14 | 28 | 31 | 274 | 0 |
| 4:15 PM | 0 | 9 | 38 | 6 | 0 | 15 | 36 | 19 | 0 | 9 | 41 | 11 | 0 | 8 | 30 | 11 | 233 | 0 |
| **4:30 PM** | **0** | **11** | **30** | **8** | **0** | **19** | **46** | **6** | **0** | **14** | **40** | **13** | **0** | **13** | **21** | **20** | **241** | 0 |
| **4:45 PM** | **0** | **11** | **38** | **3** | **0** | **11** | **43** | **26** | **0** | **13** | **28** | **15** | **0** | **11** | **30** | **15** | **244** | 992 |
| **5:00 PM** | **0** | **5** | **46** | **11** | **0** | **16** | **29** | **13** | **0** | **10** | **41** | **18** | **0** | **23** | **29** | **18** | **259** | 977 |
| **5:15 PM** | **0** | **11** | **30** | **4** | **0** | **10** | **50** | **23** | **0** | **16** | **39** | **18** | **0** | **18** | **22** | **18** | **259** | **1,003** |
| 5:30 PM | 0 | 6 | 26 | 3 | 0 | 22 | 34 | 13 | 0 | 11 | 27 | 9 | 0 | 14 | 25 | 11 | 201 | 963 |
| 5:45 PM | 0 | 14 | 36 | 4 | 0 | 11 | 38 | 21 | 0 | 10 | 19 | 14 | 0 | 13 | 25 | 14 | 219 | 938 |
| Count Total | 0 | 81 | 281 | 48 | 0 | 125 | 308 | 131 | 0 | 102 | 274 | 118 | 0 | 114 | 210 | 138 | 1,930 | 0 |
| **Peak Hour** | **0** | **38** | **144** | **26** | **0** | **56** | **168** | **68** | **0** | **53** | **148** | **64** | **0** | **65** | **102** | **71** | **1,003** | **0** |

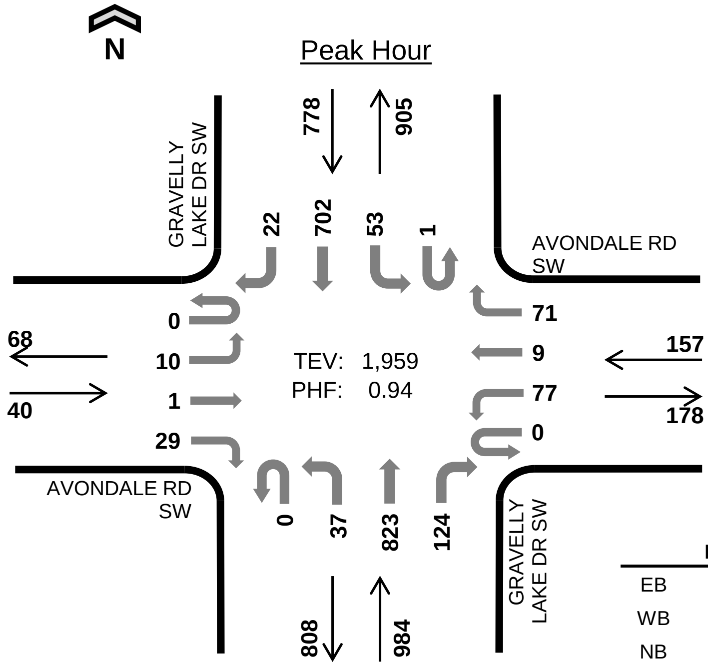
*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

| Interval Start | Heavy Vehicle Totals EB | WB | NB | SB | Total | Bicycles EB | WB | NB | SB | Total | Pedestrians (Crossing Leg) East | West | North | South | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4:00 PM | 1 | 2 | 1 | 7 | *11* | 0 | 0 | 0 | 0 | *0* | 1 | 5 | 0 | 1 | *7* |
| 4:15 PM | 1 | 7 | 0 | 1 | *9* | 0 | 0 | 0 | 0 | *0* | 2 | 6 | 3 | 4 | *15* |
| **4:30 PM** | **0** | **0** | **2** | **5** | ***7*** | **0** | **0** | **0** | **0** | ***0*** | **3** | **7** | **1** | **0** | *11* |
| **4:45 PM** | **0** | **7** | **1** | **3** | ***11*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **0** | **1** | *2* |
| **5:00 PM** | **0** | **0** | **1** | **4** | ***5*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **4** | **0** | **3** | *8* |
| **5:15 PM** | **0** | **8** | **0** | **3** | ***11*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **2** | **0** | **4** | *7* |
| 5:30 PM | 0 | 0 | 1 | 3 | *4* | 1 | 0 | 0 | 0 | *1* | 0 | 0 | 1 | 1 | *2* |
| 5:45 PM | 0 | 9 | 0 | 3 | *12* | 0 | 0 | 0 | 0 | *0* | 4 | 1 | 0 | 7 | *12* |
| Count Total | 2 | 33 | 6 | 29 | *70* | 1 | 0 | 0 | 0 | *1* | 13 | 25 | 5 | 21 | *64* |
| **Peak Hour** | **0** | **15** | **4** | **15** | ***34*** | **0** | **0** | **0** | **0** | ***0*** | **6** | **13** | **1** | **8** | ***28*** |

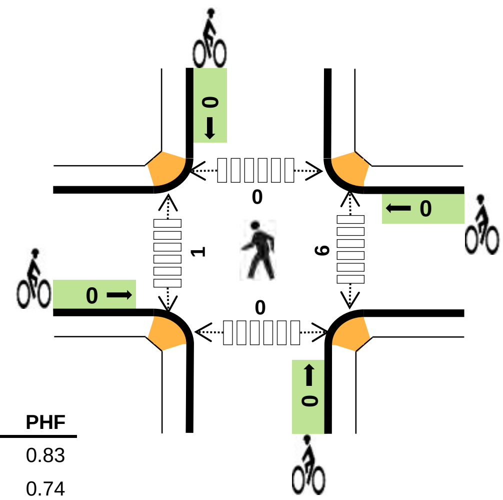

**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# GRAVELLY LAKE DR SW
# AVONDALE RD SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:30 PM to 5:30 PM




| | HV %: | PHF |
|---|---|---|
| EB | 0.0% | 0.83 |
| WB | 0.6% | 0.74 |
| NB | 0.7% | 0.93 |
| SB | 0.5% | 0.91 |
| TOTAL | 0.6% | 0.94 |




## Two-Hour Count Summaries

| Interval Start | AVONDALE RD SW Eastbound UT | LT | TH | RT | AVONDALE RD SW Westbound UT | LT | TH | RT | GRAVELLY LAKE DR SW Northbound UT | LT | TH | RT | GRAVELLY LAKE DR SW Southbound UT | LT | TH | RT | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4:00 PM | 0 | 3 | 1 | 7 | 0 | 19 | 2 | 15 | 0 | 7 | 181 | 38 | 0 | 11 | 137 | 4 | 425 | 0 |
| 4:15 PM | 0 | 0 | 1 | 10 | 0 | 19 | 3 | 32 | 0 | 13 | 188 | 36 | 0 | 7 | 150 | 5 | 464 | 0 |
| **4:30 PM** | **0** | **2** | **0** | **8** | **0** | **14** | **2** | **21** | **0** | **3** | **192** | **24** | **1** | **17** | **168** | **2** | **454** | 0 |
| **4:45 PM** | **0** | **0** | **0** | **8** | **0** | **17** | **2** | **15** | **0** | **10** | **211** | **32** | **0** | **14** | **168** | **5** | **482** | 1,825 |
| **5:00 PM** | **0** | **2** | **0** | **8** | **0** | **18** | **1** | **14** | **0** | **15** | **215** | **34** | **0** | **9** | **195** | **9** | **520** | 1,920 |
| **5:15 PM** | **0** | **6** | **1** | **5** | **0** | **28** | **4** | **21** | **0** | **9** | **205** | **34** | **0** | **13** | **171** | **6** | **503** | **1,959** |
| 5:30 PM | 0 | 0 | 3 | 7 | 0 | 17 | 2 | 29 | 0 | 9 | 163 | 24 | 0 | 12 | 139 | 1 | 406 | 1,911 |
| 5:45 PM | 0 | 1 | 1 | 3 | 0 | 20 | 1 | 22 | 0 | 5 | 143 | 33 | 0 | 16 | 163 | 2 | 410 | 1,839 |
| Count Total | 0 | 14 | 7 | 56 | 0 | 152 | 17 | 169 | 0 | 71 | 1,498 | 255 | 1 | 99 | 1,291 | 34 | 3,664 | 0 |
| **Peak Hour** | **0** | **10** | **1** | **29** | **0** | **77** | **9** | **71** | **0** | **37** | **823** | **124** | **1** | **53** | **702** | **22** | **1,959** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

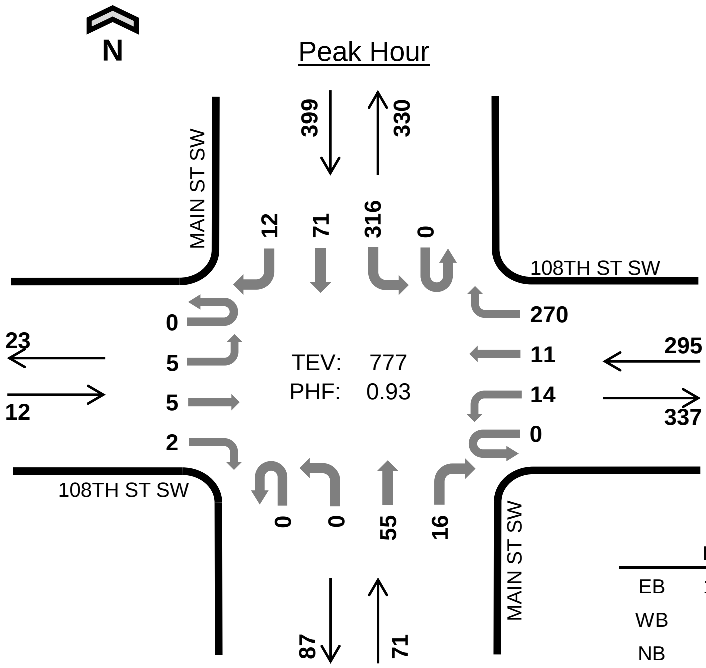
| Interval Start | Heavy Vehicle Totals EB | WB | NB | SB | Total | Bicycles EB | WB | NB | SB | Total | Pedestrians (Crossing Leg) East | West | North | South | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4:00 PM | 1 | 0 | 4 | 2 | *7* | 1 | 0 | 0 | 0 | *1* | 4 | 1 | 0 | 0 | *5* |
| 4:15 PM | 0 | 1 | 3 | 2 | *6* | 0 | 0 | 1 | 0 | *1* | 4 | 3 | 0 | 0 | *7* |
| **4:30 PM** | **0** | **0** | **2** | **1** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **0** | **0** | **0** | *1* |
| **4:45 PM** | **0** | **1** | **2** | **1** | ***4*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **0** | **0** | **0** | *2* |
| **5:00 PM** | **0** | **0** | **2** | **1** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **0** | **0** | **0** | *2* |
| **5:15 PM** | **0** | **0** | **1** | **1** | ***2*** | **0** | **0** | **0** | **0** | ***0*** | **1** | **1** | **0** | **0** | ***2*** |
| 5:30 PM | 0 | 0 | 3 | 0 | *3* | 0 | 0 | 1 | 0 | *1* | 2 | 0 | 0 | 0 | *2* |
| 5:45 PM | 0 | 0 | 1 | 2 | *3* | 0 | 0 | 0 | 0 | *0* | 0 | 0 | 0 | 0 | *0* |
| Count Total | 1 | 2 | 18 | 10 | *31* | 1 | 0 | 2 | 0 | *3* | 16 | 5 | 0 | 0 | *21* |
| **Peak Hour** | **0** | **1** | **7** | **4** | ***12*** | **0** | **0** | **0** | **0** | ***0*** | **6** | **1** | **0** | **0** | ***7*** |

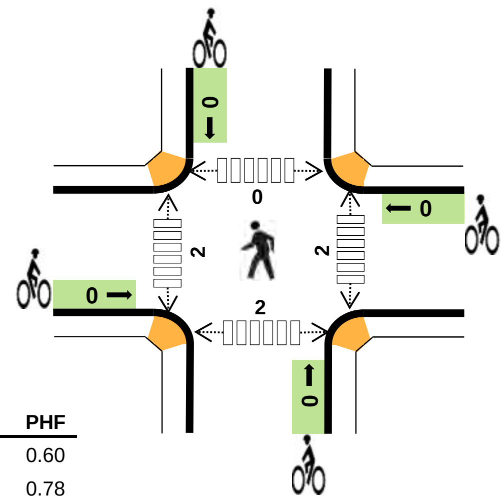


**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

# MAIN ST SW
# 108TH ST SW

**Date:** Tue, Nov 14, 2017
**Count Period:** 4:00 PM to 6:00 PM
**Peak Hour:** 4:30 PM to 5:30 PM




| | HV %: | PHF |
|---|---|---|
| EB | 16.7% | 0.60 |
| WB | 1.0% | 0.78 |
| NB | 1.4% | 0.77 |
| SB | 0.8% | 0.91 |
| TOTAL | 1.2% | 0.93 |

## Two-Hour Count Summaries

| Interval Start | 108TH ST SW | | | | 108TH ST SW | | | | MAIN ST SW | | | | MAIN ST SW | | | | 15-min Total | Rolling One Hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Eastbound | | | | Westbound | | | | Northbound | | | | Southbound | | | | | |
| | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | UT | LT | TH | RT | | |
| 4:00 PM | 0 | 2 | 5 | 0 | 0 | 0 | 1 | 58 | 0 | 0 | 18 | 5 | 0 | 81 | 32 | 6 | 208 | 0 |
| 4:15 PM | 0 | 4 | 2 | 1 | 0 | 2 | 3 | 66 | 0 | 0 | 13 | 6 | 0 | 53 | 11 | 4 | 165 | 0 |
| **4:30 PM** | **0** | **2** | **3** | **0** | **0** | **3** | **5** | **86** | **0** | **0** | **17** | **6** | **0** | **70** | **14** | **4** | **210** | 0 |
| **4:45 PM** | **0** | **3** | **1** | **1** | **0** | **3** | **0** | **60** | **0** | **0** | **12** | **6** | **0** | **75** | **18** | **5** | **184** | 767 |
| **5:00 PM** | **0** | **0** | **0** | **0** | **0** | **4** | **4** | **58** | **0** | **0** | **10** | **1** | **0** | **90** | **18** | **2** | **187** | 746 |
| **5:15 PM** | **0** | **0** | **1** | **1** | **0** | **4** | **2** | **66** | **0** | **0** | **16** | **3** | **0** | **81** | **21** | **1** | **196** | **777** |
| 5:30 PM | 0 | 0 | 3 | 0 | 0 | 7 | 3 | 49 | 0 | 0 | 8 | 6 | 0 | 57 | 18 | 2 | 153 | 720 |
| 5:45 PM | 0 | 1 | 1 | 1 | 0 | 5 | 3 | 52 | 0 | 0 | 12 | 10 | 0 | 74 | 18 | 0 | 177 | 713 |
| Count Total | 0 | 12 | 16 | 4 | 0 | 28 | 21 | 495 | 0 | 0 | 106 | 43 | 0 | 581 | 150 | 24 | 1,480 | 0 |
| **Peak Hour** | **0** | **5** | **5** | **2** | **0** | **14** | **11** | **270** | **0** | **0** | **55** | **16** | **0** | **316** | **71** | **12** | **777** | **0** |

*Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.*

| Interval Start | Heavy Vehicle Totals | | | | | Bicycles | | | | | Pedestrians (Crossing Leg) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EB | WB | NB | SB | Total | EB | WB | NB | SB | Total | East | West | North | South | Total |
| 4:00 PM | 0 | 1 | 0 | 1 | *2* | 0 | 0 | 0 | 1 | *1* | 1 | 0 | 0 | 0 | *1* |
| 4:15 PM | 0 | 0 | 2 | 2 | *4* | 0 | 1 | 0 | 0 | *1* | 2 | 0 | 2 | 1 | *5* |
| **4:30 PM** | **0** | **2** | **1** | **0** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **0** | **0** | **2** | *4* |
| **4:45 PM** | **1** | **0** | **0** | **2** | ***3*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | *0* |
| **5:00 PM** | **0** | **1** | **0** | **0** | ***1*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **2** | **0** | **0** | *2* |
| **5:15 PM** | **1** | **0** | **0** | **1** | ***2*** | **0** | **0** | **0** | **0** | ***0*** | **0** | **0** | **0** | **0** | ***0*** |
| 5:30 PM | 0 | 1 | 0 | 0 | *1* | 0 | 0 | 0 | 0 | *0* | 1 | 1 | 1 | 0 | *3* |
| 5:45 PM | 0 | 1 | 0 | 1 | *2* | 0 | 0 | 0 | 0 | *0* | 1 | 0 | 2 | 1 | *4* |
| Count Total | 2 | 6 | 3 | 7 | *18* | 0 | 1 | 0 | 1 | *2* | 7 | 3 | 5 | 4 | *19* |
| **Peak Hour** | **2** | **3** | **1** | **3** | ***9*** | **0** | **0** | **0** | **0** | ***0*** | **2** | **2** | **0** | **2** | ***6*** |



**Mark Skaggs:** (425) 250-0777 mark.skaggs@idaxdata.com

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 37 | 293 | 38 | 43 | 435 | 121 | 98 | 818 | 31 | 129 | 630 | 35 |
| Future Volume (veh/h) | 37 | 293 | 38 | 43 | 435 | 121 | 98 | 818 | 31 | 129 | 630 | 35 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 39 | 305 | 40 | 45 | 453 | 126 | 102 | 852 | 32 | 134 | 656 | 36 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 71 | 526 | 68 | 164 | 601 | 166 | 410 | 1720 | 65 | 162 | 1194 | 65 |
| Arrive On Green | 0.04 | 0.17 | 0.17 | 0.09 | 0.22 | 0.22 | 0.08 | 0.16 | 0.16 | 0.09 | 0.35 | 0.35 |
| Sat Flow, veh/h | 1774 | 3144 | 408 | 1774 | 2733 | 754 | 1774 | 3478 | 131 | 1774 | 3410 | 187 |
| Grp Volume(v), veh/h | 39 | 170 | 175 | 45 | 292 | 287 | 102 | 434 | 450 | 134 | 340 | 352 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1782 | 1774 | 1770 | 1717 | 1774 | 1770 | 1839 | 1774 | 1770 | 1828 |
| Q Serve(g_s), s | 2.4 | 9.8 | 10.0 | 2.6 | 17.0 | 17.2 | 6.0 | 24.5 | 24.5 | 8.2 | 17.0 | 17.0 |
| Cycle Q Clear(g_c), s | 2.4 | 9.8 | 10.0 | 2.6 | 17.0 | 17.2 | 6.0 | 24.5 | 24.5 | 8.2 | 17.0 | 17.0 |
| Prop In Lane | 1.00 | | 0.23 | 1.00 | | 0.44 | 1.00 | | 0.07 | 1.00 | | 0.10 |
| Lane Grp Cap(c), veh/h | 71 | 296 | 298 | 164 | 389 | 378 | 410 | 875 | 910 | 162 | 619 | 640 |
| V/C Ratio(X) | 0.55 | 0.57 | 0.59 | 0.28 | 0.75 | 0.76 | 0.25 | 0.50 | 0.50 | 0.83 | 0.55 | 0.55 |
| Avail Cap(c_a), veh/h | 161 | 507 | 510 | 164 | 507 | 492 | 410 | 875 | 910 | 210 | 619 | 640 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.98 | 0.98 | 0.98 | 0.96 | 0.96 | 0.96 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 51.8 | 42.2 | 42.3 | 46.5 | 40.1 | 40.2 | 41.8 | 33.5 | 33.5 | 49.1 | 28.8 | 28.8 |
| Incr Delay (d2), s/veh | 2.5 | 0.7 | 0.7 | 0.3 | 2.9 | 3.4 | 0.1 | 1.9 | 1.8 | 15.1 | 3.5 | 3.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.2 | 4.8 | 5.0 | 1.3 | 8.6 | 8.5 | 2.9 | 12.5 | 13.0 | 4.7 | 8.9 | 9.2 |
| LnGrp Delay(d),s/veh | 54.3 | 42.8 | 42.9 | 46.8 | 43.0 | 43.6 | 41.9 | 35.4 | 35.4 | 64.3 | 32.2 | 32.2 |
| LnGrp LOS | D | D | D | D | D | D | D | D | D | E | C | C |
| Approach Vol, veh/h | | 384 | | | 624 | | | 986 | | | 826 | |
| Approach Delay, s/veh | | 44.1 | | | 43.6 | | | 36.1 | | | 37.4 | |
| Approach LOS | | D | | | D | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 14.0 | 58.9 | 8.4 | 28.7 | 29.9 | 43.0 | 14.1 | 22.9 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 | 4.0 | 4.5 |
| Max Green Setting (Gmax), s | 13.0 | 38.5 | 10.0 | 31.5 | 13.0 | * 39 | 10.0 | 31.5 |
| Max Q Clear Time (g_c+I1), s | 10.2 | 26.5 | 4.4 | 19.2 | 8.0 | 19.0 | 4.6 | 12.0 |
| Green Ext Time (p_c), s | 0.0 | 4.4 | 0.0 | 2.8 | 0.0 | 4.2 | 0.0 | 1.9 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 39.2 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 0 | 457 | 11 | 326 | 588 | 8 | 10 | 5 | 405 | 10 | 10 | 6 |
| Future Volume (veh/h) | 0 | 457 | 11 | 326 | 588 | 8 | 10 | 5 | 405 | 10 | 10 | 6 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 0.99 | | 0.99 | 0.99 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 0 | 481 | 12 | 343 | 619 | 8 | 11 | 5 | 426 | 11 | 11 | 6 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 444 | 1670 | 42 | 631 | 2258 | 29 | 343 | 146 | 450 | 179 | 173 | 84 |
| Arrive On Green | 0.00 | 0.47 | 0.47 | 0.12 | 0.63 | 0.63 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 |
| Sat Flow, veh/h | 1774 | 3528 | 88 | 1774 | 3578 | 46 | 1003 | 509 | 1567 | 465 | 603 | 291 |
| Grp Volume(v), veh/h | 0 | 241 | 252 | 343 | 306 | 321 | 16 | 0 | 426 | 28 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1847 | 1774 | 1770 | 1854 | 1512 | 0 | 1567 | 1359 | 0 | 0 |
| Q Serve(g_s), s | 0.0 | 9.1 | 9.2 | 10.2 | 8.5 | 8.5 | 0.0 | 0.0 | 29.3 | 0.0 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 0.0 | 9.1 | 9.2 | 10.2 | 8.5 | 8.5 | 0.7 | 0.0 | 29.3 | 1.2 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.05 | 1.00 | | 0.02 | 0.69 | | 1.00 | 0.39 | | 0.21 |
| Lane Grp Cap(c), veh/h | 444 | 838 | 874 | 631 | 1117 | 1170 | 489 | 0 | 450 | 436 | 0 | 0 |
| V/C Ratio(X) | 0.00 | 0.29 | 0.29 | 0.54 | 0.27 | 0.27 | 0.03 | 0.00 | 0.95 | 0.06 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 603 | 838 | 874 | 835 | 1117 | 1170 | 502 | 0 | 463 | 447 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.00 | 0.74 | 0.74 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 0.0 | 17.7 | 17.7 | 11.1 | 9.0 | 9.0 | 28.2 | 0.0 | 38.4 | 28.4 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 0.6 | 0.6 | 0.7 | 0.6 | 0.6 | 0.0 | 0.0 | 28.6 | 0.1 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 4.6 | 4.8 | 5.0 | 4.3 | 4.5 | 0.4 | 0.0 | 16.2 | 0.6 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 0.0 | 18.3 | 18.3 | 11.9 | 9.7 | 9.6 | 28.2 | 0.0 | 67.0 | 28.5 | 0.0 | 0.0 |
| LnGrp LOS | | B | B | B | A | A | C | | E | C | | |
| Approach Vol, veh/h | | 493 | | | 970 | | | 442 | | | 28 | |
| Approach Delay, s/veh | | 18.3 | | | 10.4 | | | 65.6 | | | 28.5 | |
| Approach LOS | | B | | | B | | | E | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 17.4 | 56.6 | | 36.1 | 0.0 | 73.9 | | 36.1 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | | 4.5 | 4.0 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 26.0 | 38.5 | | 32.5 | 10.0 | 54.5 | | 32.5 |
| Max Q Clear Time (g_c+I1), s | 12.2 | 11.2 | | 3.2 | 0.0 | 10.5 | | 31.3 |
| Green Ext Time (p_c), s | 1.2 | 1.9 | | 0.1 | 0.0 | 2.6 | | 0.3 |

| Intersection Summary | | |
|---|---|---|
| HCM 2010 Ctrl Delay | | 25.3 |
| HCM 2010 LOS | | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 3 | 163 | 216 | 8 | 193 | 9 | 222 | 42 | 12 | 4 | 69 | 5 |
| Future Volume (veh/h) | 3 | 163 | 216 | 8 | 193 | 9 | 222 | 42 | 12 | 4 | 69 | 5 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.97 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 3 | 175 | 232 | 9 | 208 | 10 | 239 | 45 | 13 | 4 | 74 | 5 |
| Adj No. of Lanes | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 4 | 472 | 394 | 9 | 453 | 22 | 299 | 496 | 143 | 4 | 330 | 22 |
| Arrive On Green | 0.00 | 0.25 | 0.25 | 0.01 | 0.25 | 0.25 | 0.17 | 0.35 | 0.35 | 0.00 | 0.19 | 0.19 |
| Sat Flow, veh/h | 1792 | 1881 | 1567 | 1792 | 1779 | 86 | 1792 | 1399 | 404 | 1792 | 1739 | 118 |
| Grp Volume(v), veh/h | 3 | 175 | 232 | 9 | 0 | 218 | 239 | 0 | 58 | 4 | 0 | 79 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1881 | 1567 | 1792 | 0 | 1864 | 1792 | 0 | 1803 | 1792 | 0 | 1857 |
| Q Serve(g_s), s | 0.1 | 3.8 | 6.4 | 0.2 | 0.0 | 4.8 | 6.3 | 0.0 | 1.1 | 0.1 | 0.0 | 1.8 |
| Cycle Q Clear(g_c), s | 0.1 | 3.8 | 6.4 | 0.2 | 0.0 | 4.8 | 6.3 | 0.0 | 1.1 | 0.1 | 0.0 | 1.8 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.05 | 1.00 | | 0.22 | 1.00 | | 0.06 |
| Lane Grp Cap(c), veh/h | 4 | 472 | 394 | 9 | 0 | 475 | 299 | 0 | 639 | 4 | 0 | 353 |
| V/C Ratio(X) | 0.82 | 0.37 | 0.59 | 0.95 | 0.00 | 0.46 | 0.80 | 0.00 | 0.09 | 0.98 | 0.00 | 0.22 |
| Avail Cap(c_a), veh/h | 1113 | 2261 | 1884 | 1113 | 0 | 2241 | 1113 | 0 | 992 | 1113 | 0 | 1021 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 24.5 | 15.2 | 16.2 | 24.4 | 0.0 | 15.4 | 19.7 | 0.0 | 10.6 | 24.5 | 0.0 | 16.8 |
| Incr Delay (d2), s/veh | 87.2 | 0.7 | 2.0 | 70.0 | 0.0 | 1.0 | 1.9 | 0.0 | 0.0 | 119.8 | 0.0 | 0.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.1 | 2.0 | 3.0 | 0.3 | 0.0 | 2.6 | 3.3 | 0.0 | 0.5 | 0.2 | 0.0 | 0.9 |
| LnGrp Delay(d),s/veh | 111.7 | 15.9 | 18.2 | 94.4 | 0.0 | 16.4 | 21.6 | 0.0 | 10.6 | 144.2 | 0.0 | 16.9 |
| LnGrp LOS | F | B | B | F | | B | C | | B | F | | B |
| Approach Vol, veh/h | | 410 | | | 227 | | | 297 | | | 83 | |
| Approach Delay, s/veh | | 17.9 | | | 19.5 | | | 19.4 | | | 23.1 | |
| Approach LOS | | B | | | B | | | B | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 4.6 | 22.4 | 4.6 | 17.5 | 12.7 | 14.3 | 4.8 | 17.3 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 30.5 | 27.0 | 30.5 | 59.0 | 30.5 | 27.0 | 30.5 | 59.0 |
| Max Q Clear Time (g_c+I1), s | 2.1 | 3.1 | 2.1 | 6.8 | 8.3 | 3.8 | 2.2 | 8.4 |
| Green Ext Time (p_c), s | 0.0 | 0.0 | 0.0 | 1.4 | 0.2 | 0.1 | 0.0 | 2.9 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 19.1 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 26 | 1 | 201 | 0 | 0 | 1 | 181 | 905 | 0 | 0 | 699 | 23 |
| Future Volume (veh/h) | 26 | 1 | 201 | 0 | 0 | 1 | 181 | 905 | 0 | 0 | 699 | 23 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.98 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 1.00 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1881 | 1881 | 1900 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 27 | 1 | 209 | 0 | 0 | 1 | 189 | 943 | 0 | 0 | 728 | 24 |
| Adj No. of Lanes | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 313 | 10 | 288 | 0 | 0 | 288 | 559 | 2627 | 0 | 451 | 2267 | 75 |
| Arrive On Green | 0.18 | 0.18 | 0.18 | 0.00 | 0.00 | 0.18 | 0.11 | 1.00 | 0.00 | 0.00 | 0.64 | 0.64 |
| Sat Flow, veh/h | 1359 | 57 | 1573 | 0 | 0 | 1573 | 1792 | 3668 | 0 | 1792 | 3530 | 116 |
| Grp Volume(v), veh/h | 28 | 0 | 209 | 0 | 0 | 1 | 189 | 943 | 0 | 0 | 368 | 384 |
| Grp Sat Flow(s),veh/h/ln | 1416 | 0 | 1573 | 0 | 0 | 1573 | 1792 | 1787 | 0 | 1792 | 1787 | 1860 |
| Q Serve(g_s), s | 1.7 | 0.0 | 13.8 | 0.0 | 0.0 | 0.1 | 3.9 | 0.0 | 0.0 | 0.0 | 10.2 | 10.2 |
| Cycle Q Clear(g_c), s | 1.8 | 0.0 | 13.8 | 0.0 | 0.0 | 0.1 | 3.9 | 0.0 | 0.0 | 0.0 | 10.2 | 10.2 |
| Prop In Lane | 0.96 | | 1.00 | 0.00 | | 1.00 | 1.00 | | 0.00 | 1.00 | | 0.06 |
| Lane Grp Cap(c), veh/h | 324 | 0 | 288 | 0 | 0 | 288 | 559 | 2627 | 0 | 451 | 1147 | 1194 |
| V/C Ratio(X) | 0.09 | 0.00 | 0.73 | 0.00 | 0.00 | 0.00 | 0.34 | 0.36 | 0.00 | 0.00 | 0.32 | 0.32 |
| Avail Cap(c_a), veh/h | 457 | 0 | 436 | 0 | 0 | 436 | 767 | 2627 | 0 | 612 | 1147 | 1194 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.96 | 0.00 | 0.96 | 0.00 | 0.00 | 1.00 | 0.87 | 0.87 | 0.00 | 0.00 | 0.92 | 0.92 |
| Uniform Delay (d), s/veh | 37.4 | 0.0 | 42.3 | 0.0 | 0.0 | 36.7 | 5.5 | 0.0 | 0.0 | 0.0 | 8.9 | 8.9 |
| Incr Delay (d2), s/veh | 0.1 | 0.0 | 3.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.0 | 0.0 | 0.7 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.7 | 0.0 | 6.2 | 0.0 | 0.0 | 0.0 | 1.9 | 0.1 | 0.0 | 0.0 | 5.2 | 5.4 |
| LnGrp Delay(d),s/veh | 37.5 | 0.0 | 45.6 | 0.0 | 0.0 | 36.7 | 5.6 | 0.3 | 0.0 | 0.0 | 9.6 | 9.5 |
| LnGrp LOS | D | | D | | | D | A | A | | | A | A |
| Approach Vol, veh/h | | 237 | | | 1 | | | 1132 | | | 752 | |
| Approach Delay, s/veh | | 44.7 | | | 36.7 | | | 1.2 | | | 9.5 | |
| Approach LOS | | D | | | D | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 0.0 | 85.3 | | 24.7 | 10.2 | 75.1 | | 24.7 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | | 4.5 | 4.0 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 10.0 | 56.5 | | 30.5 | 19.0 | 47.5 | | 30.5 |
| Max Q Clear Time (g_c+I1), s | 0.0 | 2.0 | | 15.8 | 5.9 | 12.2 | | 2.1 |
| Green Ext Time (p_c), s | 0.0 | 18.6 | | 1.5 | 0.3 | 11.1 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 9.0 |
| HCM 2010 LOS | A |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.8 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 7 | 243 | 30 | 96 | 227 | 1 | 14 | 25 | 175 | 5 | 24 | 5 |
| Future Vol, veh/h | 7 | 243 | 30 | 96 | 227 | 1 | 14 | 25 | 175 | 5 | 24 | 5 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | 150 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 7 | 253 | 31 | 100 | 236 | 1 | 15 | 26 | 182 | 5 | 25 | 5 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 237 | 0 | 0 | 284 | 0 | 0 | 614 | 720 | 142 | 591 | 735 | 119 |
| Stage 1 | - | - | - | - | - | - | 283 | 283 | - | 437 | 437 | - |
| Stage 2 | - | - | - | - | - | - | 331 | 437 | - | 154 | 298 | - |
| Critical Hdwy | 4.14 | - | - | 4.14 | - | - | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.22 | - | - | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 |
| Pot Cap-1 Maneuver | 1327 | - | - | 1275 | - | - | 376 | 352 | 880 | 391 | 345 | 910 |
| Stage 1 | - | - | - | - | - | - | 700 | 676 | - | 568 | 578 | - |
| Stage 2 | - | - | - | - | - | - | 656 | 578 | - | 833 | 666 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1327 | - | - | 1275 | - | - | 326 | 319 | 880 | 270 | 312 | 910 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 326 | 319 | - | 270 | 312 | - |
| Stage 1 | - | - | - | - | - | - | 696 | 672 | - | 565 | 526 | - |
| Stage 2 | - | - | - | - | - | - | 565 | 526 | - | 631 | 662 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 2.5 | 12.3 | 16.9 |
| HCM LOS | | | B | C |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 326 | 721 | 1327 | - | - | 1275 | - | - | 337 |
| HCM Lane V/C Ratio | 0.045 | 0.289 | 0.005 | - | - | 0.078 | - | - | 0.105 |
| HCM Control Delay (s) | 16.6 | 12 | 7.7 | 0 | - | 8.1 | 0.2 | - | 16.9 |
| HCM Lane LOS | C | B | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.1 | 1.2 | 0 | - | - | 0.3 | - | - | 0.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 397 | 218 | 59 | 52 | 197 | 39 | 56 | 655 | 24 | 25 | 580 | 295 |
| Future Volume (vph) | 397 | 218 | 59 | 52 | 197 | 39 | 56 | 655 | 24 | 25 | 580 | 295 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Lane Util. Factor | 0.91 | 0.91 | | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.98 | | 1.00 | 0.97 | | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 0.98 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1626 | 3284 | | 1787 | 3462 | | 1787 | 3553 | | 1787 | 3574 | 1563 |
| Flt Permitted | 0.95 | 0.98 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1626 | 3284 | | 1787 | 3462 | | 1787 | 3553 | | 1787 | 3574 | 1563 |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 414 | 227 | 61 | 54 | 205 | 41 | 58 | 682 | 25 | 26 | 604 | 307 |
| RTOR Reduction (vph) | 0 | 11 | 0 | 0 | 15 | 0 | 0 | 2 | 0 | 0 | 0 | 179 |
| Lane Group Flow (vph) | 232 | 459 | 0 | 54 | 231 | 0 | 58 | 705 | 0 | 26 | 604 | 128 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Split | NA | | Split | NA | | Prot | NA | | Prot | NA | Perm |
| Protected Phases | 8 | 8 | | 4 | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | 23.8 | 23.8 | | 11.5 | 11.5 | | 9.0 | 50.5 | | 4.2 | 45.7 | 45.7 |
| Effective Green, g (s) | 23.8 | 23.8 | | 11.5 | 11.5 | | 9.0 | 50.5 | | 4.2 | 45.7 | 45.7 |
| Actuated g/C Ratio | 0.22 | 0.22 | | 0.10 | 0.10 | | 0.08 | 0.46 | | 0.04 | 0.42 | 0.42 |
| Clearance Time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | | 2.0 | 2.0 | | 2.0 | 3.0 | | 2.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 351 | 710 | | 186 | 361 | | 146 | 1631 | | 68 | 1484 | 649 |
| v/s Ratio Prot | c0.14 | 0.14 | | 0.03 | c0.07 | | c0.03 | c0.20 | | 0.01 | 0.17 | |
| v/s Ratio Perm | | | | | | | | | | | | 0.08 |
| v/c Ratio | 0.66 | 0.65 | | 0.29 | 0.64 | | 0.40 | 0.43 | | 0.38 | 0.41 | 0.20 |
| Uniform Delay, d1 | 39.4 | 39.3 | | 45.5 | 47.3 | | 47.9 | 20.1 | | 51.6 | 22.6 | 20.5 |
| Progression Factor | 1.00 | 1.00 | | 1.04 | 1.03 | | 0.63 | 0.61 | | 0.97 | 0.71 | 1.34 |
| Incremental Delay, d2 | 4.6 | 2.0 | | 0.3 | 2.7 | | 0.6 | 0.8 | | 1.3 | 0.8 | 0.7 |
| Delay (s) | 44.0 | 41.3 | | 47.4 | 51.2 | | 30.8 | 13.0 | | 51.4 | 16.8 | 28.1 |
| Level of Service | D | D | | D | D | | C | B | | D | B | C |
| Approach Delay (s) | | 42.2 | | | 50.6 | | | 14.4 | | | 21.5 | |
| Approach LOS | | D | | | D | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 28.1 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.53 | | |
| Actuated Cycle Length (s) | 110.0 | Sum of lost time (s) | 20.0 |
| Intersection Capacity Utilization | 73.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 20 | 36 | 80 | 4 | 72 | 33 | 88 | 221 | 6 | 16 | 239 | 38 |
| Future Volume (veh/h) | 20 | 36 | 80 | 4 | 72 | 33 | 88 | 221 | 6 | 16 | 239 | 38 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.97 | | 1.00 | 0.96 | | 1.00 | 0.99 | | 0.98 | 0.99 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Adj Flow Rate, veh/h | 21 | 38 | 0 | 4 | 77 | 0 | 94 | 235 | 6 | 17 | 254 | 40 |
| Adj No. of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cap, veh/h | 249 | 140 | 0 | 152 | 214 | 0 | 523 | 585 | 15 | 542 | 429 | 68 |
| Arrive On Green | 0.12 | 0.12 | 0.00 | 0.12 | 0.12 | 0.00 | 0.06 | 0.32 | 0.32 | 0.01 | 0.27 | 0.27 |
| Sat Flow, veh/h | 525 | 1185 | 0 | 67 | 1805 | 0 | 1810 | 1844 | 47 | 1810 | 1598 | 252 |
| Grp Volume(v), veh/h | 59 | 0 | 0 | 81 | 0 | 0 | 94 | 0 | 241 | 17 | 0 | 294 |
| Grp Sat Flow(s),veh/h/ln | 1710 | 0 | 0 | 1872 | 0 | 0 | 1810 | 0 | 1891 | 1810 | 0 | 1850 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 1.0 | 0.0 | 2.6 | 0.2 | 0.0 | 3.6 |
| Cycle Q Clear(g_c), s | 0.7 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 | 0.0 | 2.6 | 0.2 | 0.0 | 3.6 |
| Prop In Lane | 0.36 | | 0.00 | 0.05 | | 0.00 | 1.00 | | 0.02 | 1.00 | | 0.14 |
| Lane Grp Cap(c), veh/h | 389 | 0 | 0 | 366 | 0 | 0 | 523 | 0 | 600 | 542 | 0 | 497 |
| V/C Ratio(X) | 0.15 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.18 | 0.00 | 0.40 | 0.03 | 0.00 | 0.59 |
| Avail Cap(c_a), veh/h | 2380 | 0 | 0 | 2637 | 0 | 0 | 2182 | 0 | 2530 | 1596 | 0 | 2476 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 10.5 | 0.0 | 0.0 | 10.6 | 0.0 | 0.0 | 6.5 | 0.0 | 7.0 | 6.9 | 0.0 | 8.3 |
| Incr Delay (d2), s/veh | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.4 | 0.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.5 | 0.0 | 1.4 | 0.1 | 0.0 | 1.9 |
| LnGrp Delay(d),s/veh | 10.6 | 0.0 | 0.0 | 10.7 | 0.0 | 0.0 | 6.6 | 0.0 | 7.1 | 6.9 | 0.0 | 8.7 |
| LnGrp LOS | B | | | B | | | A | | A | A | | A |
| Approach Vol, veh/h | | 59 | | | 81 | | | 335 | | | 311 | |
| Approach Delay, s/veh | | 10.6 | | | 10.7 | | | 7.0 | | | 8.6 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.8 | 13.3 | | 8.1 | 6.0 | 12.0 | | 8.1 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | | 5.0 | 4.5 | 5.0 | | 5.0 |
| Max Green Setting (Gmax), s | 15.5 | 35.0 | | 35.0 | 25.5 | 35.0 | | 35.0 |
| Max Q Clear Time (g_c+I1), s | 2.2 | 4.6 | | 2.7 | 3.0 | 5.6 | | 3.0 |
| Green Ext Time (p_c), s | 0.0 | 0.5 | | 0.1 | 0.1 | 0.6 | | 0.2 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 8.3 |
| HCM 2010 LOS | A |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 19 | 76 | 246 | 29 | 69 | 19 | 249 | 656 | 15 | 7 | 468 | 21 |
| Future Volume (vph) | 19 | 76 | 246 | 29 | 69 | 19 | 249 | 656 | 15 | 7 | 468 | 21 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.98 | | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.89 | | 1.00 | 0.97 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1780 | 1637 | | 1787 | 1804 | | 1787 | 3559 | | 1787 | 3544 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1780 | 1637 | | 1787 | 1804 | | 1787 | 3559 | | 1787 | 3544 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 21 | 83 | 267 | 32 | 75 | 21 | 271 | 713 | 16 | 8 | 509 | 23 |
| RTOR Reduction (vph) | 0 | 132 | 0 | 0 | 11 | 0 | 0 | 1 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 21 | 218 | 0 | 32 | 85 | 0 | 271 | 728 | 0 | 8 | 530 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Bus Blockages (#/hr) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turn Type | Prot | NA | | Prot | NA | | Prot | NA | | Prot | NA | |
| Protected Phases | 3 | 8 | | 7 | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | 2.8 | 17.3 | | 5.2 | 19.7 | | 18.5 | 59.5 | | 1.0 | 42.0 | |
| Effective Green, g (s) | 2.8 | 17.3 | | 5.2 | 19.7 | | 18.5 | 59.5 | | 1.0 | 42.0 | |
| Actuated g/C Ratio | 0.03 | 0.17 | | 0.05 | 0.20 | | 0.18 | 0.60 | | 0.01 | 0.42 | |
| Clearance Time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 2.0 | |
| Lane Grp Cap (vph) | 49 | 283 | | 92 | 355 | | 330 | 2117 | | 17 | 1488 | |
| v/s Ratio Prot | 0.01 | c0.13 | | c0.02 | 0.05 | | c0.15 | c0.20 | | 0.00 | 0.15 | |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 0.43 | 0.77 | | 0.35 | 0.24 | | 0.82 | 0.34 | | 0.47 | 0.36 | |
| Uniform Delay, d1 | 47.8 | 39.4 | | 45.8 | 33.8 | | 39.2 | 10.3 | | 49.2 | 19.8 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.92 | 0.31 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.2 | 10.8 | | 0.8 | 0.1 | | 13.2 | 0.4 | | 7.3 | 0.7 | |
| Delay (s) | 50.0 | 50.2 | | 46.6 | 34.0 | | 49.1 | 3.6 | | 56.5 | 20.4 | |
| Level of Service | D | D | | D | C | | D | A | | E | C | |
| Approach Delay (s) | | 50.2 | | | 37.1 | | | 15.9 | | | 21.0 | |
| Approach LOS | | D | | | D | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 24.8 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.55 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 62.9% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 29 | 119 | 71 | 711 | 638 | 19 |
| Future Volume (veh/h) | 29 | 119 | 71 | 711 | 638 | 19 |
| Number | 7 | 14 | 5 | 2 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 31 | 125 | 75 | 748 | 672 | 20 |
| Adj No. of Lanes | 1 | 1 | 1 | 2 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 185 | 206 | 622 | 2878 | 2619 | 78 |
| Arrive On Green | 0.10 | 0.10 | 0.01 | 0.27 | 0.74 | 0.74 |
| Sat Flow, veh/h | 1784 | 1599 | 1792 | 3668 | 3638 | 105 |
| Grp Volume(v), veh/h | 31 | 125 | 75 | 748 | 339 | 353 |
| Grp Sat Flow(s),veh/h/ln | 1784 | 1599 | 1792 | 1787 | 1787 | 1862 |
| Q Serve(g_s), s | 1.7 | 8.1 | 1.0 | 18.2 | 6.7 | 6.7 |
| Cycle Q Clear(g_c), s | 1.7 | 8.1 | 1.0 | 18.2 | 6.7 | 6.7 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 0.06 |
| Lane Grp Cap(c), veh/h | 185 | 206 | 622 | 2878 | 1321 | 1376 |
| V/C Ratio(X) | 0.17 | 0.61 | 0.12 | 0.26 | 0.26 | 0.26 |
| Avail Cap(c_a), veh/h | 762 | 723 | 732 | 2878 | 1321 | 1376 |
| HCM Platoon Ratio | 1.00 | 1.00 | 0.33 | 0.33 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.92 | 0.92 | 0.93 | 0.93 |
| Uniform Delay (d), s/veh | 45.0 | 45.3 | 3.2 | 14.5 | 4.6 | 4.6 |
| Incr Delay (d2), s/veh | 0.4 | 2.9 | 0.0 | 0.2 | 0.4 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.9 | 7.3 | 0.5 | 9.1 | 3.5 | 3.6 |
| LnGrp Delay(d),s/veh | 45.4 | 48.1 | 3.2 | 14.7 | 5.1 | 5.0 |
| LnGrp LOS | D | D | A | B | A | A |
| Approach Vol, veh/h | 156 | | | 823 | 692 | |
| Approach Delay, s/veh | 47.6 | | | 13.7 | 5.0 | |
| Approach LOS | D | | | B | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | | 93.6 | | 16.4 | 7.3 | 86.3 | | |
| Change Period (Y+Rc), s | | 5.0 | | 5.0 | 4.5 | 5.0 | | |
| Max Green Setting (Gmax), s | | 53.0 | | 47.0 | 9.5 | 39.0 | | |
| Max Q Clear Time (g_c+I1), s | | 20.2 | | 10.1 | 3.0 | 8.7 | | |
| Green Ext Time (p_c), s | | 13.7 | | 1.4 | 0.1 | 11.5 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 13.3 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 34 | 645 | 93 | 16 | 651 | 107 | 90 | 115 | 10 | 119 | 98 | 38 |
| Future Volume (veh/h) | 34 | 645 | 93 | 16 | 651 | 107 | 90 | 115 | 10 | 119 | 98 | 38 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 35 | 665 | 96 | 16 | 671 | 110 | 93 | 119 | 0 | 123 | 101 | 0 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 451 | 1920 | 277 | 465 | 1897 | 311 | 118 | 163 | 0 | 176 | 224 | 0 |
| Arrive On Green | 0.02 | 0.62 | 0.62 | 0.02 | 0.62 | 0.62 | 0.07 | 0.09 | 0.00 | 0.10 | 0.12 | 0.00 |
| Sat Flow, veh/h | 1774 | 3102 | 447 | 1774 | 3042 | 498 | 1774 | 1863 | 0 | 1774 | 1863 | 0 |
| Grp Volume(v), veh/h | 35 | 379 | 382 | 16 | 390 | 391 | 93 | 119 | 0 | 123 | 101 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1780 | 1774 | 1770 | 1770 | 1774 | 1863 | 0 | 1774 | 1863 | 0 |
| Q Serve(g_s), s | 0.8 | 11.4 | 11.5 | 0.4 | 11.7 | 11.7 | 5.7 | 6.8 | 0.0 | 7.4 | 5.5 | 0.0 |
| Cycle Q Clear(g_c), s | 0.8 | 11.4 | 11.5 | 0.4 | 11.7 | 11.7 | 5.7 | 6.8 | 0.0 | 7.4 | 5.5 | 0.0 |
| Prop In Lane | 1.00 | | 0.25 | 1.00 | | 0.28 | 1.00 | | 0.00 | 1.00 | | 0.00 |
| Lane Grp Cap(c), veh/h | 451 | 1096 | 1102 | 465 | 1104 | 1104 | 118 | 163 | 0 | 176 | 224 | 0 |
| V/C Ratio(X) | 0.08 | 0.35 | 0.35 | 0.03 | 0.35 | 0.35 | 0.79 | 0.73 | 0.00 | 0.70 | 0.45 | 0.00 |
| Avail Cap(c_a), veh/h | 575 | 1096 | 1102 | 580 | 1104 | 1104 | 218 | 491 | 0 | 218 | 491 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.97 | 0.97 | 0.97 | 0.92 | 0.92 | 0.92 | 0.98 | 0.98 | 0.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh | 8.0 | 10.2 | 10.2 | 7.8 | 10.0 | 10.0 | 50.6 | 48.9 | 0.0 | 48.0 | 45.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 0.8 | 0.8 | 0.0 | 0.8 | 0.8 | 4.3 | 6.0 | 0.0 | 4.6 | 1.4 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.4 | 5.8 | 5.9 | 0.2 | 5.9 | 5.9 | 2.9 | 3.8 | 0.0 | 3.8 | 2.9 | 0.0 |
| LnGrp Delay(d),s/veh | 8.1 | 11.0 | 11.0 | 7.8 | 10.8 | 10.8 | 54.9 | 54.9 | 0.0 | 52.6 | 46.4 | 0.0 |
| LnGrp LOS | A | B | B | A | B | B | D | D | | D | D | |
| Approach Vol, veh/h | | 796 | | | 797 | | | 212 | | | 224 | |
| Approach Delay, s/veh | | 10.9 | | | 10.7 | | | 54.9 | | | 49.8 | |
| Approach LOS | | B | | | B | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 6.3 | 73.6 | 11.8 | 18.2 | 6.9 | 73.1 | 15.4 | 14.6 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 9.5 | 39.0 | 13.5 | 29.0 | 9.5 | 39.0 | 13.5 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 2.8 | 13.7 | 7.7 | 7.5 | 2.4 | 13.5 | 9.4 | 8.8 |
| Green Ext Time (p_c), s | 0.0 | 12.0 | 0.1 | 0.7 | 0.0 | 11.8 | 0.1 | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 19.7 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 8 | 56 | 8 | 191 | 98 | 164 | 16 | 746 | 189 | 128 | 627 | 11 |
| Future Volume (vph) | 8 | 56 | 8 | 191 | 98 | 164 | 16 | 746 | 189 | 128 | 627 | 11 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | 4.5 | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1758 | 1821 | | 1761 | 1863 | 1547 | 1763 | 3417 | | 1769 | 3527 | |
| Flt Permitted | 0.69 | 1.00 | | 0.54 | 1.00 | 1.00 | 0.38 | 1.00 | | 0.19 | 1.00 | |
| Satd. Flow (perm) | 1276 | 1821 | | 996 | 1863 | 1547 | 713 | 3417 | | 362 | 3527 | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 9 | 60 | 9 | 205 | 105 | 176 | 17 | 802 | 203 | 138 | 674 | 12 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 139 | 0 | 15 | 0 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 9 | 62 | 0 | 205 | 105 | 37 | 17 | 990 | 0 | 138 | 685 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Turn Type | pm+pt | NA | | pm+pt | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 6 | | | 2 | | |
| Actuated Green, G (s) | 13.2 | 12.3 | | 26.1 | 21.2 | 21.2 | 56.1 | 54.3 | | 64.9 | 59.1 | |
| Effective Green, g (s) | 13.2 | 12.3 | | 26.1 | 21.2 | 21.2 | 56.1 | 54.3 | | 64.9 | 59.1 | |
| Actuated g/C Ratio | 0.13 | 0.12 | | 0.26 | 0.21 | 0.21 | 0.56 | 0.54 | | 0.65 | 0.59 | |
| Clearance Time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | 4.5 | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Vehicle Extension (s) | 1.0 | 2.0 | | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | | 1.0 | 2.0 | |
| Lane Grp Cap (vph) | 172 | 223 | | 334 | 394 | 327 | 418 | 1855 | | 327 | 2084 | |
| v/s Ratio Prot | 0.00 | 0.03 | | c0.06 | 0.06 | | 0.00 | c0.29 | | c0.03 | 0.19 | |
| v/s Ratio Perm | 0.01 | | | c0.10 | | 0.02 | 0.02 | | | 0.25 | | |
| v/c Ratio | 0.05 | 0.28 | | 0.61 | 0.27 | 0.11 | 0.04 | 0.53 | | 0.42 | 0.33 | |
| Uniform Delay, d1 | 37.9 | 39.8 | | 31.0 | 32.9 | 31.8 | 9.7 | 14.7 | | 9.0 | 10.4 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 0.51 | 0.74 | |
| Incremental Delay, d2 | 0.0 | 0.2 | | 2.3 | 0.1 | 0.1 | 0.0 | 1.1 | | 0.3 | 0.4 | |
| Delay (s) | 37.9 | 40.1 | | 33.3 | 33.0 | 31.9 | 9.7 | 15.8 | | 4.9 | 8.0 | |
| Level of Service | D | D | | C | C | C | A | B | | A | A | |
| Approach Delay (s) | | 39.8 | | | 32.7 | | | 15.7 | | | 7.5 | |
| Approach LOS | | D | | | C | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 17.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.57 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 63.5% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 55 | 379 | 42 | 98 | 387 | 32 | 75 | 127 | 107 | 83 | 134 | 40 |
| Future Volume (veh/h) | 55 | 379 | 42 | 98 | 387 | 32 | 75 | 127 | 107 | 83 | 134 | 40 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 1.00 | 0.99 | | 0.98 | 0.99 | | 0.99 | 0.99 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1845 | 1845 | 1900 | 1845 | 1845 | 1900 | 1845 | 1845 | 1845 | 1845 | 1845 | 1900 |
| Adj Flow Rate, veh/h | 59 | 403 | 0 | 104 | 412 | 34 | 80 | 135 | 114 | 88 | 143 | 43 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 384 | 728 | 0 | 417 | 765 | 63 | 442 | 393 | 329 | 470 | 295 | 89 |
| Arrive On Green | 0.07 | 0.21 | 0.00 | 0.09 | 0.23 | 0.23 | 0.08 | 0.21 | 0.21 | 0.09 | 0.22 | 0.22 |
| Sat Flow, veh/h | 1757 | 3597 | 0 | 1757 | 3274 | 269 | 1757 | 1845 | 1546 | 1757 | 1358 | 408 |
| Grp Volume(v), veh/h | 59 | 403 | 0 | 104 | 220 | 226 | 80 | 135 | 114 | 88 | 0 | 186 |
| Grp Sat Flow(s),veh/h/ln | 1757 | 1752 | 0 | 1757 | 1752 | 1790 | 1757 | 1845 | 1546 | 1757 | 0 | 1766 |
| Q Serve(g_s), s | 1.2 | 4.9 | 0.0 | 2.1 | 5.2 | 5.3 | 1.6 | 3.0 | 3.0 | 1.8 | 0.0 | 4.4 |
| Cycle Q Clear(g_c), s | 1.2 | 4.9 | 0.0 | 2.1 | 5.2 | 5.3 | 1.6 | 3.0 | 3.0 | 1.8 | 0.0 | 4.4 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.15 | 1.00 | | 1.00 | 1.00 | | 0.23 |
| Lane Grp Cap(c), veh/h | 384 | 728 | 0 | 417 | 409 | 418 | 442 | 393 | 329 | 470 | 0 | 384 |
| V/C Ratio(X) | 0.15 | 0.55 | 0.00 | 0.25 | 0.54 | 0.54 | 0.18 | 0.34 | 0.35 | 0.19 | 0.00 | 0.48 |
| Avail Cap(c_a), veh/h | 541 | 2575 | 0 | 528 | 1287 | 1315 | 574 | 968 | 811 | 594 | 0 | 964 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 13.1 | 16.9 | 0.0 | 12.6 | 16.0 | 16.0 | 12.6 | 15.9 | 15.9 | 12.4 | 0.0 | 16.3 |
| Incr Delay (d2), s/veh | 0.1 | 0.2 | 0.0 | 0.1 | 0.4 | 0.4 | 0.1 | 0.2 | 0.2 | 0.1 | 0.0 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.6 | 2.4 | 0.0 | 1.0 | 2.5 | 2.6 | 0.8 | 1.5 | 1.3 | 0.8 | 0.0 | 2.2 |
| LnGrp Delay(d),s/veh | 13.2 | 17.1 | 0.0 | 12.7 | 16.4 | 16.4 | 12.7 | 16.1 | 16.2 | 12.5 | 0.0 | 16.7 |
| LnGrp LOS | B | B | | B | B | B | B | B | B | B | | B |
| Approach Vol, veh/h | | 462 | | | 550 | | | 329 | | | 274 | |
| Approach Delay, s/veh | | 16.6 | | | 15.7 | | | 15.3 | | | 15.3 | |
| Approach LOS | | B | | | B | | | B | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 9.0 | 14.9 | 8.4 | 15.3 | 7.8 | 16.1 | 8.6 | 15.1 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 7.5 | 35.0 | 7.5 | 26.0 | 7.5 | 35.0 | 7.5 | 25.0 |
| Max Q Clear Time (g_c+I1), s | 4.1 | 6.9 | 3.6 | 6.4 | 3.2 | 7.3 | 3.8 | 5.0 |
| Green Ext Time (p_c), s | 0.0 | 1.0 | 0.0 | 0.6 | 0.0 | 0.9 | 0.0 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 15.8 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 53 | 463 | 87 | 48 | 394 | 246 | 72 | 505 | 26 | 261 | 419 | 24 |
| Future Volume (veh/h) | 53 | 463 | 87 | 48 | 394 | 246 | 72 | 505 | 26 | 261 | 419 | 24 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 56 | 487 | 92 | 51 | 415 | 259 | 76 | 532 | 0 | 275 | 441 | 25 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 72 | 707 | 133 | 152 | 592 | 366 | 338 | 1007 | 0 | 419 | 1125 | 64 |
| Arrive On Green | 0.04 | 0.24 | 0.24 | 0.03 | 0.09 | 0.09 | 0.19 | 0.28 | 0.00 | 0.23 | 0.33 | 0.33 |
| Sat Flow, veh/h | 1792 | 2997 | 563 | 1792 | 2115 | 1306 | 1792 | 3668 | 0 | 1792 | 3438 | 194 |
| Grp Volume(v), veh/h | 56 | 289 | 290 | 51 | 350 | 324 | 76 | 532 | 0 | 275 | 229 | 237 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1773 | 1792 | 1787 | 1634 | 1792 | 1787 | 0 | 1792 | 1787 | 1845 |
| Q Serve(g_s), s | 3.4 | 16.2 | 16.4 | 3.1 | 20.9 | 21.2 | 4.0 | 13.8 | 0.0 | 15.3 | 10.9 | 10.9 |
| Cycle Q Clear(g_c), s | 3.4 | 16.2 | 16.4 | 3.1 | 20.9 | 21.2 | 4.0 | 13.8 | 0.0 | 15.3 | 10.9 | 10.9 |
| Prop In Lane | 1.00 | | 0.32 | 1.00 | | 0.80 | 1.00 | | 0.00 | 1.00 | | 0.11 |
| Lane Grp Cap(c), veh/h | 72 | 421 | 418 | 152 | 501 | 458 | 338 | 1007 | 0 | 419 | 585 | 604 |
| V/C Ratio(X) | 0.77 | 0.69 | 0.69 | 0.34 | 0.70 | 0.71 | 0.22 | 0.53 | 0.00 | 0.66 | 0.39 | 0.39 |
| Avail Cap(c_a), veh/h | 130 | 569 | 564 | 152 | 585 | 535 | 338 | 1007 | 0 | 419 | 585 | 604 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.97 | 0.97 | 0.97 | 0.84 | 0.84 | 0.84 | 0.96 | 0.96 | 0.00 | 0.92 | 0.92 | 0.92 |
| Uniform Delay (d), s/veh | 52.3 | 38.3 | 38.4 | 50.4 | 45.4 | 45.5 | 37.8 | 33.3 | 0.0 | 38.1 | 28.5 | 28.6 |
| Incr Delay (d2), s/veh | 6.2 | 2.8 | 3.0 | 0.4 | 3.1 | 3.6 | 0.1 | 1.9 | 0.0 | 2.7 | 1.8 | 1.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.8 | 8.4 | 8.4 | 1.5 | 10.8 | 10.1 | 2.0 | 7.1 | 0.0 | 7.9 | 5.6 | 5.8 |
| LnGrp Delay(d),s/veh | 58.5 | 41.2 | 41.4 | 50.8 | 48.5 | 49.1 | 37.9 | 35.2 | 0.0 | 40.8 | 30.4 | 30.3 |
| LnGrp LOS | E | D | D | D | D | D | D | D | | D | C | C |
| Approach Vol, veh/h | | 635 | | | 725 | | | 608 | | | 741 | |
| Approach Delay, s/veh | | 42.8 | | | 48.9 | | | 35.6 | | | 34.2 | |
| Approach LOS | | D | | | D | | | D | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 24.8 | 41.0 | 8.4 | 35.8 | 29.8 | 36.0 | 13.3 | 30.9 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 5.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Green Setting (Gmax), s | 12.0 | 36.0 | 8.0 | 36.0 | 17.0 | 31.0 | 9.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 6.0 | 12.9 | 5.4 | 23.2 | 17.3 | 15.8 | 5.1 | 18.4 |
| Green Ext Time (p_c), s | 0.0 | 3.8 | 0.0 | 5.7 | 0.0 | 5.2 | 0.0 | 5.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 40.5 |
| HCM 2010 LOS | D |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 112 | 648 | 134 | 20 | 558 | 82 | 18 | 364 | 132 | 173 | 348 | 133 |
| Future Volume (veh/h) | 112 | 648 | 134 | 20 | 558 | 82 | 18 | 364 | 132 | 173 | 348 | 133 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 119 | 689 | 143 | 21 | 594 | 87 | 19 | 387 | 140 | 184 | 370 | 141 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 513 | 1499 | 311 | 25 | 724 | 106 | 23 | 490 | 175 | 213 | 765 | 287 |
| Arrive On Green | 0.29 | 0.51 | 0.51 | 0.01 | 0.23 | 0.23 | 0.01 | 0.19 | 0.19 | 0.12 | 0.30 | 0.30 |
| Sat Flow, veh/h | 1774 | 2917 | 605 | 1774 | 3094 | 452 | 1774 | 2547 | 908 | 1774 | 2512 | 943 |
| Grp Volume(v), veh/h | 119 | 418 | 414 | 21 | 339 | 342 | 19 | 267 | 260 | 184 | 259 | 252 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1752 | 1774 | 1770 | 1776 | 1774 | 1770 | 1686 | 1774 | 1770 | 1685 |
| Q Serve(g_s), s | 5.6 | 16.5 | 16.6 | 1.3 | 20.0 | 20.1 | 1.2 | 15.8 | 16.2 | 11.2 | 13.1 | 13.4 |
| Cycle Q Clear(g_c), s | 5.6 | 16.5 | 16.6 | 1.3 | 20.0 | 20.1 | 1.2 | 15.8 | 16.2 | 11.2 | 13.1 | 13.4 |
| Prop In Lane | 1.00 | | 0.35 | 1.00 | | 0.25 | 1.00 | | 0.54 | 1.00 | | 0.56 |
| Lane Grp Cap(c), veh/h | 513 | 909 | 900 | 25 | 414 | 416 | 23 | 341 | 325 | 213 | 539 | 513 |
| V/C Ratio(X) | 0.23 | 0.46 | 0.46 | 0.83 | 0.82 | 0.82 | 0.84 | 0.78 | 0.80 | 0.86 | 0.48 | 0.49 |
| Avail Cap(c_a), veh/h | 513 | 909 | 900 | 258 | 475 | 476 | 161 | 458 | 437 | 306 | 603 | 575 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.48 | 0.48 | 0.48 | 1.00 | 1.00 | 1.00 | 0.88 | 0.88 | 0.88 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 29.8 | 17.0 | 17.0 | 54.1 | 39.9 | 39.9 | 54.2 | 42.2 | 42.4 | 47.5 | 31.1 | 31.3 |
| Incr Delay (d2), s/veh | 0.0 | 0.2 | 0.2 | 21.9 | 16.3 | 16.6 | 22.7 | 5.5 | 6.7 | 11.8 | 0.7 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.7 | 8.1 | 8.0 | 0.8 | 11.7 | 11.8 | 0.7 | 8.2 | 8.1 | 6.2 | 6.5 | 6.3 |
| LnGrp Delay(d),s/veh | 29.8 | 17.3 | 17.3 | 76.0 | 56.2 | 56.5 | 76.9 | 47.8 | 49.0 | 59.3 | 31.8 | 32.0 |
| LnGrp LOS | C | B | B | E | E | E | E | D | D | E | C | C |
| Approach Vol, veh/h | | 951 | | | 702 | | | 546 | | | 695 | |
| Approach Delay, s/veh | | 18.8 | | | 57.0 | | | 49.4 | | | 39.1 | |
| Approach LOS | | B | | | E | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 36.3 | 30.3 | 5.4 | 38.0 | 5.6 | 61.0 | 17.7 | 25.7 |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 |
| Max Green Setting (Gmax), s | 16.0 | * 30 | 10.0 | 37.5 | 16.0 | 29.5 | 19.0 | * 29 |
| Max Q Clear Time (g_c+I1), s | 7.6 | 22.1 | 3.2 | 15.4 | 3.3 | 18.6 | 13.2 | 18.2 |
| Green Ext Time (p_c), s | 0.1 | 2.5 | 0.0 | 2.0 | 0.0 | 4.0 | 0.1 | 1.6 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 38.7 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 12.4 |
| Intersection LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 38 | 144 | 26 | 56 | 168 | 68 | 53 | 148 | 64 | 65 | 102 | 71 |
| Future Vol, veh/h | 38 | 144 | 26 | 56 | 168 | 68 | 53 | 148 | 64 | 65 | 102 | 71 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 39 | 148 | 27 | 58 | 173 | 70 | 55 | 153 | 66 | 67 | 105 | 73 |
| Number of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 2 | 2 | 2 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 2 | 2 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 2 | 2 | 2 | 2 |
| HCM Control Delay | 12.1 | 13.1 | 12.6 | 11.7 |
| HCM LOS | B | B | B | B |

