City of Spokane

Grand Boulevard Transportation & Land Use Study

June 2020

Acknowledgments

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Neighborhood and Planning Services

Integrated Capital Management

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* *Special thanks to over 140 community members and public agency representatives and 475 online survey participants who supported the creation of this plan.*

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The Grand Boulevard Corridor

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Grand Boulevard is a key north-south arterial for the City of Spokane through the South Hill neighborhoods. The Grand Boulevard corridor study was commissioned to understand existing issues for pedestrians, bicyclists, and vehicles, develop potential streetscape improvements, and identify economic opportunities and zoning needs.

Introduction

Grand Boulevard is one of the busiest streets on the South Hill with few north-south routes connecting downtown to the historic neighborhoods.

This plan focuses on the Grand Boulevard segment within the Comstock neighborhood between 29th Avenue and 37th Avenue, fronted by both commercial and single family uses and serves a mix of transportation needs – driving, walking, biking, and bus transit.

The traffic volumes on the south segment are lower than the north, due to the distance away from downtown. The surrounding community, who travel to and through the corridor for daily needs, expressed concerns with the current roadway and a desire for improvements. The corridor study explored opportunities for transportation, safety, and streetscape changes to meet community goals.

This plan sets out a long-range vision that can be phased incrementally with safety, access, and mobility improvements as the opportunities arise. The Grand Boulevard Plan area is shown in **Figure 1**.

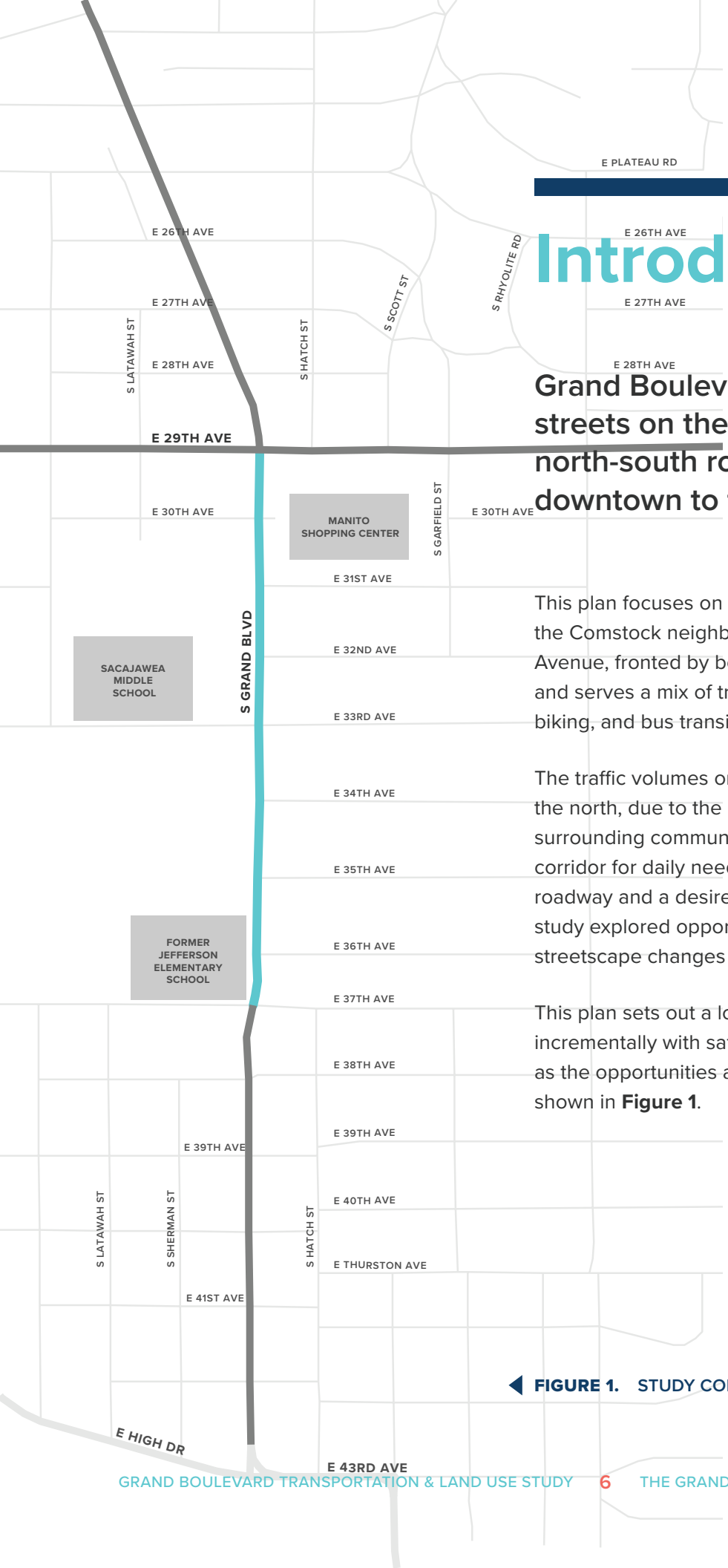


FIGURE 1. STUDY CORRIDOR

The Plan

THE **PLAN** INCLUDES THE FOLLOWING SECTIONS:

CORRIDOR CONDITIONS:

Provides an overview of the corridor and describes the deficiencies and need for change. It also presents a summary of the Market Analysis findings and recommendations.

PLANNING PROCESS:

Describes the milestones and community engagement. It presents the plan goals and how alternatives were evaluated to achieve the community's vision.

VISION:

Describes the future concept for the corridor and its key elements.

IMPLEMENTATION:

Describes the near and long-term steps, funding strategies and coordination.

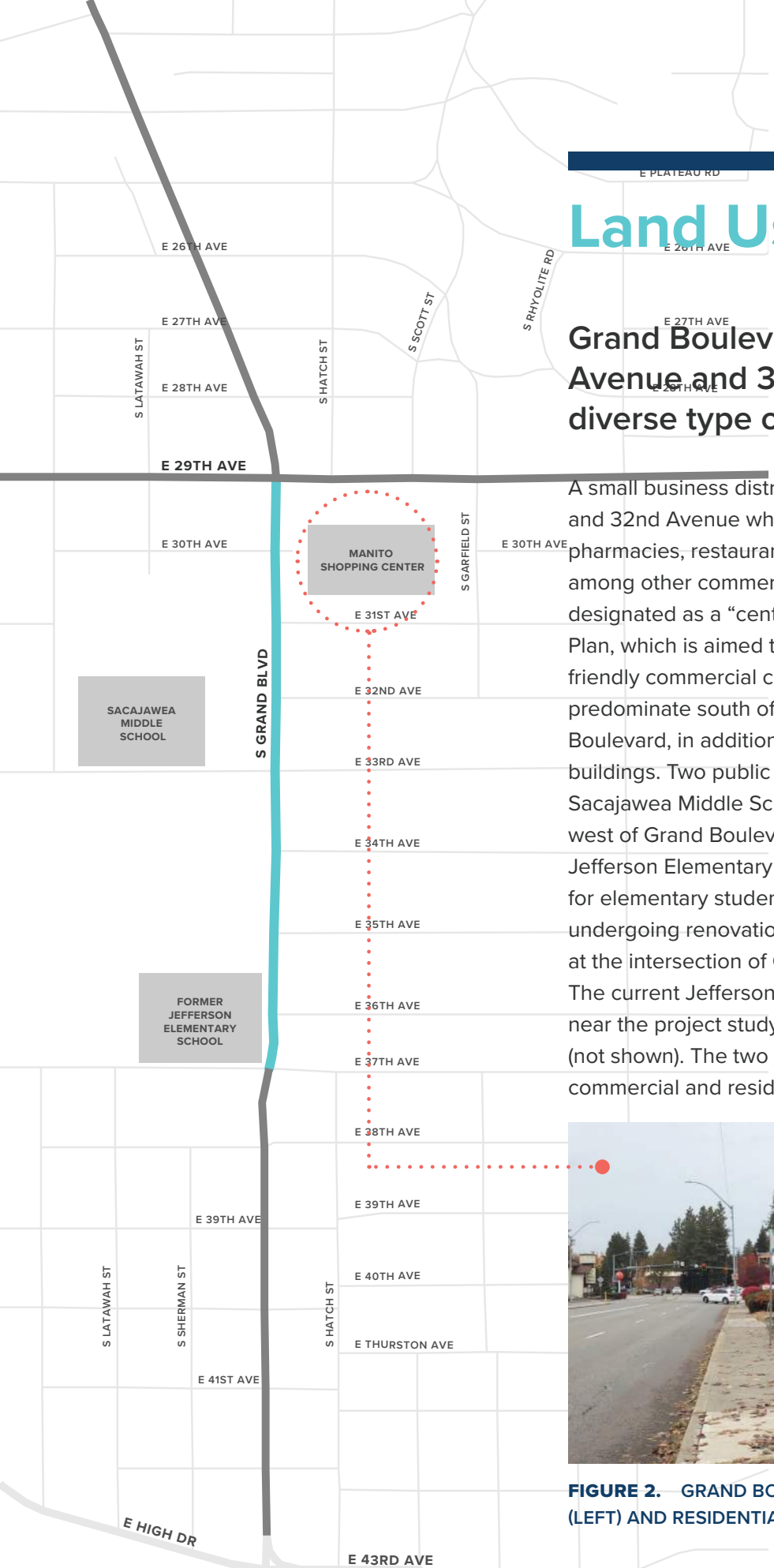
Corridor Conditions

The current project study area features a diverse mix of existing uses, ranging from commercial small businesses and storefronts to single-family homes, multi-family apartment buildings, and two public schools – all contributing to today's driving conditions.

Land Use

Grand Boulevard between 29th Avenue and 37th Avenue features a diverse type of existing uses.

A small business district extends between 29th Avenue and 32nd Avenue which includes a mix of grocery stores, pharmacies, restaurants, coffee shops, and banks, among other commercial establishments. This area is designated as a "center" in the City's Comprehensive Plan, which is aimed to evolve into a more pedestrian-friendly commercial center over time. Single family homes predominate south of 32nd Avenue and east of Grand Boulevard, in addition to several multi-family apartment buildings. Two public schools serve this neighborhood: Sacajawea Middle School located immediately to the west of Grand Boulevard off 33rd Avenue, and the former Jefferson Elementary School site – now temporary home for elementary students whose own home schools are undergoing renovation (currently "Camp Wilson") – located at the intersection of Grand Boulevard and 37th Avenue. The current Jefferson Elementary School is also located near the project study area, farther west on 37th Avenue (not shown). The two corridor land use segments – commercial and residential are shown in **Figure 2**.



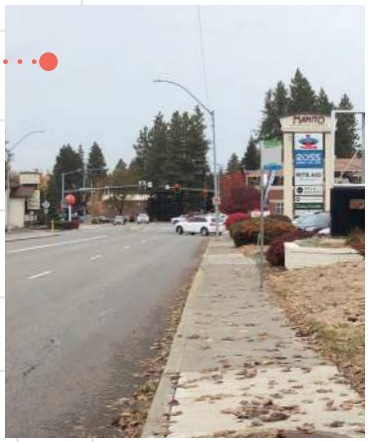


FIGURE 2. GRAND BOULEVARD'S COMMERCIAL SEGMENT (LEFT) AND RESIDENTIAL SEGMENT (RIGHT)

The Need for Change

Grand Boulevard is currently a five-lane facility for vehicles between 29th Avenue and 31st Avenue, where it transitions to a three-lane facility to the south.

Sidewalks extend on both the east and west sides of Grand Boulevard through the study area, although their quality can vary, as seen in **Figure 3**. Landscape buffers are common to the south of 31st Avenue, and marked crosswalks are available at each traffic signal and at 33rd Avenue, a designated Neighborhood Greenway. No bike facilities are currently provided on the study corridor.

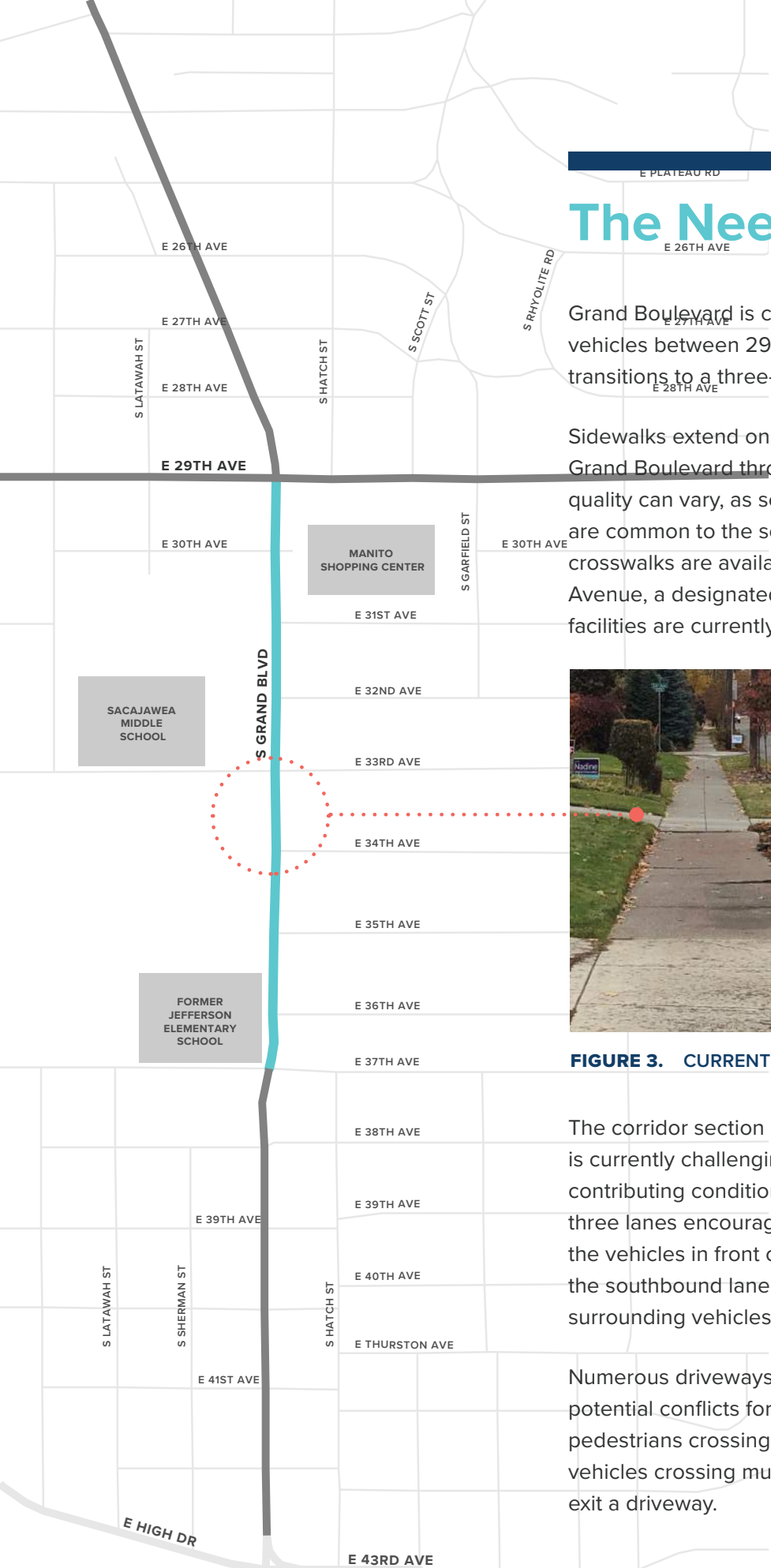


FIGURE 3. CURRENT SIDEWALK CONDITIONS

The corridor section between 29th and 33rd Avenue is currently challenging to navigate. There are several contributing conditions: The transition from five to three lanes encourages drivers to speed up and pass the vehicles in front of them, while the merging of the southbound lane causes drivers to focus more on surrounding vehicles and less on crossing pedestrians.

Numerous driveways along Grand Boulevard add to potential conflicts for all roadway users, including sidewalk pedestrians crossing driveways while they walk, and vehicles crossing multiple lanes of traffic to enter and exit a driveway.

The South Hill neighborhoods surrounding Grand Boulevard are actively seeking an enhanced transportation system that facilitates multimodal connections between the neighborhoods, including across the boulevard, and to downtown Spokane. A 2012 planning effort[1] sponsored by the South Hill Coalition identified improved arterial streetscapes near the intersection of Grand Boulevard and 29th Avenue (existing streetscape pictured in **Figure 4**) as a top priority and the 33rd Avenue greenway as a high priority which is also a financially constrained project in Spokane's Comprehensive Plan[2]. Grand Boulevard within the study area is also identified in the Bike Master Plan[3] as a candidate location for bike lanes in the future. Other relevant planning initiatives and their findings are summarized in the Appendix.

FIGURE 4.
DRIVEWAYS ALONG GRAND BOULEVARD (TOP) AND EXISTING STREETSCAPE (BOTTOM)

1 The South Hill Coalition. Connectivity and Livability Strategic Plan. 2014.
2 City of Spokane. Shaping Spokane. 2017.
3 City of Spokane. Bike Master Plan, Proposed Bike Network Map. 2016.

Existing Transportation System

Safety

Over the past five years, 111 crashes were recorded within the project study area, an average of 22 crashes each year, and seven additional crashes occurred in January 2019, summarized in **Figure 5**. Crashes are most common at intersections where over 60% (72 of 118) crashes occur. Most crashes were not severe; only 13% of crashes (15 of 118) resulted in minor injuries while only one crash led to a serious injury. No fatalities were recorded in the project study area in the past five years. Most crashes occur with clear skies (84 of 118 crashes), dry roads (83 of 118 crashes), and during the day (79 of 118 crashes). Alcohol use was a factor in 15 crashes (13%).

Pedestrians and bicyclists were each involved in four crashes over the past five years. Two pedestrian crashes occurred near the intersection of Grand Boulevard and 29th Avenue when a vehicle struck a pedestrian while turning. One pedestrian crash occurred near the intersection of Grand Boulevard and 33rd Avenue when a driver ran off the road near a school crossing, striking both a sign and a pedestrian. The fourth pedestrian crash occurred on 33rd Avenue near Arthur Street (not pictured in Figure 5) when a vehicle travelling straight struck a crossing pedestrian. Two bicyclist crashes occurred on Grand Boulevard, including near 29th Avenue and at 36th Avenue. In the crash occurring near 29th Avenue, a bicyclist riding on the sidewalk did not grant right of way to a vehicle, while in the crash occurring at 36th Avenue, a bicyclist riding in traffic was struck by a turning vehicle. Two other crashes involved bicyclists near the intersections of 29th Avenue/Lamonte Street and 36th Avenue/Arthur Street, which are not pictured in Figure 5.

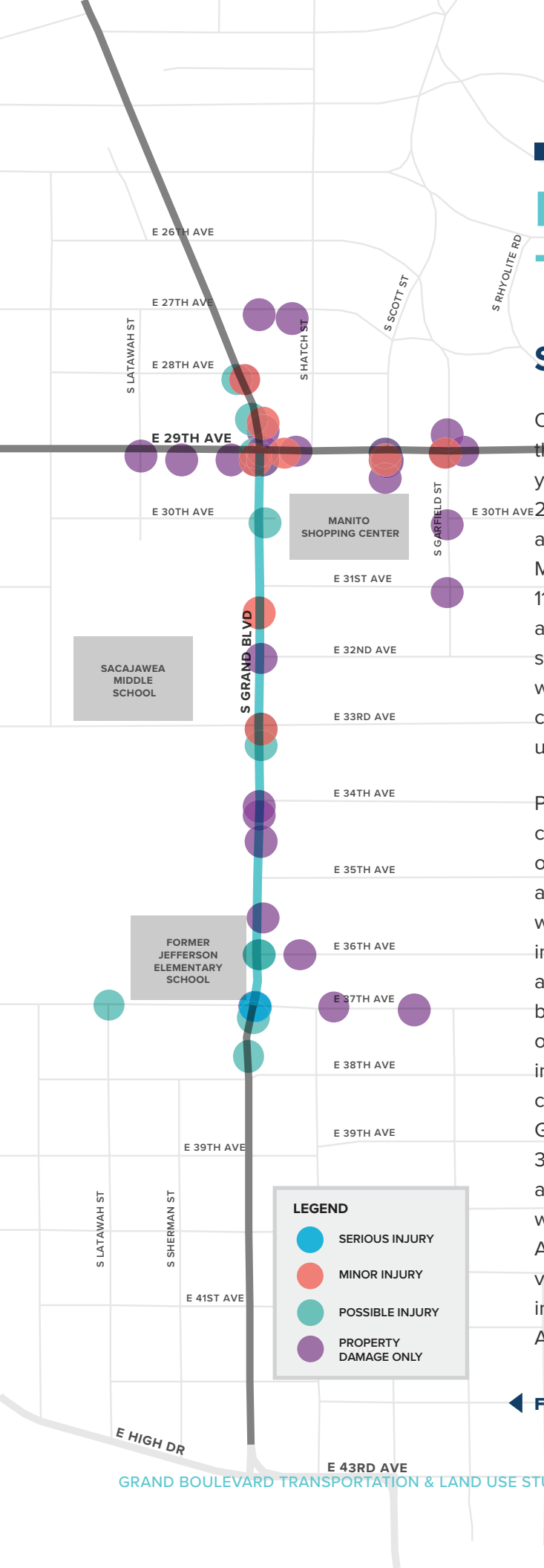


FIGURE 5. HISTORICAL CRASH LOCATIONS (2014-2019)

Multimodal Demand

Pedestrian demand, shown in **Figure 6**, is highest adjacent to major pedestrian generators. Daily pedestrian crossings of Grand Boulevard are highest at 33rd Avenue, shown in **Figure 7**, near Sacajawea Middle School, where over 250 pedestrians cross Grand Boulevard each day. Pedestrian volumes at this location are closely correlated with school traffic; most crossings are observed before school starts or after school ends when crossing guards are also in place.

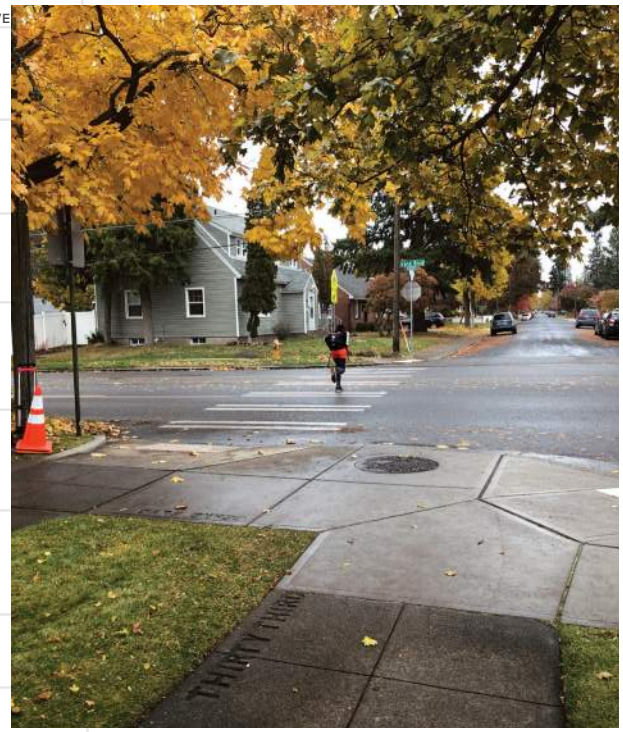


FIGURE 7. PEDESTRIAN CROSSING AT 33RD AVENUE

Between 150 and 200 daily pedestrian crossings are also observed at 30th Avenue and 32nd Avenue. The pedestrian crossing at 30th Avenue is regularly used by elderly residents who cross Grand Boulevard to reach the Manito Shopping Center from the nursing home immediately west of Grand Boulevard. Pedestrians also regularly use the crossings at 32nd Avenue, which provide access to a nearby bank, residences, the post office, and Sacajawea Middle School.

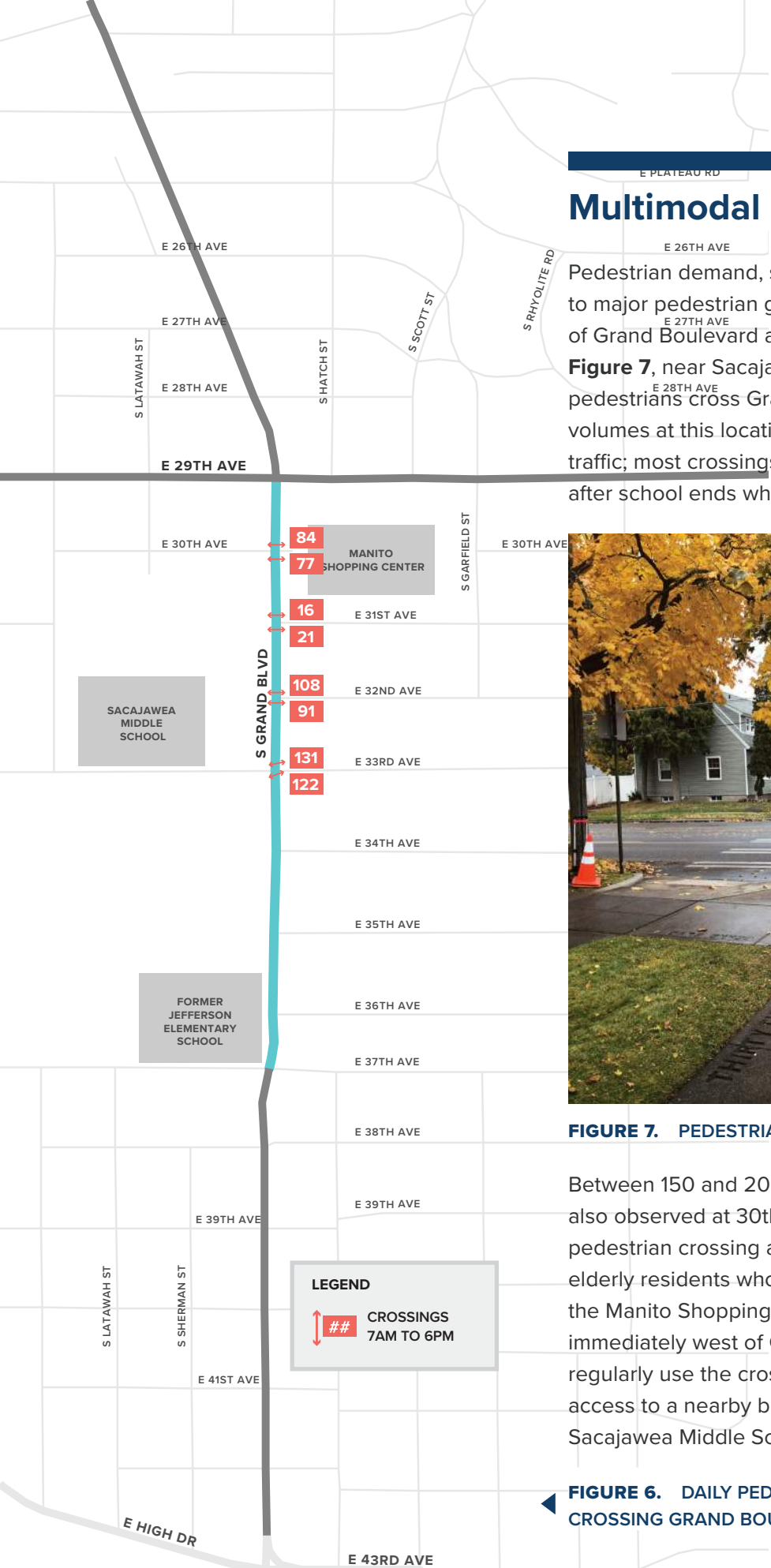


FIGURE 6. DAILY PEDESTRIAN DEMAND FOR CROSSING GRAND BOULEVARD

Pedestrian crossings are fairly consistent throughout the day at 32nd Avenue, and additional pedestrians are expected at this crossing site when a new coffee shop opens near the intersection.

FIGURE 8. ROUTE 144, A COMMUTER EXPRESS SERVICE LINE SERVING THE STUDY AREA

The study area is also currently served by Route 4, the Monroe-Regal high capacity transit line and Route 144 (**Figure 8**), a commuter express service that recently started service on Grand Boulevard in September 2019. Route 4 operates with 15-minute headways during weekdays and Route 144 operates with 20-minute headways during weekday peak hours. Both transit lines began operation in September 2019, and average daily weekday utilization data from their first month of operation is summarized in **Figure 9**.

Transit ridership is highest near the intersection of Grand Boulevard and 29th Avenue. Approximately 45 riders travel between the intersection of Grand Boulevard/29th Avenue and downtown each weekday; 10 or fewer riders travel between Grand Boulevard/29th Avenue and the Moran Station Park and Ride each weekday. Ridership is more limited on Route 144 although the utilization could be low since no transit service was previously provided on Grand Boulevard through the study area. Ridership is highest near the Manito Shopping Center and commercial developments near the intersection of Grand Boulevard/ 37th Avenue.

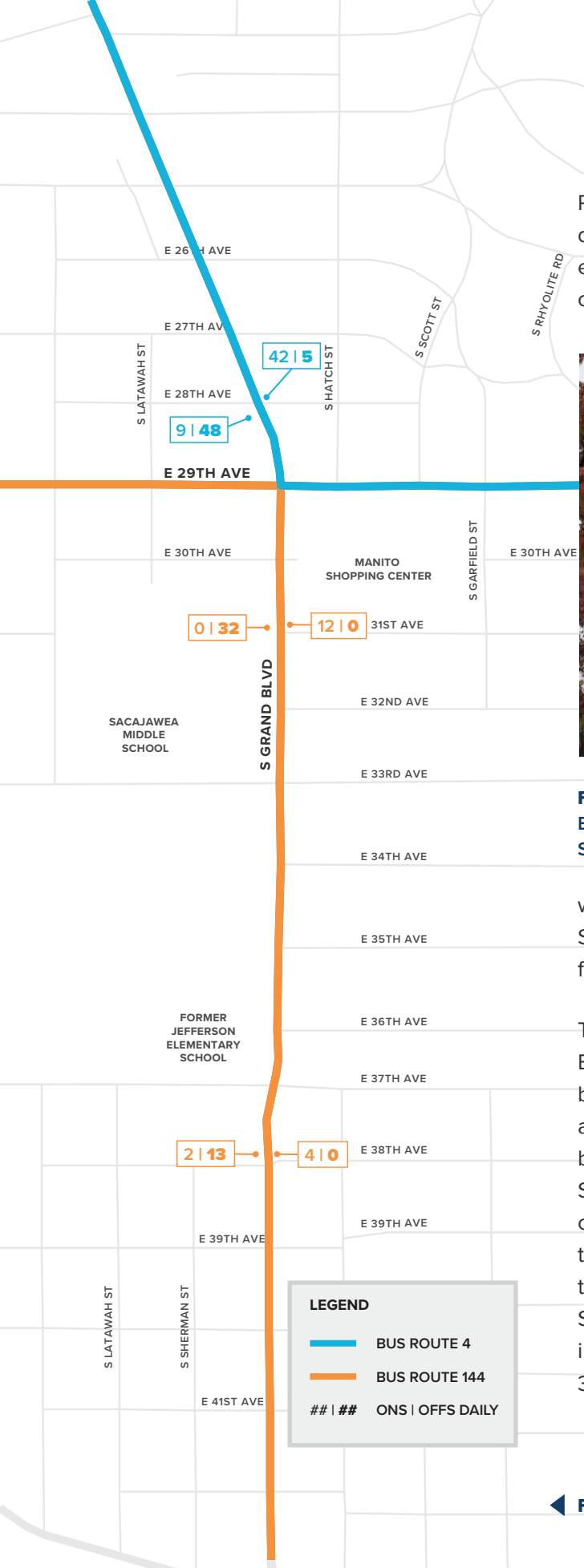


FIGURE 9. ROUTES 4 AND 144 DAILY WEEKDAY UTILIZATION

Traffic Analysis

THE **PREFERRED CORRIDOR** ALTERNATIVE INCLUDED:

- Reducing the corridor to three-lanes south of 29th Avenue
- Reconfiguring the lanes on Grand Boulevard at 29th Avenue
- Limiting vehicle access at Grand Boulevard/30th Avenue to provide an enhanced pedestrian crossing

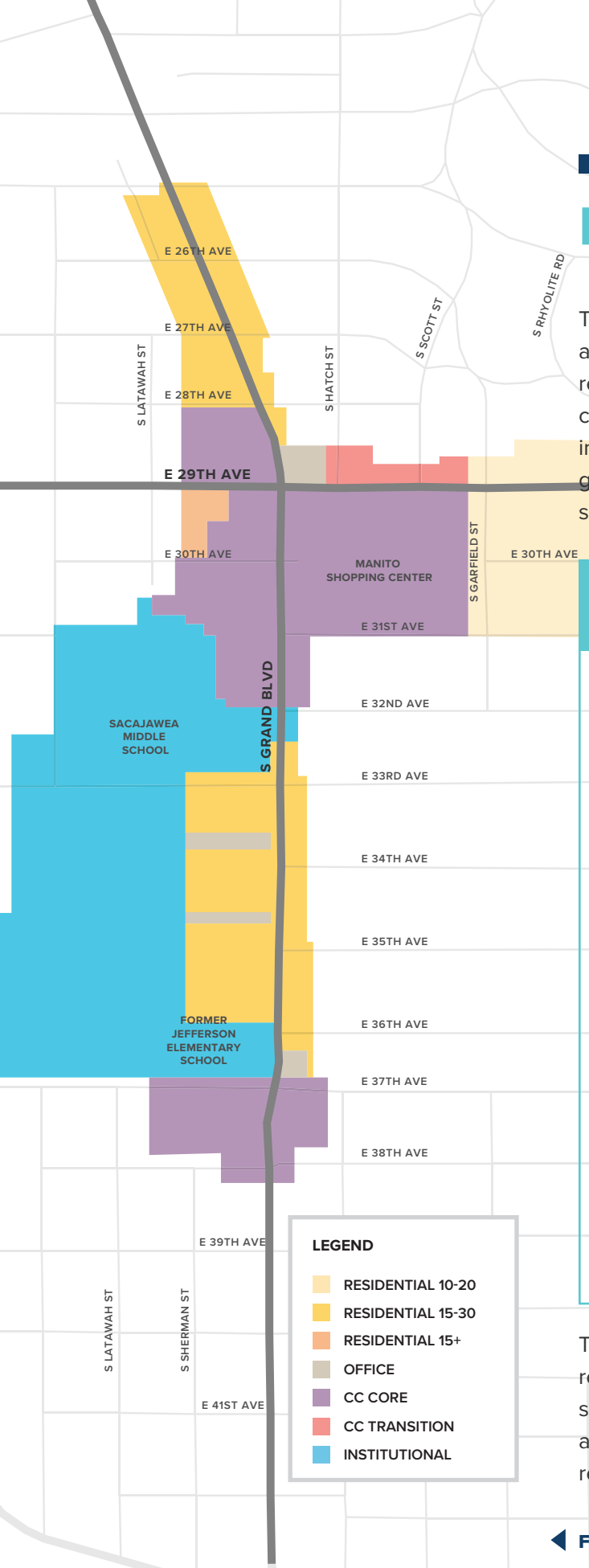
To determine if there are opportunities to reconfigure the street space to develop a comprehensive, multimodal corridor, a traffic operations analysis was conducted. Key intersections on the corridor were evaluated for existing and future year 2040 conditions to test several improvement alternatives.

Implementing the preferred alternative will have relatively modest impacts to overall vehicle traffic operations to allow improved bicycle and pedestrian facilities. Traffic operations at the Grand Boulevard/29th Avenue intersection would experience the biggest change during the evening peak hour with increased overall driver delay and longer southbound queue lengths. The complete Spokane Grand Boulevard Traffic Analysis report is provided in the Appendix.

FIGURE 10. PEAK HOUR TRAFFIC CONDITIONS

Market Analysis

To complement the transportation analysis, a market analysis was conducted to evaluate the area's redevelopment potential and study how private sector changes to the built environment might best support infrastructure recommendations to further community goals. The land use designations in the study area are shown in **Figure 11**.



KEY FINDINGS AND RECOMMENDATIONS FROM THE ANALYSIS:

- Existing land use policy for the area is well-suited to accommodate desirable development forms.
- There are favorable market conditions, with ample residential and retail demand to support infill development.
- No major development incentives are available because of the higher income profile.
- The planned investments in street improvements should help attract developer and property owner interest in redevelopment.
- Given the existing suburban auto-oriented development pattern on the corridor, there is much to be gained in terms of quality of life and safety by making street improvements and pedestrian friendly amenities.

The complete Spokane Grand Boulevard Market Analysis report is provided in the Appendix. It includes details on study area demographics, retail and residential supply and demand, land use and policy summary and specific redevelopment opportunities.

FIGURE 11. LAND USE DESIGNATIONS

3

Planning Process

The 2014 Spokane South Hill Coalition plan provided a wide range of goals with specific strategies for the study area related to corridor planning. These goals and strategies provide guidance to identify potential solutions to address the corridor's challenges.

The Code includes a Complete Street Program ordinance which "encourages healthy, active living, reduction of traffic congestion and fossil fuel use, and improvement in the safety and quality of life of residents in the City of Spokane by providing safe, convenient, and comfortable routes for walking, bicycling, and public transportation."

Goals and Policies

Spokane's community values are strong and clearly documented in the Spokane Comprehensive Plan and Spokane Municipal Code.

RELEVANT COMPREHENSIVE PLAN GOALS:

GOAL 1: ACTIVE DOWNTOWN LINKAGES

- Develop greenways
- Create additional bike routes to close network gaps
- Extend biking and walking trips with safe and convenient access to transit

GOAL 2: COMPLETE NEIGHBORHOODS

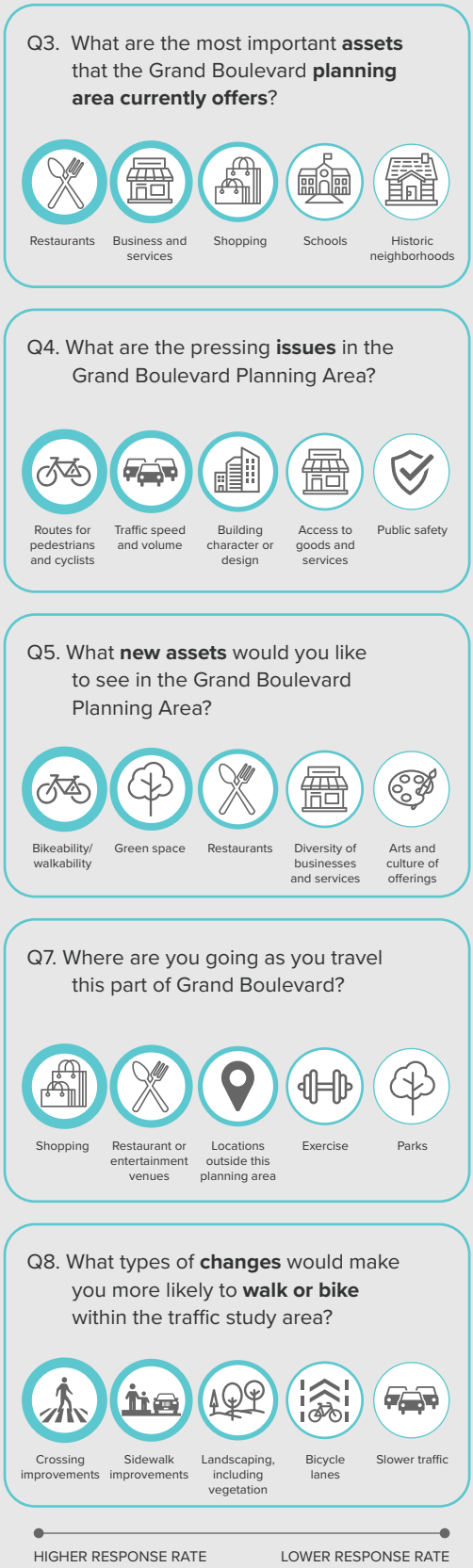
- Improve east-west access
- Where business centers are being developed, encourage multimodal access from all directions by planning for street and path connectivity
- Explore opportunities to enhance arterials. Examples include addition of bike lanes, bulbouts, raised crossings, planted medians, bus shelters, street furnishings, trash cans, bike racks, etc.

GOAL 3: CRIME PREVENTION

- Install appropriate lighting
- Encourage foot traffic in public places. Add paths, landscaping, community gardens and activity spaces.

GOAL 4: TRAFFIC SAFETY

- Work with the City to address level of service and traffic flows in order to review speed limits on arterials to improve pedestrian and bicycle safety and reduce noise.
- Improve safety for pedestrians at crossings of high-volume and/or high-speed streets.



Public Engagement

The City developed a plan with input from the community and key stakeholders.

The City hosted an online survey to gather input to help inform the direction of the corridor plan. The project survey responses to specific questions are summarized in **Figure 12**. The highest priorities identified for the corridor were providing access to restaurants and shopping and comfortable walking and biking routes.

A sample of online survey comments are shown in **Figure 13**. Comments submitted ranged from wanting no changes to pedestrian improvements to more green space. Over 400 comments were submitted online.

The project team conducted stakeholder interviews at the beginning of the planning process to discuss their concerns and ideas for improvements. Two separate public open house meetings were held to discuss community needs and get their feedback on the corridor concepts. The project team collected in-person input from over 60 community members.

FIGURE 12. PROJECT SURVEY RESPONSE SUMMARY

Project Survey Results

PEDESTRIAN FRIENDLY

"I love this neighborhood! [... I walk a lot! [...] Making this corridor more **walkable** fo me and my 2 year old son would be so wonderful. [...]

"Safety needed for **walking** for **biking** students at Sacajawea."

"I think having more **pedestrian friendly access**, **street buffers**, and **comm unity events** would fit this area well. Building compact developments and convenient stores would take away from the charm of this area."

IDEA FOR VACANT LOTS

"The old Albertson's building [...] would make a good **multi-use facility** for businesses such as co-working spaces, small performance venue, winery or micro-brew, restaurant/pub and coffee shop."

"Albertson's should be used for indoor lacrosse and gym with courts. We need more gym space for **kids athletics** near our homes."

"A grocer like My Fresh Basket or Whole Foods (with Amazon lockers) would be great for the vacant Albertson's store [...]"

SAFETY IMPROVEMENTS

"My biggest concern is **speed** of vehicles and **ability to cross** Grand at sidewalks. My kids are involved in activities at school and at the Methodist church and especially during winter can be **dark** and **dangerous** to try and get across the crosswalk at 33rd and Grand."

"Improve **sidewalks**. Enforce **snow removal** from sidewalks."

"[...] I walk in the street at night often (along 32nd), because I know the **sidewalks** are in poor repair and I can't see them well enough in the **poor lighting**."

NO CHANGE

"Leave it alone! It's **perfect** just the way it is!"

"[...] I think it should pretty much stay the same. It is a **lovely neighborhood**."

"Honestly, I am pretty content with the way it is. Walkability could be improved and some more restaurants would be nice, but the **identity is just fine** the way it is. If I wanted to live in the Perry District, I would move there."

GREENERY

"Mixed-use buildings, more **greenery**, and more **comm unity events** will transform this area."

"More **green spaces**, bike lanes, cool street lamps/lights, and just a better commu nal, engaging feel rather than an arterial thoroughfare. [...]"

TRAFFIC

"Not impressed with vehicles **speeding** through residential areas."

"Whatever is done, we need to make sure it does not add to the traffic level on Grand Blvd.. It is already quite **busy** and **loud**!"

CHARACTER

"Keep it **simple** and keep the **South Hill Charm**. We're not looking for Kendall Yards."

"This seems like an opportunity to pull in the **character of the South Hill** along a prominent part of Grand. Very exciting. I love the walkable, neighborhood retail pics and the idea of compact garden apartments."

"Keeping the character of the South Hill **history**, and finding a **central social gathering area** with retail and restaurants is way overdue. Basic services are there but fostering an **art**, **dining** and select retail space in a walkable park line configuration with a mind on parking would be a huge asset for the city."

HISTORIC IMPORTANCE

"**Preserve the historic fabric** and street trees. Don't allow incompatible architectural types to displace historic structures; infill with sensitivity."

"Please respect the **original architecture**. This is what draws people to this area. It is **distinctive** and would never be confused with any other neighborhood. [...]"

"Grand has a **great history** that is barely recognized with only the old horse trough and the beautiful houses. These houses on South Hill are what attract people to move there, eat there, and visit the parks. New development and transit need to emphasize the beauty of historic South Hill. [...]"

FIGURE 13. SAMPLE OF ONLINE SURVEY COMMENTS

What Is The Vision?

To develop a concept for Grand Boulevard between 29th and 37th Avenue, a number of complete street design and management elements were developed by the project team, then shaped with input from the community.

What Are Complete Streets?

The Grand Boulevard Study identifies complete street elements that can be added both in the short and long term to meet corridor goals. Complete streets accommodate all modes of transportation by planning, designing, and building facilities for walking, biking, transit riding, and driving trips.

GATHERING SPACES

Parks, plazas and courtyards create destinations along the street. These become opportunities for organized events, space to celebrate nature and culture.

CROSSING VISIBILITY

Clearly marked crossings create a safe and comfortable environment for people crossing the street by foot, bike and wheelchair.

BICYCLE ACCOMMODATIONS

Bicycle facilities offer separation from vehicular traffic for cyclists. These can include multi-use paths, on-street buffered and protected bike lanes. A complete street will accommodate a wide range of ages and abilities.

EFFICIENCY

Roadway design and operations should allow people to travel reliably and understand how to safely and efficiently move by bus or motor vehicle.

TRANSIT

A complete street considers every passenger's trip from start to finish. Transit stops should provide shelter, seating, wayfinding and transit information.

WALKING

A complete street should provide a high quality environment where people are safe walking and have natural features and great destinations that make people walk.

Concept Plan

To develop a concept for Grand Boulevard between 29th and 37th Avenue, a number of complete street design and management elements were developed by the project team then shaped with input from the community.

THE LONG-TERM VISION FOR THE CORRIDOR INCLUDES:

- **One northbound and one southbound travel lane,** plus a center turn lane/median area.
- **Enhanced pedestrian crossings** with flashing beacons at 30th Avenue, 32nd Avenue and 33rd Avenue, restricted vehicle turn movements at 30th Avenue
- **Continuous bike lanes** plus a buffer when space is available.
- **Landscape area** to separate sidewalks from traffic lanes.
- **Driveway relocation and consolidation** as opportunities arise.

For more information, see **Appendix A: Existing Conditions Report**

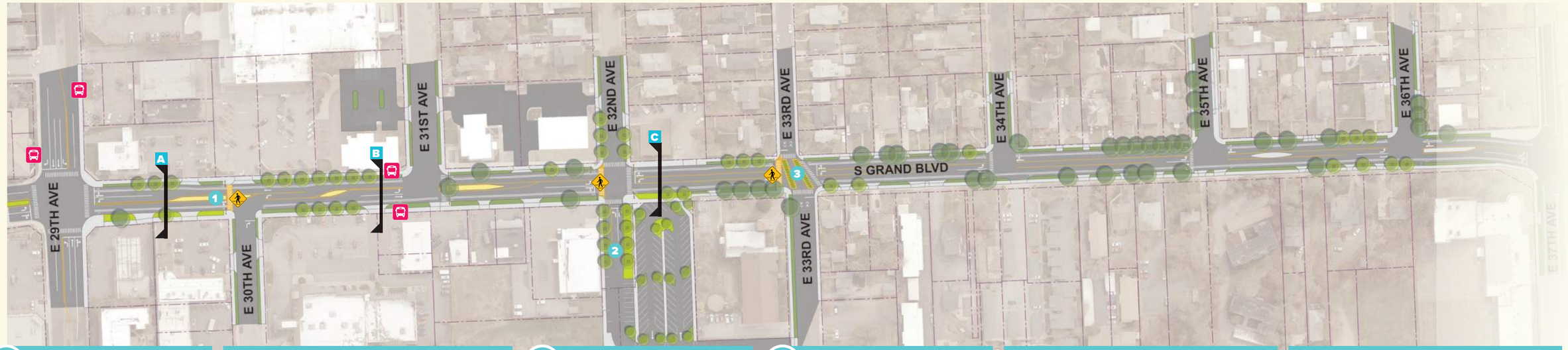
These corridor concepts are shown on the following figures for the north segment (29th Avenue and 33rd Avenue) and south segment (33rd Avenue to 37th Avenue). Improvements would be put in place over time depending on available public funding and private development activity along the frontage. The letters **A**, **B**, **C**, and **D** refer to the phased roadway sections shown on pages 27 and 28. These improvements are conceptual and will be reviewed and refined before final design and construction.

Implementing the concept will have relatively modest impacts to vehicle traffic between 29th Avenue and 33rd Avenue and no impacts to vehicle traffic between 33rd Avenue and 37th Avenue. Reducing the roadway to a three-lane section will require changes at the Grand Boulevard/29th Avenue intersection. The corridor plan would convert the existing southbound through only lane to a left turn lane and close the existing left turn pocket. The northbound through lane against the curb would be removed. The traffic signal phasing and timing would be modified to optimize performance.

The concept street maps on the following pages illustrate how the long-term vision could look along the corridor with the proposed elements in place.

Long-Term Vision

GRAND BOULEVARD POTENTIAL STREETSCAPE IMPROVEMENTS



1 ACCESS RESTRICTIONS

PEDESTRIAN SAFETY ISLAND

RAISED MEDIAN ART

POTENTIAL SHORT-TERM IMPROVEMENTS

Improve safety and bikeability with separated bike lanes and enhanced pedestrian crossings. Reduce vehicle traffic to two through lanes and one center turn lane/median. In remaining open street space, add box planters, bike parking, and other pedestrian amenities.

BUFFERED BIKE LANE

BOX PLANTERS

SNOW STORAGE

TRAFFIC CALMING

2 POTENTIAL 32ND AVE INTERSECTION EXTENSION WEST

Possible intersection extension west and revised parking area to be coordinated with potential future revisions to Sacajawea campus.

ENHANCED PEDESTRIAN CROSSINGS

RAPID FLASH BEACON (RRFB)

3 ENHANCED GREENWAY CROSSING

CYCLIST ACTIVATED RAPID FLASH BEACON (RRFB)

POTENTIAL LONG-TERM IMPROVEMENTS NORTH OF 33RD AVE

Improve safety and walkability with widened sidewalks, landscape buffers, consolidated driveways, pedestrian scale lighting and other pedestrian amenities. Add stormwater planters where feasible.

SEATING/AMENITIES

LIGHTING

GREENSTREET ELEMENTS

WIDE SIDEWALK

POTENTIAL IMPROVEMENTS SOUTH OF 33RD AVE

Improve safety and bikeability with separated bike lanes. Reduce vehicle traffic to two through lanes and one center turn lane/median. Retain existing curb as is, preserving mature trees.

TRAFFIC CALMING

BUFFERED BIKE LANES

MAP LEGEND

- Parcel Lines
- Street
- Sidewalk
- Landscape Buffer
- Tree (New Planting)
- Tree (Existing)
- Stormwater Planting
- Potential Median Art
- Lighting (Pedestrian + Street)
- Crosswalk
- Enhanced Pedestrian Crossing (RRFB)
- Enhanced Bike Crossing (RRFB)
- Separated Bike Lane
- Shared Roadway
- Transit Stop

- A Typical Street Improvements, 29th-32nd (see pg 28)
- B Street Improvements Adjacent to Recent Development (see pg 28)
- C Street Improvements Adjacent to Potential Future Development (see pg 29)
- D Typical Street Improvements, 33rd-37th (see pg 29)

N

0 30 60 90 120 feet

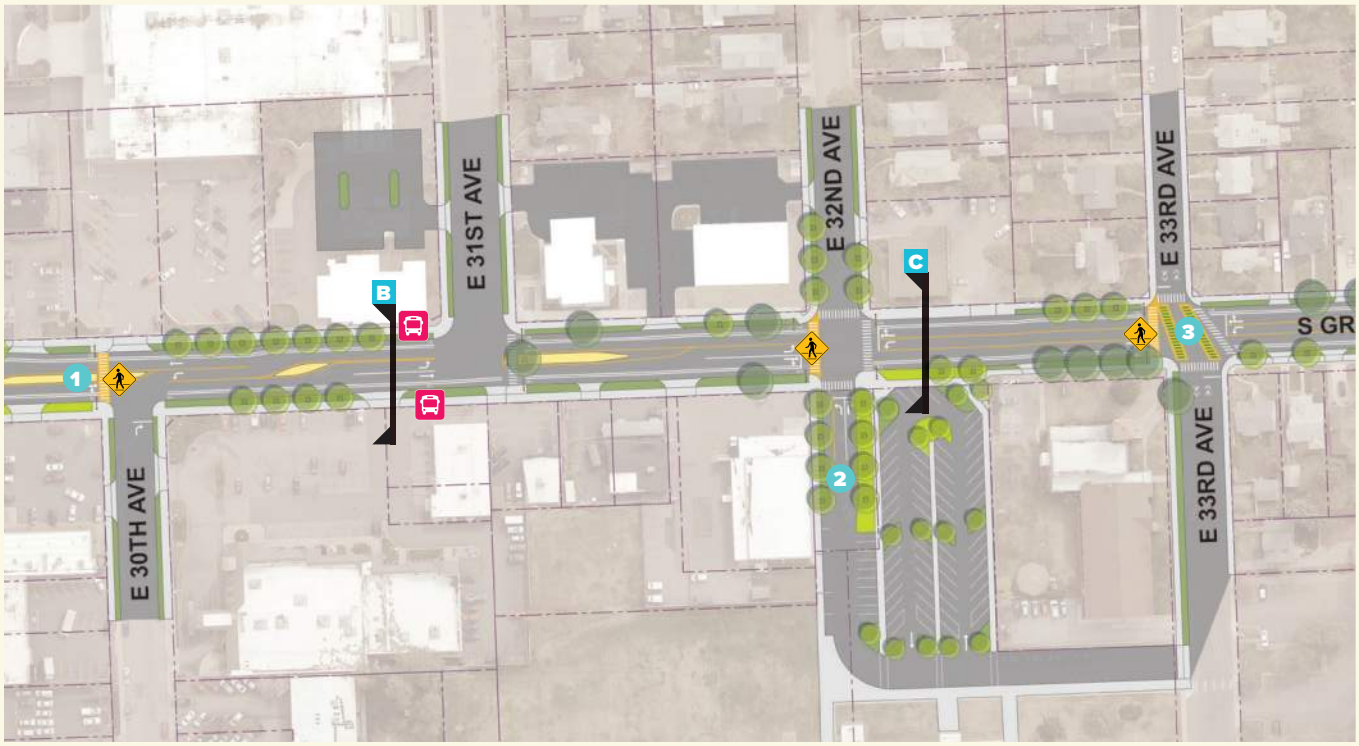
There are two types of pedestrian crossings shown on the concept map – enhanced pedestrian crossings with flashing beacons at high demand locations and marked crossings with striping and signs at other select locations.

