CITY OF PASCO

Transportation System Master Plan

JUNE 2022

PROJECT TEAM

CITY OF PASCO

Dan Ford,
City Engineer

Jacob Gonzalez,
City Planning Manager

DKS ASSOCIATES

Carl Springer,
Project Manager

Aaron Berger,
Senior Engineer

Rochelle Starrett,
Engineer

Melissa Abadie,
Creative Services

ANGELO PLANNING GROUP

Darci Rudzinski,
Principal

Andrew Parish,
Senior Planner

TECHNICAL ADVISORY COMMITTEE MEMBERS

Dan Ford,
City of Pasco

Jacob Gonzalez,
City of Pasco

Carl Springer, *DKS*

Aaron Berger, *DKS*

David Beach,
Bike Tri-Cities

Patrick Pittenger,
Benton-Franklin Council of Governments

Erin Braich,
Benton-Franklin Council of Governments

Olivia Meza,
Benton-Franklin Council of Governments

Keith Hall, *Benton Franklin Transit*

Paul Gonseth, *WSDOT*

John Gruber, *WSDOT*

Eric Snider, *WSDOT*

CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

Introduction

THE CITY OF PASCO HAS PREPARED A MASTER PLAN TO GUIDE DECISIONS AND INVESTMENTS IN THEIR TRANSPORTATION FACILITIES AND SERVICES.

For years, Pasco has been among the fastest growing cities in Washington, and it is expected to add over 40,000 new residents by 2040 when Pasco's population will exceed 120,000, surpassing the neighboring Tri-Cities. Rapid population growth of this scale has a corresponding major impact in transportation demands for a community. As the city's first transportation system master plan, this represents a foundational study that will establish a host of policies and programs that will guide the City of Pasco to a safer and more vibrant city. The challenge ahead for city leaders is to take steps to address existing system needs identified through this process and to make strategic investments with partner transportation agencies to prepare for substantial growth in the decades to come.

This transportation system master plan lays out a multimodal transportation system to better serve built parts of the community and provides a framework for growth in undeveloped areas. In addition to the specific capital improvement projects for walking, bicycling, and driving, this plan identifies a more robust street design concept for arterial and collector roadways to better serve all travel modes. The plan also includes a priority network for quality bicycle routes, and safety enhancements for mid-block crossings on arterial roadways.

The master plan also recommends new street spacing and accessibility guidelines to be applied for new portions of the community that will be built in the coming years. Significant growth is expected north of Interstate 182 in the Broadmoor Boulevard area, which includes hundreds of acres of developable residential and commercially zoned vacant land. Better street connectivity can balance travel demand across many routes and makes it easier for residents to walk or bike within the neighborhood or to access transit. This approach recognizes that the layout and design of the local transportation system is foundational to neighborhood livability. It better serves the full spectrum of community travel needs which can vary over time based on household size, income, age, physical abilities, and personal preferences.

Plan Purpose

The Pasco Transportation System Master Plan (TSMP) is a guide for future transportation investments to ensure that they align with our community's goals, values, and vision for the future. The TSMP is a key resource for implementing transportation system improvements that address current deficiencies and that serve expected local and regional growth. As the first TSMP in Pasco, this plan represents the first step towards a series of new guidelines and standards that will shape the city as it grows and re-builds. Transportation planning in Washington is required under the Growth Management Act which governs each city's transportation element of a comprehensive plan.

Under the Growth Management Act, each transportation plan must contain:

- A set of goals, policies, and evaluation criteria that define a vision for a city's transportation future
- An inventory of a city's existing, multimodal transportation system and how well this system currently serves users
- An assessment of future travel demand and the impact of this growth on the existing transportation system
- A review of bicycle and pedestrian needs and opportunities
- An understanding of available funding for transportation system improvements

The Pasco TSMP documents the operational and safety performance of the City's existing and future transportation system and provides strategies that will support growth in and around the community through the year 2040.

This TSMP will act as a supplement to the transportation element in Pasco's 2018-2038 Comprehensive Plan to further envision Pasco's transportation future.