| Lane | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 100% | 0% | 100% | 0% | 100% | 0% | 100% | 0% |
| Vol Thru, % | 0% | 70% | 0% | 85% | 0% | 71% | 0% | 59% |
| Vol Right, % | 0% | 30% | 0% | 15% | 0% | 29% | 0% | 41% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 53 | 212 | 38 | 170 | 56 | 236 | 65 | 173 |
| LT Vol | 53 | 0 | 38 | 0 | 56 | 0 | 65 | 0 |
| Through Vol | 0 | 148 | 0 | 144 | 0 | 168 | 0 | 102 |
| RT Vol | 0 | 64 | 0 | 26 | 0 | 68 | 0 | 71 |
| Lane Flow Rate | 55 | 219 | 39 | 175 | 58 | 243 | 67 | 178 |
| Geometry Grp | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Degree of Util (X) | 0.107 | 0.385 | 0.078 | 0.319 | 0.113 | 0.426 | 0.133 | 0.313 |
| Departure Headway (Hd) | 7.071 | 6.348 | 7.164 | 6.545 | 7.016 | 6.303 | 7.125 | 6.324 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 504 | 564 | 498 | 547 | 509 | 569 | 501 | 565 |
| Service Time | 4.852 | 4.128 | 4.945 | 4.326 | 4.791 | 4.077 | 4.907 | 4.105 |
| HCM Lane V/C Ratio | 0.109 | 0.388 | 0.078 | 0.32 | 0.114 | 0.427 | 0.134 | 0.315 |
| HCM Control Delay | 10.7 | 13.1 | 10.6 | 12.4 | 10.7 | 13.7 | 11 | 12 |
| HCM Lane LOS | B | B | B | B | B | B | B | B |
| HCM 95th-tile Q | 0.4 | 1.8 | 0.3 | 1.4 | 0.4 | 2.1 | 0.5 | 1.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 48 | 200 | 156 | 239 | 236 | 30 | 152 | 556 | 257 | 29 | 508 | 69 |
| Future Volume (veh/h) | 48 | 200 | 156 | 239 | 236 | 30 | 152 | 556 | 257 | 29 | 508 | 69 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 51 | 211 | 164 | 177 | 353 | 32 | 160 | 585 | 271 | 31 | 535 | 73 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 280 | 305 | 224 | 225 | 427 | 38 | 186 | 1072 | 676 | 407 | 1365 | 186 |
| Arrive On Green | 0.16 | 0.16 | 0.16 | 0.13 | 0.13 | 0.13 | 0.21 | 0.60 | 0.60 | 0.45 | 0.86 | 0.86 |
| Sat Flow, veh/h | 1792 | 1948 | 1434 | 1792 | 3394 | 306 | 1792 | 3574 | 1583 | 1792 | 3157 | 429 |
| Grp Volume(v), veh/h | 51 | 193 | 182 | 177 | 195 | 190 | 160 | 585 | 271 | 31 | 302 | 306 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1595 | 1792 | 1881 | 1818 | 1792 | 1787 | 1583 | 1792 | 1787 | 1800 |
| Q Serve(g_s), s | 2.7 | 11.2 | 12.0 | 10.5 | 11.1 | 11.2 | 9.5 | 10.7 | 9.4 | 1.1 | 3.8 | 3.8 |
| Cycle Q Clear(g_c), s | 2.7 | 11.2 | 12.0 | 10.5 | 11.1 | 11.2 | 9.5 | 10.7 | 9.4 | 1.1 | 3.8 | 3.8 |
| Prop In Lane | 1.00 | | 0.90 | 1.00 | | 0.17 | 1.00 | | 1.00 | 1.00 | | 0.24 |
| Lane Grp Cap(c), veh/h | 280 | 279 | 249 | 225 | 236 | 229 | 186 | 1072 | 676 | 407 | 773 | 778 |
| V/C Ratio(X) | 0.18 | 0.69 | 0.73 | 0.79 | 0.82 | 0.83 | 0.86 | 0.55 | 0.40 | 0.08 | 0.39 | 0.39 |
| Avail Cap(c_a), veh/h | 505 | 504 | 450 | 261 | 274 | 265 | 228 | 1072 | 676 | 407 | 773 | 778 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.90 | 0.90 | 0.90 | 0.87 | 0.87 | 0.87 | 0.97 | 0.97 | 0.97 |
| Uniform Delay (d), s/veh | 40.3 | 43.9 | 44.2 | 46.7 | 46.9 | 47.0 | 42.8 | 17.5 | 11.9 | 23.5 | 4.5 | 4.5 |
| Incr Delay (d2), s/veh | 0.4 | 4.3 | 5.8 | 9.8 | 12.8 | 14.4 | 18.3 | 1.7 | 1.6 | 0.0 | 1.4 | 1.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.4 | 5.9 | 5.7 | 5.8 | 6.6 | 6.6 | 5.6 | 5.5 | 5.1 | 0.5 | 2.0 | 2.0 |
| LnGrp Delay(d),s/veh | 40.7 | 48.1 | 50.0 | 56.5 | 59.7 | 61.3 | 61.1 | 19.3 | 13.5 | 23.5 | 5.9 | 5.9 |
| LnGrp LOS | D | D | D | E | E | E | E | B | B | C | A | A |
| Approach Vol, veh/h | | 426 | | | 562 | | | 1016 | | | 639 | |
| Approach Delay, s/veh | | 48.0 | | | 59.2 | | | 24.3 | | | 6.8 | |
| Approach LOS | | D | | | E | | | C | | | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 15.4 | 52.6 | | 19.8 | 30.0 | 38.0 | | 22.2 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | | 6.0 | 5.0 | * 5 | | 5.0 |
| Max Green Setting (Gmax), s | 14.0 | 29.0 | | 16.0 | 10.0 | * 33 | | 31.0 |
| Max Q Clear Time (g_c+I1), s | 11.5 | 5.8 | | 13.2 | 3.1 | 12.7 | | 14.0 |
| Green Ext Time (p_c), s | 0.0 | 5.2 | | 0.6 | 0.0 | 8.2 | | 3.2 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 31.3 |
| HCM 2010 LOS | C |

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Intersection | |
|---|---|
| Int Delay, s/veh | 15.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 10 | 1 | 29 | 77 | 9 | 71 | 37 | 823 | 124 | 54 | 702 | 22 |
| Future Vol, veh/h | 10 | 1 | 29 | 77 | 9 | 71 | 37 | 823 | 124 | 54 | 702 | 22 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | 0 | 150 | - | - | 150 | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 |
| Heavy Vehicles, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Mvmt Flow | 11 | 1 | 31 | 82 | 10 | 76 | 39 | 876 | 132 | 57 | 747 | 23 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1394 | 1959 | 385 | 1508 | 1904 | 504 | 770 | 0 | 0 | 1008 | 0 | 0 |
| Stage 1 | 873 | 873 | - | 1020 | 1020 | - | - | - | - | - | - | - |
| Stage 2 | 521 | 1086 | - | 488 | 884 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.52 | 6.52 | 6.92 | 7.52 | 6.52 | 6.92 | 4.12 | - | - | 4.12 | - | - |
| Critical Hdwy Stg 1 | 6.52 | 5.52 | - | 6.52 | 5.52 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.52 | 5.52 | - | 6.52 | 5.52 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.51 | 4.01 | 3.31 | 3.51 | 4.01 | 3.31 | 2.21 | - | - | 2.21 | - | - |
| Pot Cap-1 Maneuver | 102 | 64 | 616 | 84 | 69 | 516 | 847 | - | - | 689 | - | - |
| Stage 1 | 313 | 368 | - | 255 | 314 | - | - | - | - | - | - | - |
| Stage 2 | 509 | 293 | - | 533 | 364 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | 69 | 56 | 616 | ~ 71 | 60 | 516 | 847 | - | - | 689 | - | - |
| Mov Cap-2 Maneuver | 69 | 56 | - | ~ 71 | 60 | - | - | - | - | - | - | - |
| Stage 1 | 299 | 337 | - | 243 | 300 | - | - | - | - | - | - | - |
| Stage 2 | 401 | 280 | - | 463 | 334 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 29.2 | 177.2 | 0.4 | 0.7 |
| HCM LOS | D | F | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | WBLn1 | WBLn2 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 847 | - | - | 191 | 70 | 516 | 689 | - | - |
| HCM Lane V/C Ratio | 0.046 | - | - | 0.223 | 1.307 | 0.146 | 0.083 | - | - |
| HCM Control Delay (s) | 9.5 | - | - | 29.2 | $ 312.6 | 13.2 | 10.7 | - | - |
| HCM Lane LOS | A | - | - | D | F | B | B | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0.8 | 7.4 | 0.5 | 0.3 | - | - |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 30 | 21 | 1 | 285 | 4 | 120 | 1 | 852 | 206 | 102 | 713 | 6 |
| Future Volume (veh/h) | 30 | 21 | 1 | 285 | 4 | 120 | 1 | 852 | 206 | 102 | 713 | 6 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.95 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1881 | 1900 | 1900 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 31 | 22 | 1 | 297 | 4 | 125 | 1 | 888 | 215 | 106 | 743 | 6 |
| Adj No. of Lanes | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 68 | 48 | 2 | 361 | 5 | 321 | 433 | 1451 | 351 | 435 | 2202 | 18 |
| Arrive On Green | 0.06 | 0.06 | 0.06 | 0.20 | 0.20 | 0.20 | 1.00 | 1.00 | 1.00 | 0.06 | 0.61 | 0.61 |
| Sat Flow, veh/h | 1045 | 742 | 34 | 1769 | 24 | 1575 | 715 | 2849 | 689 | 1792 | 3634 | 29 |
| Grp Volume(v), veh/h | 54 | 0 | 0 | 301 | 0 | 125 | 1 | 557 | 546 | 106 | 365 | 384 |
| Grp Sat Flow(s),veh/h/ln | 1821 | 0 | 0 | 1793 | 0 | 1575 | 715 | 1787 | 1752 | 1792 | 1787 | 1876 |
| Q Serve(g_s), s | 2.9 | 0.0 | 0.0 | 16.1 | 0.0 | 6.9 | 0.0 | 0.0 | 0.0 | 2.6 | 10.1 | 10.1 |
| Cycle Q Clear(g_c), s | 2.9 | 0.0 | 0.0 | 16.1 | 0.0 | 6.9 | 0.4 | 0.0 | 0.0 | 2.6 | 10.1 | 10.1 |
| Prop In Lane | 0.57 | | 0.02 | 0.99 | | 1.00 | 1.00 | | 0.39 | 1.00 | | 0.02 |
| Lane Grp Cap(c), veh/h | 118 | 0 | 0 | 366 | 0 | 321 | 433 | 910 | 892 | 435 | 1083 | 1137 |
| V/C Ratio(X) | 0.46 | 0.00 | 0.00 | 0.82 | 0.00 | 0.39 | 0.00 | 0.61 | 0.61 | 0.24 | 0.34 | 0.34 |
| Avail Cap(c_a), veh/h | 437 | 0 | 0 | 466 | 0 | 410 | 433 | 910 | 892 | 459 | 1083 | 1137 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 45.1 | 0.0 | 0.0 | 38.1 | 0.0 | 34.4 | 0.0 | 0.0 | 0.0 | 9.1 | 9.8 | 9.8 |
| Incr Delay (d2), s/veh | 1.0 | 0.0 | 0.0 | 7.3 | 0.0 | 0.3 | 0.0 | 3.1 | 3.1 | 0.1 | 0.8 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.5 | 0.0 | 0.0 | 8.7 | 0.0 | 3.0 | 0.0 | 0.8 | 0.8 | 1.2 | 5.2 | 5.5 |
| LnGrp Delay(d),s/veh | 46.1 | 0.0 | 0.0 | 45.4 | 0.0 | 34.7 | 0.0 | 3.1 | 3.1 | 9.2 | 10.6 | 10.6 |
| LnGrp LOS | D | | | D | | C | A | A | A | A | B | B |
| Approach Vol, veh/h | | 54 | | | 426 | | | 1104 | | | 855 | |
| Approach Delay, s/veh | | 46.1 | | | 42.3 | | | 3.1 | | | 10.4 | |
| Approach LOS | | D | | | D | | | A | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 9.7 | 55.4 | | 24.4 | | 65.1 | | 10.5 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | | 4.0 | | 4.5 | | 4.0 |
| Max Green Setting (Gmax), s | 7.0 | 26.5 | | 26.0 | | 37.5 | | 24.0 |
| Max Q Clear Time (g_c+I1), s | 4.6 | 2.4 | | 18.1 | | 12.1 | | 4.9 |
| Green Ext Time (p_c), s | 0.0 | 11.8 | | 1.5 | | 7.4 | | 0.1 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 13.4 |
| HCM 2010 LOS | B |

Notes

User approved changes to right turn type.

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 7.6 |
| Intersection LOS | A |

| Approach | EB | WB | SB |
|---|---|---|---|
| Entry Lanes | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 333 | 423 | 259 |
| Demand Flow Rate, veh/h | 337 | 428 | 261 |
| Vehicles Circulating, veh/h | 136 | 69 | 258 |
| Vehicles Exiting, veh/h | 383 | 404 | 239 |
| Follow-Up Headway, s | 3.186 | 3.186 | 3.186 |
| Ped Vol Crossing Leg, #/h | 10 | 10 | 10 |
| Ped Cap Adj | 0.999 | 0.999 | 0.999 |
| Approach Delay, s/veh | 7.3 | 7.8 | 7.4 |
| Approach LOS | A | A | A |