Highlighted spot improvements include:

1 There is an opportunity to improve safety and reduce potential driving-walking conflicts at the proposed 30th Avenue enhanced crossing by restricting some vehicle turn movements with a raised center median. This would reroute southbound drivers to access the Manito Shopping Center from 29th Avenue or Garfield Street. If the restriction was not applied, the location of the enhanced crossing should be reevaluated.

2 Sacajawea Middle School is scheduled for a full building replacement in a few years. This provides an opportunity to redesign their corridor frontage to reduce existing driving-walking conflicts. The concept plan would replace the two school driveways with a continuous sidewalk and landscape area. Future access to the school would be provided by the extension of 32nd Avenue to the west, creating a four-leg intersection and clearly defined pedestrian crossings. These improvements will need to consider future use of the post office drive-up mailbox which is currently located in the school parking lot.

3 33rd Avenue is a popular crossing location for pedestrians and cyclists. It is designated as a walking route for Jefferson Elementary School and a City Neighborhood Greenway. The concept plan would add both enhanced pedestrian crossings and bicycle greenway crossings to make crossing Grand Boulevard safer and more comfortable.



ADDITIONAL IMPROVEMENTS

Additional improvements to consider include managing vehicle access onto the corridor to reduce vehicle conflicts and increase walking and biking comfort. As redevelopment occurs along the corridor, there may be an opportunity to consolidate, relocate or close driveways on a case by case basis. The existing raised medians should be retained to help manage vehicle movements. Adding raised medians should be considered along segments with a low number of driveways and near pedestrian crossings to provide additional protection. Raised medians provide a location to add esthetic elements to the corridor – low-height landscaping and painted art are popular examples. Improvements will require future approval prior to construction.

Phasing of Improvements

Potential street cross-sections were developed for key corridor segments (labeled A through D) to show how the changes could be phased over time from existing (Condition 1) to short-term improvements (Condition 2) to the long-term vision (Condition 3).

Condition 1. The existing conditions section represents the general street elements along the corridor today. The dimensions shown are illustrative of the average condition as elements such as vehicle lane widths vary along the corridor.

Condition 2. The short-term improvement sections include elements that are lower cost and easier to install compared to a full reconstruction of the roadway. These elements could be added separately or grouped into a package of projects. Recommended improvements include:

- Restriping the roadway with narrower vehicle lanes
- Adding buffered bike lanes
- Installing enhanced pedestrian crossings at high demand locations
- Adding planter boxes, bike parking and other pedestrian amenities in remaining open spaces
- Relocating bus stops adjacent to the new pedestrian crossings as needed
- Public art elements

Condition 3. The long-term vision sections include higher cost improvements that are more challenging and may require full reconstruction. Potential improvements include widening sidewalks, installing a landscape area, changing the curb location and installing pedestrian scale lighting along the roadway and building greenstreet elements.

The following figures show the potential for each key corridor segment to evolve from existing conditions to the long-range vision.

A-1 Existing Conditions

A-2 Potential Short-Term Improvements

TYPICAL STREET IMPROVEMENTS 29TH TO 32ND

A-3 Proposed Long-Term Vision

A SECTIONS

B-1 Existing Conditions

B-2 Potential Short-Term Improvements

STREET IMPROVEMENTS ADJACENT TO RECENT DEVELOPMENT

B-3 Proposed Long-Term Vision

B SECTIONS

C-1 Existing Conditions

C-2 Potential Short-Term Improvements

C-3 Proposed Long-Term Vision

STREET IMPROVEMENTS ADJACENT TO POTENTIAL FUTURE DEVELOPMENT

C SECTIONS

D-1 Existing Conditions

D-2 Potential Improvements

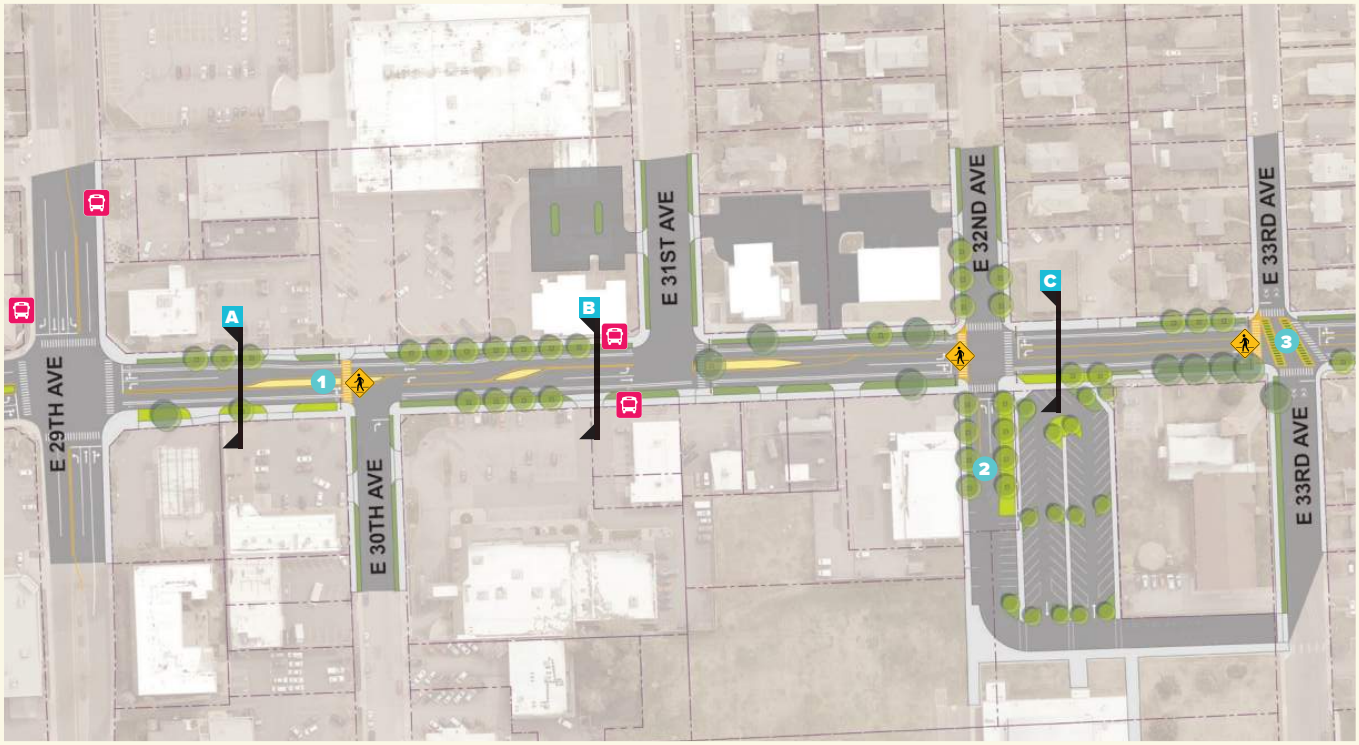
TYPICAL STREET IMPROVEMENTS 33RD TO 37TH

D SECTIONS

Street Trees

The corridor concept includes adding new street trees between 29th Avenue and 33rd Avenue, the segment with the greatest need. Both existing and proposed tree planting locations are shown on the concept map.

Plantings will be more successful if there are long-term considerations for tree planting sites with optimal soil volume. It is recommended to consider incorporating plantings of new trees to resolve possible stormwater issues in this highly impervious area. Trees mitigate stormwater in a number of ways and green infrastructure should be considered such as cell planters and/or structural soil. The presence of trees in a streetscape, neighborhood, and community can decrease the amount of stormwater runoff and pollutants that reach local waters by capturing and storing rainfall. The details of desired landscaping will need to be evaluated by Urban Forestry in future design work to ensure compliance with the City ordinance and ensure long term tree success.



MAP LEGEND

- Parcel Lines
- Street
- Sidewalk
- Landscape Buffer
- Tree (New Planting)
- Tree (Existing)
- Stormwater Planting
- Potential Median Art
- Lighting (Pedestrian + Street)
- Crosswalk
- Enhanced Pedestrian Crossing (RRFB)
- Enhanced Bike Crossing (RRFB)
- Separated Bike Lane
- Shared Roadway
- Transit Stop

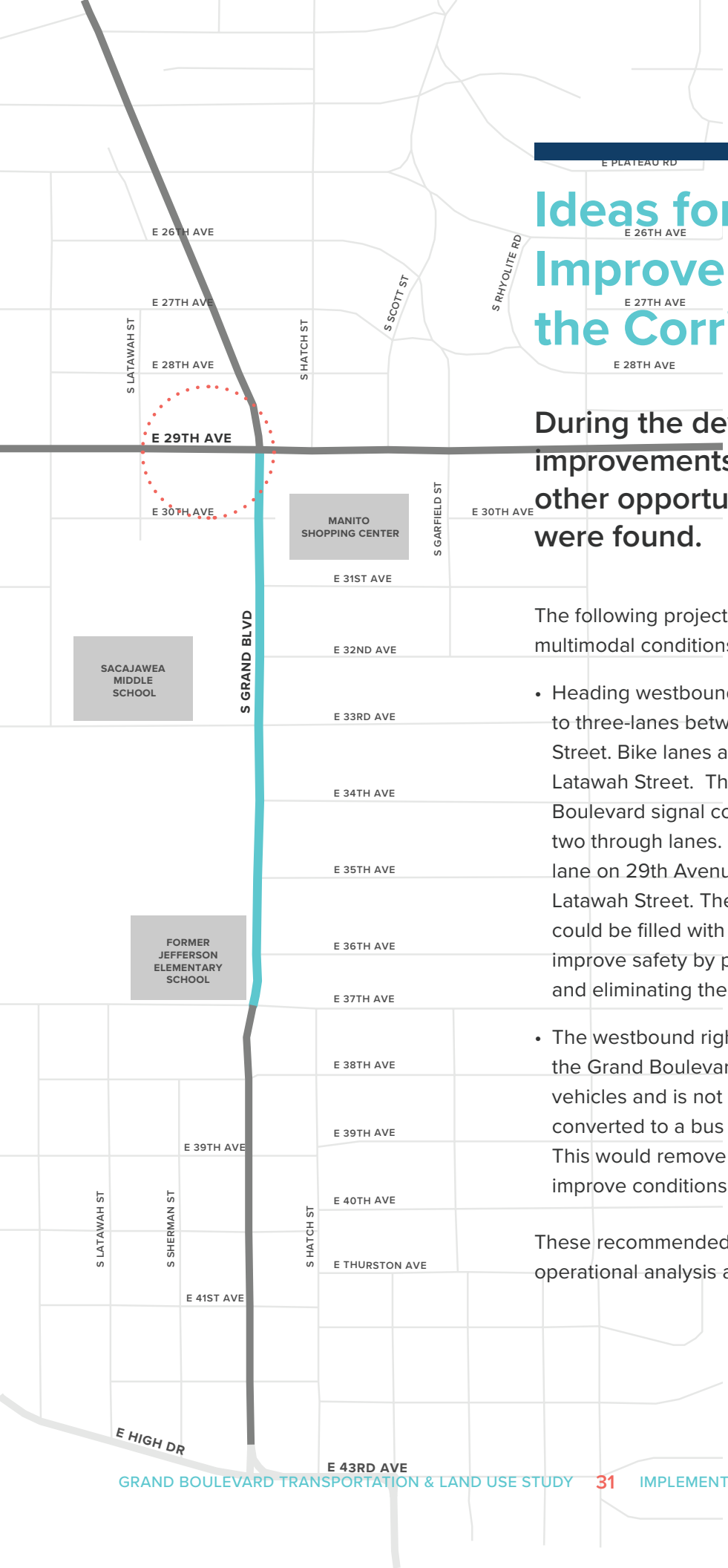
- A Typical Street Improvements, 29th-32nd (see pg 28)
- B Street Improvements Adjacent to Recent Development (see pg 28)
- C Street Improvements Adjacent to Potential Future Development (see pg 29)
- D Typical Street Improvements, 33rd-37th (see pg 29)

0 30 60 90 120 feet

Implementation

5

The development of improvements for Grand Boulevard also yielded other improvement opportunities on 29th Avenue. Implementing these recommended projects would also further encourage multimodal conditions throughout the corridor and surrounding areas.



Ideas for Further Improvements Off the Corridor

During the development of improvements for Grand Boulevard, other opportunities on 29th Avenue were found.

The following projects should be considered to encourage multimodal conditions:

- Heading westbound, 29th Avenue narrows from four-lanes to three-lanes between Grand Boulevard and Latawah Street. Bike lanes are present in both directions west of Latawah Street. The westbound vehicle lanes at the Grand Boulevard signal could be reconfigured to drop one of the two through lanes. This would allow the westbound bike lane on 29th Avenue to start at Grand Boulevard instead of Latawah Street. The extra roadway width on 29th Avenue could be filled with a bike lane buffer. This project would improve safety by proving a designated space for cyclists and eliminating the vehicle lane merge area.
- The westbound right turn-only lane on 29th Avenue at the Grand Boulevard intersection serves a low volume of vehicles and is not needed for capacity. The lane could be converted to a bus lane to serve the adjacent STA stop. This would remove vehicles driving next to the curb to improve conditions for pedestrians.

These recommended improvements will require additional operational analysis and refinements prior to implementation.

FIGURE 14. RECENT PRIVATE DEVELOPMENT IMPROVEMENTS BETWEEN 31ST AND 32ND AVENUE

Funding, Partnerships and Coordination

Creative funding strategies using a variety of sources will be needed to implement the Grand Boulevard vision. There is currently no funding source identified for improvements. Potential sources include local, state and federal programs as well as public-private partnerships. The City will actively pursue available grants, school safety program and traffic calming program. Private developers will help implement the plan's vision for the public realm as infill and redevelopment occurs.

Monitoring

Over time, the City will monitor progress towards the plan vision and goals. Specifically, the City will monitor thresholds for implementing specific types of improvements and evaluate the impacts and benefits to the community. This includes:

- Continue to evaluate vehicle operations and performance over time.
- Continue to collect and evaluate collision data and monitor trends over time.
- Continue to review transit ridership data and monitor trends over time.
- Engage in on-going community feedback to ensure improvements meet the plan vision.

City of Spokane

Grand Boulevard Transportation & Land Use Study

Appendix

Traffic Analysis

MEMORANDUM

720 SW Washington St
Suite 500
Portland, OR 97205
dksassociates.com

DATE: March 11, 2020

TO: Inga Note, City of Spokane

FROM: Reah Flisakowski, PE
Rochelle Starrett, EIT

SUBJECT: Draft Spokane Grand Boulevard Report P 19167-000

A traffic operations analysis was conducted to support the Grand Boulevard Plan and determine if there are opportunities to remove vehicle lanes to develop a comprehensive, multimodal corridor. Traffic operations at key intersections on the corridor were assessed for existing and future 2040 conditions to identify future deficiencies and test several vehicle lane scenarios. Future AM and PM peak hour volumes were projected using the Spokane Regional Transportation Council travel demand models. The Existing scenario intersection operations are summarized in Table 1. The highest vehicle delays today are experienced during the AM peak hour at the Grand Boulevard/33rd Avenue intersection for the minor street approach and during the PM peak hour at the Grand Boulevard/37th Avenue signalized intersection and the Grand Boulevard/30th Avenue intersection minor street approach. All intersections meet current City performance standards.

Table 1: Existing Vehicle Operations

#	Intersection	Control	Mobility Target	Existing AM				Existing PM[1]			
				v/c	Delay	LOS	Exceeds Target	v/c	Delay	LOS	Exceeds Target
1	Grand Boulevard and 29th Avenue	Signal	LOS E	0.58	20.3	C	No	0.75	24.2	C	No
2	Grand Boulevard and 30th Avenue[2]	TWSC	LOS E	0.24/0.17	9.0/24.2	A/C	No	0.25/0.45	9.5/33.4	A/D	No
3	Grand Boulevard and 33rd Avenue[2]	TWSC	LOS E	0.38/0.38	9.3/31.5	A/D	No	0.36/0.29	8.8/20.7	A/C	No
4	Grand Boulevard and 37th Avenue	Signal	LOS E	0.73	25.3	C	No	0.84	39.5	D	No

Notes:

1 Existing PM intersection operations reported for the PM peak hour from 4-6 PM for the intersections of Grand Boulevard and 29th Avenue, 31st Avenue, and 37th Avenue. Existing PM intersection operations reported for the School PM Peak Hour from 2:30-4:30 PM for the intersection of Grand Boulevard and 33rd Avenue.

2 Intersection Operations reported for worst Major Street/Minor Street movement at all TWSC (two-way stop-controlled) intersections

The 2040 AM and PM traffic volumes were used to understand future traffic operations with no changes to Grand Boulevard; Future Baseline traffic operations are summarized below in Table 2. Key intersections on Grand Boulevard, including the traffic signals at 29th Avenue and 37th Avenue, are expected to operate within or approach their mobility target by 2040. However, growth in vehicle volumes along Grand Boulevard will further delay side street traffic at existing two-way stop control intersections, and the minor street approaches at 30th Avenue and 33rd Avenue are expected to exceed their mobility targets by 2040.

Table 2: Future Baseline Vehicle Operations

#	Intersection	Control	Mobility Target	Future No Build (2040) AM				Future No Build (2040) PM[1]			
				v/c	Delay	LOS	Exceeds Target	v/c	Delay	LOS	Exceeds Target
1	Grand Boulevard and 29th Avenue	Signal	LOS E	0.64	21.6	C	No	0.84	29.2	C	No
2	Grand Boulevard and 30th Avenue[2]	TWSC	LOS E	0.29/0.22	9.4/32.8	A/D	No	0.29/0.58	10.0/51.5	A/F	**Yes**
3	Grand Boulevard and 33rd Avenue[2]	TWSC	LOS E	0.46/0.59	9.9/61.9	A/F	**Yes**	0.44/0.44	9.4/33.6	A/D	No
4	Grand Boulevard and 37th Avenue	Signal	LOS E	0.92	50	D	No	0.93	64.8	E	No

Notes:

1 Existing PM intersection operations reported for the PM peak hour from 4-6 PM for the intersections of Grand Boulevard and 29th Avenue, 31st Avenue, and 37th Avenue. Existing PM intersection operations reported for the School PM Peak Hour from 2:30-4:30 PM for the intersection of Grand Boulevard and 33rd Avenue.

2 Intersection Operations reported for worst Major Street/Minor Street movement at all TWSC (two-way stop-controlled) intersections

Since most study intersections operate within their existing mobility standards in the Future Baseline scenario, opportunities exist for improved multimodal transportation facilities on this corridor. These opportunities include reconfiguring existing travel lanes near the intersection of Grand Boulevard/29th Avenue to provide either wider sidewalks or add bike lanes, connecting the commercial district near 29th Avenue to the neighborhood greenway on 33rd Avenue, and new enhanced pedestrian crossings. Identified future improvements include:

- Continue the existing three-lane cross section near 32nd Avenue to the north to 29th Avenue
- Convert 30th Avenue to right in/right out only with a raised median; maintain northbound left turns at 30th Avenue to provide local circulation
- Modify the existing southbound approach at Grand Boulevard/29th Avenue for one southbound through lane; specific opportunities identified in the following section
- Extend 32nd Avenue to the west as a private access serving future plans for Sacajawea Middle School

Future traffic operations were analyzed for Grand Boulevard after modelling these improvements using the previously developed 2040 AM and PM traffic volumes; results are summarized in Table 3. Intersection operations at Grand Boulevard/29th Avenue depend on the preferred modification to convert the southbound through lane to a single through traffic lane and operations under each identified reconfiguration are discussed separately in the following section.

Table 3: Build Vehicle Operations

#	Intersection	Control	Mobility Target	Build (2040) AM				Build (2040) PM[1]			
				v/c	Delay	LOS	Exceeds Target	v/c	Delay	LOS	Exceeds Target
1	Grand Boulevard and 29th Avenue	Signal	LOS E	0.88	32.2	C	No	*See Following Section*			
2	Grand Boulevard and 30th Avenue[2]	TWSC	LOS E	0.45/0.08	9.4/14.1	A/B	No	0.51/0.19	10.1/17	B/C	No
3	Grand Boulevard and 33rd Avenue[2]	TWSC	LOS E	0.46/0.59	9.9/61.9	A/F	**Yes**	0.44/0.44	9.4/33.6	A/D	No
4	Grand Boulevard and 37th Avenue	Signal	LOS E	0.92	50	D	No	0.93	64.8	E	No

Notes:

1 Existing PM intersection operations reported for the PM peak hour from 4-6 PM for the intersections of Grand Boulevard and 29th Avenue, 31st Avenue, and 37th Avenue. Existing PM intersection operations reported for the School PM Peak Hour from 2:30-4:30 PM for the intersection of Grand Boulevard and 33rd Avenue.

2 Intersection Operations reported for worst Major Street/Minor Street movement at all TWSC intersections

Vehicle operations are expected to improve at the intersection of Grand Boulevard and 30th Avenue since high vehicle volumes on Grand Boulevard can significantly delay vehicles turning left from 30th Avenue in the future. The proposed turn restrictions are expected to provide minimal impacts to vehicle circulation. Alternative access to the Manito Shopping Center is provided from both 29th Avenue and 31st Avenue, and northbound left turn access is maintained since this provides a key access point for developments west of Grand Boulevard on 30th Avenue.

Implementing the preferred alternative will have relatively modest impacts to vehicle traffic for improved bicycle and pedestrian facilities between 29th Avenue and 33rd Avenue despite reducing the total number of travel lanes in this portion of Grand Boulevard. No impacts to vehicle traffic are expected between 33rd Avenue and 37th Avenue. The identified improvements provide a key start towards re-developing the Grand Boulevard district into a vibrant urban center in Spokane's South Hill.

Grand Boulevard & 29th Avenue Intersection Opportunities

With the preferred build alternative, one of the existing southbound travel lanes for vehicles is reconfigured to provide more space for pedestrian and bicycle facilities which will require modifications to the southbound approach to Grand Boulevard & 29th Avenue. Three build configurations were tested for the southbound approach, including:

1. **Single Left**: Convert existing through only lane to a left turn lane and close the existing left turn pocket
2. **Dual Southbound Left**: Convert existing through only lane to a left turn lane and maintain the existing left turn pocket
3. **Dual Southbound Left with Split Phasing:** Convert existing through only lane to a left turn lane and maintain the existing left turn pocket; implement northbound/southbound split phasing

Each build configuration was tested using the same cycle length as existing to provide comparable vehicle operations and queueing results. However, notably, some of these build configurations would provide additional opportunities to implement pedestrian-friendly shorter cycle lengths. A summary of build operations for each identified build configuration (PM Peak only) and queueing are detailed below.

Intersection Operations

The intersection of Grand Boulevard/29th Avenue is expected to meet its mobility target with all build configurations; intersection operations for 2040 are summarized below in Table 4. Vehicle delay at this intersection will increase between 15 and 50 seconds depending on the configuration. Using a dual southbound left turn lane minimizes the observed increase in vehicle delay while vehicle delay more than doubles with both a single southbound left turn lane and with dual southbound left turn lanes when north/south traffic is split phased. The intersection v/c ratio is also expected to exceed one when either a single southbound left turn lane or dual southbound left turn lanes with north/south traffic split phased are implemented at this location. However, existing phase lengths were not modified for the single southbound left turn lane or dual southbound left turn lane build configurations. Modifying the existing phase lengths could mitigate some of the observed increase in vehicle delay and intersection v/c ratio compared to the future no build condition.

Table 4: Build Vehicle Operations at Grand Boulevard/29th Avenue

#	Intersection	Control	Mobility Target	Future Build (2040) PM[1]			
				v/c	Delay	LOS	Exceeds Target
0	2040 No Build	Signal	LOS E	0.84	29.2	C	No
1	2040 Build - Single Left	Signal	LOS E	1.04	64.9	E	No
2	2040 Build - Dual SBL	Signal	LOS E	0.85	43.9	D	No
3	2040 Build - Dual SBL with Split Phasing	Signal	LOS E	1.04	76.1	E	No

Notes:

1 Existing PM intersection operations reported for the PM peak hour from 4-6 PM for the intersections of Grand Boulevard and 29th Avenue

Vehicle Queueing

Short term (using existing vehicle volumes) and long term (2040) vehicle queueing analysis in SimTraffic was also used to understand the potential for increased queue lengths on Grand Boulevard under each build scenario immediately after project implementation and in the future. In the short term, summarized in Table 6, vehicle queueing will moderately improve in the Build scenario since high southbound left turn volumes routinely exceed the existing left turn storage and spill back in to one of the through lanes. Increasing the available left turn storage in the Build scenario will allow vehicles to use a larger proportion of the available green time which will reduce queue lengths.

Table 6: Short Term Queueing Analysis

Scenario	SBL (Pocket)*	SBL (Existing SBT Lane)	SBTR
Existing	210	1585	1535
Short Term Build - Single Left	--	825	1050
Short Term Build - Dual SBL	195	820	910
Short Term Build - Dual SBL with Split Phasing	215	1125	1340

*150 feet storage available in SBL pocket

Dual southbound left turn lanes do not provide a significant benefit for vehicle queueing since the existing storage length is short, minimizing the number of vehicles that can use this lane. However, the Build - Dual Southbound Left cycle length could be shortened which would minimize delay for pedestrians. The Build - Dual SBL with Split Phasing has the longest estimated queue lengths of any build scenario since split phasing reduces the available green time for both northbound and southbound vehicles.

By 2040, queueing is expected to be significantly increase, regardless of the scenario, summarized in Table 7. Generally, SimTraffic queues in excess of 2,000 feet indicate severe queueing issues, and this analysis does not account for diversion that could happen with very long vehicle queues on Grand Boulevard. Due to these limitations, queueing will be comparable in each scenario by 2040.

Table 7: Long term (2040) Queueing Analysis

Scenario	SBL (Pocket)*	SBL (Existing SBT Lane)	SBTR
2040 No Build	210	5105	5065
2040 Build - Single Left	--	3675	3805
2040 Build - Dual SBL	200	4365	4515
2040 Build - Dual SBL with Split Phasing	220	4910	4775

*150 feet storage available in SBL pocket

APPENDIX

City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

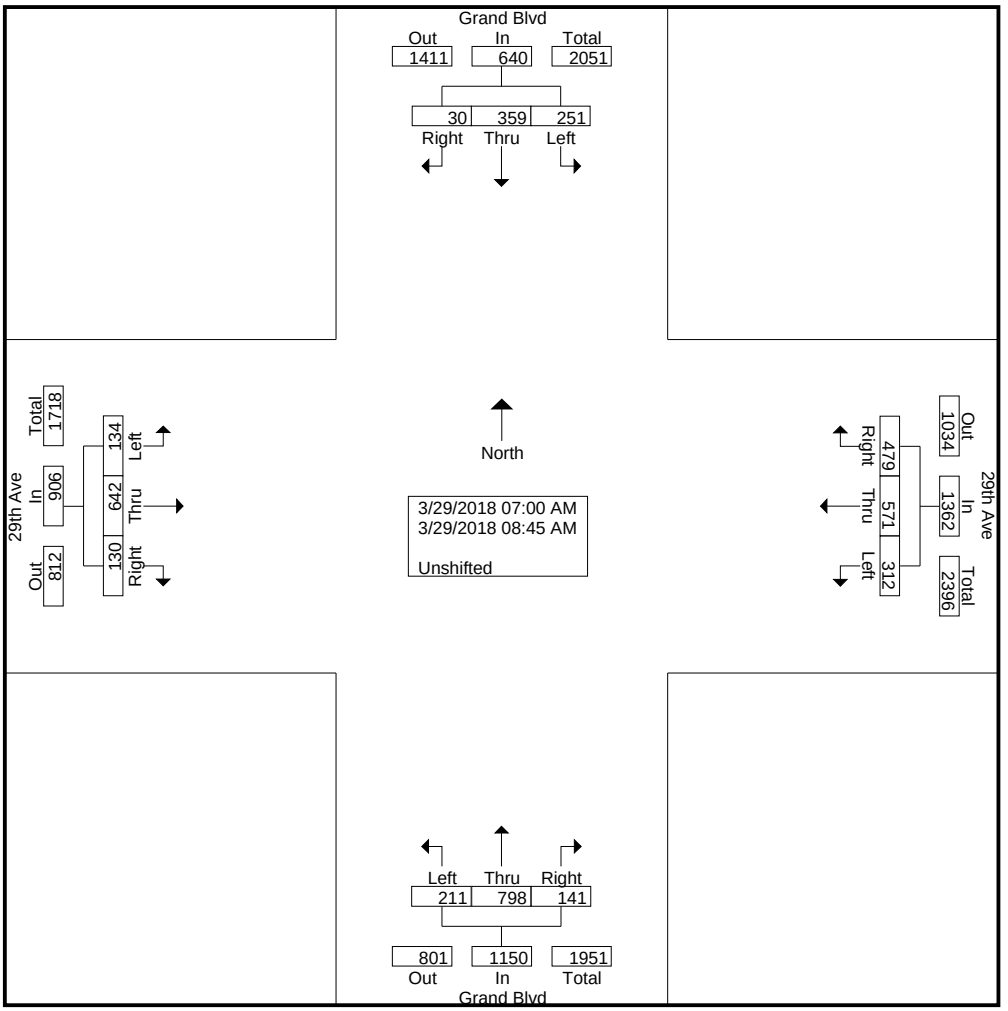
2900 S Grand Blvd
600 E 29th Ave

Peak Hour Data on Page 2

File Name : Grand & 29th INT155 AM
Site Code : INT155
Start Date : 3/29/2018

Groups Printed- Unshifted

	Grand Blvd From North				29th Ave From East				Grand Blvd From South				29th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	1	23	18	42	41	47	7	95	9	74	17	100	9	36	12	57	294
07:15 AM	2	22	17	41	44	48	21	113	13	101	33	147	10	61	8	79	380
07:30 AM	4	40	40	84	62	85	25	172	5	136	28	169	4	73	15	92	517
07:45 AM	5	48	29	82	87	89	33	209	15	126	31	172	15	77	15	107	570
Total	12	133	104	249	234	269	86	589	42	437	109	588	38	247	50	335	1761
08:00 AM	6	51	24	81	78	87	38	203	14	94	30	138	17	85	17	119	541
08:15 AM	5	56	39	100	53	91	65	209	29	77	26	132	21	112	12	145	586
08:30 AM	3	62	42	107	63	72	57	192	24	103	24	151	26	99	25	150	600
08:45 AM	4	57	42	103	51	52	66	169	32	87	22	141	28	99	30	157	570
Total	18	226	147	391	245	302	226	773	99	361	102	562	92	395	84	571	2297
Grand Total	30	359	251	640	479	571	312	1362	141	798	211	1150	130	642	134	906	4058
Apprch %	4.7	56.1	39.2		35.2	41.9	22.9		12.3	69.4	18.3		14.3	70.9	14.8		
Total %	0.7	8.8	6.2	15.8	11.8	14.1	7.7	33.6	3.5	19.7	5.2	28.3	3.2	15.8	3.3	22.3	

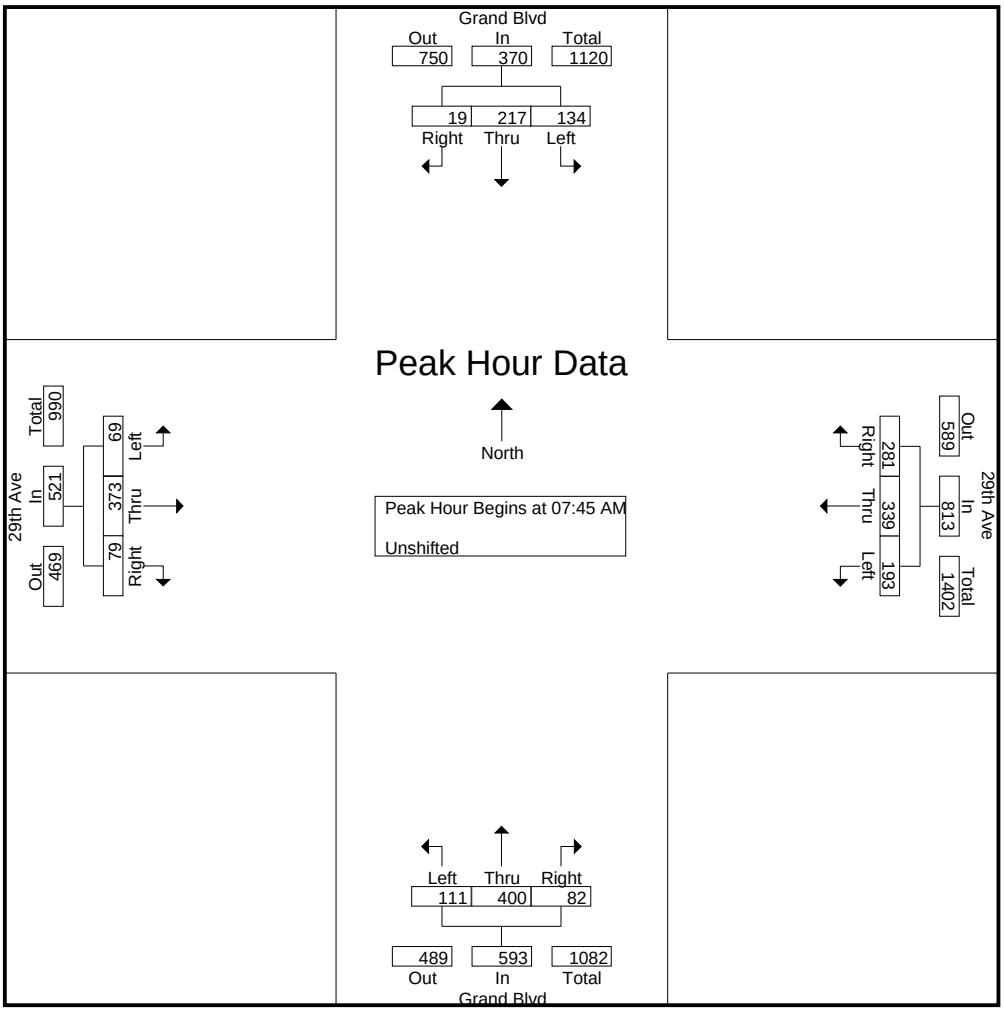


City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

File Name : Grand & 29th INT155 AM
Site Code : INT155
Start Date : 3/29/2018
Page No : 2

	Grand Blvd From North				29th Ave From East				Grand Blvd From South				29th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	5	48	29	82	**87**	89	33	**209**	15	**126**	**31**	**172**	15	77	15	107	570
08:00 AM	**6**	51	24	81	78	87	38	203	14	94	30	138	17	85	17	119	541
08:15 AM	5	56	39	100	53	**91**	**65**	209	**29**	77	26	132	21	**112**	12	145	586
08:30 AM	3	**62**	**42**	**107**	63	72	57	192	24	103	24	151	**26**	99	**25**	**150**	**600**
Total Volume	19	217	134	370	281	339	193	813	82	400	111	593	79	373	69	521	2297
% App. Total	5.1	58.6	36.2		34.6	41.7	23.7		13.8	67.5	18.7		15.2	71.6	13.2		
PHF	.792	.875	.798	.864	.807	.931	.742	.972	.707	.794	.895	.862	.760	.833	.690	.868	.957



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

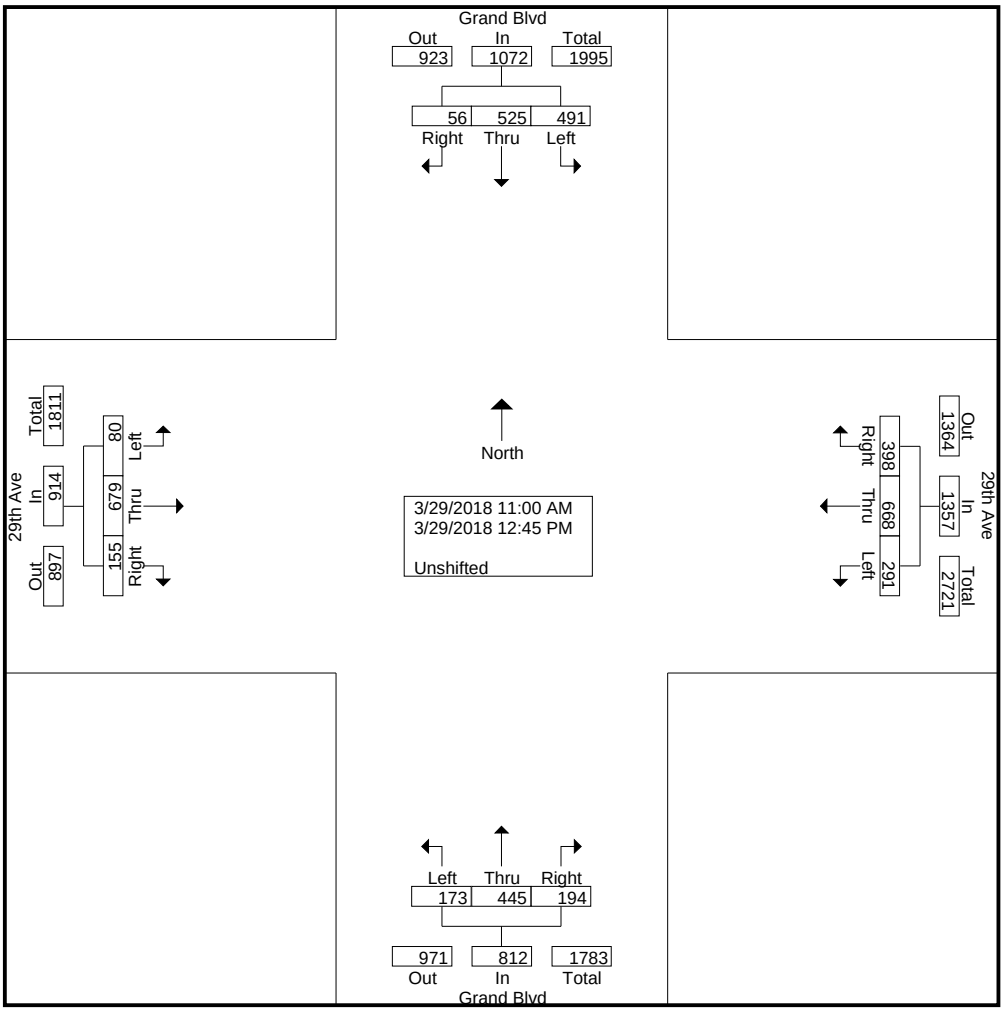
2900 S Grand Blvd
600 E 29th Ave

Peak Hour Data on Page 2

File Name : Grand & 29th INT155 MID
Site Code : INT155
Start Date : 3/29/2018
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				29th Ave From East				Grand Blvd From South				29th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
11:00 AM	7	48	57	112	46	100	39	185	26	50	18	94	22	78	10	110	501
11:15 AM	9	58	55	122	47	65	37	149	21	60	16	97	20	63	7	90	458
11:30 AM	6	51	54	111	51	75	35	161	23	55	14	92	23	81	15	119	483
11:45 AM	6	66	54	126	53	80	29	162	31	56	18	105	19	97	6	122	515
Total	28	223	220	471	197	320	140	657	101	221	66	388	84	319	38	441	1957
12:00 PM	6	69	53	128	38	73	39	150	28	52	19	99	20	83	8	111	488
12:15 PM	12	77	80	169	45	89	27	161	28	45	30	103	17	87	9	113	546
12:30 PM	4	73	69	146	55	84	36	175	11	58	30	99	12	86	6	104	524
12:45 PM	6	83	69	158	63	102	49	214	26	69	28	123	22	104	19	145	640
Total	28	302	271	601	201	348	151	700	93	224	107	424	71	360	42	473	2198
Grand Total	56	525	491	1072	398	668	291	1357	194	445	173	812	155	679	80	914	4155
Apprch %	5.2	49	45.8		29.3	49.2	21.4		23.9	54.8	21.3		17	74.3	8.8		
Total %	1.3	12.6	11.8	25.8	9.6	16.1	7	32.7	4.7	10.7	4.2	19.5	3.7	16.3	1.9	22	

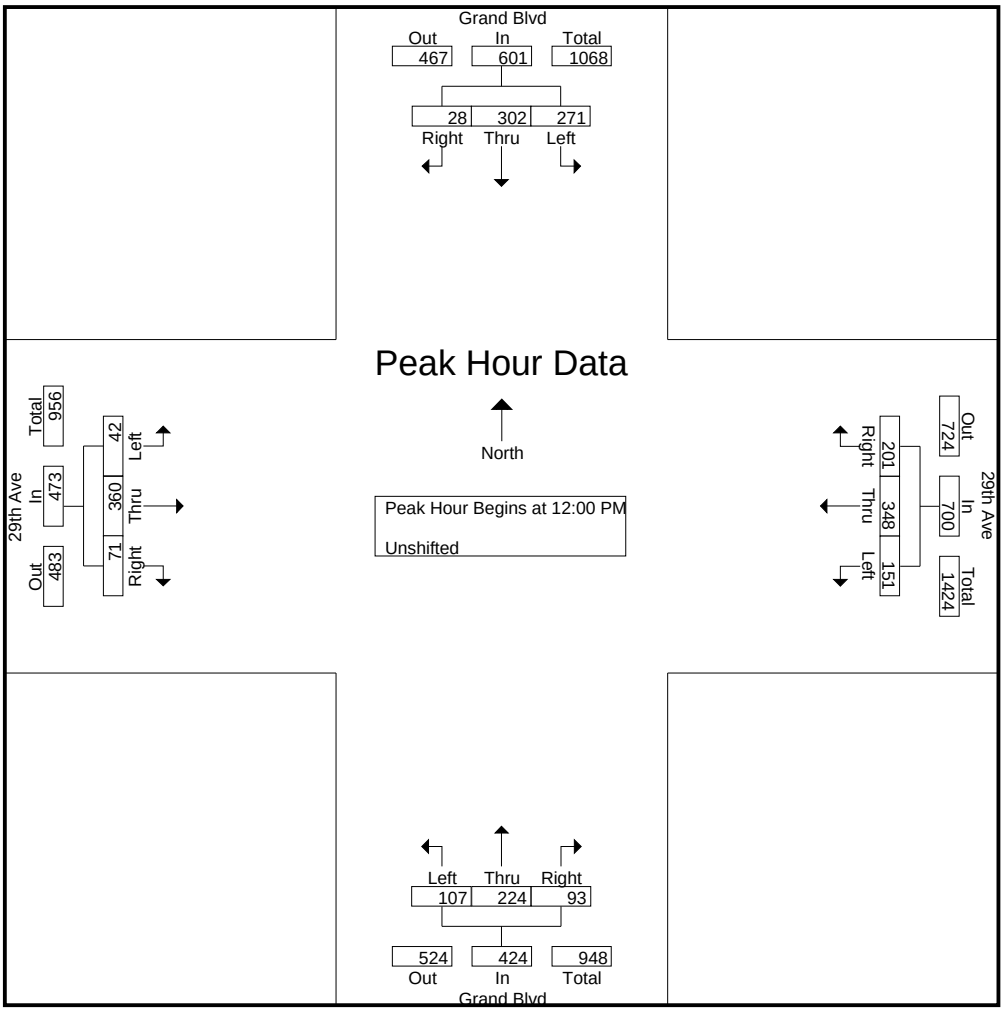


City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

File Name : Grand & 29th INT155 MID
Site Code : INT155
Start Date : 3/29/2018
Page No : 2

	Grand Blvd From North				29th Ave From East				Grand Blvd From South				29th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	6	69	53	128	38	73	39	150	**28**	52	19	99	20	83	8	111	488
12:15 PM	**12**	77	**80**	**169**	45	89	27	161	28	45	**30**	103	17	87	9	113	546
12:30 PM	4	73	69	146	55	84	36	175	11	58	30	99	12	86	6	104	524
12:45 PM	6	**83**	69	158	**63**	**102**	**49**	**214**	26	**69**	28	**123**	**22**	**104**	**19**	**145**	**640**
Total Volume	28	302	271	601	201	348	151	700	93	224	107	424	71	360	42	473	2198
% App. Total	4.7	50.2	45.1		28.7	49.7	21.6		21.9	52.8	25.2		15	76.1	8.9		
PHF	.583	.910	.847	.889	.798	.853	.770	.818	.830	.812	.892	.862	.807	.865	.553	.816	.859



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

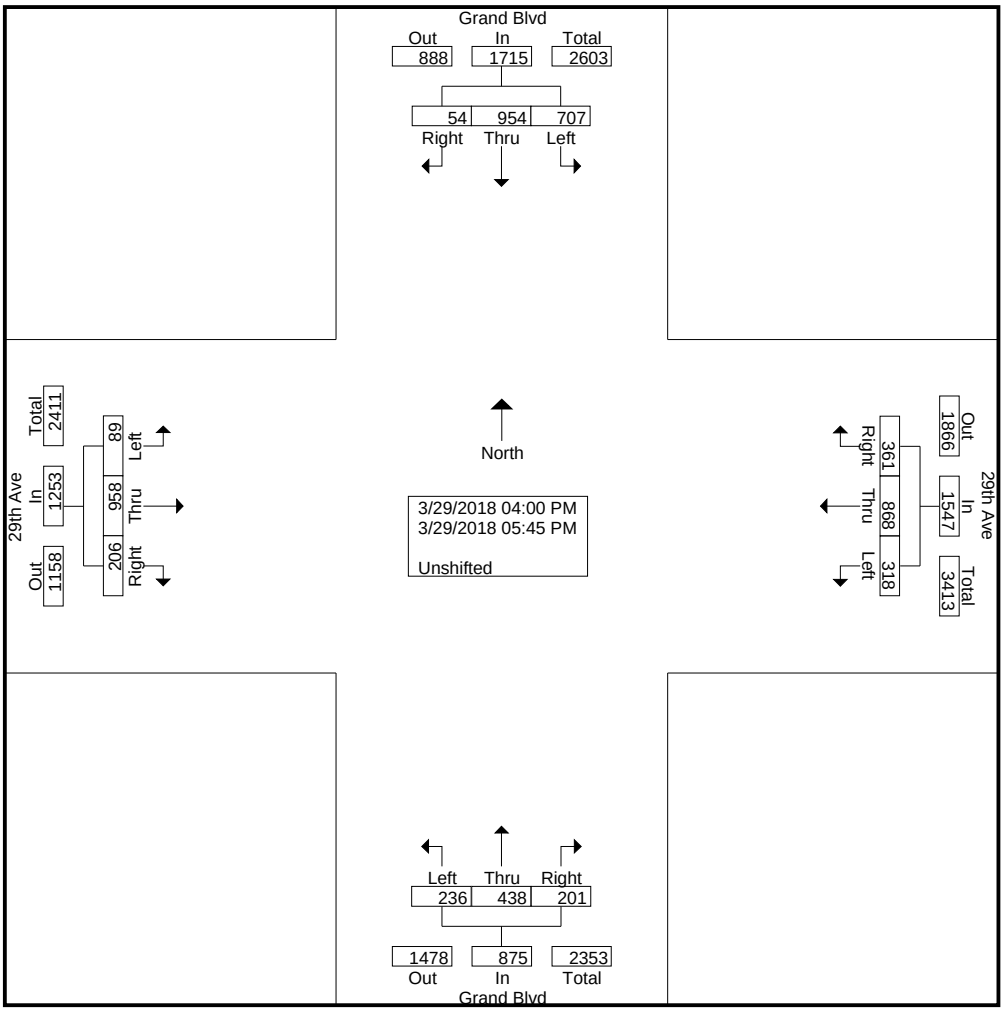
2900 S Grand Blvd
600 E 29th Ave

Peak Hour Data on Page 2

File Name : Grand & 29th INT155 PM
Site Code : INT155
Start Date : 3/29/2018

Groups Printed- Unshifted

	Grand Blvd From North				29th Ave From East				Grand Blvd From South				29th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	9	105	74	188	51	124	49	224	31	53	24	108	33	109	12	154	674
04:15 PM	6	105	92	203	42	106	35	183	20	42	34	96	16	135	9	160	642
04:30 PM	8	112	72	192	44	109	34	187	20	63	30	113	27	122	10	159	651
04:45 PM	7	126	95	228	47	109	44	200	24	58	37	119	29	118	10	157	704
Total	30	448	333	811	184	448	162	794	95	216	125	436	105	484	41	630	2671
05:00 PM	4	126	95	225	48	95	37	180	22	60	26	108	21	137	18	176	689
05:15 PM	10	162	114	286	40	115	38	193	29	51	31	111	32	115	11	158	748
05:30 PM	6	110	84	200	44	106	44	194	29	62	28	119	24	112	11	147	660
05:45 PM	4	108	81	193	45	104	37	186	26	49	26	101	24	110	8	142	622
Total	24	506	374	904	177	420	156	753	106	222	111	439	101	474	48	623	2719
Grand Total	54	954	707	1715	361	868	318	1547	201	438	236	875	206	958	89	1253	5390
Apprch %	3.1	55.6	41.2		23.3	56.1	20.6		23	50.1	27		16.4	76.5	7.1		
Total %	1	17.7	13.1	31.8	6.7	16.1	5.9	28.7	3.7	8.1	4.4	16.2	3.8	17.8	1.7	23.2	

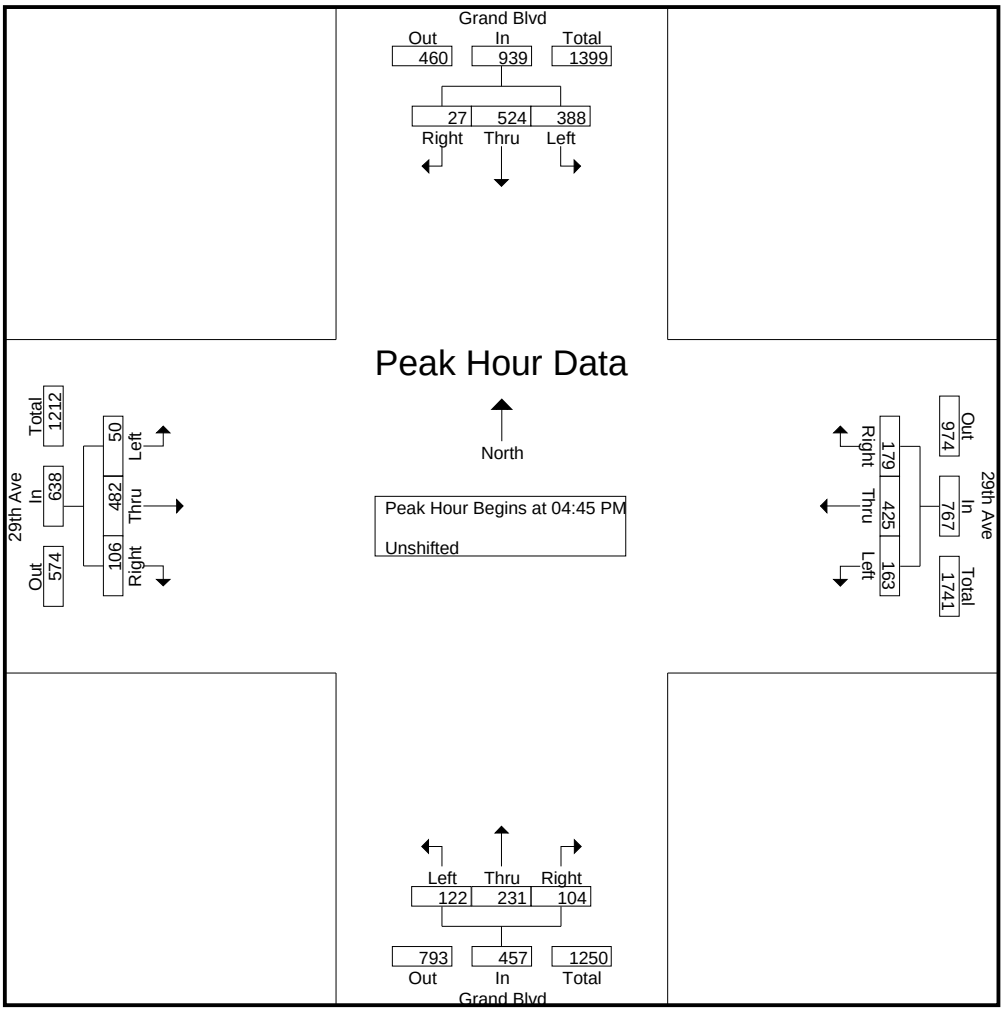


City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

File Name : Grand & 29th INT155 PM
Site Code : INT155
Start Date : 3/29/2018
Page No : 2

	Grand Blvd From North				29th Ave From East				Grand Blvd From South				29th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	7	126	95	228	47	109	**44**	**200**	24	58	**37**	**119**	29	118	10	157	704
05:00 PM	4	126	95	225	**48**	95	37	180	22	60	26	108	21	**137**	**18**	**176**	689
05:15 PM	**10**	**162**	**114**	**286**	40	**115**	38	193	**29**	51	31	111	**32**	115	11	158	**748**
05:30 PM	6	110	84	200	44	106	44	194	29	**62**	28	119	24	112	11	147	660
Total Volume	27	524	388	939	179	425	163	767	104	231	122	457	106	482	50	638	2801
% App. Total	2.9	55.8	41.3		23.3	55.4	21.3		22.8	50.5	26.7		16.6	75.5	7.8		
PHF	.675	.809	.851	.821	.932	.924	.926	.959	.897	.931	.824	.960	.828	.880	.694	.906	.936