ADA COMPLIANCE AND TRANSITION PLAN

The Americans with Disabilities Act (ADA) governs how we serve people with hearing, vision, and ambulatory disabilities. In 2013, the City of Pasco adopted the Sidewalk Transition Plan. The Sidewalk Transition Plan was intended to remove barriers to mobility of people with disabilities and improving safety for all pedestrians in Pasco. The results of that plan highlighted the needs to improve infrastructure based on area needs, including Downtown, West Court Street (between Road 48 and N 4th Avenue), Road 68 and the area around Columbia Basin College and the Tri-Cities Airport. In 2018, the Pasco City Council adopted its first Complete Streets Policy, which is aimed at maximizing the safety of the community and all users of public streets.

The implementation of the plan has been left arising opportunities, such as inclusion in the scope of capital projects or repair of sidewalks and non-compliant ADA ramps by city crews. This approach has provided certain level of success. Additionally, the City has a designated ADA coordinator, a formal process for notices and grievances.

While incremental improvement has been accomplished, a more systematic implementation plan for the ADA transition plan is recommended. This plan would establish clear parameters, schedules, and completion targets on:

1. Documentation of Existing Conditions and Compliance (Catalogue or inventory)
2. Evaluation of Internal Design Standards, Specifications and Details (Scheduled recurrent reviews, as standards and regulations are updated)
3. Implementation Schedule (Targets)
4. Progress Monitoring (Tracking progress and expenditures associated with the formal program)

Planning and Transportation Funding Framework

The TSMP was developed consistent with the state and regional transportation planning framework as required by the GMA. The chart at right illustrates how the state's Growth Management Act provides overall policy and regulatory guidance for all governmental agencies within Washington State. In addition to state guidance, the City of Pasco must also coordinate their planning with local Metropolitan Planning Organization (MPO), which is represented by the Benton-Franklin Council of Governments (BFCG). The BFCG develops and maintains the region's transportation plan (RTP) and they are responsible for oversight on regional population and employment forecasts of local city and county agencies to maintain consistency with statewide planning efforts. Land use growth assumptions are vital inputs to the transportation planning process. As noted previously, the TSMP supplements the transportation element of its Comprehensive Plan, and it provides the basis for Pasco's on-going six-year transportation improvement plan and the bicycle and pedestrian master plan.

By coordinating the city's TSMP with their regional and statewide partner agencies, the city can strengthen its position to more effectively compete for various state and federal transportation funding opportunities. The city desires to continue its record in securing state and federal grants to expedite local transportation improvement projects. A recent example is the grant that advanced the Lewis Street Overcrossing project in the downtown to began construction in 2021. New federal legislation in 2022 enabled additional grant opportunities such as the RAISE (Rebuilding American Infrastructure with Sustainability and Equity).