| Lane | Left | Left | Left |
|---|---|---|---|
| Designated Moves | LT | TR | LR |
| Assumed Moves | LT | TR | LR |
| RT Channelized | | | |
| Lane Util | 1.000 | 1.000 | 1.000 |
| Critical Headway, s | 5.193 | 5.193 | 5.193 |
| Entry Flow, veh/h | 337 | 428 | 261 |
| Cap Entry Lane, veh/h | 986 | 1055 | 873 |
| Entry HV Adj Factor | 0.989 | 0.989 | 0.992 |
| Flow Entry, veh/h | 333 | 423 | 259 |
| Cap Entry, veh/h | 974 | 1042 | 865 |
| V/C Ratio | 0.342 | 0.406 | 0.299 |
| Control Delay, s/veh | 7.3 | 7.8 | 7.4 |
| LOS | A | A | A |
| 95th %tile Queue, veh | 2 | 2 | 1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 5 | 5 | 2 | 14 | 11 | 270 | 0 | 55 | 16 | 316 | 71 | 12 |
| Future Volume (veh/h) | 5 | 5 | 2 | 14 | 11 | 270 | 0 | 55 | 16 | 316 | 71 | 12 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.98 | 0.98 | | 0.98 | 1.00 | | 0.97 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1900 | 1881 | 1881 | 1900 | 1881 | 1900 | 1900 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 5 | 5 | 2 | 15 | 12 | 293 | 0 | 60 | 17 | 343 | 77 | 13 |
| Adj No. of Lanes | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 391 | 286 | 114 | 292 | 199 | 885 | 0 | 190 | 54 | 475 | 107 | 18 |
| Arrive On Green | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.00 | 0.14 | 0.14 | 0.33 | 0.33 | 0.33 |
| Sat Flow, veh/h | 1065 | 1270 | 508 | 734 | 885 | 1563 | 0 | 1401 | 397 | 1425 | 320 | 54 |
| Grp Volume(v), veh/h | 5 | 0 | 7 | 27 | 0 | 293 | 0 | 0 | 77 | 433 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1065 | 0 | 1778 | 1619 | 0 | 1563 | 0 | 0 | 1798 | 1799 | 0 | 0 |
| Q Serve(g_s), s | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 | 4.5 | 0.0 | 0.0 | 1.7 | 9.3 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 0.7 | 0.0 | 0.1 | 0.5 | 0.0 | 4.5 | 0.0 | 0.0 | 1.7 | 9.3 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.29 | 0.56 | | 1.00 | 0.00 | | 0.22 | 0.79 | | 0.03 |
| Lane Grp Cap(c), veh/h | 391 | 0 | 400 | 491 | 0 | 885 | 0 | 0 | 244 | 599 | 0 | 0 |
| V/C Ratio(X) | 0.01 | 0.00 | 0.02 | 0.05 | 0.00 | 0.33 | 0.00 | 0.00 | 0.32 | 0.72 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 1009 | 0 | 1431 | 1402 | 0 | 1791 | 0 | 0 | 938 | 1449 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 13.7 | 0.0 | 13.3 | 13.4 | 0.0 | 5.3 | 0.0 | 0.0 | 17.2 | 12.9 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 0.0 | 0.0 | 1.0 | 2.4 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 0.0 | 0.1 | 0.3 | 0.0 | 3.4 | 0.0 | 0.0 | 0.9 | 5.0 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 13.7 | 0.0 | 13.3 | 13.5 | 0.0 | 5.6 | 0.0 | 0.0 | 18.3 | 15.3 | 0.0 | 0.0 |
| LnGrp LOS | B | | B | B | | A | | | B | B | | |
| Approach Vol, veh/h | | 12 | | | 320 | | | 77 | | | 433 | |
| Approach Delay, s/veh | | 13.5 | | | 6.3 | | | 18.3 | | | 15.3 | |
| Approach LOS | | B | | | A | | | B | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 14.4 | | 19.2 | | 14.4 | | 10.5 |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 35.5 | | 35.5 | | 35.5 | | 23.0 |
| Max Q Clear Time (g_c+I1), s | | 2.7 | | 11.3 | | 6.5 | | 3.7 |
| Green Ext Time (p_c), s | | 0.0 | | 3.0 | | 2.4 | | 0.3 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.1 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 35 | 211 | 109 | 67 | 183 | 153 | 83 | 767 | 57 | 199 | 617 | 37 |
| Future Volume (veh/h) | 35 | 211 | 109 | 67 | 183 | 153 | 83 | 767 | 57 | 199 | 617 | 37 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.98 | 0.99 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 37 | 224 | 116 | 71 | 195 | 163 | 88 | 816 | 61 | 212 | 656 | 39 |
| Adj No. of Lanes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 213 | 309 | 258 | 205 | 330 | 276 | 112 | 1179 | 88 | 499 | 1955 | 116 |
| Arrive On Green | 0.04 | 0.16 | 0.16 | 0.05 | 0.18 | 0.18 | 0.02 | 0.12 | 0.12 | 0.09 | 0.19 | 0.19 |
| Sat Flow, veh/h | 1792 | 1881 | 1570 | 1792 | 1881 | 1572 | 1792 | 3368 | 252 | 1792 | 3427 | 204 |
| Grp Volume(v), veh/h | 37 | 224 | 116 | 71 | 195 | 163 | 88 | 433 | 444 | 212 | 342 | 353 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1881 | 1570 | 1792 | 1881 | 1572 | 1792 | 1787 | 1832 | 1792 | 1787 | 1843 |
| Q Serve(g_s), s | 1.9 | 12.4 | 7.3 | 3.6 | 10.5 | 5.9 | 5.4 | 25.6 | 25.6 | 12.3 | 18.2 | 18.3 |
| Cycle Q Clear(g_c), s | 1.9 | 12.4 | 7.3 | 3.6 | 10.5 | 5.9 | 5.4 | 25.6 | 25.6 | 12.3 | 18.2 | 18.3 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.14 | 1.00 | | 0.11 |
| Lane Grp Cap(c), veh/h | 213 | 309 | 258 | 205 | 330 | 276 | 112 | 625 | 641 | 499 | 1019 | 1051 |
| V/C Ratio(X) | 0.17 | 0.73 | 0.45 | 0.35 | 0.59 | 0.59 | 0.78 | 0.69 | 0.69 | 0.42 | 0.34 | 0.34 |
| Avail Cap(c_a), veh/h | 310 | 487 | 407 | 281 | 487 | 407 | 163 | 625 | 641 | 499 | 1019 | 1051 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.86 | 0.86 | 0.86 |
| Uniform Delay (d), s/veh | 36.3 | 43.6 | 41.5 | 36.3 | 41.7 | 13.2 | 53.1 | 43.0 | 43.0 | 41.6 | 26.6 | 26.6 |
| Incr Delay (d2), s/veh | 0.1 | 1.2 | 0.5 | 0.4 | 0.6 | 0.8 | 8.2 | 6.2 | 6.1 | 0.2 | 0.8 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.9 | 6.6 | 3.2 | 1.8 | 5.5 | 2.6 | 2.9 | 13.8 | 14.1 | 6.1 | 9.3 | 9.6 |
| LnGrp Delay(d),s/veh | 36.4 | 44.9 | 42.0 | 36.7 | 42.4 | 14.0 | 61.4 | 49.1 | 49.0 | 41.8 | 27.3 | 27.3 |
| LnGrp LOS | D | D | D | D | D | B | E | D | D | D | C | C |
| Approach Vol, veh/h | | 377 | | | 429 | | | 965 | | | 907 | |
| Approach Delay, s/veh | | 43.1 | | | 30.6 | | | 50.2 | | | 30.7 | |
| Approach LOS | | D | | | C | | | D | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 15.1 | 43.0 | 9.3 | 22.5 | 10.9 | 67.2 | 8.1 | 23.8 |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.0 | 4.5 |
| Max Green Setting (Gmax), s | 16.0 | * 39 | 10.0 | 28.5 | 10.0 | 44.5 | 10.0 | 28.5 |
| Max Q Clear Time (g_c+I1), s | 14.3 | 27.6 | 5.6 | 14.4 | 7.4 | 20.3 | 3.9 | 12.5 |
| Green Ext Time (p_c), s | 0.1 | 4.1 | 0.0 | 0.7 | 0.0 | 1.5 | 0.0 | 0.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 39.5 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 0 | 1 | 1 | 251 | 2 | 113 | 0 | 871 | 224 | 130 | 896 | 0 |
| Future Volume (vph) | 0 | 1 | 1 | 251 | 2 | 113 | 0 | 871 | 224 | 130 | 896 | 0 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | 4.5 | | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | 0.97 | | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.93 | | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | 1.00 | | | 0.95 | 1.00 | | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1735 | | | 1774 | 1557 | | 3574 | 1531 | 1786 | 3574 | |
| Flt Permitted | | 1.00 | | | 0.73 | 1.00 | | 1.00 | 1.00 | 0.22 | 1.00 | |
| Satd. Flow (perm) | | 1735 | | | 1354 | 1557 | | 3574 | 1531 | 413 | 3574 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 0 | 1 | 1 | 264 | 2 | 119 | 0 | 917 | 236 | 137 | 943 | 0 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 0 | 89 | 0 | 0 | 76 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 1 | 0 | 0 | 266 | 30 | 0 | 917 | 160 | 137 | 943 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | | NA | | Perm | NA | Perm | Perm | NA | Perm | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | | 25.5 | | | 25.5 | 25.5 | | 52.9 | 52.9 | 65.5 | 65.5 | |
| Effective Green, g (s) | | 25.5 | | | 25.5 | 25.5 | | 52.9 | 52.9 | 65.5 | 65.5 | |
| Actuated g/C Ratio | | 0.26 | | | 0.26 | 0.26 | | 0.53 | 0.53 | 0.66 | 0.66 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | 4.5 | | 4.5 | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 442 | | | 345 | 397 | | 1890 | 809 | 388 | 2340 | |
| v/s Ratio Prot | | 0.00 | | | | | | c0.26 | | 0.03 | c0.26 | |
| v/s Ratio Perm | | | | | c0.20 | 0.02 | | | 0.10 | 0.20 | | |
| v/c Ratio | | 0.00 | | | 0.77 | 0.08 | | 0.49 | 0.20 | 0.35 | 0.40 | |
| Uniform Delay, d1 | | 27.8 | | | 34.5 | 28.3 | | 14.9 | 12.4 | 8.3 | 8.1 | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.0 | | | 10.2 | 0.1 | | 0.9 | 0.5 | 0.6 | 0.5 | |
| Delay (s) | | 27.8 | | | 44.7 | 28.4 | | 15.8 | 12.9 | 8.8 | 8.6 | |
| Level of Service | | C | | | D | C | | B | B | A | A | |
| Approach Delay (s) | | 27.8 | | | 39.7 | | | 15.2 | | | 8.6 | |
| Approach LOS | | C | | | D | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 16.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.57 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 63.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 60 | 470 | 50 | 70 | 690 | 150 | 120 | 1140 | 40 | 150 | 920 | 190 |
| Future Volume (veh/h) | 60 | 470 | 50 | 70 | 690 | 150 | 120 | 1140 | 40 | 150 | 920 | 190 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 62 | 490 | 52 | 73 | 719 | 156 | 125 | 1188 | 42 | 156 | 958 | 198 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 93 | 681 | 72 | 204 | 789 | 171 | 293 | 1451 | 51 | 183 | 1021 | 211 |
| Arrive On Green | 0.05 | 0.21 | 0.21 | 0.11 | 0.27 | 0.27 | 0.11 | 0.28 | 0.28 | 0.14 | 0.47 | 0.47 |
| Sat Flow, veh/h | 1774 | 3225 | 341 | 1774 | 2887 | 626 | 1774 | 3486 | 123 | 1774 | 2918 | 602 |
| Grp Volume(v), veh/h | 62 | 268 | 274 | 73 | 441 | 434 | 125 | 603 | 627 | 156 | 581 | 575 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1797 | 1774 | 1770 | 1744 | 1774 | 1770 | 1840 | 1774 | 1770 | 1750 |
| Q Serve(g_s), s | 3.8 | 15.5 | 15.6 | 4.2 | 26.5 | 26.5 | 7.2 | 35.0 | 35.0 | 9.4 | 34.2 | 34.3 |
| Cycle Q Clear(g_c), s | 3.8 | 15.5 | 15.6 | 4.2 | 26.5 | 26.5 | 7.2 | 35.0 | 35.0 | 9.4 | 34.2 | 34.3 |
| Prop In Lane | 1.00 | | 0.19 | 1.00 | | 0.36 | 1.00 | | 0.07 | 1.00 | | 0.34 |
| Lane Grp Cap(c), veh/h | 93 | 373 | 379 | 204 | 484 | 477 | 293 | 736 | 766 | 183 | 619 | 613 |
| V/C Ratio(X) | 0.66 | 0.72 | 0.72 | 0.36 | 0.91 | 0.91 | 0.43 | 0.82 | 0.82 | 0.85 | 0.94 | 0.94 |
| Avail Cap(c_a), veh/h | 161 | 507 | 515 | 204 | 507 | 499 | 293 | 736 | 766 | 210 | 619 | 613 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.67 | 0.67 | 0.67 | 1.33 | 1.33 | 1.33 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 | 0.95 | 0.90 | 0.90 | 0.90 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 51.2 | 40.3 | 40.4 | 44.9 | 38.7 | 38.7 | 44.1 | 35.8 | 35.8 | 46.6 | 28.3 | 28.3 |
| Incr Delay (d2), s/veh | 3.0 | 1.6 | 1.7 | 0.4 | 18.8 | 19.1 | 0.3 | 8.9 | 8.6 | 22.2 | 23.6 | 24.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.9 | 7.8 | 7.9 | 2.1 | 15.5 | 15.3 | 3.6 | 19.0 | 19.7 | 5.8 | 20.5 | 20.6 |
| LnGrp Delay(d),s/veh | 54.2 | 42.0 | 42.1 | 45.3 | 57.4 | 57.7 | 44.4 | 44.7 | 44.4 | 68.8 | 51.9 | 52.4 |
| LnGrp LOS | D | D | D | D | E | E | D | D | D | E | D | D |
| Approach Vol, veh/h | | 604 | | | 948 | | | 1355 | | | 1312 | |
| Approach Delay, s/veh | | 43.3 | | | 56.6 | | | 44.5 | | | 54.1 | |
| Approach LOS | | D | | | E | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 15.4 | 50.3 | 9.8 | 34.6 | 22.6 | 43.0 | 16.6 | 27.7 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 | 4.0 | 4.5 |
| Max Green Setting (Gmax), s | 13.0 | 38.5 | 10.0 | 31.5 | 13.0 | * 39 | 10.0 | 31.5 |
| Max Q Clear Time (g_c+I1), s | 11.4 | 37.0 | 5.8 | 28.5 | 9.2 | 36.3 | 6.2 | 17.6 |
| Green Ext Time (p_c), s | 0.0 | 1.0 | 0.0 | 1.6 | 0.0 | 1.5 | 0.0 | 2.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 50.1 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 640 | 20 | 520 | 840 | 10 | 20 | 10 | 480 | 20 | 20 | 10 |
| Future Volume (veh/h) | 10 | 640 | 20 | 520 | 840 | 10 | 20 | 10 | 480 | 20 | 20 | 10 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 0.99 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 11 | 674 | 21 | 547 | 884 | 11 | 21 | 11 | 505 | 21 | 21 | 11 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 366 | 1338 | 42 | 603 | 1969 | 24 | 338 | 166 | 463 | 179 | 172 | 80 |
| Arrive On Green | 0.04 | 0.38 | 0.38 | 0.20 | 0.55 | 0.55 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| Sat Flow, veh/h | 1774 | 3502 | 109 | 1774 | 3579 | 45 | 959 | 563 | 1567 | 451 | 584 | 271 |
| Grp Volume(v), veh/h | 11 | 340 | 355 | 547 | 437 | 458 | 32 | 0 | 505 | 53 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1842 | 1774 | 1770 | 1854 | 1522 | 0 | 1567 | 1305 | 0 | 0 |
| Q Serve(g_s), s | 0.4 | 16.2 | 16.2 | 19.4 | 16.2 | 16.2 | 0.0 | 0.0 | 32.5 | 0.0 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 0.4 | 16.2 | 16.2 | 19.4 | 16.2 | 16.2 | 1.4 | 0.0 | 32.5 | 2.4 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.06 | 1.00 | | 0.02 | 0.66 | | 1.00 | 0.40 | | 0.21 |
| Lane Grp Cap(c), veh/h | 366 | 676 | 704 | 603 | 973 | 1020 | 504 | 0 | 463 | 431 | 0 | 0 |
| V/C Ratio(X) | 0.03 | 0.50 | 0.50 | 0.91 | 0.45 | 0.45 | 0.06 | 0.00 | 1.09 | 0.12 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 462 | 676 | 704 | 660 | 973 | 1020 | 504 | 0 | 463 | 431 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.63 | 0.63 | 0.63 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 18.7 | 26.0 | 26.0 | 17.1 | 14.8 | 14.8 | 27.8 | 0.0 | 38.8 | 28.1 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 1.7 | 1.6 | 15.6 | 1.5 | 1.4 | 0.1 | 0.0 | 68.6 | 0.1 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.2 | 8.2 | 8.5 | 11.9 | 8.3 | 8.7 | 0.7 | 0.0 | 22.9 | 1.2 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 18.7 | 27.7 | 27.6 | 32.7 | 16.3 | 16.2 | 27.8 | 0.0 | 107.3 | 28.3 | 0.0 | 0.0 |
| LnGrp LOS | B | C | C | C | B | B | C | | F | C | | |
| Approach Vol, veh/h | | 706 | | | 1442 | | | 537 | | | 53 | |
| Approach Delay, s/veh | | 27.5 | | | 22.5 | | | 102.6 | | | 28.3 | |
| Approach LOS | | C | | | C | | | F | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 26.5 | 46.5 | | 37.0 | 8.0 | 65.0 | | 37.0 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | | 4.5 | 4.0 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 26.0 | 38.5 | | 32.5 | 10.0 | 54.5 | | 32.5 |
| Max Q Clear Time (g_c+I1), s | 21.4 | 18.2 | | 4.4 | 2.4 | 18.2 | | 34.5 |
| Green Ext Time (p_c), s | 1.1 | 2.7 | | 0.2 | 0.0 | 4.0 | | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 39.6 |
| HCM 2010 LOS | D |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 220 | 250 | 50 | 260 | 20 | 240 | 70 | 30 | 10 | 80 | 10 |
| Future Volume (veh/h) | 10 | 220 | 250 | 50 | 260 | 20 | 240 | 70 | 30 | 10 | 80 | 10 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.97 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 11 | 237 | 269 | 54 | 280 | 22 | 258 | 75 | 32 | 11 | 86 | 11 |
| Adj No. of Lanes | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 12 | 500 | 417 | 67 | 511 | 40 | 314 | 440 | 188 | 12 | 301 | 38 |
| Arrive On Green | 0.01 | 0.27 | 0.27 | 0.04 | 0.30 | 0.30 | 0.18 | 0.35 | 0.35 | 0.01 | 0.18 | 0.18 |
| Sat Flow, veh/h | 1792 | 1881 | 1569 | 1792 | 1720 | 135 | 1792 | 1247 | 532 | 1792 | 1629 | 208 |
| Grp Volume(v), veh/h | 11 | 237 | 269 | 54 | 0 | 302 | 258 | 0 | 107 | 11 | 0 | 97 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1881 | 1569 | 1792 | 0 | 1855 | 1792 | 0 | 1778 | 1792 | 0 | 1838 |
| Q Serve(g_s), s | 0.3 | 6.0 | 8.6 | 1.7 | 0.0 | 7.7 | 7.8 | 0.0 | 2.3 | 0.3 | 0.0 | 2.6 |
| Cycle Q Clear(g_c), s | 0.3 | 6.0 | 8.6 | 1.7 | 0.0 | 7.7 | 7.8 | 0.0 | 2.3 | 0.3 | 0.0 | 2.6 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.07 | 1.00 | | 0.30 | 1.00 | | 0.11 |
| Lane Grp Cap(c), veh/h | 12 | 500 | 417 | 67 | 0 | 551 | 314 | 0 | 628 | 12 | 0 | 339 |
| V/C Ratio(X) | 0.93 | 0.47 | 0.64 | 0.80 | 0.00 | 0.55 | 0.82 | 0.00 | 0.17 | 0.93 | 0.00 | 0.29 |
| Avail Cap(c_a), veh/h | 968 | 1966 | 1640 | 968 | 0 | 1938 | 968 | 0 | 851 | 968 | 0 | 879 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 28.0 | 17.4 | 18.4 | 27.0 | 0.0 | 16.7 | 22.4 | 0.0 | 12.6 | 28.0 | 0.0 | 19.8 |
| Incr Delay (d2), s/veh | 57.6 | 1.0 | 2.4 | 7.9 | 0.0 | 1.2 | 2.1 | 0.0 | 0.0 | 57.6 | 0.0 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.4 | 3.2 | 4.0 | 1.0 | 0.0 | 4.1 | 4.1 | 0.0 | 1.1 | 0.4 | 0.0 | 1.3 |
| LnGrp Delay(d),s/veh | 85.6 | 18.4 | 20.7 | 34.8 | 0.0 | 17.9 | 24.5 | 0.0 | 12.6 | 85.6 | 0.0 | 20.0 |
| LnGrp LOS | F | B | C | C | | B | C | | B | F | | B |
| Approach Vol, veh/h | | 517 | | | 356 | | | 365 | | | 108 | |
| Approach Delay, s/veh | | 21.0 | | | 20.4 | | | 21.0 | | | 26.7 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 4.9 | 24.9 | 4.9 | 21.8 | 14.4 | 15.4 | 6.6 | 20.0 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 30.5 | 27.0 | 30.5 | 59.0 | 30.5 | 27.0 | 30.5 | 59.0 |
| Max Q Clear Time (g_c+I1), s | 2.3 | 4.3 | 2.3 | 9.7 | 9.8 | 4.6 | 3.7 | 10.6 |
| Green Ext Time (p_c), s | 0.0 | 0.1 | 0.0 | 2.0 | 0.2 | 0.1 | 0.0 | 3.7 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 21.3 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 70 | 10 | 260 | 10 | 10 | 10 | 240 | 1170 | 10 | 10 | 940 | 100 |
| Future Volume (veh/h) | 70 | 10 | 260 | 10 | 10 | 10 | 240 | 1170 | 10 | 10 | 940 | 100 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.99 | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1881 | 1881 | 1900 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 73 | 10 | 271 | 10 | 10 | 10 | 250 | 1219 | 10 | 10 | 979 | 104 |
| Adj No. of Lanes | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 334 | 42 | 337 | 126 | 125 | 104 | 422 | 2384 | 20 | 356 | 1925 | 204 |
| Arrive On Green | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.16 | 1.00 | 1.00 | 0.01 | 0.59 | 0.59 |
| Sat Flow, veh/h | 1277 | 197 | 1577 | 388 | 587 | 487 | 1792 | 3633 | 30 | 1792 | 3258 | 346 |
| Grp Volume(v), veh/h | 83 | 0 | 271 | 30 | 0 | 0 | 250 | 600 | 629 | 10 | 537 | 546 |
| Grp Sat Flow(s),veh/h/ln | 1474 | 0 | 1577 | 1462 | 0 | 0 | 1792 | 1787 | 1876 | 1792 | 1787 | 1817 |
| Q Serve(g_s), s | 0.0 | 0.0 | 18.0 | 0.0 | 0.0 | 0.0 | 6.1 | 0.0 | 0.0 | 0.2 | 19.3 | 19.3 |
| Cycle Q Clear(g_c), s | 4.5 | 0.0 | 18.0 | 4.6 | 0.0 | 0.0 | 6.1 | 0.0 | 0.0 | 0.2 | 19.3 | 19.3 |
| Prop In Lane | 0.88 | | 1.00 | 0.33 | | 0.33 | 1.00 | | 0.02 | 1.00 | | 0.19 |
| Lane Grp Cap(c), veh/h | 376 | 0 | 337 | 356 | 0 | 0 | 422 | 1173 | 1231 | 356 | 1056 | 1073 |
| V/C Ratio(X) | 0.22 | 0.00 | 0.80 | 0.08 | 0.00 | 0.00 | 0.59 | 0.51 | 0.51 | 0.03 | 0.51 | 0.51 |
| Avail Cap(c_a), veh/h | 467 | 0 | 437 | 448 | 0 | 0 | 592 | 1173 | 1231 | 497 | 1056 | 1073 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.90 | 0.00 | 0.90 | 1.00 | 0.00 | 0.00 | 0.73 | 0.73 | 0.73 | 0.49 | 0.49 | 0.49 |
| Uniform Delay (d), s/veh | 35.8 | 0.0 | 41.1 | 34.6 | 0.0 | 0.0 | 9.2 | 0.0 | 0.0 | 8.7 | 13.2 | 13.2 |
| Incr Delay (d2), s/veh | 0.3 | 0.0 | 7.4 | 0.1 | 0.0 | 0.0 | 0.4 | 1.2 | 1.1 | 0.0 | 0.9 | 0.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.1 | 0.0 | 8.5 | 0.7 | 0.0 | 0.0 | 2.9 | 0.4 | 0.4 | 0.1 | 9.8 | 10.0 |
| LnGrp Delay(d),s/veh | 36.1 | 0.0 | 48.5 | 34.7 | 0.0 | 0.0 | 9.6 | 1.2 | 1.1 | 8.7 | 14.0 | 14.0 |
| LnGrp LOS | D | | D | C | | | A | A | A | A | B | B |
| Approach Vol, veh/h | | 354 | | | 30 | | | 1479 | | | 1093 | |
| Approach Delay, s/veh | | 45.6 | | | 34.7 | | | 2.6 | | | 14.0 | |
| Approach LOS | | D | | | C | | | A | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 5.3 | 76.7 | | 28.0 | 12.5 | 69.5 | | 28.0 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | | 4.5 | 4.0 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 10.0 | 56.5 | | 30.5 | 19.0 | 47.5 | | 30.5 |
| Max Q Clear Time (g_c+I1), s | 2.2 | 2.0 | | 20.0 | 8.1 | 21.3 | | 6.6 |
| Green Ext Time (p_c), s | 0.0 | 26.2 | | 1.9 | 0.4 | 15.0 | | 0.2 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 12.3 |
| HCM 2010 LOS | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 7.4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 10 | 280 | 40 | 110 | 390 | 20 | 20 | 50 | 200 | 20 | 30 | 10 |
| Future Vol, veh/h | 10 | 280 | 40 | 110 | 390 | 20 | 20 | 50 | 200 | 20 | 30 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 150 | - | - | 150 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 10 | 292 | 42 | 115 | 406 | 21 | 21 | 52 | 208 | 21 | 31 | 10 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 427 | 0 | 0 | 334 | 0 | 0 | 1000 | 990 | 313 | 1110 | 1001 | 417 |
| Stage 1 | - | - | - | - | - | - | 333 | 333 | - | 647 | 647 | - |
| Stage 2 | - | - | - | - | - | - | 667 | 657 | - | 463 | 354 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1132 | - | - | 1225 | - | - | 222 | 246 | 727 | 187 | 243 | 636 |
| Stage 1 | - | - | - | - | - | - | 681 | 644 | - | 460 | 467 | - |
| Stage 2 | - | - | - | - | - | - | 448 | 462 | - | 579 | 630 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1132 | - | - | 1225 | - | - | 180 | 221 | 727 | 101 | 218 | 636 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 180 | 221 | - | 101 | 218 | - |
| Stage 1 | - | - | - | - | - | - | 675 | 638 | - | 456 | 423 | - |
| Stage 2 | - | - | - | - | - | - | 370 | 419 | - | 376 | 624 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 1.7 | 20.4 | 37.7 |
| HCM LOS | | | C | E |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 180 | 499 | 1132 | - | - | 1225 | - | - | 171 |
| HCM Lane V/C Ratio | 0.116 | 0.522 | 0.009 | - | - | 0.094 | - | - | 0.365 |
| HCM Control Delay (s) | 27.6 | 19.8 | 8.2 | - | - | 8.2 | - | - | 37.7 |
| HCM Lane LOS | D | C | A | - | - | A | - | - | E |
| HCM 95th %tile Q(veh) | 0.4 | 3 | 0 | - | - | 0.3 | - | - | 1.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 500 | 220 | 60 | 60 | 360 | 50 | 70 | 870 | 30 | 30 | 750 | 420 |
| Future Volume (vph) | 500 | 220 | 60 | 60 | 360 | 50 | 70 | 870 | 30 | 30 | 750 | 420 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Lane Util. Factor | 0.97 | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.97 | | 1.00 | 0.98 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 3467 | 1811 | | 1787 | 3495 | | 1787 | 3552 | | 1787 | 3574 | 1563 |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 3467 | 1811 | | 1787 | 3495 | | 1787 | 3552 | | 1787 | 3574 | 1563 |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 521 | 229 | 62 | 62 | 375 | 52 | 73 | 906 | 31 | 31 | 781 | 438 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 9 | 0 | 0 | 2 | 0 | 0 | 0 | 221 |
| Lane Group Flow (vph) | 521 | 282 | 0 | 63 | 418 | 0 | 73 | 935 | 0 | 31 | 781 | 217 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Split | NA | | Split | NA | | Prot | NA | | Prot | NA | Perm |
| Protected Phases | 8 | 8 | | 4 | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | 25.7 | 25.7 | | 15.7 | 15.7 | | 9.3 | 44.1 | | 4.5 | 39.3 | 39.3 |
| Effective Green, g (s) | 25.7 | 25.7 | | 15.7 | 15.7 | | 9.3 | 44.1 | | 4.5 | 39.3 | 39.3 |
| Actuated g/C Ratio | 0.23 | 0.23 | | 0.14 | 0.14 | | 0.08 | 0.40 | | 0.04 | 0.36 | 0.36 |
| Clearance Time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | | 2.0 | 2.0 | | 2.0 | 3.0 | | 2.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 810 | 423 | | 255 | 498 | | 151 | 1424 | | 73 | 1276 | 558 |
| v/s Ratio Prot | 0.15 | c0.16 | | 0.04 | c0.12 | | c0.04 | c0.26 | | 0.02 | 0.22 | |
| v/s Ratio Perm | | | | | | | | | | | | 0.14 |
| v/c Ratio | 0.64 | 0.67 | | 0.25 | 0.84 | | 0.48 | 0.66 | | 0.42 | 0.61 | 0.39 |
| Uniform Delay, d1 | 38.0 | 38.3 | | 41.9 | 45.9 | | 48.1 | 26.8 | | 51.5 | 29.1 | 26.4 |
| Progression Factor | 1.00 | 1.00 | | 1.05 | 1.05 | | 0.68 | 0.83 | | 0.80 | 0.69 | 0.84 |
| Incremental Delay, d2 | 1.8 | 3.9 | | 0.2 | 9.5 | | 0.9 | 2.3 | | 1.3 | 2.0 | 1.8 |
| Delay (s) | 39.8 | 42.2 | | 44.0 | 57.6 | | 33.3 | 24.5 | | 42.5 | 22.1 | 24.0 |
| Level of Service | D | D | | D | E | | C | C | | D | C | C |
| Approach Delay (s) | | 40.6 | | | 55.8 | | | 25.1 | | | 23.3 | |
| Approach LOS | | D | | | E | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 32.2 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.69 | | |
| Actuated Cycle Length (s) | 110.0 | Sum of lost time (s) | 20.0 |
| Intersection Capacity Utilization | 75.9% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 40 | 50 | 110 | 10 | 160 | 50 | 150 | 250 | 10 | 20 | 270 | 80 |
| Future Volume (veh/h) | 40 | 50 | 110 | 10 | 160 | 50 | 150 | 250 | 10 | 20 | 270 | 80 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.99 | | 0.99 | 0.99 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Adj Flow Rate, veh/h | 43 | 53 | 0 | 11 | 170 | 0 | 160 | 266 | 11 | 21 | 287 | 85 |
| Adj No. of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cap, veh/h | 249 | 210 | 0 | 125 | 325 | 0 | 500 | 679 | 28 | 533 | 407 | 121 |
| Arrive On Green | 0.18 | 0.18 | 0.00 | 0.18 | 0.18 | 0.00 | 0.10 | 0.37 | 0.37 | 0.01 | 0.29 | 0.29 |
| Sat Flow, veh/h | 517 | 1173 | 0 | 59 | 1817 | 0 | 1810 | 1811 | 75 | 1810 | 1403 | 415 |
| Grp Volume(v), veh/h | 96 | 0 | 0 | 181 | 0 | 0 | 160 | 0 | 277 | 21 | 0 | 372 |
| Grp Sat Flow(s),veh/h/ln | 1691 | 0 | 0 | 1876 | 0 | 0 | 1810 | 0 | 1886 | 1810 | 0 | 1818 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 3.6 | 0.3 | 0.0 | 6.1 |
| Cycle Q Clear(g_c), s | 1.5 | 0.0 | 0.0 | 2.9 | 0.0 | 0.0 | 2.0 | 0.0 | 3.6 | 0.3 | 0.0 | 6.1 |
| Prop In Lane | 0.45 | | 0.00 | 0.06 | | 0.00 | 1.00 | | 0.04 | 1.00 | | 0.23 |
| Lane Grp Cap(c), veh/h | 458 | 0 | 0 | 449 | 0 | 0 | 500 | 0 | 707 | 533 | 0 | 527 |
| V/C Ratio(X) | 0.21 | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.32 | 0.00 | 0.39 | 0.04 | 0.00 | 0.71 |
| Avail Cap(c_a), veh/h | 1777 | 0 | 0 | 2062 | 0 | 0 | 1708 | 0 | 1977 | 1352 | 0 | 1907 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 11.9 | 0.0 | 0.0 | 12.4 | 0.0 | 0.0 | 7.4 | 0.0 | 7.6 | 8.2 | 0.0 | 10.6 |
| Incr Delay (d2), s/veh | 0.1 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.8 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 1.0 | 0.0 | 1.9 | 0.1 | 0.0 | 3.1 |
| LnGrp Delay(d),s/veh | 11.9 | 0.0 | 0.0 | 12.7 | 0.0 | 0.0 | 7.5 | 0.0 | 7.8 | 8.2 | 0.0 | 11.2 |
| LnGrp LOS | B | | | B | | | A | | A | A | | B |
| Approach Vol, veh/h | | 96 | | | 181 | | | 437 | | | 393 | |
| Approach Delay, s/veh | | 11.9 | | | 12.7 | | | 7.7 | | | 11.1 | |
| Approach LOS | | B | | | B | | | A | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.9 | 17.5 | | 11.0 | 7.7 | 14.7 | | 11.0 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | | 5.0 | 4.5 | 5.0 | | 5.0 |
| Max Green Setting (Gmax), s | 15.5 | 35.0 | | 35.0 | 25.5 | 35.0 | | 35.0 |
| Max Q Clear Time (g_c+I1), s | 2.3 | 5.6 | | 3.5 | 4.0 | 8.1 | | 4.9 |
| Green Ext Time (p_c), s | 0.0 | 0.6 | | 0.2 | 0.2 | 0.9 | | 0.4 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 10.1 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 30 | 110 | 290 | 40 | 120 | 30 | 270 | 730 | 20 | 20 | 670 | 40 |
| Future Volume (vph) | 30 | 110 | 290 | 40 | 120 | 30 | 270 | 730 | 20 | 20 | 670 | 40 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 0.98 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.89 | | 1.00 | 0.97 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1780 | 1649 | | 1787 | 1815 | | 1787 | 3556 | | 1787 | 3535 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1780 | 1649 | | 1787 | 1815 | | 1787 | 3556 | | 1787 | 3535 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 33 | 120 | 315 | 43 | 130 | 33 | 293 | 793 | 22 | 22 | 728 | 43 |
| RTOR Reduction (vph) | 0 | 100 | 0 | 0 | 10 | 0 | 0 | 1 | 0 | 0 | 4 | 0 |
| Lane Group Flow (vph) | 33 | 335 | 0 | 43 | 153 | 0 | 293 | 814 | 0 | 22 | 767 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Bus Blockages (#/hr) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turn Type | Prot | NA | | Prot | NA | | Prot | NA | | Prot | NA | |
| Protected Phases | 3 | 8 | | 7 | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | 4.3 | 23.2 | | 4.6 | 23.5 | | 19.4 | 52.8 | | 2.4 | 35.8 | |
| Effective Green, g (s) | 4.3 | 23.2 | | 4.6 | 23.5 | | 19.4 | 52.8 | | 2.4 | 35.8 | |
| Actuated g/C Ratio | 0.04 | 0.23 | | 0.05 | 0.24 | | 0.19 | 0.53 | | 0.02 | 0.36 | |
| Clearance Time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 1.0 | 2.0 | | 1.0 | 2.0 | |
| Lane Grp Cap (vph) | 76 | 382 | | 82 | 426 | | 346 | 1877 | | 42 | 1265 | |
| v/s Ratio Prot | 0.02 | c0.20 | | c0.02 | 0.08 | | c0.16 | 0.23 | | 0.01 | c0.22 | |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 0.43 | 0.88 | | 0.52 | 0.36 | | 0.85 | 0.43 | | 0.52 | 0.61 | |
| Uniform Delay, d1 | 46.7 | 37.0 | | 46.6 | 32.0 | | 38.9 | 14.4 | | 48.2 | 26.3 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.86 | 0.44 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.4 | 19.2 | | 2.8 | 0.2 | | 14.3 | 0.6 | | 5.3 | 2.2 | |
| Delay (s) | 48.1 | 56.2 | | 49.4 | 32.1 | | 47.7 | 7.0 | | 53.6 | 28.5 | |
| Level of Service | D | E | | D | C | | D | A | | D | C | |
| Approach Delay (s) | | 55.6 | | | 35.8 | | | 17.7 | | | 29.2 | |
| Approach LOS | | E | | | D | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 29.6 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.73 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 76.7% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 50 | 140 | 100 | 930 | 820 | 30 |
| Future Volume (veh/h) | 50 | 140 | 100 | 930 | 820 | 30 |
| Number | 7 | 14 | 5 | 2 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 53 | 147 | 105 | 979 | 863 | 32 |
| Adj No. of Lanes | 1 | 1 | 1 | 2 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 213 | 242 | 513 | 2822 | 2519 | 93 |
| Arrive On Green | 0.12 | 0.12 | 0.01 | 0.26 | 0.72 | 0.72 |
| Sat Flow, veh/h | 1784 | 1599 | 1792 | 3668 | 3608 | 130 |
| Grp Volume(v), veh/h | 53 | 147 | 105 | 979 | 439 | 456 |
| Grp Sat Flow(s),veh/h/ln | 1784 | 1599 | 1792 | 1787 | 1787 | 1857 |
| Q Serve(g_s), s | 3.0 | 9.5 | 1.6 | 24.5 | 10.1 | 10.1 |
| Cycle Q Clear(g_c), s | 3.0 | 9.5 | 1.6 | 24.5 | 10.1 | 10.1 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 0.07 |
| Lane Grp Cap(c), veh/h | 213 | 242 | 513 | 2822 | 1281 | 1331 |
| V/C Ratio(X) | 0.25 | 0.61 | 0.20 | 0.35 | 0.34 | 0.34 |
| Avail Cap(c_a), veh/h | 762 | 734 | 610 | 2822 | 1281 | 1331 |
| HCM Platoon Ratio | 1.00 | 1.00 | 0.33 | 0.33 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.81 | 0.81 | 0.81 | 0.81 |
| Uniform Delay (d), s/veh | 43.9 | 43.6 | 4.1 | 17.6 | 5.8 | 5.8 |
| Incr Delay (d2), s/veh | 0.6 | 2.5 | 0.1 | 0.3 | 0.6 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.5 | 8.4 | 0.8 | 12.3 | 5.2 | 5.4 |
| LnGrp Delay(d),s/veh | 44.5 | 46.1 | 4.1 | 17.9 | 6.4 | 6.4 |
| LnGrp LOS | D | D | A | B | A | A |
| Approach Vol, veh/h | 200 | | | 1084 | 895 | |
| Approach Delay, s/veh | 45.7 | | | 16.6 | 6.4 | |
| Approach LOS | D | | | B | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | | 91.8 | | 18.2 | 8.0 | 83.9 | | |
| Change Period (Y+Rc), s | | 5.0 | | 5.0 | 4.5 | 5.0 | | |
| Max Green Setting (Gmax), s | | 53.0 | | 47.0 | 9.5 | 39.0 | | |
| Max Q Clear Time (g_c+I1), s | | 26.5 | | 11.5 | 3.6 | 12.1 | | |
| Green Ext Time (p_c), s | | 16.1 | | 1.7 | 0.1 | 14.3 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 15.1 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 40 | 840 | 100 | 20 | 900 | 150 | 100 | 120 | 20 | 130 | 110 | 50 |
| Future Volume (veh/h) | 40 | 840 | 100 | 20 | 900 | 150 | 100 | 120 | 20 | 130 | 110 | 50 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 41 | 866 | 103 | 21 | 928 | 155 | 103 | 124 | 0 | 134 | 113 | 0 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 327 | 1931 | 230 | 371 | 1849 | 309 | 129 | 169 | 0 | 191 | 234 | 0 |
| Arrive On Green | 0.02 | 0.61 | 0.61 | 0.02 | 0.61 | 0.61 | 0.07 | 0.09 | 0.00 | 0.11 | 0.13 | 0.00 |
| Sat Flow, veh/h | 1774 | 3183 | 379 | 1774 | 3032 | 506 | 1774 | 1863 | 0 | 1774 | 1863 | 0 |
| Grp Volume(v), veh/h | 41 | 481 | 488 | 21 | 541 | 542 | 103 | 124 | 0 | 134 | 113 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1792 | 1774 | 1770 | 1768 | 1774 | 1863 | 0 | 1774 | 1863 | 0 |
| Q Serve(g_s), s | 1.0 | 16.2 | 16.2 | 0.5 | 18.9 | 18.9 | 6.3 | 7.1 | 0.0 | 8.0 | 6.2 | 0.0 |
| Cycle Q Clear(g_c), s | 1.0 | 16.2 | 16.2 | 0.5 | 18.9 | 18.9 | 6.3 | 7.1 | 0.0 | 8.0 | 6.2 | 0.0 |
| Prop In Lane | 1.00 | | 0.21 | 1.00 | | 0.29 | 1.00 | | 0.00 | 1.00 | | 0.00 |
| Lane Grp Cap(c), veh/h | 327 | 1073 | 1087 | 371 | 1079 | 1078 | 129 | 169 | 0 | 191 | 234 | 0 |
| V/C Ratio(X) | 0.13 | 0.45 | 0.45 | 0.06 | 0.50 | 0.50 | 0.80 | 0.74 | 0.00 | 0.70 | 0.48 | 0.00 |
| Avail Cap(c_a), veh/h | 446 | 1073 | 1087 | 484 | 1079 | 1078 | 218 | 491 | 0 | 218 | 491 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.93 | 0.93 | 0.93 | 0.84 | 0.84 | 0.84 | 0.96 | 0.96 | 0.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh | 9.6 | 11.7 | 11.7 | 8.9 | 12.1 | 12.1 | 50.2 | 48.7 | 0.0 | 47.4 | 44.8 | 0.0 |
| Incr Delay (d2), s/veh | 0.1 | 1.3 | 1.3 | 0.0 | 1.4 | 1.4 | 4.1 | 5.9 | 0.0 | 6.2 | 1.6 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.5 | 8.3 | 8.4 | 0.2 | 9.6 | 9.6 | 3.2 | 4.0 | 0.0 | 4.3 | 3.3 | 0.0 |
| LnGrp Delay(d),s/veh | 9.6 | 13.0 | 13.0 | 8.9 | 13.5 | 13.5 | 54.3 | 54.6 | 0.0 | 53.6 | 46.3 | 0.0 |
| LnGrp LOS | A | B | B | A | B | B | D | D | | D | D | |
| Approach Vol, veh/h | | 1010 | | | 1104 | | | 227 | | | 247 | |
| Approach Delay, s/veh | | 12.8 | | | 13.4 | | | 54.5 | | | 50.3 | |
| Approach LOS | | B | | | B | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 6.6 | 72.1 | 12.5 | 18.8 | 7.0 | 71.7 | 16.3 | 15.0 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 9.5 | 39.0 | 13.5 | 29.0 | 9.5 | 39.0 | 13.5 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 3.0 | 20.9 | 8.3 | 8.2 | 2.5 | 18.2 | 10.0 | 9.1 |
| Green Ext Time (p_c), s | 0.0 | 13.0 | 0.1 | 0.7 | 0.0 | 13.1 | 0.1 | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 20.3 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 70 | 10 | 240 | 140 | 180 | 20 | 860 | 230 | 150 | 860 | 20 |
| Future Volume (vph) | 10 | 70 | 10 | 240 | 140 | 180 | 20 | 860 | 230 | 150 | 860 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | 4.5 | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.98 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1759 | 1822 | | 1761 | 1863 | 1547 | 1767 | 3412 | | 1769 | 3523 | |
| Flt Permitted | 0.66 | 1.00 | | 0.54 | 1.00 | 1.00 | 0.27 | 1.00 | | 0.14 | 1.00 | |
| Satd. Flow (perm) | 1224 | 1822 | | 992 | 1863 | 1547 | 498 | 3412 | | 258 | 3523 | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 11 | 75 | 11 | 258 | 151 | 194 | 22 | 925 | 247 | 161 | 925 | 22 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 151 | 0 | 17 | 0 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 11 | 79 | 0 | 258 | 151 | 43 | 22 | 1155 | 0 | 161 | 946 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Turn Type | pm+pt | NA | | pm+pt | NA | Perm | pm+pt | NA | | pm+pt | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 6 | | | 2 | | |
| Actuated Green, G (s) | 13.8 | 12.9 | | 26.9 | 22.0 | 22.0 | 54.6 | 52.7 | | 64.1 | 58.2 | |
| Effective Green, g (s) | 13.8 | 12.9 | | 26.9 | 22.0 | 22.0 | 54.6 | 52.7 | | 64.1 | 58.2 | |
| Actuated g/C Ratio | 0.14 | 0.13 | | 0.27 | 0.22 | 0.22 | 0.55 | 0.53 | | 0.64 | 0.58 | |
| Clearance Time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | 4.5 | 4.0 | 4.5 | | 4.0 | 4.5 | |
| Vehicle Extension (s) | 1.0 | 2.0 | | 1.0 | 2.0 | 2.0 | 1.0 | 2.0 | | 1.0 | 2.0 | |
| Lane Grp Cap (vph) | 173 | 235 | | 343 | 409 | 340 | 296 | 1798 | | 277 | 2050 | |
| v/s Ratio Prot | 0.00 | 0.04 | | c0.08 | 0.08 | | 0.00 | c0.34 | | c0.04 | 0.27 | |
| v/s Ratio Perm | 0.01 | | | c0.13 | | 0.03 | 0.04 | | | 0.33 | | |
| v/c Ratio | 0.06 | 0.34 | | 0.75 | 0.37 | 0.13 | 0.07 | 0.64 | | 0.58 | 0.46 | |
| Uniform Delay, d1 | 37.4 | 39.7 | | 32.2 | 33.1 | 31.3 | 10.6 | 16.9 | | 11.6 | 11.9 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.12 | 0.62 | |
| Incremental Delay, d2 | 0.1 | 0.3 | | 8.0 | 0.2 | 0.1 | 0.0 | 1.8 | | 1.6 | 0.6 | |
| Delay (s) | 37.4 | 40.0 | | 40.3 | 33.3 | 31.3 | 10.7 | 18.7 | | 14.6 | 7.9 | |
| Level of Service | D | D | | D | C | C | B | B | | B | A | |
| Approach Delay (s) | | 39.7 | | | 35.6 | | | 18.5 | | | 8.9 | |
| Approach LOS | | D | | | D | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 19.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.70 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 71.2% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 60 | 480 | 50 | 100 | 560 | 40 | 80 | 150 | 110 | 100 | 160 | 50 |
| Future Volume (veh/h) | 60 | 480 | 50 | 100 | 560 | 40 | 80 | 150 | 110 | 100 | 160 | 50 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 1.00 | 0.99 | | 0.98 | 0.99 | | 0.99 | 0.99 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1845 | 1845 | 1900 | 1845 | 1845 | 1900 | 1845 | 1845 | 1845 | 1845 | 1845 | 1900 |
| Adj Flow Rate, veh/h | 64 | 511 | 0 | 106 | 596 | 43 | 85 | 160 | 117 | 106 | 170 | 53 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 339 | 833 | 0 | 396 | 858 | 62 | 400 | 378 | 317 | 442 | 288 | 90 |
| Arrive On Green | 0.07 | 0.24 | 0.00 | 0.09 | 0.26 | 0.26 | 0.08 | 0.21 | 0.21 | 0.09 | 0.21 | 0.21 |
| Sat Flow, veh/h | 1757 | 3597 | 0 | 1757 | 3311 | 238 | 1757 | 1845 | 1545 | 1757 | 1345 | 419 |
| Grp Volume(v), veh/h | 64 | 511 | 0 | 106 | 315 | 324 | 85 | 160 | 117 | 106 | 0 | 223 |
| Grp Sat Flow(s),veh/h/ln | 1757 | 1752 | 0 | 1757 | 1752 | 1797 | 1757 | 1845 | 1545 | 1757 | 0 | 1764 |
| Q Serve(g_s), s | 1.3 | 6.6 | 0.0 | 2.2 | 8.2 | 8.3 | 1.8 | 3.8 | 3.3 | 2.3 | 0.0 | 5.8 |
| Cycle Q Clear(g_c), s | 1.3 | 6.6 | 0.0 | 2.2 | 8.2 | 8.3 | 1.8 | 3.8 | 3.3 | 2.3 | 0.0 | 5.8 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.13 | 1.00 | | 1.00 | 1.00 | | 0.24 |
| Lane Grp Cap(c), veh/h | 339 | 833 | 0 | 396 | 454 | 465 | 400 | 378 | 317 | 442 | 0 | 378 |
| V/C Ratio(X) | 0.19 | 0.61 | 0.00 | 0.27 | 0.69 | 0.70 | 0.21 | 0.42 | 0.37 | 0.24 | 0.00 | 0.59 |
| Avail Cap(c_a), veh/h | 475 | 2415 | 0 | 495 | 1207 | 1238 | 515 | 908 | 760 | 541 | 0 | 903 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 13.2 | 17.3 | 0.0 | 12.6 | 17.0 | 17.0 | 13.8 | 17.6 | 17.4 | 13.5 | 0.0 | 18.0 |
| Incr Delay (d2), s/veh | 0.1 | 0.3 | 0.0 | 0.1 | 0.7 | 0.7 | 0.1 | 0.3 | 0.3 | 0.1 | 0.0 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.6 | 3.2 | 0.0 | 1.0 | 4.0 | 4.1 | 0.9 | 2.0 | 1.4 | 1.1 | 0.0 | 2.8 |
| LnGrp Delay(d),s/veh | 13.3 | 17.6 | 0.0 | 12.8 | 17.7 | 17.7 | 13.9 | 17.9 | 17.6 | 13.6 | 0.0 | 18.5 |
| LnGrp LOS | B | B | | B | B | B | B | B | B | B | | B |
| Approach Vol, veh/h | | 575 | | | 745 | | | 362 | | | 329 | |
| Approach Delay, s/veh | | 17.1 | | | 17.0 | | | 16.9 | | | 16.9 | |
| Approach LOS | | B | | | B | | | B | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 9.2 | 17.1 | 8.7 | 15.9 | 8.1 | 18.2 | 9.2 | 15.4 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 7.5 | 35.0 | 7.5 | 26.0 | 7.5 | 35.0 | 7.5 | 25.0 |
| Max Q Clear Time (g_c+I1), s | 4.2 | 8.6 | 3.8 | 7.8 | 3.3 | 10.3 | 4.3 | 5.8 |
| Green Ext Time (p_c), s | 0.0 | 1.3 | 0.0 | 0.8 | 0.0 | 1.4 | 0.0 | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 17.0 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 60 | 550 | 110 | 60 | 560 | 360 | 80 | 570 | 40 | 440 | 450 | 30 |
| Future Volume (veh/h) | 60 | 550 | 110 | 60 | 560 | 360 | 80 | 570 | 40 | 440 | 450 | 30 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 63 | 579 | 116 | 63 | 589 | 379 | 84 | 600 | 0 | 463 | 474 | 32 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 81 | 771 | 154 | 176 | 651 | 419 | 205 | 1105 | 0 | 303 | 1235 | 83 |
| Arrive On Green | 0.05 | 0.26 | 0.26 | 0.20 | 0.63 | 0.63 | 0.11 | 0.31 | 0.00 | 0.17 | 0.36 | 0.36 |
| Sat Flow, veh/h | 1792 | 2964 | 592 | 1792 | 2079 | 1338 | 1792 | 3668 | 0 | 1792 | 3397 | 229 |
| Grp Volume(v), veh/h | 63 | 348 | 347 | 63 | 506 | 462 | 84 | 600 | 0 | 463 | 249 | 257 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1769 | 1792 | 1787 | 1630 | 1792 | 1787 | 0 | 1792 | 1787 | 1839 |
| Q Serve(g_s), s | 3.8 | 19.7 | 19.8 | 3.3 | 26.9 | 26.9 | 4.8 | 15.3 | 0.0 | 18.6 | 11.3 | 11.4 |
| Cycle Q Clear(g_c), s | 3.8 | 19.7 | 19.8 | 3.3 | 26.9 | 26.9 | 4.8 | 15.3 | 0.0 | 18.6 | 11.3 | 11.4 |
| Prop In Lane | 1.00 | | 0.33 | 1.00 | | 0.82 | 1.00 | | 0.00 | 1.00 | | 0.12 |
| Lane Grp Cap(c), veh/h | 81 | 465 | 460 | 176 | 559 | 510 | 205 | 1105 | 0 | 303 | 650 | 669 |
| V/C Ratio(X) | 0.78 | 0.75 | 0.75 | 0.36 | 0.91 | 0.91 | 0.41 | 0.54 | 0.00 | 1.53 | 0.38 | 0.38 |
| Avail Cap(c_a), veh/h | 130 | 569 | 563 | 176 | 585 | 533 | 205 | 1105 | 0 | 303 | 650 | 669 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.86 | 0.86 | 0.86 | 0.23 | 0.23 | 0.23 | 0.92 | 0.92 | 0.00 | 0.86 | 0.86 | 0.86 |
| Uniform Delay (d), s/veh | 52.0 | 37.4 | 37.4 | 41.2 | 19.2 | 19.2 | 45.3 | 31.6 | 0.0 | 45.7 | 25.9 | 25.9 |
| Incr Delay (d2), s/veh | 5.0 | 4.4 | 4.6 | 0.1 | 5.2 | 5.6 | 0.4 | 1.8 | 0.0 | 252.2 | 1.5 | 1.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.0 | 10.3 | 10.2 | 1.6 | 13.7 | 12.6 | 2.4 | 7.9 | 0.0 | 30.4 | 5.9 | 6.1 |
| LnGrp Delay(d),s/veh | 57.0 | 41.8 | 42.0 | 41.3 | 24.3 | 24.8 | 45.7 | 33.3 | 0.0 | 297.9 | 27.3 | 27.3 |
| LnGrp LOS | E | D | D | D | C | C | D | C | | F | C | C |
| Approach Vol, veh/h | | 758 | | | 1031 | | | 684 | | | 969 | |
| Approach Delay, s/veh | | 43.2 | | | 25.6 | | | 34.8 | | | 156.6 | |
| Approach LOS | | D | | | C | | | C | | | F | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 16.6 | 45.0 | 9.0 | 39.4 | 22.6 | 39.0 | 14.8 | 33.6 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 5.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Green Setting (Gmax), s | 8.0 | 40.0 | 8.0 | 36.0 | 14.0 | 34.0 | 9.0 | 35.0 |
| Max Q Clear Time (g_c+I1), s | 6.8 | 13.4 | 5.8 | 28.9 | 20.6 | 17.3 | 5.3 | 21.8 |
| Green Ext Time (p_c), s | 0.0 | 4.4 | 0.0 | 4.9 | 0.0 | 6.2 | 0.0 | 5.9 |

| Intersection Summary | | |
|---|---|---|
| HCM 2010 Ctrl Delay | | 68.2 |
| HCM 2010 LOS | | E |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 190 | 840 | 160 | 50 | 840 | 130 | 30 | 520 | 170 | 300 | 620 | 230 |
| Future Volume (veh/h) | 190 | 840 | 160 | 50 | 840 | 130 | 30 | 520 | 170 | 300 | 620 | 230 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 202 | 894 | 170 | 53 | 894 | 138 | 32 | 553 | 181 | 319 | 660 | 245 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 226 | 1187 | 226 | 68 | 942 | 145 | 40 | 601 | 196 | 323 | 993 | 368 |
| Arrive On Green | 0.13 | 0.40 | 0.40 | 0.04 | 0.31 | 0.31 | 0.02 | 0.23 | 0.23 | 0.18 | 0.39 | 0.39 |
| Sat Flow, veh/h | 1774 | 2964 | 564 | 1774 | 3069 | 474 | 1774 | 2616 | 853 | 1774 | 2523 | 936 |
| Grp Volume(v), veh/h | 202 | 534 | 530 | 53 | 515 | 517 | 32 | 374 | 360 | 319 | 463 | 442 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1758 | 1774 | 1770 | 1774 | 1774 | 1770 | 1699 | 1774 | 1770 | 1689 |
| Q Serve(g_s), s | 12.3 | 28.5 | 28.5 | 3.3 | 31.3 | 31.3 | 2.0 | 22.7 | 22.8 | 19.7 | 23.6 | 23.7 |
| Cycle Q Clear(g_c), s | 12.3 | 28.5 | 28.5 | 3.3 | 31.3 | 31.3 | 2.0 | 22.7 | 22.8 | 19.7 | 23.6 | 23.7 |
| Prop In Lane | 1.00 | | 0.32 | 1.00 | | 0.27 | 1.00 | | 0.50 | 1.00 | | 0.55 |
| Lane Grp Cap(c), veh/h | 226 | 709 | 704 | 68 | 543 | 545 | 40 | 406 | 390 | 323 | 696 | 665 |
| V/C Ratio(X) | 0.89 | 0.75 | 0.75 | 0.78 | 0.95 | 0.95 | 0.80 | 0.92 | 0.92 | 0.99 | 0.66 | 0.67 |
| Avail Cap(c_a), veh/h | 226 | 709 | 704 | 97 | 547 | 548 | 97 | 418 | 402 | 323 | 696 | 665 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.09 | 0.09 | 0.09 | 1.00 | 1.00 | 1.00 | 0.82 | 0.82 | 0.82 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 47.3 | 28.3 | 28.3 | 52.4 | 37.3 | 37.3 | 53.5 | 41.4 | 41.4 | 44.9 | 27.4 | 27.4 |
| Incr Delay (d2), s/veh | 4.5 | 0.5 | 0.5 | 13.8 | 27.8 | 27.8 | 10.6 | 21.6 | 23.1 | 46.9 | 2.4 | 2.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.3 | 14.0 | 13.9 | 1.9 | 19.5 | 19.6 | 1.1 | 13.5 | 13.2 | 13.9 | 12.0 | 11.5 |
| LnGrp Delay(d),s/veh | 51.8 | 28.8 | 28.8 | 66.2 | 65.1 | 65.0 | 64.1 | 63.0 | 64.5 | 91.8 | 29.8 | 29.9 |
| LnGrp LOS | D | C | C | E | E | E | E | E | E | F | C | C |
| Approach Vol, veh/h | | 1266 | | | 1085 | | | 766 | | | 1224 | |
| Approach Delay, s/veh | | 32.4 | | | 65.1 | | | 63.8 | | | 46.0 | |
| Approach LOS | | C | | | E | | | E | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 18.5 | 38.3 | 6.5 | 47.8 | 8.2 | 48.6 | 24.5 | 29.8 |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 |
| Max Green Setting (Gmax), s | 13.0 | * 34 | 6.0 | 40.0 | 6.0 | 41.0 | 20.0 | * 26 |
| Max Q Clear Time (g_c+I1), s | 14.3 | 33.3 | 4.0 | 25.7 | 5.3 | 30.5 | 21.7 | 24.8 |
| Green Ext Time (p_c), s | 0.0 | 0.4 | 0.0 | 3.5 | 0.0 | 5.1 | 0.0 | 0.4 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 50.0 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 15.2 |
| Intersection LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 50 | 160 | 30 | 70 | 200 | 90 | 60 | 170 | 70 | 70 | 120 | 90 |
| Future Vol, veh/h | 50 | 160 | 30 | 70 | 200 | 90 | 60 | 170 | 70 | 70 | 120 | 90 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Heavy Vehicles, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mvmt Flow | 52 | 165 | 31 | 72 | 206 | 93 | 62 | 175 | 72 | 72 | 124 | 93 |
| Number of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 2 | 2 | 2 | 2 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 2 | 2 | 2 | 2 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 2 | 2 | 2 | 2 |
| HCM Control Delay | 13.9 | 17 | 15.2 | 14 |
| HCM LOS | B | C | C | B |

| Lane | NBLn1 | NBLn2 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|---|---|
| Vol Left, % | 100% | 0% | 100% | 0% | 100% | 0% | 100% | 0% |
| Vol Thru, % | 0% | 71% | 0% | 84% | 0% | 69% | 0% | 57% |
| Vol Right, % | 0% | 29% | 0% | 16% | 0% | 31% | 0% | 43% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 60 | 240 | 50 | 190 | 70 | 290 | 70 | 210 |
| LT Vol | 60 | 0 | 50 | 0 | 70 | 0 | 70 | 0 |
| Through Vol | 0 | 170 | 0 | 160 | 0 | 200 | 0 | 120 |
| RT Vol | 0 | 70 | 0 | 30 | 0 | 90 | 0 | 90 |
| Lane Flow Rate | 62 | 247 | 52 | 196 | 72 | 299 | 72 | 216 |
| Geometry Grp | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Degree of Util (X) | 0.133 | 0.481 | 0.112 | 0.392 | 0.152 | 0.568 | 0.156 | 0.418 |
| Departure Headway (Hd) | 7.725 | 7.004 | 7.825 | 7.198 | 7.577 | 6.844 | 7.779 | 6.959 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 464 | 515 | 458 | 499 | 473 | 526 | 461 | 517 |
| Service Time | 5.475 | 4.754 | 5.578 | 4.951 | 5.326 | 4.592 | 5.531 | 4.711 |
| HCM Lane V/C Ratio | 0.134 | 0.48 | 0.114 | 0.393 | 0.152 | 0.568 | 0.156 | 0.418 |
| HCM Control Delay | 11.7 | 16.1 | 11.6 | 14.5 | 11.7 | 18.3 | 12 | 14.7 |
| HCM Lane LOS | B | C | B | B | B | C | B | B |
| HCM 95th-tile Q | 0.5 | 2.6 | 0.4 | 1.8 | 0.5 | 3.5 | 0.5 | 2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 60 | 230 | 200 | 520 | 310 | 40 | 180 | 630 | 430 | 40 | 560 | 80 |
| Future Volume (veh/h) | 60 | 230 | 200 | 520 | 310 | 40 | 180 | 630 | 430 | 40 | 560 | 80 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 63 | 242 | 211 | 622 | 221 | 42 | 189 | 663 | 453 | 42 | 589 | 84 |
| Adj No. of Lanes | 1 | 2 | 0 | 2 | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 327 | 335 | 279 | 689 | 295 | 56 | 212 | 1072 | 783 | 240 | 1019 | 145 |
| Arrive On Green | 0.18 | 0.18 | 0.18 | 0.19 | 0.19 | 0.19 | 0.24 | 0.60 | 0.60 | 0.27 | 0.65 | 0.65 |
| Sat Flow, veh/h | 1792 | 1837 | 1531 | 3583 | 1533 | 291 | 1792 | 3574 | 1583 | 1792 | 3135 | 446 |
| Grp Volume(v), veh/h | 63 | 235 | 218 | 622 | 0 | 263 | 189 | 663 | 453 | 42 | 335 | 338 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1581 | 1792 | 0 | 1824 | 1792 | 1787 | 1583 | 1792 | 1787 | 1794 |
| Q Serve(g_s), s | 3.3 | 13.6 | 14.4 | 18.7 | 0.0 | 15.0 | 11.2 | 13.0 | 21.3 | 2.0 | 11.5 | 11.6 |
| Cycle Q Clear(g_c), s | 3.3 | 13.6 | 14.4 | 18.7 | 0.0 | 15.0 | 11.2 | 13.0 | 21.3 | 2.0 | 11.5 | 11.6 |
| Prop In Lane | 1.00 | | 0.97 | 1.00 | | 0.16 | 1.00 | | 1.00 | 1.00 | | 0.25 |
| Lane Grp Cap(c), veh/h | 327 | 326 | 289 | 689 | 0 | 351 | 212 | 1072 | 783 | 240 | 581 | 583 |
| V/C Ratio(X) | 0.19 | 0.72 | 0.76 | 0.90 | 0.00 | 0.75 | 0.89 | 0.62 | 0.58 | 0.17 | 0.58 | 0.58 |
| Avail Cap(c_a), veh/h | 505 | 504 | 446 | 717 | 0 | 365 | 212 | 1072 | 783 | 240 | 581 | 583 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.71 | 0.00 | 0.71 | 0.63 | 0.63 | 0.63 | 0.95 | 0.95 | 0.95 |
| Uniform Delay (d), s/veh | 38.1 | 42.3 | 42.6 | 43.4 | 0.0 | 41.9 | 41.3 | 18.0 | 11.2 | 35.6 | 15.0 | 15.0 |
| Incr Delay (d2), s/veh | 0.4 | 4.2 | 5.6 | 10.4 | 0.0 | 5.1 | 23.8 | 1.7 | 2.0 | 0.1 | 3.9 | 4.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.7 | 7.1 | 6.7 | 10.2 | 0.0 | 8.0 | 6.9 | 6.5 | 13.0 | 1.0 | 6.2 | 6.3 |
| LnGrp Delay(d),s/veh | 38.5 | 46.6 | 48.3 | 53.8 | 0.0 | 47.0 | 65.1 | 19.7 | 13.2 | 35.7 | 18.9 | 19.0 |
| LnGrp LOS | D | D | D | D | | D | E | B | B | D | B | B |
| Approach Vol, veh/h | | 516 | | | 885 | | | 1305 | | | 715 | |
| Approach Delay, s/veh | | 46.3 | | | 51.8 | | | 24.0 | | | 19.9 | |
| Approach LOS | | D | | | D | | | C | | | B | |
| **Timer** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 17.0 | 40.8 | | 27.2 | 19.8 | 38.0 | | 25.1 | | | | |
| Change Period (Y+Rc), s | 4.0 | 5.0 | | 6.0 | 5.0 | * 5 | | 5.0 | | | | |
| Max Green Setting (Gmax), s | 13.0 | 24.0 | | 22.0 | 4.0 | * 33 | | 31.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 13.2 | 13.6 | | 20.7 | 4.0 | 23.3 | | 16.4 | | | | |
| Green Ext Time (p_c), s | 0.0 | 3.9 | | 0.5 | 0.0 | 6.1 | | 3.7 | | | | |
| **Intersection Summary** | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 33.7 | | | | | | | | | |
| HCM 2010 LOS | | | C | | | | | | | | | |
| **Notes** | | | | | | | | | | | | |

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 20 | 20 | 40 | 110 | 20 | 80 | 50 | 980 | 140 | 60 | 940 | 50 |
| Future Volume (vph) | 20 | 20 | 40 | 110 | 20 | 80 | 50 | 980 | 140 | 60 | 940 | 50 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frt | | 0.93 | | | 1.00 | 0.85 | 1.00 | 0.98 | | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.96 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1731 | | | 1805 | 1599 | 1787 | 3507 | | 1787 | 3547 | |
| Flt Permitted | | 0.91 | | | 0.68 | 1.00 | 0.25 | 1.00 | | 0.21 | 1.00 | |
| Satd. Flow (perm) | | 1593 | | | 1276 | 1599 | 468 | 3507 | | 395 | 3547 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 21 | 21 | 43 | 117 | 21 | 85 | 53 | 1043 | 149 | 64 | 1000 | 53 |
| RTOR Reduction (vph) | 0 | 36 | 0 | 0 | 0 | 72 | 0 | 8 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 0 | 49 | 0 | 0 | 138 | 13 | 53 | 1184 | 0 | 64 | 1050 | 0 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | | 15.5 | | | 15.5 | 15.5 | 76.5 | 76.5 | | 76.5 | 76.5 | |
| Effective Green, g (s) | | 15.5 | | | 15.5 | 15.5 | 76.5 | 76.5 | | 76.5 | 76.5 | |
| Actuated g/C Ratio | | 0.16 | | | 0.16 | 0.16 | 0.76 | 0.76 | | 0.76 | 0.76 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 246 | | | 197 | 247 | 358 | 2682 | | 302 | 2713 | |
| v/s Ratio Prot | | | | | | | | c0.34 | | | 0.30 | |
| v/s Ratio Perm | | 0.03 | | | c0.11 | 0.01 | 0.11 | | | 0.16 | | |
| v/c Ratio | | 0.20 | | | 0.70 | 0.05 | 0.15 | 0.44 | | 0.21 | 0.39 | |
| Uniform Delay, d1 | | 36.8 | | | 40.0 | 36.0 | 3.1 | 4.2 | | 3.3 | 3.9 | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | 0.19 | 0.33 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | | 10.7 | 0.1 | 0.6 | 0.3 | | 1.6 | 0.4 | |
| Delay (s) | | 37.2 | | | 50.7 | 36.1 | 1.1 | 1.7 | | 4.9 | 4.3 | |
| Level of Service | | D | | | D | D | A | A | | A | A | |
| Approach Delay (s) | | 37.2 | | | 45.2 | | | 1.7 | | | 4.4 | |
| Approach LOS | | D | | | D | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 7.6 | HCM 2000 Level of Service | A |
| HCM 2000 Volume to Capacity ratio | 0.48 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 58.7% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 40 | 30 | 10 | 310 | 10 | 140 | 10 | 1010 | 250 | 120 | 990 | 10 |
| Future Volume (vph) | 40 | 30 | 10 | 310 | 10 | 140 | 10 | 1010 | 250 | 120 | 990 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | 4.0 | 4.5 | 4.5 | | 4.0 | 4.5 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 0.95 | | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 1.00 | | | 1.00 | 0.98 | 1.00 | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 1.00 | 1.00 | 0.99 | 1.00 | | 1.00 | 1.00 | |
| Frt | | 0.98 | | | 1.00 | 0.85 | 1.00 | 0.97 | | 1.00 | 1.00 | |
| Flt Protected | | 0.98 | | | 0.95 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1800 | | | 1794 | 1562 | 1777 | 3441 | | 1787 | 3568 | |
| Flt Permitted | | 0.98 | | | 0.95 | 1.00 | 0.25 | 1.00 | | 0.08 | 1.00 | |
| Satd. Flow (perm) | | 1800 | | | 1794 | 1562 | 472 | 3441 | | 157 | 3568 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 42 | 31 | 10 | 323 | 10 | 146 | 10 | 1052 | 260 | 125 | 1031 | 10 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 114 | 0 | 17 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 78 | 0 | 0 | 333 | 32 | 10 | 1295 | 0 | 125 | 1041 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Split | NA | | Split | NA | Perm | Perm | NA | | pm+pt | NA | |
| Protected Phases | 8 | 8 | | 4 | 4 | | | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | 4 | 2 | | | 6 | | |
| Actuated Green, G (s) | | 10.0 | | | 22.1 | 22.1 | 44.0 | 44.0 | | 55.4 | 55.4 | |
| Effective Green, g (s) | | 10.0 | | | 22.1 | 22.1 | 44.0 | 44.0 | | 55.4 | 55.4 | |
| Actuated g/C Ratio | | 0.10 | | | 0.22 | 0.22 | 0.44 | 0.44 | | 0.55 | 0.55 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | 4.0 | 4.5 | 4.5 | | 4.0 | 4.5 | |
| Vehicle Extension (s) | | 2.0 | | | 2.0 | 2.0 | 3.0 | 3.0 | | 2.0 | 3.0 | |
| Lane Grp Cap (vph) | | 180 | | | 396 | 345 | 207 | 1514 | | 207 | 1976 | |
| v/s Ratio Prot | | c0.04 | | | c0.19 | | | c0.38 | | 0.04 | c0.29 | |
| v/s Ratio Perm | | | | | | 0.02 | 0.02 | | | 0.29 | | |
| v/c Ratio | | 0.43 | | | 0.84 | 0.09 | 0.05 | 0.86 | | 0.60 | 0.53 | |
| Uniform Delay, d1 | | 42.3 | | | 37.3 | 31.0 | 16.0 | 25.1 | | 18.3 | 14.0 | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | | 1.60 | 0.98 | |
| Incremental Delay, d2 | | 0.6 | | | 14.3 | 0.0 | 0.4 | 6.4 | | 3.2 | 1.0 | |
| Delay (s) | | 42.9 | | | 51.5 | 31.0 | 16.5 | 31.6 | | 32.4 | 14.7 | |
| Level of Service | | D | | | D | C | B | C | | C | B | |
| Approach Delay (s) | | 42.9 | | | 45.3 | | | 31.4 | | | 16.6 | |
| Approach LOS | | D | | | D | | | C | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 28.3 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.78 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 16.5 |
| Intersection Capacity Utilization | 77.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 8.8 |
| Intersection LOS | A |

| Approach | EB | WB | SB |
|---|---|---|---|
| Entry Lanes | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 387 | 466 | 329 |
| Demand Flow Rate, veh/h | 391 | 471 | 332 |
| Vehicles Circulating, veh/h | 195 | 81 | 276 |
| Vehicles Exiting, veh/h | 413 | 505 | 276 |
| Follow-Up Headway, s | 3.186 | 3.186 | 3.186 |
| Ped Vol Crossing Leg, #/h | 10 | 10 | 10 |
| Ped Cap Adj | 0.999 | 0.999 | 0.999 |
| Approach Delay, s/veh | 8.8 | 8.6 | 8.8 |
| Approach LOS | A | A | A |

| Lane | Left | Left | Left |
|---|---|---|---|
| Designated Moves | LT | TR | LR |
| Assumed Moves | LT | TR | LR |
| RT Channelized | | | |
| Lane Util | 1.000 | 1.000 | 1.000 |
| Critical Headway, s | 5.193 | 5.193 | 5.193 |
| Entry Flow, veh/h | 391 | 471 | 332 |
| Cap Entry Lane, veh/h | 930 | 1042 | 857 |
| Entry HV Adj Factor | 0.990 | 0.990 | 0.991 |
| Flow Entry, veh/h | 387 | 466 | 329 |
| Cap Entry, veh/h | 919 | 1030 | 849 |
| V/C Ratio | 0.421 | 0.453 | 0.388 |
| Control Delay, s/veh | 8.8 | 8.6 | 8.8 |
| LOS | A | A | A |
| 95th %tile Queue, veh | 2 | 2 | 2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 10 | 10 | 20 | 20 | 310 | 10 | 70 | 20 | 360 | 90 | 20 |
| Future Volume (veh/h) | 10 | 10 | 10 | 20 | 20 | 310 | 10 | 70 | 20 | 360 | 90 | 20 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.98 | 0.98 | | 0.98 | 1.00 | | 0.97 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1900 | 1881 | 1881 | 1900 | 1881 | 1900 | 1900 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 11 | 11 | 11 | 22 | 22 | 337 | 11 | 76 | 22 | 391 | 98 | 22 |
| Adj No. of Lanes | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 353 | 195 | 195 | 256 | 223 | 938 | 26 | 182 | 53 | 499 | 125 | 28 |
| Arrive On Green | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.15 | 0.15 | 0.15 | 0.36 | 0.36 | 0.36 |
| Sat Flow, veh/h | 1015 | 854 | 854 | 660 | 975 | 1564 | 181 | 1251 | 362 | 1375 | 345 | 77 |
| Grp Volume(v), veh/h | 11 | 0 | 22 | 44 | 0 | 337 | 109 | 0 | 0 | 511 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1015 | 0 | 1708 | 1634 | 0 | 1564 | 1794 | 0 | 0 | 1797 | 0 | 0 |
| Q Serve(g_s), s | 0.4 | 0.0 | 0.5 | 0.0 | 0.0 | 5.8 | 2.8 | 0.0 | 0.0 | 13.0 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 1.4 | 0.0 | 0.5 | 0.9 | 0.0 | 5.8 | 2.8 | 0.0 | 0.0 | 13.0 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.50 | 0.50 | | 1.00 | 0.10 | | 0.20 | 0.77 | | 0.04 |
| Lane Grp Cap(c), veh/h | 353 | 0 | 390 | 479 | 0 | 938 | 261 | 0 | 0 | 652 | 0 | 0 |
| V/C Ratio(X) | 0.03 | 0.00 | 0.06 | 0.09 | 0.00 | 0.36 | 0.42 | 0.00 | 0.00 | 0.78 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 823 | 0 | 1180 | 1212 | 0 | 1661 | 803 | 0 | 0 | 1242 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 16.2 | 0.0 | 15.5 | 15.7 | 0.0 | 5.5 | 20.0 | 0.0 | 0.0 | 14.6 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.3 | 1.5 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.1 | 0.0 | 0.3 | 0.5 | 0.0 | 4.8 | 1.5 | 0.0 | 0.0 | 6.9 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 16.3 | 0.0 | 15.6 | 15.8 | 0.0 | 5.8 | 21.5 | 0.0 | 0.0 | 17.5 | 0.0 | 0.0 |
| LnGrp LOS | B | | B | B | | A | C | | | B | | |
| Approach Vol, veh/h | | 33 | | | 381 | | | 109 | | | 511 | |
| Approach Delay, s/veh | | 15.8 | | | 6.9 | | | 21.5 | | | 17.5 | |
| Approach LOS | | B | | | A | | | C | | | B | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | | 2 | | 4 | | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | | 16.2 | | 23.1 | | 16.2 | | 12.0 | | | | |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | | 4.5 | | 4.5 | | | | |
| Max Green Setting (Gmax), s | | 35.5 | | 35.5 | | 35.5 | | 23.0 | | | | |
| Max Q Clear Time (g_c+I1), s | | 3.4 | | 15.0 | | 7.8 | | 4.8 | | | | |
| Green Ext Time (p_c), s | | 0.2 | | 3.5 | | 2.9 | | 0.5 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 14.0 | | | | | | | | | |
| HCM 2010 LOS | | | B | | | | | | | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 50 | 290 | 130 | 130 | 210 | 220 | 110 | 940 | 70 | 280 | 900 | 50 |
| Future Volume (veh/h) | 50 | 290 | 130 | 130 | 210 | 220 | 110 | 940 | 70 | 280 | 900 | 50 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 53 | 309 | 138 | 138 | 223 | 234 | 117 | 1000 | 74 | 298 | 957 | 53 |
| Adj No. of Lanes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 262 | 370 | 310 | 240 | 432 | 363 | 146 | 1100 | 81 | 432 | 1689 | 94 |
| Arrive On Green | 0.04 | 0.20 | 0.20 | 0.08 | 0.23 | 0.23 | 0.03 | 0.11 | 0.11 | 0.08 | 0.16 | 0.16 |
| Sat Flow, veh/h | 1792 | 1881 | 1575 | 1792 | 1881 | 1578 | 1792 | 3370 | 249 | 1792 | 3442 | 191 |
| Grp Volume(v), veh/h | 53 | 309 | 138 | 138 | 223 | 234 | 117 | 530 | 544 | 298 | 497 | 513 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1881 | 1575 | 1792 | 1881 | 1578 | 1792 | 1787 | 1833 | 1792 | 1787 | 1845 |
| Q Serve(g_s), s | 2.5 | 17.4 | 8.5 | 6.5 | 11.4 | 8.6 | 7.1 | 32.3 | 32.3 | 17.8 | 28.2 | 28.2 |
| Cycle Q Clear(g_c), s | 2.5 | 17.4 | 8.5 | 6.5 | 11.4 | 8.6 | 7.1 | 32.3 | 32.3 | 17.8 | 28.2 | 28.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.14 | 1.00 | | 0.10 |
| Lane Grp Cap(c), veh/h | 262 | 370 | 310 | 240 | 432 | 363 | 146 | 583 | 598 | 432 | 877 | 906 |
| V/C Ratio(X) | 0.20 | 0.83 | 0.45 | 0.58 | 0.52 | 0.65 | 0.80 | 0.91 | 0.91 | 0.69 | 0.57 | 0.57 |
| Avail Cap(c_a), veh/h | 346 | 446 | 374 | 265 | 446 | 374 | 212 | 583 | 598 | 432 | 877 | 906 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.64 | 0.64 | 0.64 |
| Uniform Delay (d), s/veh | 33.0 | 42.5 | 38.9 | 32.1 | 37.0 | 12.9 | 52.7 | 47.5 | 47.5 | 46.6 | 35.3 | 35.3 |
| Incr Delay (d2), s/veh | 0.1 | 9.4 | 0.4 | 1.2 | 0.4 | 2.8 | 8.2 | 20.5 | 20.2 | 2.5 | 1.7 | 1.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.3 | 10.0 | 3.7 | 3.3 | 6.0 | 4.0 | 3.9 | 19.3 | 19.8 | 9.2 | 14.4 | 14.9 |
| LnGrp Delay(d),s/veh | 33.1 | 51.9 | 39.3 | 33.3 | 37.4 | 15.7 | 60.9 | 68.0 | 67.6 | 49.1 | 37.0 | 37.0 |
| LnGrp LOS | C | D | D | C | D | B | E | E | E | D | D | D |
| Approach Vol, veh/h | | 500 | | | 595 | | | 1191 | | | 1308 | |
| Approach Delay, s/veh | | 46.4 | | | 27.9 | | | 67.1 | | | 39.7 | |
| Approach LOS | | D | | | C | | | E | | | D | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 11.0 | 40.4 | 12.4 | 26.2 | 12.9 | 58.5 | 8.8 | 29.8 | | | | |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 21.0 | * 36 | 10.0 | 26.1 | 13.0 | 43.9 | 10.0 | 26.1 | | | | |
| Max Q Clear Time (g_c+I1), s | 19.8 | 34.3 | 8.5 | 19.4 | 9.1 | 30.2 | 4.5 | 13.4 | | | | |
| Green Ext Time (p_c), s | 0.1 | 1.0 | 0.0 | 0.7 | 0.0 | 2.1 | 0.0 | 0.9 | | | | |