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

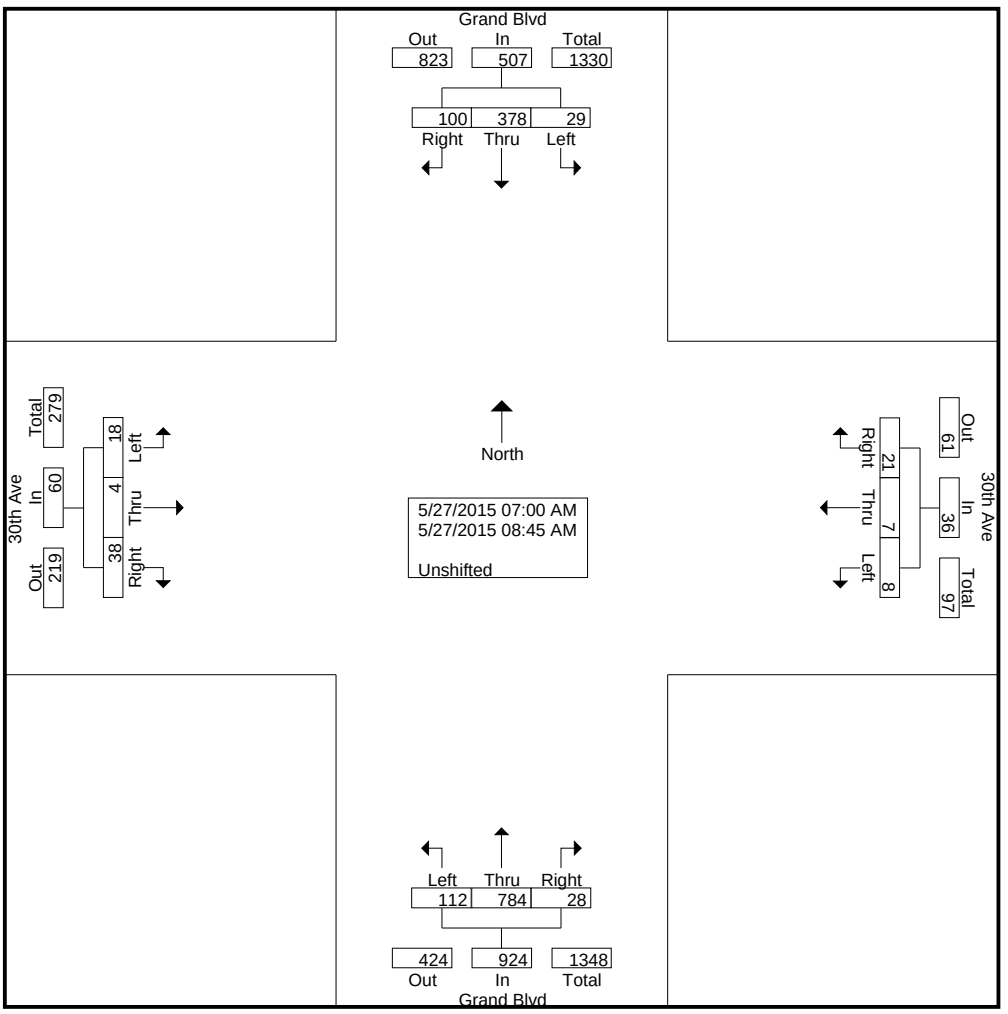
3000 S Grand Blvd
500 E 30th Ave

Peak Hour Data on Page 2

File Name : 30th & Grand AM
Site Code :
Start Date : 5/27/2015
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				30th Ave From East				Grand Blvd From South				30th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	2	27	0	29	1	0	0	1	3	81	5	89	1	1	2	4	123
07:15 AM	2	30	4	36	3	0	1	4	0	94	12	106	0	0	1	1	147
07:30 AM	11	37	0	48	2	1	0	3	5	136	11	152	3	0	2	5	208
07:45 AM	13	35	1	49	5	1	0	6	4	112	15	131	2	0	1	3	189
Total	28	129	5	162	11	2	1	14	12	423	43	478	6	1	6	13	667
08:00 AM	14	37	5	56	3	1	1	5	4	86	10	100	7	1	2	10	171
08:15 AM	22	42	8	72	2	1	0	3	4	100	17	121	7	0	6	13	209
08:30 AM	19	83	8	110	1	1	2	4	2	93	18	113	9	2	3	14	241
08:45 AM	17	87	3	107	4	2	4	10	6	82	24	112	9	0	1	10	239
Total	72	249	24	345	10	5	7	22	16	361	69	446	32	3	12	47	860
Grand Total	100	378	29	507	21	7	8	36	28	784	112	924	38	4	18	60	1527
Apprch %	19.7	74.6	5.7		58.3	19.4	22.2		3	84.8	12.1		63.3	6.7	30		
Total %	6.5	24.8	1.9	33.2	1.4	0.5	0.5	2.4	1.8	51.3	7.3	60.5	2.5	0.3	1.2	3.9	



City of Spokane - Street Department

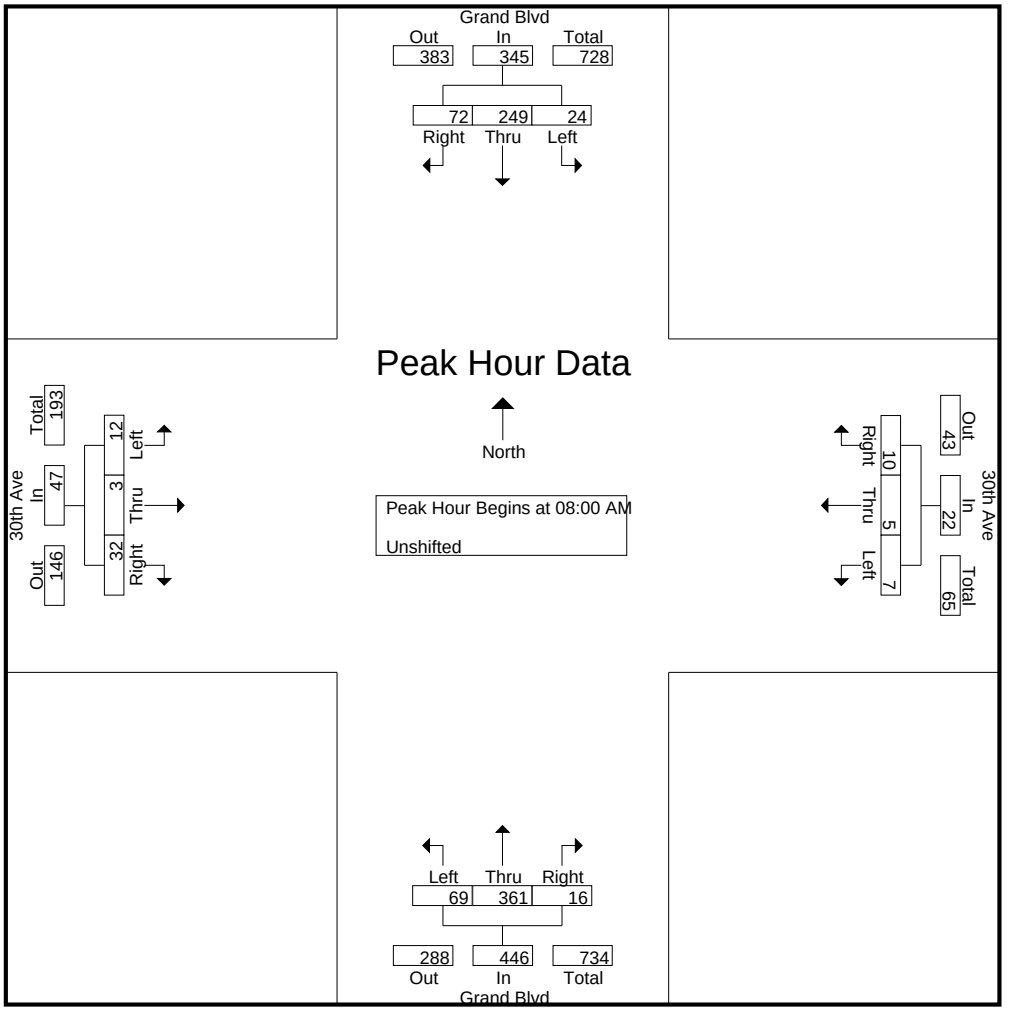
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

3000 S Grand Blvd
500 E 30th Ave

Peak Hour Data on Page 2

File Name : 30th & Grand AM
Site Code :
Start Date : 5/27/2015

	Grand Blvd From North				30th Ave From East				Grand Blvd From South				30th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	14	37	5	56	3	1	1	5	4	86	10	100	7	1	2	10	171
08:15 AM	**22**	42	**8**	72	2	1	0	3	4	**100**	17	**121**	7	0	**6**	13	209
08:30 AM	19	83	8	**110**	1	1	2	4	2	93	18	113	**9**	**2**	3	**14**	**241**
08:45 AM	17	**87**	3	107	**4**	**2**	**4**	**10**	**6**	82	**24**	112	9	0	1	10	239
Total Volume	72	249	24	345	10	5	7	22	16	361	69	446	32	3	12	47	860
% App. Total	20.9	72.2	7		45.5	22.7	31.8		3.6	80.9	15.5		68.1	6.4	25.5		
PHF	.818	.716	.750	.784	.625	.625	.438	.550	.667	.903	.719	.921	.889	.375	.500	.839	.892



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

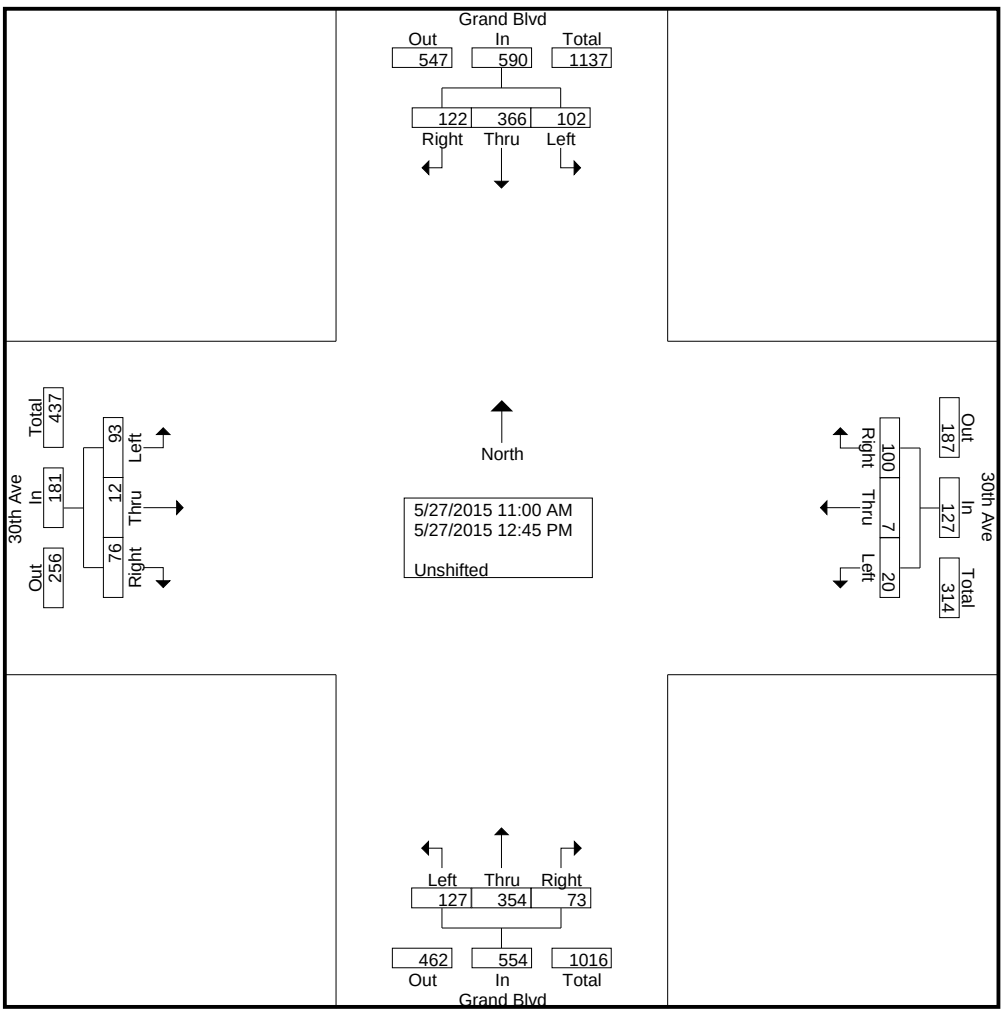
500 E 30th Ave
3000 S Grand Blvd

Peak Hour Data on Page 2

File Name : 30th & Grand MID
Site Code :
Start Date : 5/27/2015
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				30th Ave From East				Grand Blvd From South				30th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
11:00 AM	17	33	11	61	6	0	2	8	9	39	14	62	4	2	10	16	147
11:15 AM	14	47	10	71	8	0	4	12	12	37	17	66	9	1	10	20	169
11:30 AM	12	45	11	68	13	1	6	20	9	50	12	71	8	3	15	26	185
11:45 AM	11	77	11	99	12	1	2	15	6	59	10	75	14	3	9	26	215
Total	54	202	43	299	39	2	14	55	36	185	53	274	35	9	44	88	716
12:00 PM	14	53	18	85	10	1	0	11	10	34	15	59	8	0	14	22	177
12:15 PM	11	39	11	61	19	3	3	25	9	44	26	79	7	2	11	20	185
12:30 PM	23	28	12	63	14	0	2	16	9	46	18	73	11	1	17	29	181
12:45 PM	20	44	18	82	18	1	1	20	9	45	15	69	15	0	7	22	193
Total	68	164	59	291	61	5	6	72	37	169	74	280	41	3	49	93	736
Grand Total	122	366	102	590	100	7	20	127	73	354	127	554	76	12	93	181	1452
Apprch %	20.7	62	17.3		78.7	5.5	15.7		13.2	63.9	22.9		42	6.6	51.4		
Total %	8.4	25.2	7	40.6	6.9	0.5	1.4	8.7	5	24.4	8.7	38.2	5.2	0.8	6.4	12.5	



City of Spokane - Street Department

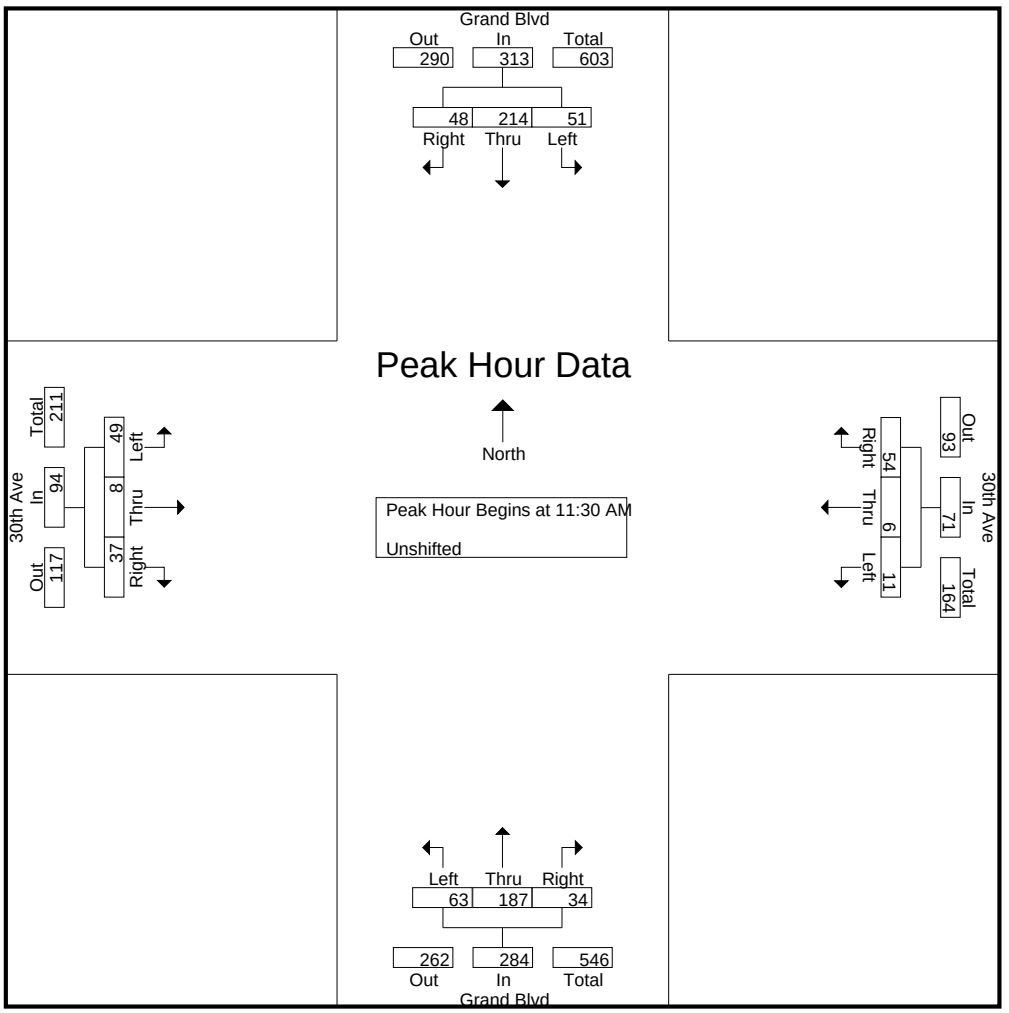
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 30th Ave
3000 S Grand Blvd

Peak Hour Data on Page 2

File Name : 30th & Grand MID
Site Code :
Start Date : 5/27/2015

	Grand Blvd From North				30th Ave From East				Grand Blvd From South				30th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:30 AM																	
11:30 AM	12	45	11	68	13	1	**6**	20	9	50	12	71	8	**3**	**15**	**26**	185
11:45 AM	11	**77**	11	**99**	12	1	2	15	6	**59**	10	75	**14**	3	9	26	**215**
12:00 PM	**14**	53	**18**	85	10	1	0	11	**10**	34	15	59	8	0	14	22	177
12:15 PM	11	39	11	61	**19**	**3**	3	**25**	9	44	**26**	**79**	7	2	11	20	185
Total Volume	48	214	51	313	54	6	11	71	34	187	63	284	37	8	49	94	762
% App. Total	15.3	68.4	16.3		76.1	8.5	15.5		12	65.8	22.2		39.4	8.5	52.1		
PHF	.857	.695	.708	.790	.711	.500	.458	.710	.850	.792	.606	.899	.661	.667	.817	.904	.886



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

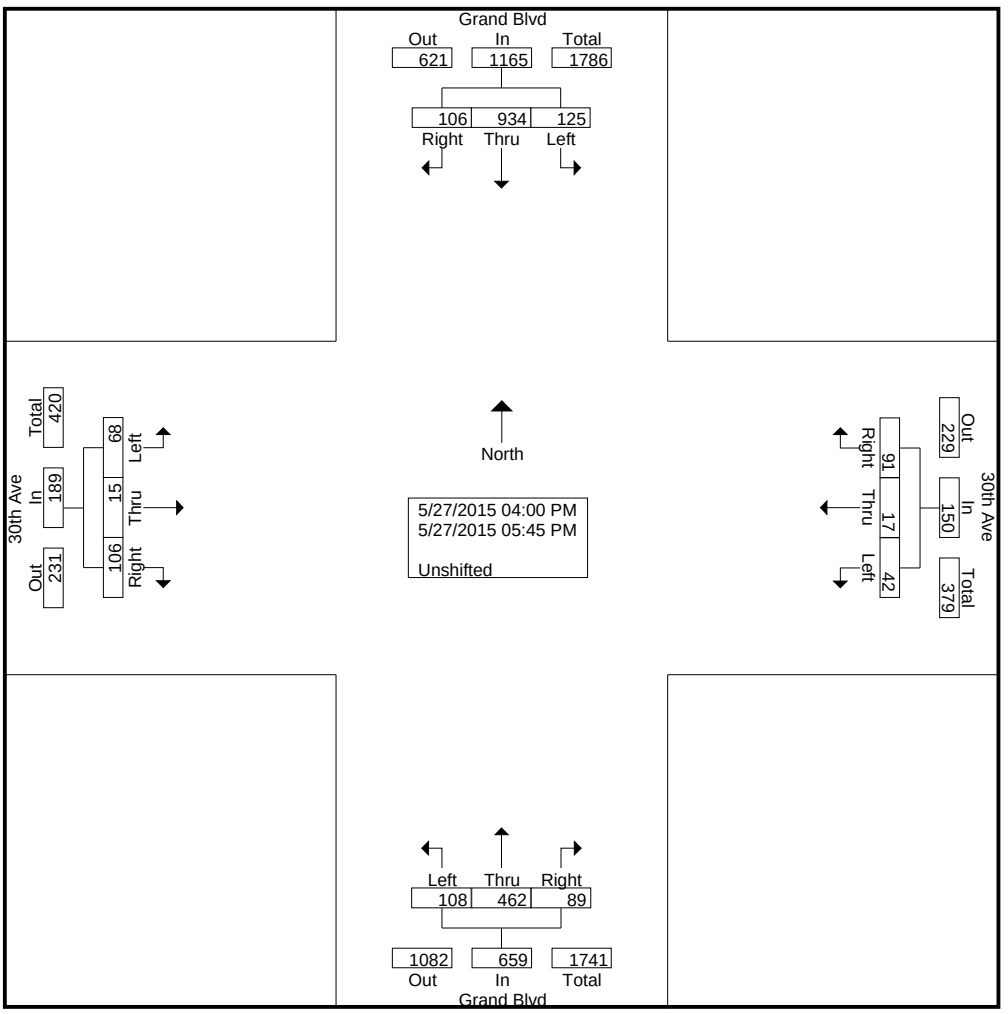
500 E 30th Ave
3000 S Grand Blvd

Peak Hour Data on Page 2

File Name : 30th & Grand PM
Site Code :
Start Date : 5/27/2015
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				30th Ave From East				Grand Blvd From South				30th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	9	97	10	116	8	2	7	17	13	67	5	85	12	2	9	23	241
04:15 PM	9	107	10	126	14	3	6	23	7	58	13	78	13	5	9	27	254
04:30 PM	16	98	14	128	9	3	4	16	10	64	15	89	13	1	8	22	255
04:45 PM	18	124	14	156	12	1	6	19	14	56	13	83	11	1	9	21	279
Total	52	426	48	526	43	9	23	75	44	245	46	335	49	9	35	93	1029
05:00 PM	8	158	13	179	18	1	8	27	6	72	11	89	14	2	8	24	319
05:15 PM	15	136	24	175	9	4	3	16	16	57	12	85	23	1	5	29	305
05:30 PM	19	104	21	144	12	1	4	17	8	65	11	84	13	2	5	20	265
05:45 PM	12	110	19	141	9	2	4	15	15	23	28	66	7	1	15	23	245
Total	54	508	77	639	48	8	19	75	45	217	62	324	57	6	33	96	1134
Grand Total	106	934	125	1165	91	17	42	150	89	462	108	659	106	15	68	189	2163
Apprch %	9.1	80.2	10.7		60.7	11.3	28		13.5	70.1	16.4		56.1	7.9	36		
Total %	4.9	43.2	5.8	53.9	4.2	0.8	1.9	6.9	4.1	21.4	5	30.5	4.9	0.7	3.1	8.7	



City of Spokane - Street Department

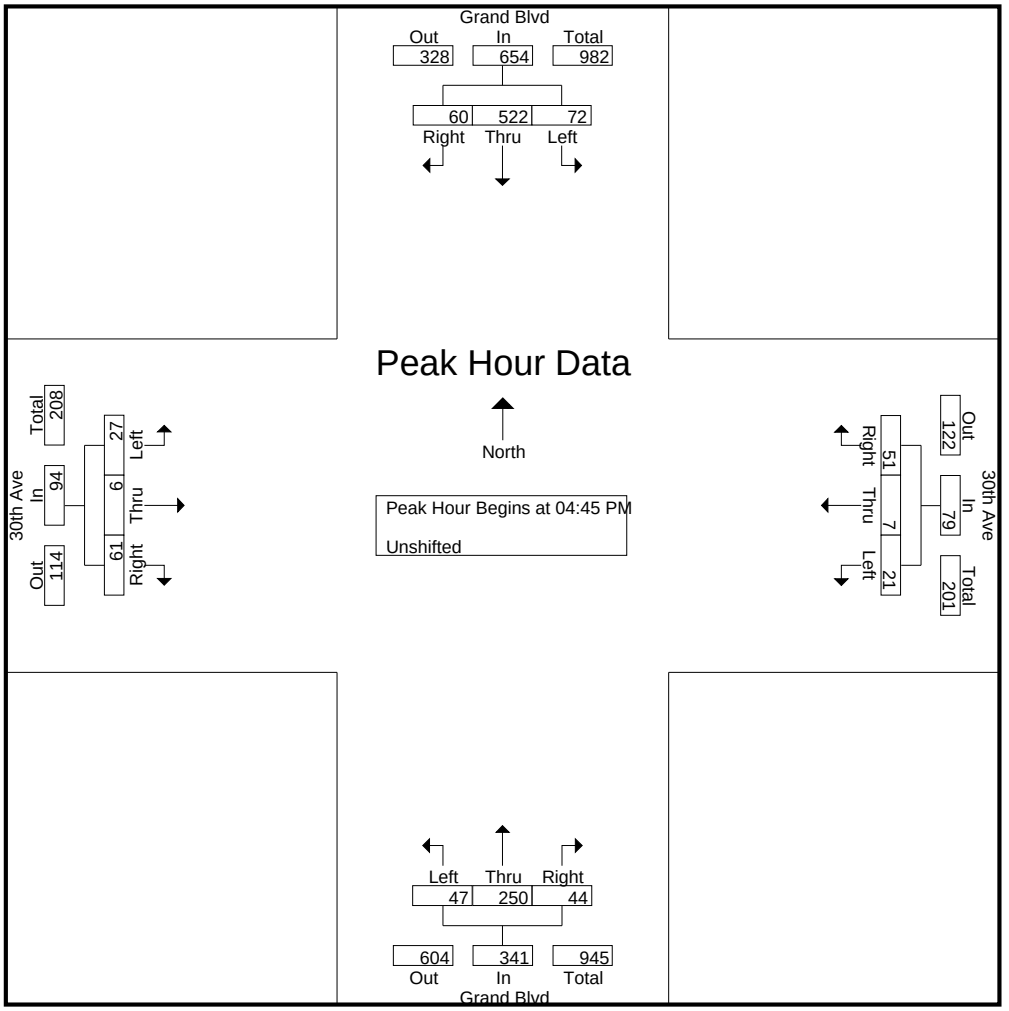
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 30th Ave
3000 S Grand Blvd

Peak Hour Data on Page 2

File Name : 30th & Grand PM
Site Code :
Start Date : 5/27/2015

	Grand Blvd From North				30th Ave From East				Grand Blvd From South				30th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	18	124	14	156	12	1	6	19	14	56	**13**	83	11	1	**9**	21	279
05:00 PM	8	**158**	13	**179**	**18**	1	**8**	**27**	6	**72**	11	**89**	14	**2**	8	24	**319**
05:15 PM	15	136	**24**	175	9	**4**	3	16	**16**	57	12	85	**23**	1	5	**29**	305
05:30 PM	**19**	104	21	144	12	1	4	17	8	65	11	84	13	2	5	20	265
Total Volume	60	522	72	654	51	7	21	79	44	250	47	341	61	6	27	94	1168
% App. Total	9.2	79.8	11		64.6	8.9	26.6		12.9	73.3	13.8		64.9	6.4	28.7		
PHF	.789	.826	.750	.913	.708	.438	.656	.731	.688	.868	.904	.958	.663	.750	.750	.810	.915



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

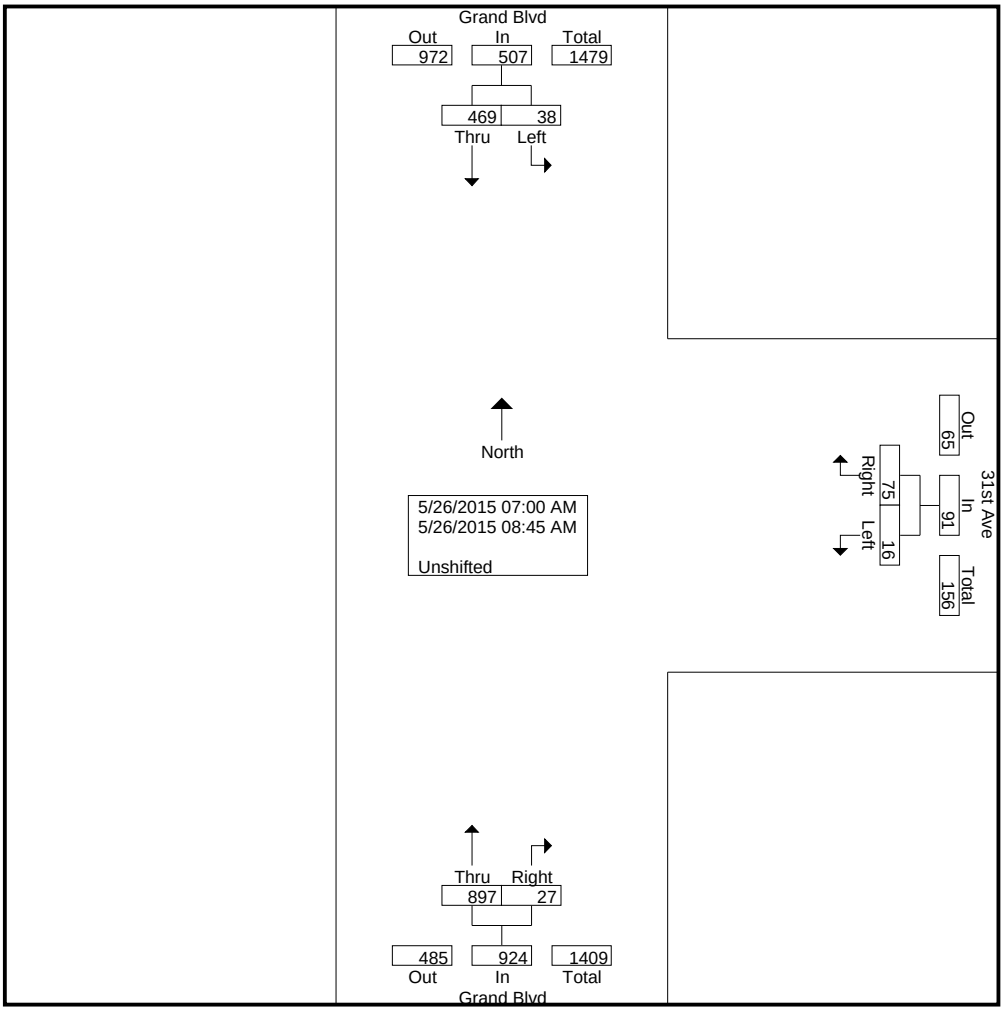
500 E 31st Ave
3100 S Grand Blvd

Peak Hour Data on Page 2

File Name : 31st & Grand AM
Site Code :
Start Date : 5/26/2015

Groups Printed- Unshifted

	Grand Blvd From North			31st Ave From East			Grand Blvd From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
07:00 AM	26	3	29	7	0	7	2	87	89	125
07:15 AM	36	0	36	13	2	15	3	103	106	157
07:30 AM	42	6	48	11	5	16	6	146	152	216
07:45 AM	44	5	49	7	1	8	4	127	131	188
Total	148	14	162	38	8	46	15	463	478	686
08:00 AM	54	2	56	7	1	8	1	99	100	164
08:15 AM	66	6	72	13	1	14	3	118	121	207
08:30 AM	101	9	110	5	4	9	4	109	113	232
08:45 AM	100	7	107	12	2	14	4	108	112	233
Total	321	24	345	37	8	45	12	434	446	836
Grand Total	469	38	507	75	16	91	27	897	924	1522
Apprch %	92.5	7.5		82.4	17.6		2.9	97.1		
Total %	30.8	2.5	33.3	4.9	1.1	6	1.8	58.9	60.7	



City of Spokane - Street Department

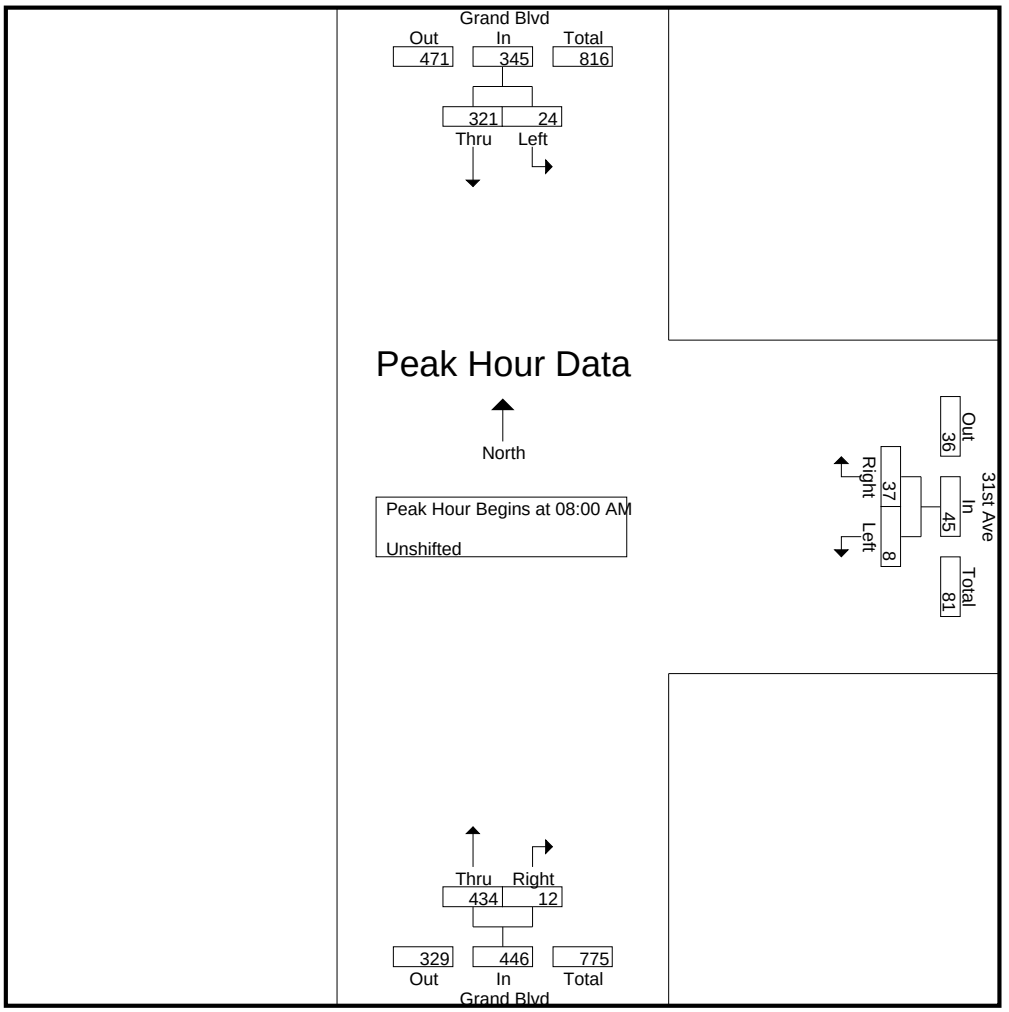
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 31st Ave
3100 S Grand Blvd

Peak Hour Data on Page 2

File Name : 31st & Grand AM
Site Code :
Start Date : 5/26/2015

	Grand Blvd From North			31st Ave From East			Grand Blvd From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	54	2	56	7	1	8	1	99	100	164
08:15 AM	66	6	72	**13**	1	**14**	3	**118**	**121**	207
08:30 AM	**101**	**9**	**110**	5	**4**	9	**4**	109	113	232
08:45 AM	100	7	107	12	2	14	4	108	112	**233**
Total Volume	321	24	345	37	8	45	12	434	446	836
% App. Total	93	7		82.2	17.8		2.7	97.3		
PHF	.795	.667	.784	.712	.500	.804	.750	.919	.921	.897



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

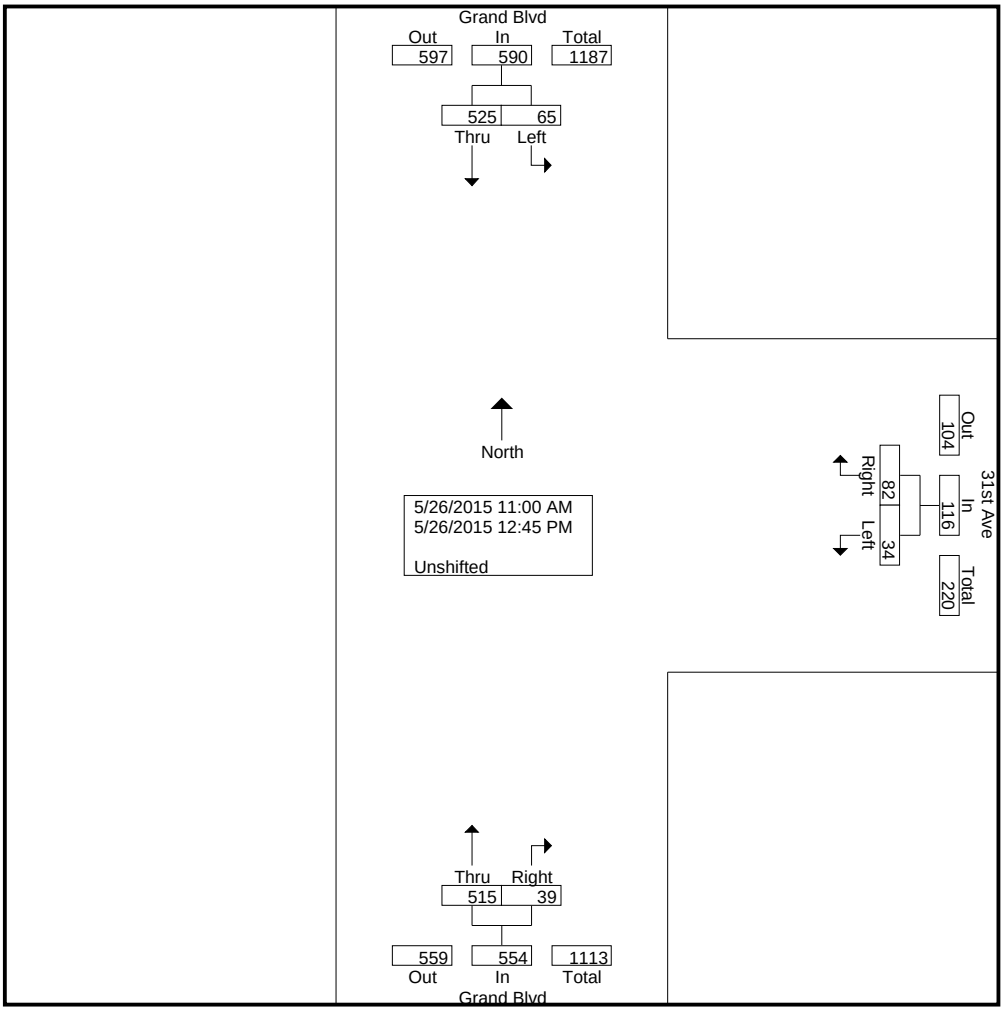
500 E 31st Ave
3100 S Grand Blvd

Peak Hour Data on Page 2

File Name : 31st & Grand MID
Site Code :
Start Date : 5/26/2015

Groups Printed- Unshifted

	Grand Blvd From North			31st Ave From East			Grand Blvd From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
11:00 AM	55	6	61	9	4	13	6	56	62	136
11:15 AM	67	4	71	9	2	11	5	61	66	148
11:30 AM	60	8	68	7	1	8	4	67	71	147
11:45 AM	94	5	99	11	3	14	6	69	75	188
Total	276	23	299	36	10	46	21	253	274	619
12:00 PM	74	11	85	11	8	19	6	53	59	163
12:15 PM	47	14	61	10	8	18	8	71	79	158
12:30 PM	52	11	63	10	4	14	1	72	73	150
12:45 PM	76	6	82	15	4	19	3	66	69	170
Total	249	42	291	46	24	70	18	262	280	641
Grand Total	525	65	590	82	34	116	39	515	554	1260
Apprch %	89	11		70.7	29.3		7	93		
Total %	41.7	5.2	46.8	6.5	2.7	9.2	3.1	40.9	44	



City of Spokane - Street Department

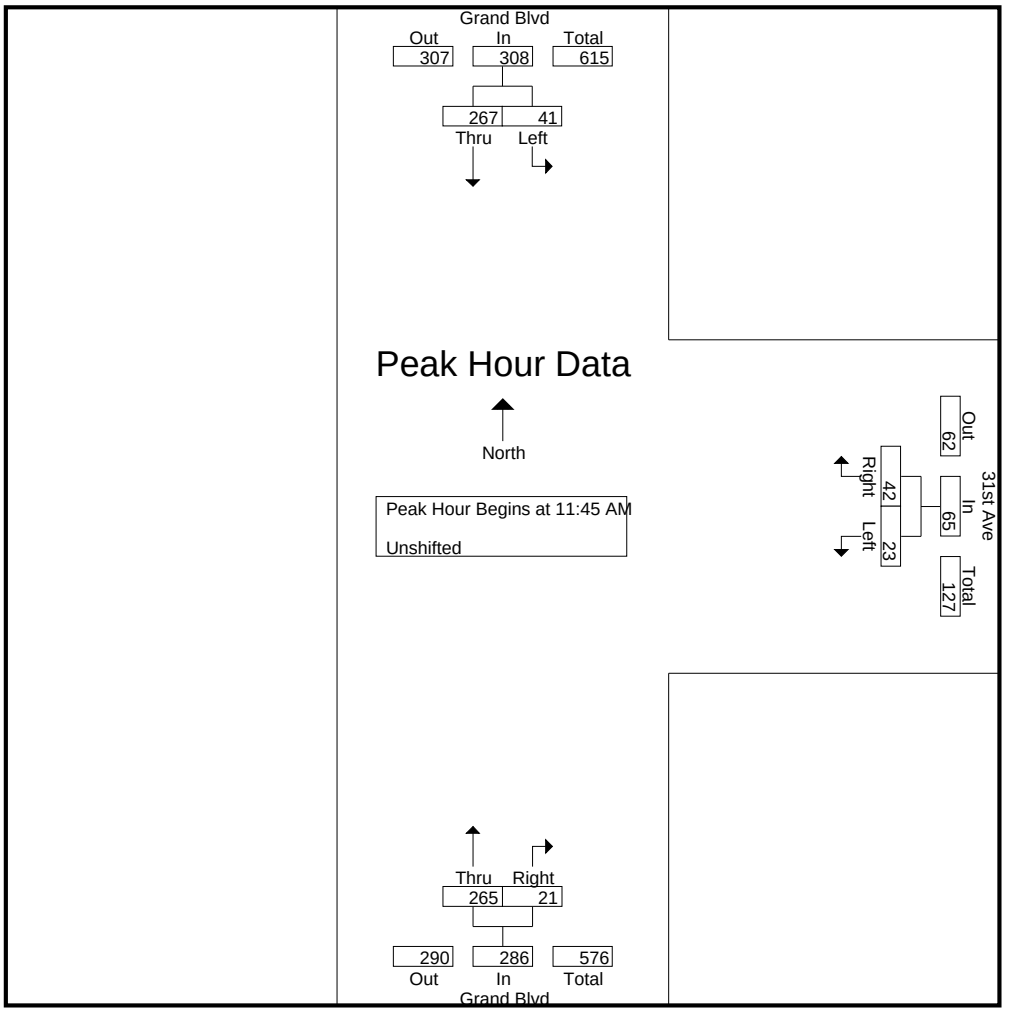
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 31st Ave
3100 S Grand Blvd

Peak Hour Data on Page 2

File Name : 31st & Grand MID
Site Code :
Start Date : 5/26/2015
Page No : 2

	Grand Blvd From North			31st Ave From East			Grand Blvd From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 11:45 AM										
11:45 AM	**94**	5	**99**	**11**	3	14	6	69	75	**188**
12:00 PM	74	11	85	11	**8**	**19**	6	53	59	163
12:15 PM	47	**14**	61	10	8	18	**8**	71	**79**	158
12:30 PM	52	11	63	10	4	14	1	**72**	73	150
Total Volume	267	41	308	42	23	65	21	265	286	659
% App. Total	86.7	13.3		64.6	35.4		7.3	92.7		
PHF	.710	.732	.778	.955	.719	.855	.656	.920	.905	.876



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

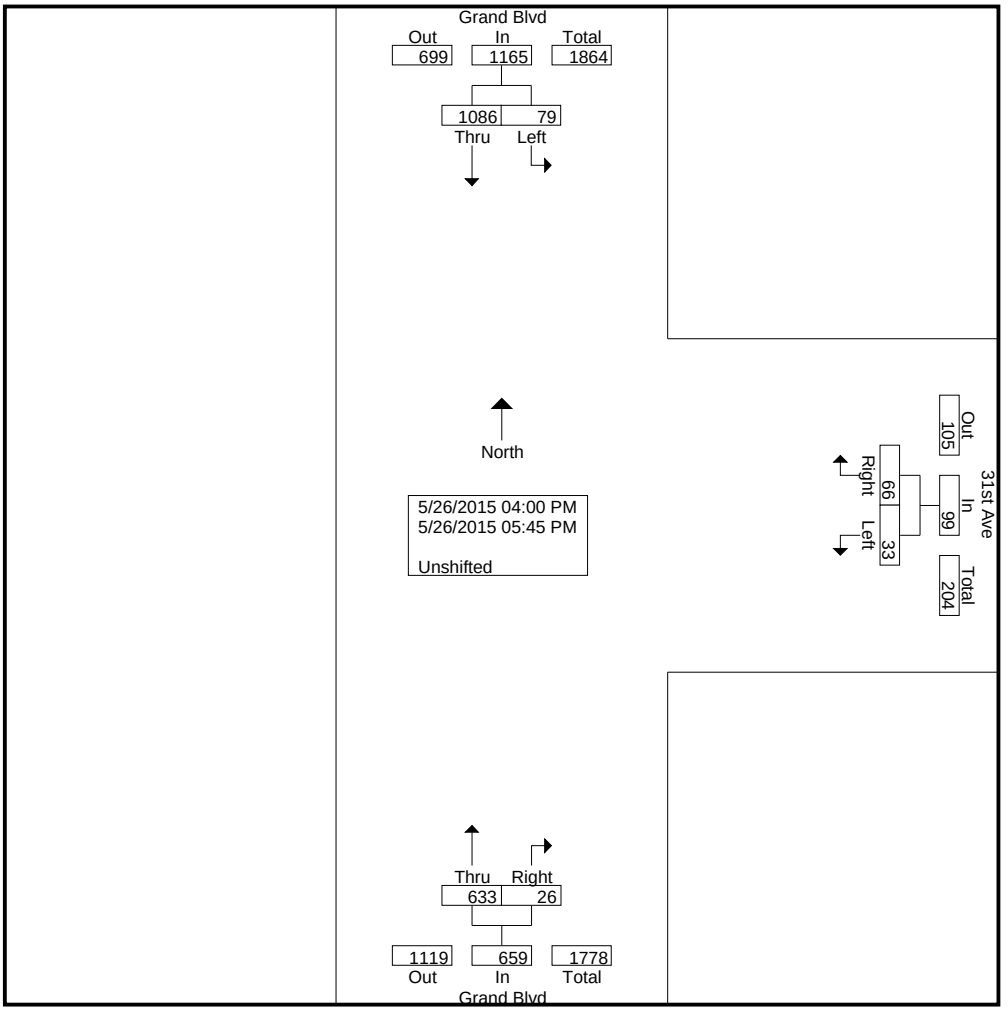
500 E 31st Ave
3100 S Grand Blvd

Peak Hour Data on Page 2

File Name : 31st & Grand PM
Site Code :
Start Date : 5/26/2015

Groups Printed- Unshifted

	Grand Blvd From North			31st Ave From East			Grand Blvd From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
04:00 PM	110	6	116	8	2	10	4	81	85	211
04:15 PM	117	9	126	9	7	16	3	75	78	220
04:30 PM	116	12	128	10	1	11	3	86	89	228
04:45 PM	148	8	156	11	8	19	4	79	83	258
Total	491	35	526	38	18	56	14	321	335	917
05:00 PM	169	10	179	9	1	10	2	87	89	278
05:15 PM	160	15	175	7	5	12	4	81	85	272
05:30 PM	133	11	144	6	6	12	2	82	84	240
05:45 PM	133	8	141	6	3	9	4	62	66	216
Total	595	44	639	28	15	43	12	312	324	1006
Grand Total	1086	79	1165	66	33	99	26	633	659	1923
Apprch %	93.2	6.8		66.7	33.3		3.9	96.1		
Total %	56.5	4.1	60.6	3.4	1.7	5.1	1.4	32.9	34.3	



City of Spokane - Street Department

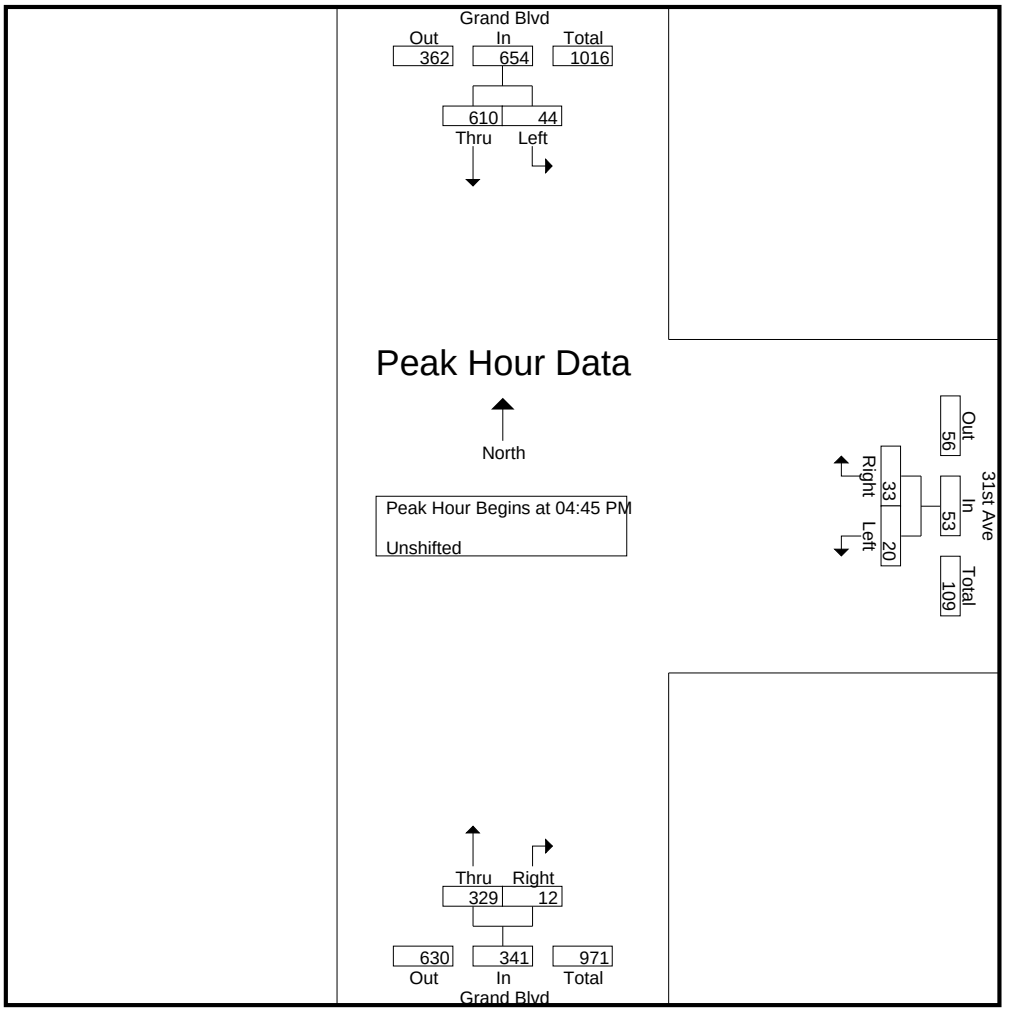
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 31st Ave
3100 S Grand Blvd

Peak Hour Data on Page 2

File Name : 31st & Grand PM
Site Code :
Start Date : 5/26/2015

	Grand Blvd From North			31st Ave From East			Grand Blvd From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	148	8	156	**11**	**8**	**19**	**4**	79	83	258
05:00 PM	**169**	10	**179**	9	1	10	2	**87**	**89**	**278**
05:15 PM	160	**15**	175	7	5	12	4	81	85	272
05:30 PM	133	11	144	6	6	12	2	82	84	240
Total Volume	610	44	654	33	20	53	12	329	341	1048
% App. Total	93.3	6.7		62.3	37.7		3.5	96.5		
PHF	.902	.733	.913	.750	.625	.697	.750	.945	.958	.942