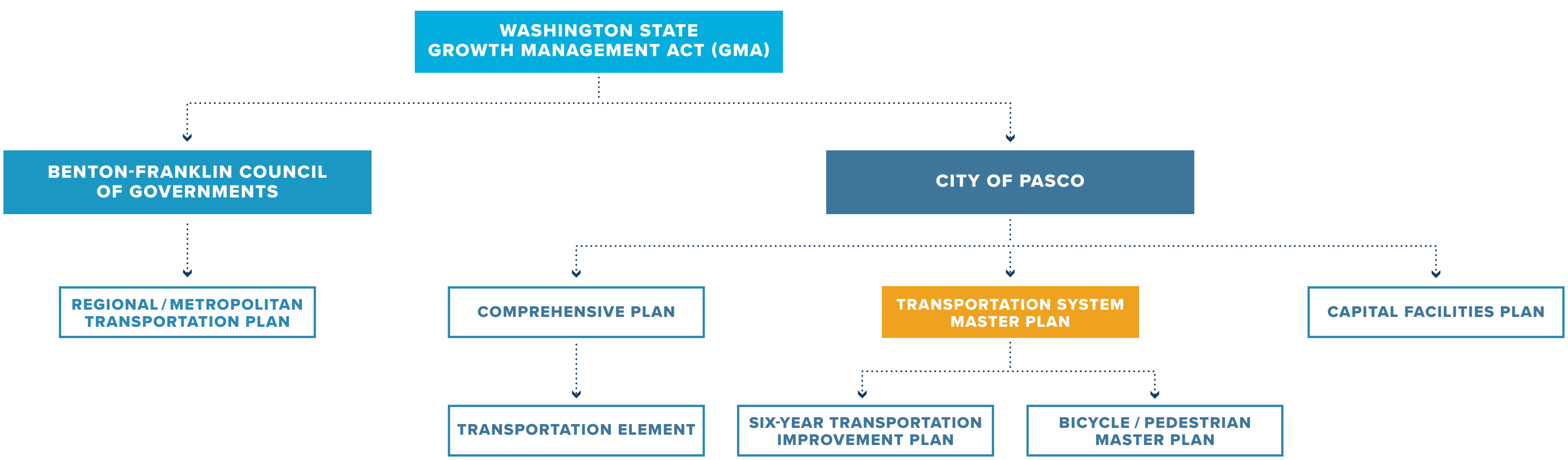


FIGURE 1. STATE, REGIONAL, AND CITY PLANNING FRAMEWORK

The Planning Process

The TSMP project team, which included city staff members and the consultant team, worked closely with a Technical Advisory Committee (TAC) comprised of local partners to develop and review interim work products and address major issues collaboratively. The TAC roster included representatives from Washington State Department of Transportation (WSDOT), Franklin County, Ben Franklin Transit (BFT), Benton-Franklin Council of Government (BFCG), and Bike Tri-Cities. The TAC met three times to review how the system works today, expected changes with growth to 2040, and proposed transportation improvements recommended within Pasco. During each meeting, initial technical findings were presented and discussed with TAC members to collect feedback on draft concepts and to align long-range plans among the various partner agencies.

In addition, two online public open house events were conducted during the development of the TSMP. Given the restricted conditions of the ongoing COVID pandemic, these events were limited to being conducted online only.

- The first event (June 2020) identified community concerns and issues related to walking, bicycling, and driving within Pasco today through an online survey. Refer to Appendix A for a summary of the public responses to the survey.
- The second online event (May/June 2021) collected public feedback on the proposed projects and programs that the TSMP process identified to address current and expected future transportation system issues.

PERFORMANCE-BASED PLANNING ELEMENTS

The Pasco TSMP differs from prior transportation planning processes in that this update applied a performance-based approach. As described below, that begins with the community's vision for its transportation system, which is distilled into measurable goals and supporting policies. These goals and policies are then used to develop performance measures that are used to identify gaps and challenges in the system today, to evaluate potential projects, and to measure long-term alignment between Pasco's transportation system and the community's vision of this system. The plan process is illustrated in Figure 2, along with the key questions that are considered at each stage of the planning work. The advantage of a performance-based planning process is that it demonstrates how strategic investments directly benefit and address essential community goals regarding multimodal transportation services for all of the community's residents, workers, and visitors.

FIGURE 2. PERFORMANCE-BASED PLANNING PROCESS

Pasco's Transportation Vision

The first stage of the planning process involves defining the City's vision for their transportation system and developing goals and policies to guide it. Pasco's comprehensive plan defines a vision for Pasco in 2038 which includes their idealized future transportation system; this concept was used to develop the following vision statement to guide the TSMP.

VISION:

The City of Pasco's future transportation system is a safe and balanced multimodal transportation system which equitably serves pedestrians, bicyclists, transit, freight, and drivers. Pasco's residents should have access to livable neighborhoods through established planning practices which prioritize system connectivity and multimodal street design, including a network of parks, trails, and bikeways which connect all residents to the Columbia River. Pasco's transportation system also supports regional economic activities, including access to Pasco's freight facilities for regional agriculture and other industries, and supports regional, multimodal transportation connections in Pasco.

Transportation Goals and Policies

The following goals and policies were identified for Pasco's TSMP based on the existing transportation goals for Pasco's comprehensive plan and relevant state and regional plan goals.

GOAL #1

TR-1: COORDINATE WITH REGIONAL PARTNERS ON SHARED TRANSPORTATION INVESTMENTS

TR-1-A: Participate in the metropolitan and regional transportation planning efforts of the Benton-Franklin Council of Governments.

TR-1-B: Work with other jurisdictions to plan, fund, and implement multi-jurisdictional projects necessary to meet shared transportation needs including right-of-way acquisition.

TR-1-C: Collaborate with Ben Franklin Transit in programming transit routes, transit stops, and supporting facilities that increase user accessibility during the development process.