| Intersection Summary | | |
|---|---|---|
| HCM 2010 Ctrl Delay | | 47.8 |
| HCM 2010 LOS | | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 10 | 10 | 470 | 10 | 140 | 10 | 1060 | 300 | 140 | 1160 | 10 |
| Future Volume (vph) | 10 | 10 | 10 | 470 | 10 | 140 | 10 | 1060 | 300 | 140 | 1160 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | 0.97 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.95 | | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | 0.98 | | | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1752 | | | 1776 | 1557 | 1780 | 3574 | 1531 | 1787 | 3568 | |
| Flt Permitted | | 0.86 | | | 0.71 | 1.00 | 0.17 | 1.00 | 1.00 | 0.10 | 1.00 | |
| Satd. Flow (perm) | | 1538 | | | 1316 | 1557 | 315 | 3574 | 1531 | 179 | 3568 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 11 | 11 | 11 | 495 | 11 | 147 | 11 | 1116 | 316 | 147 | 1221 | 11 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 88 | 0 | 0 | 106 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 26 | 0 | 0 | 506 | 59 | 11 | 1116 | 210 | 147 | 1232 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | Perm | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | | 39.8 | | | 39.8 | 39.8 | 38.1 | 38.1 | 38.1 | 51.2 | 51.2 | |
| Effective Green, g (s) | | 39.8 | | | 39.8 | 39.8 | 38.1 | 38.1 | 38.1 | 51.2 | 51.2 | |
| Actuated g/C Ratio | | 0.40 | | | 0.40 | 0.40 | 0.38 | 0.38 | 0.38 | 0.51 | 0.51 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 612 | | | 523 | 619 | 120 | 1361 | 583 | 237 | 1826 | |
| v/s Ratio Prot | | | | | | | | c0.31 | | 0.06 | c0.35 | |
| v/s Ratio Perm | | 0.02 | | | c0.38 | 0.04 | 0.03 | | 0.14 | 0.26 | | |
| v/c Ratio | | 0.04 | | | 0.97 | 0.09 | 0.09 | 0.82 | 0.36 | 0.62 | 0.67 | |
| Uniform Delay, d1 | | 18.4 | | | 29.5 | 18.8 | 19.9 | 27.9 | 22.2 | 18.7 | 18.2 | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.0 | | | 30.8 | 0.1 | 1.5 | 5.6 | 1.7 | 5.0 | 2.0 | |
| Delay (s) | | 18.5 | | | 60.3 | 18.9 | 21.4 | 33.5 | 23.9 | 23.7 | 20.2 | |
| Level of Service | | B | | | E | B | C | C | C | C | C | |
| Approach Delay (s) | | 18.5 | | | 51.0 | | | 31.3 | | | 20.6 | |
| Approach LOS | | B | | | D | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 30.6 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.88 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 83.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 70 | 540 | 60 | 90 | 750 | 160 | 130 | 1190 | 50 | 170 | 970 | 200 |
| Future Volume (veh/h) | 70 | 540 | 60 | 90 | 750 | 160 | 130 | 1190 | 50 | 170 | 970 | 200 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 73 | 562 | 35 | 94 | 781 | 119 | 135 | 1240 | 37 | 177 | 1010 | 146 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 104 | 749 | 47 | 198 | 844 | 129 | 223 | 1446 | 43 | 177 | 1184 | 171 |
| Arrive On Green | 0.06 | 0.22 | 0.22 | 0.11 | 0.27 | 0.27 | 0.08 | 0.28 | 0.28 | 0.13 | 0.51 | 0.51 |
| Sat Flow, veh/h | 1774 | 3382 | 210 | 1774 | 3075 | 468 | 1774 | 3508 | 105 | 1774 | 3101 | 448 |
| Grp Volume(v), veh/h | 73 | 294 | 303 | 94 | 449 | 451 | 135 | 625 | 652 | 177 | 576 | 580 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1822 | 1774 | 1770 | 1774 | 1774 | 1770 | 1843 | 1774 | 1770 | 1780 |
| Q Serve(g_s), s | 4.4 | 17.0 | 17.1 | 5.5 | 27.2 | 27.2 | 8.1 | 36.8 | 36.9 | 11.0 | 31.1 | 31.2 |
| Cycle Q Clear(g_c), s | 4.4 | 17.0 | 17.1 | 5.5 | 27.2 | 27.2 | 8.1 | 36.8 | 36.9 | 11.0 | 31.1 | 31.2 |
| Prop In Lane | 1.00 | | 0.12 | 1.00 | | 0.26 | 1.00 | | 0.06 | 1.00 | | 0.25 |
| Lane Grp Cap(c), veh/h | 104 | 392 | 404 | 198 | 486 | 487 | 223 | 730 | 760 | 177 | 676 | 679 |
| V/C Ratio(X) | 0.70 | 0.75 | 0.75 | 0.47 | 0.93 | 0.93 | 0.60 | 0.86 | 0.86 | 1.00 | 0.85 | 0.85 |
| Avail Cap(c_a), veh/h | 161 | 499 | 514 | 198 | 499 | 500 | 223 | 730 | 760 | 177 | 676 | 679 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.67 | 0.67 | 0.67 | 1.33 | 1.33 | 1.33 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.94 | 0.94 | 0.94 | 0.89 | 0.89 | 0.89 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 50.8 | 40.0 | 40.0 | 45.8 | 38.8 | 38.8 | 47.7 | 36.7 | 36.7 | 47.7 | 24.4 | 24.4 |
| Incr Delay (d2), s/veh | 3.2 | 3.2 | 3.2 | 0.6 | 21.5 | 21.5 | 2.9 | 11.2 | 10.9 | 66.8 | 12.9 | 12.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.3 | 8.7 | 9.0 | 2.7 | 16.1 | 16.2 | 4.2 | 20.3 | 21.1 | 8.6 | 17.5 | 17.6 |
| LnGrp Delay(d),s/veh | 54.0 | 43.2 | 43.2 | 46.4 | 60.3 | 60.3 | 50.7 | 48.0 | 47.7 | 114.5 | 37.3 | 37.3 |
| LnGrp LOS | D | D | D | D | E | E | D | D | D | F | D | D |
| Approach Vol, veh/h | | 670 | | | 994 | | | 1412 | | | 1333 | |
| Approach Delay, s/veh | | 44.4 | | | 59.0 | | | 48.1 | | | 47.5 | |
| Approach LOS | | D | | | E | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 15.0 | 49.9 | 10.5 | 34.7 | 18.4 | 46.5 | 16.3 | 28.9 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 | 4.0 | 4.5 |
| Max Green Setting (Gmax), s | 11.0 | 41.0 | 10.0 | 31.0 | 10.0 | * 42 | 10.0 | 31.0 |
| Max Q Clear Time (g_c+I1), s | 13.0 | 38.9 | 6.4 | 29.2 | 10.1 | 33.2 | 7.5 | 19.1 |
| Green Ext Time (p_c), s | 0.0 | 1.5 | 0.0 | 1.0 | 0.0 | 4.8 | 0.0 | 2.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 49.8 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 740 | 20 | 500 | 910 | 10 | 20 | 10 | 490 | 20 | 20 | 10 |
| Future Volume (veh/h) | 10 | 740 | 20 | 500 | 910 | 10 | 20 | 10 | 490 | 20 | 20 | 10 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 0.99 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 11 | 779 | 21 | 526 | 958 | 11 | 21 | 11 | 516 | 21 | 21 | 11 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 352 | 1366 | 37 | 562 | 1971 | 23 | 338 | 166 | 463 | 178 | 172 | 80 |
| Arrive On Green | 0.04 | 0.39 | 0.39 | 0.20 | 0.55 | 0.55 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| Sat Flow, veh/h | 1774 | 3519 | 95 | 1774 | 3584 | 41 | 959 | 563 | 1567 | 448 | 581 | 270 |
| Grp Volume(v), veh/h | 11 | 392 | 408 | 526 | 473 | 496 | 32 | 0 | 516 | 53 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1845 | 1774 | 1770 | 1855 | 1522 | 0 | 1567 | 1299 | 0 | 0 |
| Q Serve(g_s), s | 0.4 | 19.1 | 19.1 | 18.6 | 18.1 | 18.1 | 0.0 | 0.0 | 32.5 | 0.0 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 0.4 | 19.1 | 19.1 | 18.6 | 18.1 | 18.1 | 1.4 | 0.0 | 32.5 | 2.4 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.05 | 1.00 | | 0.02 | 0.66 | | 1.00 | 0.40 | | 0.21 |
| Lane Grp Cap(c), veh/h | 352 | 687 | 716 | 562 | 973 | 1020 | 504 | 0 | 463 | 429 | 0 | 0 |
| V/C Ratio(X) | 0.03 | 0.57 | 0.57 | 0.94 | 0.49 | 0.49 | 0.06 | 0.00 | 1.11 | 0.12 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 449 | 687 | 716 | 630 | 973 | 1020 | 504 | 0 | 463 | 429 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.48 | 0.48 | 0.48 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 18.3 | 26.4 | 26.4 | 18.5 | 15.2 | 15.2 | 27.8 | 0.0 | 38.8 | 28.1 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 1.6 | 1.6 | 20.4 | 1.7 | 1.7 | 0.1 | 0.0 | 76.8 | 0.1 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.2 | 9.7 | 10.1 | 12.1 | 9.3 | 9.7 | 0.7 | 0.0 | 24.0 | 1.2 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 18.3 | 28.1 | 28.0 | 38.9 | 16.9 | 16.9 | 27.8 | 0.0 | 115.6 | 28.3 | 0.0 | 0.0 |
| LnGrp LOS | B | C | C | D | B | B | C | | F | C | | |
| Approach Vol, veh/h | | 811 | | | 1495 | | | 548 | | | 53 | |
| Approach Delay, s/veh | | 27.9 | | | 24.6 | | | 110.5 | | | 28.3 | |
| Approach LOS | | C | | | C | | | F | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 25.8 | 47.2 | | 37.0 | 8.0 | 65.0 | | 37.0 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | | 4.5 | 4.0 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 26.0 | 38.5 | | 32.5 | 10.0 | 54.5 | | 32.5 |
| Max Q Clear Time (g_c+I1), s | 20.6 | 21.1 | | 4.4 | 2.4 | 20.1 | | 34.5 |
| Green Ext Time (p_c), s | 1.2 | 3.1 | | 0.2 | 0.0 | 4.4 | | 0.0 |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 41.8 |
| HCM 2010 LOS | | | D |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 220 | 260 | 60 | 290 | 20 | 240 | 70 | 30 | 10 | 80 | 10 |
| Future Volume (veh/h) | 10 | 220 | 260 | 60 | 290 | 20 | 240 | 70 | 30 | 10 | 80 | 10 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.97 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 11 | 237 | 280 | 65 | 312 | 22 | 258 | 75 | 32 | 11 | 86 | 11 |
| Adj No. of Lanes | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 12 | 508 | 424 | 83 | 537 | 38 | 313 | 435 | 186 | 12 | 296 | 38 |
| Arrive On Green | 0.01 | 0.27 | 0.27 | 0.05 | 0.31 | 0.31 | 0.17 | 0.35 | 0.35 | 0.01 | 0.18 | 0.18 |
| Sat Flow, veh/h | 1792 | 1881 | 1569 | 1792 | 1735 | 122 | 1792 | 1246 | 532 | 1792 | 1629 | 208 |
| Grp Volume(v), veh/h | 11 | 237 | 280 | 65 | 0 | 334 | 258 | 0 | 107 | 11 | 0 | 97 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1881 | 1569 | 1792 | 0 | 1857 | 1792 | 0 | 1778 | 1792 | 0 | 1837 |
| Q Serve(g_s), s | 0.4 | 6.1 | 9.2 | 2.1 | 0.0 | 8.8 | 8.0 | 0.0 | 2.4 | 0.4 | 0.0 | 2.6 |
| Cycle Q Clear(g_c), s | 0.4 | 6.1 | 9.2 | 2.1 | 0.0 | 8.8 | 8.0 | 0.0 | 2.4 | 0.4 | 0.0 | 2.6 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.07 | 1.00 | | 0.30 | 1.00 | | 0.11 |
| Lane Grp Cap(c), veh/h | 12 | 508 | 424 | 83 | 0 | 575 | 313 | 0 | 621 | 12 | 0 | 333 |
| V/C Ratio(X) | 0.93 | 0.47 | 0.66 | 0.79 | 0.00 | 0.58 | 0.83 | 0.00 | 0.17 | 0.93 | 0.00 | 0.29 |
| Avail Cap(c_a), veh/h | 943 | 1916 | 1598 | 943 | 0 | 1892 | 943 | 0 | 829 | 943 | 0 | 856 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 28.8 | 17.7 | 18.8 | 27.3 | 0.0 | 16.8 | 23.1 | 0.0 | 13.0 | 28.8 | 0.0 | 20.5 |
| Incr Delay (d2), s/veh | 57.2 | 1.0 | 2.5 | 6.0 | 0.0 | 1.3 | 2.1 | 0.0 | 0.0 | 57.2 | 0.0 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.4 | 3.3 | 4.2 | 1.2 | 0.0 | 4.7 | 4.1 | 0.0 | 1.2 | 0.4 | 0.0 | 1.4 |
| LnGrp Delay(d),s/veh | 86.0 | 18.6 | 21.3 | 33.4 | 0.0 | 18.2 | 25.2 | 0.0 | 13.1 | 86.0 | 0.0 | 20.7 |
| LnGrp LOS | F | B | C | C | | B | C | | B | F | | C |
| Approach Vol, veh/h | | 528 | | | 399 | | | 365 | | | 108 | |
| Approach Delay, s/veh | | 21.4 | | | 20.6 | | | 21.6 | | | 27.3 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 4.9 | 25.2 | 4.9 | 22.9 | 14.6 | 15.5 | 7.2 | 20.6 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 30.5 | 27.0 | 30.5 | 59.0 | 30.5 | 27.0 | 30.5 | 59.0 |
| Max Q Clear Time (g_c+I1), s | 2.4 | 4.4 | 2.4 | 10.8 | 10.0 | 4.6 | 4.1 | 11.2 |
| Green Ext Time (p_c), s | 0.0 | 0.1 | 0.0 | 2.2 | 0.2 | 0.1 | 0.0 | 3.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 21.7 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 110 | 10 | 240 | 10 | 10 | 10 | 240 | 1140 | 10 | 10 | 940 | 160 |
| Future Volume (veh/h) | 110 | 10 | 240 | 10 | 10 | 10 | 240 | 1140 | 10 | 10 | 940 | 160 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.99 | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1881 | 1881 | 1900 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 115 | 10 | 250 | 10 | 10 | 10 | 250 | 1188 | 10 | 10 | 979 | 167 |
| Adj No. of Lanes | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 243 | 19 | 323 | 72 | 71 | 50 | 405 | 2416 | 20 | 369 | 1834 | 313 |
| Arrive On Green | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.15 | 1.00 | 1.00 | 0.01 | 0.60 | 0.60 |
| Sat Flow, veh/h | 880 | 91 | 1576 | 139 | 346 | 242 | 1792 | 3632 | 31 | 1792 | 3051 | 520 |
| Grp Volume(v), veh/h | 125 | 0 | 250 | 30 | 0 | 0 | 250 | 584 | 614 | 10 | 573 | 573 |
| Grp Sat Flow(s),veh/h/ln | 971 | 0 | 1576 | 727 | 0 | 0 | 1792 | 1787 | 1876 | 1792 | 1787 | 1784 |
| Q Serve(g_s), s | 0.1 | 0.0 | 16.5 | 0.3 | 0.0 | 0.0 | 6.0 | 0.0 | 0.0 | 0.2 | 20.7 | 20.8 |
| Cycle Q Clear(g_c), s | 16.2 | 0.0 | 16.5 | 16.3 | 0.0 | 0.0 | 6.0 | 0.0 | 0.0 | 0.2 | 20.7 | 20.8 |
| Prop In Lane | 0.92 | | 1.00 | 0.33 | | 0.33 | 1.00 | | 0.02 | 1.00 | | 0.29 |
| Lane Grp Cap(c), veh/h | 262 | 0 | 323 | 193 | 0 | 0 | 405 | 1189 | 1247 | 369 | 1074 | 1072 |
| V/C Ratio(X) | 0.48 | 0.00 | 0.77 | 0.16 | 0.00 | 0.00 | 0.62 | 0.49 | 0.49 | 0.03 | 0.53 | 0.53 |
| Avail Cap(c_a), veh/h | 364 | 0 | 437 | 298 | 0 | 0 | 578 | 1189 | 1247 | 510 | 1074 | 1072 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.90 | 0.00 | 0.90 | 1.00 | 0.00 | 0.00 | 0.59 | 0.59 | 0.59 | 0.48 | 0.48 | 0.48 |
| Uniform Delay (d), s/veh | 41.2 | 0.0 | 41.3 | 36.1 | 0.0 | 0.0 | 9.6 | 0.0 | 0.0 | 8.3 | 12.9 | 12.9 |
| Incr Delay (d2), s/veh | 1.2 | 0.0 | 5.4 | 0.4 | 0.0 | 0.0 | 0.3 | 0.9 | 0.8 | 0.0 | 0.9 | 0.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 3.7 | 0.0 | 7.7 | 0.8 | 0.0 | 0.0 | 2.9 | 0.3 | 0.3 | 0.1 | 10.5 | 10.5 |
| LnGrp Delay(d),s/veh | 42.4 | 0.0 | 46.8 | 36.4 | 0.0 | 0.0 | 9.9 | 0.9 | 0.8 | 8.3 | 13.8 | 13.8 |
| LnGrp LOS | D | | D | D | | | A | A | A | A | B | B |
| Approach Vol, veh/h | | 375 | | | 30 | | | 1448 | | | 1156 | |
| Approach Delay, s/veh | | 45.3 | | | 36.4 | | | 2.4 | | | 13.8 | |
| Approach LOS | | D | | | D | | | A | | | B | |
| **Timer** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 5.3 | 77.7 | | 27.0 | 12.4 | 70.6 | | 27.0 | | | | |
| Change Period (Y+Rc), s | 4.0 | 4.5 | | 4.5 | 4.0 | 4.5 | | 4.5 | | | | |
| Max Green Setting (Gmax), s | 10.0 | 56.5 | | 30.5 | 19.0 | 47.5 | | 30.5 | | | | |
| Max Q Clear Time (g_c+I1), s | 2.2 | 2.0 | | 18.5 | 8.0 | 22.8 | | 18.3 | | | | |
| Green Ext Time (p_c), s | 0.0 | 25.2 | | 2.0 | 0.4 | 15.4 | | 0.1 | | | | |
| **Intersection Summary** | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 12.5 | | | | | | | | | |
| HCM 2010 LOS | | | B | | | | | | | | | |

| Intersection | |
|---|---|
| Int Delay, s/veh | 10.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 10 | 250 | 40 | 140 | 360 | 20 | 20 | 70 | 230 | 20 | 40 | 10 |
| Future Vol, veh/h | 10 | 250 | 40 | 140 | 360 | 20 | 20 | 70 | 230 | 20 | 40 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 150 | - | - | 150 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 10 | 260 | 42 | 146 | 375 | 21 | 21 | 73 | 240 | 21 | 42 | 10 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 396 | 0 | 0 | 302 | 0 | 0 | 1005 | 989 | 281 | 1136 | 1000 | 386 |
| Stage 1 | - | - | - | - | - | - | 301 | 301 | - | 678 | 678 | - |
| Stage 2 | - | - | - | - | - | - | 704 | 688 | - | 458 | 322 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1163 | - | - | 1259 | - | - | 220 | 247 | 758 | 179 | 243 | 662 |
| Stage 1 | - | - | - | - | - | - | 708 | 665 | - | 442 | 452 | - |
| Stage 2 | - | - | - | - | - | - | 428 | 447 | - | 583 | 651 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1163 | - | - | 1259 | - | - | 167 | 216 | 758 | 82 | 213 | 662 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 167 | 216 | - | 82 | 213 | - |
| Stage 1 | - | - | - | - | - | - | 702 | 659 | - | 438 | 400 | - |
| Stage 2 | - | - | - | - | - | - | 334 | 395 | - | 352 | 645 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.3 | 2.2 | 25.9 | 46.4 |
| HCM LOS | | | D | E |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 167 | 478 | 1163 | - | - | 1259 | - | - | 157 |
| HCM Lane V/C Ratio | 0.125 | 0.654 | 0.009 | - | - | 0.116 | - | - | 0.464 |
| HCM Control Delay (s) | 29.6 | 25.6 | 8.1 | - | - | 8.2 | - | - | 46.4 |
| HCM Lane LOS | D | D | A | - | - | A | - | - | E |
| HCM 95th %tile Q(veh) | 0.4 | 4.6 | 0 | - | - | 0.4 | - | - | 2.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 340 | 180 | 60 | 60 | 310 | 50 | 70 | 960 | 30 | 30 | 810 | 250 |
| Future Volume (vph) | 340 | 180 | 60 | 60 | 310 | 50 | 70 | 960 | 30 | 30 | 810 | 250 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.96 |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.97 | | 1.00 | 0.98 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1698 | 1709 | | 1787 | 1835 | | 1787 | 3554 | | 1787 | 3574 | 1539 |
| Flt Permitted | 0.95 | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1698 | 1709 | | 1787 | 1835 | | 1787 | 3554 | | 1787 | 3574 | 1539 |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 354 | 188 | 62 | 62 | 323 | 52 | 73 | 1000 | 31 | 31 | 844 | 260 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 5 | 0 | 0 | 2 | 0 | 0 | 0 | 126 |
| Lane Group Flow (vph) | 301 | 295 | 0 | 63 | 370 | 0 | 73 | 1029 | 0 | 31 | 844 | 134 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Split | NA | | Split | NA | | Prot | NA | | Prot | NA | Perm |
| Protected Phases | 8 | 8 | | 4 | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | 25.4 | 25.4 | | 18.8 | 18.8 | | 9.3 | 41.3 | | 4.5 | 36.5 | 36.5 |
| Effective Green, g (s) | 25.4 | 25.4 | | 18.8 | 18.8 | | 9.3 | 41.3 | | 4.5 | 36.5 | 36.5 |
| Actuated g/C Ratio | 0.23 | 0.23 | | 0.17 | 0.17 | | 0.08 | 0.38 | | 0.04 | 0.33 | 0.33 |
| Clearance Time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | | 2.0 | 2.0 | | 2.0 | 3.0 | | 2.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 392 | 394 | | 305 | 313 | | 151 | 1334 | | 73 | 1185 | 510 |
| v/s Ratio Prot | c0.18 | 0.17 | | 0.04 | c0.20 | | c0.04 | c0.29 | | 0.02 | 0.24 | |
| v/s Ratio Perm | | | | | | | | | | | | 0.09 |
| v/c Ratio | 0.77 | 0.75 | | 0.21 | 1.18 | | 0.48 | 0.77 | | 0.42 | 0.71 | 0.26 |
| Uniform Delay, d1 | 39.5 | 39.3 | | 39.2 | 45.6 | | 48.1 | 30.2 | | 51.5 | 32.2 | 26.9 |
| Progression Factor | 1.00 | 1.00 | | 1.07 | 1.10 | | 0.73 | 0.83 | | 0.70 | 0.63 | 0.61 |
| Incremental Delay, d2 | 8.7 | 7.6 | | 0.1 | 105.1 | | 0.8 | 4.2 | | 1.3 | 3.2 | 1.1 |
| Delay (s) | 48.3 | 46.9 | | 42.0 | 155.3 | | 36.0 | 29.3 | | 37.1 | 23.4 | 17.6 |
| Level of Service | D | D | | D | F | | D | C | | D | C | B |
| Approach Delay (s) | | 47.6 | | | 139.0 | | | 29.7 | | | 22.5 | |
| Approach LOS | | D | | | F | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 45.1 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.85 | | |
| Actuated Cycle Length (s) | 110.0 | Sum of lost time (s) | 20.0 |
| Intersection Capacity Utilization | 88.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 40 | 60 | 120 | 10 | 170 | 50 | 150 | 260 | 10 | 20 | 280 | 90 |
| Future Volume (veh/h) | 40 | 60 | 120 | 10 | 170 | 50 | 150 | 260 | 10 | 20 | 280 | 90 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.99 | | 0.99 | 0.99 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Adj Flow Rate, veh/h | 43 | 64 | 0 | 11 | 181 | 0 | 160 | 277 | 11 | 21 | 298 | 96 |
| Adj No. of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cap, veh/h | 231 | 230 | 0 | 120 | 336 | 0 | 487 | 695 | 28 | 529 | 410 | 132 |
| Arrive On Green | 0.18 | 0.18 | 0.00 | 0.18 | 0.18 | 0.00 | 0.10 | 0.38 | 0.38 | 0.01 | 0.30 | 0.30 |
| Sat Flow, veh/h | 461 | 1249 | 0 | 53 | 1824 | 0 | 1810 | 1814 | 72 | 1810 | 1371 | 442 |
| Grp Volume(v), veh/h | 107 | 0 | 0 | 192 | 0 | 0 | 160 | 0 | 288 | 21 | 0 | 394 |
| Grp Sat Flow(s),veh/h/ln | 1710 | 0 | 0 | 1877 | 0 | 0 | 1810 | 0 | 1886 | 1810 | 0 | 1813 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 3.8 | 0.3 | 0.0 | 6.7 |
| Cycle Q Clear(g_c), s | 1.7 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 | 2.0 | 0.0 | 3.8 | 0.3 | 0.0 | 6.7 |
| Prop In Lane | 0.40 | | 0.00 | 0.06 | | 0.00 | 1.00 | | 0.04 | 1.00 | | 0.24 |
| Lane Grp Cap(c), veh/h | 461 | 0 | 0 | 456 | 0 | 0 | 487 | 0 | 722 | 529 | 0 | 543 |
| V/C Ratio(X) | 0.23 | 0.00 | 0.00 | 0.42 | 0.00 | 0.00 | 0.33 | 0.00 | 0.40 | 0.04 | 0.00 | 0.73 |
| Avail Cap(c_a), veh/h | 1743 | 0 | 0 | 1998 | 0 | 0 | 1653 | 0 | 1916 | 1321 | 0 | 1842 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 12.2 | 0.0 | 0.0 | 12.8 | 0.0 | 0.0 | 7.5 | 0.0 | 7.7 | 8.3 | 0.0 | 10.8 |
| Incr Delay (d2), s/veh | 0.1 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.9 | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 1.0 | 0.0 | 1.9 | 0.1 | 0.0 | 3.4 |
| LnGrp Delay(d),s/veh | 12.2 | 0.0 | 0.0 | 13.0 | 0.0 | 0.0 | 7.7 | 0.0 | 7.9 | 8.3 | 0.0 | 11.5 |
| LnGrp LOS | B | | | B | | | A | | A | A | | B |
| Approach Vol, veh/h | | 107 | | | 192 | | | 448 | | | 415 | |
| Approach Delay, s/veh | | 12.2 | | | 13.0 | | | 7.8 | | | 11.3 | |
| Approach LOS | | B | | | B | | | A | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.9 | 18.2 | | 11.3 | 7.8 | 15.3 | | 11.3 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | | 5.0 | 4.5 | 5.0 | | 5.0 |
| Max Green Setting (Gmax), s | 15.5 | 35.0 | | 35.0 | 25.5 | 35.0 | | 35.0 |
| Max Q Clear Time (g_c+I1), s | 2.3 | 5.8 | | 3.7 | 4.0 | 8.7 | | 5.2 |
| Green Ext Time (p_c), s | 0.0 | 0.7 | | 0.2 | 0.2 | 0.9 | | 0.4 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 10.3 |
| HCM 2010 LOS | B |

HCM 2010 analysis does not support non-NEMA phasing.

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 70 | 140 | 100 | 1050 | 930 | 50 |
| Future Volume (veh/h) | 70 | 140 | 100 | 1050 | 930 | 50 |
| Number | 7 | 14 | 5 | 2 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 74 | 147 | 105 | 1105 | 979 | 53 |
| Adj No. of Lanes | 1 | 1 | 1 | 2 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 215 | 243 | 454 | 2819 | 2468 | 134 |
| Arrive On Green | 0.12 | 0.12 | 0.01 | 0.26 | 0.72 | 0.72 |
| Sat Flow, veh/h | 1784 | 1599 | 1792 | 3668 | 3541 | 187 |
| Grp Volume(v), veh/h | 74 | 147 | 105 | 1105 | 508 | 524 |
| Grp Sat Flow(s),veh/h/ln | 1784 | 1599 | 1792 | 1787 | 1787 | 1847 |
| Q Serve(g_s), s | 4.2 | 9.4 | 1.6 | 28.0 | 12.4 | 12.4 |
| Cycle Q Clear(g_c), s | 4.2 | 9.4 | 1.6 | 28.0 | 12.4 | 12.4 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 0.10 |
| Lane Grp Cap(c), veh/h | 215 | 243 | 454 | 2819 | 1279 | 1322 |
| V/C Ratio(X) | 0.34 | 0.60 | 0.23 | 0.39 | 0.40 | 0.40 |
| Avail Cap(c_a), veh/h | 762 | 734 | 552 | 2819 | 1279 | 1322 |
| HCM Platoon Ratio | 1.00 | 1.00 | 0.33 | 0.33 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.70 | 0.70 | 0.72 | 0.72 |
| Uniform Delay (d), s/veh | 44.4 | 43.5 | 4.5 | 19.0 | 6.2 | 6.2 |
| Incr Delay (d2), s/veh | 0.9 | 2.4 | 0.1 | 0.3 | 0.7 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.1 | 8.4 | 0.8 | 14.0 | 6.3 | 6.5 |
| LnGrp Delay(d),s/veh | 45.3 | 45.9 | 4.5 | 19.2 | 6.9 | 6.8 |
| LnGrp LOS | D | D | A | B | A | A |
| Approach Vol, veh/h | 221 | | | 1210 | 1032 | |
| Approach Delay, s/veh | 45.7 | | | 18.0 | 6.9 | |
| Approach LOS | D | | | B | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | | 91.8 | | 18.2 | 8.0 | 83.8 | | |
| Change Period (Y+Rc), s | | 5.0 | | 5.0 | 4.5 | 5.0 | | |
| Max Green Setting (Gmax), s | | 53.0 | | 47.0 | 9.5 | 39.0 | | |
| Max Q Clear Time (g_c+I1), s | | 30.0 | | 11.4 | 3.6 | 14.4 | | |
| Green Ext Time (p_c), s | | 16.1 | | 1.8 | 0.1 | 15.6 | | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 15.8 |
| HCM 2010 LOS | | | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↱ | | ↰ | ↑↱ | | ↰ | ↱ | | ↰ | ↱ | |
| Traffic Volume (veh/h) | 40 | 890 | 160 | 30 | 960 | 160 | 170 | 150 | 30 | 140 | 140 | 60 |
| Future Volume (veh/h) | 40 | 890 | 160 | 30 | 960 | 160 | 170 | 150 | 30 | 140 | 140 | 60 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 41 | 918 | 165 | 31 | 990 | 165 | 175 | 155 | 0 | 144 | 144 | 0 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 265 | 1641 | 295 | 292 | 1679 | 280 | 204 | 202 | 0 | 257 | 258 | 0 |
| Arrive On Green | 0.02 | 0.55 | 0.55 | 0.03 | 0.55 | 0.55 | 0.11 | 0.11 | 0.00 | 0.14 | 0.14 | 0.00 |
| Sat Flow, veh/h | 1774 | 2994 | 538 | 1774 | 3033 | 505 | 1774 | 1863 | 0 | 1774 | 1863 | 0 |
| Grp Volume(v), veh/h | 41 | 542 | 541 | 31 | 577 | 578 | 175 | 155 | 0 | 144 | 144 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1762 | 1774 | 1770 | 1768 | 1774 | 1863 | 0 | 1774 | 1863 | 0 |
| Q Serve(g_s), s | 1.1 | 22.0 | 22.0 | 0.8 | 23.8 | 23.8 | 10.7 | 8.9 | 0.0 | 8.3 | 7.9 | 0.0 |
| Cycle Q Clear(g_c), s | 1.1 | 22.0 | 22.0 | 0.8 | 23.8 | 23.8 | 10.7 | 8.9 | 0.0 | 8.3 | 7.9 | 0.0 |
| Prop In Lane | 1.00 | | 0.31 | 1.00 | | 0.29 | 1.00 | | 0.00 | 1.00 | | 0.00 |
| Lane Grp Cap(c), veh/h | 265 | 970 | 966 | 292 | 980 | 979 | 204 | 202 | 0 | 257 | 258 | 0 |
| V/C Ratio(X) | 0.15 | 0.56 | 0.56 | 0.11 | 0.59 | 0.59 | 0.86 | 0.77 | 0.00 | 0.56 | 0.56 | 0.00 |
| Avail Cap(c_a), veh/h | 382 | 970 | 966 | 399 | 980 | 979 | 218 | 491 | 0 | 257 | 491 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.91 | 0.91 | 0.91 | 0.72 | 0.72 | 0.72 | 0.70 | 0.70 | 0.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh | 13.2 | 16.2 | 16.2 | 12.5 | 16.3 | 16.3 | 47.8 | 47.7 | 0.0 | 43.8 | 44.3 | 0.0 |
| Incr Delay (d2), s/veh | 0.1 | 2.1 | 2.1 | 0.0 | 1.9 | 1.9 | 18.6 | 4.2 | 0.0 | 1.7 | 1.9 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.5 | 11.3 | 11.2 | 0.4 | 12.1 | 12.1 | 6.3 | 4.8 | 0.0 | 4.2 | 4.2 | 0.0 |
| LnGrp Delay(d),s/veh | 13.2 | 18.3 | 18.3 | 12.5 | 18.1 | 18.2 | 66.4 | 51.9 | 0.0 | 45.5 | 46.1 | 0.0 |
| LnGrp LOS | B | B | B | B | B | B | E | D | | D | D | |
| Approach Vol, veh/h | | 1124 | | | 1186 | | | 330 | | | 288 | |
| Approach Delay, s/veh | | 18.1 | | | 18.0 | | | 59.6 | | | 45.8 | |
| Approach LOS | | B | | | B | | | E | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 6.7 | 65.9 | 17.1 | 20.2 | 7.3 | 65.3 | 20.4 | 16.9 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 9.5 | 39.0 | 13.5 | 29.0 | 9.5 | 39.0 | 13.5 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 3.1 | 25.8 | 12.7 | 9.9 | 2.8 | 24.0 | 10.3 | 10.9 |
| Green Ext Time (p_c), s | 0.0 | 10.4 | 0.0 | 1.0 | 0.0 | 11.2 | 0.1 | 1.0 |

| Intersection Summary | | |
|---|---|---|
| HCM 2010 Ctrl Delay | | 25.5 |
| HCM 2010 LOS | | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 20 | 100 | 10 | 220 | 200 | 200 | 10 | 670 | 190 | 120 | 680 | 20 |
| Future Volume (vph) | 20 | 100 | 10 | 220 | 200 | 200 | 10 | 670 | 190 | 120 | 680 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1758 | 1830 | | 1757 | 1863 | 1523 | 1756 | 1863 | 1583 | 1770 | 1852 | |
| Flt Permitted | 0.54 | 1.00 | | 0.51 | 1.00 | 1.00 | 0.32 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 994 | 1830 | | 939 | 1863 | 1523 | 591 | 1863 | 1583 | 1770 | 1852 | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 22 | 108 | 11 | 237 | 215 | 215 | 11 | 720 | 204 | 129 | 731 | 22 |
| RTOR Reduction (vph) | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 22 | 115 | 0 | 237 | 215 | 215 | 11 | 720 | 204 | 129 | 752 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Turn Type | pm+pt | NA | | pm+pt | NA | Perm | custom | NA | custom | Prot | NA | |
| Protected Phases | 7 | 4 | | 3 | 8 | | | 6 9 | 6 | 5 | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 6 | | | | | |
| Actuated Green, G (s) | 19.0 | 16.9 | | 26.8 | 20.8 | 20.8 | 41.2 | 49.8 | 41.2 | 10.8 | 64.1 | |
| Effective Green, g (s) | 19.0 | 16.9 | | 26.8 | 20.8 | 20.8 | 41.2 | 49.8 | 41.2 | 10.8 | 64.1 | |
| Actuated g/C Ratio | 0.19 | 0.17 | | 0.27 | 0.21 | 0.21 | 0.41 | 0.50 | 0.41 | 0.11 | 0.64 | |
| Clearance Time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | 1.0 | 2.0 | | 1.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 1.0 | 2.0 | |
| Lane Grp Cap (vph) | 204 | 309 | | 300 | 387 | 316 | 243 | 927 | 652 | 191 | 1187 | |
| v/s Ratio Prot | 0.00 | 0.06 | | c0.05 | 0.12 | | | c0.39 | 0.13 | 0.07 | c0.41 | |
| v/s Ratio Perm | 0.02 | | | c0.16 | | 0.14 | 0.02 | | | | | |
| v/c Ratio | 0.11 | 0.37 | | 0.79 | 0.56 | 0.68 | 0.05 | 0.78 | 0.31 | 0.68 | 0.63 | |
| Uniform Delay, d1 | 33.2 | 36.8 | | 33.9 | 35.5 | 36.5 | 17.6 | 20.5 | 19.8 | 42.9 | 10.9 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 0.83 | |
| Incremental Delay, d2 | 0.1 | 0.3 | | 12.4 | 1.0 | 4.7 | 0.4 | 4.1 | 1.3 | 5.4 | 1.9 | |
| Delay (s) | 33.3 | 37.1 | | 46.2 | 36.4 | 41.3 | 18.0 | 24.7 | 21.1 | 44.2 | 10.9 | |
| Level of Service | C | D | | D | D | D | B | C | C | D | B | |
| Approach Delay (s) | | 36.5 | | | 41.5 | | | 23.8 | | | 15.8 | |
| Approach LOS | | D | | | D | | | C | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 26.3 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.85 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 74.8% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↑↱ | | ↰ | ↑↑↱ | | ↰ | ↑↱ | | ↰ | ↑↱ | |
| Traffic Volume (veh/h) | 80 | 720 | 60 | 120 | 820 | 50 | 90 | 210 | 130 | 110 | 200 | 80 |
| Future Volume (veh/h) | 80 | 720 | 60 | 120 | 820 | 50 | 90 | 210 | 130 | 110 | 200 | 80 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.98 | 0.99 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1845 | 1845 | 1900 | 1845 | 1845 | 1900 | 1845 | 1845 | 1900 | 1845 | 1845 | 1900 |
| Adj Flow Rate, veh/h | 85 | 766 | 0 | 128 | 872 | 53 | 96 | 223 | 138 | 117 | 213 | 85 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 269 | 1046 | 0 | 318 | 1034 | 63 | 360 | 280 | 173 | 311 | 335 | 134 |
| Arrive On Green | 0.07 | 0.30 | 0.00 | 0.08 | 0.31 | 0.31 | 0.07 | 0.26 | 0.26 | 0.08 | 0.27 | 0.27 |
| Sat Flow, veh/h | 1757 | 3597 | 0 | 1757 | 3353 | 204 | 1757 | 1062 | 657 | 1757 | 1251 | 499 |
| Grp Volume(v), veh/h | 85 | 766 | 0 | 128 | 456 | 469 | 96 | 0 | 361 | 117 | 0 | 298 |
| Grp Sat Flow(s),veh/h/ln | 1757 | 1752 | 0 | 1757 | 1752 | 1805 | 1757 | 0 | 1720 | 1757 | 0 | 1750 |
| Q Serve(g_s), s | 2.2 | 13.3 | 0.0 | 3.3 | 16.5 | 16.5 | 2.6 | 0.0 | 13.3 | 3.2 | 0.0 | 10.2 |
| Cycle Q Clear(g_c), s | 2.2 | 13.3 | 0.0 | 3.3 | 16.5 | 16.5 | 2.6 | 0.0 | 13.3 | 3.2 | 0.0 | 10.2 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.11 | 1.00 | | 0.38 | 1.00 | | 0.29 |
| Lane Grp Cap(c), veh/h | 269 | 1046 | 0 | 318 | 540 | 556 | 360 | 0 | 453 | 311 | 0 | 469 |
| V/C Ratio(X) | 0.32 | 0.73 | 0.00 | 0.40 | 0.84 | 0.84 | 0.27 | 0.00 | 0.80 | 0.38 | 0.00 | 0.64 |
| Avail Cap(c_a), veh/h | 338 | 1804 | 0 | 370 | 902 | 929 | 424 | 0 | 632 | 367 | 0 | 669 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 16.4 | 21.4 | 0.0 | 15.8 | 22.0 | 22.0 | 16.6 | 0.0 | 23.4 | 17.3 | 0.0 | 22.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.4 | 0.0 | 0.3 | 1.6 | 1.5 | 0.1 | 0.0 | 3.2 | 0.3 | 0.0 | 0.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.1 | 6.4 | 0.0 | 1.6 | 8.2 | 8.4 | 1.3 | 0.0 | 6.7 | 1.6 | 0.0 | 5.0 |
| LnGrp Delay(d),s/veh | 16.6 | 21.8 | 0.0 | 16.1 | 23.6 | 23.5 | 16.7 | 0.0 | 26.6 | 17.5 | 0.0 | 22.5 |
| LnGrp LOS | B | C | | B | C | C | B | | C | B | | C |
| Approach Vol, veh/h | | 851 | | | 1053 | | | 457 | | | 415 | |
| Approach Delay, s/veh | | 21.3 | | | 22.6 | | | 24.5 | | | 21.1 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 10.0 | 25.3 | 9.5 | 23.2 | 9.3 | 26.0 | 9.8 | 22.9 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 7.5 | 35.0 | 7.5 | 26.0 | 7.5 | 35.0 | 7.5 | 25.0 |
| Max Q Clear Time (g_c+I1), s | 5.3 | 15.3 | 4.6 | 12.2 | 4.2 | 18.5 | 5.2 | 15.3 |
| Green Ext Time (p_c), s | 0.0 | 2.1 | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 1.1 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 22.3 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 70 | 690 | 120 | 90 | 680 | 420 | 100 | 670 | 50 | 480 | 520 | 40 |
| Future Volume (veh/h) | 70 | 690 | 120 | 90 | 680 | 420 | 100 | 670 | 50 | 480 | 520 | 40 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 74 | 726 | 84 | 95 | 716 | 322 | 105 | 705 | 0 | 505 | 547 | 30 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 95 | 883 | 102 | 178 | 766 | 344 | 178 | 1105 | 0 | 276 | 1253 | 69 |
| Arrive On Green | 0.05 | 0.27 | 0.27 | 0.20 | 0.64 | 0.64 | 0.10 | 0.31 | 0.00 | 0.15 | 0.36 | 0.36 |
| Sat Flow, veh/h | 1792 | 3225 | 373 | 1792 | 2392 | 1075 | 1792 | 3668 | 0 | 1792 | 3445 | 189 |
| Grp Volume(v), veh/h | 74 | 402 | 408 | 95 | 535 | 503 | 105 | 705 | 0 | 505 | 283 | 294 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1811 | 1792 | 1787 | 1679 | 1792 | 1787 | 0 | 1792 | 1787 | 1846 |
| Q Serve(g_s), s | 4.5 | 23.2 | 23.2 | 5.2 | 29.5 | 29.5 | 6.2 | 18.7 | 0.0 | 16.9 | 13.2 | 13.2 |
| Cycle Q Clear(g_c), s | 4.5 | 23.2 | 23.2 | 5.2 | 29.5 | 29.5 | 6.2 | 18.7 | 0.0 | 16.9 | 13.2 | 13.2 |
| Prop In Lane | 1.00 | | 0.21 | 1.00 | | 0.64 | 1.00 | | 0.00 | 1.00 | | 0.10 |
| Lane Grp Cap(c), veh/h | 95 | 489 | 496 | 178 | 572 | 538 | 178 | 1105 | 0 | 276 | 650 | 671 |
| V/C Ratio(X) | 0.78 | 0.82 | 0.82 | 0.53 | 0.93 | 0.94 | 0.59 | 0.64 | 0.00 | 1.83 | 0.44 | 0.44 |
| Avail Cap(c_a), veh/h | 130 | 536 | 543 | 179 | 585 | 550 | 178 | 1105 | 0 | 276 | 650 | 671 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.71 | 0.71 | 0.71 | 0.13 | 0.13 | 0.13 | 0.79 | 0.79 | 0.00 | 0.77 | 0.77 | 0.77 |
| Uniform Delay (d), s/veh | 51.5 | 37.4 | 37.4 | 41.8 | 18.7 | 18.7 | 47.4 | 32.7 | 0.0 | 46.5 | 26.5 | 26.5 |
| Incr Delay (d2), s/veh | 9.0 | 7.3 | 7.2 | 0.2 | 4.6 | 4.9 | 2.7 | 2.2 | 0.0 | 384.0 | 1.6 | 1.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.5 | 12.4 | 12.6 | 2.6 | 14.7 | 13.9 | 3.2 | 9.5 | 0.0 | 37.8 | 6.8 | 7.1 |
| LnGrp Delay(d),s/veh | 60.5 | 44.7 | 44.7 | 42.0 | 23.3 | 23.6 | 50.1 | 34.9 | 0.0 | 430.5 | 28.1 | 28.1 |
| LnGrp LOS | E | D | D | D | C | C | D | C | | F | C | C |
| Approach Vol, veh/h | | 884 | | | 1133 | | | 810 | | | 1082 | |
| Approach Delay, s/veh | | 46.0 | | | 25.0 | | | 36.9 | | | 215.9 | |
| Approach LOS | | D | | | C | | | D | | | F | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 14.9 | 45.0 | 9.8 | 40.2 | 20.9 | 39.0 | 14.9 | 35.1 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 5.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Green Setting (Gmax), s | 8.0 | 40.0 | 8.0 | 36.0 | 14.0 | 34.0 | 11.0 | 33.0 |
| Max Q Clear Time (g_c+I1), s | 18.2 | 15.2 | 6.5 | 31.5 | 18.9 | 20.7 | 7.2 | 25.2 |
| Green Ext Time (p_c), s | 0.0 | 5.0 | 0.0 | 3.4 | 0.0 | 6.3 | 0.0 | 4.6 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 85.1 |
| HCM 2010 LOS | F |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↱ | | ↰ | ↑↱ | | ↰ | ↑↱ | | ↰ | ↑↱ | |
| Traffic Volume (veh/h) | 210 | 950 | 190 | 100 | 940 | 150 | 60 | 600 | 230 | 330 | 680 | 250 |
| Future Volume (veh/h) | 210 | 950 | 190 | 100 | 940 | 150 | 60 | 600 | 230 | 330 | 680 | 250 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 223 | 1011 | 133 | 106 | 1000 | 115 | 64 | 638 | 173 | 351 | 723 | 185 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 578 | 1931 | 254 | 81 | 1053 | 121 | 82 | 662 | 179 | 290 | 1011 | 259 |
| Arrive On Green | 0.33 | 0.61 | 0.61 | 0.05 | 0.33 | 0.33 | 0.05 | 0.24 | 0.24 | 0.16 | 0.36 | 0.36 |
| Sat Flow, veh/h | 1774 | 3144 | 413 | 1774 | 3196 | 367 | 1774 | 2746 | 744 | 1774 | 2787 | 713 |
| Grp Volume(v), veh/h | 223 | 569 | 575 | 106 | 553 | 562 | 64 | 411 | 400 | 351 | 459 | 449 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1787 | 1774 | 1770 | 1794 | 1774 | 1770 | 1720 | 1774 | 1770 | 1730 |
| Q Serve(g_s), s | 10.7 | 20.1 | 20.1 | 5.0 | 33.6 | 33.6 | 3.9 | 25.2 | 25.3 | 18.0 | 24.6 | 24.6 |
| Cycle Q Clear(g_c), s | 10.7 | 20.1 | 20.1 | 5.0 | 33.6 | 33.6 | 3.9 | 25.2 | 25.3 | 18.0 | 24.6 | 24.6 |
| Prop In Lane | 1.00 | | 0.23 | 1.00 | | 0.20 | 1.00 | | 0.43 | 1.00 | | 0.41 |
| Lane Grp Cap(c), veh/h | 578 | 1087 | 1098 | 81 | 583 | 591 | 82 | 426 | 414 | 290 | 642 | 628 |
| V/C Ratio(X) | 0.39 | 0.52 | 0.52 | 1.31 | 0.95 | 0.95 | 0.78 | 0.96 | 0.97 | 1.21 | 0.72 | 0.72 |
| Avail Cap(c_a), veh/h | 578 | 1087 | 1098 | 81 | 587 | 595 | 129 | 426 | 414 | 290 | 642 | 628 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.09 | 0.09 | 0.09 | 1.00 | 1.00 | 1.00 | 0.67 | 0.67 | 0.67 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 28.6 | 12.1 | 12.1 | 52.5 | 36.0 | 36.0 | 51.9 | 41.3 | 41.3 | 46.0 | 30.2 | 30.2 |
| Incr Delay (d2), s/veh | 0.0 | 0.1 | 0.1 | 205.7 | 26.7 | 26.6 | 4.0 | 26.7 | 27.7 | 121.8 | 3.8 | 3.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.2 | 9.8 | 9.9 | 7.0 | 20.6 | 20.9 | 2.0 | 15.5 | 15.2 | 18.6 | 12.7 | 12.4 |
| LnGrp Delay(d),s/veh | 28.6 | 12.1 | 12.1 | 258.2 | 62.7 | 62.7 | 55.9 | 68.0 | 68.9 | 167.8 | 33.9 | 34.0 |
| LnGrp LOS | C | B | B | F | E | E | E | E | E | F | C | C |
| Approach Vol, veh/h | | 1367 | | | 1221 | | | 875 | | | 1259 | |
| Approach Delay, s/veh | | 14.8 | | | 79.7 | | | 67.6 | | | 71.3 | |
| Approach LOS | | B | | | E | | | E | | | E | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 11.1 | 40.7 | 9.1 | 44.4 | 9.0 | 72.8 | 22.5 | 31.0 |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 |
| Max Green Setting (Gmax), s | 12.0 | * 37 | 8.0 | 36.5 | 5.0 | 43.5 | 18.0 | * 27 |
| Max Q Clear Time (g_c+I1), s | 12.7 | 35.6 | 5.9 | 26.6 | 7.0 | 22.1 | 20.0 | 27.3 |
| Green Ext Time (p_c), s | 0.0 | 0.6 | 0.0 | 2.9 | 0.0 | 8.1 | 0.0 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 56.4 |
| HCM 2010 LOS | E |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 16.9 |
| Intersection LOS | C |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 536 | 588 | 309 | 330 |
| Demand Flow Rate, veh/h | 552 | 606 | 318 | 340 |
| Vehicles Circulating, veh/h | 320 | 318 | 606 | 542 |
| Vehicles Exiting, veh/h | 562 | 606 | 266 | 382 |
| Follow-Up Headway, s | 3.186 | 3.186 | 3.186 | 3.186 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 16.6 | 19.7 | 14.8 | 14.1 |
| Approach LOS | C | C | B | B |

| Lane | Left | Left | Left | Left |
|---|---|---|---|---|
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Critical Headway, s | 5.193 | 5.193 | 5.193 | 5.193 |
| Entry Flow, veh/h | 552 | 606 | 318 | 340 |
| Cap Entry Lane, veh/h | 821 | 822 | 616 | 657 |
| Entry HV Adj Factor | 0.972 | 0.970 | 0.971 | 0.971 |
| Flow Entry, veh/h | 536 | 588 | 309 | 330 |
| Cap Entry, veh/h | 797 | 798 | 599 | 638 |
| V/C Ratio | 0.673 | 0.737 | 0.516 | 0.517 |
| Control Delay, s/veh | 16.6 | 19.7 | 14.8 | 14.1 |
| LOS | C | C | B | B |
| 95th %tile Queue, veh | 5 | 7 | 3 | 3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 70 | 380 | 320 | 570 | 480 | 50 | 210 | 740 | 450 | 50 | 650 | 100 |
| Future Volume (veh/h) | 70 | 380 | 320 | 570 | 480 | 50 | 210 | 740 | 450 | 50 | 650 | 100 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 74 | 400 | 241 | 381 | 811 | 38 | 221 | 779 | 323 | 53 | 684 | 69 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 417 | 500 | 297 | 342 | 680 | 32 | 195 | 1137 | 809 | 120 | 934 | 94 |
| Arrive On Green | 0.23 | 0.23 | 0.23 | 0.19 | 0.19 | 0.19 | 0.22 | 0.64 | 0.64 | 0.13 | 0.57 | 0.57 |
| Sat Flow, veh/h | 1792 | 2146 | 1277 | 1792 | 3563 | 167 | 1792 | 3574 | 1584 | 1792 | 3273 | 330 |
| Grp Volume(v), veh/h | 74 | 332 | 309 | 381 | 428 | 421 | 221 | 779 | 323 | 53 | 373 | 380 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1636 | 1792 | 1881 | 1849 | 1792 | 1787 | 1584 | 1792 | 1787 | 1816 |
| Q Serve(g_s), s | 3.6 | 19.3 | 19.6 | 21.0 | 21.0 | 21.0 | 12.0 | 15.5 | 9.9 | 3.0 | 16.9 | 17.0 |
| Cycle Q Clear(g_c), s | 3.6 | 19.3 | 19.6 | 21.0 | 21.0 | 21.0 | 12.0 | 15.5 | 9.9 | 3.0 | 16.9 | 17.0 |
| Prop In Lane | 1.00 | | 0.78 | 1.00 | | 0.09 | 1.00 | | 1.00 | 1.00 | | 0.18 |
| Lane Grp Cap(c), veh/h | 417 | 416 | 381 | 342 | 359 | 353 | 195 | 1137 | 809 | 120 | 510 | 518 |
| V/C Ratio(X) | 0.18 | 0.80 | 0.81 | 1.11 | 1.19 | 1.19 | 1.13 | 0.68 | 0.40 | 0.44 | 0.73 | 0.73 |
| Avail Cap(c_a), veh/h | 505 | 504 | 461 | 342 | 359 | 353 | 195 | 1137 | 809 | 120 | 510 | 518 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.42 | 0.42 | 0.42 | 0.56 | 0.56 | 0.56 | 0.89 | 0.89 | 0.89 |
| Uniform Delay (d), s/veh | 33.8 | 39.8 | 39.9 | 44.5 | 44.5 | 44.5 | 43.0 | 16.4 | 8.4 | 45.7 | 20.5 | 20.5 |
| Incr Delay (d2), s/veh | 0.3 | 8.3 | 9.9 | 67.5 | 97.9 | 98.2 | 88.6 | 1.9 | 0.8 | 0.8 | 8.1 | 8.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.8 | 10.5 | 9.9 | 16.8 | 20.6 | 20.3 | 10.7 | 7.7 | 6.1 | 1.5 | 9.2 | 9.4 |
| LnGrp Delay(d),s/veh | 34.1 | 48.1 | 49.8 | 112.0 | 142.4 | 142.7 | 131.6 | 18.4 | 9.2 | 46.5 | 28.6 | 28.5 |
| LnGrp LOS | C | D | D | F | F | F | F | B | A | D | C | C |
| Approach Vol, veh/h | | 715 | | | 1230 | | | 1323 | | | 806 | |
| Approach Delay, s/veh | | 47.4 | | | 133.1 | | | 35.0 | | | 29.7 | |
| Approach LOS | | D | | | F | | | D | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 16.0 | 36.4 | | 27.0 | 12.4 | 40.0 | | 30.6 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | | 6.0 | 5.0 | * 5 | | 5.0 |
| Max Green Setting (Gmax), s | 12.0 | 26.0 | | 21.0 | 3.0 | * 35 | | 31.0 |
| Max Q Clear Time (g_c+I1), s | 14.0 | 19.0 | | 23.0 | 5.0 | 17.5 | | 21.6 |
| Green Ext Time (p_c), s | 0.0 | 3.3 | | 0.0 | 0.0 | 9.8 | | 4.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 65.8 |
| HCM 2010 LOS | E |