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

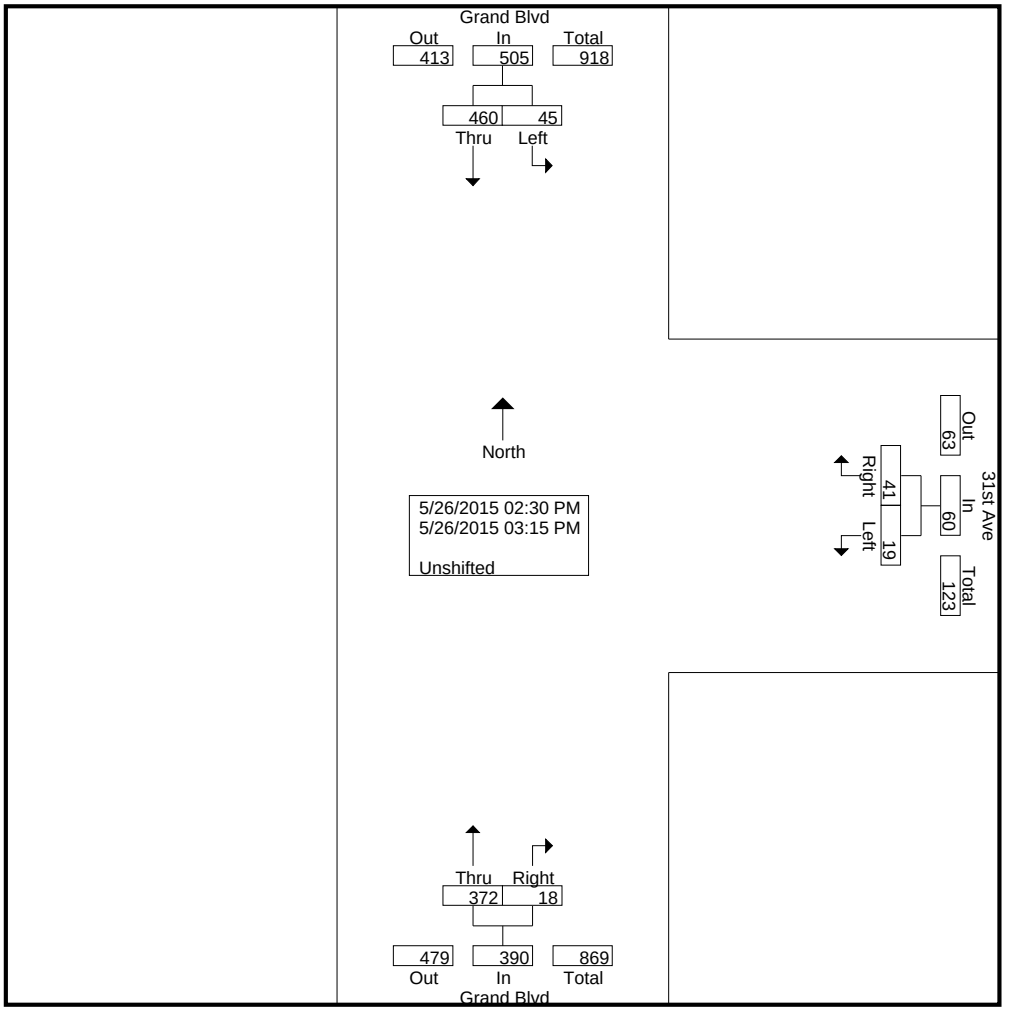
500 E 31st Ave
3100 S Grand Blvd

Peak Hour Data on Page 2

File Name : 31st & Grand School Out
Site Code :
Start Date : 5/26/2015
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North			31st Ave From East			Grand Blvd From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
02:30 PM	85	7	92	5	6	11	5	52	57	160
02:45 PM	159	10	169	13	4	17	2	63	65	251
Total	244	17	261	18	10	28	7	115	122	411
03:00 PM	89	12	101	9	5	14	9	126	135	250
03:15 PM	127	16	143	14	4	18	2	131	133	294
Grand Total	460	45	505	41	19	60	18	372	390	955
Apprch %	91.1	8.9		68.3	31.7		4.6	95.4		
Total %	48.2	4.7	52.9	4.3	2	6.3	1.9	39	40.8	



City of Spokane - Street Department

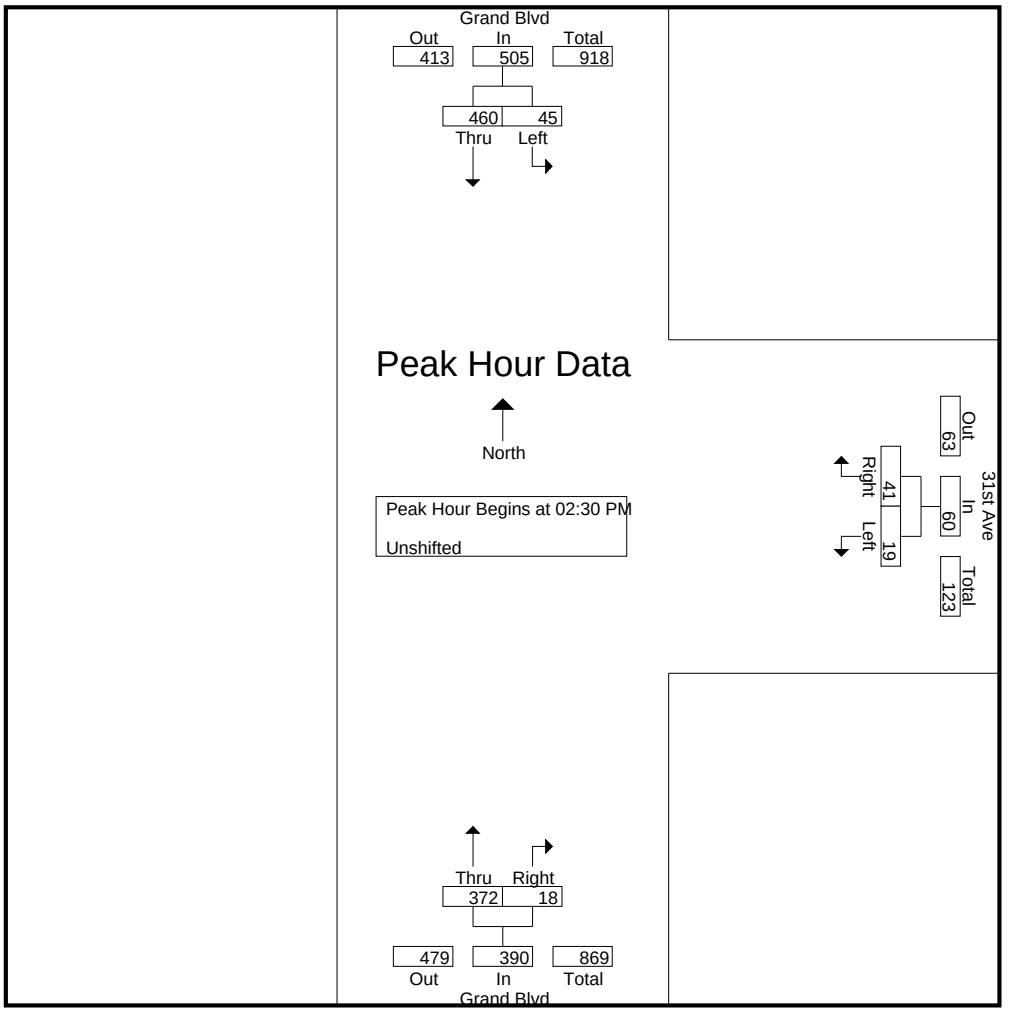
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 31st Ave
3100 S Grand Blvd

Peak Hour Data on Page 2

File Name : 31st & Grand School Out
Site Code :
Start Date : 5/26/2015
Page No : 2

	Grand Blvd From North			31st Ave From East			Grand Blvd From South			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 03:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 02:30 PM										
02:30 PM	85	7	92	5	**6**	11	5	52	57	160
02:45 PM	**159**	10	**169**	13	4	17	2	63	65	251
03:00 PM	89	12	101	9	5	14	**9**	126	**135**	250
03:15 PM	127	**16**	143	**14**	4	**18**	2	**131**	133	**294**
Total Volume	460	45	505	41	19	60	18	372	390	955
% App. Total	91.1	8.9		68.3	31.7		4.6	95.4		
PHF	.723	.703	.747	.732	.792	.833	.500	.710	.722	.812



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

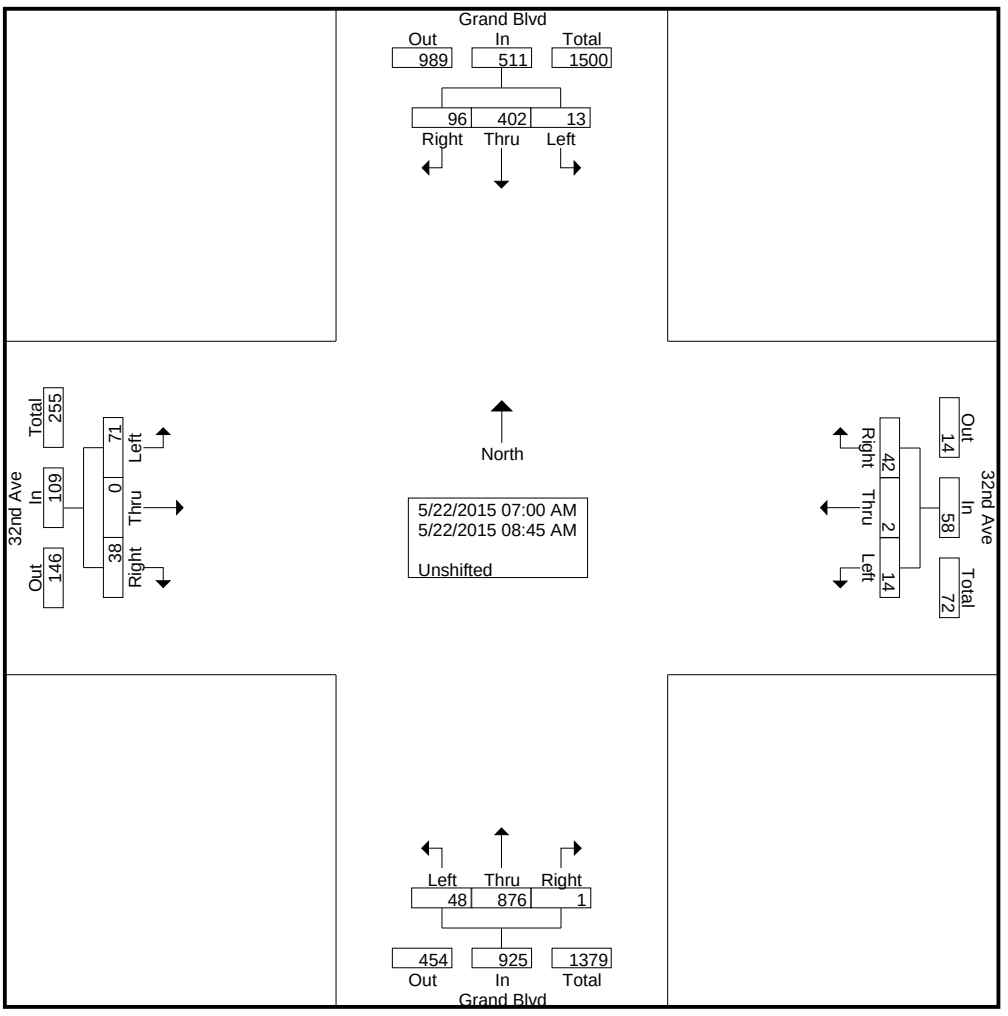
500 E 32nd Ave
3200 S Grand Blvd

Peak Hour Data on Page 2

File Name : 32nd & Grand AM
Site Code :
Start Date : 5/22/2015
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				32nd Ave From East				Grand Blvd From South				32nd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	7	22	0	29	2	0	1	3	0	87	2	89	4	0	3	7	128
07:15 AM	4	31	1	36	3	0	2	5	0	105	1	106	1	0	3	4	151
07:30 AM	6	41	1	48	5	0	0	5	0	149	3	152	2	0	6	8	213
07:45 AM	7	40	2	49	8	0	1	9	0	128	3	131	0	0	5	5	194
Total	24	134	4	162	18	0	4	22	0	469	9	478	7	0	17	24	686
08:00 AM	12	40	4	56	7	0	1	8	1	93	7	101	1	0	5	6	171
08:15 AM	22	45	5	72	4	2	3	9	0	113	8	121	11	0	10	21	223
08:30 AM	29	81	0	110	8	0	2	10	0	96	17	113	16	0	29	45	278
08:45 AM	9	102	0	111	5	0	4	9	0	105	7	112	3	0	10	13	245
Total	72	268	9	349	24	2	10	36	1	407	39	447	31	0	54	85	917
Grand Total	96	402	13	511	42	2	14	58	1	876	48	925	38	0	71	109	1603
Apprch %	18.8	78.7	2.5		72.4	3.4	24.1		0.1	94.7	5.2		34.9	0	65.1		
Total %	6	25.1	0.8	31.9	2.6	0.1	0.9	3.6	0.1	54.6	3	57.7	2.4	0	4.4	6.8	



City of Spokane - Street Department

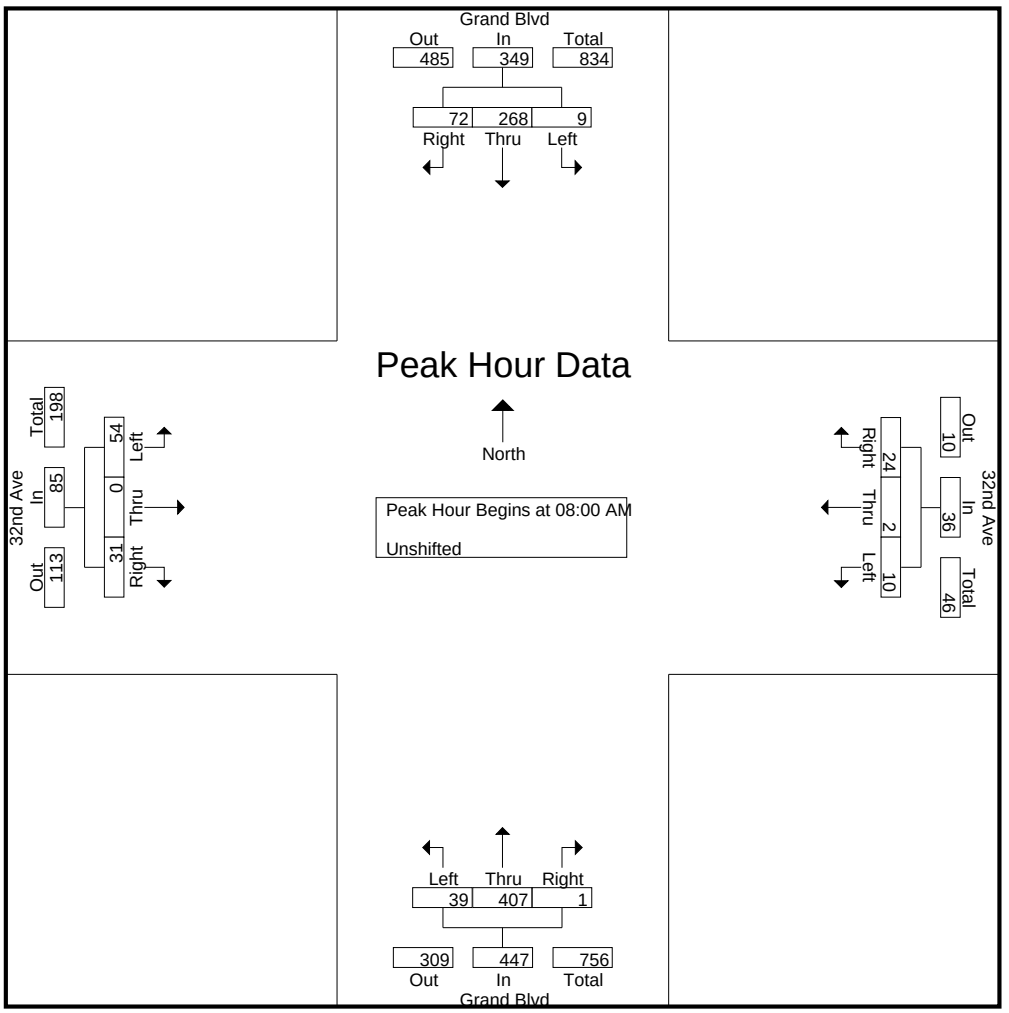
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 32nd Ave
3200 S Grand Blvd

Peak Hour Data on Page 2

File Name : 32nd & Grand AM
Site Code :
Start Date : 5/22/2015
Page No : 2

	Grand Blvd From North				32nd Ave From East				Grand Blvd From South				32nd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	12	40	4	56	7	0	1	8	**1**	93	7	101	1	0	5	6	171
08:15 AM	22	45	**5**	72	4	**2**	3	9	0	**113**	8	**121**	11	0	10	21	223
08:30 AM	**29**	81	0	110	**8**	0	2	**10**	0	96	**17**	113	**16**	0	**29**	**45**	**278**
08:45 AM	9	**102**	0	**111**	5	0	**4**	9	0	105	7	112	3	0	10	13	245
Total Volume	72	268	9	349	24	2	10	36	1	407	39	447	31	0	54	85	917
% App. Total	20.6	76.8	2.6		66.7	5.6	27.8		0.2	91.1	8.7		36.5	0	63.5		
PHF	.621	.657	.450	.786	.750	.250	.625	.900	.250	.900	.574	.924	.484	.000	.466	.472	.825



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

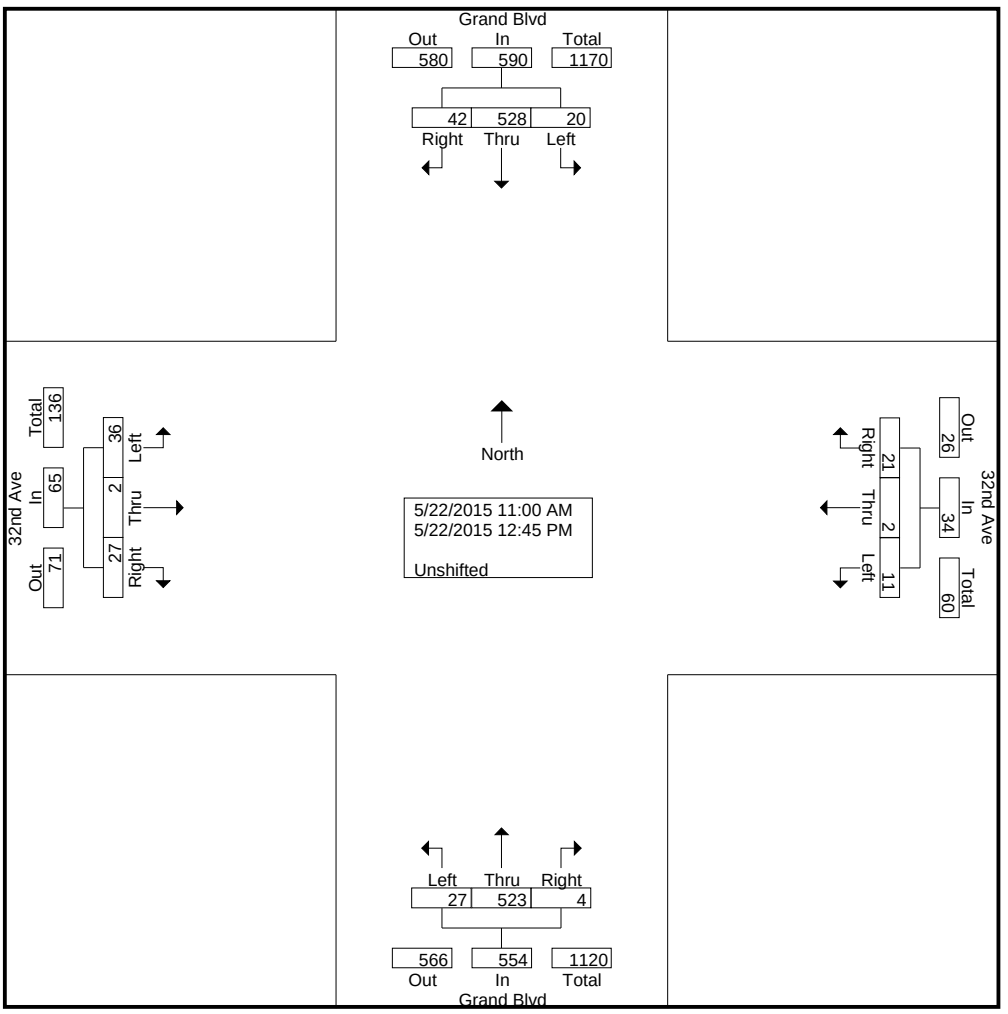
500 E 32nd Ave
3200 S Grand Blvd

Peak Hour Data on Page 2

File Name : 32nd & Grand MID
Site Code :
Start Date : 5/22/2015
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				32nd Ave From East				Grand Blvd From South				32nd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
11:00 AM	4	56	1	61	0	0	3	3	2	54	6	62	4	0	2	6	132
11:15 AM	5	63	3	71	3	1	3	7	0	62	4	66	3	2	7	12	156
11:30 AM	6	59	3	68	5	0	1	6	0	70	1	71	5	0	1	6	151
11:45 AM	4	91	4	99	4	0	0	4	1	72	2	75	5	0	4	9	187
Total	19	269	11	299	12	1	7	20	3	258	13	274	17	2	14	33	626
12:00 PM	6	77	2	85	0	0	1	1	0	55	4	59	5	0	2	7	152
12:15 PM	2	57	2	61	4	0	2	6	1	73	5	79	2	0	7	9	155
12:30 PM	8	50	5	63	3	0	0	3	0	71	2	73	3	0	2	5	144
12:45 PM	7	75	0	82	2	1	1	4	0	66	3	69	0	0	11	11	166
Total	23	259	9	291	9	1	4	14	1	265	14	280	10	0	22	32	617
Grand Total	42	528	20	590	21	2	11	34	4	523	27	554	27	2	36	65	1243
Apprch %	7.1	89.5	3.4		61.8	5.9	32.4		0.7	94.4	4.9		41.5	3.1	55.4		
Total %	3.4	42.5	1.6	47.5	1.7	0.2	0.9	2.7	0.3	42.1	2.2	44.6	2.2	0.2	2.9	5.2	



City of Spokane - Street Department

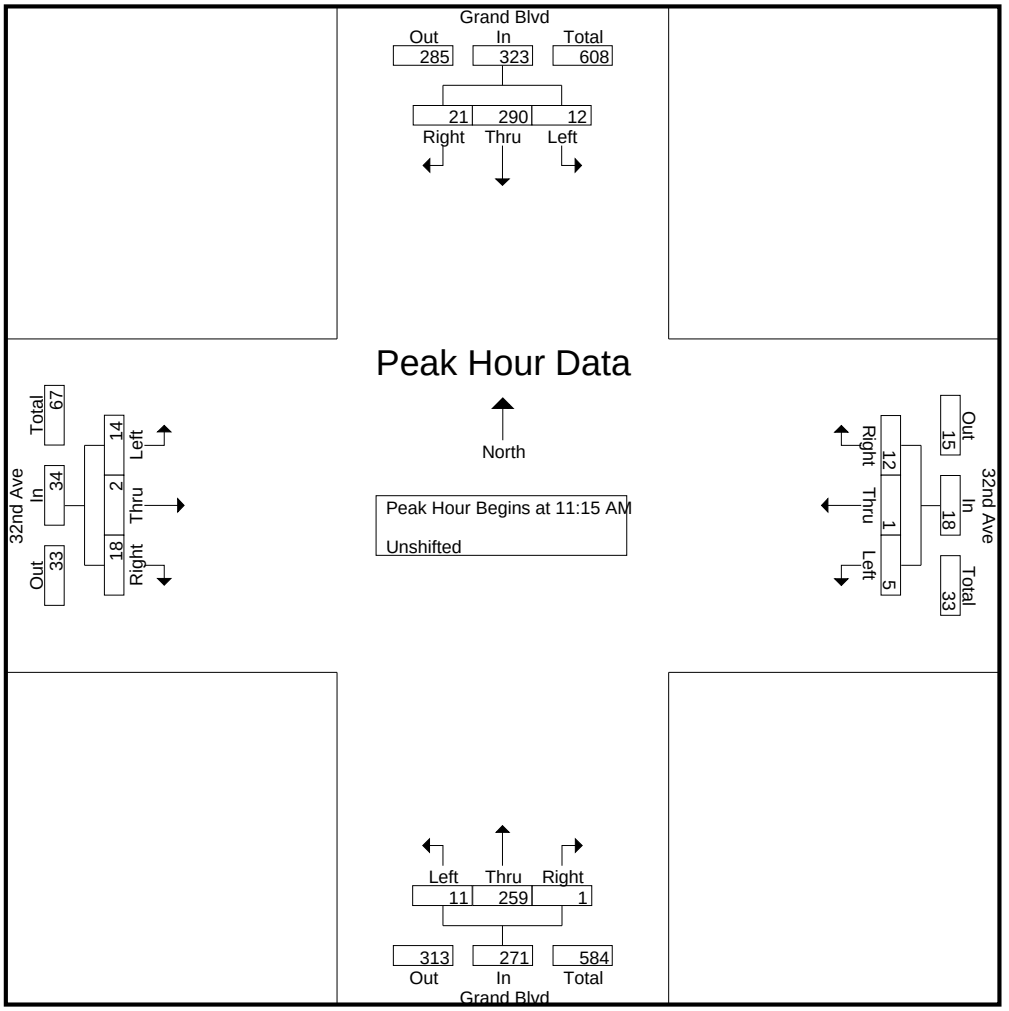
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 32nd Ave
3200 S Grand Blvd

Peak Hour Data on Page 2

File Name : 32nd & Grand MID
Site Code :
Start Date : 5/22/2015
Page No : 2

	Grand Blvd From North				32nd Ave From East				Grand Blvd From South				32nd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:15 AM																	
11:15 AM	5	63	3	71	3	**1**	**3**	**7**	0	62	**4**	66	3	**2**	**7**	**12**	156
11:30 AM	**6**	59	3	68	**5**	0	1	6	0	70	1	71	**5**	0	1	6	151
11:45 AM	4	**91**	**4**	**99**	4	0	0	4	**1**	**72**	2	**75**	5	0	4	9	**187**
12:00 PM	6	77	2	85	0	0	1	1	0	55	4	59	5	0	2	7	152
Total Volume	21	290	12	323	12	1	5	18	1	259	11	271	18	2	14	34	646
% App. Total	6.5	89.8	3.7		66.7	5.6	27.8		0.4	95.6	4.1		52.9	5.9	41.2		
PHF	.875	.797	.750	.816	.600	.250	.417	.643	.250	.899	.688	.903	.900	.250	.500	.708	.864



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

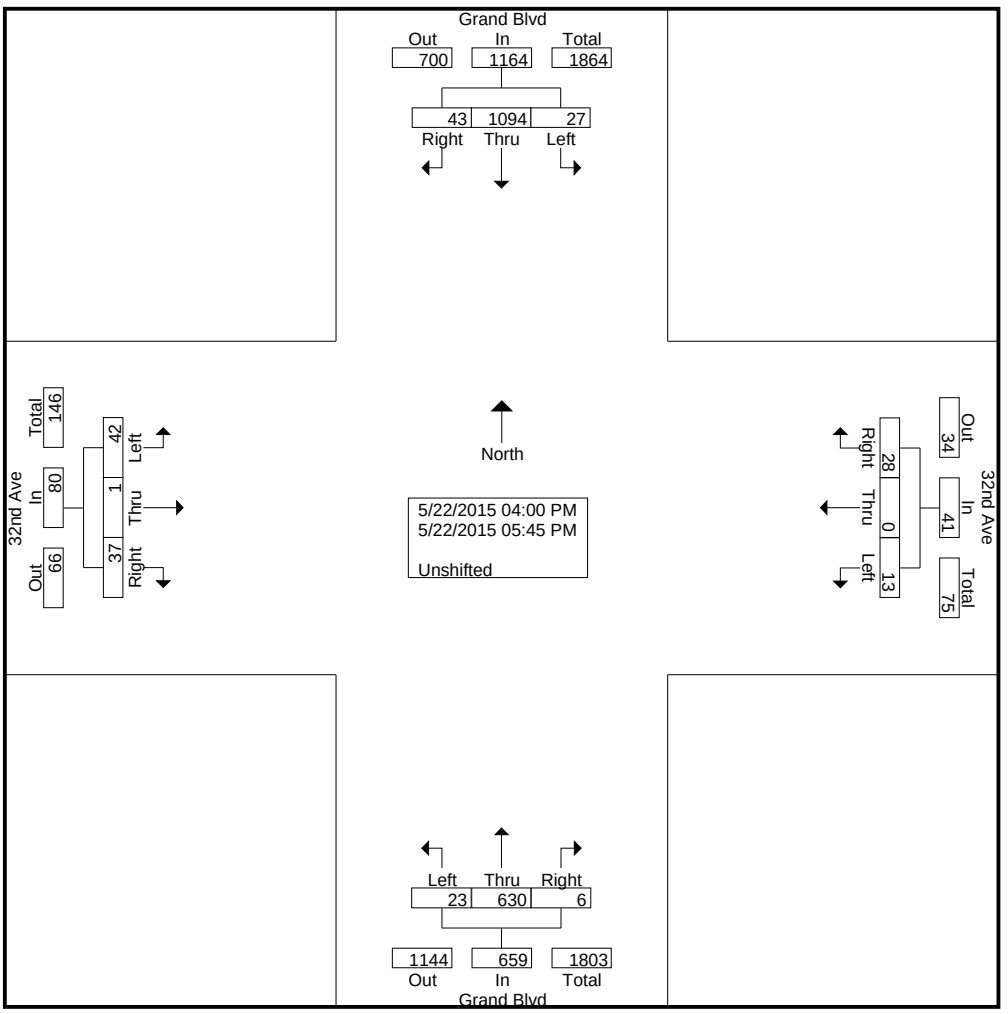
500 E 32nd Ave
3200 S Grand Blvd

Peak Hour Data on Page 2

File Name : 32nd & Grand PM
Site Code :
Start Date : 5/22/2015
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				32nd Ave From East				Grand Blvd From South				32nd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	6	107	3	116	3	0	1	4	0	81	4	85	9	0	6	15	220
04:15 PM	8	115	3	126	2	0	1	3	1	70	7	78	8	0	10	18	225
04:30 PM	5	120	3	128	3	0	1	4	0	88	1	89	1	1	9	11	232
04:45 PM	4	149	3	156	1	0	4	5	2	78	3	83	6	0	5	11	255
Total	23	491	12	526	9	0	7	16	3	317	15	335	24	1	30	55	932
05:00 PM	5	167	7	179	10	0	2	12	0	85	4	89	4	0	6	10	290
05:15 PM	7	165	3	175	3	0	1	4	0	81	4	85	4	0	1	5	269
05:30 PM	5	137	2	144	4	0	1	5	2	82	0	84	3	0	3	6	239
05:45 PM	3	134	3	140	2	0	2	4	1	65	0	66	2	0	2	4	214
Total	20	603	15	638	19	0	6	25	3	313	8	324	13	0	12	25	1012
Grand Total	43	1094	27	1164	28	0	13	41	6	630	23	659	37	1	42	80	1944
Apprch %	3.7	94	2.3		68.3	0	31.7		0.9	95.6	3.5		46.2	1.2	52.5		
Total %	2.2	56.3	1.4	59.9	1.4	0	0.7	2.1	0.3	32.4	1.2	33.9	1.9	0.1	2.2	4.1	



City of Spokane - Street Department

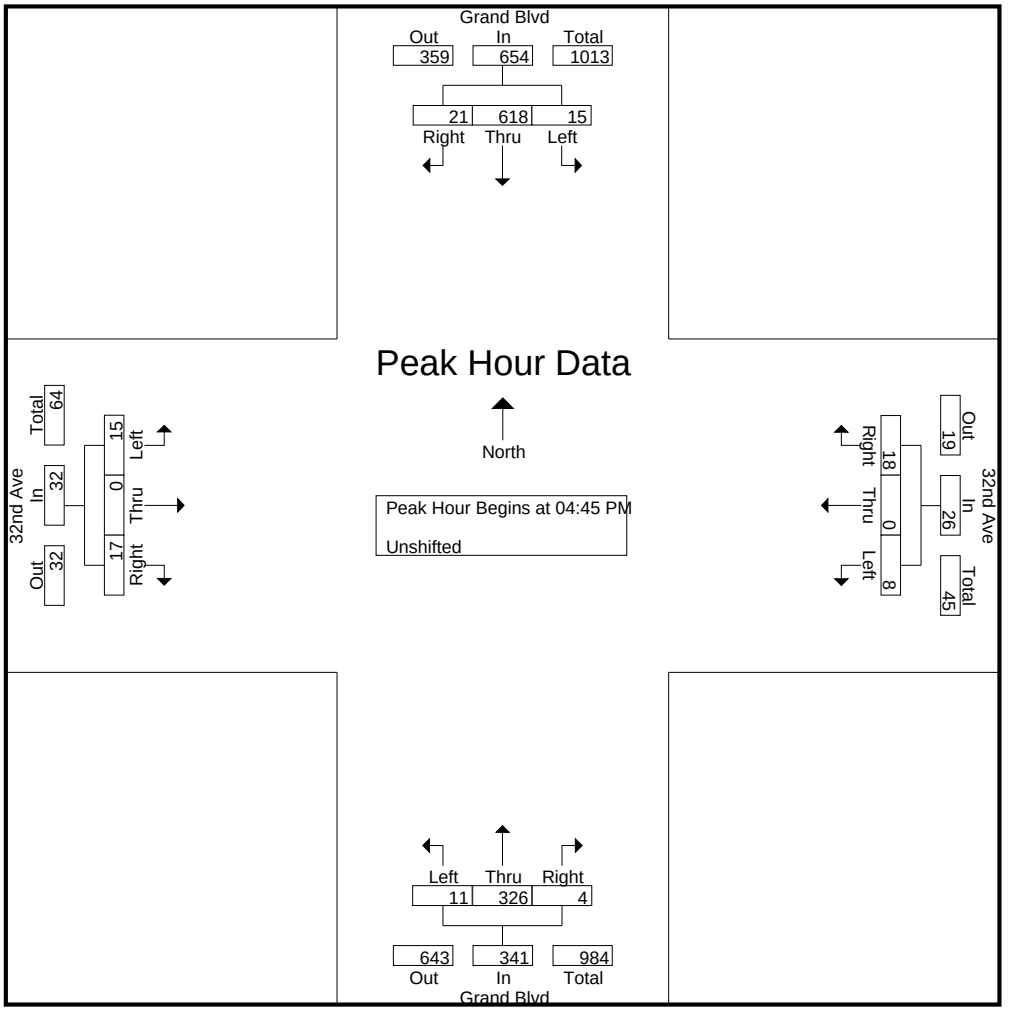
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 32nd Ave
3200 S Grand Blvd

Peak Hour Data on Page 2

File Name : 32nd & Grand PM
Site Code :
Start Date : 5/22/2015
Page No : 2

	Grand Blvd From North				32nd Ave From East				Grand Blvd From South				32nd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	4	149	3	156	1	0	**4**	5	**2**	78	3	83	**6**	0	5	**11**	255
05:00 PM	5	**167**	**7**	**179**	**10**	0	2	**12**	0	**85**	**4**	**89**	4	0	**6**	10	**290**
05:15 PM	**7**	165	3	175	3	0	1	4	0	81	4	85	4	0	1	5	269
05:30 PM	5	137	2	144	4	0	1	5	2	82	0	84	3	0	3	6	239
Total Volume	21	618	15	654	18	0	8	26	4	326	11	341	17	0	15	32	1053
% App. Total	3.2	94.5	2.3		69.2	0	30.8		1.2	95.6	3.2		53.1	0	46.9		
PHF	.750	.925	.536	.913	.450	.000	.500	.542	.500	.959	.688	.958	.708	.000	.625	.727	.908



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

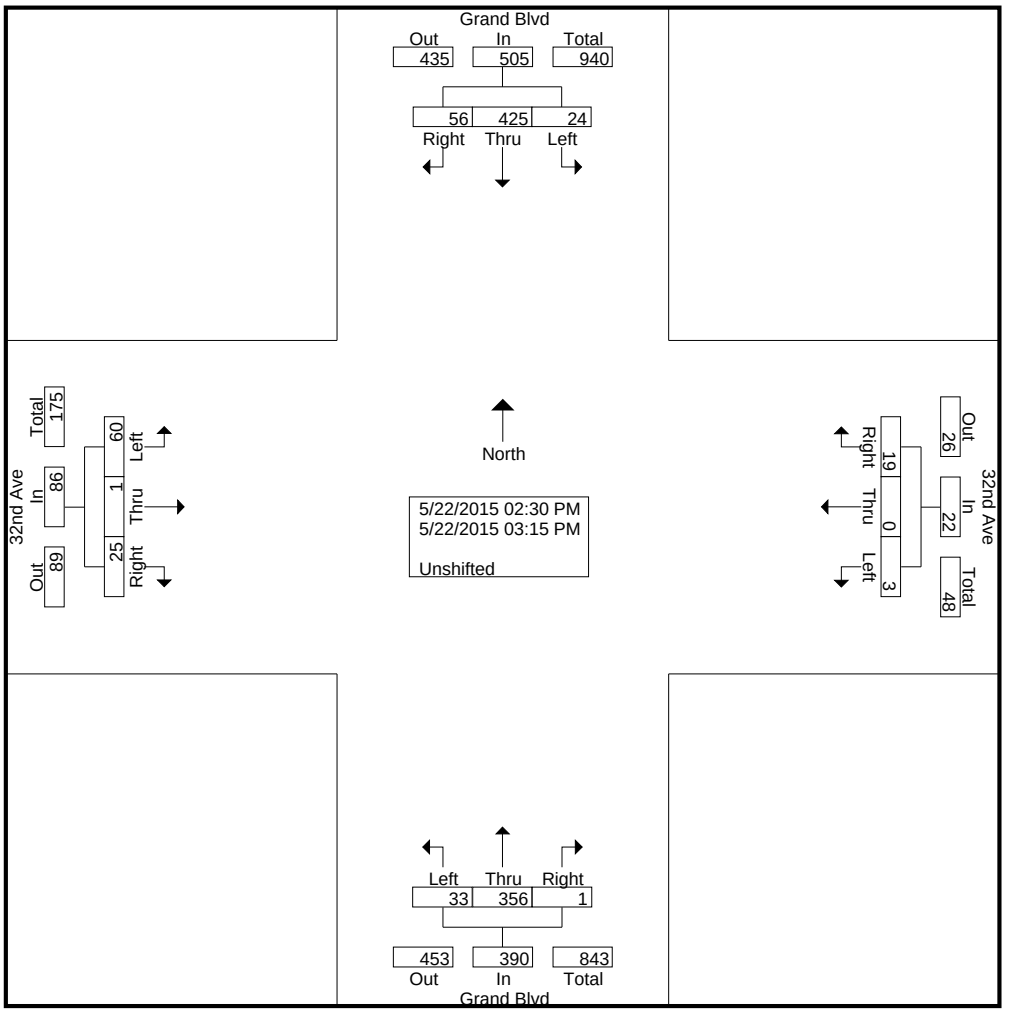
500 E 32nd Ave
3200 S Grand Blvd

Peak Hour Data on Page 2

File Name : 32nd & Grand School Out
Site Code :
Start Date : 5/22/2015
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				32nd Ave From East				Grand Blvd From South				32nd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
02:30 PM	7	82	3	92	3	0	1	4	0	54	3	57	4	0	8	12	165
02:45 PM	6	158	5	169	7	0	1	8	0	58	7	65	2	0	7	9	251
Total	13	240	8	261	10	0	2	12	0	112	10	122	6	0	15	21	416
03:00 PM	16	77	8	101	4	0	0	4	0	123	12	135	4	0	7	11	251
03:15 PM	27	108	8	143	5	0	1	6	1	121	11	133	15	1	38	54	336
Grand Total	56	425	24	505	19	0	3	22	1	356	33	390	25	1	60	86	1003
Apprch %	11.1	84.2	4.8		86.4	0	13.6		0.3	91.3	8.5		29.1	1.2	69.8		
Total %	5.6	42.4	2.4	50.3	1.9	0	0.3	2.2	0.1	35.5	3.3	38.9	2.5	0.1	6	8.6	



City of Spokane - Street Department

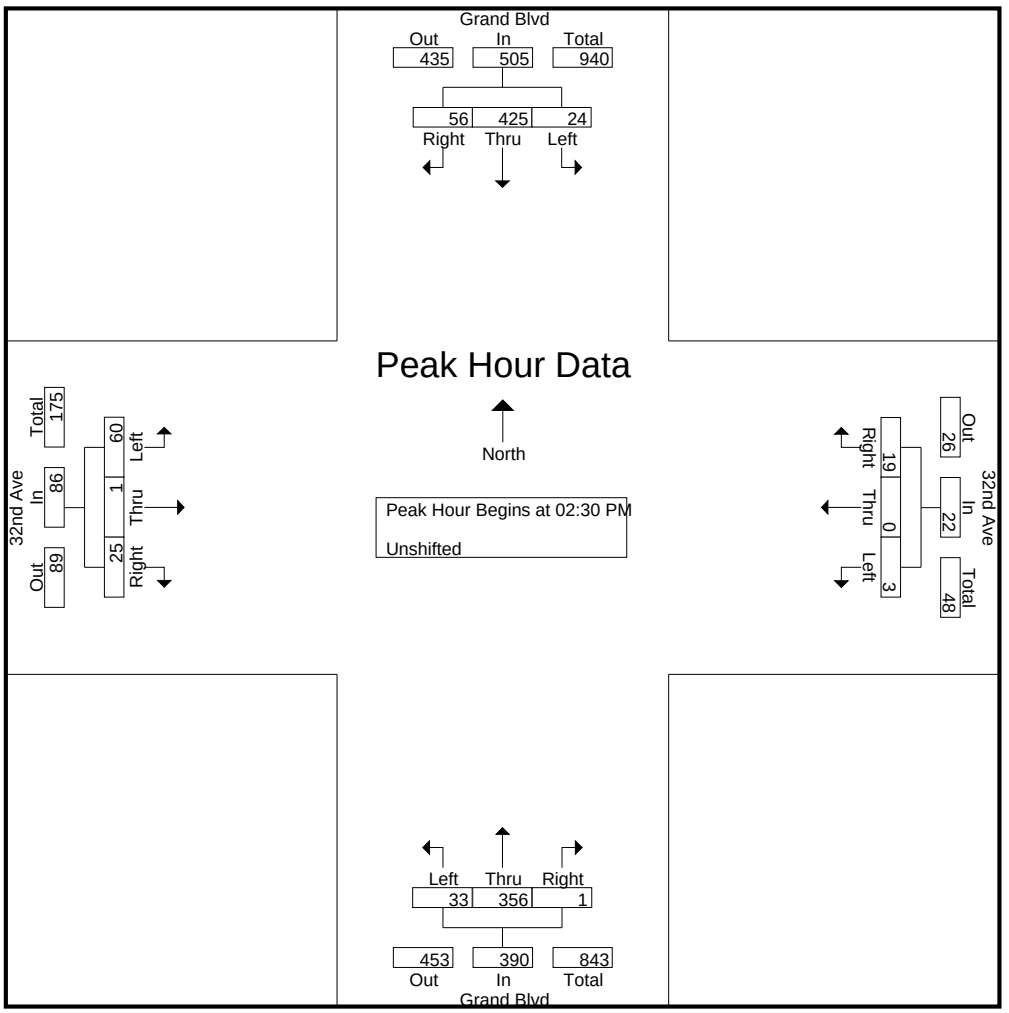
901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

500 E 32nd Ave
3200 S Grand Blvd

Peak Hour Data on Page 2

File Name : 32nd & Grand School Out
Site Code :
Start Date : 5/22/2015
Page No : 2

	Grand Blvd From North				32nd Ave From East				Grand Blvd From South				32nd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 03:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:30 PM																	
02:30 PM	7	82	3	92	3	0	**1**	4	0	54	3	57	4	0	8	12	165
02:45 PM	6	**158**	5	**169**	**7**	0	1	**8**	0	58	7	65	2	0	7	9	251
03:00 PM	16	77	**8**	101	4	0	0	4	0	**123**	**12**	**135**	4	0	7	11	251
03:15 PM	**27**	108	8	143	5	0	1	6	**1**	121	11	133	**15**	**1**	**38**	**54**	**336**
Total Volume	56	425	24	505	19	0	3	22	1	356	33	390	25	1	60	86	1003
% App. Total	11.1	84.2	4.8		86.4	0	13.6		0.3	91.3	8.5		29.1	1.2	69.8		
PHF	.519	.672	.750	.747	.679	.000	.750	.688	.250	.724	.688	.722	.417	.250	.395	.398	.746



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

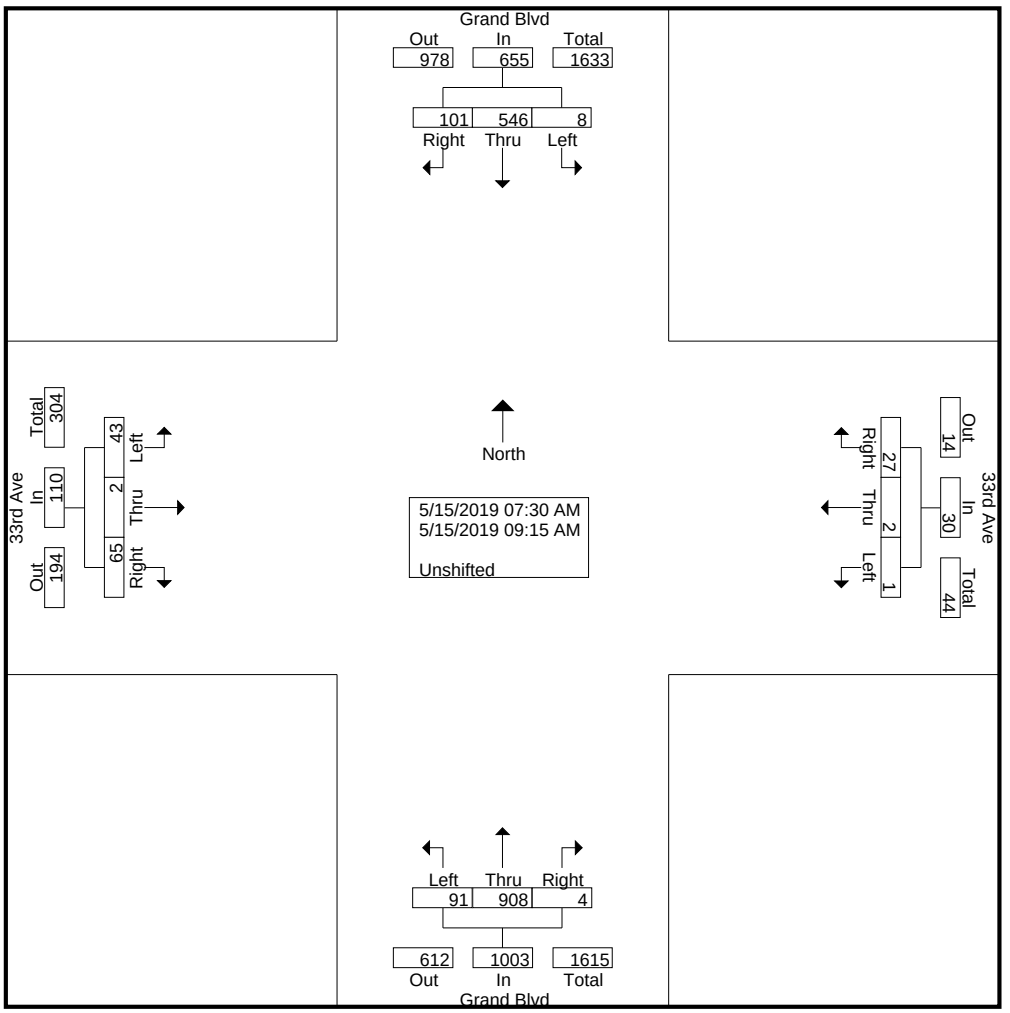
3300 S Grand Blvd
600 E 33rd Ave

Peak hour data on page 2

File Name : Grand & 33rd School Let in
Site Code :
Start Date : 5/15/2019

Groups Printed- Unshifted

	Grand Blvd From North				33rd Ave From East				Grand Blvd From South				33rd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:30 AM	4	52	3	59	9	1	0	10	1	185	5	191	7	0	12	19	279
07:45 AM	2	56	0	58	5	0	0	5	0	118	4	122	2	0	2	4	189
Total	6	108	3	117	14	1	0	15	1	303	9	313	9	0	14	23	468
08:00 AM	11	67	0	78	2	0	0	2	0	122	9	131	9	0	3	12	223
08:15 AM	17	78	1	96	0	0	1	1	0	106	13	119	13	1	3	17	233
08:30 AM	36	80	0	116	3	0	0	3	2	117	22	141	18	0	2	20	280
08:45 AM	14	77	2	93	4	0	0	4	0	101	32	133	11	0	14	25	255
Total	78	302	3	383	9	0	1	10	2	446	76	524	51	1	22	74	991
09:00 AM	4	82	0	86	0	0	0	0	0	79	4	83	2	0	1	3	172
09:15 AM	13	54	2	69	4	1	0	5	1	80	2	83	3	1	6	10	167
Grand Total	101	546	8	655	27	2	1	30	4	908	91	1003	65	2	43	110	1798
Apprch %	15.4	83.4	1.2		90	6.7	3.3		0.4	90.5	9.1		59.1	1.8	39.1		
Total %	5.6	30.4	0.4	36.4	1.5	0.1	0.1	1.7	0.2	50.5	5.1	55.8	3.6	0.1	2.4	6.1	

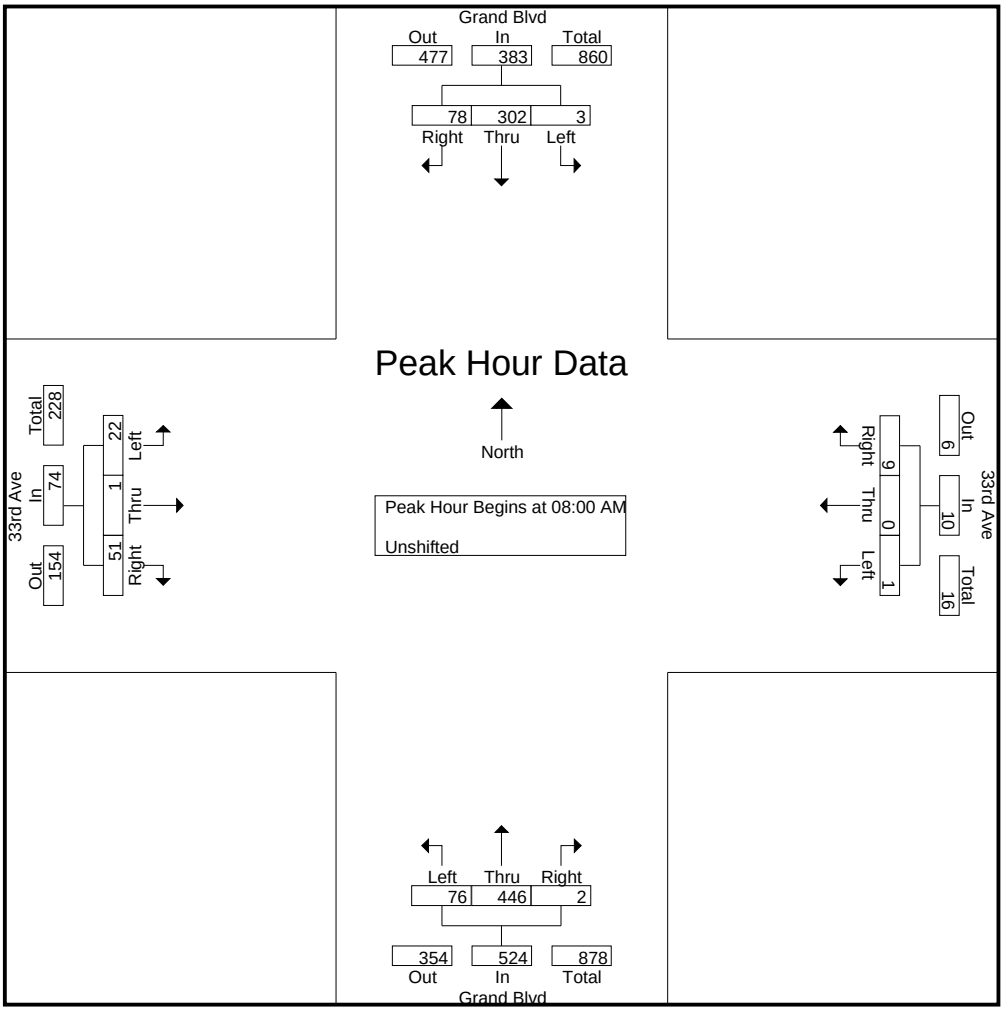


City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

File Name : Grand & 33rd School Let in
Site Code :
Start Date : 5/15/2019
Page No : 2

	Grand Blvd From North				33rd Ave From East				Grand Blvd From South				33rd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	11	67	0	78	2	0	0	2	0	**122**	9	131	9	0	3	12	223
08:15 AM	17	78	1	96	0	0	**1**	1	0	106	13	119	13	**1**	3	17	233
08:30 AM	**36**	**80**	0	**116**	3	0	0	3	**2**	117	22	**141**	**18**	0	2	20	**280**
08:45 AM	14	77	**2**	93	**4**	0	0	**4**	0	101	**32**	133	11	0	**14**	**25**	255
Total Volume	78	302	3	383	9	0	1	10	2	446	76	524	51	1	22	74	991
% App. Total	20.4	78.9	0.8		90	0	10		0.4	85.1	14.5		68.9	1.4	29.7		
PHF	.542	.944	.375	.825	.563	.000	.250	.625	.250	.914	.594	.929	.708	.250	.393	.740	.885



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

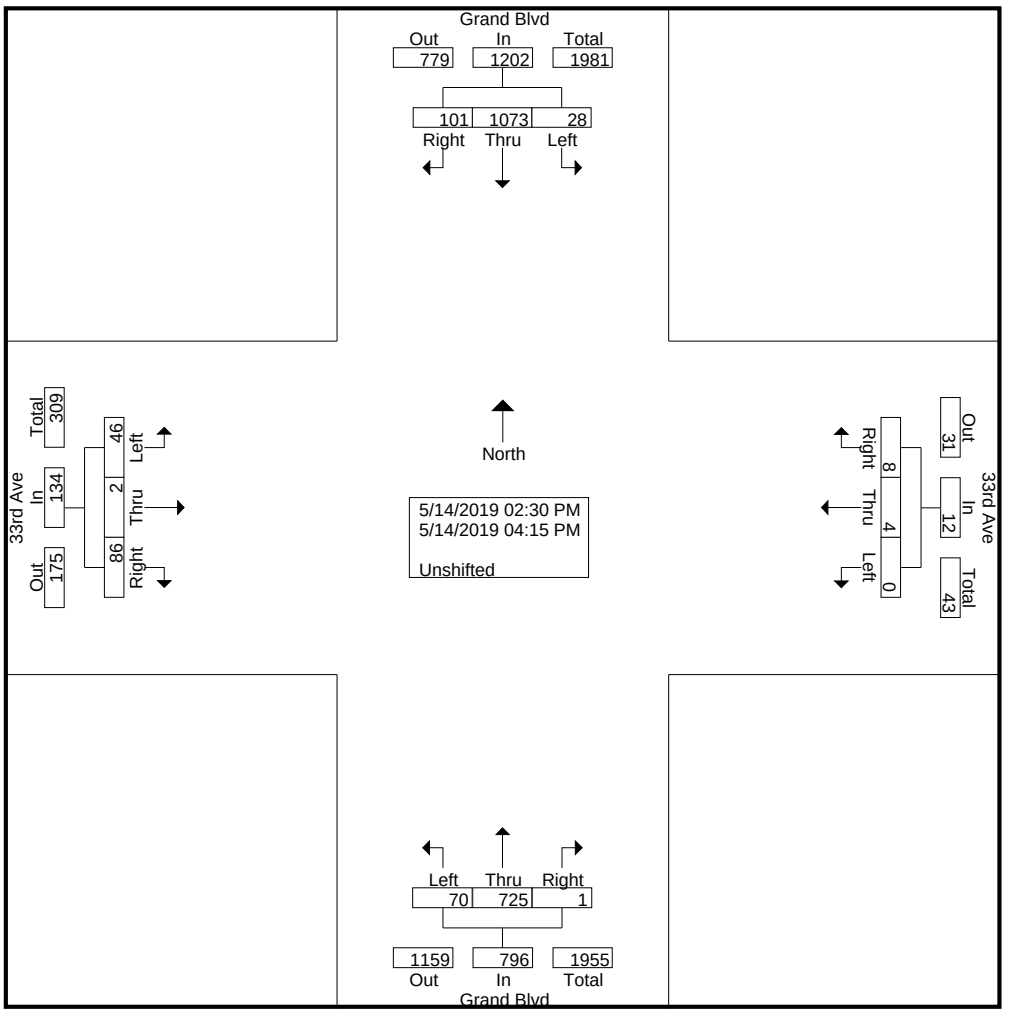
3300 S Grand Blvd
600 E 33rd Ave

Peak hour data on page 2

File Name : Grand & 33rd School Let out
Site Code :
Start Date : 5/14/2019

Groups Printed- Unshifted

	Grand Blvd From North				33rd Ave From East				Grand Blvd From South				33rd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
02:30 PM	9	129	2	140	2	0	0	2	0	74	11	85	3	0	6	9	236
02:45 PM	13	122	2	137	0	0	0	0	0	79	11	90	4	0	3	7	234
Total	22	251	4	277	2	0	0	2	0	153	22	175	7	0	9	16	470
03:00 PM	11	117	3	131	0	0	0	0	0	110	6	116	19	0	7	26	273
03:15 PM	24	130	10	164	0	0	0	0	1	113	18	132	5	0	3	8	304
03:30 PM	13	124	4	141	3	0	0	3	0	82	7	89	24	1	7	32	265
03:45 PM	7	142	2	151	2	3	0	5	0	95	2	97	11	0	7	18	271
Total	55	513	19	587	5	3	0	8	1	400	33	434	59	1	24	84	1113
04:00 PM	11	137	2	150	0	1	0	1	0	87	6	93	10	0	4	14	258
04:15 PM	13	172	3	188	1	0	0	1	0	85	9	94	10	1	9	20	303
Grand Total	101	1073	28	1202	8	4	0	12	1	725	70	796	86	2	46	134	2144
Apprch %	8.4	89.3	2.3		66.7	33.3	0		0.1	91.1	8.8		64.2	1.5	34.3		
Total %	4.7	50	1.3	56.1	0.4	0.2	0	0.6	0	33.8	3.3	37.1	4	0.1	2.1	6.2	

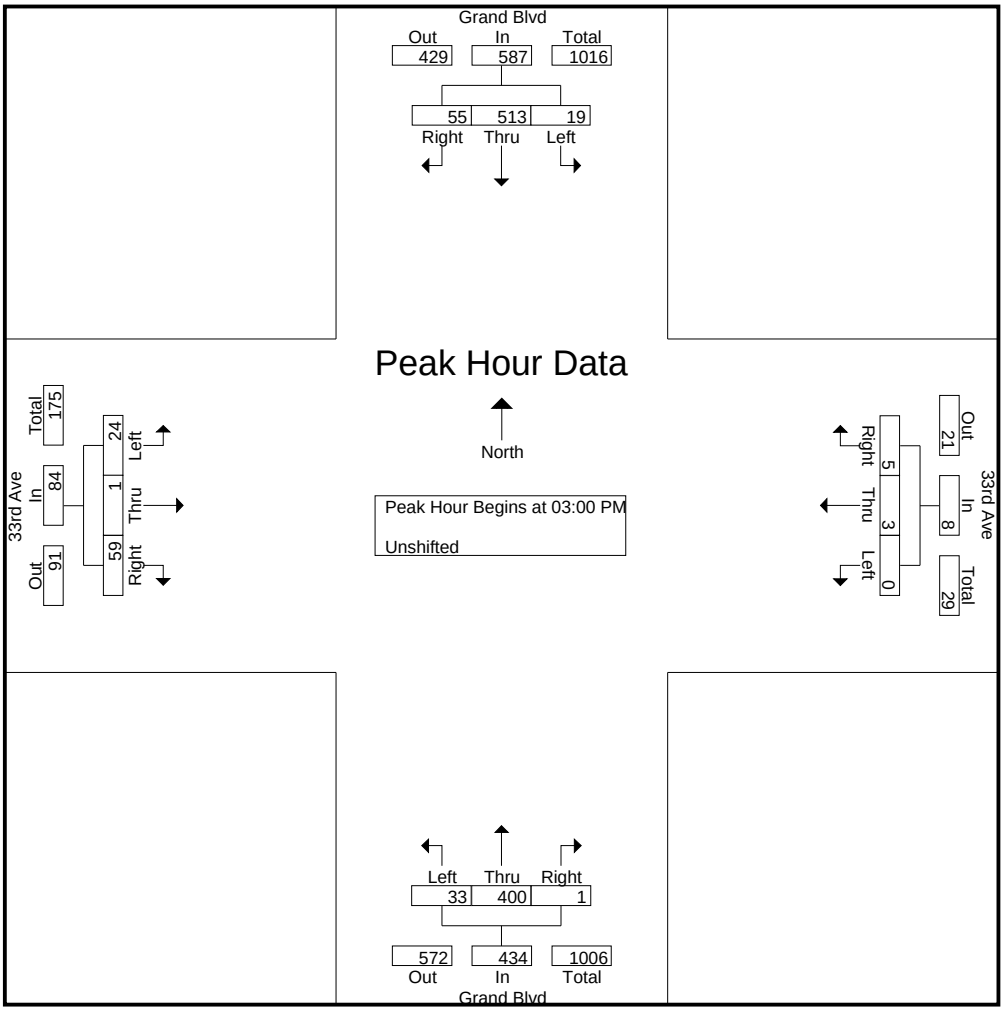


City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

File Name : Grand & 33rd School Let out
Site Code :
Start Date : 5/14/2019
Page No : 2

	Grand Blvd From North				33rd Ave From East				Grand Blvd From South				33rd Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 04:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	11	117	3	131	0	0	0	0	0	110	6	116	19	0	**7**	26	273
03:15 PM	**24**	130	**10**	**164**	0	0	0	0	**1**	**113**	**18**	**132**	5	0	3	8	**304**
03:30 PM	13	124	4	141	**3**	0	0	3	0	82	7	89	**24**	**1**	7	**32**	265
03:45 PM	7	**142**	2	151	2	**3**	0	**5**	0	95	2	97	11	0	7	18	271
Total Volume	55	513	19	587	5	3	0	8	1	400	33	434	59	1	24	84	1113
% App. Total	9.4	87.4	3.2		62.5	37.5	0		0.2	92.2	7.6		70.2	1.2	28.6		
PHF	.573	.903	.475	.895	.417	.250	.000	.400	.250	.885	.458	.822	.615	.250	.857	.656	.915



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

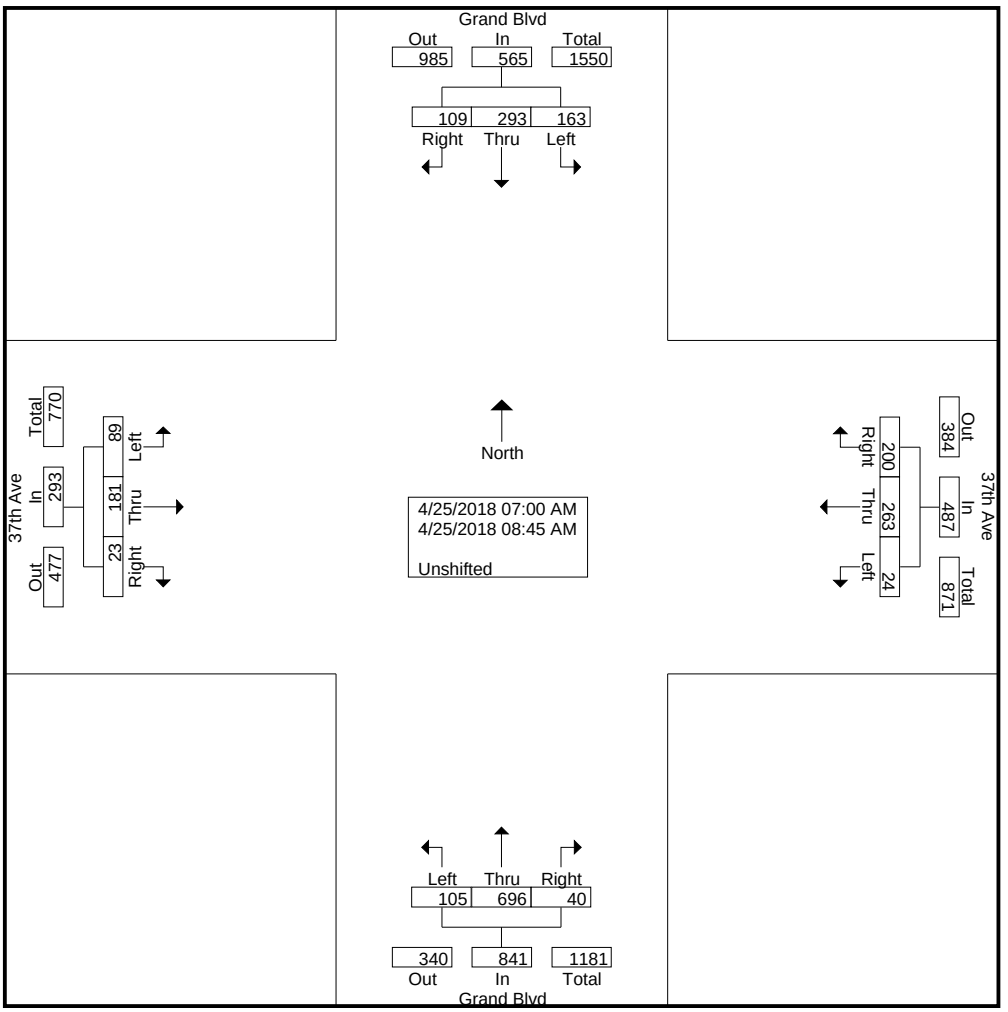
3700 S Grand Blvd
600 E 37th Ave

Peak Hour Data on Page 2

File Name : Grand & 37th INT255 AM
Site Code : INT255
Start Date : 4/25/2018
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				37th Ave From East				Grand Blvd From South				37th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	3	15	13	31	12	19	2	33	2	55	14	71	0	18	2	20	155
07:15 AM	11	21	15	47	17	34	5	56	4	82	11	97	3	28	6	37	237
07:30 AM	9	40	12	61	28	47	1	76	1	107	8	116	1	20	8	29	282
07:45 AM	10	37	25	72	20	37	3	60	5	90	21	116	2	17	8	27	275
Total	33	113	65	211	77	137	11	225	12	334	54	400	6	83	24	113	949
08:00 AM	25	39	24	88	27	37	0	64	3	68	15	86	1	19	13	33	271
08:15 AM	27	38	24	89	29	39	7	75	5	81	24	110	8	32	24	64	338
08:30 AM	15	50	27	92	31	29	2	62	6	119	6	131	1	29	19	49	334
08:45 AM	9	53	23	85	36	21	4	61	14	94	6	114	7	18	9	34	294
Total	76	180	98	354	123	126	13	262	28	362	51	441	17	98	65	180	1237
Grand Total	109	293	163	565	200	263	24	487	40	696	105	841	23	181	89	293	2186
Apprch %	19.3	51.9	28.8		41.1	54	4.9		4.8	82.8	12.5		7.8	61.8	30.4		
Total %	5	13.4	7.5	25.8	9.1	12	1.1	22.3	1.8	31.8	4.8	38.5	1.1	8.3	4.1	13.4	

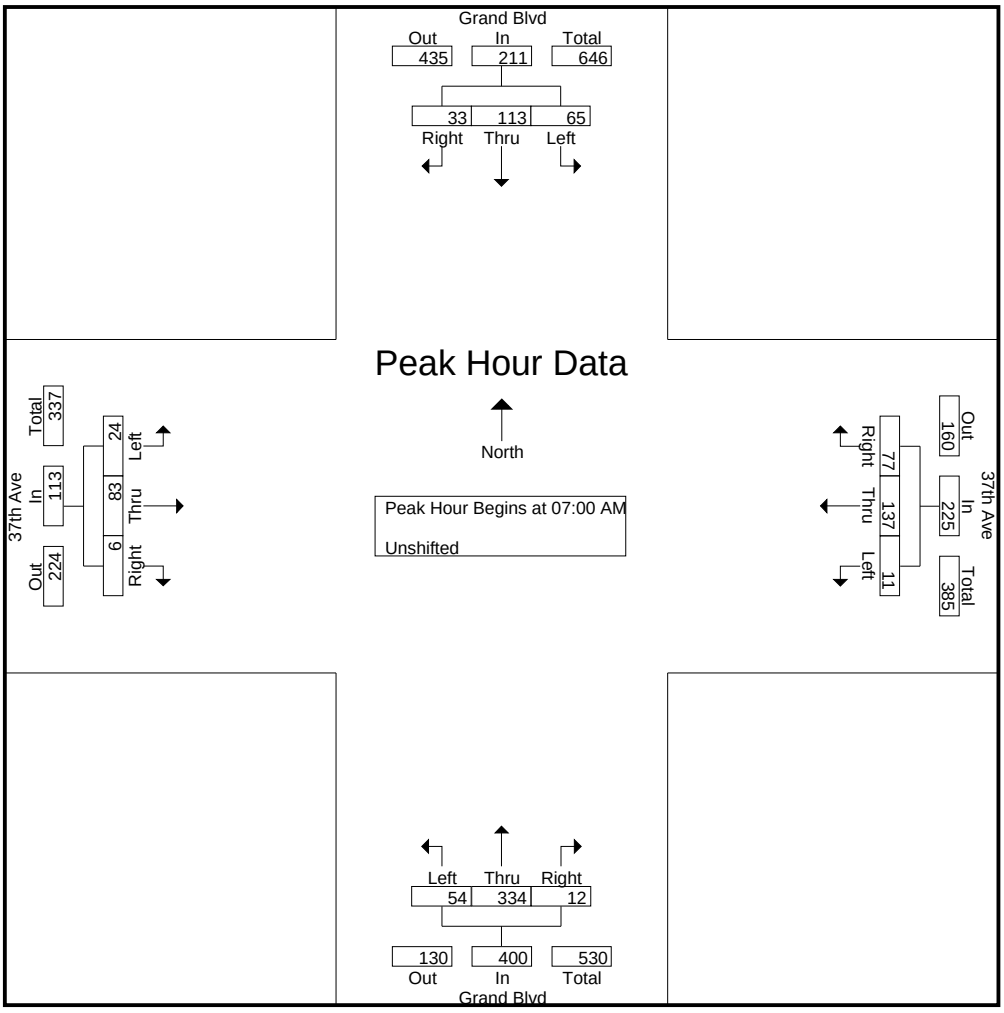


City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

File Name : Grand & 37th INT255 AM
Site Code : INT255
Start Date : 4/25/2018
Page No : 2

	Grand Blvd From North				37th Ave From East				Grand Blvd From South				37th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	3	15	13	31	12	19	2	33	2	55	14	71	0	18	2	20	155
07:15 AM	**11**	21	15	47	17	34	**5**	56	4	82	11	97	**3**	**28**	6	**37**	237
07:30 AM	9	**40**	12	61	**28**	**47**	1	**76**	1	**107**	8	**116**	1	20	**8**	29	**282**
07:45 AM	10	37	**25**	**72**	20	37	3	60	**5**	90	**21**	116	2	17	8	27	275
Total Volume	33	113	65	211	77	137	11	225	12	334	54	400	6	83	24	113	949
% App. Total	15.6	53.6	30.8		34.2	60.9	4.9		3	83.5	13.5		5.3	73.5	21.2		
PHF	.750	.706	.650	.733	.688	.729	.550	.740	.600	.780	.643	.862	.500	.741	.750	.764	.841



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

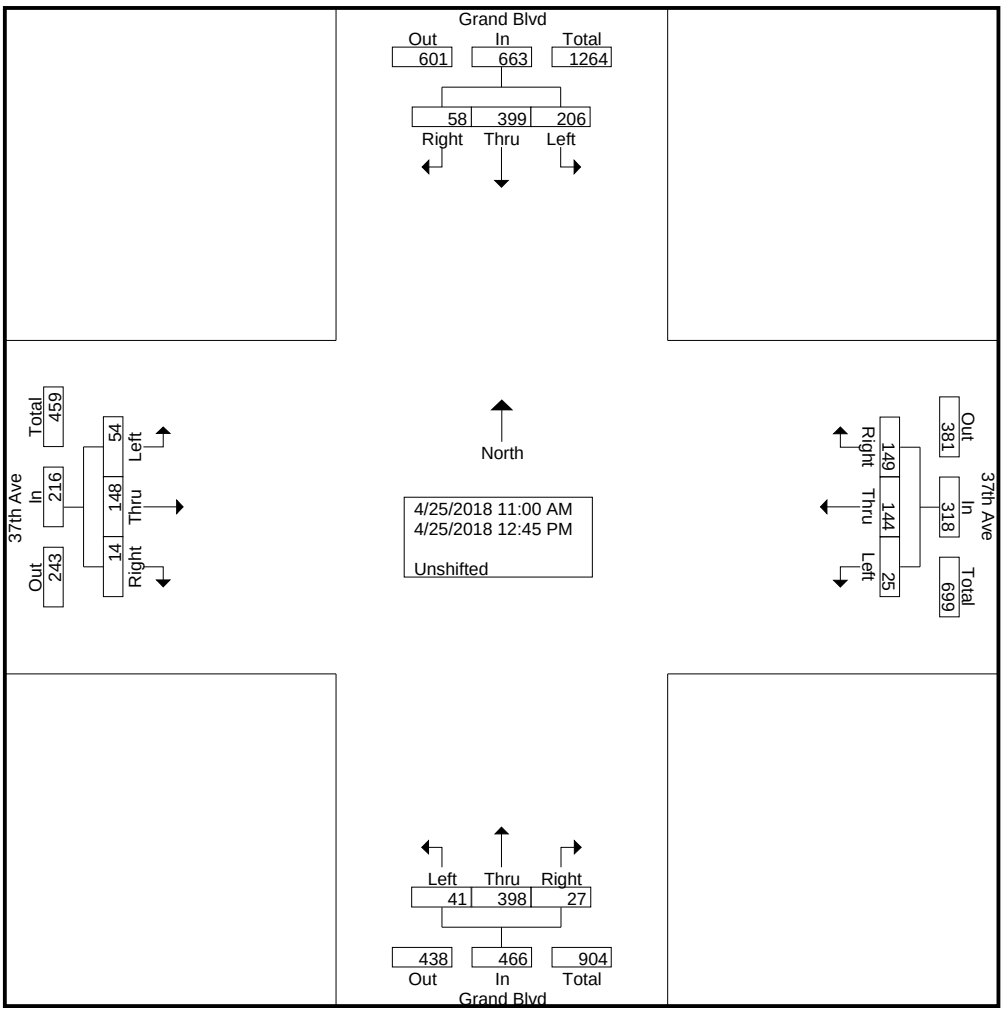
3700 S Grand Blvd
600 E 37th Ave

Peak Hour Data on Page 2

File Name : Grand & 37th INT255 MID
Site Code : INT255
Start Date : 4/25/2018
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				37th Ave From East				Grand Blvd From South				37th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
11:00 AM	6	42	17	65	23	12	4	39	7	45	1	53	4	17	7	28	185
11:15 AM	3	43	23	69	17	18	4	39	2	52	5	59	1	17	7	25	192
11:30 AM	6	60	32	98	24	11	0	35	5	53	6	64	2	15	4	21	218
11:45 AM	12	49	29	90	19	17	2	38	2	57	6	65	1	22	10	33	226
Total	27	194	101	322	83	58	10	151	16	207	18	241	8	71	28	107	821
12:00 PM	6	51	28	85	8	18	3	29	3	46	9	58	2	21	10	33	205
12:15 PM	11	53	24	88	17	20	2	39	1	51	4	56	2	22	7	31	214
12:30 PM	4	44	27	75	23	21	8	52	3	42	5	50	0	19	5	24	201
12:45 PM	10	57	26	93	18	27	2	47	4	52	5	61	2	15	4	21	222
Total	31	205	105	341	66	86	15	167	11	191	23	225	6	77	26	109	842
Grand Total	58	399	206	663	149	144	25	318	27	398	41	466	14	148	54	216	1663
Apprch %	8.7	60.2	31.1		46.9	45.3	7.9		5.8	85.4	8.8		6.5	68.5	25		
Total %	3.5	24	12.4	39.9	9	8.7	1.5	19.1	1.6	23.9	2.5	28	0.8	8.9	3.2	13	

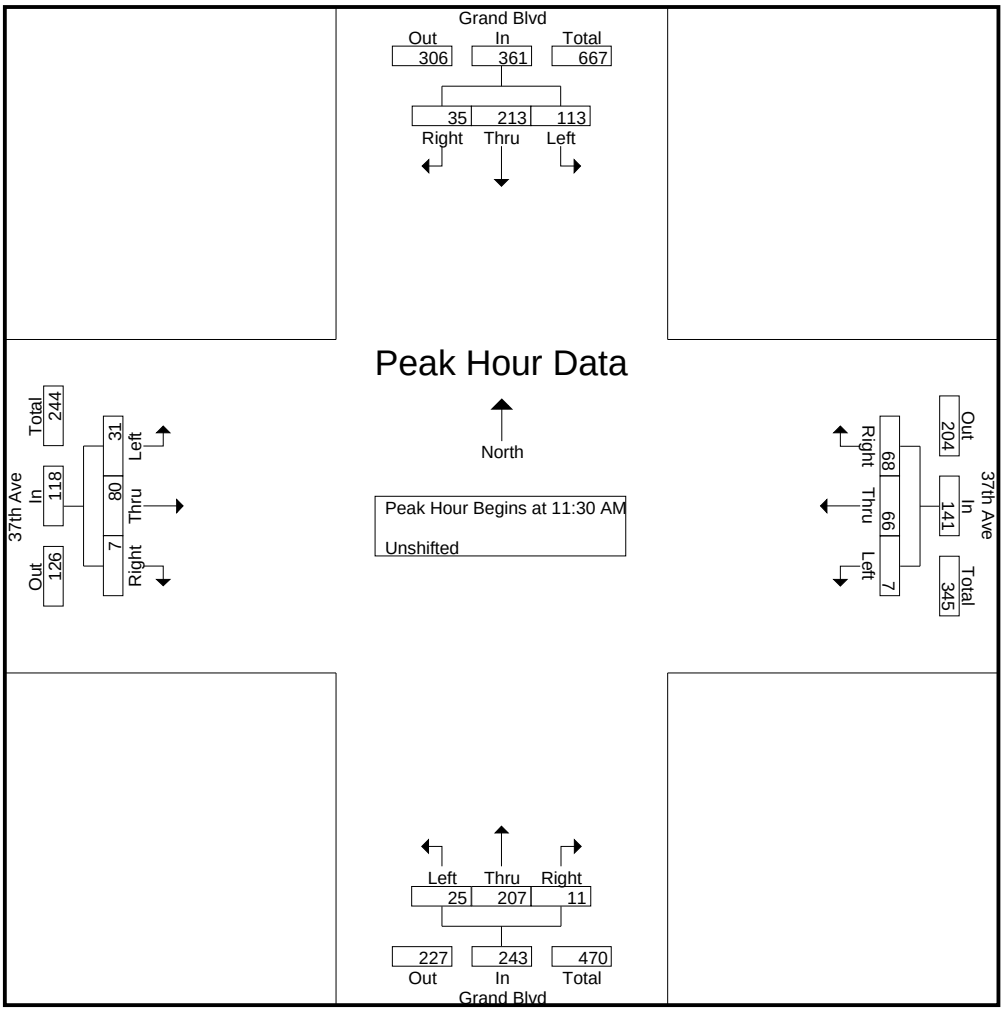


City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

File Name : Grand & 37th INT255 MID
Site Code : INT255
Start Date : 4/25/2018
Page No : 2

	Grand Blvd From North				37th Ave From East				Grand Blvd From South				37th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:30 AM																	
11:30 AM	6	**60**	**32**	**98**	**24**	11	0	35	**5**	53	6	64	**2**	15	4	21	218
11:45 AM	**12**	49	29	90	19	17	2	38	2	**57**	6	**65**	1	**22**	**10**	**33**	**226**
12:00 PM	6	51	28	85	8	18	**3**	29	3	46	**9**	58	2	21	10	33	205
12:15 PM	11	53	24	88	17	**20**	2	**39**	1	51	4	56	2	22	7	31	214
Total Volume	35	213	113	361	68	66	7	141	11	207	25	243	7	80	31	118	863
% App. Total	9.7	59	31.3		48.2	46.8	5		4.5	85.2	10.3		5.9	67.8	26.3		
PHF	.729	.888	.883	.921	.708	.825	.583	.904	.550	.908	.694	.935	.875	.909	.775	.894	.955



City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

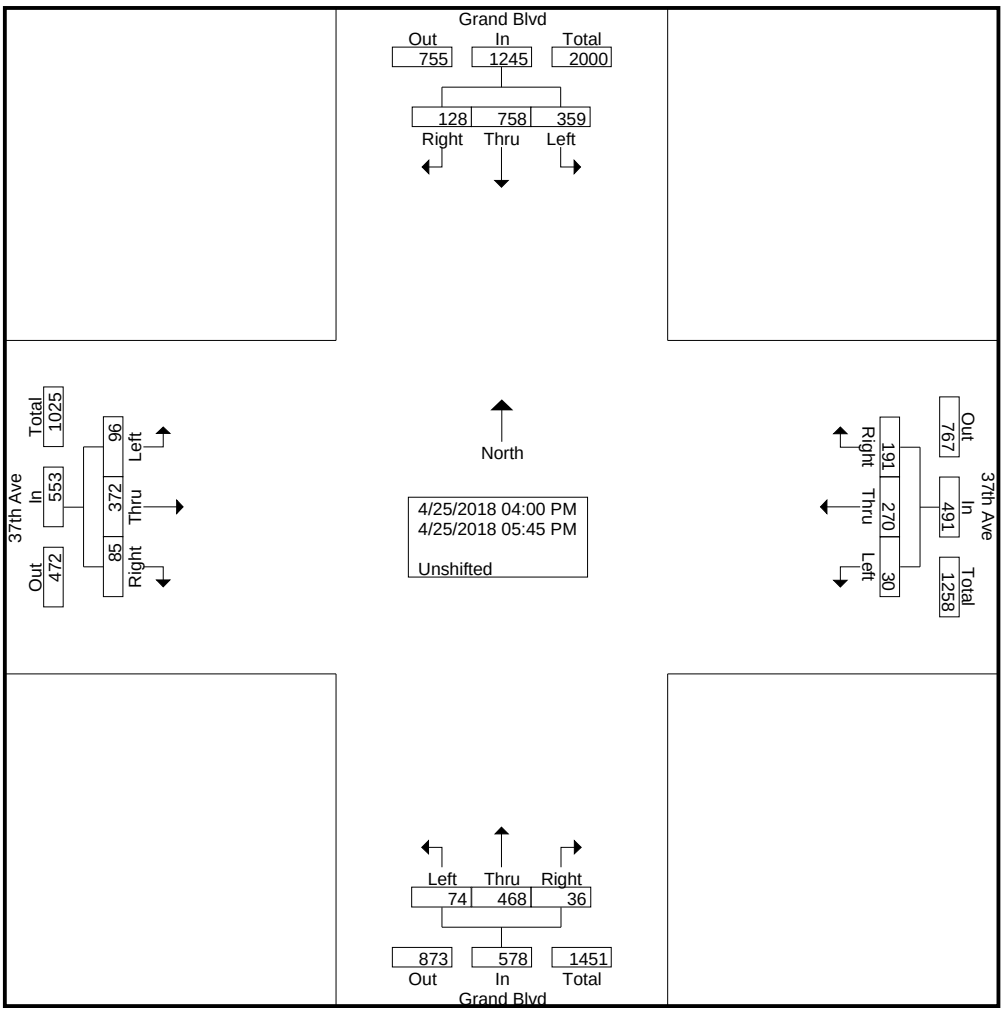
3700 S Grand Blvd
600 E 37th Ave

Peak Hour Data on Page 2

File Name : Grand & 37th INT255 PM
Site Code : INT255
Start Date : 4/25/2018
Page No : 1

Groups Printed- Unshifted

	Grand Blvd From North				37th Ave From East				Grand Blvd From South				37th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	18	79	49	146	24	37	5	66	3	59	14	76	5	38	10	53	341
04:15 PM	12	83	39	134	19	32	2	53	1	49	6	56	7	41	11	59	302
04:30 PM	14	99	43	156	20	40	3	63	7	53	11	71	12	44	7	63	353
04:45 PM	16	83	42	141	24	30	2	56	5	57	3	65	13	49	11	73	335
Total	60	344	173	577	87	139	12	238	16	218	34	268	37	172	39	248	1331
05:00 PM	18	112	41	171	31	34	9	74	4	51	10	65	8	50	9	67	377
05:15 PM	21	114	56	191	32	31	8	71	7	69	15	91	10	63	16	89	442
05:30 PM	18	108	52	178	23	31	0	54	5	78	6	89	13	58	17	88	409
05:45 PM	11	80	37	128	18	35	1	54	4	52	9	65	17	29	15	61	308
Total	68	414	186	668	104	131	18	253	20	250	40	310	48	200	57	305	1536
Grand Total	128	758	359	1245	191	270	30	491	36	468	74	578	85	372	96	553	2867
Apprch %	10.3	60.9	28.8		38.9	55	6.1		6.2	81	12.8		15.4	67.3	17.4		
Total %	4.5	26.4	12.5	43.4	6.7	9.4	1	17.1	1.3	16.3	2.6	20.2	3	13	3.3	19.3	

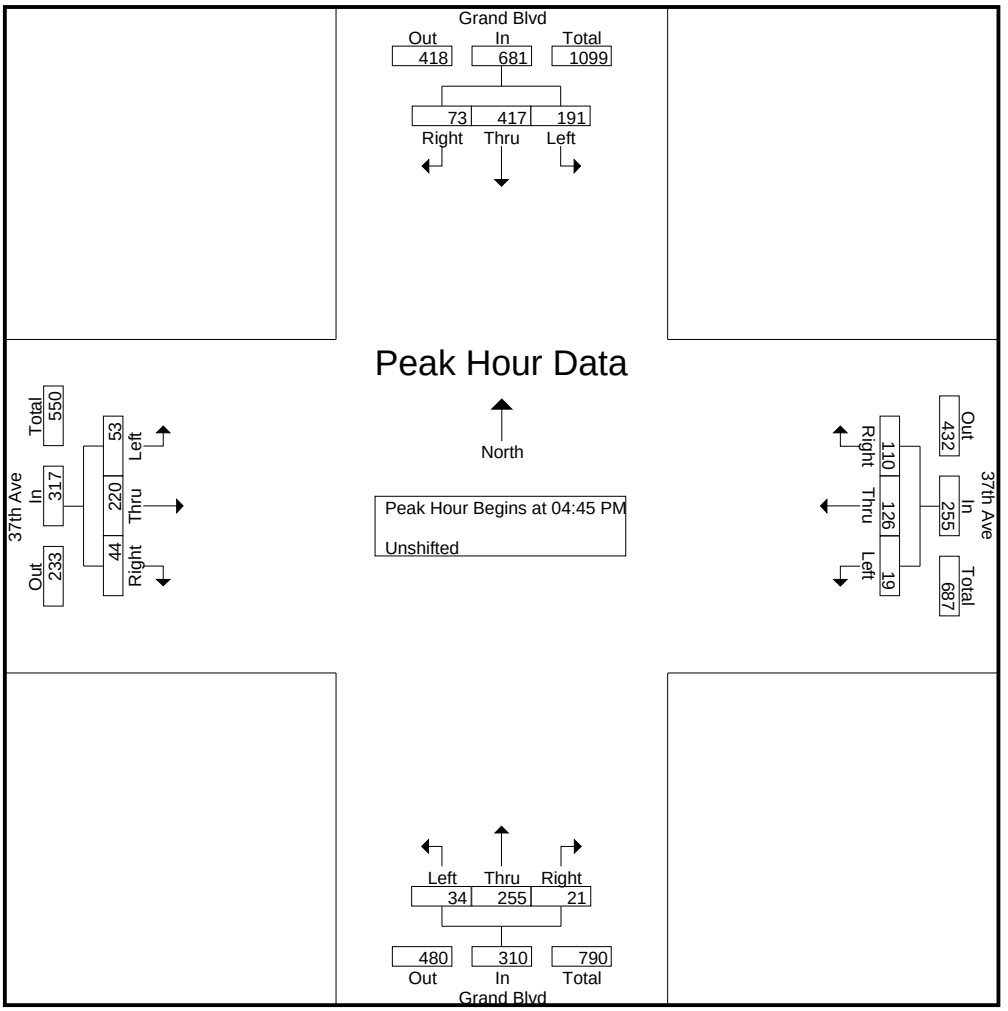


City of Spokane - Street Department

901 N. Nelson Street
Spokane, WA 99202-3769
509-232-8800

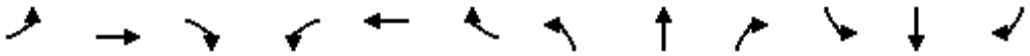
File Name : Grand & 37th INT255 PM
Site Code : INT255
Start Date : 4/25/2018
Page No : 2

	Grand Blvd From North				37th Ave From East				Grand Blvd From South				37th Ave From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	16	83	42	141	24	30	2	56	5	57	3	65	**13**	49	11	73	335
05:00 PM	18	112	41	171	31	**34**	**9**	**74**	4	51	10	65	8	50	9	67	377
05:15 PM	**21**	**114**	**56**	**191**	**32**	31	8	71	**7**	69	**15**	**91**	10	**63**	16	**89**	**442**
05:30 PM	18	108	52	178	23	31	0	54	5	**78**	6	89	13	58	**17**	88	409
Total Volume	73	417	191	681	110	126	19	255	21	255	34	310	44	220	53	317	1563
% App. Total	10.7	61.2	28		43.1	49.4	7.5		6.8	82.3	11		13.9	69.4	16.7		
PHF	.869	.914	.853	.891	.859	.926	.528	.861	.750	.817	.567	.852	.846	.873	.779	.890	.884



HCM 6th Signalized Intersection Summary
1: Grand Blvd & 29th Ave

2018 Existing AM



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	226	302	245	84	395	92	102	361	99	147	226	18
Future Volume (veh/h)	226	302	245	84	395	92	102	361	99	147	226	18
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	235	315	255	88	411	96	106	376	103	153	235	19
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	454	500	395	370	819	365	492	624	169	397	790	63
Arrive On Green	0.14	0.29	0.28	0.10	0.25	0.25	0.11	0.25	0.23	0.12	0.26	0.25
Sat Flow, veh/h	1641	1738	1374	1641	3273	1460	1641	2546	689	1641	3069	246
Grp Volume(v), veh/h	235	296	274	88	411	96	106	240	239	153	125	129
Grp Sat Flow(s),veh/h/ln	1641	1637	1475	1641	1637	1460	1641	1637	1599	1641	1637	1678
Q Serve(g_s), s	6.6	10.1	10.5	2.4	6.9	3.4	2.9	8.3	8.5	4.3	3.9	4.0
Cycle Q Clear(g_c), s	6.6	10.1	10.5	2.4	6.9	3.4	2.9	8.3	8.5	4.3	3.9	4.0
Prop In Lane	1.00		0.93	1.00		1.00	1.00		0.43	1.00		0.15
Lane Grp Cap(c), veh/h	454	471	425	370	819	365	492	401	392	397	421	432
V/C Ratio(X)	0.52	0.63	0.64	0.24	0.50	0.26	0.22	0.60	0.61	0.39	0.30	0.30
Avail Cap(c_a), veh/h	742	938	846	720	1876	837	882	1040	1016	769	1043	1069
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.8	19.8	20.2	15.4	20.6	19.3	15.0	21.4	21.6	15.6	19.1	19.2
Incr Delay (d2), s/veh	0.3	2.0	2.3	0.1	0.7	0.5	0.1	2.0	2.2	0.2	0.6	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	2.2	3.8	3.6	0.8	2.5	1.1	1.0	3.2	3.2	1.5	1.5	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.2	21.8	22.6	15.5	21.3	19.8	15.1	23.4	23.8	15.8	19.7	19.7
LnGrp LOS	B	C	C	B	C	B	B	C	C	B	B	B
Approach Vol, veh/h		805			595			585			407	
Approach Delay, s/veh		20.1			20.2			22.0			18.2	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.5	19.8	12.7	20.0	10.8	20.5	10.3	22.4
Change Period (Y+Rc), s	4.0	* 4.8	4.0	* 4.7	4.0	* 4.8	4.0	* 4.7
Max Green Setting (Gmax), s	22.0	* 40	20.0	* 36	22.0	* 40	20.0	* 36
Max Q Clear Time (g_c+I1), s	6.3	10.5	8.6	8.9	4.9	6.0	4.4	12.5
Green Ext Time (p_c), s	0.2	4.5	0.3	4.5	0.1	2.2	0.1	5.3

Intersection Summary	
HCM 6th Ctrl Delay	20.3
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	3	32	7	5	10	69	536	16	24	424	97
Future Vol, veh/h	12	3	32	7	5	10	69	536	16	24	424	97
Conflicting Peds, #/hr	4	0	17	17	0	4	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	125	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	3	36	8	6	11	78	602	18	27	476	109

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1050	1362	311	1078	1407	314	586	0	0	620	0	0
Stage 1	586	586	-	767	767	-	-	-	-	-	-	-
Stage 2	464	776	-	311	640	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
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	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	181	147	685	173	138	682	985	-	-	956	-	-
Stage 1	463	495	-	361	410	-	-	-	-	-	-	-
Stage 2	548	406	-	674	468	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	157	131	673	145	123	679	984	-	-	956	-	-
Mov Cap-2 Maneuver	157	131	-	145	123	-	-	-	-	-	-	-
Stage 1	426	481	-	332	378	-	-	-	-	-	-	-
Stage 2	487	374	-	606	454	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.5	24.2	1	0.4
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	984	-	-	320	212	956	-	-
HCM Lane V/C Ratio	0.079	-	-	0.165	0.117	0.028	-	-
HCM Control Delay (s)	9	-	-	18.5	24.2	8.9	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.6	0.4	0.1	-	-

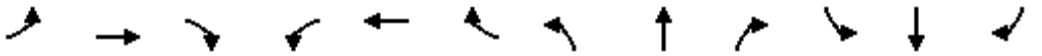
Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	1	51	1	0	9	76	571	2	3	377	78
Future Vol, veh/h	22	1	51	1	0	9	76	571	2	3	377	78
Conflicting Peds, #/hr	44	0	6	6	0	44	69	0	6	6	0	69
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	1	57	1	0	10	85	642	2	3	424	88

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1405	1363	543	1328	1406	693	581	0	0	650	0	0
Stage 1	543	543	-	819	819	-	-	-	-	-	-	-
Stage 2	862	820	-	509	587	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	117	148	540	132	139	443	993	-	-	936	-	-
Stage 1	524	520	-	369	389	-	-	-	-	-	-	-
Stage 2	350	389	-	547	497	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	95	124	502	107	117	422	928	-	-	931	-	-
Mov Cap-2 Maneuver	95	124	-	107	117	-	-	-	-	-	-	-
Stage 1	445	484	-	333	351	-	-	-	-	-	-	-
Stage 2	297	351	-	479	463	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	31.5	16.4	1.1	0.1
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	928	-	-	217	326	931	-	-
HCM Lane V/C Ratio	0.092	-	-	0.383	0.034	0.004	-	-
HCM Control Delay (s)	9.3	-	-	31.5	16.4	8.9	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	1.7	0.1	0	-	-



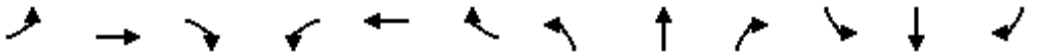
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	98	17	13	126	148	51	412	28	113	230	86
Future Volume (veh/h)	65	98	17	13	126	148	51	412	28	113	230	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	71	108	19	14	138	163	56	453	31	124	253	95
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	89	135	24	16	162	191	352	530	36	264	419	157
Arrive On Green	0.15	0.15	0.15	0.23	0.23	0.23	0.05	0.33	0.32	0.07	0.35	0.34
Sat Flow, veh/h	597	908	160	70	689	814	1641	1594	109	1641	1194	448
Grp Volume(v), veh/h	198	0	0	315	0	0	56	0	484	124	0	348
Grp Sat Flow(s),veh/h/ln	1664	0	0	1573	0	0	1641	0	1703	1641	0	1642
Q Serve(g_s), s	8.7	0.0	0.0	14.5	0.0	0.0	1.7	0.0	20.1	3.8	0.0	13.3
Cycle Q Clear(g_c), s	8.7	0.0	0.0	14.5	0.0	0.0	1.7	0.0	20.1	3.8	0.0	13.3
Prop In Lane	0.36		0.10	0.04		0.52	1.00		0.06	1.00		0.27
Lane Grp Cap(c), veh/h	248	0	0	370	0	0	352	0	566	264	0	576
V/C Ratio(X)	0.80	0.00	0.00	0.85	0.00	0.00	0.16	0.00	0.86	0.47	0.00	0.60
Avail Cap(c_a), veh/h	877	0	0	828	0	0	587	0	1144	468	0	1103
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	31.2	0.0	0.0	27.8	0.0	0.0	16.4	0.0	23.7	18.3	0.0	20.4
Incr Delay (d2), s/veh	2.3	0.0	0.0	2.2	0.0	0.0	0.2	0.0	1.5	1.3	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	3.5	0.0	0.0	5.4	0.0	0.0	0.6	0.0	7.8	1.4	0.0	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.5	0.0	0.0	30.0	0.0	0.0	16.6	0.0	25.2	19.6	0.0	20.8
LnGrp LOS	C	A	A	C	A	A	B	A	C	B	A	C
Approach Vol, veh/h		198			315			540			472	
Approach Delay, s/veh		33.5			30.0			24.3			20.5	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.6	29.2		15.3	8.2	30.6		21.8				
Change Period (Y+Rc), s	4.0	5.0		4.0	4.0	5.0		4.0				
Max Green Setting (Gmax), s	15.0	50.0		40.0	15.0	50.0		40.0				
Max Q Clear Time (g_c+I1), s	5.8	22.1		10.7	3.7	15.3		16.5				
Green Ext Time (p_c), s	0.2	2.1		0.7	0.1	1.5		1.3				

Intersection Summary												
HCM 6th Ctrl Delay			25.5									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary
1: Grand Blvd & 29th Ave

2018 Existing PM



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	482	106	163	425	179	122	231	104	388	524	27
Future Volume (veh/h)	50	482	106	163	425	179	122	231	104	388	524	27
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	53	513	113	173	452	190	130	246	111	413	557	29
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	361	745	163	339	1017	454	382	407	178	533	985	51
Arrive On Green	0.07	0.28	0.27	0.10	0.31	0.31	0.10	0.18	0.17	0.22	0.31	0.30
Sat Flow, veh/h	1641	2669	585	1641	3273	1460	1641	2215	970	1641	3165	165
Grp Volume(v), veh/h	53	314	312	173	452	190	130	180	177	413	288	298
Grp Sat Flow(s),veh/h/ln	1641	1637	1617	1641	1637	1460	1641	1637	1548	1641	1637	1693
Q Serve(g_s), s	1.7	13.1	13.2	5.6	8.4	7.9	4.8	7.7	8.1	14.8	11.2	11.3
Cycle Q Clear(g_c), s	1.7	13.1	13.2	5.6	8.4	7.9	4.8	7.7	8.1	14.8	11.2	11.3
Prop In Lane	1.00		0.36	1.00		1.00	1.00		0.63	1.00		0.10
Lane Grp Cap(c), veh/h	361	457	452	339	1017	454	382	301	284	533	509	527
V/C Ratio(X)	0.15	0.69	0.69	0.51	0.44	0.42	0.34	0.60	0.62	0.78	0.56	0.57
Avail Cap(c_a), veh/h	674	786	777	601	1572	701	694	871	824	637	874	904
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.4	24.6	24.7	18.1	21.1	20.9	22.0	28.6	29.0	18.0	22.0	22.0
Incr Delay (d2), s/veh	0.1	2.6	2.7	0.4	0.4	0.9	0.2	2.7	3.2	4.0	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	0.6	5.1	5.2	2.0	3.1	2.7	1.8	3.1	3.2	5.7	4.3	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.5	27.2	27.4	18.6	21.5	21.8	22.2	31.3	32.1	21.9	23.4	23.4
LnGrp LOS	B	C	C	B	C	C	C	C	C	C	C	C
Approach Vol, veh/h		679			815			487			999	
Approach Delay, s/veh		26.5			20.9			29.2			22.8	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.1	18.1	9.4	27.7	11.5	27.8	11.8	25.4
Change Period (Y+Rc), s	4.0	* 4.8	4.0	* 4.7	4.0	* 4.8	4.0	* 4.7
Max Green Setting (Gmax), s	22.0	* 40	20.0	* 36	22.0	* 40	20.0	* 36
Max Q Clear Time (g_c+I1), s	16.8	10.1	3.7	10.4	6.8	13.3	7.6	15.2
Green Ext Time (p_c), s	0.4	3.3	0.0	5.5	0.1	5.4	0.2	5.4

Intersection Summary	
HCM 6th Ctrl Delay	24.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	27	6	61	21	7	76	47	350	44	97	597	85
Future Vol, veh/h	27	6	61	21	7	76	47	350	44	97	597	85
Conflicting Peds, #/hr	9	0	6	6	0	9	3	0	0	0	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	125	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	7	66	23	8	83	51	380	48	105	649	92

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1213	1438	380	1050	1460	223	744	0	0	428	0	0
Stage 1	908	908	-	506	506	-	-	-	-	-	-	-
Stage 2	305	530	-	544	954	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
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	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	138	132	618	181	128	780	859	-	-	1128	-	-
Stage 1	296	352	-	517	538	-	-	-	-	-	-	-
Stage 2	680	525	-	491	335	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	103	112	613	136	109	773	857	-	-	1128	-	-
Mov Cap-2 Maneuver	103	112	-	136	109	-	-	-	-	-	-	-
Stage 1	278	318	-	486	506	-	-	-	-	-	-	-
Stage 2	558	494	-	387	303	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	33.4	21.6	1	1.1
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	857	-	-	226	328	1128	-	-
HCM Lane V/C Ratio	0.06	-	-	0.452	0.345	0.093	-	-
HCM Control Delay (s)	9.5	-	-	33.4	21.6	8.5	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	2.2	1.5	0.3	-	-

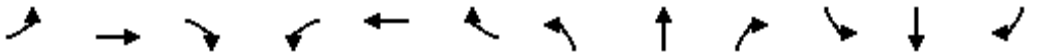
Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	1	59	0	3	5	33	400	1	19	513	55
Future Vol, veh/h	24	1	59	0	3	5	33	400	1	19	513	55
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	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	26	1	64	0	3	5	36	435	1	21	558	60

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1142	1138	588	1171	1168	436	618	0	0	436	0	0
Stage 1	630	630	-	508	508	-	-	-	-	-	-	-
Stage 2	512	508	-	663	660	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	179	203	513	171	195	625	972	-	-	1134	-	-
Stage 1	473	478	-	551	542	-	-	-	-	-	-	-
Stage 2	548	542	-	454	463	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	168	192	513	143	184	625	972	-	-	1134	-	-
Mov Cap-2 Maneuver	168	192	-	143	184	-	-	-	-	-	-	-
Stage 1	455	469	-	531	522	-	-	-	-	-	-	-
Stage 2	520	522	-	389	454	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.7	16.2	0.7	0.3
HCM LOS	C	C		

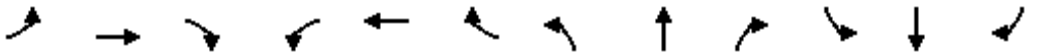
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	972	-	-	319	329	1134	-	-
HCM Lane V/C Ratio	0.037	-	-	0.286	0.026	0.018	-	-
HCM Control Delay (s)	8.8	-	-	20.7	16.2	8.2	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.2	0.1	0.1	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	220	44	19	126	110	34	255	21	191	417	73
Future Volume (veh/h)	53	220	44	19	126	110	34	255	21	191	417	73
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	60	250	50	22	143	125	39	290	24	217	474	83
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	67	278	56	25	162	141	165	460	38	380	520	91
Arrive On Green	0.24	0.24	0.24	0.21	0.21	0.21	0.04	0.29	0.28	0.11	0.36	0.36
Sat Flow, veh/h	278	1158	232	121	786	687	1641	1569	130	1641	1428	250
Grp Volume(v), veh/h	360	0	0	290	0	0	39	0	314	217	0	557
Grp Sat Flow(s),veh/h/ln	1667	0	0	1593	0	0	1641	0	1699	1641	0	1678
Q Serve(g_s), s	22.2	0.0	0.0	18.8	0.0	0.0	1.8	0.0	17.0	9.5	0.0	33.6
Cycle Q Clear(g_c), s	22.2	0.0	0.0	18.8	0.0	0.0	1.8	0.0	17.0	9.5	0.0	33.6
Prop In Lane	0.17		0.14	0.08		0.43	1.00		0.08	1.00		0.15
Lane Grp Cap(c), veh/h	401	0	0	328	0	0	165	0	498	380	0	612
V/C Ratio(X)	0.90	0.00	0.00	0.88	0.00	0.00	0.24	0.00	0.63	0.57	0.00	0.91
Avail Cap(c_a), veh/h	627	0	0	600	0	0	333	0	815	431	0	805
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	39.1	0.0	0.0	41.0	0.0	0.0	28.3	0.0	32.6	23.3	0.0	32.2
Incr Delay (d2), s/veh	7.4	0.0	0.0	3.2	0.0	0.0	0.7	0.0	0.5	1.4	0.0	10.3
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	9.8	0.0	0.0	7.6	0.0	0.0	0.7	0.0	7.0	3.8	0.0	15.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.5	0.0	0.0	44.1	0.0	0.0	29.1	0.0	33.1	24.7	0.0	42.5
LnGrp LOS	D	A	A	D	A	A	C	A	C	C	A	D
Approach Vol, veh/h		360			290			353			774	
Approach Delay, s/veh		46.5			44.1			32.7			37.5	
Approach LOS		D			D			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.7	35.1		29.5	8.1	42.7		25.9				
Change Period (Y+Rc), s	4.0	5.0		4.0	4.0	5.0		4.0				
Max Green Setting (Gmax), s	15.0	50.0		40.0	15.0	50.0		40.0				
Max Q Clear Time (g_c+I1), s	11.5	19.0		24.2	3.8	35.6		20.8				
Green Ext Time (p_c), s	0.2	1.3		1.3	0.0	2.2		1.1				