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 20 | 40 | 50 | 30 | 90 | 80 | 50 | 530 | 70 | 60 | 690 | 30 |
| Future Volume (vph) | 20 | 40 | 50 | 30 | 90 | 80 | 50 | 530 | 70 | 60 | 690 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.94 | | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.99 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1750 | | | 1858 | 1599 | 1787 | 1881 | 1599 | 1787 | 1869 | |
| Flt Permitted | | 0.93 | | | 0.86 | 1.00 | 0.38 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1638 | | | 1616 | 1599 | 706 | 1881 | 1599 | 1787 | 1869 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 21 | 43 | 53 | 32 | 96 | 85 | 53 | 564 | 74 | 64 | 734 | 32 |
| RTOR Reduction (vph) | 0 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 0 | 85 | 0 | 0 | 128 | 85 | 53 | 564 | 74 | 64 | 765 | 0 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | Perm | NA | Perm | custom | NA | custom | Prot | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 7 | 2 | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | | | |
| Actuated Green, G (s) | | 12.7 | | | 12.7 | 12.7 | 52.6 | 67.5 | 52.6 | 7.8 | 79.3 | |
| Effective Green, g (s) | | 12.7 | | | 12.7 | 12.7 | 52.6 | 67.5 | 52.6 | 7.8 | 79.3 | |
| Actuated g/C Ratio | | 0.13 | | | 0.13 | 0.13 | 0.53 | 0.68 | 0.53 | 0.08 | 0.79 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 208 | | | 205 | 203 | 371 | 1269 | 841 | 139 | 1482 | |
| v/s Ratio Prot | | | | | | | | 0.30 | 0.05 | 0.04 | c0.41 | |
| v/s Ratio Perm | | 0.05 | | | c0.08 | 0.05 | 0.08 | | | | | |
| v/c Ratio | | 0.41 | | | 0.62 | 0.42 | 0.14 | 0.44 | 0.09 | 0.46 | 0.52 | |
| Uniform Delay, d1 | | 40.2 | | | 41.4 | 40.2 | 12.1 | 7.5 | 11.8 | 44.1 | 3.6 | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | 0.96 | 0.69 | 0.99 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.3 | | | 5.8 | 1.4 | 0.7 | 0.2 | 0.2 | 2.4 | 1.3 | |
| Delay (s) | | 41.5 | | | 47.2 | 41.6 | 12.4 | 5.4 | 11.9 | 46.5 | 4.9 | |
| Level of Service | | D | | | D | D | B | A | B | D | A | |
| Approach Delay (s) | | 41.5 | | | 45.0 | | | 6.7 | | | 8.1 | |
| Approach LOS | | D | | | D | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 13.9 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.58 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 64.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 40 | 30 | 10 | 330 | 10 | 140 | 10 | 450 | 480 | 120 | 660 | 10 |
| Future Volume (vph) | 40 | 30 | 10 | 330 | 10 | 140 | 10 | 450 | 480 | 120 | 660 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | 4.5 | 4.0 | | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | | 0.99 | | 1.00 | 0.96 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.98 | | 1.00 | 0.86 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | 0.98 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1771 | | 1772 | 1556 | | 1772 | 1881 | 1599 | 1787 | 1876 | |
| Flt Permitted | | 0.76 | | 0.57 | 1.00 | | 0.35 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1381 | | 1065 | 1556 | | 660 | 1881 | 1599 | 1787 | 1876 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 42 | 31 | 10 | 344 | 10 | 146 | 10 | 469 | 500 | 125 | 688 | 10 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 78 | 0 | 344 | 156 | 0 | 10 | 469 | 500 | 125 | 698 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | pm+pt | NA | | Perm | NA | custom | Prot | NA | |
| Protected Phases | | 8 | | 7 | 4 | | | 2 10 | 2 | 1 | 6 | |
| Permitted Phases | 8 | | | 4 | | | 2 10 | | | | | |
| Actuated Green, G (s) | | 7.6 | | 28.3 | 28.3 | | 50.7 | 50.7 | 42.2 | 9.0 | 63.2 | |
| Effective Green, g (s) | | 7.6 | | 28.3 | 28.3 | | 50.7 | 50.7 | 42.2 | 9.0 | 63.2 | |
| Actuated g/C Ratio | | 0.08 | | 0.28 | 0.28 | | 0.51 | 0.51 | 0.42 | 0.09 | 0.63 | |
| Clearance Time (s) | | 4.0 | | 4.5 | 4.0 | | | | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | | 2.0 | | 3.0 | 2.0 | | | | 3.0 | 2.0 | 3.0 | |
| Lane Grp Cap (vph) | | 104 | | 415 | 440 | | 334 | 953 | 674 | 160 | 1185 | |
| v/s Ratio Prot | | | | c0.13 | 0.10 | | | 0.25 | c0.31 | c0.07 | c0.37 | |
| v/s Ratio Perm | | 0.06 | | c0.10 | | | 0.02 | | | | | |
| v/c Ratio | | 0.75 | | 0.83 | 0.35 | | 0.03 | 0.49 | 0.74 | 0.78 | 0.59 | |
| Uniform Delay, d1 | | 45.3 | | 32.7 | 28.6 | | 12.3 | 16.2 | 24.3 | 44.5 | 10.8 | |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.06 | 0.82 | |
| Incremental Delay, d2 | | 23.6 | | 12.3 | 0.2 | | 0.0 | 0.4 | 7.2 | 18.0 | 1.9 | |
| Delay (s) | | 68.9 | | 44.9 | 28.8 | | 12.4 | 16.6 | 31.5 | 65.1 | 10.7 | |
| Level of Service | | E | | D | C | | B | B | C | E | B | |
| Approach Delay (s) | | 68.9 | | | 39.9 | | | 24.2 | | | 19.0 | |
| Approach LOS | | E | | | D | | | C | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 27.2 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.82 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 80.7% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 10.0 |
| Intersection LOS | B |

| Approach | EB | WB | SB |
|---|---|---|---|
| Entry Lanes | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 466 | 512 | 353 |
| Demand Flow Rate, veh/h | 471 | 517 | 356 |
| Vehicles Circulating, veh/h | 207 | 92 | 310 |
| Vehicles Exiting, veh/h | 459 | 586 | 299 |
| Follow-Up Headway, s | 3.186 | 3.186 | 3.186 |
| Ped Vol Crossing Leg, #/h | 10 | 10 | 10 |
| Ped Cap Adj | 0.999 | 0.999 | 0.999 |
| Approach Delay, s/veh | 10.6 | 9.6 | 9.8 |
| Approach LOS | B | A | A |

| Lane | Left | Left | Left |
|---|---|---|---|
| Designated Moves | LT | TR | LR |
| Assumed Moves | LT | TR | LR |
| RT Channelized | | | |
| Lane Util | 1.000 | 1.000 | 1.000 |
| Critical Headway, s | 5.193 | 5.193 | 5.193 |
| Entry Flow, veh/h | 471 | 517 | 356 |
| Cap Entry Lane, veh/h | 919 | 1031 | 829 |
| Entry HV Adj Factor | 0.990 | 0.990 | 0.992 |
| Flow Entry, veh/h | 466 | 512 | 353 |
| Cap Entry, veh/h | 908 | 1019 | 821 |
| V/C Ratio | 0.513 | 0.502 | 0.430 |
| Control Delay, s/veh | 10.6 | 9.6 | 9.8 |
| LOS | B | A | A |
| 95th %tile Queue, veh | 3 | 3 | 2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 20 | 10 | 10 | 20 | 20 | 380 | 10 | 180 | 20 | 430 | 150 | 30 |
| Future Volume (veh/h) | 20 | 10 | 10 | 20 | 20 | 380 | 10 | 180 | 20 | 430 | 150 | 30 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.98 | 0.98 | | 0.98 | 1.00 | | 0.97 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1900 | 1881 | 1881 | 1900 | 1881 | 1900 | 1900 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 22 | 11 | 11 | 22 | 22 | 413 | 11 | 196 | 22 | 467 | 163 | 33 |
| Adj No. of Lanes | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 292 | 187 | 187 | 228 | 204 | 1007 | 15 | 275 | 31 | 527 | 184 | 37 |
| Arrive On Green | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.17 | 0.17 | 0.17 | 0.42 | 0.42 | 0.42 |
| Sat Flow, veh/h | 948 | 854 | 854 | 690 | 932 | 1563 | 88 | 1574 | 177 | 1268 | 443 | 90 |
| Grp Volume(v), veh/h | 22 | 0 | 22 | 44 | 0 | 413 | 229 | 0 | 0 | 663 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 948 | 0 | 1707 | 1622 | 0 | 1563 | 1839 | 0 | 0 | 1801 | 0 | 0 |
| Q Serve(g_s), s | 1.3 | 0.0 | 0.7 | 0.0 | 0.0 | 9.3 | 8.3 | 0.0 | 0.0 | 24.1 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 2.7 | 0.0 | 0.7 | 1.3 | 0.0 | 9.3 | 8.3 | 0.0 | 0.0 | 24.1 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.50 | 0.50 | | 1.00 | 0.05 | | 0.10 | 0.70 | | 0.05 |
| Lane Grp Cap(c), veh/h | 292 | 0 | 375 | 432 | 0 | 1007 | 321 | 0 | 0 | 748 | 0 | 0 |
| V/C Ratio(X) | 0.08 | 0.00 | 0.06 | 0.10 | 0.00 | 0.41 | 0.71 | 0.00 | 0.00 | 0.89 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 559 | 0 | 856 | 879 | 0 | 1448 | 598 | 0 | 0 | 903 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 23.1 | 0.0 | 21.8 | 22.1 | 0.0 | 6.4 | 27.6 | 0.0 | 0.0 | 19.1 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.1 | 0.1 | 0.0 | 0.4 | 4.2 | 0.0 | 0.0 | 9.9 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.4 | 0.0 | 0.4 | 0.7 | 0.0 | 8.0 | 4.6 | 0.0 | 0.0 | 13.8 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 23.3 | 0.0 | 21.9 | 22.2 | 0.0 | 6.8 | 31.7 | 0.0 | 0.0 | 29.0 | 0.0 | 0.0 |
| LnGrp LOS | C | | C | C | | A | C | | | C | | |
| Approach Vol, veh/h | | 44 | | | 457 | | | 229 | | | 663 | |
| Approach Delay, s/veh | | 22.6 | | | 8.3 | | | 31.7 | | | 29.0 | |
| Approach LOS | | C | | | A | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 20.0 | | 33.9 | | 20.0 | | 16.8 |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 35.5 | | 35.5 | | 35.5 | | 23.0 |
| Max Q Clear Time (g_c+I1), s | | 4.7 | | 26.1 | | 11.3 | | 10.3 |
| Green Ext Time (p_c), s | | 0.2 | | 3.3 | | 3.5 | | 1.0 |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 22.5 |
| HCM 2010 LOS | | | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 60 | 330 | 180 | 140 | 250 | 240 | 130 | 1070 | 70 | 300 | 1040 | 50 |
| Future Volume (veh/h) | 60 | 330 | 180 | 140 | 250 | 240 | 130 | 1070 | 70 | 300 | 1040 | 50 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 64 | 351 | 134 | 149 | 266 | 183 | 138 | 1138 | 47 | 319 | 1106 | 35 |
| Adj No. of Lanes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 265 | 402 | 337 | 240 | 465 | 390 | 163 | 1224 | 51 | 353 | 1628 | 52 |
| Arrive On Green | 0.05 | 0.21 | 0.21 | 0.08 | 0.25 | 0.25 | 0.03 | 0.12 | 0.12 | 0.07 | 0.15 | 0.15 |
| Sat Flow, veh/h | 1792 | 1881 | 1577 | 1792 | 1881 | 1580 | 1792 | 3496 | 144 | 1792 | 3535 | 112 |
| Grp Volume(v), veh/h | 64 | 351 | 134 | 149 | 266 | 183 | 138 | 582 | 603 | 319 | 559 | 582 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1881 | 1577 | 1792 | 1881 | 1580 | 1792 | 1787 | 1853 | 1792 | 1787 | 1860 |
| Q Serve(g_s), s | 3.0 | 19.8 | 8.0 | 6.9 | 13.6 | 6.8 | 8.4 | 35.5 | 35.5 | 19.5 | 32.5 | 32.5 |
| Cycle Q Clear(g_c), s | 3.0 | 19.8 | 8.0 | 6.9 | 13.6 | 6.8 | 8.4 | 35.5 | 35.5 | 19.5 | 32.5 | 32.5 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.08 | 1.00 | | 0.06 |
| Lane Grp Cap(c), veh/h | 265 | 402 | 337 | 240 | 465 | 390 | 163 | 625 | 649 | 353 | 823 | 857 |
| V/C Ratio(X) | 0.24 | 0.87 | 0.40 | 0.62 | 0.57 | 0.47 | 0.85 | 0.93 | 0.93 | 0.90 | 0.68 | 0.68 |
| Avail Cap(c_a), veh/h | 344 | 487 | 408 | 259 | 487 | 409 | 163 | 625 | 649 | 353 | 823 | 857 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.09 | 0.09 | 0.09 |
| Uniform Delay (d), s/veh | 31.7 | 41.8 | 37.2 | 31.1 | 36.3 | 14.0 | 52.6 | 47.3 | 47.3 | 50.4 | 39.0 | 39.0 |
| Incr Delay (d2), s/veh | 0.2 | 12.3 | 0.3 | 2.7 | 0.8 | 0.3 | 30.5 | 22.3 | 21.8 | 3.3 | 0.4 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.5 | 11.7 | 3.5 | 3.5 | 7.2 | 3.0 | 5.6 | 21.4 | 22.2 | 10.0 | 16.2 | 16.9 |
| LnGrp Delay(d),s/veh | 31.8 | 54.1 | 37.4 | 33.8 | 37.2 | 14.3 | 83.1 | 69.6 | 69.2 | 53.7 | 39.4 | 39.4 |
| LnGrp LOS | C | D | D | C | D | B | F | E | E | D | D | D |
| Approach Vol, veh/h | | 549 | | | 598 | | | 1323 | | | 1460 | |
| Approach Delay, s/veh | | 47.4 | | | 29.3 | | | 70.8 | | | 42.5 | |
| Approach LOS | | D | | | C | | | E | | | D | |
| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 26.2 | 43.0 | 12.8 | 28.0 | 14.0 | 55.2 | 9.2 | 31.7 | | | | |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | | | | |
| Max Green Setting (Gmax), s | 16.0 | * 39 | 10.0 | 28.5 | 10.0 | 44.5 | 10.0 | 28.5 | | | | |
| Max Q Clear Time (g_c+I1), s | 21.5 | 37.5 | 8.9 | 21.8 | 10.4 | 34.5 | 5.0 | 15.6 | | | | |
| Green Ext Time (p_c), s | 0.0 | 0.7 | 0.0 | 0.8 | 0.0 | 2.2 | 0.0 | 0.9 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 50.7 | | | | | | | | | |
| HCM 2010 LOS | | | D | | | | | | | | | |
| Notes | | | | | | | | | | | | |

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 10 | 10 | 530 | 10 | 160 | 10 | 750 | 410 | 150 | 860 | 10 |
| Future Volume (vph) | 10 | 10 | 10 | 530 | 10 | 160 | 10 | 750 | 410 | 150 | 860 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | 0.96 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.95 | | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | 0.98 | | | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1754 | | | 1776 | 1530 | 1787 | 1881 | 1531 | 1787 | 1877 | |
| Flt Permitted | | 0.65 | | | 0.71 | 1.00 | 0.14 | 1.00 | 1.00 | 0.08 | 1.00 | |
| Satd. Flow (perm) | | 1153 | | | 1315 | 1530 | 271 | 1881 | 1531 | 153 | 1877 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 11 | 11 | 11 | 558 | 11 | 168 | 11 | 789 | 432 | 158 | 905 | 11 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 113 | 0 | 0 | 210 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 26 | 0 | 0 | 569 | 55 | 11 | 789 | 222 | 158 | 916 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | Perm | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | | 32.5 | | | 32.5 | 32.5 | 45.2 | 45.2 | 45.2 | 58.5 | 58.5 | |
| Effective Green, g (s) | | 32.5 | | | 32.5 | 32.5 | 45.2 | 45.2 | 45.2 | 58.5 | 58.5 | |
| Actuated g/C Ratio | | 0.32 | | | 0.32 | 0.32 | 0.45 | 0.45 | 0.45 | 0.58 | 0.58 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 374 | | | 427 | 497 | 122 | 850 | 692 | 241 | 1098 | |
| v/s Ratio Prot | | | | | | | | c0.42 | | 0.06 | c0.49 | |
| v/s Ratio Perm | | 0.02 | | | c0.43 | 0.04 | 0.04 | | 0.14 | 0.32 | | |
| v/c Ratio | | 0.07 | | | 1.33 | 0.11 | 0.09 | 0.93 | 0.32 | 0.66 | 0.83 | |
| Uniform Delay, d1 | | 23.3 | | | 33.8 | 23.6 | 15.7 | 25.9 | 17.6 | 20.6 | 16.8 | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.1 | | | 165.0 | 0.1 | 1.5 | 17.7 | 1.2 | 6.3 | 7.5 | |
| Delay (s) | | 23.4 | | | 198.7 | 23.7 | 17.1 | 43.6 | 18.8 | 26.9 | 24.3 | |
| Level of Service | | C | | | F | C | B | D | B | C | C | |
| Approach Delay (s) | | 23.4 | | | 158.8 | | | 34.6 | | | 24.7 | |
| Approach LOS | | C | | | F | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 60.8 | HCM 2000 Level of Service | E |
| HCM 2000 Volume to Capacity ratio | 1.08 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 100.4% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

# HCM 2010 Signalized Intersection Summary
## 5: 59th Ave SW & Gravelly Lake Dr SW

01/25/2018

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 250 | 40 | 140 | 360 | 20 | 20 | 70 | 230 | 20 | 40 | 10 |
| Future Volume (veh/h) | 10 | 250 | 40 | 140 | 360 | 20 | 20 | 70 | 230 | 20 | 40 | 10 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 10 | 260 | 42 | 146 | 375 | 21 | 21 | 73 | 240 | 21 | 42 | 10 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 689 | 1106 | 179 | 767 | 1235 | 69 | 224 | 82 | 269 | 58 | 100 | 18 |
| Arrive On Green | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 |
| Sat Flow, veh/h | 984 | 1565 | 253 | 1073 | 1748 | 98 | 1347 | 383 | 1258 | 57 | 468 | 83 |
| Grp Volume(v), veh/h | 10 | 0 | 302 | 146 | 0 | 396 | 21 | 0 | 313 | 73 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 984 | 0 | 1818 | 1073 | 0 | 1845 | 1347 | 0 | 1641 | 608 | 0 | 0 |
| Q Serve(g_s), s | 0.4 | 0.0 | 5.8 | 5.5 | 0.0 | 8.0 | 0.0 | 0.0 | 18.5 | 0.7 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 8.4 | 0.0 | 5.8 | 11.4 | 0.0 | 8.0 | 2.7 | 0.0 | 18.5 | 19.2 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.14 | 1.00 | | 0.05 | 1.00 | | 0.77 | 0.29 | | 0.14 |
| Lane Grp Cap(c), veh/h | 689 | 0 | 1285 | 767 | 0 | 1304 | 224 | 0 | 350 | 176 | 0 | 0 |
| V/C Ratio(X) | 0.01 | 0.00 | 0.24 | 0.19 | 0.00 | 0.30 | 0.09 | 0.00 | 0.89 | 0.41 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 689 | 0 | 1285 | 767 | 0 | 1304 | 273 | 0 | 410 | 231 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.63 | 0.00 | 0.63 | 1.00 | 0.00 | 1.00 | 0.78 | 0.00 | 0.78 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 7.1 | 0.0 | 5.2 | 7.2 | 0.0 | 5.5 | 32.0 | 0.0 | 38.2 | 33.2 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 0.0 | 0.3 | 0.6 | 0.0 | 0.6 | 0.1 | 0.0 | 15.8 | 1.6 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.1 | 0.0 | 3.0 | 1.7 | 0.0 | 4.3 | 0.5 | 0.0 | 10.0 | 1.7 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 7.1 | 0.0 | 5.4 | 7.7 | 0.0 | 6.1 | 32.1 | 0.0 | 54.1 | 34.8 | 0.0 | 0.0 |
| LnGrp LOS | A | | A | A | | A | C | | D | C | | |
| Approach Vol, veh/h | | 312 | | | 542 | | | 334 | | | 73 | |
| Approach Delay, s/veh | | 5.5 | | | 6.5 | | | 52.7 | | | 34.8 | |
| Approach LOS | | A | | | A | | | D | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 25.3 | | 74.7 | | 25.3 | | 74.7 |
| Change Period (Y+Rc), s | | 4.0 | | 4.0 | | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 25.0 | | 67.0 | | 25.0 | | 67.0 |
| Max Q Clear Time (g_c+I1), s | | 20.5 | | 10.4 | | 21.2 | | 13.4 |
| Green Ext Time (p_c), s | | 0.8 | | 2.1 | | 0.1 | | 3.3 |

| Intersection Summary | | |
|---|---|---|
| HCM 2010 Ctrl Delay | | 20.1 |
| HCM 2010 LOS | | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 0 | 690 | 120 | 0 | 680 | 420 | 100 | 670 | 50 | 480 | 520 | 40 |
| Future Volume (veh/h) | 0 | 690 | 120 | 0 | 680 | 420 | 100 | 670 | 50 | 480 | 520 | 40 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 0 | 1881 | 1900 | 0 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 0 | 726 | 84 | 0 | 716 | 322 | 105 | 705 | 0 | 505 | 547 | 30 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 1 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 0 | 909 | 105 | 0 | 1007 | 446 | 277 | 1007 | 0 | 554 | 1503 | 82 |
| Arrive On Green | 0.00 | 0.28 | 0.28 | 0.00 | 0.56 | 0.56 | 0.15 | 0.28 | 0.00 | 0.31 | 0.44 | 0.44 |
| Sat Flow, veh/h | 0 | 3319 | 373 | 0 | 3668 | 1582 | 1792 | 3668 | 0 | 1792 | 3445 | 189 |
| Grp Volume(v), veh/h | 0 | 402 | 408 | 0 | 716 | 322 | 105 | 705 | 0 | 505 | 283 | 294 |
| Grp Sat Flow(s),veh/h/ln | 0 | 1787 | 1811 | 0 | 1787 | 1582 | 1792 | 1787 | 0 | 1792 | 1787 | 1846 |
| Q Serve(g_s), s | 0.0 | 22.9 | 23.0 | 0.0 | 16.0 | 16.5 | 5.8 | 19.4 | 0.0 | 29.8 | 11.7 | 11.7 |
| Cycle Q Clear(g_c), s | 0.0 | 22.9 | 23.0 | 0.0 | 16.0 | 16.5 | 5.8 | 19.4 | 0.0 | 29.8 | 11.7 | 11.7 |
| Prop In Lane | 0.00 | | 0.21 | 0.00 | | 1.00 | 1.00 | | 0.00 | 1.00 | | 0.10 |
| Lane Grp Cap(c), veh/h | 0 | 504 | 510 | 0 | 1007 | 446 | 277 | 1007 | 0 | 554 | 780 | 806 |
| V/C Ratio(X) | 0.00 | 0.80 | 0.80 | 0.00 | 0.71 | 0.72 | 0.38 | 0.70 | 0.00 | 0.91 | 0.36 | 0.36 |
| Avail Cap(c_a), veh/h | 0 | 585 | 593 | 0 | 1170 | 518 | 277 | 1007 | 0 | 554 | 780 | 806 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.00 | 0.76 | 0.76 | 0.00 | 0.12 | 0.12 | 0.78 | 0.78 | 0.00 | 0.77 | 0.77 | 0.77 |
| Uniform Delay (d), s/veh | 0.0 | 36.6 | 36.6 | 0.0 | 20.7 | 20.8 | 41.8 | 35.3 | 0.0 | 36.6 | 20.8 | 20.8 |
| Incr Delay (d2), s/veh | 0.0 | 5.7 | 5.7 | 0.0 | 0.3 | 0.6 | 0.2 | 3.2 | 0.0 | 15.5 | 1.0 | 1.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 12.1 | 12.2 | 0.0 | 7.8 | 14.2 | 2.9 | 10.0 | 0.0 | 17.1 | 6.0 | 6.2 |
| LnGrp Delay(d),s/veh | 0.0 | 42.3 | 42.3 | 0.0 | 21.0 | 21.5 | 42.0 | 38.5 | 0.0 | 52.1 | 21.8 | 21.8 |
| LnGrp LOS | | D | D | | C | C | D | D | | D | C | C |
| Approach Vol, veh/h | | 810 | | | 1038 | | | 810 | | | 1082 | |
| Approach Delay, s/veh | | 42.3 | | | 21.1 | | | 39.0 | | | 35.9 | |
| Approach LOS | | D | | | C | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 21.0 | 53.0 | | 36.0 | 38.0 | 36.0 | | 36.0 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | | 5.0 | 4.0 | 5.0 | | 5.0 |
| Max Green Setting (Gmax), s | 12.0 | 48.0 | | 36.0 | 29.0 | 31.0 | | 36.0 |
| Max Q Clear Time (g_c+I1), s | 7.8 | 13.7 | | 18.5 | 31.8 | 21.4 | | 25.0 |
| Green Ext Time (p_c), s | 0.0 | 5.4 | | 9.2 | 0.0 | 5.0 | | 6.0 |

| Intersection Summary | | |
|---|---|---|
| HCM 2010 Ctrl Delay | | 33.9 |
| HCM 2010 LOS | | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑↱ | | ↰ | ↑↱ | | ↰ | ↑↱ | | ↰ | ↑↱ | |
| Traffic Volume (veh/h) | 210 | 950 | 190 | 150 | 890 | 150 | 60 | 600 | 230 | 330 | 720 | 210 |
| Future Volume (veh/h) | 210 | 950 | 190 | 150 | 890 | 150 | 60 | 600 | 230 | 330 | 720 | 210 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 223 | 1011 | 133 | 160 | 947 | 115 | 64 | 638 | 173 | 351 | 766 | 142 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 522 | 1586 | 209 | 189 | 992 | 120 | 82 | 681 | 184 | 323 | 1155 | 214 |
| Arrive On Green | 0.29 | 0.50 | 0.50 | 0.11 | 0.31 | 0.31 | 0.05 | 0.25 | 0.25 | 0.18 | 0.39 | 0.39 |
| Sat Flow, veh/h | 1774 | 3143 | 413 | 1774 | 3175 | 385 | 1774 | 2747 | 744 | 1774 | 2978 | 552 |
| Grp Volume(v), veh/h | 223 | 569 | 575 | 160 | 528 | 534 | 64 | 411 | 400 | 351 | 455 | 453 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1787 | 1774 | 1770 | 1790 | 1774 | 1770 | 1721 | 1774 | 1770 | 1760 |
| Q Serve(g_s), s | 11.2 | 25.8 | 25.9 | 9.7 | 32.1 | 32.2 | 3.9 | 25.0 | 25.1 | 20.0 | 23.3 | 23.3 |
| Cycle Q Clear(g_c), s | 11.2 | 25.8 | 25.9 | 9.7 | 32.1 | 32.2 | 3.9 | 25.0 | 25.1 | 20.0 | 23.3 | 23.3 |
| Prop In Lane | 1.00 | | 0.23 | 1.00 | | 0.22 | 1.00 | | 0.43 | 1.00 | | 0.31 |
| Lane Grp Cap(c), veh/h | 522 | 893 | 902 | 189 | 553 | 560 | 82 | 439 | 426 | 323 | 686 | 683 |
| V/C Ratio(X) | 0.43 | 0.64 | 0.64 | 0.85 | 0.95 | 0.95 | 0.78 | 0.94 | 0.94 | 1.09 | 0.66 | 0.66 |
| Avail Cap(c_a), veh/h | 522 | 893 | 902 | 274 | 555 | 562 | 210 | 442 | 430 | 323 | 686 | 683 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.30 | 0.30 | 0.30 | 1.00 | 1.00 | 1.00 | 0.58 | 0.58 | 0.58 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 31.4 | 19.9 | 19.9 | 48.3 | 37.0 | 37.0 | 51.9 | 40.5 | 40.5 | 45.0 | 27.8 | 27.8 |
| Incr Delay (d2), s/veh | 0.1 | 0.5 | 0.5 | 10.7 | 28.4 | 28.3 | 3.5 | 18.9 | 19.6 | 75.8 | 2.4 | 2.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.5 | 12.6 | 12.8 | 5.3 | 20.1 | 20.3 | 2.0 | 14.5 | 14.2 | 16.6 | 11.8 | 11.8 |
| LnGrp Delay(d),s/veh | 31.4 | 20.4 | 20.4 | 58.9 | 65.5 | 65.3 | 55.3 | 59.4 | 60.2 | 120.8 | 30.2 | 30.2 |
| LnGrp LOS | C | C | C | E | E | E | E | E | E | F | C | C |
| Approach Vol, veh/h | | 1367 | | | 1222 | | | 875 | | | 1259 | |
| Approach Delay, s/veh | | 22.2 | | | 64.6 | | | 59.5 | | | 55.4 | |
| Approach LOS | | C | | | E | | | E | | | E | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 37.5 | 38.9 | 9.1 | 47.2 | 15.7 | 60.7 | 24.5 | 31.8 |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 |
| Max Green Setting (Gmax), s | 11.0 | * 35 | 13.0 | 34.5 | 17.0 | 28.5 | 20.0 | * 28 |
| Max Q Clear Time (g_c+I1), s | 13.2 | 34.2 | 5.9 | 25.3 | 11.7 | 27.9 | 22.0 | 27.1 |
| Green Ext Time (p_c), s | 0.0 | 0.2 | 0.0 | 2.8 | 0.1 | 0.5 | 0.0 | 0.2 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 48.9 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 70 | 380 | 320 | 570 | 480 | 50 | 210 | 740 | 450 | 50 | 650 | 100 |
| Future Volume (veh/h) | 70 | 380 | 320 | 570 | 480 | 50 | 210 | 740 | 450 | 50 | 650 | 100 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 74 | 400 | 241 | 600 | 505 | 38 | 221 | 779 | 323 | 53 | 684 | 69 |
| Adj No. of Lanes | 1 | 2 | 0 | 2 | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 105 | 442 | 263 | 668 | 587 | 44 | 246 | 1235 | 548 | 117 | 925 | 93 |
| Arrive On Green | 0.06 | 0.21 | 0.21 | 0.19 | 0.34 | 0.34 | 0.27 | 0.69 | 0.69 | 0.13 | 0.57 | 0.57 |
| Sat Flow, veh/h | 1792 | 2145 | 1276 | 3476 | 1727 | 130 | 1792 | 3574 | 1585 | 1792 | 3273 | 330 |
| Grp Volume(v), veh/h | 74 | 332 | 309 | 600 | 0 | 543 | 221 | 779 | 323 | 53 | 373 | 380 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1634 | 1738 | 0 | 1857 | 1792 | 1787 | 1585 | 1792 | 1787 | 1816 |
| Q Serve(g_s), s | 4.5 | 19.9 | 20.3 | 18.5 | 0.0 | 30.0 | 13.1 | 13.1 | 6.6 | 3.0 | 17.1 | 17.2 |
| Cycle Q Clear(g_c), s | 4.5 | 19.9 | 20.3 | 18.5 | 0.0 | 30.0 | 13.1 | 13.1 | 6.6 | 3.0 | 17.1 | 17.2 |
| Prop In Lane | 1.00 | | 0.78 | 1.00 | | 0.07 | 1.00 | | 1.00 | 1.00 | | 0.18 |
| Lane Grp Cap(c), veh/h | 105 | 369 | 337 | 668 | 0 | 631 | 246 | 1235 | 548 | 117 | 505 | 513 |
| V/C Ratio(X) | 0.70 | 0.90 | 0.92 | 0.90 | 0.00 | 0.86 | 0.90 | 0.63 | 0.59 | 0.45 | 0.74 | 0.74 |
| Avail Cap(c_a), veh/h | 114 | 374 | 342 | 695 | 0 | 631 | 277 | 1235 | 548 | 130 | 505 | 513 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.57 | 0.00 | 0.57 | 0.61 | 0.61 | 0.61 | 0.94 | 0.94 | 0.94 |
| Uniform Delay (d), s/veh | 50.8 | 42.6 | 42.7 | 43.4 | 0.0 | 33.9 | 39.2 | 13.2 | 4.2 | 46.0 | 20.9 | 20.9 |
| Incr Delay (d2), s/veh | 18.2 | 24.4 | 28.6 | 9.1 | 0.0 | 6.7 | 18.0 | 1.5 | 2.8 | 1.0 | 8.8 | 8.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.8 | 12.4 | 11.9 | 9.8 | 0.0 | 16.6 | 7.6 | 6.5 | 3.1 | 1.5 | 9.5 | 9.7 |
| LnGrp Delay(d),s/veh | 69.0 | 67.0 | 71.4 | 52.5 | 0.0 | 40.6 | 57.2 | 14.7 | 7.0 | 47.0 | 29.7 | 29.6 |
| LnGrp LOS | E | E | E | D | | D | E | B | A | D | C | C |
| Approach Vol, veh/h | | 715 | | | 1143 | | | 1323 | | | 806 | |
| Approach Delay, s/veh | | 69.1 | | | 46.9 | | | 19.9 | | | 30.8 | |
| Approach LOS | | E | | | D | | | B | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 19.1 | 36.1 | 11.5 | 43.4 | 12.2 | 43.0 | 26.1 | 28.7 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 5.0 | 6.0 | 5.0 | * 5 | 5.0 | * 6 |
| Max Green Setting (Gmax), s | 17.0 | 29.0 | 7.0 | 37.0 | 8.0 | * 38 | 22.0 | * 23 |
| Max Q Clear Time (g_c+I1), s | 15.1 | 19.2 | 6.5 | 32.0 | 5.0 | 15.1 | 20.5 | 22.3 |
| Green Ext Time (p_c), s | 0.0 | 4.2 | 0.0 | 1.1 | 0.0 | 11.6 | 0.6 | 0.4 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 38.7 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 10 | 10 | 530 | 10 | 160 | 10 | 750 | 410 | 150 | 860 | 10 |
| Future Volume (vph) | 10 | 10 | 10 | 530 | 10 | 160 | 10 | 750 | 410 | 150 | 860 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | | 1.00 | | 0.97 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | | 0.99 | | 1.00 | 0.97 | | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.95 | | 1.00 | 0.86 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | 0.98 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1742 | | 3467 | 1564 | | 1787 | 1881 | 1531 | 1787 | 1877 | |
| Flt Permitted | | 0.55 | | 0.95 | 1.00 | | 0.14 | 1.00 | 1.00 | 0.08 | 1.00 | |
| Satd. Flow (perm) | | 968 | | 3467 | 1564 | | 257 | 1881 | 1531 | 157 | 1877 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 11 | 11 | 11 | 558 | 11 | 168 | 11 | 789 | 432 | 158 | 905 | 11 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 112 | 0 | 0 | 0 | 201 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 23 | 0 | 558 | 67 | 0 | 11 | 789 | 231 | 158 | 916 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | Prot | NA | | Perm | NA | Perm | pm+pt | NA | |
| Protected Phases | | 7 | | 8 | 3 | | | 2 | | 1 | 6 | |
| Permitted Phases | 7 | | | | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | | 7.3 | | 21.5 | 33.3 | | 43.8 | 43.8 | 43.8 | 57.7 | 57.7 | |
| Effective Green, g (s) | | 7.3 | | 21.5 | 33.3 | | 43.8 | 43.8 | 43.8 | 57.7 | 57.7 | |
| Actuated g/C Ratio | | 0.07 | | 0.22 | 0.33 | | 0.44 | 0.44 | 0.44 | 0.58 | 0.58 | |
| Clearance Time (s) | | 4.5 | | 4.5 | 4.5 | | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 70 | | 745 | 520 | | 112 | 823 | 670 | 251 | 1083 | |
| v/s Ratio Prot | | | | c0.16 | 0.04 | | | c0.42 | | 0.06 | c0.49 | |
| v/s Ratio Perm | | c0.02 | | | | | 0.04 | | 0.15 | 0.30 | | |
| v/c Ratio | | 0.33 | | 0.75 | 0.13 | | 0.10 | 0.96 | 0.34 | 0.63 | 0.85 | |
| Uniform Delay, d1 | | 44.0 | | 36.7 | 23.2 | | 16.5 | 27.2 | 18.6 | 20.3 | 17.5 | |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 2.7 | | 4.1 | 0.1 | | 1.7 | 22.8 | 1.4 | 4.9 | 8.1 | |
| Delay (s) | | 46.7 | | 40.9 | 23.4 | | 18.2 | 50.0 | 20.0 | 25.1 | 25.6 | |
| Level of Service | | D | | D | C | | B | D | C | C | C | |
| Approach Delay (s) | | 46.7 | | | 36.6 | | | 39.2 | | | 25.5 | |
| Approach LOS | | D | | | D | | | D | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 33.9 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.85 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 17.5 |
| Intersection Capacity Utilization | 85.6% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 70 | 540 | 90 | 110 | 760 | 160 | 130 | 1210 | 50 | 170 | 980 | 210 |
| Future Volume (veh/h) | 70 | 540 | 90 | 110 | 760 | 160 | 130 | 1210 | 50 | 170 | 980 | 210 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 73 | 562 | 67 | 115 | 792 | 119 | 135 | 1260 | 37 | 177 | 1021 | 157 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 104 | 729 | 87 | 187 | 851 | 128 | 220 | 1441 | 42 | 177 | 1173 | 180 |
| Arrive On Green | 0.06 | 0.23 | 0.23 | 0.11 | 0.28 | 0.28 | 0.08 | 0.28 | 0.28 | 0.13 | 0.51 | 0.51 |
| Sat Flow, veh/h | 1774 | 3181 | 378 | 1774 | 3082 | 463 | 1774 | 3510 | 103 | 1774 | 3073 | 472 |
| Grp Volume(v), veh/h | 73 | 312 | 317 | 115 | 455 | 456 | 135 | 635 | 662 | 177 | 587 | 591 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1790 | 1774 | 1770 | 1775 | 1774 | 1770 | 1844 | 1774 | 1770 | 1775 |
| Q Serve(g_s), s | 4.4 | 18.1 | 18.2 | 6.8 | 27.5 | 27.5 | 8.1 | 37.7 | 37.7 | 11.0 | 32.2 | 32.3 |
| Cycle Q Clear(g_c), s | 4.4 | 18.1 | 18.2 | 6.8 | 27.5 | 27.5 | 8.1 | 37.7 | 37.7 | 11.0 | 32.2 | 32.3 |
| Prop In Lane | 1.00 | | 0.21 | 1.00 | | 0.26 | 1.00 | | 0.06 | 1.00 | | 0.27 |
| Lane Grp Cap(c), veh/h | 104 | 406 | 410 | 187 | 489 | 490 | 220 | 727 | 757 | 177 | 676 | 678 |
| V/C Ratio(X) | 0.70 | 0.77 | 0.77 | 0.61 | 0.93 | 0.93 | 0.61 | 0.87 | 0.87 | 1.00 | 0.87 | 0.87 |
| Avail Cap(c_a), veh/h | 161 | 499 | 504 | 187 | 499 | 500 | 220 | 727 | 757 | 177 | 676 | 678 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.67 | 0.67 | 0.67 | 1.33 | 1.33 | 1.33 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.93 | 0.93 | 0.93 | 0.89 | 0.89 | 0.89 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 50.8 | 39.7 | 39.7 | 47.0 | 38.8 | 38.8 | 47.9 | 37.1 | 37.2 | 47.7 | 24.7 | 24.7 |
| Incr Delay (d2), s/veh | 3.2 | 4.4 | 4.5 | 4.0 | 22.4 | 22.4 | 3.3 | 12.6 | 12.2 | 66.8 | 14.3 | 14.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.3 | 9.3 | 9.5 | 3.6 | 16.4 | 16.5 | 4.2 | 21.0 | 21.8 | 8.6 | 18.2 | 18.4 |
| LnGrp Delay(d),s/veh | 54.0 | 44.1 | 44.2 | 51.1 | 61.2 | 61.2 | 51.1 | 49.7 | 49.4 | 114.5 | 38.9 | 39.1 |
| LnGrp LOS | D | D | D | D | E | E | D | D | D | F | D | D |
| Approach Vol, veh/h | | 702 | | | 1026 | | | 1432 | | | 1355 | |
| Approach Delay, s/veh | | 45.2 | | | 60.1 | | | 49.7 | | | 48.9 | |
| Approach LOS | | D | | | E | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 15.0 | 49.7 | 10.5 | 34.9 | 18.2 | 46.5 | 15.6 | 29.7 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 | 4.0 | 4.5 |
| Max Green Setting (Gmax), s | 11.0 | 41.0 | 10.0 | 31.0 | 10.0 | * 42 | 10.0 | 31.0 |
| Max Q Clear Time (g_c+I1), s | 13.0 | 39.7 | 6.4 | 29.5 | 10.1 | 34.3 | 8.8 | 20.2 |
| Green Ext Time (p_c), s | 0.0 | 1.0 | 0.0 | 0.8 | 0.0 | 4.4 | 0.0 | 2.9 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 51.1 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 730 | 20 | 540 | 920 | 10 | 20 | 10 | 530 | 20 | 20 | 10 |
| Future Volume (veh/h) | 10 | 730 | 20 | 540 | 920 | 10 | 20 | 10 | 530 | 20 | 20 | 10 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 0.99 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1900 | 1863 | 1863 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 11 | 768 | 21 | 568 | 968 | 11 | 21 | 11 | 558 | 21 | 21 | 11 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 334 | 1256 | 34 | 594 | 1971 | 22 | 338 | 166 | 463 | 175 | 169 | 78 |
| Arrive On Green | 0.04 | 0.36 | 0.36 | 0.23 | 0.55 | 0.55 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| Sat Flow, veh/h | 1774 | 3518 | 96 | 1774 | 3584 | 41 | 959 | 563 | 1567 | 438 | 571 | 264 |
| Grp Volume(v), veh/h | 11 | 386 | 403 | 568 | 478 | 501 | 32 | 0 | 558 | 53 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1844 | 1774 | 1770 | 1855 | 1522 | 0 | 1567 | 1274 | 0 | 0 |
| Q Serve(g_s), s | 0.4 | 19.8 | 19.8 | 22.9 | 18.3 | 18.3 | 0.0 | 0.0 | 32.5 | 0.0 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 0.4 | 19.8 | 19.8 | 22.9 | 18.3 | 18.3 | 1.4 | 0.0 | 32.5 | 2.4 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.05 | 1.00 | | 0.02 | 0.66 | | 1.00 | 0.40 | | 0.21 |
| Lane Grp Cap(c), veh/h | 334 | 632 | 658 | 594 | 973 | 1020 | 504 | 0 | 463 | 422 | 0 | 0 |
| V/C Ratio(X) | 0.03 | 0.61 | 0.61 | 0.96 | 0.49 | 0.49 | 0.06 | 0.00 | 1.21 | 0.13 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 430 | 632 | 658 | 606 | 973 | 1020 | 504 | 0 | 463 | 422 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.47 | 0.47 | 0.47 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 20.4 | 29.1 | 29.1 | 21.4 | 15.3 | 15.3 | 27.8 | 0.0 | 38.8 | 28.1 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 2.1 | 2.0 | 26.0 | 1.8 | 1.7 | 0.1 | 0.0 | 111.2 | 0.1 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.2 | 10.0 | 10.4 | 21.2 | 9.4 | 9.8 | 0.7 | 0.0 | 28.4 | 1.2 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 20.4 | 31.2 | 31.1 | 47.3 | 17.0 | 16.9 | 27.8 | 0.0 | 150.0 | 28.3 | 0.0 | 0.0 |
| LnGrp LOS | C | C | C | D | B | B | C | | F | C | | |
| Approach Vol, veh/h | | 800 | | | 1547 | | | 590 | | | 53 | |
| Approach Delay, s/veh | | 31.0 | | | 28.1 | | | 143.3 | | | 28.3 | |
| Approach LOS | | C | | | C | | | F | | | C | |
| **Timer** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 29.2 | 43.8 | | 37.0 | 8.0 | 65.0 | | 37.0 | | | | |
| Change Period (Y+Rc), s | 4.0 | 4.5 | | 4.5 | 4.0 | 4.5 | | 4.5 | | | | |
| Max Green Setting (Gmax), s | 26.0 | 38.5 | | 32.5 | 10.0 | 54.5 | | 32.5 | | | | |
| Max Q Clear Time (g_c+I1), s | 24.9 | 21.8 | | 4.4 | 2.4 | 20.3 | | 34.5 | | | | |
| Green Ext Time (p_c), s | 0.3 | 3.0 | | 0.2 | 0.0 | 4.5 | | 0.0 | | | | |
| **Intersection Summary** | | | | | | | | | | | | |
| HCM 2010 Ctrl Delay | | | 51.6 | | | | | | | | | |
| HCM 2010 LOS | | | D | | | | | | | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑↱ | | ↰ | ↑↱ | | ↰ | ↑↱ | |
| Traffic Volume (veh/h) | 10 | 240 | 270 | 70 | 300 | 30 | 280 | 80 | 40 | 20 | 90 | 10 |
| Future Volume (veh/h) | 10 | 240 | 270 | 70 | 300 | 30 | 280 | 80 | 40 | 20 | 90 | 10 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.98 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.97 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 11 | 258 | 290 | 75 | 323 | 32 | 301 | 86 | 43 | 22 | 97 | 11 |
| Adj No. of Lanes | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 12 | 508 | 424 | 97 | 534 | 53 | 354 | 421 | 210 | 25 | 288 | 33 |
| Arrive On Green | 0.01 | 0.27 | 0.27 | 0.05 | 0.32 | 0.32 | 0.20 | 0.36 | 0.36 | 0.01 | 0.17 | 0.17 |
| Sat Flow, veh/h | 1792 | 1881 | 1569 | 1792 | 1682 | 167 | 1792 | 1178 | 589 | 1792 | 1654 | 188 |
| Grp Volume(v), veh/h | 11 | 258 | 290 | 75 | 0 | 355 | 301 | 0 | 129 | 22 | 0 | 108 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1881 | 1569 | 1792 | 0 | 1849 | 1792 | 0 | 1767 | 1792 | 0 | 1842 |
| Q Serve(g_s), s | 0.4 | 7.2 | 10.3 | 2.6 | 0.0 | 10.1 | 10.1 | 0.0 | 3.2 | 0.8 | 0.0 | 3.2 |
| Cycle Q Clear(g_c), s | 0.4 | 7.2 | 10.3 | 2.6 | 0.0 | 10.1 | 10.1 | 0.0 | 3.2 | 0.8 | 0.0 | 3.2 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.09 | 1.00 | | 0.33 | 1.00 | | 0.10 |
| Lane Grp Cap(c), veh/h | 12 | 508 | 424 | 97 | 0 | 587 | 354 | 0 | 631 | 25 | 0 | 320 |
| V/C Ratio(X) | 0.92 | 0.51 | 0.68 | 0.78 | 0.00 | 0.60 | 0.85 | 0.00 | 0.20 | 0.87 | 0.00 | 0.34 |
| Avail Cap(c_a), veh/h | 876 | 1780 | 1485 | 876 | 0 | 1749 | 876 | 0 | 765 | 876 | 0 | 797 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 31.0 | 19.2 | 20.4 | 29.1 | 0.0 | 18.0 | 24.1 | 0.0 | 13.9 | 30.7 | 0.0 | 22.6 |
| Incr Delay (d2), s/veh | 56.1 | 1.1 | 2.8 | 4.9 | 0.0 | 1.4 | 2.3 | 0.0 | 0.1 | 26.4 | 0.0 | 0.2 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.4 | 3.9 | 4.8 | 1.4 | 0.0 | 5.4 | 5.2 | 0.0 | 1.6 | 0.6 | 0.0 | 1.6 |
| LnGrp Delay(d),s/veh | 87.0 | 20.4 | 23.2 | 34.0 | 0.0 | 19.4 | 26.4 | 0.0 | 14.0 | 57.1 | 0.0 | 22.8 |
| LnGrp LOS | F | C | C | C | | B | C | | B | E | | C |
| Approach Vol, veh/h | | 559 | | | 430 | | | 430 | | | 130 | |
| Approach Delay, s/veh | | 23.1 | | | 22.0 | | | 22.7 | | | 28.6 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 5.4 | 27.3 | 4.9 | 24.8 | 16.8 | 15.8 | 7.9 | 21.8 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 30.5 | 27.0 | 30.5 | 59.0 | 30.5 | 27.0 | 30.5 | 59.0 |
| Max Q Clear Time (g_c+I1), s | 2.8 | 5.2 | 2.4 | 12.1 | 12.1 | 5.2 | 4.6 | 12.3 |
| Green Ext Time (p_c), s | 0.0 | 0.1 | 0.0 | 2.4 | 0.3 | 0.1 | 0.1 | 4.1 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 23.1 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 130 | 10 | 230 | 10 | 10 | 10 | 230 | 1120 | 10 | 10 | 940 | 210 |
| Future Volume (veh/h) | 130 | 10 | 230 | 10 | 10 | 10 | 230 | 1120 | 10 | 10 | 940 | 210 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.99 | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1881 | 1881 | 1900 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 135 | 10 | 240 | 10 | 10 | 10 | 240 | 1167 | 10 | 10 | 979 | 219 |
| Adj No. of Lanes | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 241 | 16 | 366 | 63 | 62 | 41 | 370 | 2316 | 20 | 361 | 1660 | 370 |
| Arrive On Green | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.15 | 1.00 | 1.00 | 0.01 | 0.57 | 0.57 |
| Sat Flow, veh/h | 765 | 68 | 1578 | 83 | 267 | 175 | 1792 | 3631 | 31 | 1792 | 2900 | 647 |
| Grp Volume(v), veh/h | 145 | 0 | 240 | 30 | 0 | 0 | 240 | 574 | 603 | 10 | 603 | 595 |
| Grp Sat Flow(s),veh/h/ln | 832 | 0 | 1578 | 526 | 0 | 0 | 1792 | 1787 | 1875 | 1792 | 1787 | 1760 |
| Q Serve(g_s), s | 0.0 | 0.0 | 15.1 | 0.4 | 0.0 | 0.0 | 6.1 | 0.0 | 0.0 | 0.3 | 23.9 | 24.1 |
| Cycle Q Clear(g_c), s | 21.2 | 0.0 | 15.1 | 21.5 | 0.0 | 0.0 | 6.1 | 0.0 | 0.0 | 0.3 | 23.9 | 24.1 |
| Prop In Lane | 0.93 | | 1.00 | 0.33 | | 0.33 | 1.00 | | 0.02 | 1.00 | | 0.37 |
| Lane Grp Cap(c), veh/h | 256 | 0 | 366 | 166 | 0 | 0 | 370 | 1140 | 1196 | 361 | 1023 | 1007 |
| V/C Ratio(X) | 0.57 | 0.00 | 0.65 | 0.18 | 0.00 | 0.00 | 0.65 | 0.50 | 0.50 | 0.03 | 0.59 | 0.59 |
| Avail Cap(c_a), veh/h | 320 | 0 | 438 | 232 | 0 | 0 | 541 | 1140 | 1196 | 502 | 1023 | 1007 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.85 | 0.00 | 0.85 | 1.00 | 0.00 | 0.00 | 0.55 | 0.55 | 0.55 | 0.44 | 0.44 | 0.44 |
| Uniform Delay (d), s/veh | 40.4 | 0.0 | 38.2 | 34.4 | 0.0 | 0.0 | 11.8 | 0.0 | 0.0 | 9.6 | 15.2 | 15.2 |
| Incr Delay (d2), s/veh | 1.7 | 0.0 | 2.3 | 0.5 | 0.0 | 0.0 | 0.4 | 0.9 | 0.8 | 0.0 | 1.1 | 1.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 4.3 | 0.0 | 6.8 | 0.7 | 0.0 | 0.0 | 3.0 | 0.3 | 0.3 | 0.1 | 12.0 | 11.9 |
| LnGrp Delay(d),s/veh | 42.1 | 0.0 | 40.5 | 34.9 | 0.0 | 0.0 | 12.2 | 0.9 | 0.8 | 9.6 | 16.3 | 16.3 |
| LnGrp LOS | D | | D | C | | | B | A | A | A | B | B |
| Approach Vol, veh/h | | 385 | | | 30 | | | 1417 | | | 1208 | |
| Approach Delay, s/veh | | 41.1 | | | 34.9 | | | 2.8 | | | 16.2 | |
| Approach LOS | | D | | | C | | | A | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 5.3 | 74.6 | | 30.0 | 12.5 | 67.4 | | 30.0 |
| Change Period (Y+Rc), s | 4.0 | 4.5 | | 4.5 | 4.0 | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | 10.0 | 56.5 | | 30.5 | 19.0 | 47.5 | | 30.5 |
| Max Q Clear Time (g_c+I1), s | 2.3 | 2.0 | | 23.2 | 8.1 | 26.1 | | 23.5 |
| Green Ext Time (p_c), s | 0.0 | 24.5 | | 1.5 | 0.4 | 14.5 | | 0.1 |