Intersection Summary												
HCM 6th Ctrl Delay			39.5									
HCM 6th LOS			D									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	225	300	245	85	395	90	125	440	120	180	275	20
Future Volume (veh/h)	225	300	245	85	395	90	125	440	120	180	275	20
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	234	312	255	89	411	94	130	458	125	188	286	21
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	433	482	385	348	781	348	497	711	193	381	888	65
Arrive On Green	0.14	0.28	0.27	0.10	0.24	0.24	0.11	0.28	0.27	0.11	0.29	0.28
Sat Flow, veh/h	1641	1730	1381	1641	3273	1460	1641	2546	690	1641	3093	226
Grp Volume(v), veh/h	234	295	272	89	411	94	130	293	290	188	151	156
Grp Sat Flow(s),veh/h/ln	1641	1637	1474	1641	1637	1460	1641	1637	1599	1641	1637	1682
Q Serve(g_s), s	7.2	10.9	11.3	2.7	7.5	3.6	3.7	10.8	11.0	5.5	5.0	5.0
Cycle Q Clear(g_c), s	7.2	10.9	11.3	2.7	7.5	3.6	3.7	10.8	11.0	5.5	5.0	5.0
Prop In Lane	1.00		0.94	1.00		1.00	1.00		0.43	1.00		0.13
Lane Grp Cap(c), veh/h	433	456	411	348	781	348	497	457	447	381	470	483
V/C Ratio(X)	0.54	0.65	0.66	0.26	0.53	0.27	0.26	0.64	0.65	0.49	0.32	0.32
Avail Cap(c_a), veh/h	688	873	786	669	1745	778	846	968	945	720	970	997
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.4	21.8	22.3	17.3	22.8	21.3	14.7	21.8	22.0	16.0	19.3	19.3
Incr Delay (d2), s/veh	0.4	2.2	2.6	0.1	0.8	0.6	0.1	2.1	2.3	0.4	0.6	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	2.5	4.2	4.0	1.0	2.8	1.2	1.3	4.2	4.2	1.9	1.9	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.8	24.0	24.9	17.4	23.6	21.9	14.8	23.9	24.2	16.3	19.8	19.9
LnGrp LOS	B	C	C	B	C	C	B	C	C	B	B	B
Approach Vol, veh/h		801			594			713			495	
Approach Delay, s/veh		22.2			22.4			22.4			18.5	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.8	23.3	13.3	20.4	11.3	23.8	10.5	23.2
Change Period (Y+Rc), s	4.0	* 4.8	4.0	* 4.7	4.0	* 4.8	4.0	* 4.7
Max Green Setting (Gmax), s	22.0	* 40	20.0	* 36	22.0	* 40	20.0	* 36
Max Q Clear Time (g_c+I1), s	7.5	13.0	9.2	9.5	5.7	7.0	4.7	13.3
Green Ext Time (p_c), s	0.2	5.5	0.3	4.5	0.1	2.7	0.1	5.2

Intersection Summary	
HCM 6th Ctrl Delay	21.6
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	5	30	5	5	10	85	655	20	30	495	100
Future Vol, veh/h	10	5	30	5	5	10	85	655	20	30	495	100
Conflicting Peds, #/hr	4	0	17	17	0	4	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	125	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	6	34	6	6	11	96	736	22	34	556	112

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1248	1631	352	1305	1676	383	669	0	0	758	0	0
Stage 1	681	681	-	939	939	-	-	-	-	-	-	-
Stage 2	567	950	-	366	737	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
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	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	130	101	644	118	94	615	917	-	-	849	-	-
Stage 1	407	448	-	284	341	-	-	-	-	-	-	-
Stage 2	476	337	-	626	423	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	107	87	633	93	81	613	916	-	-	849	-	-
Mov Cap-2 Maneuver	107	87	-	93	81	-	-	-	-	-	-	-
Stage 1	364	430	-	254	305	-	-	-	-	-	-	-
Stage 2	409	302	-	552	406	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.3	32.8	1	0.5
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	916	-	-	227	152	849	-	-
HCM Lane V/C Ratio	0.104	-	-	0.223	0.148	0.04	-	-
HCM Control Delay (s)	9.4	-	-	25.3	32.8	9.4	-	-
HCM Lane LOS	A	-	-	D	D	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.8	0.5	0.1	-	-

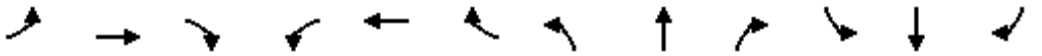
Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	5	50	5	0	10	95	695	5	5	460	95
Future Vol, veh/h	20	5	50	5	0	10	95	695	5	5	460	95
Conflicting Peds, #/hr	44	0	6	6	0	44	69	0	6	6	0	69
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	6	56	6	0	11	107	781	6	6	517	107

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1700	1659	646	1624	1709	834	693	0	0	793	0	0
Stage 1	652	652	-	1004	1004	-	-	-	-	-	-	-
Stage 2	1048	1007	-	620	705	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	73	98	472	82	91	368	902	-	-	828	-	-
Stage 1	457	464	-	291	320	-	-	-	-	-	-	-
Stage 2	275	319	-	476	439	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	57	79	438	60	73	351	843	-	-	823	-	-
Mov Cap-2 Maneuver	57	79	-	60	73	-	-	-	-	-	-	-
Stage 1	373	430	-	253	278	-	-	-	-	-	-	-
Stage 2	223	277	-	404	407	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	61.9	35.7	1.2	0.1
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	843	-	-	142	134	823	-	-
HCM Lane V/C Ratio	0.127	-	-	0.593	0.126	0.007	-	-
HCM Control Delay (s)	9.9	-	-	61.9	35.7	9.4	-	-
HCM Lane LOS	A	-	-	F	E	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	3.1	0.4	0	-	-



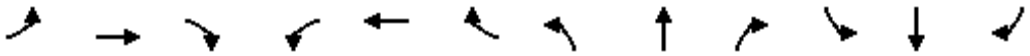
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	120	20	15	155	180	60	505	35	140	280	105
Future Volume (veh/h)	80	120	20	15	155	180	60	505	35	140	280	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	88	132	22	16	170	198	66	555	38	154	308	115
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	100	150	25	17	183	213	308	592	41	201	481	179
Arrive On Green	0.16	0.16	0.16	0.26	0.26	0.26	0.04	0.37	0.36	0.07	0.40	0.39
Sat Flow, veh/h	606	908	151	66	697	811	1641	1594	109	1641	1196	446
Grp Volume(v), veh/h	242	0	0	384	0	0	66	0	593	154	0	423
Grp Sat Flow(s),veh/h/ln	1665	0	0	1573	0	0	1641	0	1703	1641	0	1642
Q Serve(g_s), s	17.8	0.0	0.0	29.9	0.0	0.0	3.1	0.0	42.1	7.1	0.0	26.1
Cycle Q Clear(g_c), s	17.8	0.0	0.0	29.9	0.0	0.0	3.1	0.0	42.1	7.1	0.0	26.1
Prop In Lane	0.36		0.09	0.04		0.52	1.00		0.06	1.00		0.27
Lane Grp Cap(c), veh/h	274	0	0	413	0	0	308	0	632	201	0	660
V/C Ratio(X)	0.88	0.00	0.00	0.93	0.00	0.00	0.21	0.00	0.94	0.77	0.00	0.64
Avail Cap(c_a), veh/h	531	0	0	502	0	0	433	0	692	276	0	668
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	51.2	0.0	0.0	45.1	0.0	0.0	25.1	0.0	38.1	29.5	0.0	30.3
Incr Delay (d2), s/veh	3.7	0.0	0.0	20.0	0.0	0.0	0.3	0.0	18.9	8.3	0.0	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	7.7	0.0	0.0	13.9	0.0	0.0	1.3	0.0	20.6	3.2	0.0	10.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.9	0.0	0.0	65.1	0.0	0.0	25.5	0.0	57.0	37.9	0.0	31.9
LnGrp LOS	D	A	A	E	A	A	C	A	E	D	A	C
Approach Vol, veh/h		242			384			659			577	
Approach Delay, s/veh		54.9			65.1			53.8			33.5	
Approach LOS		D			E			D			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.3	50.6		24.7	9.4	54.4		36.9				
Change Period (Y+Rc), s	4.0	5.0		4.0	4.0	5.0		4.0				
Max Green Setting (Gmax), s	15.0	50.0		40.0	15.0	50.0		40.0				
Max Q Clear Time (g_c+I1), s	9.1	44.1		19.8	5.1	28.1		31.9				
Green Ext Time (p_c), s	0.2	1.4		0.9	0.1	1.8		1.1				

Intersection Summary			
HCM 6th Ctrl Delay		50.0	
HCM 6th LOS		D	

HCM 6th Signalized Intersection Summary
1: Grand Blvd & 29th Ave

2040 Future No Build PM



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	515	115	175	435	200	145	295	125	430	595	30
Future Volume (veh/h)	55	515	115	175	435	200	145	295	125	430	595	30
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	59	548	122	186	463	213	154	314	133	457	633	32
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	338	740	164	311	1020	455	371	466	193	527	1099	56
Arrive On Green	0.07	0.28	0.27	0.10	0.31	0.31	0.10	0.21	0.20	0.23	0.35	0.34
Sat Flow, veh/h	1641	2662	591	1641	3273	1460	1641	2255	936	1641	3170	160
Grp Volume(v), veh/h	59	336	334	186	463	213	154	226	221	457	327	338
Grp Sat Flow(s),veh/h/ln	1641	1637	1616	1641	1637	1460	1641	1637	1554	1641	1637	1694
Q Serve(g_s), s	2.2	16.8	16.9	7.1	10.2	10.6	6.6	11.4	11.8	18.9	14.6	14.7
Cycle Q Clear(g_c), s	2.2	16.8	16.9	7.1	10.2	10.6	6.6	11.4	11.8	18.9	14.6	14.7
Prop In Lane	1.00		0.37	1.00		1.00	1.00		0.60	1.00		0.09
Lane Grp Cap(c), veh/h	338	455	449	311	1020	455	371	338	321	527	568	587
V/C Ratio(X)	0.17	0.74	0.74	0.60	0.45	0.47	0.42	0.67	0.69	0.87	0.58	0.58
Avail Cap(c_a), veh/h	590	668	660	508	1336	596	616	741	704	545	743	769
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.7	29.5	29.7	21.6	24.8	24.9	24.8	32.8	33.2	20.3	24.0	24.0
Incr Delay (d2), s/veh	0.1	3.4	3.6	0.7	0.5	1.1	0.3	3.2	3.7	12.8	1.3	1.3
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	0.8	6.8	6.8	2.7	3.9	3.7	2.5	4.7	4.7	8.6	5.7	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.8	32.9	33.2	22.3	25.3	26.0	25.0	36.0	36.9	33.1	25.3	25.3
LnGrp LOS	C	C	C	C	C	C	C	D	D	C	C	C
Approach Vol, veh/h		729			862			601			1122	
Approach Delay, s/veh		32.1			24.8			33.5			28.5	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.0	22.7	10.2	32.0	12.5	35.2	13.2	29.0
Change Period (Y+Rc), s	4.0	* 4.8	4.0	* 4.7	4.0	* 4.8	4.0	* 4.7
Max Green Setting (Gmax), s	22.0	* 40	20.0	* 36	22.0	* 40	20.0	* 36
Max Q Clear Time (g_c+I1), s	20.9	13.8	4.2	12.6	8.6	16.7	9.1	18.9
Green Ext Time (p_c), s	0.1	4.1	0.0	5.6	0.2	6.0	0.2	5.4

Intersection Summary	
HCM 6th Ctrl Delay	29.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	5	60	20	5	75	55	445	55	110	680	95
Future Vol, veh/h	25	5	60	20	5	75	55	445	55	110	680	95
Conflicting Peds, #/hr	9	0	6	6	0	9	3	0	0	0	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	125	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	5	65	22	5	82	60	484	60	120	739	103

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1408	1698	430	1252	1719	281	845	0	0	544	0	0
Stage 1	1034	1034	-	634	634	-	-	-	-	-	-	-
Stage 2	374	664	-	618	1085	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
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	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	99	91	573	129	89	716	787	-	-	1021	-	-
Stage 1	248	308	-	434	471	-	-	-	-	-	-	-
Stage 2	619	456	-	443	291	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	70	74	568	92	72	710	785	-	-	1021	-	-
Mov Cap-2 Maneuver	70	74	-	92	72	-	-	-	-	-	-	-
Stage 1	228	271	-	401	435	-	-	-	-	-	-	-
Stage 2	495	421	-	337	256	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	51.5	29.2	1	1.1
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	785	-	-	170	255	1021	-	-
HCM Lane V/C Ratio	0.076	-	-	0.575	0.426	0.117	-	-
HCM Control Delay (s)	10	-	-	51.5	29.2	9	-	-
HCM Lane LOS	A	-	-	F	D	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	3	2	0.4	-	-

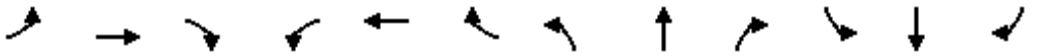
Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	5	60	0	5	5	40	490	5	25	625	65
Future Vol, veh/h	25	5	60	0	5	5	40	490	5	25	625	65
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	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	27	5	65	0	5	5	43	533	5	27	679	71

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1396	1393	715	1426	1426	536	750	0	0	538	0	0
Stage 1	769	769	-	622	622	-	-	-	-	-	-	-
Stage 2	627	624	-	804	804	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	120	143	434	114	137	549	868	-	-	1040	-	-
Stage 1	397	413	-	478	482	-	-	-	-	-	-	-
Stage 2	475	481	-	380	398	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	108	132	434	89	127	549	868	-	-	1040	-	-
Mov Cap-2 Maneuver	108	132	-	89	127	-	-	-	-	-	-	-
Stage 1	377	402	-	454	458	-	-	-	-	-	-	-
Stage 2	442	457	-	310	388	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	33.6	23.4	0.7	0.3
HCM LOS	D	C		

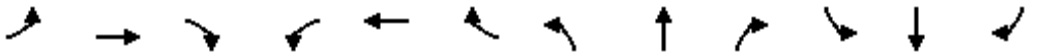
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	868	-	-	221	206	1040	-	-
HCM Lane V/C Ratio	0.05	-	-	0.443	0.053	0.026	-	-
HCM Control Delay (s)	9.4	-	-	33.6	23.4	8.6	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	2.1	0.2	0.1	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	220	45	25	130	145	35	320	25	215	485	75
Future Volume (veh/h)	60	220	45	25	130	145	35	320	25	215	485	75
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	68	250	51	28	148	165	40	364	28	244	551	85
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	73	269	55	30	160	178	110	473	36	316	548	84
Arrive On Green	0.24	0.24	0.24	0.23	0.23	0.23	0.03	0.30	0.29	0.11	0.38	0.37
Sat Flow, veh/h	307	1129	230	130	685	764	1641	1579	121	1641	1457	225
Grp Volume(v), veh/h	369	0	0	341	0	0	40	0	392	244	0	636
Grp Sat Flow(s),veh/h/ln	1666	0	0	1579	0	0	1641	0	1701	1641	0	1682
Q Serve(g_s), s	29.4	0.0	0.0	28.7	0.0	0.0	2.3	0.0	28.5	13.8	0.0	51.0
Cycle Q Clear(g_c), s	29.4	0.0	0.0	28.7	0.0	0.0	2.3	0.0	28.5	13.8	0.0	51.0
Prop In Lane	0.18		0.14	0.08		0.48	1.00		0.07	1.00		0.13
Lane Grp Cap(c), veh/h	398	0	0	368	0	0	110	0	510	316	0	632
V/C Ratio(X)	0.93	0.00	0.00	0.93	0.00	0.00	0.37	0.00	0.77	0.77	0.00	1.01
Avail Cap(c_a), veh/h	491	0	0	465	0	0	234	0	639	316	0	632
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	50.5	0.0	0.0	50.9	0.0	0.0	37.3	0.0	43.3	31.6	0.0	42.4
Incr Delay (d2), s/veh	19.7	0.0	0.0	19.6	0.0	0.0	2.0	0.0	3.3	11.2	0.0	37.3
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	14.4	0.0	0.0	13.3	0.0	0.0	1.0	0.0	12.4	6.4	0.0	27.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.2	0.0	0.0	70.5	0.0	0.0	39.4	0.0	46.6	42.7	0.0	79.8
LnGrp LOS	E	A	A	E	A	A	D	A	D	D	A	F
Approach Vol, veh/h		369			341			432			880	
Approach Delay, s/veh		70.2			70.5			45.9			69.5	
Approach LOS		E			E			D			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	19.0	44.7		36.4	8.7	55.0		35.7				
Change Period (Y+Rc), s	4.0	5.0		4.0	4.0	5.0		4.0				
Max Green Setting (Gmax), s	15.0	50.0		40.0	15.0	50.0		40.0				
Max Q Clear Time (g_c+I1), s	15.8	30.5		31.4	4.3	53.0		30.7				
Green Ext Time (p_c), s	0.0	1.5		1.0	0.0	0.0		1.0				

Intersection Summary			
HCM 6th Ctrl Delay		64.8	
HCM 6th LOS		E	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	305	245	85	395	90	125	435	115	205	250	20
Future Volume (veh/h)	230	305	245	85	395	90	125	435	115	205	250	20
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	240	318	255	89	411	94	130	453	120	214	260	21
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	337	465	365	269	550	125	528	526	139	298	662	54
Arrive On Green	0.13	0.27	0.26	0.07	0.21	0.21	0.08	0.40	0.39	0.10	0.42	0.41
Sat Flow, veh/h	1641	1745	1368	1641	2650	601	1641	1312	348	1641	1573	127
Grp Volume(v), veh/h	240	298	275	89	252	253	130	0	573	214	0	281
Grp Sat Flow(s),veh/h/ln	1641	1637	1476	1641	1637	1615	1641	0	1660	1641	0	1700
Q Serve(g_s), s	11.0	16.2	16.8	4.1	14.4	14.6	4.5	0.0	31.5	7.6	0.0	11.4
Cycle Q Clear(g_c), s	11.0	16.2	16.8	4.1	14.4	14.6	4.5	0.0	31.5	7.6	0.0	11.4
Prop In Lane	1.00		0.93	1.00		0.37	1.00		0.21	1.00		0.07
Lane Grp Cap(c), veh/h	337	436	393	269	340	335	528	0	665	298	0	716
V/C Ratio(X)	0.71	0.68	0.70	0.33	0.74	0.75	0.25	0.00	0.86	0.72	0.00	0.39
Avail Cap(c_a), veh/h	417	654	590	280	491	485	532	0	962	368	0	1088
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	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.3	32.7	33.2	28.4	37.0	37.1	15.6	0.0	27.4	21.4	0.0	20.0
Incr Delay (d2), s/veh	2.8	2.7	3.2	0.3	4.8	5.3	0.1	0.0	6.7	3.5	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	4.5	6.7	6.3	1.6	6.1	6.2	1.7	0.0	13.2	3.0	0.0	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.1	35.4	36.4	28.7	41.8	42.4	15.7	0.0	34.0	24.8	0.0	20.5
LnGrp LOS	C	D	D	C	D	D	B	A	C	C	A	C
Approach Vol, veh/h		813			594			703			495	
Approach Delay, s/veh		33.9			40.1			30.6			22.4	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.7	44.0	17.2	24.7	11.8	45.9	11.3	30.5
Change Period (Y+Rc), s	4.0	* 4.8	4.0	* 4.7	4.0	* 4.8	4.0	* 4.7
Max Green Setting (Gmax), s	14.0	* 57	18.0	* 29	8.0	* 63	8.0	* 39
Max Q Clear Time (g_c+I1), s	9.6	33.5	13.0	16.6	6.5	13.4	6.1	18.8
Green Ext Time (p_c), s	0.1	5.8	0.2	3.3	0.0	2.7	0.0	5.0

Intersection Summary	
HCM 6th Ctrl Delay	32.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	35	0	0	10	90	655	20	0	500	100
Future Vol, veh/h	0	0	35	0	0	10	90	655	20	0	500	100
Conflicting Peds, #/hr	4	0	17	17	0	4	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	125	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	39	0	0	11	101	736	22	0	562	112

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	636	-	-	751	675	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.22	-	-	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.318	-	-	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	478	0	0	411	916	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	470	-	-	409	915	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.4	14.1	1.1	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	915	-	-	470	409	-	-
HCM Lane V/C Ratio	0.111	-	-	0.084	0.027	-	-
HCM Control Delay (s)	9.4	-	-	13.4	14.1	-	-
HCM Lane LOS	A	-	-	B	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-	0.3	0.1	-	-

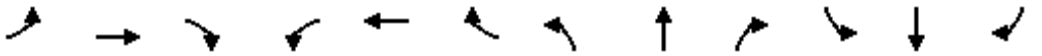
Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	5	50	5	0	10	95	695	5	5	460	95
Future Vol, veh/h	20	5	50	5	0	10	95	695	5	5	460	95
Conflicting Peds, #/hr	44	0	6	6	0	44	69	0	6	6	0	69
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	6	56	6	0	11	107	781	6	6	517	107

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1700	1659	646	1624	1709	834	693	0	0	793	0	0
Stage 1	652	652	-	1004	1004	-	-	-	-	-	-	-
Stage 2	1048	1007	-	620	705	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	73	98	472	82	91	368	902	-	-	828	-	-
Stage 1	457	464	-	291	320	-	-	-	-	-	-	-
Stage 2	275	319	-	476	439	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	57	79	438	60	73	351	843	-	-	823	-	-
Mov Cap-2 Maneuver	57	79	-	60	73	-	-	-	-	-	-	-
Stage 1	373	430	-	253	278	-	-	-	-	-	-	-
Stage 2	223	277	-	404	407	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	61.9	35.7	1.2	0.1
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	843	-	-	142	134	823	-	-
HCM Lane V/C Ratio	0.127	-	-	0.593	0.126	0.007	-	-
HCM Control Delay (s)	9.9	-	-	61.9	35.7	9.4	-	-
HCM Lane LOS	A	-	-	F	E	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	3.1	0.4	0	-	-



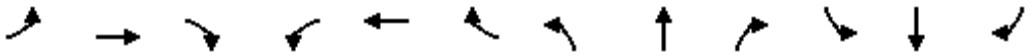
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	120	20	15	155	180	60	505	35	140	280	105
Future Volume (veh/h)	80	120	20	15	155	180	60	505	35	140	280	105
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	88	132	22	16	170	198	66	555	38	154	308	115
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	100	150	25	17	183	213	308	592	41	201	481	179
Arrive On Green	0.16	0.16	0.16	0.26	0.26	0.26	0.04	0.37	0.36	0.07	0.40	0.39
Sat Flow, veh/h	606	908	151	66	697	811	1641	1594	109	1641	1196	446
Grp Volume(v), veh/h	242	0	0	384	0	0	66	0	593	154	0	423
Grp Sat Flow(s),veh/h/ln	1665	0	0	1573	0	0	1641	0	1703	1641	0	1642
Q Serve(g_s), s	17.8	0.0	0.0	29.9	0.0	0.0	3.1	0.0	42.1	7.1	0.0	26.1
Cycle Q Clear(g_c), s	17.8	0.0	0.0	29.9	0.0	0.0	3.1	0.0	42.1	7.1	0.0	26.1
Prop In Lane	0.36		0.09	0.04		0.52	1.00		0.06	1.00		0.27
Lane Grp Cap(c), veh/h	274	0	0	413	0	0	308	0	632	201	0	660
V/C Ratio(X)	0.88	0.00	0.00	0.93	0.00	0.00	0.21	0.00	0.94	0.77	0.00	0.64
Avail Cap(c_a), veh/h	531	0	0	502	0	0	433	0	692	276	0	668
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	51.2	0.0	0.0	45.1	0.0	0.0	25.1	0.0	38.1	29.5	0.0	30.3
Incr Delay (d2), s/veh	3.7	0.0	0.0	20.0	0.0	0.0	0.3	0.0	18.9	8.3	0.0	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	7.7	0.0	0.0	13.9	0.0	0.0	1.3	0.0	20.6	3.2	0.0	10.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.9	0.0	0.0	65.1	0.0	0.0	25.5	0.0	57.0	37.9	0.0	31.9
LnGrp LOS	D	A	A	E	A	A	C	A	E	D	A	C
Approach Vol, veh/h		242			384			659			577	
Approach Delay, s/veh		54.9			65.1			53.8			33.5	
Approach LOS		D			E			D			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	13.3	50.6		24.7	9.4	54.4		36.9				
Change Period (Y+Rc), s	4.0	5.0		4.0	4.0	5.0		4.0				
Max Green Setting (Gmax), s	15.0	50.0		40.0	15.0	50.0		40.0				
Max Q Clear Time (g_c+I1), s	9.1	44.1		19.8	5.1	28.1		31.9				
Green Ext Time (p_c), s	0.2	1.4		0.9	0.1	1.8		1.1				

Intersection Summary			
HCM 6th Ctrl Delay		50.0	
HCM 6th LOS		D	

HCM 6th Signalized Intersection Summary
1: Grand Blvd & 29th Ave

2040 Future Build PM



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	525	115	175	435	200	145	280	115	520	505	30
Future Volume (veh/h)	70	525	115	175	435	200	145	280	115	520	505	30
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	74	559	122	186	463	213	154	298	122	553	537	32
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	179	591	129	205	555	254	366	304	124	563	826	49
Arrive On Green	0.06	0.22	0.22	0.09	0.25	0.25	0.06	0.26	0.26	0.31	0.51	0.51
Sat Flow, veh/h	1641	2673	581	1641	2183	997	1641	1162	476	1641	1610	96
Grp Volume(v), veh/h	74	342	339	186	346	330	154	0	420	553	0	569
Grp Sat Flow(s),veh/h/ln	1641	1637	1618	1641	1637	1543	1641	0	1637	1641	0	1705
Q Serve(g_s), s	4.7	27.8	28.0	11.8	27.1	27.5	8.0	0.0	34.5	40.7	0.0	33.1
Cycle Q Clear(g_c), s	4.7	27.8	28.0	11.8	27.1	27.5	8.0	0.0	34.5	40.7	0.0	33.1
Prop In Lane	1.00		0.36	1.00		0.65	1.00		0.29	1.00		0.06
Lane Grp Cap(c), veh/h	179	362	358	205	416	393	366	0	429	563	0	875
V/C Ratio(X)	0.41	0.94	0.95	0.91	0.83	0.84	0.42	0.00	0.98	0.98	0.00	0.65
Avail Cap(c_a), veh/h	185	362	358	205	416	393	366	0	429	563	0	875
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	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.8	52.0	52.2	39.0	47.8	47.9	35.2	0.0	49.8	38.7	0.0	24.1
Incr Delay (d2), s/veh	0.6	33.1	34.5	37.2	13.9	15.4	0.3	0.0	38.2	33.1	0.0	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	1.9	14.8	14.8	6.9	12.7	12.3	3.9	0.0	18.6	23.4	0.0	13.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.4	85.1	86.7	76.2	61.7	63.4	35.4	0.0	88.0	71.9	0.0	26.1
LnGrp LOS	D	F	F	E	E	E	D	A	F	E	A	C
Approach Vol, veh/h		755			862			574			1122	
Approach Delay, s/veh		81.4			65.5			73.9			48.6	
Approach LOS		F			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	46.0	39.6	11.5	38.5	12.0	73.6	16.0	34.0
Change Period (Y+Rc), s	4.0	* 4.8	4.0	* 4.7	4.0	* 4.8	4.0	* 4.7
Max Green Setting (Gmax), s	42.0	* 35	8.0	* 33	8.0	* 69	12.0	* 29
Max Q Clear Time (g_c+I1), s	42.7	36.5	6.7	29.5	10.0	35.1	13.8	30.0
Green Ext Time (p_c), s	0.0	0.0	0.0	1.9	0.0	6.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	64.9
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	65	0	0	75	60	445	55	0	700	95
Future Vol, veh/h	0	0	65	0	0	75	60	445	55	0	700	95
Conflicting Peds, #/hr	9	0	6	6	0	9	3	0	0	0	0	3
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	125	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	71	0	0	82	65	484	60	0	761	103

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	-	-	822	-	-	523	867	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.22	-	-	6.22	4.12	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.318	-	-	3.318	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	374	0	0	554	777	-	-	0	-	-
Stage 1	0	0	-	0	0	-	-	-	-	0	-	-
Stage 2	0	0	-	0	0	-	-	-	-	0	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	-	371	-	-	549	775	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17	12.7	1.1	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	775	-	-	371	549	-	-
HCM Lane V/C Ratio	0.084	-	-	0.19	0.148	-	-
HCM Control Delay (s)	10.1	-	-	17	12.7	-	-
HCM Lane LOS	B	-	-	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.7	0.5	-	-

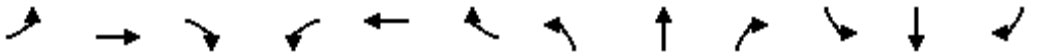
Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	5	60	0	5	5	40	490	5	25	625	65
Future Vol, veh/h	25	5	60	0	5	5	40	490	5	25	625	65
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	-	-	-	-	-	-	50	-	-	50	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	27	5	65	0	5	5	43	533	5	27	679	71

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1396	1393	715	1426	1426	536	750	0	0	538	0	0
Stage 1	769	769	-	622	622	-	-	-	-	-	-	-
Stage 2	627	624	-	804	804	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	120	143	434	114	137	549	868	-	-	1040	-	-
Stage 1	397	413	-	478	482	-	-	-	-	-	-	-
Stage 2	475	481	-	380	398	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	108	132	434	89	127	549	868	-	-	1040	-	-
Mov Cap-2 Maneuver	108	132	-	89	127	-	-	-	-	-	-	-
Stage 1	377	402	-	454	458	-	-	-	-	-	-	-
Stage 2	442	457	-	310	388	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	33.6	23.4	0.7	0.3
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	868	-	-	221	206	1040	-	-
HCM Lane V/C Ratio	0.05	-	-	0.443	0.053	0.026	-	-
HCM Control Delay (s)	9.4	-	-	33.6	23.4	8.6	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	2.1	0.2	0.1	-	-



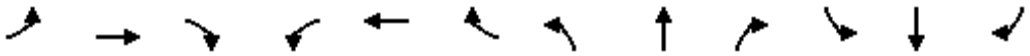
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	220	45	25	130	145	35	320	25	215	485	75
Future Volume (veh/h)	60	220	45	25	130	145	35	320	25	215	485	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	68	250	51	28	148	165	40	364	28	244	551	85
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	73	269	55	30	160	178	110	473	36	316	548	84
Arrive On Green	0.24	0.24	0.24	0.23	0.23	0.23	0.03	0.30	0.29	0.11	0.38	0.37
Sat Flow, veh/h	307	1129	230	130	685	764	1641	1579	121	1641	1457	225
Grp Volume(v), veh/h	369	0	0	341	0	0	40	0	392	244	0	636
Grp Sat Flow(s),veh/h/ln	1666	0	0	1579	0	0	1641	0	1701	1641	0	1682
Q Serve(g_s), s	29.4	0.0	0.0	28.7	0.0	0.0	2.3	0.0	28.5	13.8	0.0	51.0
Cycle Q Clear(g_c), s	29.4	0.0	0.0	28.7	0.0	0.0	2.3	0.0	28.5	13.8	0.0	51.0
Prop In Lane	0.18		0.14	0.08		0.48	1.00		0.07	1.00		0.13
Lane Grp Cap(c), veh/h	398	0	0	368	0	0	110	0	510	316	0	632
V/C Ratio(X)	0.93	0.00	0.00	0.93	0.00	0.00	0.37	0.00	0.77	0.77	0.00	1.01
Avail Cap(c_a), veh/h	491	0	0	465	0	0	234	0	639	316	0	632
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	50.5	0.0	0.0	50.9	0.0	0.0	37.3	0.0	43.3	31.6	0.0	42.4
Incr Delay (d2), s/veh	19.7	0.0	0.0	19.6	0.0	0.0	2.0	0.0	3.3	11.2	0.0	37.3
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	14.4	0.0	0.0	13.3	0.0	0.0	1.0	0.0	12.4	6.4	0.0	27.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.2	0.0	0.0	70.5	0.0	0.0	39.4	0.0	46.6	42.7	0.0	79.8
LnGrp LOS	E	A	A	E	A	A	D	A	D	D	A	F
Approach Vol, veh/h		369			341			432			880	
Approach Delay, s/veh		70.2			70.5			45.9			69.5	
Approach LOS		E			E			D			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	19.0	44.7		36.4	8.7	55.0		35.7				
Change Period (Y+Rc), s	4.0	5.0		4.0	4.0	5.0		4.0				
Max Green Setting (Gmax), s	15.0	50.0		40.0	15.0	50.0		40.0				
Max Q Clear Time (g_c+I1), s	15.8	30.5		31.4	4.3	53.0		30.7				
Green Ext Time (p_c), s	0.0	1.5		1.0	0.0	0.0		1.0				

Intersection Summary			
HCM 6th Ctrl Delay		64.8	
HCM 6th LOS		E	

HCM 6th Signalized Intersection Summary
1: Grand Blvd & 29th Ave

2040 Future Build PM - Dual SBL



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	525	115	175	435	200	145	280	115	520	505	30
Future Volume (veh/h)	70	525	115	175	435	200	145	280	115	520	505	30
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	74	559	122	186	463	213	154	298	122	553	537	32
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	241	670	146	267	621	283	181	352	144	620	624	37
Arrive On Green	0.07	0.25	0.24	0.10	0.28	0.28	0.11	0.30	0.30	0.19	0.39	0.38
Sat Flow, veh/h	1641	2673	581	1641	2183	997	1641	1162	476	3183	1610	96
Grp Volume(v), veh/h	74	342	339	186	346	330	154	0	420	553	0	569
Grp Sat Flow(s),veh/h/ln	1641	1637	1618	1641	1637	1543	1641	0	1637	1591	0	1705
Q Serve(g_s), s	3.5	21.0	21.2	8.7	20.4	20.7	9.8	0.0	25.6	18.0	0.0	32.6
Cycle Q Clear(g_c), s	3.5	21.0	21.2	8.7	20.4	20.7	9.8	0.0	25.6	18.0	0.0	32.6
Prop In Lane	1.00		0.36	1.00		0.65	1.00		0.29	1.00		0.06
Lane Grp Cap(c), veh/h	241	410	405	267	465	439	181	0	496	620	0	662
V/C Ratio(X)	0.31	0.83	0.84	0.70	0.74	0.75	0.85	0.00	0.85	0.89	0.00	0.86
Avail Cap(c_a), veh/h	255	462	456	287	525	495	247	0	793	778	0	986
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	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.0	37.7	37.9	27.7	34.5	34.6	46.4	0.0	34.9	41.7	0.0	29.9
Incr Delay (d2), s/veh	0.3	12.1	12.6	5.3	5.7	6.3	14.3	0.0	6.4	9.4	0.0	6.3
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	1.4	9.7	9.7	3.7	8.8	8.4	4.7	0.0	10.9	7.8	0.0	14.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.2	49.8	50.5	33.0	40.2	41.0	60.7	0.0	41.3	51.2	0.0	36.2
LnGrp LOS	C	D	D	C	D	D	E	A	D	D	A	D
Approach Vol, veh/h		755			862			574			1122	
Approach Delay, s/veh		48.0			38.9			46.5			43.6	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.7	36.3	11.1	34.2	15.8	45.3	14.7	30.6
Change Period (Y+Rc), s	4.0	* 4.8	4.0	* 4.7	4.0	* 4.8	4.0	* 4.7
Max Green Setting (Gmax), s	26.0	* 51	8.0	* 33	16.0	* 61	12.0	* 29
Max Q Clear Time (g_c+I1), s	20.0	27.6	5.5	22.7	11.8	34.6	10.7	23.2
Green Ext Time (p_c), s	0.7	3.9	0.0	4.2	0.1	5.8	0.0	2.8

Intersection Summary	
HCM 6th Ctrl Delay	43.9
HCM 6th LOS	D

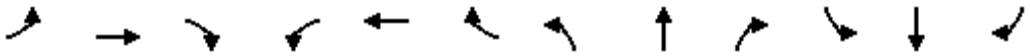
Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary
1: Grand Blvd & 29th Ave

2040 Future Build - Dual SBL with Split Phasing



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	525	115	175	435	200	145	280	115	520	505	30
Future Volume (veh/h)	70	525	115	175	435	200	145	280	115	520	505	30
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	74	559	122	186	463	213	154	298	122	553	537	32
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	169	562	122	198	532	243	403	291	119	1038	535	32
Arrive On Green	0.06	0.21	0.21	0.09	0.24	0.24	0.25	0.25	0.25	0.33	0.33	0.33
Sat Flow, veh/h	1641	2673	581	1641	2183	997	1641	1162	476	3183	1610	96
Grp Volume(v), veh/h	74	342	339	186	346	330	154	0	420	553	0	569
Grp Sat Flow(s),veh/h/ln	1641	1637	1618	1641	1637	1543	1641	0	1637	1591	0	1705
Q Serve(g_s), s	4.7	28.2	28.4	12.0	27.5	27.9	10.6	0.0	34.0	19.2	0.0	45.0
Cycle Q Clear(g_c), s	4.7	28.2	28.4	12.0	27.5	27.9	10.6	0.0	34.0	19.2	0.0	45.0
Prop In Lane	1.00		0.36	1.00		0.65	1.00		0.29	1.00		0.06
Lane Grp Cap(c), veh/h	169	344	340	198	398	376	403	0	411	1038	0	566
V/C Ratio(X)	0.44	0.99	1.00	0.94	0.87	0.88	0.38	0.00	1.02	0.53	0.00	1.00
Avail Cap(c_a), veh/h	175	344	340	198	398	376	403	0	411	1038	0	566
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	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.0	53.4	53.6	39.8	49.2	49.3	42.5	0.0	50.9	37.2	0.0	45.3
Incr Delay (d2), s/veh	0.7	46.3	48.1	45.8	18.6	20.7	0.8	0.0	50.2	0.7	0.0	39.0
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	2.0	16.0	16.1	7.4	13.3	12.9	4.4	0.0	19.6	7.6	0.0	25.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.7	99.7	101.7	85.6	67.8	70.0	43.4	0.0	101.1	37.9	0.0	84.2
LnGrp LOS	D	F	F	F	E	E	D	A	F	D	A	F
Approach Vol, veh/h		755			862			574			1122	
Approach Delay, s/veh		94.9			72.5			85.6			61.4	
Approach LOS		F			E			F			E	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		38.0	11.5	37.0		49.0	16.0	32.5				
Change Period (Y+Rc), s		* 4.7	4.0	* 4.7		4.8	4.0	* 4.7				
Max Green Setting (Gmax), s		* 33	8.0	* 32		44.2	12.0	* 28				
Max Q Clear Time (g_c+I1), s		36.0	6.7	29.9		47.0	14.0	30.4				
Green Ext Time (p_c), s		0.0	0.0	1.1		0.0	0.0	0.0				

Intersection Summary	
HCM 6th Ctrl Delay	76.1
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Grand Blvd & 29th Ave

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	T
Maximum Queue (ft)	177	449	436	220	576	554	149	148	199	232	175	1159
Average Queue (ft)	51	221	212	136	239	223	77	77	86	122	166	724
95th Queue (ft)	140	445	448	244	646	608	155	140	165	209	218	1585
Link Distance (ft)		1128	1128		1477	1477			262	262		1637
Upstream Blk Time (%)		0	1		0	0			0	0		9
Queuing Penalty (veh)		0	0		0	0			0	1		0
Storage Bay Dist (ft)	175			200			125	125			150	
Storage Blk Time (%)	0	15		22	1	9	0	1	2		36	32
Queuing Penalty (veh)	0	7		46	1	15	0	2	3		94	122

Intersection: 1: Grand Blvd & 29th Ave

Movement	SB
Directions Served	TR
Maximum Queue (ft)	1115
Average Queue (ft)	646
95th Queue (ft)	1533
Link Distance (ft)	1637
Upstream Blk Time (%)	2
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Grand Blvd & 30th Ave/Manito Shopping Center

Movement	EB	WB	NB	NB	NB	B12	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	T	L	T	TR
Maximum Queue (ft)	248	258	77	109	61	32	75	301	289
Average Queue (ft)	88	132	28	13	5	2	46	155	140
95th Queue (ft)	270	306	76	126	29	38	95	364	359
Link Distance (ft)	725	269		557	557	319		262	262
Upstream Blk Time (%)	1	27		1		0		13	9
Queuing Penalty (veh)	0	0		2		2		52	35
Storage Bay Dist (ft)			125				50		
Storage Blk Time (%)			3				2	43	
Queuing Penalty (veh)			5				6	41	

Intersection: 3: Grand Blvd & 33rd Ave

Movement	NB	SB	B12	B12
Directions Served	TR	TR	T	
Maximum Queue (ft)	34	436	593	538
Average Queue (ft)	1	327	405	292
95th Queue (ft)	18	572	795	751
Link Distance (ft)	1256	319	557	557
Upstream Blk Time (%)		58	28	9
Queuing Penalty (veh)		394	92	31
Storage Bay Dist (ft)				
Storage Blk Time (%)	0	58		
Queuing Penalty (veh)	0	0		

Intersection: 4: Grand Blvd & 37th Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	524	352	99	359	75	1272
Average Queue (ft)	251	181	30	168	61	1194
95th Queue (ft)	455	307	80	317	94	1562
Link Distance (ft)	870	832		629		1256
Upstream Blk Time (%)	0					24
Queuing Penalty (veh)	0					162
Storage Bay Dist (ft)			75		50	
Storage Blk Time (%)			1	31	30	51
Queuing Penalty (veh)			2	11	150	97

Network Summary

Network wide Queuing Penalty: 1372

Intersection: 1: Grand Blvd & 29th Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	TR
Maximum Queue (ft)	200	540	523	225	860	837	150	278	845	872
Average Queue (ft)	104	326	308	193	456	442	107	242	404	462
95th Queue (ft)	223	528	503	279	1037	1000	183	324	825	1047
Link Distance (ft)		1140	1140		1489	1489		262	1465	1465
Upstream Blk Time (%)					3	2		27	0	0
Queuing Penalty (veh)					0	0		115	0	0
Storage Bay Dist (ft)	175			200			125			
Storage Blk Time (%)	0	41		48	7		5	48		
Queuing Penalty (veh)	1	27		100	12		18	59		

Intersection: 2: Grand Blvd & 30th Ave/Manito Shopping Center

Movement	EB	WB	NB	NB	B12	SB
Directions Served	R	R	L	TR	T	TR
Maximum Queue (ft)	297	237	150	451	18	237
Average Queue (ft)	128	94	43	154	1	135
95th Queue (ft)	387	236	122	405	23	335
Link Distance (ft)	737	281		557	319	262
Upstream Blk Time (%)		8		1		6
Queuing Penalty (veh)		0		3		39
Storage Bay Dist (ft)			125			
Storage Blk Time (%)			0	16		
Queuing Penalty (veh)			0	8		

Intersection: 3: Grand Blvd & 33rd Ave

Movement	SB	B12
Directions Served	TR	T
Maximum Queue (ft)	437	568
Average Queue (ft)	328	368
95th Queue (ft)	558	773
Link Distance (ft)	319	557
Upstream Blk Time (%)	55	10
Queuing Penalty (veh)	368	70
Storage Bay Dist (ft)		
Storage Blk Time (%)	59	
Queuing Penalty (veh)	0	

Intersection: 4: Grand Blvd & 37th Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	477	341	99	362	74	1272
Average Queue (ft)	257	187	30	177	63	1238
95th Queue (ft)	426	300	81	306	92	1378
Link Distance (ft)	870	832		629		1256
Upstream Blk Time (%)						26
Queuing Penalty (veh)						175
Storage Bay Dist (ft)			75		50	
Storage Blk Time (%)			1	34	33	53
Queuing Penalty (veh)			2	12	164	102

Network Summary

Network wide Queuing Penalty: 1275

Intersection: 1: Grand Blvd & 29th Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	L	TR
Maximum Queue (ft)	200	512	489	225	692	660	150	277	175	825	938
Average Queue (ft)	93	307	292	175	368	361	126	224	169	462	479
95th Queue (ft)	218	513	492	275	799	754	180	322	194	820	908
Link Distance (ft)		1134	1134		1483	1483		261		1465	1465
Upstream Blk Time (%)								12			
Queuing Penalty (veh)								52			
Storage Bay Dist (ft)	175			200			125		150		
Storage Blk Time (%)	0	38		39	5		22	25	18	52	
Queuing Penalty (veh)	0	25		81	8		74	30	42	123	

Intersection: 2: Grand Blvd & 30th Ave/Manito Shopping Center

Movement	EB	WB	NB	NB	SB
Directions Served	R	R	L	TR	TR
Maximum Queue (ft)	223	150	120	316	259
Average Queue (ft)	89	50	30	69	162
95th Queue (ft)	226	116	80	224	354
Link Distance (ft)	736	280		557	261
Upstream Blk Time (%)		0		0	7
Queuing Penalty (veh)		0		0	47
Storage Bay Dist (ft)			125		
Storage Blk Time (%)			0	4	
Queuing Penalty (veh)			0	2	

Intersection: 3: Grand Blvd & 33rd Ave

Movement	SB	B12
Directions Served	TR	T
Maximum Queue (ft)	430	564
Average Queue (ft)	353	424
95th Queue (ft)	546	781
Link Distance (ft)	319	557
Upstream Blk Time (%)	64	13
Queuing Penalty (veh)	428	85
Storage Bay Dist (ft)		
Storage Blk Time (%)	64	
Queuing Penalty (veh)	0	

Intersection: 4: Grand Blvd & 37th Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	483	402	99	380	77	1272
Average Queue (ft)	256	210	32	168	62	1243
95th Queue (ft)	429	362	83	307	92	1396
Link Distance (ft)	870	832		629		1256
Upstream Blk Time (%)						29
Queuing Penalty (veh)						193
Storage Bay Dist (ft)			75		50	
Storage Blk Time (%)			1	31	29	53
Queuing Penalty (veh)			2	11	147	101

Network Summary

Network wide Queuing Penalty: 1452

Intersection: 1: Grand Blvd & 29th Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	L	TR
Maximum Queue (ft)	200	710	683	225	562	536	150	277	175	1011	1128
Average Queue (ft)	103	469	447	193	332	330	112	263	153	460	743
95th Queue (ft)	222	772	737	275	568	543	193	285	212	1122	1339
Link Distance (ft)		1134	1134		1483	1483		261		1465	1465
Upstream Blk Time (%)								50		4	5
Queuing Penalty (veh)								213		0	0
Storage Bay Dist (ft)	175			200			125		150		
Storage Blk Time (%)	2	60		32	13		7	66	8	23	
Queuing Penalty (veh)	5	39		67	21		23	81	18	54	

Intersection: 2: Grand Blvd & 30th Ave/Manito Shopping Center

Movement	EB	WB	NB	NB	B12	SB
Directions Served	R	R	L	TR	T	TR
Maximum Queue (ft)	138	300	150	541	74	226
Average Queue (ft)	51	209	55	283	8	70
95th Queue (ft)	118	380	148	553	71	227
Link Distance (ft)	736	280		557	319	261
Upstream Blk Time (%)		48		3	0	1
Queuing Penalty (veh)		0		11	0	9
Storage Bay Dist (ft)			125			
Storage Blk Time (%)			0	36		
Queuing Penalty (veh)			0	19		

Intersection: 3: Grand Blvd & 33rd Ave

Movement	NB	SB	B12
Directions Served	TR	TR	T
Maximum Queue (ft)	2	400	447
Average Queue (ft)	0	248	237
95th Queue (ft)	2	553	638
Link Distance (ft)	1256	319	557
Upstream Blk Time (%)		40	4
Queuing Penalty (veh)		270	26
Storage Bay Dist (ft)			
Storage Blk Time (%)		44	
Queuing Penalty (veh)		0	

Intersection: 4: Grand Blvd & 37th Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	492	403	99	386	77	1271
Average Queue (ft)	260	193	29	168	64	1129
95th Queue (ft)	454	346	80	311	91	1529
Link Distance (ft)	870	832		629		1256
Upstream Blk Time (%)						19
Queuing Penalty (veh)						130
Storage Bay Dist (ft)			75		50	
Storage Blk Time (%)			1	31	34	52
Queuing Penalty (veh)			1	10	171	99

Network Summary

Network wide Queuing Penalty: 1268

Intersection: 1: Grand Blvd & 29th Ave

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	T
Maximum Queue (ft)	200	496	478	225	1222	1203	150	150	262	268	175	4855
Average Queue (ft)	72	270	256	201	721	676	97	96	126	149	170	2781
95th Queue (ft)	190	433	421	277	1504	1440	184	162	235	250	211	5102
Link Distance (ft)		1128	1128		1477	1477			262	262		6058
Upstream Blk Time (%)					8	3			0	1		1
Queuing Penalty (veh)					0	0			1	3		0
Storage Bay Dist (ft)	175			200			125	125			150	
Storage Blk Time (%)	0	29		72	2	16	1	6	7		35	64
Queuing Penalty (veh)	0	16		154	3	32	1	8	10		105	274

Intersection: 1: Grand Blvd & 29th Ave

Movement	SB
Directions Served	TR
Maximum Queue (ft)	4811
Average Queue (ft)	2659
95th Queue (ft)	5064
Link Distance (ft)	6058
Upstream Blk Time (%)	1
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Grand Blvd & 30th Ave/Manito Shopping Center

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	190	294	76	56	66	75	323	327
Average Queue (ft)	76	240	26	5	7	59	248	241
95th Queue (ft)	166	367	63	31	39	104	377	392
Link Distance (ft)	725	269		557	557		262	262
Upstream Blk Time (%)		78					26	19
Queuing Penalty (veh)		0					116	85
Storage Bay Dist (ft)			125			50		
Storage Blk Time (%)				0		3	75	
Queuing Penalty (veh)				0		9	82	

Intersection: 3: Grand Blvd & 33rd Ave

Movement	SB	B12	B12
Directions Served	TR	T	
Maximum Queue (ft)	436	611	609
Average Queue (ft)	386	533	487
95th Queue (ft)	496	767	808
Link Distance (ft)	319	557	557
Upstream Blk Time (%)	77	54	22
Queuing Penalty (veh)	579	204	82
Storage Bay Dist (ft)			
Storage Blk Time (%)	74		
Queuing Penalty (veh)	0		

Intersection: 4: Grand Blvd & 37th Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	573	503	99	550	75	1271
Average Queue (ft)	281	230	28	266	67	1258
95th Queue (ft)	496	402	78	479	89	1319
Link Distance (ft)	870	832		629		1256
Upstream Blk Time (%)				1		34
Queuing Penalty (veh)				0		266
Storage Bay Dist (ft)			75		50	
Storage Blk Time (%)			0	43	42	51
Queuing Penalty (veh)			1	15	240	110

Network Summary

Network wide Queuing Penalty: 2395

Intersection: 1: Grand Blvd & 29th Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	TR
Maximum Queue (ft)	200	1079	1038	225	1513	1497	150	281	3469	3465
Average Queue (ft)	118	754	730	219	1017	982	117	267	1860	2017
95th Queue (ft)	242	1218	1197	252	1786	1751	187	276	3673	3802
Link Distance (ft)		1140	1140		1489	1489		262	4885	4885
Upstream Blk Time (%)		8	8		28	17		54		
Queuing Penalty (veh)		0	0		0	0		282		
Storage Bay Dist (ft)	175			200			125			
Storage Blk Time (%)	1	74		88	4		11	63		
Queuing Penalty (veh)	2	52		189	7		42	91		

Intersection: 2: Grand Blvd & 30th Ave/Manito Shopping Center

Movement	EB	WB	NB	NB	B12	SB
Directions Served	R	R	L	TR	T	TR
Maximum Queue (ft)	413	308	150	661	316	279
Average Queue (ft)	219	266	60	543	147	239
95th Queue (ft)	497	368	161	782	387	355
Link Distance (ft)	737	281		557	319	262
Upstream Blk Time (%)		81		37	10	20
Queuing Penalty (veh)		0		197	50	155
Storage Bay Dist (ft)			125			
Storage Blk Time (%)			0	57		
Queuing Penalty (veh)			0	34		

Intersection: 3: Grand Blvd & 33rd Ave

Movement	NB	SB	B12
Directions Served	TR	TR	T
Maximum Queue (ft)	448	442	573
Average Queue (ft)	107	399	541
95th Queue (ft)	466	432	684
Link Distance (ft)	1256	319	557
Upstream Blk Time (%)		80	26
Queuing Penalty (veh)		615	200
Storage Bay Dist (ft)			
Storage Blk Time (%)	14	76	
Queuing Penalty (veh)	0	0	

Intersection: 4: Grand Blvd & 37th Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	527	494	99	520	75	1271
Average Queue (ft)	291	254	28	264	67	1262
95th Queue (ft)	490	469	78	473	89	1271
Link Distance (ft)	870	832		629		1256
Upstream Blk Time (%)		0		0		37
Queuing Penalty (veh)		0		0		286
Storage Bay Dist (ft)			75		50	
Storage Blk Time (%)			1	44	46	52
Queuing Penalty (veh)			4	16	258	111

Network Summary

Network wide Queuing Penalty: 2591

Intersection: 1: Grand Blvd & 29th Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	L	TR
Maximum Queue (ft)	200	943	930	225	1516	1494	150	278	175	4055	4080
Average Queue (ft)	124	689	672	219	1050	1018	137	261	168	2248	2337
95th Queue (ft)	247	1226	1202	256	1802	1764	178	303	199	4363	4513
Link Distance (ft)		1134	1134		1483	1483		261		7111	7111
Upstream Blk Time (%)		16	16		26	14		38			
Queuing Penalty (veh)		0	0		0	0		197			
Storage Bay Dist (ft)	175			200			125		150		
Storage Blk Time (%)	1	69		89	3		44	26	26	64	
Queuing Penalty (veh)	1	48		192	6		171	37	67	167	

Intersection: 2: Grand Blvd & 30th Ave/Manito Shopping Center

Movement	EB	WB	NB	NB	B12	SB
Directions Served	R	R	L	TR	T	TR
Maximum Queue (ft)	321	278	148	600	182	277
Average Queue (ft)	145	169	57	322	36	239
95th Queue (ft)	329	350	152	684	186	355
Link Distance (ft)	736	280		557	319	261
Upstream Blk Time (%)		33		10	2	17
Queuing Penalty (veh)		0		55	10	138
Storage Bay Dist (ft)			125			
Storage Blk Time (%)			0	33		
Queuing Penalty (veh)			1	19		

Intersection: 3: Grand Blvd & 33rd Ave

Movement	NB	SB	B12
Directions Served	TR	TR	T
Maximum Queue (ft)	140	433	574
Average Queue (ft)	26	389	530
95th Queue (ft)	234	483	722
Link Distance (ft)	1256	319	557
Upstream Blk Time (%)		79	25
Queuing Penalty (veh)		601	191
Storage Bay Dist (ft)			
Storage Blk Time (%)	3	75	
Queuing Penalty (veh)	0	0	

Intersection: 4: Grand Blvd & 37th Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	566	508	99	554	76	1272
Average Queue (ft)	305	260	29	277	68	1261
95th Queue (ft)	514	453	84	487	88	1293
Link Distance (ft)	870	832		629		1256
Upstream Blk Time (%)				1		36
Queuing Penalty (veh)				0		280
Storage Bay Dist (ft)			75		50	
Storage Blk Time (%)			1	47	49	52
Queuing Penalty (veh)			4	16	274	112

Network Summary

Network wide Queuing Penalty: 2587

Intersection: 1: Grand Blvd & 29th Ave

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	L	TR
Maximum Queue (ft)	200	1164	1145	225	1134	1110	150	278	175	4470	4434
Average Queue (ft)	122	897	875	216	729	710	103	267	140	2512	2691
95th Queue (ft)	249	1344	1331	260	1427	1396	193	275	219	4906	4773
Link Distance (ft)		1134	1134		1483	1483		261		4788	4788
Upstream Blk Time (%)		27	28		10	5		61		9	9
Queuing Penalty (veh)		0	0		0	0		319		0	0
Storage Bay Dist (ft)	175			200			125		150		
Storage Blk Time (%)	1	77		76	7		5	71	9	27	
Queuing Penalty (veh)	2	54		164	12		20	103	24	69	

Intersection: 2: Grand Blvd & 30th Ave/Manito Shopping Center

Movement	EB	WB	NB	NB	B12	SB
Directions Served	R	R	L	TR	T	TR
Maximum Queue (ft)	332	300	150	670	358	275
Average Queue (ft)	140	267	66	608	272	204
95th Queue (ft)	332	344	171	753	461	363
Link Distance (ft)	736	280		557	319	261
Upstream Blk Time (%)		81		65	34	12
Queuing Penalty (veh)		0		345	180	91
Storage Bay Dist (ft)			125			
Storage Blk Time (%)			0	68		
Queuing Penalty (veh)			1	41		

Intersection: 3: Grand Blvd & 33rd Ave

Movement	NB	SB	B12
Directions Served	TR	TR	T
Maximum Queue (ft)	1038	430	573
Average Queue (ft)	527	375	494
95th Queue (ft)	1267	518	775
Link Distance (ft)	1256	319	557
Upstream Blk Time (%)	3	74	20
Queuing Penalty (veh)	13	559	154
Storage Bay Dist (ft)			
Storage Blk Time (%)	51	72	
Queuing Penalty (veh)	0	0	

Intersection: 4: Grand Blvd & 37th Ave

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	604	500	99	548	77	1272
Average Queue (ft)	312	272	27	287	69	1255
95th Queue (ft)	550	545	78	541	85	1330
Link Distance (ft)	870	832		629		1256
Upstream Blk Time (%)	0	3		5		34
Queuing Penalty (veh)	0	0		0		267
Storage Bay Dist (ft)			75		50	
Storage Blk Time (%)			1	48	47	50
Queuing Penalty (veh)			3	17	269	107

Network Summary

Network wide Queuing Penalty: 2814

Market Analysis

A

Market Analysis

Spokane Grand Boulevard

Leland Consulting Group
March 2020

Table of Contents

Introduction

This market analysis is part of a larger Grand Boulevard Transportation and Land Use Study being undertaken by the City of Spokane to evaluate Grand Boulevard along a Study Area extending from 27th to 39th Avenues.

Much of that effort is devoted to exploring opportunities for transportation, safety, and aesthetic improvements to that stretch of Grand Boulevard, potentially including changes to streetscaping, bike/ped amenities, traffic engineering, etc.

This market analysis component is included to evaluate the area's redevelopment potential and study how private sector changes to the built environment might best complement any transportation infrastructure recommendations to further Comprehensive Plan goals.

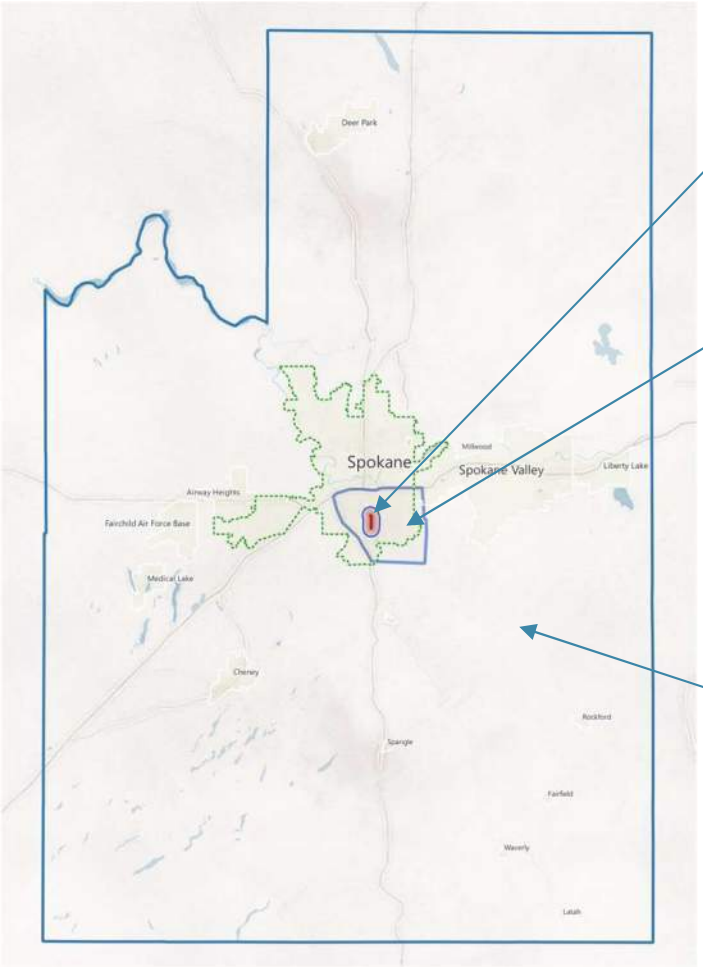
The report, in fact, provides evidence for favorable market conditions, with ample residential and retail demand to support infill development in the Study Area.

Existing land use policy for the area appears to be well-suited to accommodate desirable development forms (although could perhaps be better promoted).

Finally, the contemplated investments in street improvements should help attract developer and property owner interest in redevelopment – leading by example in moving towards a vision of a more vibrant, resident- and business-friendly street.

Comparison Geographies

This market study involves analysis of demographic and economic conditions at varying geographic scales. This is an overview of those boundaries, along with a rationale for their use and notes on some exceptions.



Geography	Use and Rationale	Notes
Grand Boulevard Study Area or "Study Area"	This half-mile buffer around the stretch of Grand Blvd. from 27th to 39th Streets is the immediate project vicinity and area most directly affected by any street improvements or changes to zoning or policy.	
South Side Market Area or "Market Area"	The Market Area is drawn to encompass areas of likely competition for private sector land uses such as new housing or retail. In the case of retail (and dining), the boundary is also intended to cover a "catchment area" of neighborhoods most likely to patronize Study Area establishments. Although political boundaries can sometimes be used to define a market area, it is important to respect factors such as drive times and major physical divides such as rivers and highways. In this case, the boundary extends into unincorporated Spokane County to the southeast, in recognition that those households have few convenient, available shopping alternatives.	The main provider of commercial real estate data, Costar, tracks indicators such as inventory, rents and vacancy rates for pre-defined submarkets with different boundaries that do not exactly match the Market Area used here. Costar's "South Spokane" retail submarket excludes unincorporated areas to the southeast of Spokane. For their multifamily reports, Costar (confusingly) uses a different boundary for their South Spokane submarket – excluding South Hill
Spokane County	Spokane County serves as the Metropolitan Statistical Area (MSA) boundary for Census (and other) data sources and is a suitable area for regional comparisons.	Some sources consider "metro Spokane" to extend eastward to include Coeur d'Alene and the rest of Kootenai County, ID. While those households may indeed support regional retail elsewhere in Spokane County, they are not considered as competition or demand sources in this analysis.

Data Sources

This report draws on data from a variety of public and private sources. The table below describes the primary data providers and how they are used in this report.

Source	Description	Use in this Report
U.S. Census	All key demographics including population, age, income, household composition, household spending potential, and housing characteristics are based on U.S. Census decennial counts and American Community Survey (ACS) inter-year sampled surveys. The Census division's Longitudinal Employment and Household Dynamics (LEHD) tool provides information on employment and commuting flows using jobs data based on both place-of-work and place-of-residence data for major industry sectors at the Census block level.	• Historical population growth • Employment estimates • Commuter flows and mapping *Note: LEHD mapping data is very fine-grained geographically but does include some "blurring" to preserve confidentiality (moving a small portion of locations to adjacent blocks and/or changing industry classification to similar categories)*
ESRI	Leading subscription-based demographics data provider. Most ESRI data is Census-based but is projected forward to current year estimates using proprietary models and supplementary data sources.	• Current-year demographic comparisons • Projected growth by age group • Household spending potential retail sales estimates by category
Costar	Leading subscription-based commercial real estate data provider, selling individual property information and aggregated market statistics.	• Multifamily and retail inventory mapping • Multifamily and retail rent, vacancy and activity statistics by market and submarket
Spokane County Assessor, City of Spokane	GIS and tabular parcel data, including information on size, values, land use and zoning.	Land use, land utilization and property value mapping.

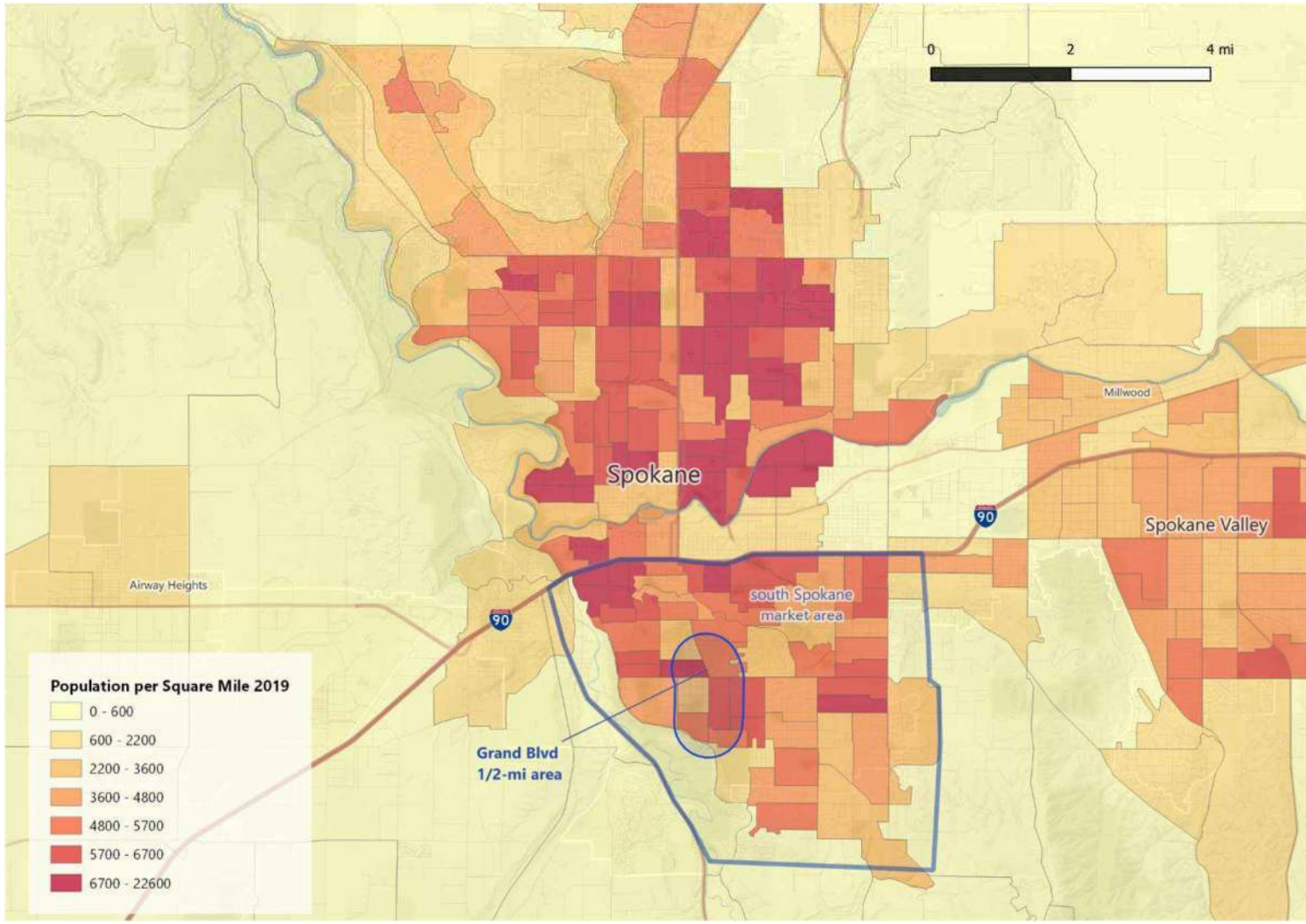
DEMOGRAPHICS & EMPLOYMENT

Population Density

Regional population density is highly concentrated within the Spokane and Spokane Valley municipal boundaries.

The Market Area is less dense than the city's northeast quadrant, but pockets of population density (5,000+ per square mile) are scattered throughout the south side.

Resident population is limited by topography along the city's southwest side, just beyond the Study Area – posing a natural limit on the household catchment than can support Grand Boulevard retail.



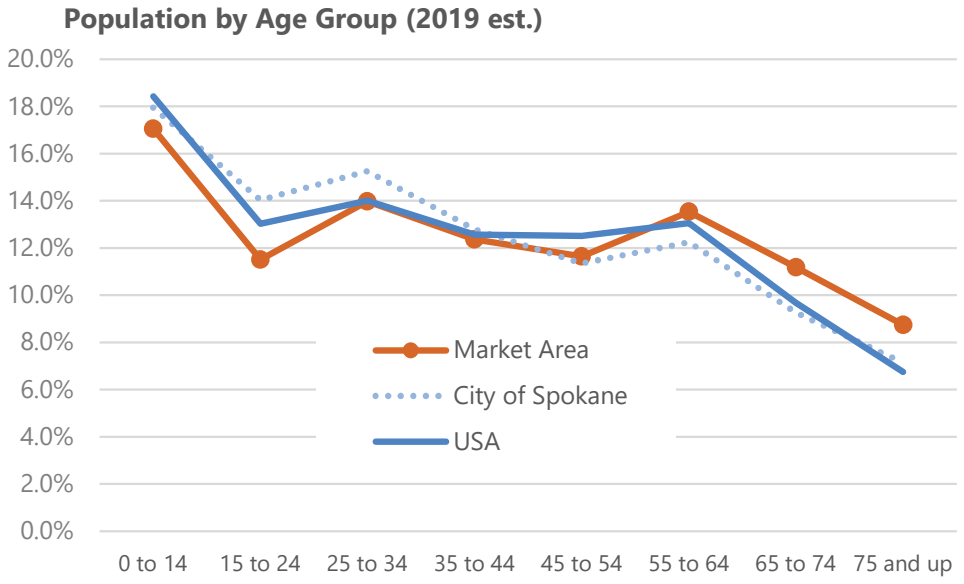
	Study Area 1/2-mi Area	South Spokane Market Area	City of Spokane	Spokane County	USA
Population					
2000	6,637	64,777	198,140	417,939	281,421,906
2010	6,650	67,644	209,770	471,221	308,745,538
2019	7,044	73,486	227,620	528,652	332,417,793
Annual Growth Rate					
2000 to 2010	0.02%	0.43%	0.57%	1.21%	0.93%
2010 to 2019	0.64%	0.92%	0.91%	1.29%	0.82%

Source: US Census-based estimates from ESRI

Population by Age

All comparison areas have similar proportions of adults aged 35 to 54. The Market Area, however, skews older than the citywide, county and national comparisons, both in terms of median age and share of seniors aged 65 and up.

As the larger Baby Boomer and Millennial generational cohorts advance in age over the next five years, the Market Area may see considerable growth in residents over age 70 and age 30-45. The increase in senior population should boost demand for senior-friendly housing options throughout the region.



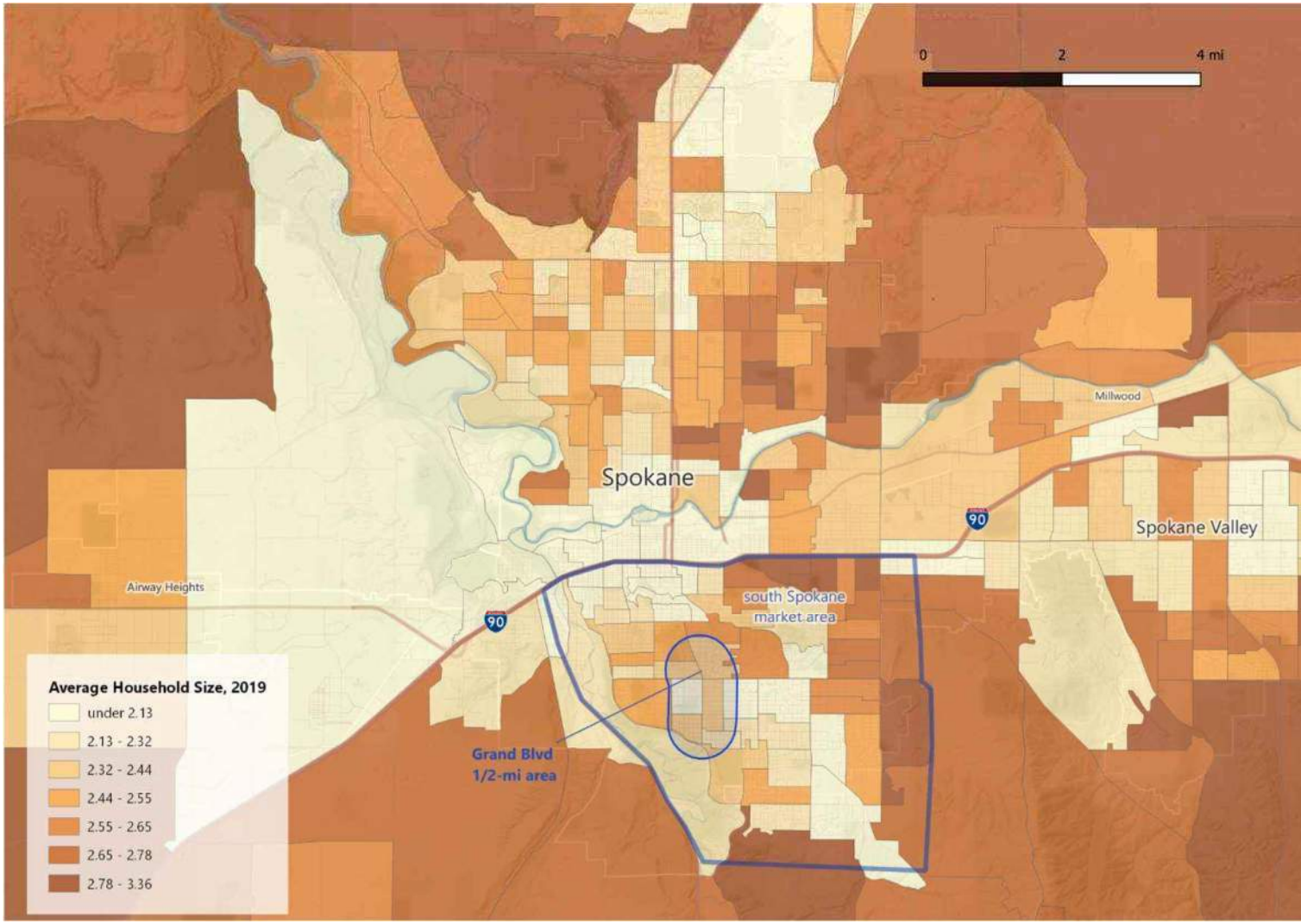
	Median Age	Age 65+
Study Area	41.3	19.5%
Market Area	40.8	19.9%
City of Spokane	37.0	16.4%
Spokane County	38.4	16.9%
USA	38.5	16.4%

Source: US Census-based estimates from ESRI

Household Sizes

Study Area households are smaller, on average, than those found on the fringes of suburban Spokane and into the county, but not as consistently small as those across central and downtown Spokane.

The broader Market Area has slightly smaller household sizes than the Study Area – both below countywide and national averages.



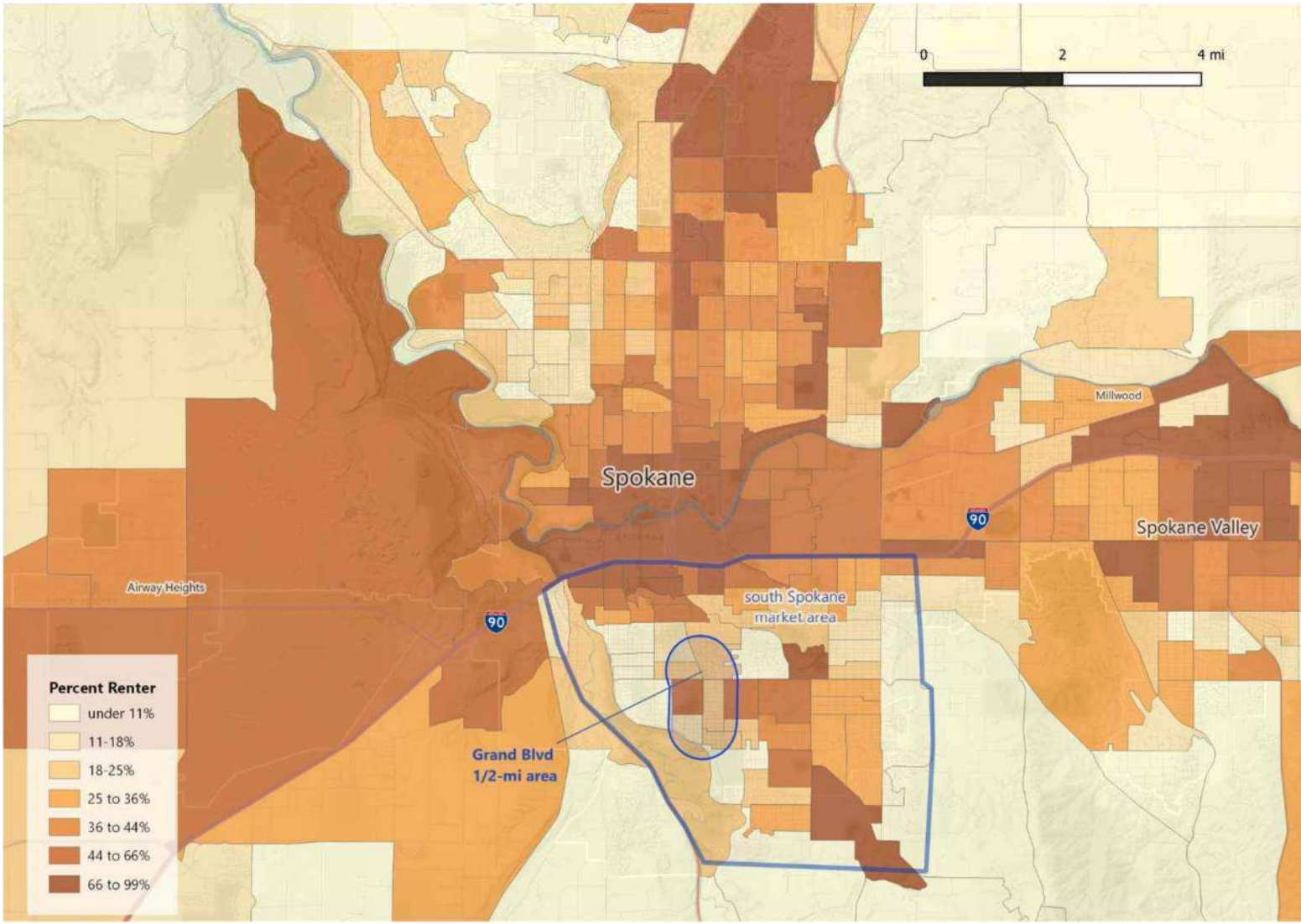
Households

	Study Area 1/2-mi Area	South Spokane Market Area	City of Spokane	Spokane County	USA
Average Household Size	2.3	2.3	2.3	2.5	2.6

Source: US Census-based estimates from ESRI

Renter Households

Housing in the Market Area and immediate Study Area is predominantly owner-occupied but does includes substantial representation of renter households, both in apartments and detached homes.



Households

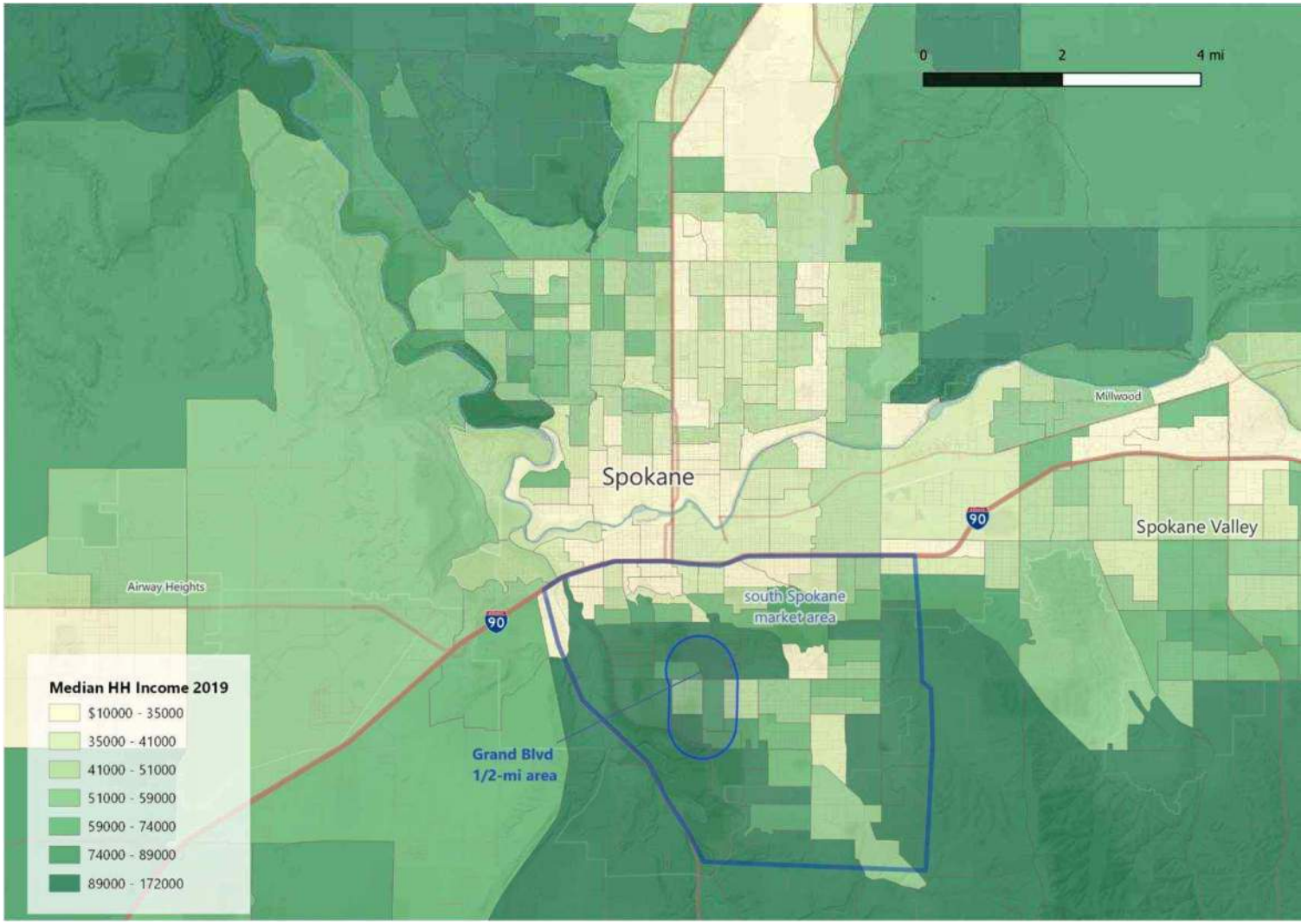
	Study Area 1/2-mi Area	South Spokane Market Area	City of Spokane	Spokane County	USA
Percent Renter	28%	39%	43%	36%	37%

Source: US Census-based estimates from ESRI

Household Incomes

Incomes in the Market Area are substantially higher than county-wide figures, which in turn are higher than those within City of Spokane overall.

Study Area incomes are higher still, with half earning over $78K and average (mean) income topping $100K, by current estimates.



Households by Income

	Study Area 1/2-mi Area	South Spokane Market Area	City of Spokane	Spokane County	USA
Median Household Income	$78,136	$61,175	$47,943	$56,227	$60,548
Average Household Income	$101,270	$86,925	$68,559	$77,749	$87,398
Per Capita Income	$44,078	$38,104	$28,749	$30,841	$33,028

Source: US Census-based estimates from ESRI

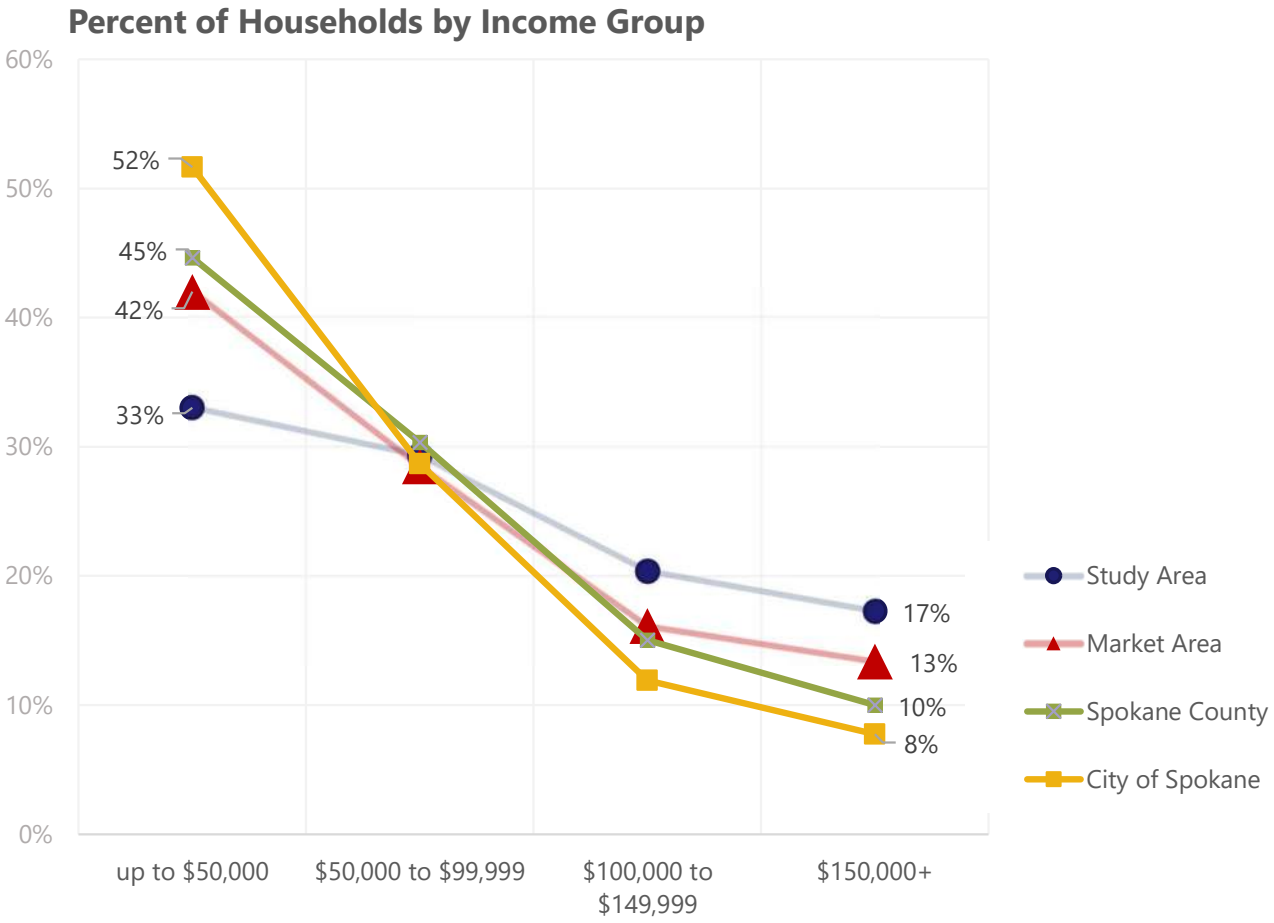
Household Incomes

This figure shows the distribution of households across income ranges for each comparison geography.

Each area has roughly 30% of households earning between $50K and $100K.

However, just one-third of Study Area households make less than $50K, while more than half of Spokane citywide households fall in that group.

Conversely, the Study Area and Market Area have higher proportions earning in the top two income groups.



Source: US Census-based estimates from ESRI

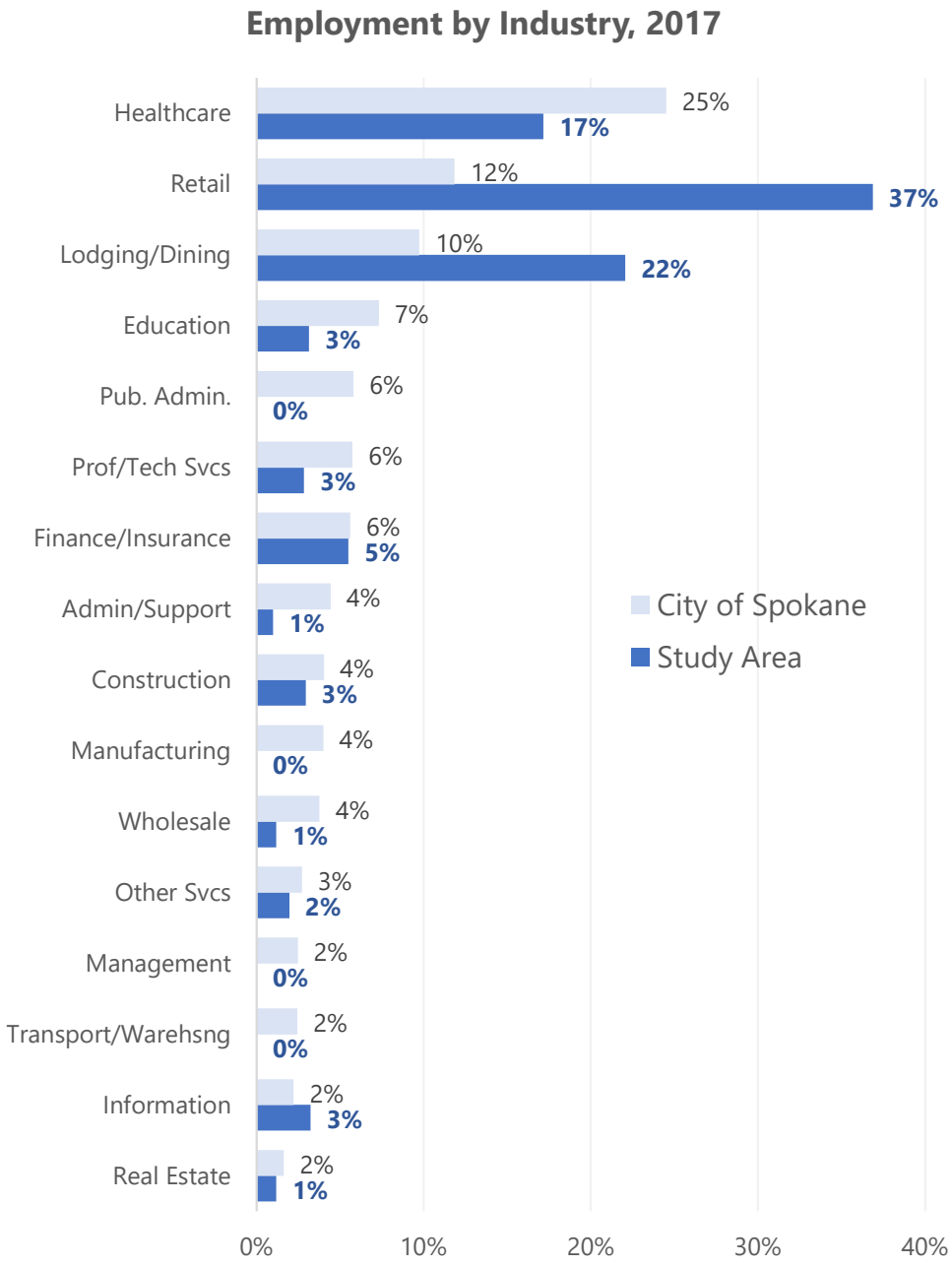
Study Area Employment Profile

Establishments within the Study Area employed just over 1,000 workers as of 2017.

Study Area jobs are almost exclusively within service industries, with 37% working in retail and 22% in food service and accommodations (mostly restaurants). Another 17% work in the healthcare industry.

There is currently a mismatch between the Study Area jobs and residents, in that its daytime workforce population tends to work in lower-wage industries, while area residents tend to have higher-paying jobs.

This presents a challenge to creating at least the possibility of a *live-work* environment. That is, without some housing that is more affordable to Grand Boulevard employees, they will always have to commute in from outside – worsening traffic and wasting time. Conversely, without some higher-paying jobs in the Study Area, local residents will always have to commute outside for work.

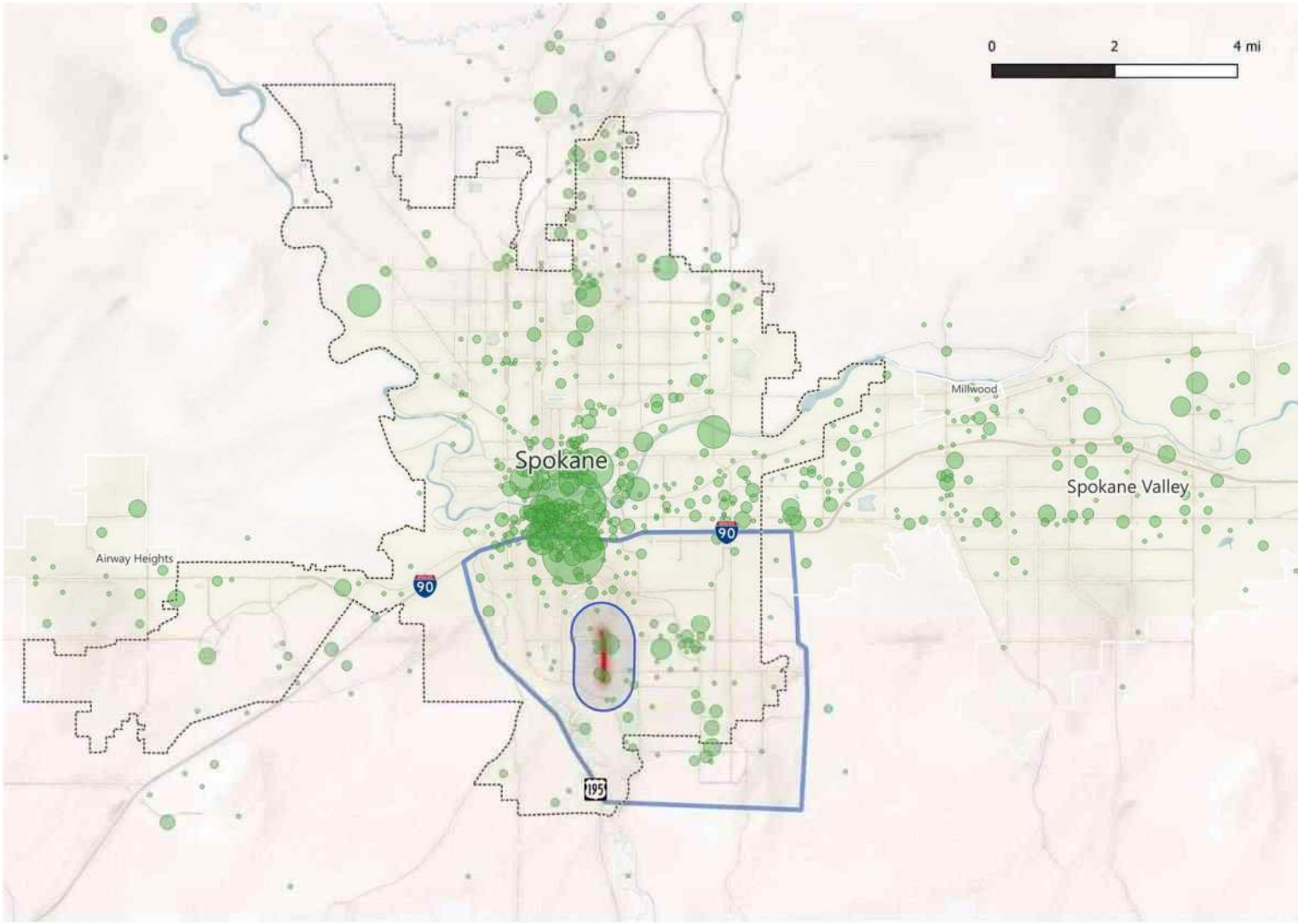


Source: US Census LEHD 2017 data (latest available)

Where do Study Area Residents Commute To?

Of the Study Area's 3,000 employed residents, less than 40 remain within the ½-mile Study Area to work each day.

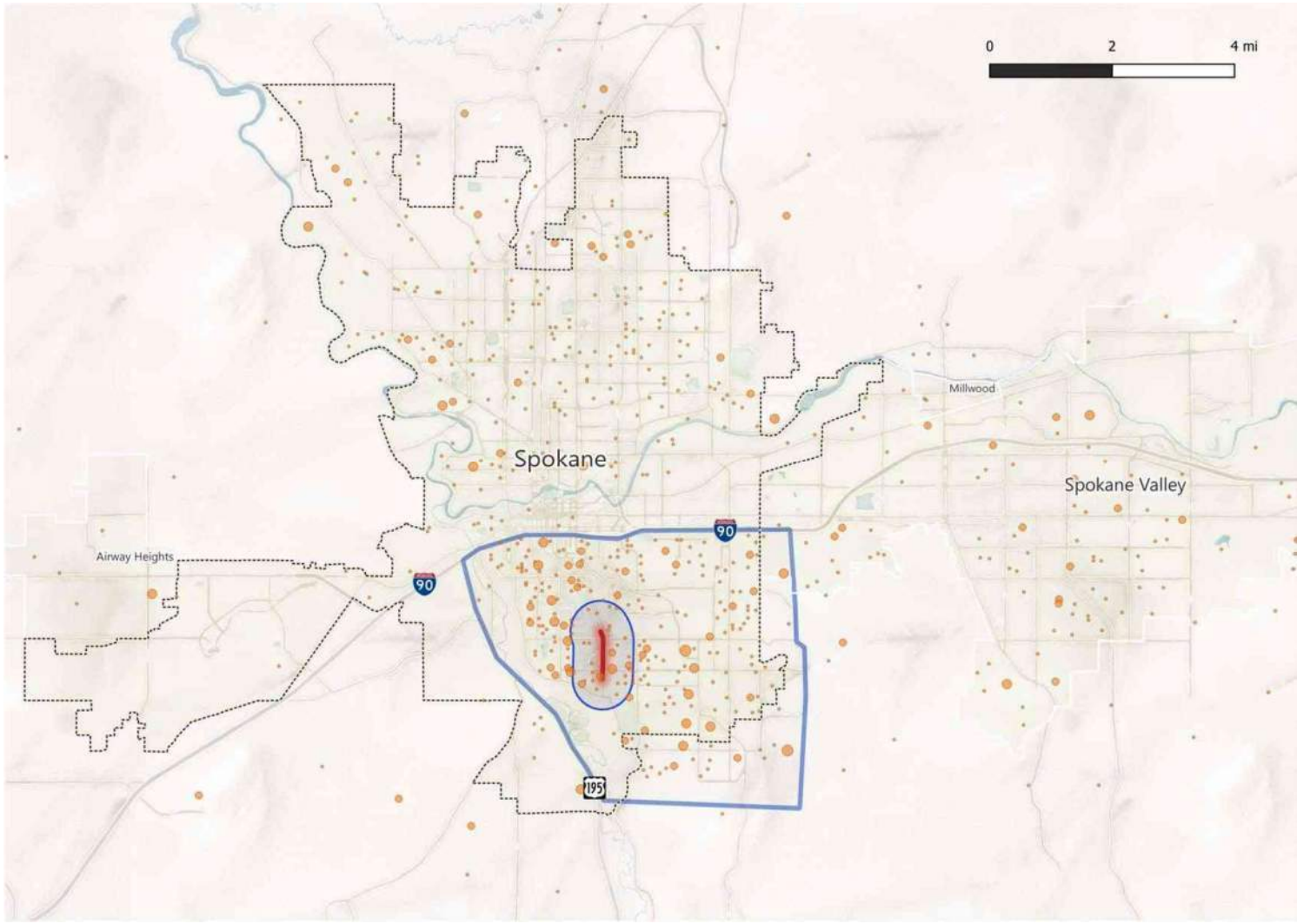
Downtown Spokane is by far the most common commute destination, with the remainder scattered throughout the city and along I-90.



Source: US Census LEHD 2017 data (latest available)

Where do Study Area Workers Commute From?

In contrast, the 1,000+ Study Area jobs are filled by residents scattered widely across the metro area. South side Market Area residents are somewhat more likely to fill Study Area jobs, but metro-wide, no more than four Study Area employees reside within any one of the region's nearly 900 Census blocks.



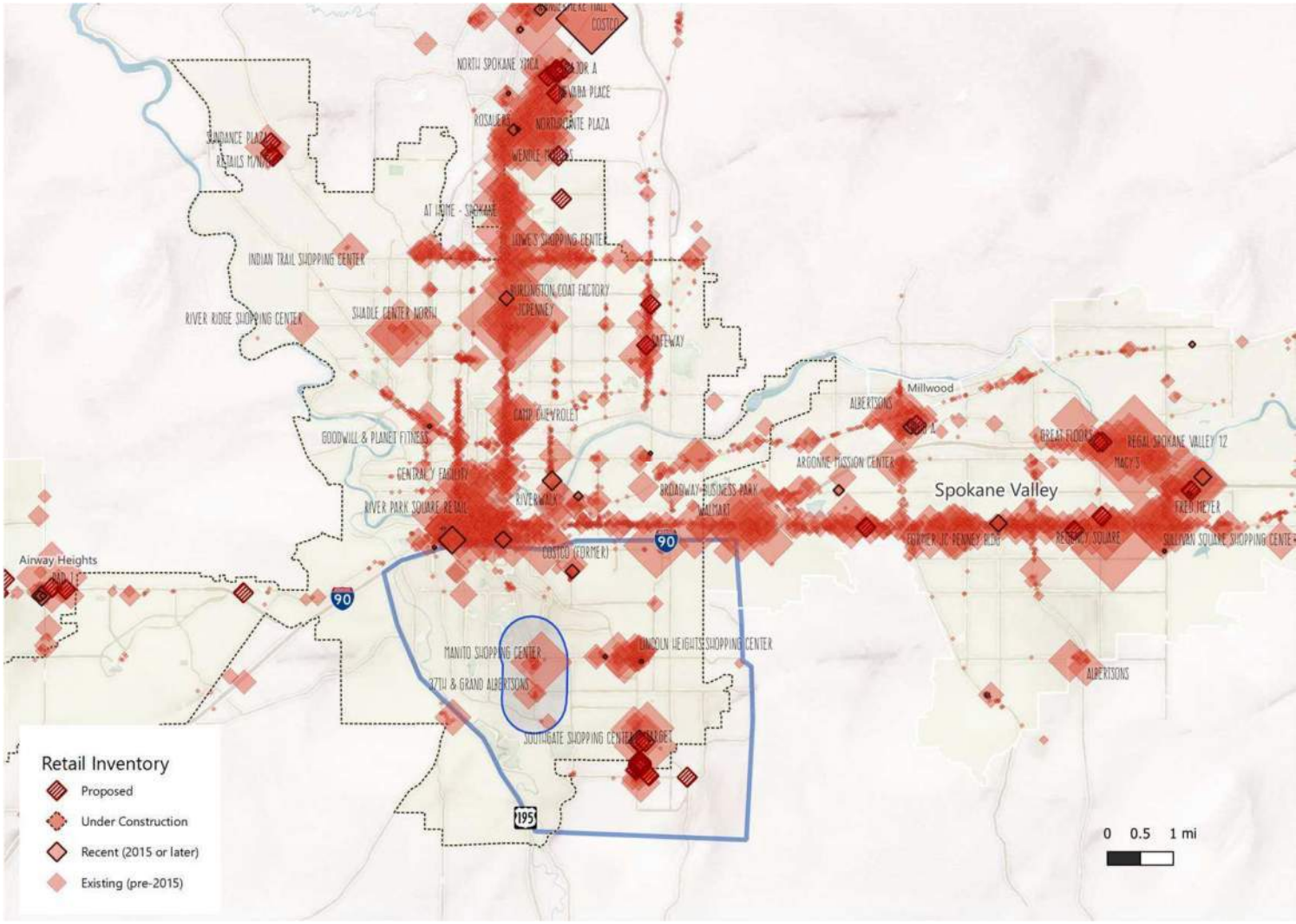
Source: US Census LEHD 2017 data (latest available)

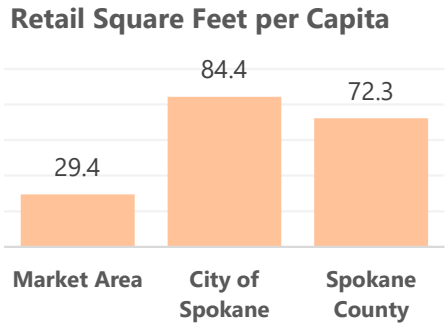
RETAIL SUPPLY & DEMAND

Retail Inventory

A nearly unbroken string of retail stretches from downtown Spokane to Spokane Valley along Sprague and north from the interstate well past the city limits along Division.

The standing inventory of retail in the Spokane County market is considerably unbalanced with respect to its resident population, with less than 30 square feet of retail per capita in the Market Area, versus 72 countywide and 84 for all Spokane city resident. Market rents on the south side are almost $5 per square foot per year higher than countywide average.



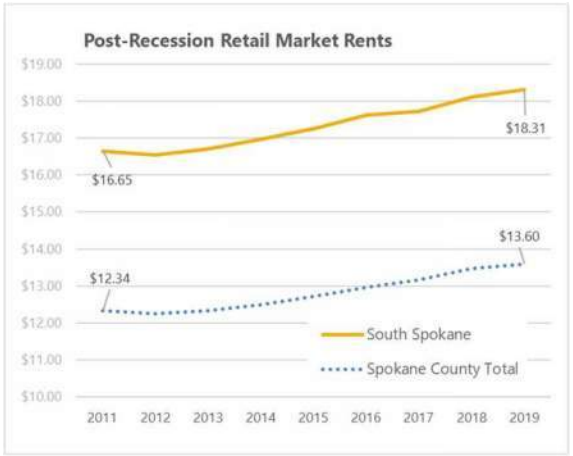


Submarket	Retail Inventory (s.f.), Q4-2019	% of County	Square Footage Built Past 12 mo.	Under Construction	Vacancy Rate	Market Rent (per s.f., per year)
Market Area	2.25 million	6%	0	0*	5.2%	$18.05
Spokane County Total	38.2 million	100%	34,000	59,200	4.3%	$13.27

**Note: early-stage construction taking place on Grand Blvd. at 31st and 32nd is not reflected in Costar retail property data pulled in November, 2019.*

Source: Costar 2019 property data

Retail Inventory (South Side Zoom)



South Spokane retail is limited to a small presence in the Study Area, including the Manito Shopping Center (Ross, Rite-Aid, Super 1 Foods).

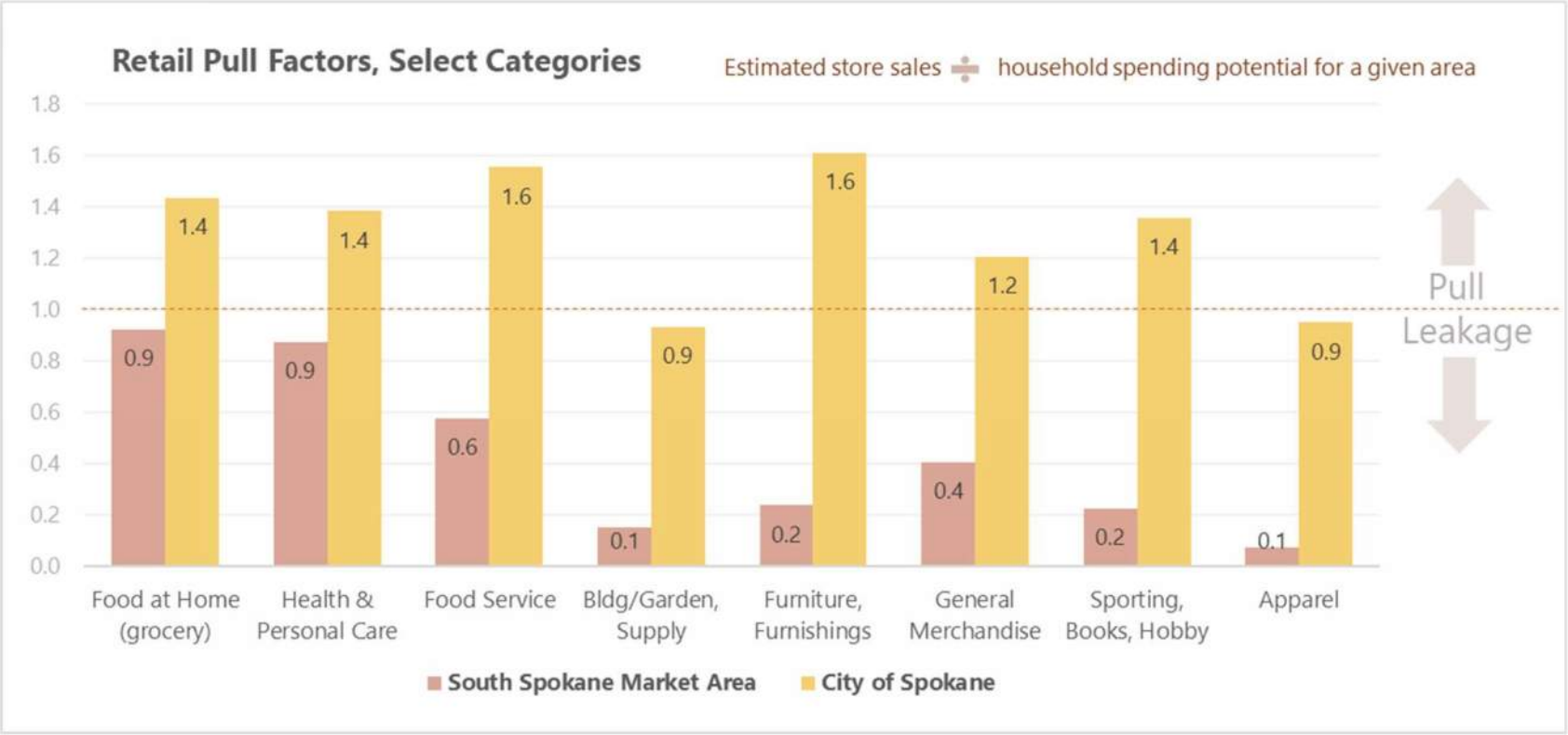
Larger concentrations are centered on Regal 1.5 miles east, with the Lincoln Heights Center (Trader Joe's, Joann, Petco) at 29th on the north and a cluster anchored by Rite-Aid, Shopko, and Target further south.