| Intersection Summary | | |
|---|---|---|
| HCM 2010 Ctrl Delay | | 13.3 |
| HCM 2010 LOS | | B |

| Intersection | |
|---|---|
| Int Delay, s/veh | 18.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 10 | 290 | 40 | 160 | 370 | 20 | 20 | 90 | 250 | 20 | 40 | 10 |
| Future Vol, veh/h | 10 | 290 | 40 | 160 | 370 | 20 | 20 | 90 | 250 | 20 | 40 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 150 | - | - | 150 | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 10 | 302 | 42 | 167 | 385 | 21 | 21 | 94 | 260 | 21 | 42 | 10 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 406 | 0 | 0 | 344 | 0 | 0 | 1099 | 1083 | 323 | 1250 | 1094 | 396 |
| Stage 1 | - | - | - | - | - | - | 343 | 343 | - | 730 | 730 | - |
| Stage 2 | - | - | - | - | - | - | 756 | 740 | - | 520 | 364 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1153 | - | - | 1215 | - | - | 190 | 217 | 718 | 150 | 214 | 653 |
| Stage 1 | - | - | - | - | - | - | 672 | 637 | - | 414 | 428 | - |
| Stage 2 | - | - | - | - | - | - | 400 | 423 | - | 539 | 624 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1153 | - | - | 1215 | - | - | 138 | 186 | 718 | 52 | 183 | 653 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 138 | 186 | - | 52 | 183 | - |
| Stage 1 | - | - | - | - | - | - | 666 | 631 | - | 410 | 369 | - |
| Stage 2 | - | - | - | - | - | - | 301 | 365 | - | 290 | 618 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 2.5 | 48.7 | 82 |
| HCM LOS | | | E | F |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 138 | 409 | 1153 | - | - | 1215 | - | - | 113 |
| HCM Lane V/C Ratio | 0.151 | 0.866 | 0.009 | - | - | 0.137 | - | - | 0.645 |
| HCM Control Delay (s) | 35.7 | 49.5 | 8.2 | - | - | 8.4 | - | - | 82 |
| HCM Lane LOS | E | E | A | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 0.5 | 8.6 | 0 | - | - | 0.5 | - | - | 3.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 340 | 230 | 70 | 60 | 320 | 50 | 70 | 970 | 30 | 30 | 820 | 260 |
| Future Volume (vph) | 340 | 230 | 70 | 60 | 320 | 50 | 70 | 970 | 30 | 30 | 820 | 260 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Lane Util. Factor | 0.95 | 0.95 | | 1.00 | 1.00 | | 1.00 | 0.95 | | 1.00 | 0.95 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.96 |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.97 | | 1.00 | 0.98 | | 1.00 | 1.00 | | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1698 | 1714 | | 1787 | 1836 | | 1787 | 3555 | | 1787 | 3574 | 1539 |
| Flt Permitted | 0.95 | 0.99 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1698 | 1714 | | 1787 | 1836 | | 1787 | 3555 | | 1787 | 3574 | 1539 |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 354 | 240 | 73 | 62 | 333 | 52 | 73 | 1010 | 31 | 31 | 854 | 271 |
| RTOR Reduction (vph) | 0 | 9 | 0 | 0 | 5 | 0 | 0 | 2 | 0 | 0 | 0 | 133 |
| Lane Group Flow (vph) | 319 | 339 | 0 | 63 | 380 | 0 | 73 | 1039 | 0 | 31 | 854 | 138 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Split | NA | | Split | NA | | Prot | NA | | Prot | NA | Perm |
| Protected Phases | 8 | 8 | | 4 | 4 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | | | | | | | | | | | | 6 |
| Actuated Green, G (s) | 27.0 | 27.0 | | 18.8 | 18.8 | | 9.3 | 39.7 | | 4.5 | 34.9 | 34.9 |
| Effective Green, g (s) | 27.0 | 27.0 | | 18.8 | 18.8 | | 9.3 | 39.7 | | 4.5 | 34.9 | 34.9 |
| Actuated g/C Ratio | 0.25 | 0.25 | | 0.17 | 0.17 | | 0.08 | 0.36 | | 0.04 | 0.32 | 0.32 |
| Clearance Time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | | 2.0 | 2.0 | | 2.0 | 3.0 | | 2.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 416 | 420 | | 305 | 313 | | 151 | 1283 | | 73 | 1133 | 488 |
| v/s Ratio Prot | 0.19 | c0.20 | | 0.04 | c0.21 | | c0.04 | c0.29 | | 0.02 | 0.24 | |
| v/s Ratio Perm | | | | | | | | | | | | 0.09 |
| v/c Ratio | 0.77 | 0.81 | | 0.21 | 1.21 | | 0.48 | 0.81 | | 0.42 | 0.75 | 0.28 |
| Uniform Delay, d1 | 38.6 | 39.0 | | 39.2 | 45.6 | | 48.1 | 31.7 | | 51.5 | 33.7 | 28.2 |
| Progression Factor | 1.00 | 1.00 | | 1.06 | 1.11 | | 0.76 | 0.89 | | 0.69 | 0.64 | 0.62 |
| Incremental Delay, d2 | 8.2 | 10.8 | | 0.1 | 116.5 | | 0.8 | 5.3 | | 1.2 | 4.0 | 1.2 |
| Delay (s) | 46.8 | 49.9 | | 41.7 | 167.1 | | 37.3 | 33.6 | | 36.7 | 25.4 | 18.7 |
| Level of Service | D | D | | D | F | | D | C | | D | C | B |
| Approach Delay (s) | | 48.4 | | | 149.5 | | | 33.8 | | | 24.2 | |
| Approach LOS | | D | | | F | | | C | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 48.7 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.88 | | |
| Actuated Cycle Length (s) | 110.0 | Sum of lost time (s) | 20.0 |
| Intersection Capacity Utilization | 90.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 50 | 60 | 140 | 10 | 180 | 50 | 160 | 300 | 10 | 20 | 300 | 90 |
| Future Volume (veh/h) | 50 | 60 | 140 | 10 | 180 | 50 | 160 | 300 | 10 | 20 | 300 | 90 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.98 | | 1.00 | 0.98 | | 1.00 | 0.99 | | 0.99 | 0.99 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Adj Flow Rate, veh/h | 53 | 64 | 0 | 11 | 191 | 0 | 170 | 319 | 11 | 21 | 319 | 96 |
| Adj No. of Lanes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cap, veh/h | 247 | 217 | 0 | 115 | 345 | 0 | 481 | 719 | 25 | 504 | 428 | 129 |
| Arrive On Green | 0.19 | 0.19 | 0.00 | 0.19 | 0.19 | 0.00 | 0.10 | 0.39 | 0.39 | 0.01 | 0.31 | 0.31 |
| Sat Flow, veh/h | 537 | 1154 | 0 | 49 | 1829 | 0 | 1810 | 1825 | 63 | 1810 | 1397 | 420 |
| Grp Volume(v), veh/h | 117 | 0 | 0 | 202 | 0 | 0 | 170 | 0 | 330 | 21 | 0 | 415 |
| Grp Sat Flow(s),veh/h/ln | 1690 | 0 | 0 | 1879 | 0 | 0 | 1810 | 0 | 1888 | 1810 | 0 | 1818 |
| Q Serve(g_s), s | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 0.0 | 4.6 | 0.3 | 0.0 | 7.3 |
| Cycle Q Clear(g_c), s | 1.9 | 0.0 | 0.0 | 3.5 | 0.0 | 0.0 | 2.1 | 0.0 | 4.6 | 0.3 | 0.0 | 7.3 |
| Prop In Lane | 0.45 | | 0.00 | 0.05 | | 0.00 | 1.00 | | 0.03 | 1.00 | | 0.23 |
| Lane Grp Cap(c), veh/h | 465 | 0 | 0 | 460 | 0 | 0 | 481 | 0 | 744 | 504 | 0 | 557 |
| V/C Ratio(X) | 0.25 | 0.00 | 0.00 | 0.44 | 0.00 | 0.00 | 0.35 | 0.00 | 0.44 | 0.04 | 0.00 | 0.75 |
| Avail Cap(c_a), veh/h | 1648 | 0 | 0 | 1927 | 0 | 0 | 1591 | 0 | 1848 | 1266 | 0 | 1779 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 12.6 | 0.0 | 0.0 | 13.2 | 0.0 | 0.0 | 7.6 | 0.0 | 8.0 | 8.4 | 0.0 | 11.1 |
| Incr Delay (d2), s/veh | 0.1 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.0 | 0.0 | 0.0 | 1.8 | 0.0 | 0.0 | 1.1 | 0.0 | 2.4 | 0.1 | 0.0 | 3.7 |
| LnGrp Delay(d),s/veh | 12.7 | 0.0 | 0.0 | 13.4 | 0.0 | 0.0 | 7.8 | 0.0 | 8.1 | 8.4 | 0.0 | 11.9 |
| LnGrp LOS | B | | | B | | | A | | A | A | | B |
| Approach Vol, veh/h | | 117 | | | 202 | | | 500 | | | 436 | |
| Approach Delay, s/veh | | 12.7 | | | 13.4 | | | 8.0 | | | 11.7 | |
| Approach LOS | | B | | | B | | | A | | | B | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 4.9 | 19.1 | | 11.7 | 8.1 | 16.0 | | 11.7 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | | 5.0 | 4.5 | 5.0 | | 5.0 |
| Max Green Setting (Gmax), s | 15.5 | 35.0 | | 35.0 | 25.5 | 35.0 | | 35.0 |
| Max Q Clear Time (g_c+I1), s | 2.3 | 6.6 | | 3.9 | 4.1 | 9.3 | | 5.5 |
| Green Ext Time (p_c), s | 0.0 | 0.8 | | 0.3 | 0.2 | 1.0 | | 0.4 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 10.6 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 40 | 150 | 290 | 60 | 170 | 40 | 280 | 480 | 60 | 20 | 400 | 30 |
| Future Volume (vph) | 40 | 150 | 290 | 60 | 170 | 40 | 280 | 480 | 60 | 20 | 400 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.97 | | 1.00 | 0.99 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.90 | | 1.00 | 0.97 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1780 | 1653 | | 1787 | 1814 | | 1787 | 1881 | 1599 | 1787 | 1855 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1780 | 1653 | | 1787 | 1814 | | 1787 | 1881 | 1599 | 1787 | 1855 | |
| Peak-hour factor, PHF | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 43 | 163 | 315 | 65 | 185 | 43 | 304 | 522 | 65 | 22 | 435 | 33 |
| RTOR Reduction (vph) | 0 | 70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 43 | 408 | 0 | 65 | 228 | 0 | 304 | 522 | 65 | 22 | 465 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Bus Blockages (#/hr) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turn Type | Prot | NA | | Prot | NA | | Prot | NA | custom | Prot | NA | |
| Protected Phases | 3 | 8 | | 7 | 4 | | 1 | 6 9 | 6 | 5 | 2 | |
| Permitted Phases | | | | | | | | | | | | |
| Actuated Green, G (s) | 4.6 | 27.1 | | 6.1 | 28.6 | | 18.0 | 47.9 | 39.4 | 2.4 | 31.8 | |
| Effective Green, g (s) | 4.6 | 27.1 | | 6.1 | 28.6 | | 18.0 | 47.9 | 39.4 | 2.4 | 31.8 | |
| Actuated g/C Ratio | 0.05 | 0.27 | | 0.06 | 0.29 | | 0.18 | 0.48 | 0.39 | 0.02 | 0.32 | |
| Clearance Time (s) | 4.0 | 4.5 | | 4.0 | 4.5 | | 4.0 | | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 1.0 | | 2.0 | 1.0 | 2.0 | |
| Lane Grp Cap (vph) | 81 | 447 | | 109 | 518 | | 321 | 900 | 630 | 42 | 589 | |
| v/s Ratio Prot | 0.02 | c0.25 | | c0.04 | 0.13 | | c0.17 | 0.28 | 0.04 | 0.01 | c0.25 | |
| v/s Ratio Perm | | | | | | | | | | | | |
| v/c Ratio | 0.53 | 0.91 | | 0.60 | 0.44 | | 0.95 | 0.58 | 0.10 | 0.52 | 0.79 | |
| Uniform Delay, d1 | 46.6 | 35.3 | | 45.8 | 29.2 | | 40.5 | 18.8 | 19.1 | 48.2 | 31.1 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.80 | 1.38 | 0.92 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 3.3 | 22.5 | | 5.7 | 0.2 | | 24.9 | 0.5 | 0.2 | 5.3 | 10.4 | |
| Delay (s) | 50.0 | 57.8 | | 51.5 | 29.4 | | 57.2 | 26.5 | 17.9 | 53.6 | 41.4 | |
| Level of Service | D | E | | D | C | | E | C | B | D | D | |
| Approach Delay (s) | | 57.1 | | | 34.3 | | | 36.4 | | | 42.0 | |
| Approach LOS | | E | | | C | | | D | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 42.3 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.89 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 82.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 90 | 190 | 110 | 1060 | 960 | 80 |
| Future Volume (veh/h) | 90 | 190 | 110 | 1060 | 960 | 80 |
| Number | 7 | 14 | 5 | 2 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | 1.00 | 1.00 | | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 95 | 200 | 116 | 1116 | 1011 | 84 |
| Adj No. of Lanes | 1 | 1 | 1 | 2 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 279 | 308 | 407 | 2691 | 2256 | 187 |
| Arrive On Green | 0.16 | 0.16 | 0.01 | 0.25 | 0.68 | 0.68 |
| Sat Flow, veh/h | 1784 | 1599 | 1792 | 3668 | 3434 | 277 |
| Grp Volume(v), veh/h | 95 | 200 | 116 | 1116 | 541 | 554 |
| Grp Sat Flow(s),veh/h/ln | 1784 | 1599 | 1792 | 1787 | 1787 | 1830 |
| Q Serve(g_s), s | 5.2 | 12.7 | 2.0 | 28.8 | 15.5 | 15.5 |
| Cycle Q Clear(g_c), s | 5.2 | 12.7 | 2.0 | 28.8 | 15.5 | 15.5 |
| Prop In Lane | 1.00 | 1.00 | 1.00 | | | 0.15 |
| Lane Grp Cap(c), veh/h | 279 | 308 | 407 | 2691 | 1207 | 1236 |
| V/C Ratio(X) | 0.34 | 0.65 | 0.28 | 0.41 | 0.45 | 0.45 |
| Avail Cap(c_a), veh/h | 762 | 741 | 497 | 2691 | 1207 | 1236 |
| HCM Platoon Ratio | 1.00 | 1.00 | 0.33 | 0.33 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.63 | 0.63 | 0.68 | 0.68 |
| Uniform Delay (d), s/veh | 41.3 | 41.0 | 6.2 | 21.0 | 8.3 | 8.3 |
| Incr Delay (d2), s/veh | 0.7 | 2.3 | 0.1 | 0.3 | 0.8 | 0.8 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.6 | 11.2 | 1.0 | 14.3 | 7.8 | 8.0 |
| LnGrp Delay(d),s/veh | 42.1 | 43.3 | 6.3 | 21.3 | 9.1 | 9.1 |
| LnGrp LOS | D | D | A | C | A | A |
| Approach Vol, veh/h | 295 | | | 1232 | 1095 | |
| Approach Delay, s/veh | 42.9 | | | 19.9 | 9.1 | |
| Approach LOS | D | | | B | A | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | 5 | 6 | | |
| Phs Duration (G+Y+Rc), s | | 87.8 | | 22.2 | 8.5 | 79.3 | | |
| Change Period (Y+Rc), s | | 5.0 | | 5.0 | 4.5 | 5.0 | | |
| Max Green Setting (Gmax), s | | 53.0 | | 47.0 | 9.5 | 39.0 | | |
| Max Q Clear Time (g_c+I1), s | | 30.8 | | 14.7 | 4.0 | 17.5 | | |
| Green Ext Time (p_c), s | | 15.8 | | 2.5 | 0.1 | 14.9 | | |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 18.0 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 50 | 950 | 190 | 30 | 950 | 170 | 190 | 190 | 30 | 170 | 150 | 70 |
| Future Volume (veh/h) | 50 | 950 | 190 | 30 | 950 | 170 | 190 | 190 | 30 | 170 | 150 | 70 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 52 | 979 | 196 | 31 | 979 | 175 | 196 | 196 | 0 | 175 | 155 | 0 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 261 | 1572 | 314 | 256 | 1607 | 287 | 218 | 246 | 0 | 237 | 266 | 0 |
| Arrive On Green | 0.03 | 0.54 | 0.54 | 0.03 | 0.54 | 0.54 | 0.12 | 0.13 | 0.00 | 0.13 | 0.14 | 0.00 |
| Sat Flow, veh/h | 1774 | 2935 | 587 | 1774 | 2997 | 535 | 1774 | 1863 | 0 | 1774 | 1863 | 0 |
| Grp Volume(v), veh/h | 52 | 590 | 585 | 31 | 578 | 576 | 196 | 196 | 0 | 175 | 155 | 0 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1753 | 1774 | 1770 | 1762 | 1774 | 1863 | 0 | 1774 | 1863 | 0 |
| Q Serve(g_s), s | 1.5 | 25.5 | 25.6 | 0.9 | 24.7 | 24.8 | 12.0 | 11.2 | 0.0 | 10.4 | 8.6 | 0.0 |
| Cycle Q Clear(g_c), s | 1.5 | 25.5 | 25.6 | 0.9 | 24.7 | 24.8 | 12.0 | 11.2 | 0.0 | 10.4 | 8.6 | 0.0 |
| Prop In Lane | 1.00 | | 0.33 | 1.00 | | 0.30 | 1.00 | | 0.00 | 1.00 | | 0.00 |
| Lane Grp Cap(c), veh/h | 261 | 948 | 938 | 256 | 949 | 945 | 218 | 246 | 0 | 237 | 266 | 0 |
| V/C Ratio(X) | 0.20 | 0.62 | 0.62 | 0.12 | 0.61 | 0.61 | 0.90 | 0.80 | 0.00 | 0.74 | 0.58 | 0.00 |
| Avail Cap(c_a), veh/h | 370 | 948 | 938 | 362 | 949 | 945 | 218 | 491 | 0 | 237 | 491 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.87 | 0.87 | 0.87 | 0.62 | 0.62 | 0.62 | 0.61 | 0.61 | 0.00 | 1.00 | 1.00 | 0.00 |
| Uniform Delay (d), s/veh | 14.0 | 17.8 | 17.8 | 14.0 | 17.6 | 17.6 | 47.6 | 46.3 | 0.0 | 45.8 | 44.1 | 0.0 |
| Incr Delay (d2), s/veh | 0.1 | 2.7 | 2.7 | 0.0 | 1.8 | 1.8 | 24.2 | 3.6 | 0.0 | 10.2 | 2.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.7 | 13.2 | 13.1 | 0.4 | 12.5 | 12.5 | 7.3 | 6.0 | 0.0 | 5.8 | 4.5 | 0.0 |
| LnGrp Delay(d),s/veh | 14.2 | 20.5 | 20.5 | 14.0 | 19.4 | 19.4 | 71.8 | 49.9 | 0.0 | 56.0 | 46.1 | 0.0 |
| LnGrp LOS | B | C | C | B | B | B | E | D | | E | D | |
| Approach Vol, veh/h | | 1227 | | | 1185 | | | 392 | | | 330 | |
| Approach Delay, s/veh | | 20.2 | | | 19.2 | | | 60.9 | | | 51.3 | |
| Approach LOS | | C | | | B | | | E | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 7.3 | 64.0 | 18.0 | 20.7 | 7.4 | 63.9 | 19.2 | 19.5 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 9.5 | 39.0 | 13.5 | 29.0 | 9.5 | 39.0 | 13.5 | 29.0 |
| Max Q Clear Time (g_c+I1), s | 3.5 | 26.8 | 14.0 | 10.6 | 2.9 | 27.6 | 12.4 | 13.2 |
| Green Ext Time (p_c), s | 0.0 | 9.8 | 0.0 | 1.1 | 0.0 | 9.3 | 0.0 | 1.3 |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 28.2 |
| HCM 2010 LOS | | | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 20 | 100 | 30 | 260 | 170 | 220 | 30 | 760 | 200 | 190 | 750 | 20 |
| Future Volume (vph) | 20 | 100 | 30 | 260 | 170 | 220 | 30 | 760 | 200 | 190 | 750 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | 4.5 | | 4.0 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 1.00 | 0.97 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1754 | 1783 | | 1760 | 1863 | 1547 | 1756 | 1863 | 1583 | 1770 | 1853 | |
| Flt Permitted | 0.64 | 1.00 | | 0.40 | 1.00 | 1.00 | 0.33 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1186 | 1783 | | 747 | 1863 | 1547 | 614 | 1863 | 1583 | 1770 | 1853 | |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 22 | 108 | 32 | 280 | 183 | 237 | 32 | 817 | 215 | 204 | 806 | 22 |
| RTOR Reduction (vph) | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 22 | 128 | 0 | 280 | 183 | 237 | 32 | 817 | 215 | 204 | 827 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Turn Type | Perm | NA | | pm+pt | NA | Perm | custom | NA | custom | Prot | NA | |
| Protected Phases | | 4 | | 3 | 8 | | | 6 9 | 6 | 5 | 2 | |
| Permitted Phases | 4 | | | 8 | | 8 | 6 | | | | | |
| Actuated Green, G (s) | 13.2 | 13.2 | | 23.2 | 23.2 | 23.2 | 39.3 | 47.8 | 39.3 | 16.5 | 67.8 | |
| Effective Green, g (s) | 13.2 | 13.2 | | 23.2 | 23.2 | 23.2 | 39.3 | 47.8 | 39.3 | 16.5 | 67.8 | |
| Actuated g/C Ratio | 0.13 | 0.13 | | 0.23 | 0.23 | 0.23 | 0.39 | 0.48 | 0.39 | 0.16 | 0.68 | |
| Clearance Time (s) | 4.5 | 4.5 | | 4.0 | 4.5 | 4.5 | 4.5 | | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 1.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 1.0 | 2.0 | |
| Lane Grp Cap (vph) | 156 | 235 | | 234 | 432 | 358 | 241 | 890 | 622 | 292 | 1256 | |
| v/s Ratio Prot | | 0.07 | | c0.07 | 0.10 | | | c0.44 | 0.14 | 0.12 | c0.45 | |
| v/s Ratio Perm | 0.02 | | | c0.21 | | 0.15 | 0.05 | | | | | |
| v/c Ratio | 0.14 | 0.54 | | 1.20 | 0.42 | 0.66 | 0.13 | 0.92 | 0.35 | 0.70 | 0.66 | |
| Uniform Delay, d1 | 38.4 | 40.6 | | 38.0 | 32.7 | 34.8 | 19.4 | 24.3 | 21.3 | 39.4 | 9.4 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.97 | 0.85 | |
| Incremental Delay, d2 | 0.2 | 1.4 | | 122.3 | 0.2 | 3.5 | 1.1 | 14.0 | 1.5 | 4.6 | 2.1 | |
| Delay (s) | 38.5 | 42.0 | | 160.4 | 33.0 | 38.4 | 20.6 | 38.3 | 22.8 | 42.6 | 10.1 | |
| Level of Service | D | D | | F | C | D | C | D | C | D | B | |
| Approach Delay (s) | | 41.5 | | | 85.8 | | | 34.7 | | | 16.5 | |
| Approach LOS | | D | | | F | | | C | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 40.8 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 1.04 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 90.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 80 | 720 | 70 | 130 | 810 | 60 | 100 | 240 | 130 | 120 | 240 | 70 |
| Future Volume (veh/h) | 80 | 720 | 70 | 130 | 810 | 60 | 100 | 240 | 130 | 120 | 240 | 70 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1845 | 1845 | 1900 | 1845 | 1845 | 1900 | 1845 | 1845 | 1900 | 1845 | 1845 | 1900 |
| Adj Flow Rate, veh/h | 85 | 766 | 0 | 138 | 862 | 64 | 106 | 255 | 138 | 128 | 255 | 74 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Cap, veh/h | 261 | 1037 | 0 | 311 | 1013 | 75 | 351 | 308 | 167 | 301 | 382 | 111 |
| Arrive On Green | 0.07 | 0.30 | 0.00 | 0.08 | 0.31 | 0.31 | 0.07 | 0.27 | 0.27 | 0.08 | 0.28 | 0.28 |
| Sat Flow, veh/h | 1757 | 3597 | 0 | 1757 | 3304 | 245 | 1757 | 1122 | 607 | 1757 | 1371 | 398 |
| Grp Volume(v), veh/h | 85 | 766 | 0 | 138 | 457 | 469 | 106 | 0 | 393 | 128 | 0 | 329 |
| Grp Sat Flow(s),veh/h/ln | 1757 | 1752 | 0 | 1757 | 1752 | 1797 | 1757 | 0 | 1730 | 1757 | 0 | 1769 |
| Q Serve(g_s), s | 2.3 | 13.8 | 0.0 | 3.7 | 17.2 | 17.2 | 2.9 | 0.0 | 15.0 | 3.6 | 0.0 | 11.6 |
| Cycle Q Clear(g_c), s | 2.3 | 13.8 | 0.0 | 3.7 | 17.2 | 17.2 | 2.9 | 0.0 | 15.0 | 3.6 | 0.0 | 11.6 |
| Prop In Lane | 1.00 | | 0.00 | 1.00 | | 0.14 | 1.00 | | 0.35 | 1.00 | | 0.22 |
| Lane Grp Cap(c), veh/h | 261 | 1037 | 0 | 311 | 537 | 551 | 351 | 0 | 475 | 301 | 0 | 493 |
| V/C Ratio(X) | 0.33 | 0.74 | 0.00 | 0.44 | 0.85 | 0.85 | 0.30 | 0.00 | 0.83 | 0.43 | 0.00 | 0.67 |
| Avail Cap(c_a), veh/h | 327 | 1749 | 0 | 359 | 875 | 897 | 408 | 0 | 617 | 351 | 0 | 656 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 17.1 | 22.2 | 0.0 | 16.5 | 22.8 | 22.8 | 16.8 | 0.0 | 23.9 | 17.7 | 0.0 | 22.4 |
| Incr Delay (d2), s/veh | 0.3 | 0.4 | 0.0 | 0.4 | 2.3 | 2.2 | 0.2 | 0.0 | 5.6 | 0.4 | 0.0 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.1 | 6.7 | 0.0 | 1.8 | 8.6 | 8.8 | 1.4 | 0.0 | 7.8 | 1.7 | 0.0 | 5.7 |
| LnGrp Delay(d),s/veh | 17.4 | 22.6 | 0.0 | 16.9 | 25.1 | 25.0 | 17.0 | 0.0 | 29.5 | 18.0 | 0.0 | 23.0 |
| LnGrp LOS | B | C | | B | C | C | B | | C | B | | C |
| Approach Vol, veh/h | | 851 | | | 1064 | | | 499 | | | 457 | |
| Approach Delay, s/veh | | 22.1 | | | 24.0 | | | 26.8 | | | 21.6 | |
| Approach LOS | | C | | | C | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 10.1 | 25.8 | 9.7 | 24.5 | 9.4 | 26.5 | 10.0 | 24.3 |
| Change Period (Y+Rc), s | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 | 4.5 | 5.0 |
| Max Green Setting (Gmax), s | 7.5 | 35.0 | 7.5 | 26.0 | 7.5 | 35.0 | 7.5 | 25.0 |
| Max Q Clear Time (g_c+I1), s | 5.7 | 15.8 | 4.9 | 13.6 | 4.3 | 19.2 | 5.6 | 17.0 |
| Green Ext Time (p_c), s | 0.0 | 2.1 | 0.0 | 1.1 | 0.0 | 2.0 | 0.0 | 1.1 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 23.5 |
| HCM 2010 LOS | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 80 | 760 | 140 | 100 | 780 | 400 | 110 | 710 | 50 | 540 | 560 | 40 |
| Future Volume (veh/h) | 80 | 760 | 140 | 100 | 780 | 400 | 110 | 710 | 50 | 540 | 560 | 40 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 84 | 800 | 105 | 105 | 821 | 301 | 116 | 747 | 0 | 568 | 589 | 30 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 107 | 955 | 125 | 165 | 852 | 312 | 192 | 1040 | 0 | 273 | 1164 | 59 |
| Arrive On Green | 0.06 | 0.30 | 0.30 | 0.18 | 0.67 | 0.67 | 0.11 | 0.29 | 0.00 | 0.15 | 0.34 | 0.34 |
| Sat Flow, veh/h | 1792 | 3173 | 416 | 1792 | 2557 | 936 | 1792 | 3668 | 0 | 1792 | 3459 | 176 |
| Grp Volume(v), veh/h | 84 | 450 | 455 | 105 | 573 | 549 | 116 | 747 | 0 | 568 | 304 | 315 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1803 | 1792 | 1787 | 1706 | 1792 | 1787 | 0 | 1792 | 1787 | 1848 |
| Q Serve(g_s), s | 5.1 | 25.9 | 25.9 | 6.0 | 32.8 | 33.0 | 6.8 | 20.6 | 0.0 | 16.8 | 15.0 | 15.0 |
| Cycle Q Clear(g_c), s | 5.1 | 25.9 | 25.9 | 6.0 | 32.8 | 33.0 | 6.8 | 20.6 | 0.0 | 16.8 | 15.0 | 15.0 |
| Prop In Lane | 1.00 | | 0.23 | 1.00 | | 0.55 | 1.00 | | 0.00 | 1.00 | | 0.10 |
| Lane Grp Cap(c), veh/h | 107 | 538 | 543 | 165 | 596 | 569 | 192 | 1040 | 0 | 273 | 601 | 622 |
| V/C Ratio(X) | 0.79 | 0.84 | 0.84 | 0.64 | 0.96 | 0.96 | 0.61 | 0.72 | 0.00 | 2.08 | 0.51 | 0.51 |
| Avail Cap(c_a), veh/h | 147 | 585 | 590 | 165 | 601 | 574 | 192 | 1040 | 0 | 273 | 601 | 622 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.65 | 0.65 | 0.65 | 0.09 | 0.09 | 0.09 | 0.72 | 0.72 | 0.00 | 0.66 | 0.66 | 0.66 |
| Uniform Delay (d), s/veh | 51.0 | 35.9 | 35.9 | 43.2 | 17.7 | 17.7 | 46.9 | 35.0 | 0.0 | 46.6 | 29.2 | 29.2 |
| Incr Delay (d2), s/veh | 7.9 | 7.0 | 6.9 | 0.6 | 5.0 | 5.4 | 2.8 | 3.1 | 0.0 | 494.1 | 2.0 | 2.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.8 | 13.8 | 13.9 | 2.9 | 16.4 | 15.8 | 3.5 | 10.6 | 0.0 | 45.8 | 7.7 | 8.0 |
| LnGrp Delay(d),s/veh | 59.0 | 42.9 | 42.9 | 43.7 | 22.7 | 23.2 | 49.7 | 38.1 | 0.0 | 540.7 | 31.2 | 31.2 |
| LnGrp LOS | E | D | D | D | C | C | D | D | | F | C | C |
| Approach Vol, veh/h | | 989 | | | 1227 | | | 863 | | | 1187 | |
| Approach Delay, s/veh | | 44.2 | | | 24.7 | | | 39.6 | | | 275.0 | |
| Approach LOS | | D | | | C | | | D | | | F | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 15.8 | 42.0 | 10.6 | 41.7 | 20.8 | 37.0 | 14.1 | 38.1 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 5.0 | 4.0 | 5.0 | 4.0 | 5.0 |
| Max Green Setting (Gmax), s | 9.0 | 37.0 | 9.0 | 37.0 | 14.0 | 32.0 | 10.0 | 36.0 |
| Max Q Clear Time (g_c+I1), s | 18.8 | 17.0 | 7.1 | 35.0 | 18.8 | 22.6 | 8.0 | 27.9 |
| Green Ext Time (p_c), s | 0.0 | 5.0 | 0.0 | 1.6 | 0.0 | 5.1 | 0.0 | 5.2 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 101.9 |
| HCM 2010 LOS | F |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 230 | 1040 | 230 | 80 | 960 | 150 | 90 | 650 | 240 | 330 | 680 | 270 |
| Future Volume (veh/h) | 230 | 1040 | 230 | 80 | 960 | 150 | 90 | 650 | 240 | 330 | 680 | 270 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 245 | 1106 | 176 | 85 | 1021 | 115 | 96 | 691 | 183 | 351 | 723 | 206 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 713 | 2118 | 336 | 81 | 1062 | 120 | 120 | 665 | 176 | 290 | 927 | 264 |
| Arrive On Green | 0.40 | 0.69 | 0.69 | 0.05 | 0.33 | 0.33 | 0.07 | 0.24 | 0.24 | 0.16 | 0.34 | 0.34 |
| Sat Flow, veh/h | 1774 | 3059 | 485 | 1774 | 3204 | 361 | 1774 | 2762 | 731 | 1774 | 2714 | 773 |
| Grp Volume(v), veh/h | 245 | 639 | 643 | 85 | 564 | 572 | 96 | 443 | 431 | 351 | 471 | 458 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1775 | 1774 | 1770 | 1795 | 1774 | 1770 | 1723 | 1774 | 1770 | 1718 |
| Q Serve(g_s), s | 10.5 | 19.1 | 19.2 | 5.0 | 34.4 | 34.4 | 5.9 | 26.5 | 26.5 | 18.0 | 26.3 | 26.3 |
| Cycle Q Clear(g_c), s | 10.5 | 19.1 | 19.2 | 5.0 | 34.4 | 34.4 | 5.9 | 26.5 | 26.5 | 18.0 | 26.3 | 26.3 |
| Prop In Lane | 1.00 | | 0.27 | 1.00 | | 0.20 | 1.00 | | 0.42 | 1.00 | | 0.45 |
| Lane Grp Cap(c), veh/h | 713 | 1225 | 1229 | 81 | 587 | 595 | 120 | 426 | 415 | 290 | 604 | 587 |
| V/C Ratio(X) | 0.34 | 0.52 | 0.52 | 1.05 | 0.96 | 0.96 | 0.80 | 1.04 | 1.04 | 1.21 | 0.78 | 0.78 |
| Avail Cap(c_a), veh/h | 713 | 1225 | 1229 | 81 | 587 | 596 | 129 | 426 | 415 | 290 | 604 | 587 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.09 | 0.09 | 0.09 | 1.00 | 1.00 | 1.00 | 0.60 | 0.60 | 0.60 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 22.8 | 8.1 | 8.2 | 52.5 | 36.1 | 36.1 | 50.5 | 41.8 | 41.8 | 46.0 | 32.5 | 32.5 |
| Incr Delay (d2), s/veh | 0.0 | 0.0 | 0.0 | 115.8 | 28.6 | 28.5 | 16.1 | 44.2 | 44.9 | 121.8 | 6.5 | 6.7 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 5.2 | 9.2 | 9.3 | 5.0 | 21.4 | 21.7 | 3.4 | 18.1 | 17.7 | 18.6 | 13.9 | 13.5 |
| LnGrp Delay(d),s/veh | 22.8 | 8.2 | 8.2 | 169.4 | 64.7 | 64.6 | 66.7 | 85.9 | 86.6 | 167.8 | 39.0 | 39.2 |
| LnGrp LOS | C | A | A | F | E | E | E | F | F | F | D | D |
| Approach Vol, veh/h | | 1527 | | | 1221 | | | 970 | | | 1280 | |
| Approach Delay, s/veh | | 10.6 | | | 71.9 | | | 84.3 | | | 74.4 | |
| Approach LOS | | B | | | E | | | F | | | E | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 49.7 | 41.0 | 11.4 | 42.1 | 9.0 | 81.6 | 22.5 | 31.0 |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 |
| Max Green Setting (Gmax), s | 12.0 | * 37 | 8.0 | 36.5 | 5.0 | 43.5 | 18.0 | * 27 |
| Max Q Clear Time (g_c+I1), s | 12.5 | 36.4 | 7.9 | 28.3 | 7.0 | 21.2 | 20.0 | 28.5 |
| Green Ext Time (p_c), s | 0.0 | 0.1 | 0.0 | 2.7 | 0.0 | 9.6 | 0.0 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 56.2 |
| HCM 2010 LOS | E |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 24.3 |
| Intersection LOS | C |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Entry Lanes | 1 | 1 | 1 | 1 |
| Conflicting Circle Lanes | 1 | 1 | 1 | 1 |
| Adj Approach Flow, veh/h | 577 | 691 | 350 | 351 |
| Demand Flow Rate, veh/h | 594 | 712 | 360 | 362 |
| Vehicles Circulating, veh/h | 340 | 340 | 680 | 626 |
| Vehicles Exiting, veh/h | 648 | 700 | 254 | 426 |
| Follow-Up Headway, s | 3.186 | 3.186 | 3.186 | 3.186 |
| Ped Vol Crossing Leg, #/h | 0 | 0 | 0 | 0 |
| Ped Cap Adj | 1.000 | 1.000 | 1.000 | 1.000 |
| Approach Delay, s/veh | 20.1 | 33.3 | 19.9 | 17.9 |
| Approach LOS | C | D | C | C |

| Lane | Left | Left | Left | Left |
|---|---|---|---|---|
| Designated Moves | LTR | LTR | LTR | LTR |
| Assumed Moves | LTR | LTR | LTR | LTR |
| RT Channelized | | | | |
| Lane Util | 1.000 | 1.000 | 1.000 | 1.000 |
| Critical Headway, s | 5.193 | 5.193 | 5.193 | 5.193 |
| Entry Flow, veh/h | 594 | 712 | 360 | 362 |
| Cap Entry Lane, veh/h | 804 | 804 | 572 | 604 |
| Entry HV Adj Factor | 0.971 | 0.971 | 0.973 | 0.970 |
| Flow Entry, veh/h | 577 | 691 | 350 | 351 |
| Cap Entry, veh/h | 781 | 781 | 557 | 586 |
| V/C Ratio | 0.739 | 0.885 | 0.629 | 0.599 |
| Control Delay, s/veh | 20.1 | 33.3 | 19.9 | 17.9 |
| LOS | C | D | C | C |
| 95th %tile Queue, veh | 7 | 11 | 4 | 4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 70 | 430 | 320 | 570 | 480 | 50 | 230 | 790 | 500 | 50 | 700 | 120 |
| Future Volume (veh/h) | 70 | 430 | 320 | 570 | 480 | 50 | 230 | 790 | 500 | 50 | 700 | 120 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.98 | 1.00 | | 0.99 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 74 | 453 | 241 | 381 | 811 | 38 | 242 | 832 | 375 | 53 | 737 | 90 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 438 | 550 | 291 | 342 | 680 | 32 | 195 | 1137 | 809 | 100 | 876 | 107 |
| Arrive On Green | 0.24 | 0.24 | 0.24 | 0.19 | 0.19 | 0.19 | 0.22 | 0.64 | 0.64 | 0.11 | 0.55 | 0.55 |
| Sat Flow, veh/h | 1792 | 2252 | 1189 | 1792 | 3563 | 167 | 1792 | 3574 | 1584 | 1792 | 3200 | 391 |
| Grp Volume(v), veh/h | 74 | 359 | 335 | 381 | 428 | 421 | 242 | 832 | 375 | 53 | 411 | 416 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1654 | 1792 | 1881 | 1849 | 1792 | 1787 | 1584 | 1792 | 1787 | 1804 |
| Q Serve(g_s), s | 3.6 | 20.9 | 21.1 | 21.0 | 21.0 | 21.0 | 12.0 | 17.4 | 13.0 | 3.1 | 21.2 | 21.3 |
| Cycle Q Clear(g_c), s | 3.6 | 20.9 | 21.1 | 21.0 | 21.0 | 21.0 | 12.0 | 17.4 | 13.0 | 3.1 | 21.2 | 21.3 |
| Prop In Lane | 1.00 | | 0.72 | 1.00 | | 0.09 | 1.00 | | 1.00 | 1.00 | | 0.22 |
| Lane Grp Cap(c), veh/h | 438 | 437 | 404 | 342 | 359 | 353 | 195 | 1137 | 809 | 100 | 489 | 494 |
| V/C Ratio(X) | 0.17 | 0.82 | 0.83 | 1.11 | 1.19 | 1.19 | 1.24 | 0.73 | 0.46 | 0.53 | 0.84 | 0.84 |
| Avail Cap(c_a), veh/h | 505 | 504 | 466 | 342 | 359 | 353 | 195 | 1137 | 809 | 100 | 489 | 494 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.35 | 0.35 | 0.35 | 0.36 | 0.36 | 0.36 | 0.84 | 0.84 | 0.84 |
| Uniform Delay (d), s/veh | 32.8 | 39.3 | 39.4 | 44.5 | 44.5 | 44.5 | 43.0 | 16.8 | 8.8 | 47.5 | 22.9 | 22.9 |
| Incr Delay (d2), s/veh | 0.3 | 10.1 | 11.5 | 65.5 | 96.3 | 96.6 | 122.3 | 1.5 | 0.7 | 2.4 | 13.6 | 13.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.8 | 11.5 | 11.0 | 16.6 | 20.5 | 20.2 | 12.5 | 8.6 | 7.9 | 1.6 | 12.1 | 12.3 |
| LnGrp Delay(d),s/veh | 33.0 | 49.4 | 50.9 | 110.0 | 140.8 | 141.1 | 165.3 | 18.3 | 9.5 | 49.9 | 36.5 | 36.5 |
| LnGrp LOS | C | D | D | F | F | F | F | B | A | D | D | D |
| Approach Vol, veh/h | | 768 | | | 1230 | | | 1449 | | | 880 | |
| Approach Delay, s/veh | | 48.5 | | | 131.4 | | | 40.6 | | | 37.3 | |
| Approach LOS | | D | | | F | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 16.0 | 35.1 | | 27.0 | 11.1 | 40.0 | | 31.9 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | | 6.0 | 5.0 | * 5 | | 5.0 |
| Max Green Setting (Gmax), s | 12.0 | 26.0 | | 21.0 | 3.0 | * 35 | | 31.0 |
| Max Q Clear Time (g_c+I1), s | 14.0 | 23.3 | | 23.0 | 5.1 | 19.4 | | 23.1 |
| Green Ext Time (p_c), s | 0.0 | 1.6 | | 0.0 | 0.0 | 9.8 | | 3.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 67.1 |
| HCM 2010 LOS | E |

Notes

User approved volume balancing among the lanes for turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 20 | 70 | 60 | 60 | 110 | 80 | 60 | 520 | 160 | 70 | 740 | 30 |
| Future Volume (vph) | 20 | 70 | 60 | 60 | 110 | 80 | 60 | 520 | 160 | 70 | 740 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.95 | | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | |
| Flt Protected | | 0.99 | | | 0.98 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1767 | | | 1849 | 1599 | 1787 | 1881 | 1599 | 1787 | 1870 | |
| Flt Permitted | | 0.93 | | | 0.71 | 1.00 | 0.32 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1653 | | | 1333 | 1599 | 608 | 1881 | 1599 | 1787 | 1870 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 21 | 74 | 64 | 64 | 117 | 85 | 64 | 553 | 170 | 74 | 787 | 32 |
| RTOR Reduction (vph) | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 0 | 134 | 0 | 0 | 181 | 85 | 64 | 553 | 170 | 74 | 818 | 0 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | Perm | NA | Perm | custom | NA | custom | Prot | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 7 | 2 | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | | | |
| Actuated Green, G (s) | | 16.7 | | | 16.7 | 16.7 | 49.9 | 63.4 | 49.9 | 7.9 | 75.3 | |
| Effective Green, g (s) | | 16.7 | | | 16.7 | 16.7 | 49.9 | 63.4 | 49.9 | 7.9 | 75.3 | |
| Actuated g/C Ratio | | 0.17 | | | 0.17 | 0.17 | 0.50 | 0.63 | 0.50 | 0.08 | 0.75 | |
| Clearance Time (s) | | 4.0 | | | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 276 | | | 222 | 267 | 303 | 1192 | 797 | 141 | 1408 | |
| v/s Ratio Prot | | | | | | | | 0.29 | 0.11 | 0.04 | c0.44 | |
| v/s Ratio Perm | | 0.08 | | | c0.14 | 0.05 | 0.11 | | | | | |
| v/c Ratio | | 0.49 | | | 0.82 | 0.32 | 0.21 | 0.46 | 0.21 | 0.52 | 0.58 | |
| Uniform Delay, d1 | | 37.8 | | | 40.2 | 36.6 | 14.0 | 9.5 | 14.0 | 44.2 | 5.4 | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | 1.19 | 0.65 | 1.22 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 1.3 | | | 20.1 | 0.7 | 1.3 | 0.2 | 0.5 | 3.5 | 1.8 | |
| Delay (s) | | 39.1 | | | 60.2 | 37.3 | 18.0 | 6.4 | 17.6 | 47.7 | 7.2 | |
| Level of Service | | D | | | E | D | B | A | B | D | A | |
| Approach Delay (s) | | 39.1 | | | 52.9 | | | 9.7 | | | 10.5 | |
| Approach LOS | | D | | | D | | | A | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 17.8 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.68 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 16.0 |
| Intersection Capacity Utilization | 73.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 40 | 30 | 10 | 330 | 10 | 140 | 10 | 580 | 400 | 120 | 780 | 10 |
| Future Volume (vph) | 40 | 30 | 10 | 330 | 10 | 140 | 10 | 580 | 400 | 120 | 780 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.0 | | 4.0 | 4.0 | | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | | 0.99 | | 1.00 | 0.98 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.98 | | 1.00 | 0.86 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | 0.98 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1775 | | 1773 | 1580 | | 1777 | 1881 | 1599 | 1787 | 1877 | |
| Flt Permitted | | 0.76 | | 0.56 | 1.00 | | 0.24 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | | 1384 | | 1042 | 1580 | | 448 | 1881 | 1599 | 1787 | 1877 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 42 | 31 | 10 | 344 | 10 | 146 | 10 | 604 | 417 | 125 | 812 | 10 |
| RTOR Reduction (vph) | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 78 | 0 | 344 | 156 | 0 | 10 | 604 | 417 | 125 | 823 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | pm+pt | NA | | custom | NA | custom | Prot | NA | |
| Protected Phases | | 8 | | 7 | 4 | | | 2 10 | 2 | 1 | 6 | |
| Permitted Phases | 8 | | | 4 | | | 2 | | | | | |
| Actuated Green, G (s) | | 6.4 | | 28.8 | 28.8 | | 41.3 | 49.8 | 41.3 | 9.4 | 62.7 | |
| Effective Green, g (s) | | 6.4 | | 28.8 | 28.8 | | 41.3 | 49.8 | 41.3 | 9.4 | 62.7 | |
| Actuated g/C Ratio | | 0.06 | | 0.29 | 0.29 | | 0.41 | 0.50 | 0.41 | 0.09 | 0.63 | |
| Clearance Time (s) | | 4.0 | | 4.0 | 4.0 | | 4.5 | | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | | 2.0 | | 2.0 | 2.0 | | 3.0 | | 3.0 | 2.0 | 3.0 | |
| Lane Grp Cap (vph) | | 88 | | 434 | 455 | | 185 | 936 | 660 | 167 | 1176 | |
| v/s Ratio Prot | | | | c0.15 | 0.10 | | | 0.32 | 0.26 | 0.07 | c0.44 | |
| v/s Ratio Perm | | 0.06 | | c0.08 | | | 0.02 | | | | | |
| v/c Ratio | | 0.89 | | 0.79 | 0.34 | | 0.05 | 0.65 | 0.63 | 0.75 | 0.70 | |
| Uniform Delay, d1 | | 46.5 | | 31.7 | 28.1 | | 17.6 | 18.6 | 23.3 | 44.1 | 12.4 | |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.10 | 0.79 | |
| Incremental Delay, d2 | | 59.1 | | 9.0 | 0.2 | | 0.6 | 1.5 | 4.6 | 12.6 | 2.9 | |
| Delay (s) | | 105.6 | | 40.7 | 28.3 | | 18.2 | 20.1 | 27.9 | 61.3 | 12.7 | |
| Level of Service | | F | | D | C | | B | C | C | E | B | |
| Approach Delay (s) | | 105.6 | | | 36.8 | | | 23.2 | | | 19.1 | |
| Approach LOS | | F | | | D | | | C | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 27.0 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.83 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 20.5 |
| Intersection Capacity Utilization | 85.8% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 20 | 10 | 10 | 30 | 20 | 400 | 10 | 200 | 20 | 490 | 150 | 30 |
| Future Volume (veh/h) | 20 | 10 | 10 | 30 | 20 | 400 | 10 | 200 | 20 | 490 | 150 | 30 |
| Number | 5 | 2 | 12 | 1 | 6 | 16 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.98 | 0.98 | | 0.98 | 1.00 | | 0.97 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1900 | 1881 | 1881 | 1900 | 1881 | 1900 | 1900 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 22 | 11 | 11 | 33 | 22 | 435 | 11 | 217 | 22 | 533 | 163 | 33 |
| Adj No. of Lanes | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 269 | 184 | 184 | 256 | 154 | 1027 | 15 | 288 | 29 | 569 | 174 | 35 |
| Arrive On Green | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.18 | 0.18 | 0.18 | 0.43 | 0.43 | 0.43 |
| Sat Flow, veh/h | 929 | 853 | 853 | 848 | 714 | 1562 | 81 | 1600 | 162 | 1316 | 402 | 81 |
| Grp Volume(v), veh/h | 22 | 0 | 22 | 55 | 0 | 435 | 250 | 0 | 0 | 729 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 929 | 0 | 1707 | 1562 | 0 | 1562 | 1843 | 0 | 0 | 1800 | 0 | 0 |
| Q Serve(g_s), s | 1.5 | 0.0 | 0.8 | 0.6 | 0.0 | 10.7 | 10.1 | 0.0 | 0.0 | 30.3 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 3.5 | 0.0 | 0.8 | 2.0 | 0.0 | 10.7 | 10.1 | 0.0 | 0.0 | 30.3 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.50 | 0.60 | | 1.00 | 0.04 | | 0.09 | 0.73 | | 0.05 |
| Lane Grp Cap(c), veh/h | 269 | 0 | 368 | 410 | 0 | 1027 | 332 | 0 | 0 | 778 | 0 | 0 |
| V/C Ratio(X) | 0.08 | 0.00 | 0.06 | 0.13 | 0.00 | 0.42 | 0.75 | 0.00 | 0.00 | 0.94 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 489 | 0 | 773 | 774 | 0 | 1398 | 541 | 0 | 0 | 815 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 26.3 | 0.0 | 24.4 | 24.9 | 0.0 | 6.7 | 30.5 | 0.0 | 0.0 | 21.2 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.2 | 0.0 | 0.1 | 0.2 | 0.0 | 0.4 | 4.9 | 0.0 | 0.0 | 18.0 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.4 | 0.0 | 0.4 | 1.0 | 0.0 | 9.4 | 5.6 | 0.0 | 0.0 | 18.9 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 26.5 | 0.0 | 24.5 | 25.1 | 0.0 | 7.1 | 35.3 | 0.0 | 0.0 | 39.3 | 0.0 | 0.0 |
| LnGrp LOS | C | | C | C | | A | D | | | D | | |
| Approach Vol, veh/h | | 44 | | | 490 | | | 250 | | | 729 | |
| Approach Delay, s/veh | | 25.5 | | | 9.2 | | | 35.3 | | | 39.3 | |
| Approach LOS | | C | | | A | | | D | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 21.4 | | 38.4 | | 21.4 | | 18.6 |
| Change Period (Y+Rc), s | | 4.5 | | 4.5 | | 4.5 | | 4.5 |
| Max Green Setting (Gmax), s | | 35.5 | | 35.5 | | 35.5 | | 23.0 |
| Max Q Clear Time (g_c+I1), s | | 5.5 | | 32.3 | | 12.7 | | 12.1 |
| Green Ext Time (p_c), s | | 0.2 | | 1.6 | | 3.7 | | 1.1 |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 28.5 |
| HCM 2010 LOS | | | C |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↑ | ↱ | ↰ | ↑ | ↱ | ↰ | ↑↱ | | ↰ | ↑↱ | |
| Traffic Volume (veh/h) | 60 | 360 | 190 | 150 | 280 | 240 | 120 | 1180 | 90 | 300 | 1110 | 60 |
| Future Volume (veh/h) | 60 | 360 | 190 | 150 | 280 | 240 | 120 | 1180 | 90 | 300 | 1110 | 60 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 64 | 383 | 145 | 160 | 298 | 183 | 128 | 1255 | 69 | 319 | 1181 | 46 |
| Adj No. of Lanes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 263 | 425 | 357 | 240 | 494 | 415 | 157 | 1205 | 66 | 325 | 1572 | 61 |
| Arrive On Green | 0.05 | 0.23 | 0.23 | 0.08 | 0.26 | 0.26 | 0.03 | 0.12 | 0.12 | 0.12 | 0.30 | 0.30 |
| Sat Flow, veh/h | 1792 | 1881 | 1578 | 1792 | 1881 | 1581 | 1792 | 3443 | 189 | 1792 | 3506 | 136 |
| Grp Volume(v), veh/h | 64 | 383 | 145 | 160 | 298 | 183 | 128 | 651 | 673 | 319 | 602 | 625 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1881 | 1578 | 1792 | 1881 | 1581 | 1792 | 1787 | 1845 | 1792 | 1787 | 1855 |
| Q Serve(g_s), s | 3.0 | 21.8 | 8.6 | 7.3 | 15.3 | 6.8 | 7.8 | 38.5 | 38.5 | 19.5 | 33.5 | 33.5 |
| Cycle Q Clear(g_c), s | 3.0 | 21.8 | 8.6 | 7.3 | 15.3 | 6.8 | 7.8 | 38.5 | 38.5 | 19.5 | 33.5 | 33.5 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.10 | 1.00 | | 0.07 |
| Lane Grp Cap(c), veh/h | 263 | 425 | 357 | 240 | 494 | 415 | 157 | 625 | 646 | 325 | 801 | 832 |
| V/C Ratio(X) | 0.24 | 0.90 | 0.41 | 0.67 | 0.60 | 0.44 | 0.82 | 1.04 | 1.04 | 0.98 | 0.75 | 0.75 |
| Avail Cap(c_a), veh/h | 342 | 487 | 409 | 253 | 494 | 415 | 163 | 625 | 646 | 325 | 801 | 832 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 0.67 | 0.67 | 0.67 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.09 | 0.09 | 0.09 |
| Uniform Delay (d), s/veh | 30.8 | 41.4 | 36.3 | 30.3 | 35.5 | 14.0 | 52.5 | 48.6 | 48.6 | 48.1 | 32.9 | 32.9 |
| Incr Delay (d2), s/veh | 0.2 | 16.9 | 0.3 | 4.7 | 1.5 | 0.3 | 24.0 | 46.9 | 47.1 | 11.2 | 0.6 | 0.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.5 | 13.3 | 3.8 | 3.9 | 8.1 | 3.0 | 4.9 | 27.2 | 28.1 | 10.7 | 16.6 | 17.3 |
| LnGrp Delay(d),s/veh | 30.9 | 58.3 | 36.6 | 35.0 | 37.0 | 14.3 | 76.6 | 95.5 | 95.7 | 59.3 | 33.5 | 33.5 |
| LnGrp LOS | C | E | D | D | D | B | E | F | F | E | C | C |
| Approach Vol, veh/h | | 592 | | | 641 | | | 1452 | | | 1546 | |
| Approach Delay, s/veh | | 50.0 | | | 30.0 | | | 93.9 | | | 38.9 | |
| Approach LOS | | D | | | C | | | F | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 24.4 | 43.0 | 13.2 | 29.4 | 13.6 | 53.8 | 9.2 | 33.4 |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.0 | 4.5 |
| Max Green Setting (Gmax), s | 16.0 | * 39 | 10.0 | 28.5 | 10.0 | 44.5 | 10.0 | 28.5 |
| Max Q Clear Time (g_c+I1), s | 21.5 | 40.5 | 9.3 | 23.8 | 9.8 | 35.5 | 5.0 | 17.3 |
| Green Ext Time (p_c), s | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 2.3 | 0.0 | 0.9 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 58.0 |
| HCM 2010 LOS | E |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 10 | 10 | 540 | 10 | 160 | 10 | 750 | 420 | 170 | 930 | 10 |
| Future Volume (vph) | 10 | 10 | 10 | 540 | 10 | 160 | 10 | 750 | 420 | 170 | 930 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | | 0.99 | | | 1.00 | 0.96 | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 1.00 | | | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.95 | | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | 0.98 | | | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1754 | | | 1776 | 1530 | 1787 | 1881 | 1531 | 1787 | 1877 | |
| Flt Permitted | | 0.63 | | | 0.71 | 1.00 | 0.09 | 1.00 | 1.00 | 0.08 | 1.00 | |
| Satd. Flow (perm) | | 1122 | | | 1315 | 1530 | 168 | 1881 | 1531 | 155 | 1877 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 11 | 11 | 11 | 568 | 11 | 168 | 11 | 789 | 442 | 179 | 979 | 11 |
| RTOR Reduction (vph) | 0 | 7 | 0 | 0 | 0 | 113 | 0 | 0 | 217 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 26 | 0 | 0 | 579 | 55 | 11 | 789 | 225 | 179 | 990 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | Perm | NA | Perm | Perm | NA | Perm | pm+pt | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | | 32.5 | | | 32.5 | 32.5 | 44.7 | 44.7 | 44.7 | 58.5 | 58.5 | |
| Effective Green, g (s) | | 32.5 | | | 32.5 | 32.5 | 44.7 | 44.7 | 44.7 | 58.5 | 58.5 | |
| Actuated g/C Ratio | | 0.32 | | | 0.32 | 0.32 | 0.45 | 0.45 | 0.45 | 0.58 | 0.58 | |
| Clearance Time (s) | | 4.5 | | | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 364 | | | 427 | 497 | 75 | 840 | 684 | 250 | 1098 | |
| v/s Ratio Prot | | | | | | | | 0.42 | | 0.07 | c0.53 | |
| v/s Ratio Perm | | 0.02 | | | c0.44 | 0.04 | 0.07 | | 0.15 | 0.35 | | |
| v/c Ratio | | 0.07 | | | 1.36 | 0.11 | 0.15 | 0.94 | 0.33 | 0.72 | 0.90 | |
| Uniform Delay, d1 | | 23.3 | | | 33.8 | 23.6 | 16.4 | 26.4 | 17.9 | 23.3 | 18.2 | |
| Progression Factor | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 0.1 | | | 174.9 | 0.1 | 4.1 | 19.4 | 1.3 | 9.4 | 11.8 | |
| Delay (s) | | 23.4 | | | 208.6 | 23.7 | 20.4 | 45.7 | 19.2 | 32.6 | 30.0 | |
| Level of Service | | C | | | F | C | C | D | B | C | C | |
| Approach Delay (s) | | 23.4 | | | 167.1 | | | 36.1 | | | 30.4 | |
| Approach LOS | | C | | | F | | | D | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 64.5 | HCM 2000 Level of Service | E |
| HCM 2000 Volume to Capacity ratio | 1.11 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 13.0 |
| Intersection Capacity Utilization | 104.6% | ICU Level of Service | G |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.2 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 250 | 50 | 100 | 65 | 50 | 75 |
| Future Vol, veh/h | 250 | 50 | 100 | 65 | 50 | 75 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 272 | 54 | 109 | 71 | 54 | 82 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 326 | 0 | 588 | 299 |
| Stage 1 | - | - | - | - | 299 | - |
| Stage 2 | - | - | - | - | 289 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1234 | - | 471 | 741 |
| Stage 1 | - | - | - | - | 752 | - |
| Stage 2 | - | - | - | - | 760 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1234 | - | 428 | 741 |
| Mov Cap-2 Maneuver | - | - | - | - | 428 | - |
| Stage 1 | - | - | - | - | 683 | - |
| Stage 2 | - | - | - | - | 760 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 5 | 13.2 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 573 | - | - | 1234 | - |
| HCM Lane V/C Ratio | 0.237 | - | - | 0.088 | - |
| HCM Control Delay (s) | 13.2 | - | - | 8.2 | 0 |
| HCM Lane LOS | B | - | - | A | A |
| HCM 95th %tile Q(veh) | 0.9 | - | - | 0.3 | - |

| Intersection | | | | | | |
|---|---|---|---|---|---|---|
| Int Delay, s/veh | 7.9 | | | | | |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 140 | 110 | 65 | 100 | 140 | 100 |
| Future Vol, veh/h | 140 | 110 | 65 | 100 | 140 | 100 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 152 | 120 | 71 | 109 | 152 | 109 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 180 | 0 | - | 0 | 550 | 126 |
| Stage 1 | - | - | - | - | 126 | - |
| Stage 2 | - | - | - | - | 424 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1396 | - | - | - | 496 | 924 |
| Stage 1 | - | - | - | - | 900 | - |
| Stage 2 | - | - | - | - | 660 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1396 | - | - | - | 438 | 924 |
| Mov Cap-2 Maneuver | - | - | - | - | 438 | - |
| Stage 1 | - | - | - | - | 795 | - |
| Stage 2 | - | - | - | - | 660 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 4.4 | 0 | 16.9 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1396 | - | - | - | 561 |
| HCM Lane V/C Ratio | 0.109 | - | - | - | 0.465 |
| HCM Control Delay (s) | 7.9 | 0 | - | - | 16.9 |
| HCM Lane LOS | A | A | - | - | C |
| HCM 95th %tile Q(veh) | 0.4 | - | - | - | 2.4 |

| Intersection | | | | | | |
|---|---|---|---|---|---|---|
| Int Delay, s/veh | 4.7 | | | | | |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 65 | 185 | 20 | 20 | 145 | 35 |
| Future Vol, veh/h | 65 | 185 | 20 | 20 | 145 | 35 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 71 | 201 | 22 | 22 | 158 | 38 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 272 | 0 | 238 | 172 |
| Stage 1 | - | - | - | - | 172 | - |
| Stage 2 | - | - | - | - | 66 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1291 | - | 750 | 872 |
| Stage 1 | - | - | - | - | 858 | - |
| Stage 2 | - | - | - | - | 957 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1291 | - | 737 | 872 |
| Mov Cap-2 Maneuver | - | - | - | - | 737 | - |
| Stage 1 | - | - | - | - | 843 | - |
| Stage 2 | - | - | - | - | 957 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 3.9 | 11.4 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 760 | - | - | 1291 | - |
| HCM Lane V/C Ratio | 0.257 | - | - | 0.017 | - |
| HCM Control Delay (s) | 11.4 | - | - | 7.8 | 0 |
| HCM Lane LOS | B | - | - | A | A |
| HCM 95th %tile Q(veh) | 1 | - | - | 0.1 | - |

| Intersection | | | | | | |
|---|---|---|---|---|---|---|
| Int Delay, s/veh | 3 | | | | | |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 70 | 400 | 275 | 55 | 40 | 105 |
| Future Vol, veh/h | 70 | 400 | 275 | 55 | 40 | 105 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 76 | 435 | 299 | 60 | 43 | 114 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 359 | 0 | - | 0 | 916 | 329 |
| Stage 1 | - | - | - | - | 329 | - |
| Stage 2 | - | - | - | - | 587 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1200 | - | - | - | 302 | 712 |
| Stage 1 | - | - | - | - | 729 | - |
| Stage 2 | - | - | - | - | 556 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1200 | - | - | - | 277 | 712 |
| Mov Cap-2 Maneuver | - | - | - | - | 277 | - |
| Stage 1 | - | - | - | - | 668 | - |
| Stage 2 | - | - | - | - | 556 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 1.2 | 0 | 15.6 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1200 | - | - | - | 497 |
| HCM Lane V/C Ratio | 0.063 | - | - | - | 0.317 |
| HCM Control Delay (s) | 8.2 | 0 | - | - | 15.6 |
| HCM Lane LOS | A | A | - | - | C |
| HCM 95th %tile Q(veh) | 0.2 | - | - | - | 1.4 |

| Intersection | | | | | | |
|---|---|---|---|---|---|---|
| Int Delay, s/veh | 5.8 | | | | | |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 30 | 430 | 260 | 150 | 155 | 30 |
| Future Vol, veh/h | 30 | 430 | 260 | 150 | 155 | 30 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 33 | 467 | 283 | 163 | 168 | 33 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 446 | 0 | - | 0 | 898 | 365 |
| Stage 1 | - | - | - | - | 365 | - |
| Stage 2 | - | - | - | - | 533 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1114 | - | - | - | 310 | 680 |
| Stage 1 | - | - | - | - | 702 | - |
| Stage 2 | - | - | - | - | 588 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1114 | - | - | - | 298 | 680 |
| Mov Cap-2 Maneuver | - | - | - | - | 298 | - |
| Stage 1 | - | - | - | - | 674 | - |
| Stage 2 | - | - | - | - | 588 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.5 | 0 | 31.9 |
| HCM LOS | | | D |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1114 | - | - | - | 328 |
| HCM Lane V/C Ratio | 0.029 | - | - | - | 0.613 |
| HCM Control Delay (s) | 8.3 | 0 | - | - | 31.9 |
| HCM Lane LOS | A | A | - | - | D |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 3.8 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 10 | 290 | 40 | 160 | 370 | 20 | 20 | 90 | 250 | 20 | 40 | 10 |
| Future Volume (veh/h) | 10 | 290 | 40 | 160 | 370 | 20 | 20 | 90 | 250 | 20 | 40 | 10 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1900 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 10 | 302 | 42 | 167 | 385 | 21 | 21 | 94 | 260 | 21 | 42 | 10 |
| Adj No. of Lanes | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 485 | 880 | 122 | 532 | 963 | 53 | 447 | 162 | 448 | 130 | 246 | 52 |
| Arrive On Green | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.55 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| Sat Flow, veh/h | 975 | 1601 | 223 | 1032 | 1750 | 95 | 1347 | 438 | 1211 | 227 | 664 | 142 |
| Grp Volume(v), veh/h | 10 | 0 | 344 | 167 | 0 | 406 | 21 | 0 | 354 | 73 | 0 | 0 |
| Grp Sat Flow(s),veh/h/ln | 975 | 0 | 1823 | 1032 | 0 | 1846 | 1347 | 0 | 1649 | 1033 | 0 | 0 |
| Q Serve(g_s), s | 0.6 | 0.0 | 10.5 | 10.7 | 0.0 | 12.7 | 0.0 | 0.0 | 17.2 | 0.6 | 0.0 | 0.0 |
| Cycle Q Clear(g_c), s | 13.3 | 0.0 | 10.5 | 21.2 | 0.0 | 12.7 | 2.1 | 0.0 | 17.2 | 17.9 | 0.0 | 0.0 |
| Prop In Lane | 1.00 | | 0.12 | 1.00 | | 0.05 | 1.00 | | 0.73 | 0.29 | | 0.14 |
| Lane Grp Cap(c), veh/h | 485 | 0 | 1003 | 532 | 0 | 1015 | 447 | 0 | 610 | 429 | 0 | 0 |
| V/C Ratio(X) | 0.02 | 0.00 | 0.34 | 0.31 | 0.00 | 0.40 | 0.05 | 0.00 | 0.58 | 0.17 | 0.00 | 0.00 |
| Avail Cap(c_a), veh/h | 485 | 0 | 1003 | 532 | 0 | 1015 | 447 | 0 | 610 | 429 | 0 | 0 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.55 | 0.00 | 0.55 | 1.00 | 0.00 | 1.00 | 0.69 | 0.00 | 0.69 | 1.00 | 0.00 | 0.00 |
| Uniform Delay (d), s/veh | 16.8 | 0.0 | 12.5 | 18.3 | 0.0 | 13.0 | 20.5 | 0.0 | 25.3 | 21.5 | 0.0 | 0.0 |
| Incr Delay (d2), s/veh | 0.0 | 0.0 | 0.5 | 1.5 | 0.0 | 1.2 | 0.1 | 0.0 | 2.8 | 0.9 | 0.0 | 0.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.2 | 0.0 | 5.4 | 3.3 | 0.0 | 6.8 | 0.4 | 0.0 | 8.2 | 1.4 | 0.0 | 0.0 |
| LnGrp Delay(d),s/veh | 16.9 | 0.0 | 13.0 | 19.9 | 0.0 | 14.2 | 20.6 | 0.0 | 28.0 | 22.3 | 0.0 | 0.0 |
| LnGrp LOS | B | | B | B | | B | C | | C | C | | |
| Approach Vol, veh/h | | 354 | | | 573 | | | 375 | | | 73 | |
| Approach Delay, s/veh | | 13.1 | | | 15.8 | | | 27.6 | | | 22.3 | |
| Approach LOS | | B | | | B | | | C | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | | 2 | | 4 | | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | | 41.0 | | 59.0 | | 41.0 | | 59.0 |
| Change Period (Y+Rc), s | | 4.0 | | 4.0 | | 4.0 | | 4.0 |
| Max Green Setting (Gmax), s | | 37.0 | | 55.0 | | 37.0 | | 55.0 |
| Max Q Clear Time (g_c+I1), s | | 19.2 | | 15.3 | | 19.9 | | 23.2 |
| Green Ext Time (p_c), s | | 2.2 | | 2.4 | | 0.3 | | 3.5 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 18.7 |
| HCM 2010 LOS | B |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 0 | 760 | 140 | 0 | 780 | 400 | 110 | 710 | 50 | 540 | 560 | 40 |
| Future Volume (veh/h) | 0 | 760 | 140 | 0 | 780 | 400 | 110 | 710 | 50 | 540 | 560 | 40 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 1.00 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 0 | 1881 | 1900 | 0 | 1881 | 1881 | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 0 | 800 | 105 | 0 | 821 | 301 | 116 | 747 | 0 | 568 | 589 | 30 |
| Adj No. of Lanes | 0 | 2 | 0 | 0 | 2 | 1 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 0 | 980 | 129 | 0 | 1104 | 489 | 294 | 1072 | 0 | 473 | 1384 | 70 |
| Arrive On Green | 0.00 | 0.31 | 0.31 | 0.00 | 0.41 | 0.41 | 0.16 | 0.30 | 0.00 | 0.26 | 0.40 | 0.40 |
| Sat Flow, veh/h | 0 | 3268 | 416 | 0 | 3668 | 1583 | 1792 | 3668 | 0 | 1792 | 3460 | 176 |
| Grp Volume(v), veh/h | 0 | 450 | 455 | 0 | 821 | 301 | 116 | 747 | 0 | 568 | 304 | 315 |
| Grp Sat Flow(s),veh/h/ln | 0 | 1787 | 1803 | 0 | 1787 | 1583 | 1792 | 1787 | 0 | 1792 | 1787 | 1849 |
| Q Serve(g_s), s | 0.0 | 25.6 | 25.6 | 0.0 | 21.4 | 16.5 | 6.4 | 20.3 | 0.0 | 29.0 | 13.5 | 13.6 |
| Cycle Q Clear(g_c), s | 0.0 | 25.6 | 25.6 | 0.0 | 21.4 | 16.5 | 6.4 | 20.3 | 0.0 | 29.0 | 13.5 | 13.6 |
| Prop In Lane | 0.00 | | 0.23 | 0.00 | | 1.00 | 1.00 | | 0.00 | 1.00 | | 0.10 |
| Lane Grp Cap(c), veh/h | 0 | 552 | 557 | 0 | 1104 | 489 | 294 | 1072 | 0 | 473 | 715 | 739 |
| V/C Ratio(X) | 0.00 | 0.82 | 0.82 | 0.00 | 0.74 | 0.62 | 0.40 | 0.70 | 0.00 | 1.20 | 0.43 | 0.43 |
| Avail Cap(c_a), veh/h | 0 | 617 | 623 | 0 | 1235 | 547 | 294 | 1072 | 0 | 473 | 715 | 739 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.33 | 1.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.00 | 0.69 | 0.69 | 0.00 | 0.19 | 0.19 | 0.61 | 0.61 | 0.00 | 0.59 | 0.59 | 0.59 |
| Uniform Delay (d), s/veh | 0.0 | 35.1 | 35.1 | 0.0 | 28.7 | 27.3 | 41.1 | 34.1 | 0.0 | 40.5 | 23.9 | 23.9 |
| Incr Delay (d2), s/veh | 0.0 | 5.9 | 5.8 | 0.0 | 0.5 | 0.4 | 0.2 | 2.3 | 0.0 | 102.4 | 1.1 | 1.1 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.0 | 13.5 | 13.7 | 0.0 | 10.6 | 14.6 | 3.2 | 10.4 | 0.0 | 27.8 | 6.9 | 7.1 |
| LnGrp Delay(d),s/veh | 0.0 | 41.0 | 41.0 | 0.0 | 29.2 | 27.7 | 41.3 | 36.4 | 0.0 | 142.9 | 24.9 | 24.9 |
| LnGrp LOS | | D | D | | C | C | D | D | | F | C | C |
| Approach Vol, veh/h | | 905 | | | 1122 | | | 863 | | | 1187 | |
| Approach Delay, s/veh | | 41.0 | | | 28.8 | | | 37.1 | | | 81.4 | |
| Approach LOS | | D | | | C | | | D | | | F | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | | 4 | 5 | 6 | | 8 |
| Phs Duration (G+Y+Rc), s | 22.0 | 49.0 | | 39.0 | 33.0 | 38.0 | | 39.0 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | | 5.0 | 4.0 | 5.0 | | 5.0 |
| Max Green Setting (Gmax), s | 14.0 | 44.0 | | 38.0 | 25.0 | 33.0 | | 38.0 |
| Max Q Clear Time (g_c+I1), s | 8.4 | 15.6 | | 23.4 | 31.0 | 22.3 | | 27.6 |
| Green Ext Time (p_c), s | 0.1 | 5.7 | | 8.9 | 0.0 | 5.7 | | 6.3 |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 48.6 |
| HCM 2010 LOS | | | D |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 230 | 1040 | 230 | 140 | 920 | 150 | 90 | 650 | 240 | 330 | 740 | 210 |
| Future Volume (veh/h) | 230 | 1040 | 230 | 140 | 920 | 150 | 90 | 650 | 240 | 330 | 740 | 210 |
| Number | 1 | 6 | 16 | 5 | 2 | 12 | 3 | 8 | 18 | 7 | 4 | 14 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 | 1863 | 1863 | 1900 |
| Adj Flow Rate, veh/h | 245 | 1106 | 176 | 149 | 979 | 115 | 96 | 691 | 183 | 351 | 787 | 142 |
| Adj No. of Lanes | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 383 | 1367 | 217 | 178 | 1041 | 122 | 121 | 665 | 176 | 331 | 1089 | 196 |
| Arrive On Green | 0.22 | 0.45 | 0.45 | 0.10 | 0.33 | 0.33 | 0.07 | 0.24 | 0.24 | 0.19 | 0.36 | 0.36 |
| Sat Flow, veh/h | 1774 | 3058 | 485 | 1774 | 3188 | 374 | 1774 | 2762 | 731 | 1774 | 2992 | 540 |
| Grp Volume(v), veh/h | 245 | 639 | 643 | 149 | 543 | 551 | 96 | 443 | 431 | 351 | 465 | 464 |
| Grp Sat Flow(s),veh/h/ln | 1774 | 1770 | 1773 | 1774 | 1770 | 1793 | 1774 | 1770 | 1723 | 1774 | 1770 | 1762 |
| Q Serve(g_s), s | 13.8 | 34.4 | 34.6 | 9.1 | 32.8 | 32.8 | 5.9 | 26.5 | 26.5 | 20.5 | 25.0 | 25.0 |
| Cycle Q Clear(g_c), s | 13.8 | 34.4 | 34.6 | 9.1 | 32.8 | 32.8 | 5.9 | 26.5 | 26.5 | 20.5 | 25.0 | 25.0 |
| Prop In Lane | 1.00 | | 0.27 | 1.00 | | 0.21 | 1.00 | | 0.42 | 1.00 | | 0.31 |
| Lane Grp Cap(c), veh/h | 383 | 791 | 793 | 178 | 578 | 586 | 121 | 426 | 415 | 331 | 644 | 641 |
| V/C Ratio(X) | 0.64 | 0.81 | 0.81 | 0.84 | 0.94 | 0.94 | 0.80 | 1.04 | 1.04 | 1.06 | 0.72 | 0.72 |
| Avail Cap(c_a), veh/h | 383 | 791 | 793 | 323 | 587 | 595 | 210 | 426 | 415 | 331 | 644 | 641 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 0.09 | 0.09 | 0.09 | 1.00 | 1.00 | 1.00 | 0.61 | 0.61 | 0.61 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 39.2 | 26.3 | 26.4 | 48.6 | 36.0 | 36.0 | 50.5 | 41.8 | 41.8 | 44.8 | 30.2 | 30.2 |
| Incr Delay (d2), s/veh | 0.3 | 0.6 | 0.6 | 4.0 | 25.2 | 25.1 | 2.8 | 44.3 | 45.0 | 66.7 | 4.0 | 4.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 6.8 | 16.8 | 16.9 | 4.6 | 20.0 | 20.3 | 3.0 | 18.2 | 17.8 | 16.1 | 12.9 | 12.8 |
| LnGrp Delay(d),s/veh | 39.5 | 26.9 | 27.0 | 52.6 | 61.2 | 61.0 | 53.3 | 86.1 | 86.8 | 111.5 | 34.2 | 34.2 |
| LnGrp LOS | D | C | C | D | E | E | D | F | F | F | C | C |
| Approach Vol, veh/h | | 1527 | | | 1243 | | | 970 | | | 1280 | |
| Approach Delay, s/veh | | 29.0 | | | 60.1 | | | 83.2 | | | 55.4 | |
| Approach LOS | | C | | | E | | | F | | | E | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 28.7 | 40.4 | 11.5 | 44.5 | 15.0 | 54.1 | 25.0 | 31.0 |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.5 | * 4.5 |
| Max Green Setting (Gmax), s | 9.5 | * 37 | 13.0 | 34.0 | 20.0 | 26.0 | 20.5 | * 27 |
| Max Q Clear Time (g_c+I1), s | 15.8 | 34.8 | 7.9 | 27.0 | 11.1 | 36.6 | 22.5 | 28.5 |
| Green Ext Time (p_c), s | 0.0 | 1.1 | 0.0 | 2.4 | 0.1 | 0.0 | 0.0 | 0.0 |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2010 Ctrl Delay | | | 53.9 |
| HCM 2010 LOS | | | D |

Notes

User approved pedestrian interval to be less than phase max green.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 70 | 430 | 320 | 630 | 540 | 50 | 230 | 790 | 500 | 50 | 640 | 60 |
| Future Volume (veh/h) | 70 | 430 | 320 | 630 | 540 | 50 | 230 | 790 | 500 | 50 | 640 | 60 |
| Number | 3 | 8 | 18 | 7 | 4 | 14 | 1 | 6 | 16 | 5 | 2 | 12 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.98 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1900 | 1881 | 1881 | 1900 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 74 | 453 | 241 | 663 | 568 | 38 | 242 | 832 | 375 | 53 | 674 | 27 |
| Adj No. of Lanes | 1 | 2 | 0 | 2 | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 109 | 547 | 289 | 732 | 684 | 46 | 163 | 1105 | 489 | 83 | 958 | 38 |
| Arrive On Green | 0.06 | 0.24 | 0.24 | 0.21 | 0.39 | 0.39 | 0.18 | 0.62 | 0.62 | 0.09 | 0.55 | 0.55 |
| Sat Flow, veh/h | 1792 | 2252 | 1189 | 3476 | 1743 | 117 | 1792 | 3574 | 1583 | 1792 | 3500 | 140 |
| Grp Volume(v), veh/h | 74 | 359 | 335 | 663 | 0 | 606 | 242 | 832 | 375 | 53 | 344 | 357 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1787 | 1654 | 1738 | 0 | 1860 | 1792 | 1787 | 1583 | 1792 | 1787 | 1853 |
| Q Serve(g_s), s | 4.4 | 20.9 | 21.2 | 20.5 | 0.0 | 32.3 | 10.0 | 18.3 | 10.6 | 3.1 | 15.6 | 15.6 |
| Cycle Q Clear(g_c), s | 4.4 | 20.9 | 21.2 | 20.5 | 0.0 | 32.3 | 10.0 | 18.3 | 10.6 | 3.1 | 15.6 | 15.6 |
| Prop In Lane | 1.00 | | 0.72 | 1.00 | | 0.06 | 1.00 | | 1.00 | 1.00 | | 0.08 |
| Lane Grp Cap(c), veh/h | 109 | 434 | 402 | 732 | 0 | 730 | 163 | 1105 | 489 | 83 | 489 | 507 |
| V/C Ratio(X) | 0.68 | 0.83 | 0.83 | 0.91 | 0.00 | 0.83 | 1.49 | 0.75 | 0.77 | 0.64 | 0.70 | 0.70 |
| Avail Cap(c_a), veh/h | 489 | 504 | 466 | 758 | 0 | 730 | 163 | 1105 | 489 | 83 | 489 | 507 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 0.44 | 0.00 | 0.44 | 0.46 | 0.46 | 0.46 | 0.91 | 0.91 | 0.91 |
| Uniform Delay (d), s/veh | 50.6 | 39.4 | 39.5 | 42.4 | 0.0 | 30.1 | 45.0 | 18.0 | 5.8 | 49.0 | 21.6 | 21.6 |
| Incr Delay (d2), s/veh | 9.9 | 10.5 | 11.9 | 7.4 | 0.0 | 3.5 | 233.1 | 2.2 | 5.2 | 10.6 | 7.5 | 7.3 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 2.5 | 11.5 | 11.0 | 10.6 | 0.0 | 17.2 | 15.4 | 9.1 | 5.1 | 1.8 | 8.5 | 8.8 |
| LnGrp Delay(d),s/veh | 60.5 | 49.9 | 51.5 | 49.7 | 0.0 | 33.6 | 278.1 | 20.2 | 11.0 | 59.6 | 29.1 | 28.9 |
| LnGrp LOS | E | D | D | D | | C | F | C | B | E | C | C |
| Approach Vol, veh/h | | 768 | | | 1269 | | | 1449 | | | 754 | |
| Approach Delay, s/veh | | 51.6 | | | 42.0 | | | 60.9 | | | 31.1 | |
| Approach LOS | | D | | | D | | | E | | | C | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 14.0 | 35.1 | 11.7 | 49.2 | 10.1 | 39.0 | 28.2 | 32.7 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 5.0 | 6.0 | 5.0 | * 5 | 5.0 | * 6 |
| Max Green Setting (Gmax), s | 10.0 | 26.0 | 30.0 | 24.0 | 2.0 | * 34 | 24.0 | * 31 |
| Max Q Clear Time (g_c+I1), s | 12.0 | 17.6 | 6.4 | 34.3 | 5.1 | 20.3 | 22.5 | 23.2 |
| Green Ext Time (p_c), s | 0.0 | 3.5 | 0.3 | 0.0 | 0.0 | 8.9 | 0.7 | 3.5 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 48.3 |
| HCM 2010 LOS | D |

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 60 | 360 | 190 | 150 | 280 | 240 | 120 | 1180 | 90 | 300 | 1110 | 60 |
| Future Volume (veh/h) | 60 | 360 | 190 | 150 | 280 | 240 | 120 | 1180 | 90 | 300 | 1110 | 60 |
| Number | 7 | 4 | 14 | 3 | 8 | 18 | 5 | 2 | 12 | 1 | 6 | 16 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 0.99 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Adj Sat Flow, veh/h/ln | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1881 | 1900 |
| Adj Flow Rate, veh/h | 64 | 383 | 145 | 160 | 298 | 183 | 128 | 1255 | 69 | 319 | 1181 | 46 |
| Adj No. of Lanes | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 0 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cap, veh/h | 250 | 423 | 355 | 219 | 471 | 396 | 158 | 1283 | 566 | 330 | 1612 | 63 |
| Arrive On Green | 0.05 | 0.22 | 0.22 | 0.07 | 0.25 | 0.25 | 0.03 | 0.12 | 0.12 | 0.06 | 0.15 | 0.15 |
| Sat Flow, veh/h | 1792 | 1881 | 1578 | 1792 | 1881 | 1580 | 1792 | 3574 | 1577 | 1792 | 3506 | 136 |
| Grp Volume(v), veh/h | 64 | 383 | 145 | 160 | 298 | 183 | 128 | 1255 | 69 | 319 | 602 | 625 |
| Grp Sat Flow(s),veh/h/ln | 1792 | 1881 | 1578 | 1792 | 1881 | 1580 | 1792 | 1787 | 1577 | 1792 | 1787 | 1855 |
| Q Serve(g_s), s | 3.0 | 21.8 | 8.6 | 7.5 | 15.5 | 7.0 | 7.8 | 38.5 | 3.3 | 19.5 | 35.3 | 35.4 |
| Cycle Q Clear(g_c), s | 3.0 | 21.8 | 8.6 | 7.5 | 15.5 | 7.0 | 7.8 | 38.5 | 3.3 | 19.5 | 35.3 | 35.4 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 0.07 |
| Lane Grp Cap(c), veh/h | 250 | 423 | 355 | 219 | 471 | 396 | 158 | 1283 | 566 | 330 | 822 | 853 |
| V/C Ratio(X) | 0.26 | 0.91 | 0.41 | 0.73 | 0.63 | 0.46 | 0.81 | 0.98 | 0.12 | 0.97 | 0.73 | 0.73 |
| Avail Cap(c_a), veh/h | 296 | 453 | 380 | 219 | 471 | 396 | 293 | 1283 | 566 | 330 | 822 | 853 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 | 0.33 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.34 | 0.34 | 0.34 |
| Uniform Delay (d), s/veh | 31.1 | 41.5 | 36.4 | 31.9 | 36.7 | 14.5 | 52.5 | 48.0 | 19.3 | 51.3 | 40.2 | 40.2 |
| Incr Delay (d2), s/veh | 0.2 | 19.9 | 0.3 | 10.4 | 2.1 | 0.3 | 3.7 | 20.3 | 0.4 | 20.8 | 2.0 | 1.9 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 1.5 | 13.6 | 3.8 | 4.3 | 8.3 | 3.0 | 4.1 | 22.7 | 1.5 | 11.6 | 18.0 | 18.7 |
| LnGrp Delay(d),s/veh | 31.3 | 61.5 | 36.7 | 42.3 | 38.8 | 14.8 | 56.2 | 68.4 | 19.8 | 72.1 | 42.2 | 42.2 |
| LnGrp LOS | C | E | D | D | D | B | E | E | B | E | D | D |
| Approach Vol, veh/h | | 592 | | | 641 | | | 1452 | | | 1546 | |
| Approach Delay, s/veh | | 52.1 | | | 32.8 | | | 65.0 | | | 48.4 | |
| Approach LOS | | D | | | C | | | E | | | D | |

| Timer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Phs Duration (G+Y+Rc), s | 24.8 | 44.0 | 12.0 | 29.2 | 13.7 | 55.1 | 9.2 | 32.1 |
| Change Period (Y+Rc), s | 4.5 | * 4.5 | 4.0 | 4.5 | 4.0 | 4.5 | 4.0 | 4.5 |
| Max Green Setting (Gmax), s | 19.0 | * 40 | 8.0 | 26.5 | 18.0 | 40.5 | 8.0 | 26.5 |
| Max Q Clear Time (g_c+I1), s | 21.5 | 40.5 | 9.5 | 23.8 | 9.8 | 37.4 | 5.0 | 17.5 |
| Green Ext Time (p_c), s | 0.0 | 0.0 | 0.0 | 0.4 | 0.1 | 1.2 | 0.0 | 0.8 |

| Intersection Summary | |
|---|---|
| HCM 2010 Ctrl Delay | 52.2 |
| HCM 2010 LOS | D |

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 10 | 10 | 510 | 10 | 160 | 10 | 750 | 420 | 170 | 930 | 10 |
| Future Volume (vph) | 10 | 10 | 10 | 510 | 10 | 160 | 10 | 750 | 420 | 170 | 930 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 4.5 | | 4.0 | 4.0 | | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Lane Util. Factor | | 1.00 | | 0.97 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | | 0.99 | | 1.00 | 0.97 | | 1.00 | 1.00 | 0.96 | 1.00 | 1.00 | |
| Flpb, ped/bikes | | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | 0.95 | | 1.00 | 0.86 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | |
| Flt Protected | | 0.98 | | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | | 1743 | | 3467 | 1564 | | 1787 | 1881 | 1531 | 1787 | 1877 | |
| Flt Permitted | | 0.49 | | 0.95 | 1.00 | | 0.09 | 1.00 | 1.00 | 0.08 | 1.00 | |
| Satd. Flow (perm) | | 873 | | 3467 | 1564 | | 169 | 1881 | 1531 | 155 | 1877 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 11 | 11 | 11 | 537 | 11 | 168 | 11 | 789 | 442 | 179 | 979 | 11 |
| RTOR Reduction (vph) | 0 | 10 | 0 | 0 | 112 | 0 | 0 | 0 | 171 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 23 | 0 | 537 | 67 | 0 | 11 | 789 | 271 | 179 | 990 | 0 |
| Confl. Peds. (#/hr) | 10 | | 10 | 10 | | 10 | 10 | | 10 | 10 | | 10 |
| Heavy Vehicles (%) | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Turn Type | Perm | NA | | Prot | NA | | Perm | NA | Perm | pm+pt | NA | |
| Protected Phases | | 7 | | 8 | 3 | | | 2 | | 1 | 6 | |
| Permitted Phases | 7 | | | | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | | 7.3 | | 21.7 | 33.5 | | 44.4 | 44.4 | 44.4 | 58.0 | 58.0 | |
| Effective Green, g (s) | | 7.3 | | 21.7 | 33.5 | | 44.4 | 44.4 | 44.4 | 58.0 | 58.0 | |
| Actuated g/C Ratio | | 0.07 | | 0.22 | 0.34 | | 0.44 | 0.44 | 0.44 | 0.58 | 0.58 | |
| Clearance Time (s) | | 4.5 | | 4.0 | 4.0 | | 4.5 | 4.5 | 4.5 | 4.0 | 4.5 | |
| Vehicle Extension (s) | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | | 63 | | 752 | 523 | | 75 | 835 | 679 | 246 | 1088 | |
| v/s Ratio Prot | | | | c0.15 | 0.04 | | | 0.42 | | 0.07 | c0.53 | |
| v/s Ratio Perm | | c0.03 | | | | | 0.06 | | 0.18 | 0.35 | | |
| v/c Ratio | | 0.36 | | 0.71 | 0.13 | | 0.15 | 0.94 | 0.40 | 0.73 | 0.91 | |
| Uniform Delay, d1 | | 44.1 | | 36.3 | 23.1 | | 16.5 | 26.6 | 18.8 | 23.3 | 18.7 | |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | | 3.5 | | 3.2 | 0.1 | | 4.1 | 20.3 | 1.7 | 10.2 | 12.7 | |
| Delay (s) | | 47.7 | | 39.5 | 23.2 | | 20.6 | 46.9 | 20.5 | 33.6 | 31.4 | |
| Level of Service | | D | | D | C | | C | D | C | C | C | |
| Approach Delay (s) | | 47.7 | | | 35.4 | | | 37.3 | | | 31.7 | |
| Approach LOS | | D | | | D | | | D | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 34.9 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.85 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 88.3% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

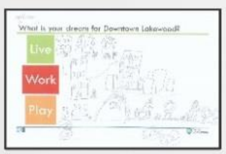
# LAKEWOOD DOWNTOWN·PLAN : WE HEAR YOU

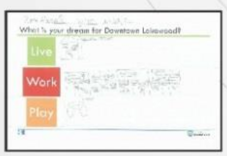
Between September 2017 and November 2017, we hosted a series of public outreach and engagement efforts to encourage local residents to participate in conversations about their community's future. Activities and events were designed to promote meaningful dialogue within the city's diverse community of businesses and residents to ensure the Downtown Plan reflects local desires and needs, and lays a foundation to create ***the district's best future.***

## FARMER'S MARKET
Booth | Sept. 5
24 Participants

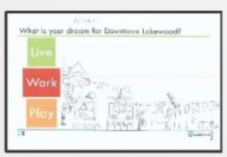

## BOO HAN
Intercept | Oct. 14
27 Participants

## TRUCK & TRACTOR
Booth | Oct. 14
31 Participants








## CHARETTE KICKOFF
Meeting | Nov. 15
24 Participants

## YOUTH COUNCIL
Focus Group | Oct. 16
22 Participants

## DEVELOPER FORUM
Focus Group | Nov. 15
11 Participants



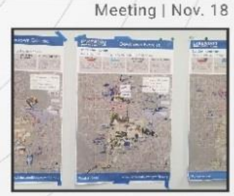
## KWA
Focus Group | Nov. 1
8 Participants

## EL MERCADO
Intercept | Nov. 5
7 Participants


## JBLM
Intercept | Nov. 5

49 Participants

## CHARETTE OPEN HOUSE
Meeting | Nov. 18



7 Participants

## 5TH GRADE
Focus Groups | Nov. 13, 14 & 15
97 Participants

## VISION SURVEY
Online | Nov. 10 – Dec. 1
338 Participants

## KEY THEMES

- More **entertainment** venues and restaurants.
- More **retail choices**, both mom and pop and brand stores.
- **Well-designed housing** for seniors & disabled and mixed use with housing and commercial together, within walking distance of work, shopping and buses.
- **Pedestrian friendly** street design, well-maintained and safe roads.
- **Family activities and gathering spaces**, including Outdoor recreation (e.g. spraypark, climbing walls, skating rink, other) and indoor cultural facilities (e.g. expanded library, children's museum, etc.).

What three words best describe Downtown Lakewood today?


Dream big! Imagine you can change or improve any aspect of Downtown Lakewood. What would you want to see and where?


CITY OF LAKEWOOD
BERK

#IamLakewood | www.LakewoodDowntownPlan.org

# Draft Planned Action Lakewood Downtown

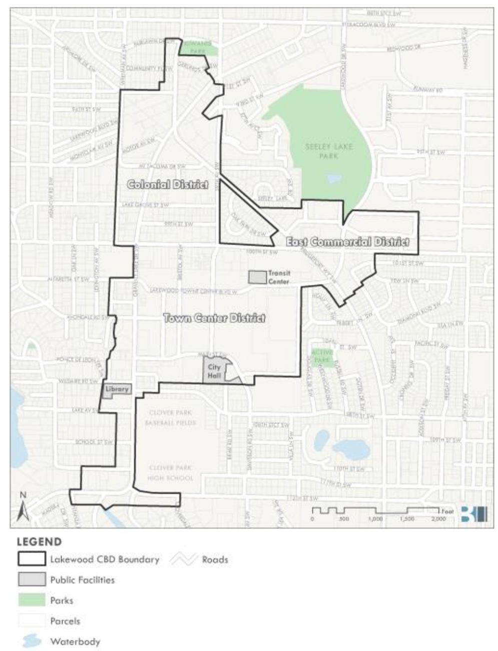
**Discussion Guide**

## Planned Action

The City is proposing that future development within the Downtown be designated by the City as a Planned Action, pursuant to SEPA (RCW 43.21c.440 and WAC 197-11-164 to 172). A planned action provides more detailed environmental analysis during an areawide planning stage rather than at the project permit review stage. Designating a planned action streamlines environmental review for development proposals consistent with Environmental Impact Statement (EIS) mitigation measures that are adopted in a planned action ordinance. Planned actions would be allowed if they meet or exceed proposed land use and environmental performance standards. This tool has been used elsewhere by local governments in Washington State.

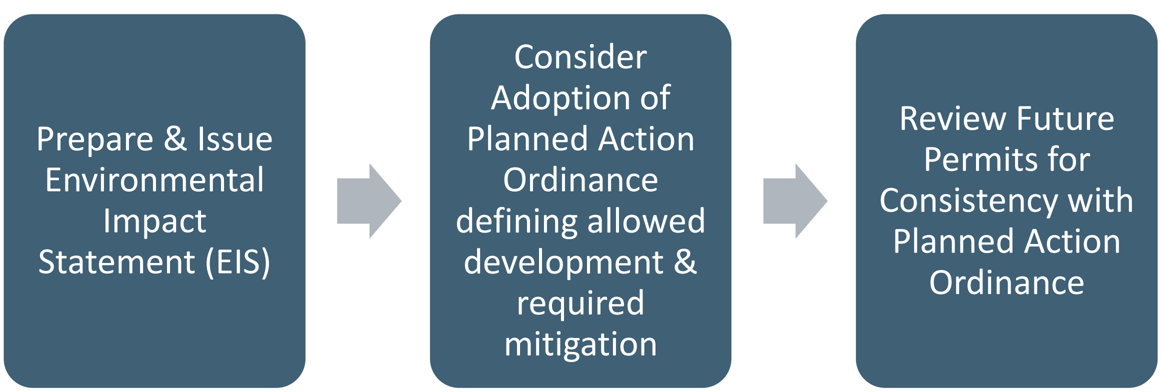
The Proposed Planned Action Boundary is included in Exhibit 1. A diagram of the Planned Action process is included in Exhibit 2.

**Exhibit 1. Proposed Planned Action Boundary**




Source: BERK Consulting 2018

**Exhibit 2. Planned Action Process**



Review of a planned action is intended to be simpler and more focused than for other projects. If the PAO is adopted, the City would follow the applicable procedures contained in the ordinance to determine if the proposed project impacts are consistent with the EIS. When a permit application and environmental checklist are submitted for a project that is being proposed as a planned action project, the City must first verify the following:

- The project meets the description of any project(s) designated as a planned action by ordinance or resolution;
- The probable significant adverse environmental impacts were adequately addressed in the EIS; and
- The project includes any conditions or mitigation measures outlined in the ordinance or resolution.

If the project meets the above requirements, the project qualifies as a planned action project and a SEPA threshold determination is not required. However, City actions (i.e., the permit process) are still applicable.

# Alternatives

The City has developed three land use alternatives for consideration by the Planning Commission and City Council:

- **No Action.** This alternative assumes growth according to current trends and under current City Plans and development regulations, including over 450 housing units, and over 1,660 jobs.
- **Action Alternative 1,** assuming a moderate level of development, with over three times the housing and over two times the jobs as the No Action Alternative, based on targeted infrastructure and civic investments and plan and code changes. Investments include a "Green Loop" of street and trail improvements, more public streets, and a 2-acre central park. Development evaluated include nearly 1,580 housing units and over 4,150 jobs.
- **Action Alternative 2,** assuming a high level of growth, with five times the housing and jobs compared with No Action and with the greatest level of civic and infrastructure investments, (including a Green Loop, added public streets, and a 4-acre central park). With Alternative 2, over 2,250 housing units would be developed and nearly 7,370 jobs.

**Exhibit 3. Comparison of Alternatives Population, Housing, Employment**

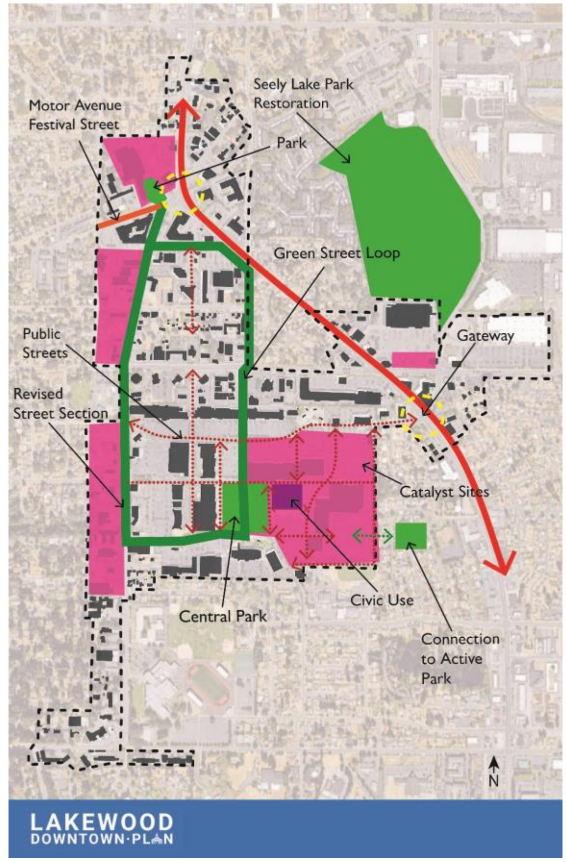
| Alternative | Population | Housing | Jobs |
|---|---|---|---|
| **Base Year Units** | 909 | 419 | 5,248 |
| **Net Growth** | | | |
| No Action | 990 | 456 | 1,667 |
| Action Alternative 1 | 3,426 | 1,579 | 4,147 |
| Action Alternative 2 | 4,898 | 2,257 | 7,369 |
| **Total Units 2035** | | | |
| No Action | 1,899 | 875 | 6,915 |
| Action Alternative 1 | 4,336 | 1,998 | 9,395 |
| Action Alternative 2 | 5,807 | 2,676 | 12,617 |

Notes: No Action estimates based on City of Lakewood Transportation Model; assumes limited redevelopment
Persons per Household, Census Tract 719.01, 1-Year Estimates 2016

Key concepts included in the Action Alternatives are described below.

The overall concept plan was initially developed during the 2017 charrette and informed by the public design exercise, public input to date, and insights from the planning and design team based on best practices and experience on similar projects (See Exhibit 4). The following are highlights from the concept plan:

**Exhibit 4. Downtown Plan Concept**




Framework, 2017

- **Green Street Loop**: To address the lack of park space, improve public streets, and improve circulation for pedestrians and bicyclists the green loop will include park like elements, green infrastructure, and support redevelopment in Downtown.
- **New Public Streets**: The Downtown lacks a dense and walkable street grid to support urban development, circulation, and an active public realm.
- **Central Park**: A new urban park of between two to four acres is proposed just north of City Hall to serve as the main gathering space for the community and to include a variety of features and programming.
- **Revised Gravelly Lake Drive**: As part of the Green Street Loop, a revised road design for Gravelly Lake Drive SW is proposed. The revision will allow for expanded sidewalks and a multi-use path on the east side of the street.
- **Catalyst Sites**: Catalyst sites are the best opportunities to weave together public improvements in infrastructure and amenities with infill and redevelopment by the private sector. The best opportunities for redevelopment based on vacant and underutilized sites, and large surface parking areas, and surrounding context have been identified as catalyst sites in the near term to further the implementation of this Plan.
- **Motor Avenue Festival Street**: The City intends to move forward with creating a festival street along Motor Avenue consistent with the adopted concept plan. The plan includes a large central plaza, a pedestrian promenade, a farmer's market and event structure, street trees, landscaping, and public art opportunities.

**The City may choose to implement an alternative under study, a combination of alternatives, or another alternative in the range of alternatives studied in this EIS.**

# Proposed Planned Action Ordinance

The proposed draft Planned Action Ordinance (PAO) is included in the Draft Environmental Impact Statement (EIS) published in March 2018, and includes the following sections:

- Recitals: The recitals identify facts and procedures the City followed in developing the PAO.
- Purpose. The overall purposes are to streamline and expedite the land use permit review process in the PAO and ensure that environmental analysis, land use plans, development regulations, City codes and ordinances together with the mitigation measures in the Planned Action EIS and Addendum mitigate environmental impacts.
- Findings: The findings indicate the PAO meets the criteria in SEPA Rules.
- Procedures and Criteria for Evaluating and Determining Planned Action Projects within Planned Action Area: This section establishes thresholds for growth, land use, and transportation. This section also establishes criteria by which the City would review planned action applications.
- Monitoring and Review: Establishes a review process to monitor the progress of the Planned Action.
- Exhibit A: Identifies the boundary of the Planned Action Area.
- Exhibit B: Identifies Planned Action EIS Mitigation Measures that apply to new development. Mitigation addresses topics such as natural environment, population/employment/housing, land use, transportation, public services, and utilities, plus topics addressed in the SEPA Checklist such as cultural resources and human health.

CITY OF
LAKEWOOD

**TO:** Lakewood Planning Commission

**FROM:** Courtney Brunell, Planning Manager

**DATE:** April 11, 2018

**SUBJECT:** Sign Code Amendments

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**Purpose:** The purpose of this memo is to provide additional information about the City's required sign code update, provide one potential sign code draft and begin the discussion on public outreach.

**Background:** On April 4, 2018 the Planning Commission reviewed the need to amend the City's sign code. After some discussion, the Commission unanimously agreed to address both commercial and non-commercial signs in the new draft code and requested additional public outreach be planned. Since the meeting staff has reviewed the survey completed by the planning commissioners to rate priorities and drafted a version of the sign code to launch further discussion. In addition, staff has created a tentatively timeline for public outreach to present to the Planning Commission.

**Survey Results:** In order to assess priorities, staff provided the Commission with a survey to rate different aspects of a sign code. The survey (attached) included five major topic areas. The results of the survey prioritized (1= highest, 5=lowest) the following categories:

> Priority #1: Permitting Process- the commissioners unanimously agreed that the new sign code needs to involve a permitting process rather than no permitting process to allow us to regulate signs.
> Priority #2: Number of Signs- The majority of the commissioners preferred fewer signs over more signs.
> Priority #3: Placement of Signs- The majority of the commissioners preferred that signs be concentrated in specific areas rather than greatly dispersed throughout the City.
> Priority #4: Signs in specific zones- The majority of the Commissioners preferred that signs be located in both residential and commercial zones.
> Priority #5: Enforcement **–** The majority of commissioners were neutral on enforcement.

To summarize, the survey showed that commissioners would like for staff to prioritize the permitting process, the number of signs and placement of those signs, but were less concerned with enforcement. It is important to note that higher priority items, specifically permitting and the overall number of signs may require heavier enforcement actions. For example, if it is a priority to have temporary signs removed in a timely manner, or for illegal signs to be removed (to support the want for an active permitting process to reduce the total number of signs in the City), than the City will need to have proactive code enforcement.

**Draft Sign Code Discussion:** Based on the discussion at the April 4th meeting, staff has prepared a draft sign code and would like to draw the commissioner's attention to the following areas:

*Section 1- Purpose:* Please review this section and consider if this list encompasses the priorities of the City of Lakewood pertaining to the sign code. Are there any listed points you would disagree with? Is there anything else you would like to have addressed?