There is no truly regional retail in the Market Area, with most shopping centers being neighborhood grocery-anchored centers or somewhat larger big-box clusters. The county's malls, lifestyle centers and major club stores are all located in the north metro or to the east in Spokane Valley

Market-wide (Spokane County) retail rents have steadily climbed as vacancies have been in slow decline throughout the recovery period. The South Spokane Hill subarea has also seen rents rise in lockstep with the metro, despite more volatility in occupancy.

Source: Costar (2019 property data); and Leland Consulting Group

Retail Pull, Leakage



Measures of retail "**pull**" and "**leakage**" are based on comparing an area's household spending potential with the volume of sales actually occurring in that area.

When sales exceed resident spending potential, an area is said to be "pulling" in retail dollars from outside its boundary. When sales fall short of resident buying power, an area is "leaking" retail dollars to stores outside the area.

For all major store types except supermarkets and drugstores, Spokane's south side residents depend heavily on retail outlets (and restaurants) outside the market area, either north of the interstate or to the east in the City of Spokane Valley.

- In fact, south Spokane does not exceed the 1.0 pull factor threshold for any retail category – where an area theoretically exceeds self-sufficiency and "pulls" dollars in from non-area households.

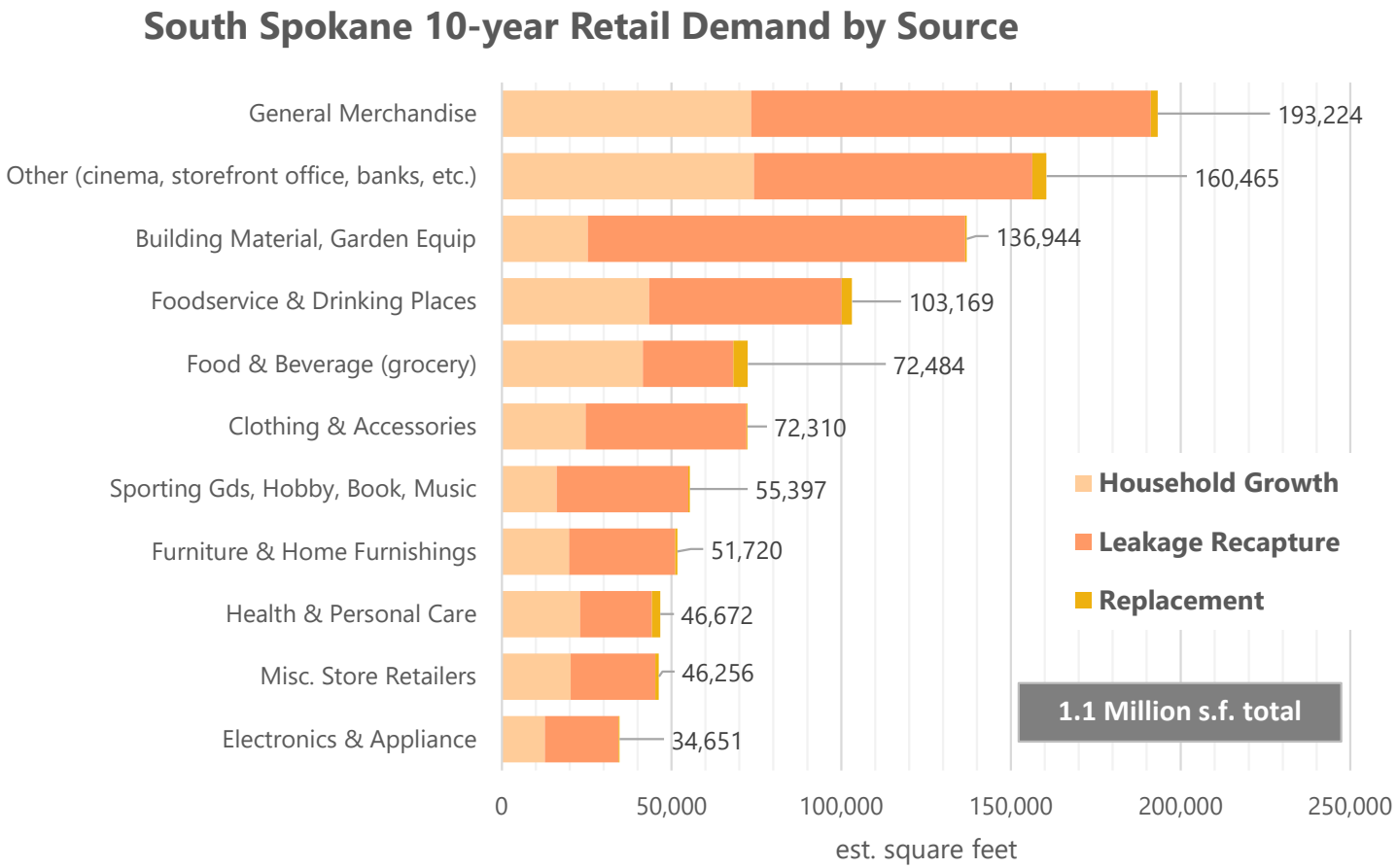
Source: ESRI (2020 report using 2017 data for retail supply/demand; and Leland Consulting Group

Market Area Retail Demand Growth

Retail demand for the Market Area is driven largely by the widespread leakage across categories, plus some additional demand due to moderate continued household growth.

In total, new retail demand for the Market Area should top 1.1 million square feet over the coming decade.

This projection is then adjusted to account for growing share of e-commerce* before estimating the attainable capture for the Grand Boulevard Study Area.



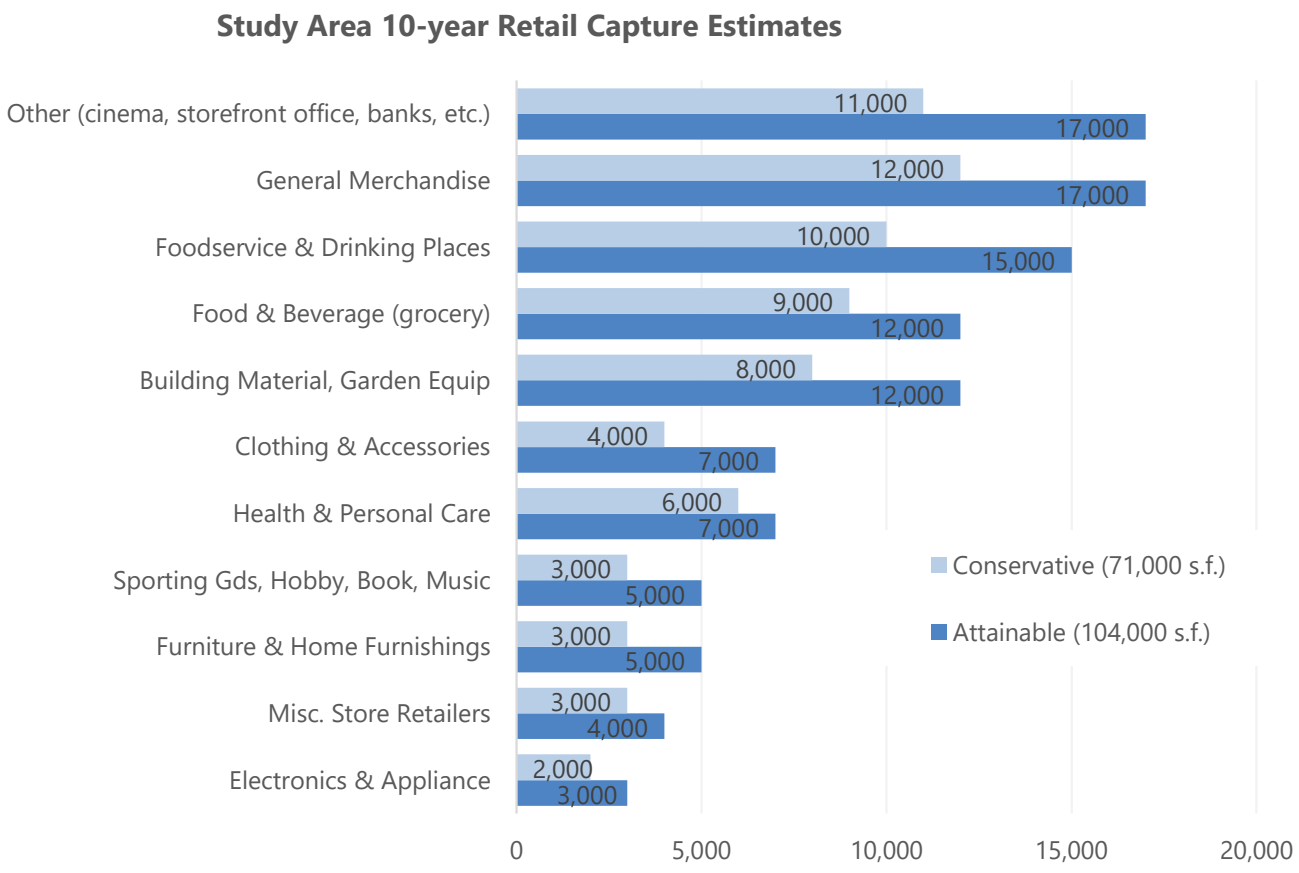
Source: Leland Consulting Group, using estimates for household expenditure and category sales from ESRI
**Note: Manual model changes to account for e-commerce are all downwards adjustments, and vary by store type.*

Estimated Attainable Capture for Grand Boulevard

At an estimated capture rate of between 10% and 15% (15-20% for grocery and drugstore categories), the Study Area could absorb approximately 71,000 to 104,000 s.f. of new Market Area retail demand over the coming decade.

At a typical retail floor area ratio (FAR) of 0.25*, this level of development would require 6.5 to 9.6 acres of land – about the size of the existing Manito Shopping Center site.

Because the largest vacant commercial parcel in the Study Area (the vacant Albertson's site at 37th) is 3.1 acres, the full capture shown here would likely be spread across multiple sites, and would require redevelopment of one or more currently occupied sites



*Floor Area Ratio for a given parcel is the building area divided by land area. So, at an FAR of 0.25, a one-story retail building would take up one-quarter of the lot, with the rest taken up by parking and landscaping.

An FAR of up to 3.0 (or even higher, with certain approved bonuses) is permitted under existing Study Area zoning – and, in fact desirable, from the standpoint of minimizing surface parking – but anything higher is very uncommon in the U.S. outside of much more urban neighborhood environments.

Source: Leland Consulting Group, using estimates for household expenditure and category sales from ESRI

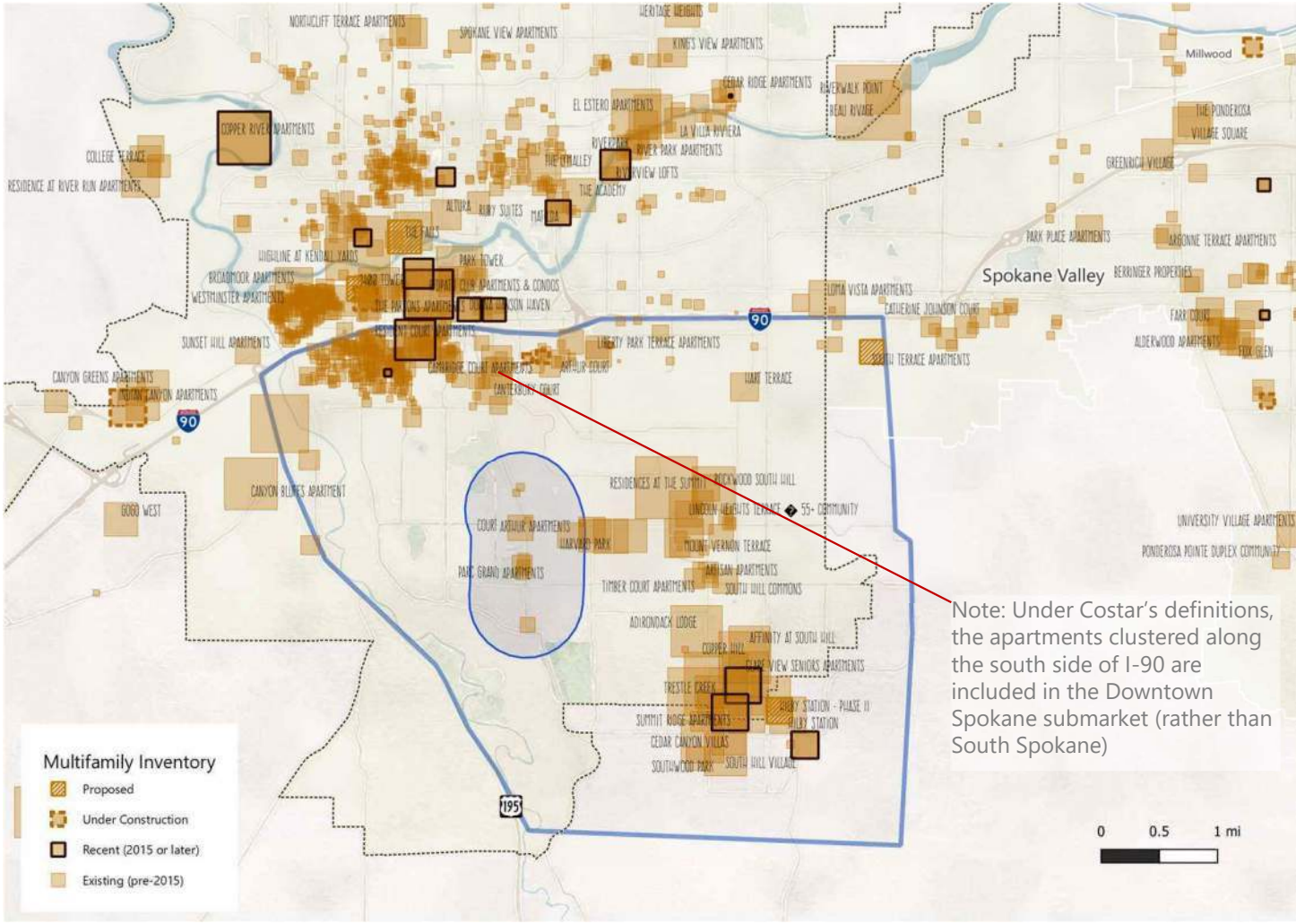
RESIDENTIAL SUPPLY & DEMAND

Apartment Inventory

South Spokane accounts for a small fraction of metro-wide multifamily inventory. Excluding the properties clustered near downtown, just 8% of countywide apartment units are in the Market Area.

Most recent and ongoing construction activity in the city of Spokane is limited to downtown and the north side. Most ongoing countywide construction activity is, in fact, taking place in Spokane Valley and across unincorporated locations.

There are several recently-completed, and at least one proposed, apartment projects within the Market Area, but all are just outside the city limits, along south Regal.



Submarket	Unit Inventory (Q4-2019)	% of County	Units Built (past 12 mo.)	Units Under Construction
Downtown Spokane	8,394	25%	32	65
North Spokane	6,745	20%	6	64
South Spokane	2,736	8%	0	0
Spokane Valley	9,904	30%	20	527
All Other Spokane County	5,593	17%	0	461
Spokane County Total	33,372	100%	58	1,117

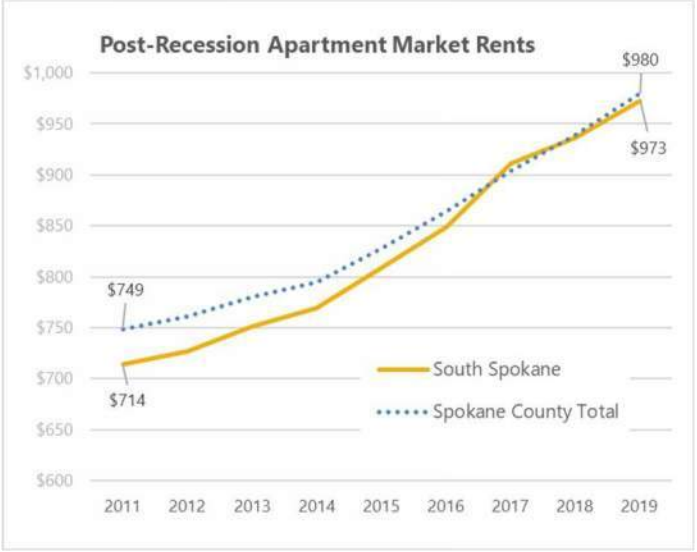
Source: Costar (2019 data; and Leland Consulting Group

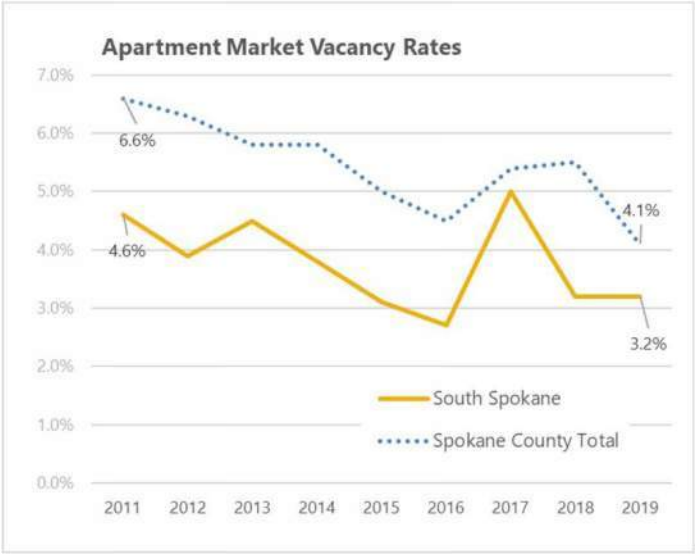
Apartment Supply Conditions

South Spokane (excluding properties along I-90) has closed the gap in rents with the overall metro area over the post-recession period, with current market rents now hovering around $980 across all property types and ages.

Vacancy rates in the South Spokane submarket (again, by Costar definitions) have remained lower than those across the overall market, although the gap has closed from two percentage points to just one since 2011.

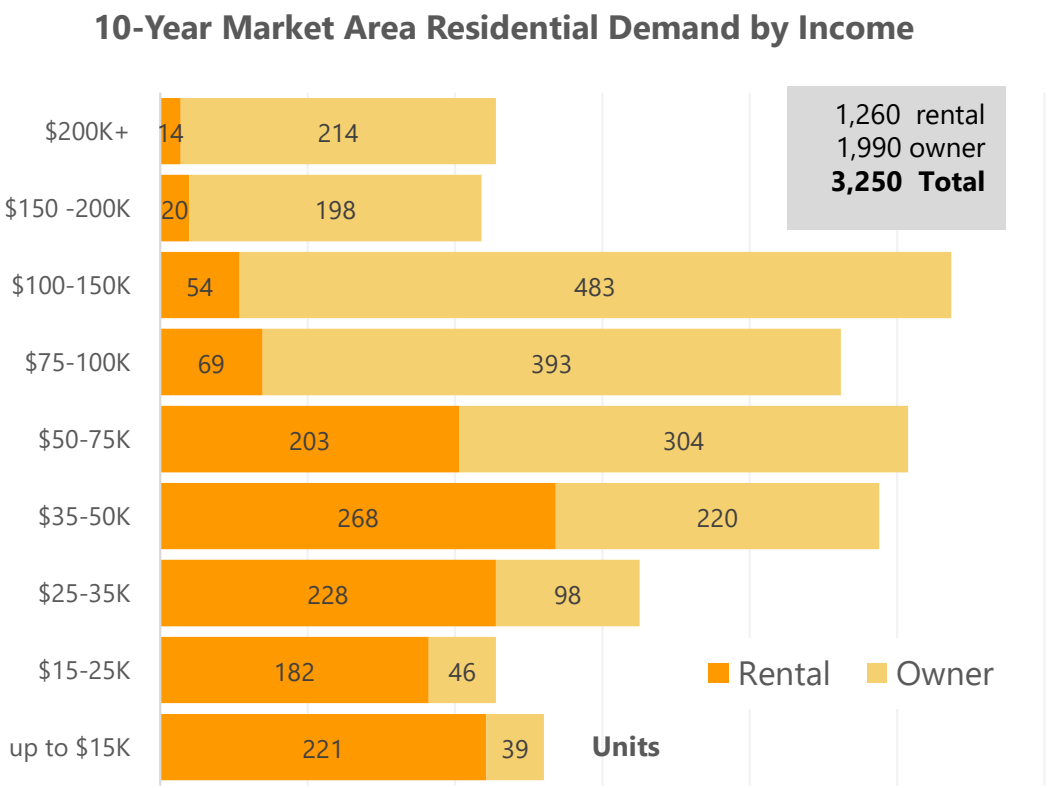
Both the South Spokane submarket and the overall market are "tighter" than the 5.0% vacancy generally considered to be an equilibrium level for multifamily development (where renters and landlords have similar negotiating power and there is adequate inventory to accommodate normal turnover levels.)





Source: Costar; and Leland Consulting Group

Market Area Residential Demand



Demand for net new housing units is based on applying a 0.93% annual growth rate to the existing Market Area household count. This rate is an average of 2010-19 actual historical growth and ESRI's 2019-24 projected growth rates.

The projected 10-year growth in households is then increased by an additional 5% overall (to account for preserving a healthy market vacancy rate while allowing for a modest amount of potential demolitions and growth due to second homes) to arrive at a 10-year new unit requirement.

This total unit count is then allocated across household income categories and tenure (rent vs. own). For this analysis, we assume that the percent renting in each income group will remain constant (39%) into the forecast period. Although home ownership rates have been dropping nationally for years, most analysts are reluctant to assume additional declines as Millennials move further into prime home-ownership years.

Population by income range is assumed to remain generally constant, with moderate reductions to shares in the lowest income brackets as declining housing affordability gradually displaces some households.

Based on projected household growth alone (i.e. irrespective of any arguable pent-up demand in the multifamily rental market), the south Spokane market area should generate demand for approximately 3,250 new units per decade – apportioned across rental and ownership units as shown in the figure above.

Source: Leland Consulting Group, using historical growth rate, tenure and income distribution data from ESRI

Residential Demand & Study Area Capture Potential

Summary of Market Area Demand and Attainable 10-year Study Area Capture by Product Type

	Market Area Unit Demand*	Conservative Capture Rate	Attainable Capture Rate	10-year Study Area Absorption (low)	10-year Study Area Absorption (high)	Approx. Units Per Acre (low)	Approx. Units Per Acre (high)	Acreage Required (low)	Acreage Required (high)
Rental Apartments	1,040	10%	20%	100	210	18	30	5.6	7.0
Attached Ownership (Townhome, Condo, Plex, etc.)	290	10%	20%	30	60	15	18	2.0	3.3
Single Family Smaller Lot	567	0%	0%	0	0	10	12	0.0	0.0
Single Family Larger Lot	1,288	0%	0%	0	0	4	8	0.0	0.0
Totals*	**3,185***	**4%**	**8%**	**130**	**270**			**8**	**10**

*Totals above exclude demand from households earning below $15K

total unit demand for lowest income segment (<$15K)	*260*

Source: Leland Consulting Group, using historical growth rate, tenure and income distribution data from ESRI

The Market Area's moderate but steady growth should support development of nearly 3,500 housing units over the coming decade.

Of this, the Study Area should theoretically be able to attract approximately 130 to 270 units, as a mix of rental and attached ownership products.

However, as with retail demand and capture estimates, this absorption level – requiring some 8-10 acres – would require redevelopment of one or more larger sites currently occupied. Parcels in Manito Center are unlikely to redevelop in the coming decade, at least, due to profitable ongoing operations and stringent lease restrictions.

Note: Single family detached demand for the Market Area is shown in the table above but this analysis assumes that only multifamily development is under consideration for the Study Area.

It is possible that some modest level of housing demand could be absorbed within the Study Area single family neighborhoods in the form of accessory dwelling units (ADUs).

The City has recently updated its code related to infill development, making it easier to construct attached units, cottages, and other small format homes. Although not a use-by-right in Low Density Residential zones, ADUs that meet development standards do not require a conditional use permit. For details, see:

https://my.spokanecity.org/business/residential/development-options/

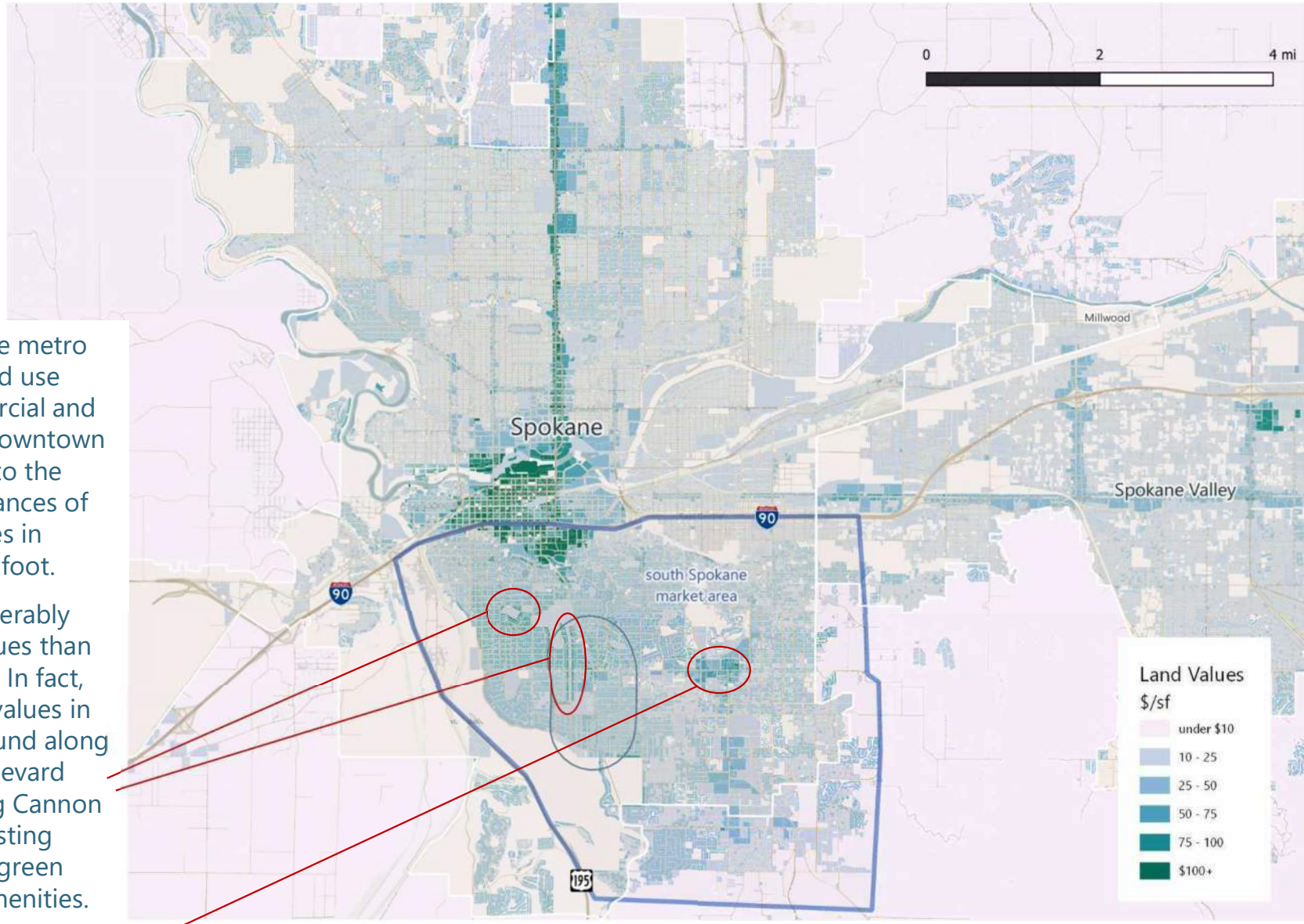
POLICY & LAND USE

Regional Land Values

Land values in the Spokane metro area are closely tied to land use designations, with commercial and denser mixed-use zones downtown and along Division Street to the north having the only instances of (Assessor-appraised) values in excess of $100 per square foot.

South Spokane has considerably higher residential land values than can be found to the north. In fact, some of the highest land values in the market area can be found along the tree-lined Manito Boulevard and on the streets fronting Cannon and Manito Parks – suggesting market responsiveness to green and pedestrian-friendly amenities.

Values for commercial parcels along 29th Avenue between Southeast Boulevard and Regal Street also reach above $75/sf.



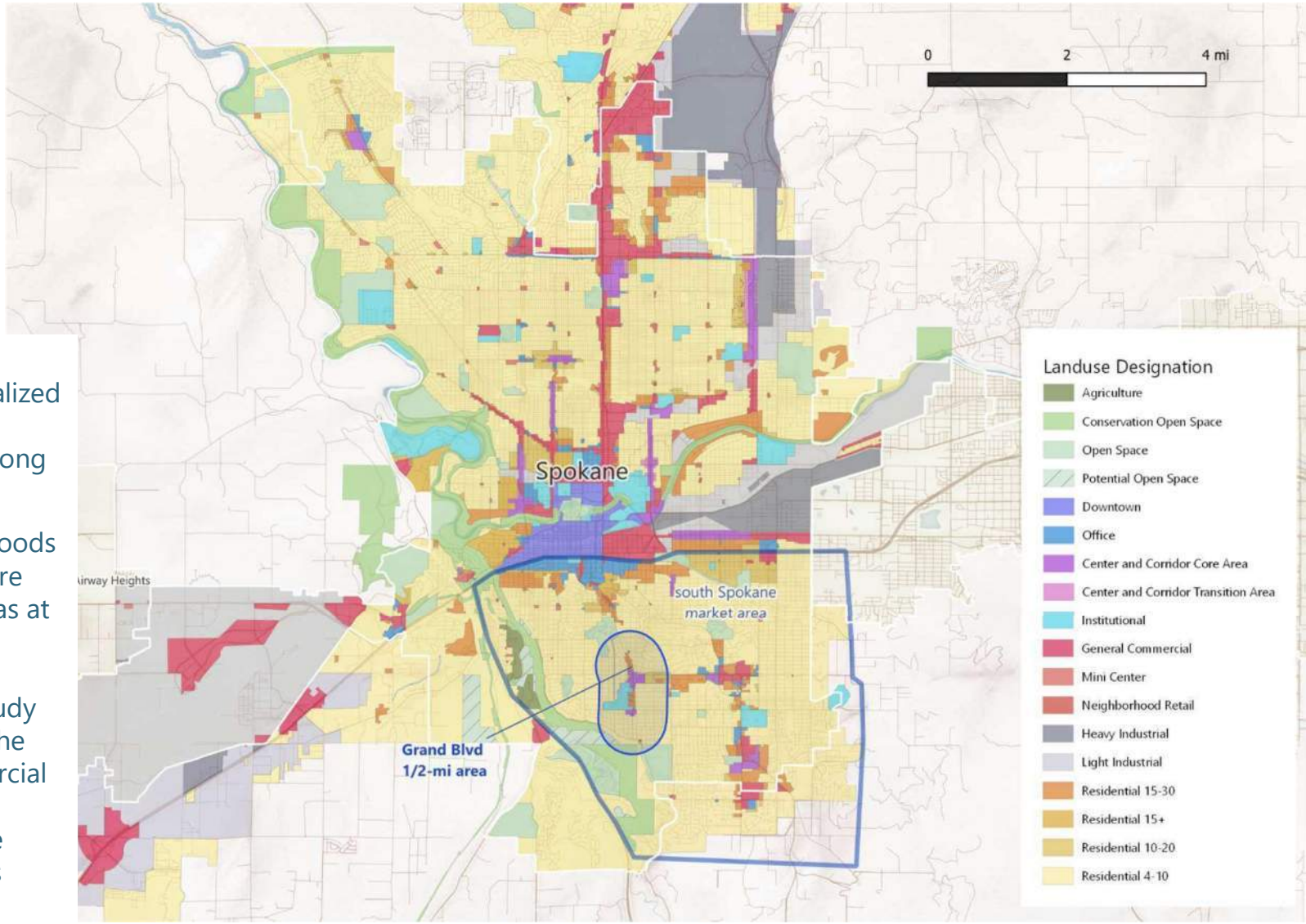
Source: Spokane County Assessor; and Leland Consulting Group

Metro Land Use Context

Spokane area land use is dominated by a strongly centralized downtown and the commercial spine extending to the north along Division.

Whereas residential neighborhoods on the north side of Spokane are punctuated by commercial areas at arterial corners, the expanse of single-family development surrounding the Study Area Study Area is relatively unbroken to the south, west and north. Commercial and other higher-value development on the south side (apart from the I-90 corridor) is largely concentrated along the Regal corridor, 1.5 miles east of Grand Boulevard.

Growth potential to the west of the south Spokane market area is largely constrained by topography (bluff and Latah Creek).

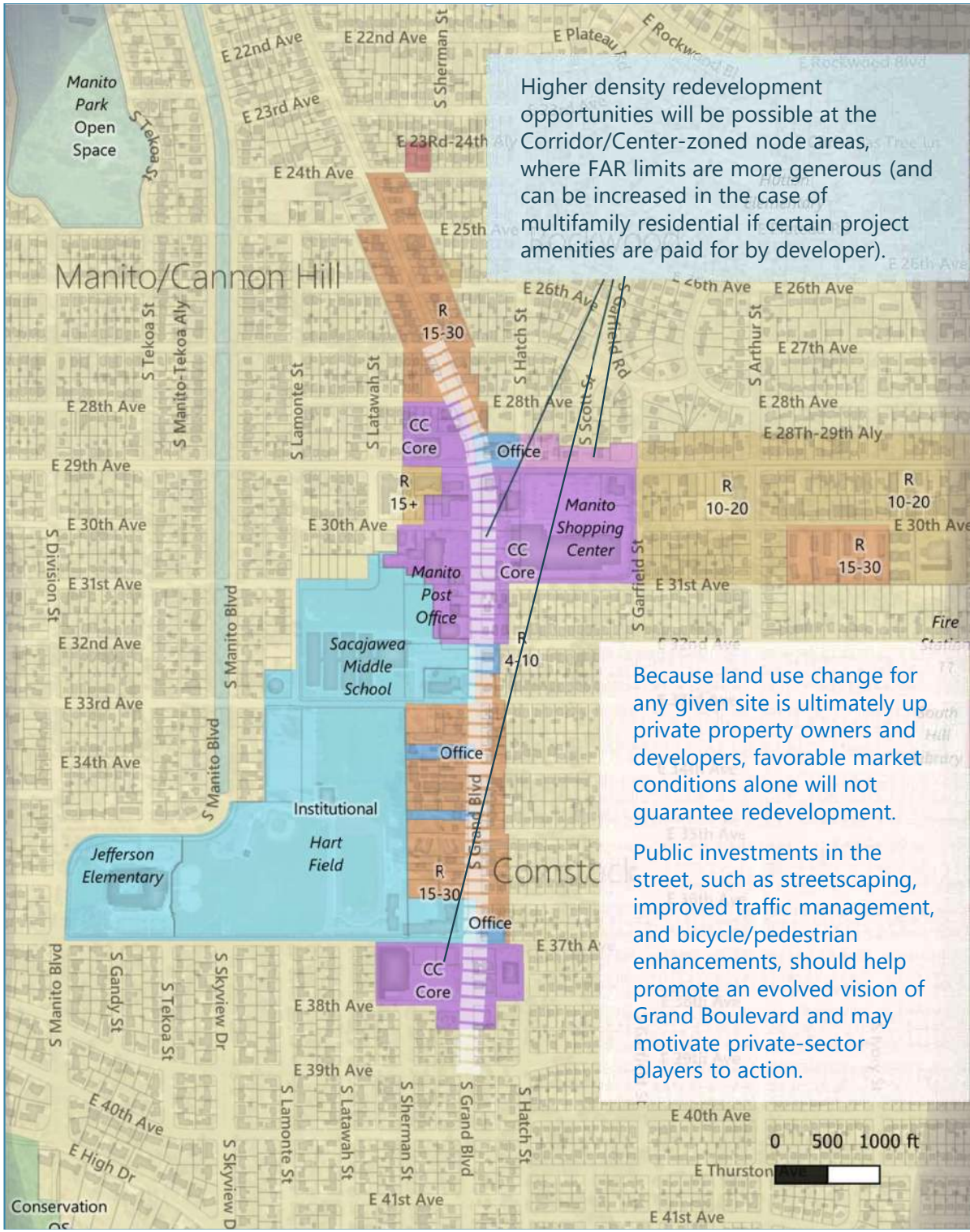


Source: Spokane County Assessor and City of Spokane

Study Area Land Use Designations

A zoom in to the half-mile Study Area shows a relatively narrow corridor of commercial and institutional (primarily school-related) uses surrounded by low density residential neighborhoods.

Some medium-high density residential uses are also found interspersed, limited to areas fronting or within a block of either Grand or 30th Avenue. These are limited to older (typically 70s-construction) apartments and the occasional multi-unit building amid lots simply being used for single-family residences – the predominant pattern along the upzoned portions of 29th and 30th Avenues. These areas represent capacity for increased residential density in theory, but redevelopment is likely to be fragmented and opportunistic, depending on prevailing market conditions and land purchase prices.

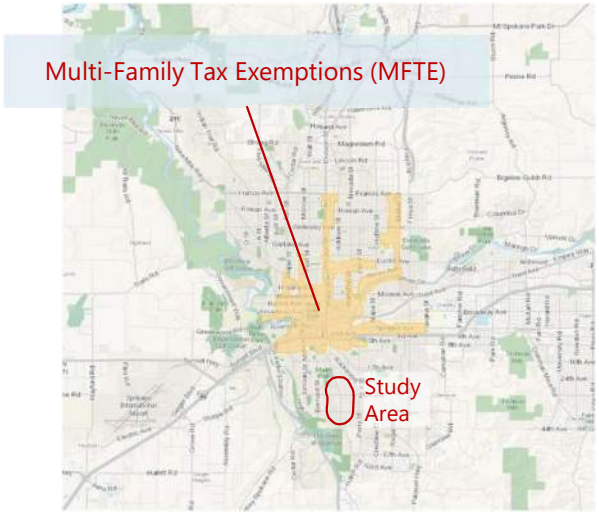


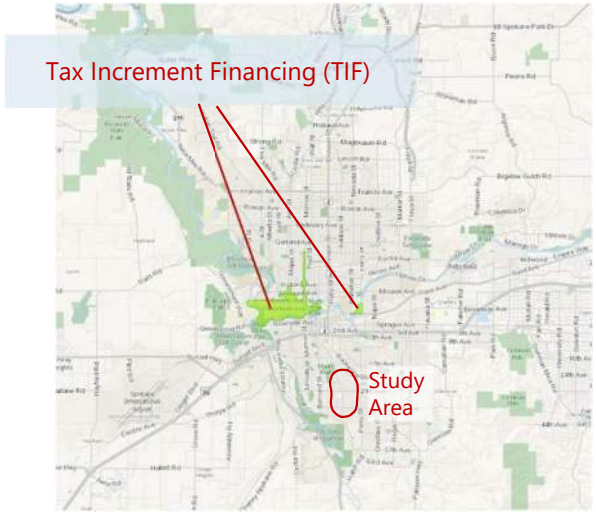
Source: Spokane County Assessor, City of Spokane, and Leland Consulting Group

Economic Development Incentives

The Study Area has higher median income and market forces that are generally functioning to meet area demand for both residential and commercial development. As such, the area is not included in major City and federal economic incentive program boundaries.

- The City's Multi-Family Tax Exemption (MFTE) program, which provides substantial property tax savings over 8 to 12 years for newly constructed multi-unit residential projects, is currently limited to designated areas with lower median incomes.
- Because Tax Increment Financing districts in Washington are designed to address conditions of economic instability or stagnation, the Study Area is an unlikely candidate for TIF designation and related incentives.
- The federal Opportunity Zone program is specifically targeted to low income Census tracts.





Source: City of Spokane mapping

REDEVELOPMENT OPPORTUNITIES

Land Utilization

Examining the patterns in existing land utilization can be an important step in screening for potential redevelopment opportunities.

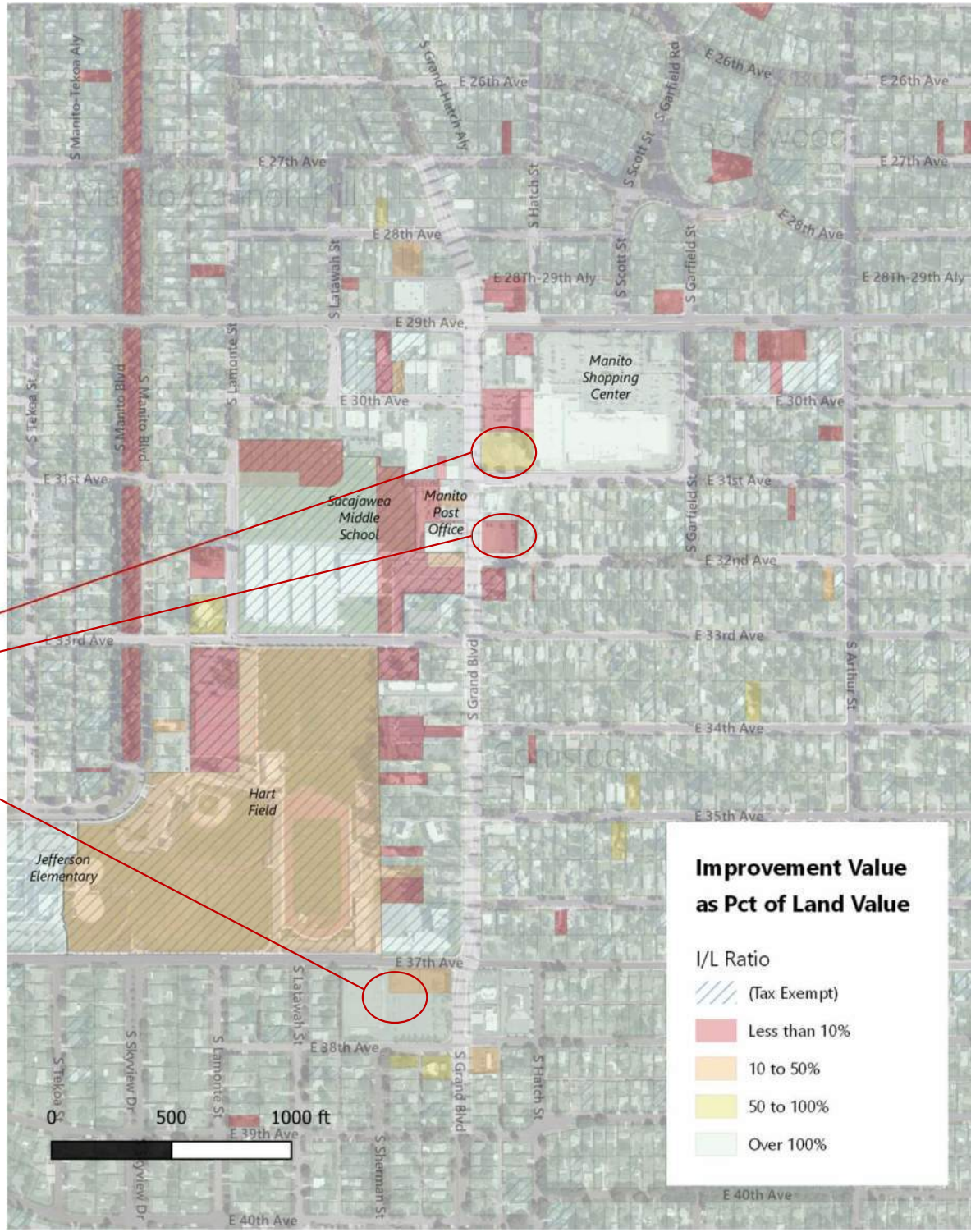
Parcels with low improvement (building) values relative to the underlying land value are flagged here in yellow, orange, or red shading.

Note that most shaded land in the Study Area also has blue hash markings – indicating that the land is tax-exempt. These public and charitable/religious uses are typically not redevelopment candidates.

In the northern half of the Study Area, only the parcels at the northeast corners of Grand & 31st (0.8 acres) and Grand & 32nd (0.5 acres) are immediately redevelopable.

The largest immediate redevelopment opportunity is near the southern end of the Study Area the 3.1 acre vacant Albertsons parcel.

With just 5% tenant vacancy (per Costar), the Manito Shopping Center does not currently appear to be functionally underutilized (although it is not well-configured to serve as a pedestrian-friendly shopping destination).



Source: Spokane County Assessor, 2019 parcel data

Exploring Residential Infill Redevelopment Feasibility in Spokane

The City of Spokane recently commissioned a study of market feasibility for multifamily infill development focused on Spokane's South Perry Center and Monroe Street Corridor (Comprehensive Plan designations).

That analysis, documented the *City of Spokane Housing Feasibility Analysis*, December 2019, by Community Attributes, Inc. (CAI), used market data on rents and product types, together with input from area developers, to generate assumptions for land values, construction costs, attainable rents and other proforma inputs. Those inputs were used to derive likely financial outcomes, including residual land value and an expected internal rate of return (IRR).

Their report found that, based on a minimum 15% IRR threshold, three-story walk-up apartments had the greatest feasibility potential in most contexts but that scenarios involving structured parking or mixed-use products were less likely to be feasible.

Scenarios involving the use of Multifamily Tax Exemptions (MFTEs) were much more likely to pencil out as feasible (or have more attractive IRRs) than those which did not.

Substituting structured parking for surface parking also reduced IRRs to below-acceptable levels for 3-story walk-up models.

The model is sensitive to inputs for land acquisition costs and attainable rents, so major shifts in those could alter IRR performance in practice.

Infill Redevelopment Prospects

Using proforma worksheets created by CAI for that 2019 analysis, Leland Consulting Group examined preliminary feasibility for infill redevelopment of three major vacant sites (3.1-acre vacant Albertson's, plus the 0.8-acre and 0.5-acre corner lots at 31st and 32nd) identified in the previous slide.

For the three-story walk-up property type, multifamily development at those sites appear feasible when using Assessor-appraised values as the assumed land purchase price, even without MFTE incentives.

- For the 0.5-acre parcel at the northeast corner of 32st Ave and Grand, the CAI model yields a 21% IRR (assuming a 25-unit project achieving rents of $1,250)
- For the 0.8-acre parcel one block to the north, the model shows an attainable IRR of 18% for a 42-unit project.
- If converted to residential, the former Albertsons parcel(s) shows acceptable returns (15.1% IRR) under the CAI model assumptions for 162 three-story walk-up units, even after assuming a $3.1M site purchase price and tear-down of the existing 39,000 square foot structure.

Feasibility for the above sites appeared much more questionable for mixed-use or ownership townhome scenarios, with IRRs dipping below 5% for all three sites in the CAI models.

- The Albertson's site would be simpler and likely more profitable to redevelop as another grocery store, keeping and rehabbing the existing building, but the CAI model was not set up to examine retail-only proforma scenarios.

Examples of smaller-lot attached housing on Grand Blvd.

Conclusions & Strategic Considerations

The Grand Boulevard Study Area lies within a market context of favorable income demographics and modest but steady residential growth.

Together with the significant undersupply of retail south of I-90, this creates an environment of healthy residential and retail demand for the Market Area, with a diminishing supply of land to satisfy that demand.

The estimated residential and retail Market Area demand is more than adequate to support unsubsidized redevelopment of the limited supply of vacant zoned parcels in the Study Area.

- At conservative capture rates, we estimate approximately 130 to 270 new multifamily units (primarily rental) could be absorbed in the Study Area, along with approximately 70,000 to 100,000 SF of neighborhood-serving retail space.

Unless the Manito Shopping Center decides to embark on a major redevelopment, near-term (0-5 year) infill activity will likely be limited to a handful of relatively small infill sites in the Study Area.

Given the existing suburban auto-oriented development pattern in the Study Area, there is much to be gained in terms of quality of life and safety by making street improvements and adding ped-friendly amenities.

Opportunistically adding increased residential density and reconfiguring existing retail to help define street edges and forge walk/bike connections would both help to further that goal.

Conclusions & Strategic Considerations (continued)

Existing zoning along Grand Boulevard is relatively generous in terms of densities, relative to what developers (either retail or residential) are likely to consider for the area, suggesting that local policy is not a significant constraint to redevelopment here.

The three largest available sites are formerly commercial/retail uses fronting Grand Boulevard. Because of the limited retail supply in the Market Area relative to its population and spending power, conversion of those sites to retail would be simpler for developers and would serve an evident local need.

- However, redevelopment as multifamily residential of one or more of the sites would offer advantages of providing additional activation to the street and providing new spending support for existing retail and dining on Grand.
- Redevelopment of any sort on the Albertson's site (though more expensive than adaptive re-use) would allow for better configuration of buildings relative to the street front.

Because of its higher income profile, no major development incentives are available in the Study Area, leaving developers to rely mainly on an unsubsidized profit calculus to drive land assembly and rehab or scrape/rebuild decisions.

- Adding new units to low- and middle-income areas is an obvious and direct route to combating the city's growing housing affordability problem; however, the creation of new residential inventory *anywhere* in the city will actually help shift the supply/demand equation in favor greater affordability.
- While the Study Area may not need profit-boosting incentives to the same extent as other Spokane neighborhoods, the combination of incentives plus infrastructure investment can be a strong motivating signal to property owners who may otherwise be reluctant to consider redevelopment.
- Expanding the City's MFTE program, in particular, to cover all Spokane neighborhoods could help spur opportunistic infill development in the Study Area -- promoting greater housing diversity, adding needed supply units, and helping to reshape Grand Boulevard in concert with transportation and streetscape improvements.

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Project List and Cost Estimates

A

Spokane Grand Boulevard Transportation and Land Use Study

Project ID	Project Description	Project Elements	Planning Level Cost Estimate
		SHORT TERM PROJECTS	
S1.A	Restripe Grand Boulevard to reduce to three lanes and add buffered bike lanes between 29th Avenue and 32nd Avenue	New cross-section includes a 6' bike lane (NB/SB), 8' concrete planter strip (SB), 2' striped buffer (NB), and 7' painted curb space extension (NB)	$ 140,000.00
S1.B	Restripe Grand Boulevard to reduce vehicle travel lane width and add buffered bike lanesbetween 32nd Avenue and 37th Avenue	New cross-section includes a 5' bike lane (NB/SB) and 2' striped buffer (NB/SB)	$ 85,000.00
S2	Install temporary access restrictions at 30th Avenue/Grand Bouelvard intersection	Installation of bollards and striping to restrict turn movements	$ 45,000.00
S3	Install enhanced pedestrian crossing at 30th Avenue	Installation of signing, RRFB, and striped crosswalk on north leg of Grand Boulevard at 30th Avenue. ADA ramps will be upgraded as needed.	$ 75,000.00
S4	Install enhanced pedestrian crossing at 32nd Avenue	Installation of signing, RRFB, and striped crosswalk on north leg of Grand Boulevard at 32nd Avenue. ADA ramps will be upgraded as needed.	$ 75,000.00
S5	Install enhanced pedestrian crossing at 33rd Avenue	Installation of signing, RRFB, and striped crosswalk on both legs of Grand Boulevard at 33rd Avenue; marked bike crossings will also be provided. A ramps will be upgraded as needed.	$ 75,000.00
S6	Modify Grand Boulevard/29th Avenue intersection	Traffic signal and striping modifications for new northbound and southbound lane configurations	$ 100,000.00
		LONG TERM PROJECTS	
L1	Extend 32nd Avenue to the west	New street connection associated with school rebuild project	$ -
L2	Improve existing streetscape on Grand Boulevard between 29th Avenue and 32nd Avenue	Complete road reconstruction with new cross-section includes 2' sidewalk widening, 6' curb extensions for pedestrian scale lighting, drainage and restriping	$ 2,080,000.00
L3	Install permenant access restrictions at 30th Avenue/Grand Boulevard	Installation of raised median/curb signage and striping	$ 190,000.00
L4	Install raised medians	Installation of raised medians between 30th and 31st, approaching 31st (NB), between 35th and 36th, and approaching 36th (NB)	$ 60,000.00
L5	Install street trees	Installation of new street trees between 29th Avenue and 32nd Avenue	$ 125,000.00

Planning level cost estimates include contingencies for administration, design, mobilization and traffic control costs. The estimates do not include right of way or environmental costs.