*Section 4- Prohibited Signs:* Please review the prohibited sign list, would you request any initial changes?

*Section 5- Sign Permit Exemptions:* Please review the initial list of exemptions. Staff offers the following narrative to assist in your review.

> **5.B.1** allows for any property owner to have a single sign not exceeding 2 square feet of sign area without obtaining a permit. This would apply to residential and commercial properties and could include signs currently defined as "political signs", "real-estate signs", or "garage sale signs".
> **5.B.2** exempts signs that are currently defined as "name-plates, historic markers, or decorative plaques."
> **5.B.6** exempts "incidental signs", defined as sign that is not visible either from a right-of-way or off of the property on which the sign is located. Incidental signs typically inform the public about goods, facilities, or services available on the premises including, but not limited to, Menu's, directional sign, restrooms, hours of operation, acceptable credit cards, property ownership or management, phone booths or recycling containers.
> **5.B.8** exempts address numbers

*Section 6- General Provisions:* Provides general regulations for all signs in the City of Lakewood, includes special regulations for digital signs and for Lakewood bus shelters (borrowed from existing code).

*Section 7- Provisions for Permanent Signs or Continuous Displays:* The dimensional standards, permit requirements, sign types and associated table are the same as our existing code. All are open for discussion and subject to change. Staff has removed the sign types that relied on content.

*Section 8- Non Permanent Signs:* The City's current administrative policy pertaining to temporary signs.

**Public Outreach:** Staff acknowledges the need for public outreach to draft the sign code. We request that the commission offer ideas for individuals to serve on a special task force, which would include several meetings to discuss the sign code update. Staff would like begin public outreach efforts in early May.

**Next Steps*:**

1. April 18, 2018- Staff brings back the sign code for additional discussion
2. May-June, 2018- Staff engages the public for public outreach
3. June 6, 2018- Staff reports back results of public outreach efforts, to-date
4. June 20, 2018- Public Hearing
5. July 18, 2018- decision
6. July 23- City Council begins review

* These dates are subject to change based on the Commission's schedule for the Downtown Subarea Plan

**Attachments:**

1. Example survey
2. Draft sign code

What's Most Important? Sign Code Update

Rate each item from 1-5, prioritizing 1-5.

More Signs | Less Signs

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Concentrated Placement | Dispersed Placement

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Residential Zones | Everywhere | Commercial Zones

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Heavy Enforcement | Light Enforcement

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Permitting Process | No Permitting Process

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

**EXHIBIT B**

**Chapter XXX**
**Signs**

**Sections**

**Purpose**
**Administration**
**Sign Permit Required**
**Prohibited Signs**
**Exemptions**
**General Provisions**
**Permanent Signs**
**Non-Permanent Signs**
**Nonconforming Signs**
**Sign Definitions**

## Section 1 Purpose - Sign Regulations

This section recognizes that signs serve a number of valuable public and private functions, including providing effective communication between people, wayfinding information, commercial images, marketing, advertising, and education; and creating a visually stimulating retail environment. However, the City also finds that unregulated signage can be detrimental to the promotion of the safety, well-being, and comfort of the users of streets, reduce the effectiveness of individual signs, have a significant negative impact on the aesthetic quality of the City's streetscapes, negatively impact property values and can result in dangerous conflicts between traffic control signs and other signs. This section balances the community's interest in traffic safety, aesthetics, and potential negative consequences of unregulated signage, with the community's desire to realize the public and private benefits of private signage. These regulations strive to achieve this balance by limiting the number, type, size and location of signs in order to minimize visual blight, clutter and traffic hazards while at the same time providing opportunities for free speech, freedom of expression, and the realization of the benefits of private signage. This section reduces distractions and obstructions from signs that would adversely affect traffic safety; and reduces hazards caused by signs encroaching upon public ways. The City's visual character is enhanced by promoting new and replacement signage which is creative and distinctive, compatible with the surroundings, and responsive to the public need to locate a business establishment by identification, address, and product and/or service information.

With these purposes in mind, it is the intent of this Chapter to ensure that the use and regulation of signage is consistent with the public interest as follows:

A. Balance multiple goals including promoting economic development and creating an attractive community;

B. Provide minimum standards to safeguard life, health, property and the general welfare by regulating and controlling the design, quality of materials, construction, location, electrification and maintenance of all signs and sign structures;

C. Ensure that signs are compatible with adjacent land uses;

D. Protect the public from hazardous conditions resulting from signs that are structurally unsafe, obscure vision of motorists, distract motorists, or interfere with traffic signs and signals;

E. Minimize overhead clutter for drivers and pedestrians;

F. Provide for types and sizes of signs appropriate to the land uses and zoning districts of the City;

G. Encourage well-designed signs that are compatible both with surrounding land uses and the buildings to which they are appurtenant;

H. Provide the public with reasonable means to help them easily and safely locate businesses and other locations in Lakewood;

I. Recognize free speech rights by regulating signs in a content-neutral manner;

J. Implement the goals and policies of the City of Lakewood Comprehensive Plan; and

K. Protect property values by encouraging signs that are appropriate in both scale and design to surrounding buildings and landscape and by discouraging a needless proliferation of the number of signs.

1. Provide functional flexibility and accommodate signage that follows basic principles of good contextual design;

2. Ensure legibility of signage in the circumstances in which it is seen;

3. Assure that public benefits derived from expenditures of public funds for the improvement and beautification of streets, other public structures, and spaces are not obviated by overly aggressive signage that results in a negative impact on the visual and aesthetic cohesiveness of the streetscape.

**Section 2 Administration - Sign Regulations**

A. *Permitted Zones.* Only signs of the type or types as designated by this section shall be permitted in approved zoning districts that allow their use. This section shall be enforced pursuant to the procedures established in LMC 18A.02.460, Enforcement.

B. *Review and time limits.* The Community Development Director shall promptly review the application upon the receipt of a completed permit application and payment of the permit fee by the applicant. The Community Development Director shall grant or deny the permit application within twenty (20) days from the date the completed application and permit fee was filed with the Community Development Department.

C. Approval or denial. The Community Development Director shall approve a permit for the sign if it complies with all applicable laws, including the building, electrical or other adopted codes of the City of Lakewood; the regulations for signs contained in this Chapter; and any variances granted from this Chapter. If the Community Development Director does not approve a permit for the sign, he/she shall state the reasons for the denial in writing, and shall mail a certified copy of the reasons for denial to the address of the applicant stated on the application.

D. *Appeal of sign permit determinations.* Decisions on sign permit applications may be appealed to the City's hearing examiner pursuant to LMC Section 18A.02.740. An appeal hearing regarding the issuance of a sign permit shall be conducted within 30 days of the receipt of the appeal petition and appeal fee.

**Section 3 Sign Permit Required**

New sign or sign modification permit. A permit is required for any new sign or modification of any existing sign, except as provided for in (REFERENCE TO EXEMPTIONS- SECTION 5).

A. Each individual permanent or temporary sign shall require a separate sign permit, except as specifically exempted in this section. Any sign for which a building permit is required under the Uniform Building Code shall also obtain a building permit.

B. No sign shall hereafter be erected, re-erected, constructed, installed, or altered except as provided by this Chapter. For the purposes of this Chapter "altered sign," as defined in (XXX code citation) shall not include maintenance as that term is used in (XXX Code citation), Definitions.

C. Any alteration or change to a sign or any change in the sign copy requires a sign permit, except for a change in the sign copy where the sign copy is contained within a permanent framework and designed to be periodically replaced, or a message which changes on a changeable copy reader board or a billboard.

D. A new sign or sign modification permit shall become null and void if the work for which the permit was issued has not been completed within six (6) months of issuance.

E. The Community Development Director shall not issue a sign permit for a freestanding sign or modification of a freestanding sign if a nonconforming sign exists on the subject property or contiguously owned properties; nor issue a sign permit for a wall sign or modification of a wall sign if a nonconforming wall or sign exists on the subject property or contiguously owned properties, except as provided in (LMC XXXX Code citation), Nonconforming Signs.

**Section 4 Prohibited Signs**

The following signs are prohibited in all zoning districts:

A. Mobile reader boards.

B. Roof signs.

C. Signs posted upon utility poles, traffic control devices, public sign posts, or other public utility devices.

D. Signs which, by virtue of their size, location, movement, coloring or manner of illumination that may be confused with traffic control signs or signals.

E. Posters, pennants, banners, streamers, string pennants, blinking or flashing or strobe lights, balloons, searchlights, strings, twirlers, propellers, flares, and other displays of a carnival nature, blimps, or inflatables except as permitted in conjunction with a temporary sign pursuant to LMC 18A.50.665, Signs for Temporary Display.

F. Animated, emitting, moving, rotating, or visually projecting signs.

G. Vehicle signs, except as allowed pursuant to LMC 18A.50.625(B)(21)-(22), Sign Permit Exceptions.

H. Parking lot, curb or wheelstop painting, or advertising which is not restrictive or cautionary in nature.

I. Public address systems or sound devices used in conjunction with any sign or advertising device.

J. Abandoned signs.

K. Off-premise signs, except as specifically permitted within this section.

L. Billboard signs, except as provided for in (SECTION 7 XXX- LMC code citation)

M. Feather banners

**Section 5 Sign Permit Exemptions**

A. Exemption from the sign permit requirements of this Chapter shall not be deemed to grant authorization for any sign constructed, erected or located in any manner in violation of the provisions of this Chapter or any other laws or Ordinances of the City or the State of Washington.

B. A sign permit shall not be required for the following:

1. In addition to other permitted signs, a property may display a permanent sign not exceeding two (2) square feet of sign area intended to be visible to public right of way.

2. Signs, plaques, inscriptions attached to or on a building provided it is:

    a. non-illuminated; and

    b. no more than two signs per site; and

    c. a maximum twelve (12) square feet of sign area.

3. Signs owned and/or required by the State, City, or public utility entities indicating or warning of danger, aids to safety, traffic control, or traffic direction signs.

4. Maintenance of a legal sign in accordance with this section.

5.  Signs posted on a property, parcel, or public land issued by a public agency or court intended to notify the public.

6.  Incidental signs, defined in Section 11.V

7.  Identification signs installed on and pertaining to structures or improvements such as phone booths, charitable donation containers, and recycling boxes. Signs may not exceed ten (10) percent of the area of the structure's facade or surface elevation upon which they are installed.

8.  Building signs attached to structure that comply with the Uniform Building Code and Uniform Fire Code.

9.  Signs located inside of a building, painted on a window, or hanging inside of a window, provided that window signs shall be limited to forty (40) percent of the window area.

10.   Strings of incandescent lights where the lights do not flash or blink in any way and do not unreasonably impact adjacent properties or street with excessive illumination or glare.

11.  Gravestones or other memorial displays associated with cemeteries and mausoleums.

12.  Vehicle signs painted or adhered directly and permanently on the vehicle, such as vinyl letters and logos, adhered magnetically, or inside a vehicle window,

> a.  Signs must be painted or adhered directly and permanently  upon the vehicle, such as vinyl. Adhered magnetically, placed in side of the window, or otherwise securely mounted to the vehicle which is routinely operated throughout the normal course of the business for delivery, pickup, or transportation.
>
> b.  Signs being placed inside of their marketed for sale vehicle window.

13.  Public transit buses and taxis bearing rental advertising, subject to the requirements of LMC 18A.50.630, General Sign Standards.

14.  Public service directional signs, subject to the requirements of LMC 18A.50.630.

> a.  Public Service Directional Signs.  Signs that represent a public or quasi-public nature such as, medical and emergency facilities, neighborhood welcome signs, signs recognizing scenic or historical spot may be erected by an official civic body.  Tourist related highway business signs are regulated by WSDOT rules and not included within Public Service Directional signs. Public service directional signs may be located in any zone with the approval of the Community Development Director if all of the following standards are met:
>
> > 1.  The sign shall not exceed a nine (9) square foot sign face.

2. Signs are of a consistent size, color and style as established by the City.

3. No more than four (4) such signs for each use or occupancy shall be approved.

4. Such a sign shall meet all other applicable provisions of this section.

5. These signs may be located within the public rights-of-way with approval of the sign placement by the City Engineer.

6. Signs shall be located on arterial streets nearest the location unless otherwise approved by the Community Development Director.

**Section 6 General Provisions**

The provisions of this section apply within all zone districts citywide and include rules for signs that may be approved to benefit the general public interest as well as general rules for the placement and maintenance of all signs.

A. General Sign Requirements.

1. No permanent sign shall be constructed, erected, or retained unless the sign and sign structure is constructed, erected, and maintained so as to be able to withstand the wind, seismic, and other regulations as specified in the Uniform Building Code or other applicable regulations.

2. Area of Signs.

a. The area of a sign means the area within a continuous perimeter enclosing the outer limits of the sign face, but not including structural elements which are not a part of the display.

b. When two identical sign faces are placed back to back, the sign area shall be computed by the measurement of one of the sign faces. No more than two faces are permitted per freestanding sign. The area of a spherical, cubical or polyhedral sign equals one-half the total surface area.

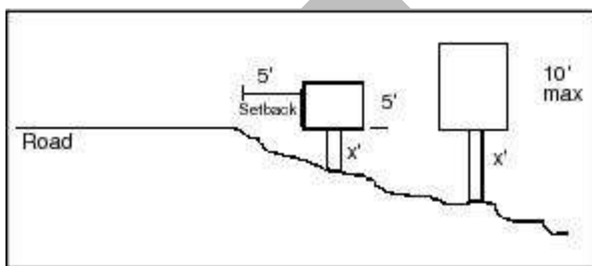
3. Area of Freestanding Letters. Freestanding letters and/or characters forming a sign or message shall be considered to occupy two-thirds of the combined overall background area.

4. Height of Signs. Maximum height of all freestanding signs or any part of the freestanding sign structure shall be 10 feet above average finished grade. Sign height shall be measured from the average finished grade at the sign foundation. The average finished grade for signs on grades lower than the adjacent right-of-way shall be considered the same as the average grade of the adjacent right-of-way. See the diagram following subsection (A)(7) of this section for grade exceptions.

5. Width of Signs. The maximum width of a freestanding sign structure shall be 12 feet. Sign width shall be measured on the face side of the sign from one side of the face or any part of the sign structure to the farthest point on the opposite side of the face or part of the sign structure.

7. Illumination. External sign illumination shall be directed only towards the sign face or freestanding letters and shall be shielded in ways to prevent light and glare on adjacent properties.

8. Grade Exception. When the elevation at the base of a freestanding sign is at least five feet below the elevation of the adjacent road, a single pole may be used to support the sign provided the portion of the sign above the elevation of the adjacent roadway has the appearance of a monument sign. See figure below.




9. Maintenance of Signs. All signs shall be maintained in a safe condition and in good repair. Any sign that is damaged shall be restored to a safe condition immediately. Failure to maintain a sign in a safe condition and in good repair shall be grounds for revocation of a sign permit.

10. Fire Safety Obstructing Signs. No sign or sign structure shall be constructed in such a manner or at such a location that it will obstruct access to any fire escape or other means of ingress or egress from a building or any exit corridor, exit hallway, or exit doorway. No sign or supporting structure shall cover, wholly or partially, any window or doorway in any manner that will substantially limit access to the building in case of fire.

B. Placement.

1. Setbacks for Signs. All signs are permitted a zero-foot setback, except as provided in this chapter, provided the owner demonstrates to the City by reasonable evidence that the sign will not obstruct the clear sight zone as specified in Title XX LMC.

2. Establishment of Property Lines. It shall be the responsibility of the property owner or an authorized representative to establish and clearly mark out any property line from which a sign setback measurement shall be taken. In the event of a dispute or discrepancy in the Director may order an independent survey to ensure compliance with this chapter. The survey cost shall be charged to the sign applicant.

3. A sign shall not be affixed to a tree, shrub, rock or other natural object.

4. No unauthorized sign may be affixed to a utility pole, or other public structure.

5. Signs shall not be mounted on any portion of the roof or extend above the roof line unless mounted on a parapet wall. Signs shall not extend above the top edge of the parapet wall.

6. No sign shall project into a vehicular public way or be less than nine (9) feet above a pedestrian way.

7. No sign together with any supporting framework shall extend to a height above the maximum building height allowed in a zone.

8. Signs shall not cover architectural details such as, but not limited to, arches, sills, moldings, cornices, and transom windows.

9. Signs shall not obstruct traffic signals. The issuance of a sign permit as regulated by this code shall not relieve the permit holder from fully complying with the State of Washington or any other law governing the obstruction of any authorized traffic sign, signal or device.

10. Signs shall not obstruct vision clearance as determined by the City Engineer.

11. Signs shall not be placed within the public right-of-way except as specifically allowed in this section. No person, organization, or agency shall place any signs, indicators, advertisements, stakes, posts or any other foreign object or objects within a public street or the right-of-way of any public street in the City of Lakewood without the express permission, in writing, of the City Engineer. Any such objects now upon the public rights-of-way are hereby declared illegal, except for those now in place with written permission of the City Engineer and except for mailboxes or newspaper delivery tubes placed on the public right-of-way, with the approval of the City Engineer.

12. Unauthorized signs in the public right-of-way that the City Engineer determines to be located so as to present a hazard to the public health or safety may be immediately removed without prior notice.

13. Transmission Lines - Clearance. Horizontal and vertical clearance of signs or sign structures from power and communication transmission lines shall not be less than twelve (12) feet.

C. Flagpoles. No flagpole shall extend to a height above the maximum building height allowed in the zone. A flagpole greater than six (6) feet in height shall require a building permit. All flagpoles shall be set back eight (8) feet from all property lines. Flagpoles greater than twenty-five (25) feet in height shall be set back an additional foot for each foot in height above twenty-five (25) feet.

D. Digital Signs. The purpose of this section is to regulate how digital signage technology might be applied to sign types otherwise permitted by this chapter. It is not intended to allow more signs or larger signs than otherwise permitted by this chapter.

1. One digital sign is allowed per one hundred (100) feet of street frontage in non-residential zones.

2. Maximum luminance of not more than 0.2 foot-candles over ambient lighting conditions. All permitted digital signs shall be equipped with a sensor or other device that automatically determines ambient illumination and is programmed to automatically dim according to ambient light conditions. Digital sign illumination shall be measured in accordance with Night-time Brightness Level Recommendations for On Premise Electronic Message Centers. (International Sign Association, August 2016).

3. No motion allowed except for instantaneous change of message.

4. Minimum hold between messages: eight (8) seconds plus 1.5 second transition fade.

5. Programming. To ensure that digital signs are programmed and continue to operate according to local standards, digital signs shall be designed for local on-site control and programing only.

J. To support the provision of transit bus shelters in Lakewood, signs are permitted when provided in conjunction with the City-approved Pierce Transit Lakewood Bus Shelter Program, subject to the following requirements:

1. An accessory sign that is structurally integrated into a bus shelter approved for design, construction, and location by Pierce Transit and the City of Lakewood.

a. The maximum sign area is forty-eight (48) square feet for the entire shelter structure.

b. Sign setback requirements are waived.

c. Sign separation requirements are waived.

d is exclusive of signage limits of the lot on which it is located.

e. A sign permit for a bus shelter sign may be issued where a nonconforming freestanding sign exists on the lot.

2. Signs shall only be permitted on shelters in accordance to the City of Lakewood and Pierce Transit Bus Shelter Program.

**Section 7 Provisions for Permanent Signs or Continuous Displays**

A. Table 18A.50.640 presents the dimensional standards and permit requirements by zone district for signs that are permanently installed or otherwise permitted for display without time restriction.

| Zone Districts | Sign Standards1 | | | | | |
|---|---|---|---|---|---|---|
| | **Sign Type** | **Number Allowed** | **Sign Size** | **Maximum Total Area** | **Height** | **Permit Rqd?** |
| **Residential (All R, MR, and MF Zones)** | | | | | | |
| Subdivision | Monument | 1 per primary entrance | 0 sf. / 32 sf. | | 7’ | Y |
| Each residential lot | All | 1 per street frontage | 0 sf. / 4 sf. | 4 sf. | 3’ for picket | N |
| MF with more than 6 units | Monument | 1 per primary entrance | 0 sf. / 32 sf. | | 7’ | Y |
| Schools, churches and other permitted non-residential | Monument | 1 per primary entrance | 0 / 32 sf. | | 7’ | Y |
| | Wall2 | Number limited by Total Area | 0 / 50 sf. | 5% of façade up to 50 sf | | Y |
| **Commercial / Industrial** | | | | | | |
| **All (excluding Freeway)** | | | | | | |
| | Monument (by frontage) | | | | | Y |
| | 50’ or less | 1 | 16 sf. / 24 sf. | 24 sf. | 7’ | Y |
| | More than 50’ | Number limited by Total Area | 24 sf. / 40 sf. | 24 sf. plus 0.17 for each frontage foot over 50 sf. | 7’ | Y |
| | | A monument sign shall be separated from any other monument sign on the same property by a minimum 200’ | | | | |
| | Pole (by frontage) | | | | | |
| | Less than 250’ | None | | | | |
| | 250’ to 500’ | 1 in trade for any 2 permitted Monument | 24 sf. / 40 sf. | | 20’ | Y |
| | Over 500’ | | 24 sf. /48 sf. | | 20’ | Y |
| | Wall2 | | 200 per sign or group | 10% of facade | | Y |
| | Window | | 40% of the window area on each wall. | | | N |
| | Sale / Lease | 1 per street frontage | 16 sf. for ARC, TOC, NC; 32 sf. for others | | 10’ | Y |
| | Incidental | See Note #3 below | | | | N |
| | Portable | See Subsection #C.4 below | | | | N |
| **Freeway**[4] **(Select TOC, C1, C2, IBP, I1)** | | | | | | |
| | Pole/Monument | Same as Non-Freeway Commercial / Industrial | | | | Y |

| | | | | | | |
|---|---|---|---|---|---|---|
| | -Surface Street frontage | | | | | |
| | Pole- Freeway Frontage | 1 additional pole sign per freeway frontage. Min 60 l.f. surface street frontage req'd. | 60 s.f. min/ 200 s.f. max. Must be within 50' of freeway r.o.w.) | 1 sq. ft. per lineal foot arterial frontage (min. 60 linear feet of surface street frontage to qualify for freeway pole sign) | 35' w/in 50' of fre eway | Y |
| | Wall2, Window, Sale / Lease, Incidental, Portable | Same as Non-Freeway Commercial / Industrial | | | | |
| **Open Space, Public, and Institutional (OSR1, OSR2, P1)** | The Director shall review any request for signs in these districts and consider the type, size and location of the proposed signage in respect to the type and intensity of the use, and make a determination to approve, deny or modify the proposed sign(s) consistent with the intent of this chapter and the applicable zone district regulations. | | | | | |

B. Notes for Figure 18A.50.640

1. The following abbreviations are used in the Table:

Min. / Max. = Minimum / Maximum; sf = square foot or feet; Y = Yes; N = No; Rqd.= Required; r.o.w. = right-of-way.

2. Wall sign includes Projecting, Canopy, Awning, and Marquee signs.

3. Incidental signs are defined (CODE CITATION, DEFINITIONS) Incidental signs shall not be readily visible or legible from a public right-of-way. Incidental signs shall not individually exceed two (2) square feet or, cumulatively, one-half of one (1/2 of 1) percent of the building facade; provided, said size limitation shall not apply to signs providing directions, warnings or information when, established, authorized, or maintained by a public agency.

4. Freeway Commercial / Industrial. TOC, C1, C2, IBP, NC2 and I1 zoning districts which abut I-5, SR 512, Tacoma Mall Boulevard, or the BNSF rail-road right-of-way in Tillicum.

C. Additional requirements and explanations for specific Sign Types and situations:

1. Wall signs shall not project more that 18 (eighteen) inches from the façade of the supporting structure.

2. Projecting signs shall not extend more than 6 (six) feet from the attached building.

3. Freestanding signage for landlocked parcels.

a. For purposes of this section:

(1) A landlocked parcel is a parcel which does not have frontage on a public street and access to the parcel is provided through an adjacent parcel via a recorded access easement, or is a parcel that has less than 30 (thirty) feet on a public street and may or may not have access on that street.

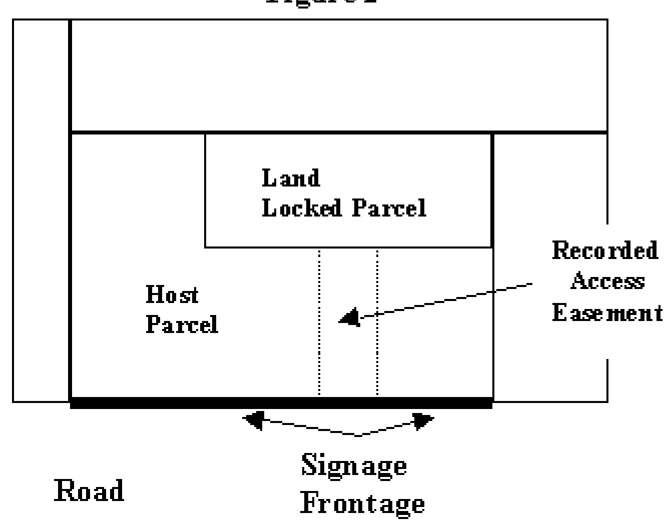
(2) A host parcel is the parcel which provides the access to a landlocked parcel, via an easement.

b. A host parcel may share its allocation of freestanding signage with the landlocked parcel. The host parcel is under no obligation to grant the landlocked parcel use of its property for an easement or to grant part of its signage allotment.

c. Freestanding signage for the landlocked parcel shall be placed adjacent to the recorded access easement and shall only advertise those businesses located on the landlocked parcel and/or the host parcel.

d. In the case of landlocked parcels utilizing a host parcel for signage, the signage for the landlocked parcel shall not be considered to be off-premise signage.

Figure 2




D. Standards for Portable Signs Intended for Continuous Display:

Any business may display one portable sign, either a freestanding sign such as an A-Frame or a T-Frame, or a banner, on a continuous basis under the terms of this subsection. Portable signs permitted under this subsection are in addition to any permanent or temporary signs otherwise permitted by this Chapter. No permit is required if the portable sign complies with the following standards:

a. The sign must be located on private property on which the business is located (with the permission of the property owner) and shall not be located within the public right-of-way. On-site portable signs that are not generally visible from the public right-of-way or property are not considered signs under this Chapter.

b. The sign shall not block critical sight distances for the adjacent roadway, or for vehicles entering or exiting the roadway to or from a lawfully established driveway.

c. The sign may not block any pedestrian way. A minimum of 48 (forty-eight) inches clearance shall be provided.

d. The sign shall not block or interfere with any vehicular circulation, maneuvering or parking areas.

e. The maximum size for an A-Frame or T-Frame sign displayed under this subsection shall be 36 (thirty-six) inches wide and 48 (forty-eight) inches high.

f. The maximum size of a banner allowed under this subsection shall be 40 (forty) square feet.

g. Banners shall be displayed against a building wall, and shall be maintained in good condition. Torn, faded, dirty, dingy, or shredded banners shall be removed immediately. Banners displayed on a continuous basis are in addition to the allotment of permanent wall signs for the business.

h. Freestanding portable signs shall be separated from each other by a minimum of 50 (fifty) feet.

i. Only one portable sign per business may be displayed on a permanent basis under the terms of this section. A business may display a freestanding portable sign (A-Frame/ T-Frame) or a banner, but not both, under the terms of this subsection. For the purposes of this subsection, separate business entities occupying one tenant space shall be considered a single business. Additional portable signs may only be displayed on a temporary basis subject to the provisions of Section 18A.50.665, Signs for Temporary Display.

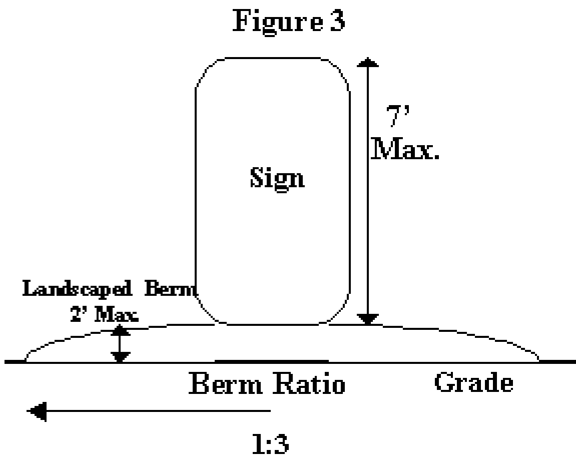
j. Freestanding portable signs permitted under this section shall be displayed only during regular business hours when the business is open, and shall be removed during those times when the business is closed.

k. No balloons, streamers, stringer pennants, festoons, or other similar devices are permitted in conjunction with signs displayed under this subsection. Such devices may be allowed on a temporary basis as permitted under Section 18A.50.665, Signs for Temporary Display.

l. Preference shall be given to conventional, non-portable signs lawfully erected and intended for display on a permanent basis. Signs displayed under this subsection shall be subject to all applicable standards and provisions of this Chapter.

E. Landscaped berm and decorative block edged berm alternatives for a monument sign.

a. Landscaped berms or decorative block edged berms of 2 (two) feet or less in height shall not be included in the height calculations of a ground sign. Berms of more than 2 (two) feet in height shall be counted toward the sign height calculation. Landscaped berms shall have a slope ratio of not more than 1:3 height-to-width, from the center of the berm to be considered a landscaped berm.




[Added]

F. Major Commercial or Employment Centers within the NC1, NC2, CBD, TOC, C1, C2, IBP, I1 and I2 zoning districts.

(a) A major commercial center or employment center is an integrated development with contiguous ownership larger than 10 (ten) acres in size. Contiguous properties under separate control, but which function as an integrated center and when combined are larger than 10 (ten) acres in size, may be considered a major center.

(b) Major commercial and employment centers may vary from the development standards of this section by obtaining approval of an Integrated Sign Plan for the center.

(1) The sign plan for the center shall be reviewed either separately or as part of the conditional use permit for the project.

**Section 8 Non-Permanent Signs**

1. Limited Duration Signs

A. Limited duration signs, as defined in this Section, located on private property are subject to the regulations set forth below. Limited Durations signs that comply with the requirements in this subsection shall not be included in the determination of the type, number, or area of signs allowed on a property. Unless otherwise stated below, the requirements listed below shall apply to both commercial and non-commercial signs.

B. Size and Number
   a. Non-Residential Zones:
      i. Large Limited Duration Signs: One (1) large limited duration sign is permitted per property in all non-residential zones. If a property has at

least 400 feet of street frontage or has more than 10,000 square feet of floor area, one (1) additional large limited duration sign may be permitted so long as there is a minimum spacing of 200 feet between the two (2) large limited duration signs.

1. Type
    a. Freestanding sign
    b. Window sign
    c. Wall sign
2. Area: Each large limited duration sign shall have a maximum area of 16 sq ft
3. Height: Large limited duration signs that are freestanding shall have a maximum height of eight (8) feet.

ii. Small Limited duration signs: In addition to the large limited duration sign(s) outlined above, one (1) small limited duration sign is permitted per property in all non-residential zones. If a property has at least 400 feet of street frontage or has more than 10,000 square feet of floor area, one (1) additional small sign may be permitted.

1. Type
    a. Freestanding sign
    b. Window sign
    c. Wall Sign
2. Area: Each small limited duration sign shall have a maximum area of six (6) sq. ft.
3. Height: Small limited duration signs that are freestanding shall have a maximum height of six (6) feet

b. Residential Zones:

i. Small Limited Duration Sign: One (1) small limited duration sign is permitted per property.

1. Type
    a. Freestanding sign
    b. Window sign
    c. Wall Sign
2. Area: Each small limited duration sign shall have a maximum area of six (6) sq. ft.
3. Height: Small limited duration signs that are freestanding shall have a maximum height of six (6) feet

C. Permit Requirements

a. A permit for a limited duration sign is issued for one (1) year and may be renewed annually.

b. One (1) sign is allowed per permit. An applicant may requires up to two (2) permits per address, but is subject to the size and number requirements set forth in this section.

c. An allocation for a limited duration sign permit must include:

i. A description of the sign indicating the number, size, shape, dimensions, and colors of the sign, and the expected length of time the sign will be displayed;

ii. A schematic drawing of the site showing proposed location of the sign in relation to nearby building and streets;

iii. The number of signs on the site.

D. Installation and Maintenance

a. All limited duration signs must be installed such that in the opinion of the municipality building official, they do not create a safety hazard.

b. All limited duration signs must be made of durable materials and shall be well-maintained.
c. Limited duration signs that are frayed, torn, broken, or that are no longer legible will be deemed unmaintained and required to be removed.

E. Illumination: Illumination of any limited duration sign is prohibited

F. Summary Table of limited duration Signs

| | Limited Duration Signs | |
|---|---|---|
| | Non-Residential Zones | Residential Zones |
| Large Limited Duration Signs (Max area 16 sq. ft.) | Number: 1 per property; 2 if property has 400+ ft. of street frontage of has > 10,000 sq. ft. of floor area.<br><br>Height: Maximum 8 ft. | |
| Small Limited Duration Signs (Max area 6 sq. ft.) | Number: 1 per property; 2 if property has 400+ ft. of street frontage of has > 10,000 sq. ft. of floor area.<br><br>Height: Maximum 6 ft. | Number: 1 per property<br><br>Height: Maximum 6 ft. |

2. Temporary Signs
   a. Temporary signs, as defined by this section, located on private property, are exempt from standard permit requirements. Temporary signs that comply with the requirements of this sub-section shall not be included in the determination of the type, number, or area of signs allowed on a property.
   b. Unless otherwise stated below, the requirements listed below shall apply to both commercial and non-commercial signs.
   c. Size and Number.
      i. Non-Residential Districts:
         1. Large Temporary Signs: One (1) large temporary sign is permitted per property in all non-residential districts. If a property has at least 400 feet of street frontage or has > 10,000 sq. ft. of floor area
            a. Type:
               i. Freestanding sign
               ii. Window sign
               iii. Wall sign
               iv. Banner sign
            b. Area
               i. Each large temporary freestanding, window, or wall sign shall have a maximum area of 16 sq. ft.
               ii. Each large temporary banner shall have a maximum area of 32 sq. ft.
            c. Height:

            i. Large temporary signs that are freestanding shall have a maximum height of eight (8) feet
            ii. Banners shall hang at a height no greater than 24 feet.
    2. Small Temporary Signs: In addition to the large temporary sign(s) outlined above, one (1) small temporary sign is permitted per property in all non-residential districts. If a property has at least 400 feet of street frontage or has > 10,000 square feet of floor area, one (1) additional small sign may be permitted so long as there is a minimum spacing of 200 feet between both sets of small temporary signs.
        a. Type:
            i. Freestanding sign
            ii. Window sign
            iii. Wall sign
        b. Area: Each small temporary sign shall have a maximum area of six (6) sq. ft.
        c. Height: Small temporary signs shall have a maximum height of six (6) feet.
ii. Residential Districts:
    1. Large Temporary Signs: One (1) large temporary sign is permitted per property in all residential districts. If a property has at least 400 feet of street frontage
        a. Type:
            i. Freestanding sign
            ii. Window sign
            iii. Wall sign
            iv. Banner sign
        b. Area
            i. Each large temporary freestanding, window, or wall sign shall have a maximum area of 16 sq. ft.
            ii. Each large temporary banner shall have a maximum area of 32 sq. ft.
        c. Height:
            i. Large temporary signs that are freestanding shall have a maximum height of eight (8) feet
            ii. Banners shall hang at a height no greater than 24 feet.
    2. Small Temporary Signs: One (1) small temporary sign is permitted per residential property
        a. Type:
            i. Freestanding sign
            ii. Window sign
            iii. Wall sign
        b. Area: Each small temporary sign shall have a maximum area of six (6) sq. ft.
        c. Height: Small temporary signs shall have a maximum height of six (6) feet.

d. Duration and Removal
    i. Temporary signs may be displayed up to a maximum of 30 consecutive days, two (2) times per year.
    ii. The City of Lakewood or the property owner may confiscate signs installed in violation of this chapter. Neither The City of Lakewood nor the property

owner is responsible for notifying sign owners of confiscation of an illegal sign.

e. Permission: The party posting the temporary sign is solely responsible for obtaining the permission of the property owner before posting their temporary sign.
f. Municipal Notification: Temporary signs are exempt from the standard permit requirements but the date of erection of a temporary sign must be written in indelible ink on the lower right hand corner of the sign.
g. Installation and Maintenance.
    i. All temporary signs must be installed such that in the opinion of City of Lakewood's building official, they do not create a safety hazard.
    ii. All temporary signs must be made of durable materials and shall be well-maintained.
    iii. Temporary signs that are frayed, torn, broken, or that are no longer legible will be deemed unmaintained and required to be removed.
h. Illumination: Illumination of any temporary sign is prohibited.
i. Summary Table for Temporary Signs.

| | Temporary Signs | |
|---|---|---|
| | Non-Residential Zones | Residential Zones |
| Large Temporary Signs (Max area: 32 sq. ft. for banner, 16 sq. ft. for all other signs) | Number: 1 per property; 2 if property has 400+ ft. of street frontage of has > 10,000 sq. ft. of floor area.<br><br>Height:<br>*Ground:* Maximum 8 ft.<br>*Banner:* Maximum 24 ft. | Number: 1 per property if property has 400+ ft. of street frontage |
| Small Temporary Signs (Max area 6 sq. ft.) | Number: 1 per property; 2 if property has 400+ ft. of street frontage of has > 10,000 sq. ft. of floor area.<br><br>Height: Maximum 6 ft. | Number: 1 per property<br><br>Height: Maximum 6 ft. |

3. Portable Signs
    a. General Provisions
        i. Illumination: Illumination of any portable sign is prohibited
        ii. Hours of Display
            1. Signs shall not be displayed on any premises before 6:00 AM and shall be removed each day at or before 10:00 PM. However, all portable signs must be taken in during hours of non-operation of the business being advertised.
            2. All portable signs must be taken in during inclement weather.

b. Sandwich Board of A-frame Signs. Sandwich board signs that comply with the requirements in this sub-section shall not be included in the determination of the type, number, or area of signs allowed on a property.
   i. Number: One (1) sandwich board sign in permitted per establishment. For the purposes of this subsection, a parking garage or parking lot shall be considered an establishment.
   ii. Area: Each sign shall have a maximum area of seven (7) sq. ft. per sign face.
   iii. Height: Signs shall have a maximum height of three and one-half (3.5) feet.
   iv. Sign Placement
      1. If a sign is located on a public or private sidewalk, a minimum of 36 inches of unobstructed sidewalk clearance must be maintained between the sign and any building or other obstruction
      2. The sign must be located on the premises, and within 12 feet of the primary public entrance of the establishment is advertises. For the purposes of this subsection, a public entrance includes a vehicular entrance into a parking garage or parking lot.
      3. Portable signs shall be weighted, temporarily secured, or strategically placed so as to avoid being carried away by high winds.
   v. Manual Changeable Copy
      1. Manual changeable copy signs are permitted when integrated into a sandwich board sign.

**Section 9 Nonconforming Signs**

A. Any sign which does not conform to the sign standards within this chapter, for which a permit was issued by Pierce County prior to February 28, 1996, and which was constructed, erected, and maintained in compliance with applicable Pierce County regulations shall be regarded as a legal non-conforming sign; excluding those signs that are prohibited under LMC 18A.50.620, Prohibited Signs.

B. Nonconforming Sign Permits.

1. A permit is required for each legal nonconforming sign within the city of Lakewood.

2. The permit shall include the necessary information pertaining to the nonconforming status of the sign for administrative tracking, public notice, amortization (if applicable), and removal of the sign in accordance with this title.

3. All property owners, lessors, or businesses with control of a nonconforming sign within the city shall obtain a nonconforming sign permit for each nonconforming sign within ninety (90) days of notification by the City of Lakewood.

4. No fee shall be charged for required nonconforming sign permits which are obtained within ninety (90) days of notification by the City of Lakewood. Owners of signs who have not obtained the required permit prior to the stated deadline shall be assessed a permit fee for administration of the permit.

5. Changes to nonconforming signs, as allowed pursuant to this title, shall be permitted by documenting the nature and extent of the change on a nonconforming sign permit.

C. Any legal nonconforming sign which is structurally altered, relocated, or replaced shall immediately be brought into compliance with all of the provisions of this title, excluding the, repair, and/or restoration of a sign to a safe condition. Normal maintenance shall be permitted on any part of a sign or sign structure without loss of nonconforming status. Sign face changes that do not result in an increase of the nonconformity shall be allowed, except as specifically prohibited in this chapter.

D. All nonconforming signs not exempted by subsection E below shall be removed or modified to conform with current sign standards no later than December 31, 2006. A sign permit shall be obtained for any sign modifications necessary to bring signs into conformance. Pursuant to subsection C, all non-conforming signs required to be modified or replaced by this section shall be brought into full compliance with the provisions of this code.

E. Signs for which permits were issued by Pierce County prior to February 28, 1996, if they are within 25 percent of the height and area requirements of the current sign standards as of the effective date of this Ordinance, shall be exempt from the provisions of subsection D above. In addition, any sign erected pursuant to a valid sign permit issued by the City of Lakewood at any time since incorporation of the City shall be exempt from the provisions of subsection D above. These exemptions shall not apply to any sign listed as a prohibited sign. If the removal of a non-conforming sign is subject to compensation by the City pursuant to RCW 47.42, the Highway Scenic Control/Scenic Vistas Act, an exemption may be provided for said sign at the discretion of the City Manager.

F. In addition to the provisions of subsection D, all nonconforming signs not exempted by subsection E shall be removed or brought into conformance prior to December 31, 2006, under the following conditions:

1. In conjunction with any administrative use permit, conditional use permit, variance, subdivision, change in use, or building permit application for an expansion or alteration (including new structures) on the property on which the sign is located, where the cost of the expansion, alteration, or new construction is greater than twenty-five (25) percent of the value of the existing structure(s) on the site. This calculation shall include cumulative value, adjusted for inflation, of all expansions, alterations, and new construction initiated since incorporation of the City.

2. Within ninety (90) days of the demolition or destruction of any portion of a building containing the use to which a non-conforming sign is accessory, where the value of that portion of the building is greater than fifty (50) percent of the appraised value of the entire building

3. Within ninety (90) days of damage of the sign by catastrophic events, such as earthquakes, floods and wind, vandalism, fire or other casualty such that the cost of repair and restoration of the sign, to the same or a more conforming design, exceeds fifty (50) percent of the cost of replacing the sign with a conforming sign. The Building Official may require that such sign be removed or repaired in less than ninety (90) days if the sign is deemed to be an immediate danger to the public.

4. Upon notice by the City that the sign is in a state of disrepair, is unsafe, or may become a danger to the public, providing the costs of repair and restoration of the sign exceeds fifty (50) percent of the cost of replacing the sign with a conforming sign.

5. Upon notice by the City that the sign constitutes a traffic hazard not created by the relocation of streets or highways or the result of acts by the City.

G. Any signs not removed within the time limit specified in Section D above, or as otherwise ordered by the City shall be deemed a public nuisance, subject to the removal provisions of this chapter, and shall be removed by the City if the sign owner or property owner fails to do so after being so ordered by the Community Development Director. Costs, including administrative and indirect costs, of said removal shall be borne by the sign and/or property owner and may be recovered by the City, if necessary, by placing a lien on the property from which the sign has been removed.

H. Amortization. To ease the economic impact of this code on businesses with legal nonconforming signs subject to removal under subsection D, this code has provided for a limited period of use for a nonconforming sign in its existing state. During this period, it is expected that the sign will be amortized on federal income taxes; however, whether it may be so amortized shall not affect the application of this section. Similar treatment shall be accorded signs in new areas annexed to the City.

I. Billboards: The following requirements shall pertain to all billboards located within the City.

1. The total number of billboard faces within the City of Lakewood shall not exceed the total number of billboard faces existing on the date of incorporation of the City.

2. The demolition or removal of any billboard face reduces the number of allowable billboard faces by the number removed.

3. In the event that the City of Lakewood annexes areas containing billboards after the date of incorporation, the total number of allowable billboard faces shall be increased by the number of faces existing in such areas on the effective date of annexation.

4. Any billboard sign in existence on the date of incorporation, or on the effective date of annexation, shall be considered nonconforming.

5. Removal or demolition of a billboard shall require the issuance of a demolition permit for the removal of the existing billboard. Billboard removal or demolition shall be completed within ninety (90) days of permit issuance.

6. Billboards shall not be altered or modified, except:

a. Ordinary and necessary maintenance and repairs that do not change the size, shape, orientation, height, or location of billboards shall not require a zoning certification, but may require a building permit. Billboard copy replacement may occur at any time and is exempt from the requirement for permits.

b. Billboards that have any projections that extend more than three (3) feet out from the surface of the billboard face shall not be modified, except to remove or reduce such projections.

c. Billboards that contain, include, or are illuminated by any flashing, intermittent, or moving lights shall not be altered or modified, except to remove or reduce such lights. Billboards shall not include lighting unless it is effectively shielded so that the light is directed to the billboard face and prevents beams or rays of light from being directed at any portion of the traveled ways of the highway or airways, or is of such low intensity or brilliance as not to cause glare or to impair the vision of the driver of any motor vehicle. Billboards found to have excessive illumination, at the sole discretion of the City, shall be modified in accordance with the City's instructions.

7. Amortization of billboards shall be fulfilled as required in (CITATIONXXX), Nonconforming Signs.

**Section 10 Sign Definitions**

For the purposes of this chapter, the following definitions shall apply:

A. ABANDONED SIGN. Any sign that has been deserted and its effective use terminated, and which no longer fulfills the purpose for which it was constructed.

B. A-FRAME OR T-FRAME SIGN. A temporary, portable, freestanding, and self-supporting sign which may be either single- or double-faced, forming an "A" shape, or on a pole attached to a flat base.

C. ALTERATION SIGN. Any change in size, shape, position, location, construction, or supporting structure of a sign. A change in copy is not an alteration.

D. ANIMATED SIGN. A sign which has any visible moving part, flashing or oscillating lights, visible mechanical movement of any description, or other apparent visible movement achieved by any means. Animated signs include, but are not limited to, changing or moving pictures, drawings, and designs regardless of the means and mechanisms of the animation; and message display changes at intervals of five seconds or less.

E. AWNING SIGN. Any sign painted on, attached to, or supported by an awning.

F. BALLOON. A decorative inflatable device with a diameter of less than eighteen (18) inches, generally composed of a thin layer of latex or Mylar. The tether of a balloon is less than twelve (12) feet in length (see "blimp").

G. BANNER SIGN. A typically rectangular or square shaped sign, of cloth or other similar material, bearing a commercial message, motto, or slogan. A banner may have a message and/or display a commercial graphic or symbol. It can vary in size, color, and design.

H. BILLBOARD. A sign that is in a different location than the entity claiming it. These signs are generally offered for rental or lease to persons other than the owner of the structured sign. Included in Billboards are not only the Sign Face, yet also the pole or any other structure the sign is attached to.

I. BILLBOARD SIGN FACE. That portion of a billboard, exclusive of its structural support, in which changeable fixings are pre-printed poster panels are adhered on or by painted copy.

J. BLIMP. An advertising or decorative device with a diameter or combined diameter of eighteen (18) inches or larger that is inflated by some means and is used to attract attention, advertise, promote, market or display goods and/or services. These devices include large single displays or displays of smaller balloons connected in some fashion to create a larger display. A balloon with a tether longer than twelve (12) feet is considered a blimp.

K. BUSINESS SIGN. A sign that directs attention to a business, commodity, goods, service or entertainment conducted, sold or offered on the premises.

L. CANOPY SIGN. A sign attached to the underside of a canopy.

M. CONSTRUCTION SIGN. A sign in which is posted on or about a parcel of land, building, or structure where the action of construction is taken place.

N. DIRECTIONAL OR INFORMATIONAL SIGN.

O. EMITTING SIGN. A sign which emits sound, odor, or visible matter such as smoke or steam.

P. FLASHING SIGN. Any illuminated sign on which the artificial light is not maintained in a stationary status and/or remain constant in intensity and color at all times when such sign is in use.

Q. FLASHING SIGN. An illuminated sign may utilize action or motion, or light or color.

R. FREESTANDING SIGN. A sign that is self-supported on a structure used exclusively or primarily for the support of the sign or for a group of signs, being detached from any building or structure.

S. GATE OR ENTRANCE SIGN. A sign attached or adjacent to an entranceway of a residential site or subdivision, which identifies the site or subdivision.

T. INFLATABLES. A decorative device with a diameter or combined diameter of 18 inches or larger that is inflated by some means and is used to attract and/or promote attention to a site or service. These devices include large single displays or displays of smaller balloons connected in some fashion to create a larger display. Blimps are not considered inflatables.

U. ILLUMINATED SIGN. A sign designed to give forth artificial light or reflect such light from an artificial source.

V. INCIDENTAL SIGN. A sign that is not visible either from a right-of-way or off of the property on which the sign is located. Incidental signs typically inform the public about goods, facilities, or services available on the premises including, but not limited to, Menu’s, directional sign, restrooms, hours of operation, acceptable credit cards, property ownership or management, phone booths or recycling containers.

V. INDIRECTLY ILLUMINATED SIGN. An illuminated nonflashing sign whose illumination is derived entirely from an external artificial source and which is arranged so that no direct rays of light are projected from such source into residences or the street.

W. Integrated Sign Plan. A special sign entitlement available to Major Commercial or Employment Centers as defined in this Code. An integrated sign plan is subject to review and approval by the Hearing Examiner using the procedures provided for conditional use permits.

X. MARQUEE SIGN. Any sign painted on, attached to, or supported by a marquee.

Y. MOBILE READERBOARD SIGN. Any sign which is manifestly designed to be transported, including by trailer or on its own wheels, even though the wheels of such sign may be removed and the remaining chassis or support constructed without wheels is converted to an “A” or “T” frame sign, or attached temporarily or permanently to the ground since this characteristic is based on the design of such a sign. It is characteristic of such a mobile readerboard that the space provided for advertising matter consists of a changeable copy sign.

Z. MONUMENT SIGN. A freestanding sign which is affixed in or upon the ground with no air space between the ground and the sign face.

AA. NONCONFORMING SIGN. Any sign legally established prior to the effective date of this title or subsequent amendments thereto, which is not in full compliance with the regulations of this title.

BB. NON-PROFIT COMMUNITY ORGANIZATION. Any organization that qualifies as a non-profit entity under the provisions of section 501(c)(3) of the IRS federal tax code, including but limited to children’s clubs, religious institutions, fraternal organizations, public schools, and governmental organizations.

CC. PAINTED SIGN. A sign which is painted on any office, wall, window, fence or structure of any kind.

DD. POLE SIGN. A freestanding sign where the sign face is elevated above the site grade by structural supports, and includes the supports.

EE. PORTABLE SIGN. A sign that is not permanently affixed to the ground or to a building or structure and which may be easily moved.

FF. PROJECTING SIGN. A two-faced wall sign affixed to the exterior wall of a building or structure with the exposed faces perpendicular to the plane of such wall.

GG. READERBOARD OR CHANGEABLE MESSAGE SIGN. A sign or part of a sign on which the letters are readily replaceable such that the copy can be changed.

HH. ROOF SIGN. A sign or sign structure erected upon, against or directly above a roof or above the vertical parapet wall of a building, including a sign affixed to any structure erected upon a roof.

II. OFF-PREMISE SIGN. A sign that contains a message or directs attention to a business, profession, product, activity, or service that is not directly related to a use or activity conducted or offered on the premise or at the location where the sign is located, excluding road directional signs.

JJ. ON-PREMISE SIGN. A sign identifying a business, product, service or activity conducted or sold on the same premises as that on which the sign is located.

KK. SIGN. Any structure, device, letter, figure, character, poster, picture, logo, trademark or reading matter which is used or designed to announce, declare, demonstrate, display or otherwise identify or advertise, or attract the attention of the public. Including, but not limited to every device, frame, letter, figure, character, mark, plane, point, design, picture, logo, stroke, stripe, trademark, plane, point, design, picture, logo, stroke, stripe, trademark, or reading matter, which is used or intended to be used to attract attention or convey information when the same is placed visible from a public right-of-way or public property; and shall include all parts, portions, units, and materials composing the same, together with the frame, background, and supports or anchoring thereof.

LL. SIGN AREA. The total area of all sign faces expressed in square feet.

MM. SIGN FACE. The total area of one sign face expressed in square feet. Area is measured from the outside perimeter, including backup, molding, framing, but excluding structural supports, architectural details, decorative scrollwork, etc. The area of a group of individual mounted letters or figures shall be the area of the smallest single geometric form necessary to enclose the entire group of letters or figures.

NN. SIGN HEIGHT. The distance from ground level to the highest point on the sign structure.

OO. STRING PENNANT. A series of shapes, signs, streamers, or other similar devices made of fabric, plastic or other material which are connected together or attached to a cord to create a rope-like device that is typically displayed between poles or buildings. String pennants may contain advertising or be decorative. String pennants can vary in size, color, or design.

PP. SUBDIVISION SIGN. A sign erected and maintained within the boundaries of a recorded subdivision and indicating the name of the subdivision, the name of the contractor or subdivider and the name of the owner or agent, and giving information regarding directions, price or terms.

QQ. TEMPORARY SIGN. A sign intended to be displayed for a limited time and which is not permanently mounted, that advertises non-profit community or civic events, special events, temporary uses, a subdivision, or is an interim sign for a business.

RR. VEHICLE SIGN. The use of a vehicle as a sign, any sign which is attached to or placed on a parked vehicle or trailer which is principally used for advertising purposes rather than transportation, any advertising or advertising space for which the owners or operator of the vehicle receives any compensation, except public transit buses bearing rental advertising.

SS. VISUALLY PROJECTED SIGN. A sign which is projected, by whatever means, onto a surface or into the air.

TT. WALL SIGN. Any sign painted on or attached directly to or erected against and supported by a building wall, or facade, with the exposed face of the sign in a plane parallel to the portion of the structure to which it is attached. (Ord. 534 § 13, 2011; Ord. 277 § 1 (part), 2002; Ord. 264 § 1 (part), 2001.)