TR-1-D: Require transportation and land use planning efforts and policies that meet the needs of the community and the objectives of this plan.

GOAL #2

TR-2: PROVIDE SAFE ACCESS TO TRANSPORTATION FOR ALL SYSTEM USERS

TR-2-A: Minimize traffic conflicts on the arterial street system by implementing access and corridor management best practices.

TR-2-B: Maintain a current local road safety plan to identify and prioritize safety investments.

TR-2-C: Reduce frequency of fatal and severe injury crashes particularly for vulnerable road users.

TR-2-D: Establish a vision zero plan for transportation safety.

GOAL #3

TR-3: PRESERVE EXISTING ROADS, SIDEWALKS, TRAILS, AND TRANSIT FACILITIES

TR-3-A: Ensure adequate maintenance of the existing facilities.

TR-3-B: Encourage retrofit projects that include beautification on major arterial streets.

GOAL #4

TR-4: PRIORITIZE A CONNECTED AND EFFICIENT TRANSPORTATION SYSTEM FOR DRIVERS

TR-4-A: Adopt and maintain a functional street classification system consistent with regional and state guidance.

TR-4-B: Maintain level-of-service (LOS) "D" on all arterials and collectors and level-of-service (LOS) "C" during the PM peak-hour.

TR-4-C: Provide increased neighborhood travel connections to enhance public safety and provide for transportation disbursement.

TR-4-D: Evaluate, plan, and install traffic control devices and intersection designs to improve travel safety and efficiency.

GOAL #5

TR-5: DEVELOP A TRANSPORTATION SYSTEM THAT SUPPORTS AND ACCOMMODATES THE NEEDS OF BUSINESSES AND VISITORS

TR-5-A: Promote the safe and efficient movement of freight through the city.

TR-5-B: Support the development of facilities that are critical components of the movement of freight.

TR-5-C: Maintain the multimodal passenger terminal.

TR-5-D: Support rail services for passengers, industries, and commerce within the area.

TR-5-E: Support air services for passengers, industries, and commerce within the area in coordination with the Pasco Airport Master Plan.

GOAL #6

TR-6: SUPPORT HEALTHY AND LIVABLE NEIGHBORHOODS IN PASCO

TR-6-A: Develop an interconnected network of streets, trails, and other public ways during the development process to ensure and improve neighborhood accessibility.

TR-6-B: Encourage multimodal street design with traffic calming and safety in consideration of surrounding land uses.

TR-6-C: Require developments to meet the mission of the Pasco Complete Street Ordinance.

TR-6-D: Incorporate aesthetic design and streetscape into all major arterial and collector streets as they are constructed.

GOAL #7

TR-7: DEVELOP A COMPLETE MULTIMODAL TRANSPORTATION SYSTEM

TR-7-A: Collaborate with Ben Franklin Transit in programming transit routes, transit stops, and supporting facilities that increase user accessibility during the development process.

TR-7-B: Encourage the use of public transportation including ride-sharing and Ben Franklin Transit's Van-Pool program.

TR-7-C: Encourage park-and-ride lots for bicycles and/or automobiles.

TR-7-D: Encourage bicycle and pedestrian travel by providing safe and purposeful bicycle and pedestrian routes.

TR-7-E: Reduce major existing system connectivity gaps for bicyclists and pedestrians to improve multimodal access.

TR-7-F: Develop new transportation performance measures for a multimodal system that could include measures like freight delay.

CHAPTER 2

Pasco Today and Tomorrow

PASCO IS A RAPIDLY GROWING COMMUNITY IN THE TRI-CITIES REGION. THE RAPID GROWTH IS MAKING IT MORE DIFFICULT FOR RESIDENTS TO GET AROUND PASCO AND REQUIRES NEW SOLUTIONS TO MANAGE THE FUTURE GROWTH.

Pasco attracts visitors from the entire Columbia Basin, Yakima Valley, Walla Walla and Northeastern Oregon region. It is home to the regional Tri-Cities Airport, Columbia Basin College, expanding regional sports facilities, and our rapidly changing Downtown.

One feature that makes Pasco unique compared to its neighboring cities is its dependence on the four bridges over the Columbia and Snake Rivers for inter-city and regional travel (see Figure 3).

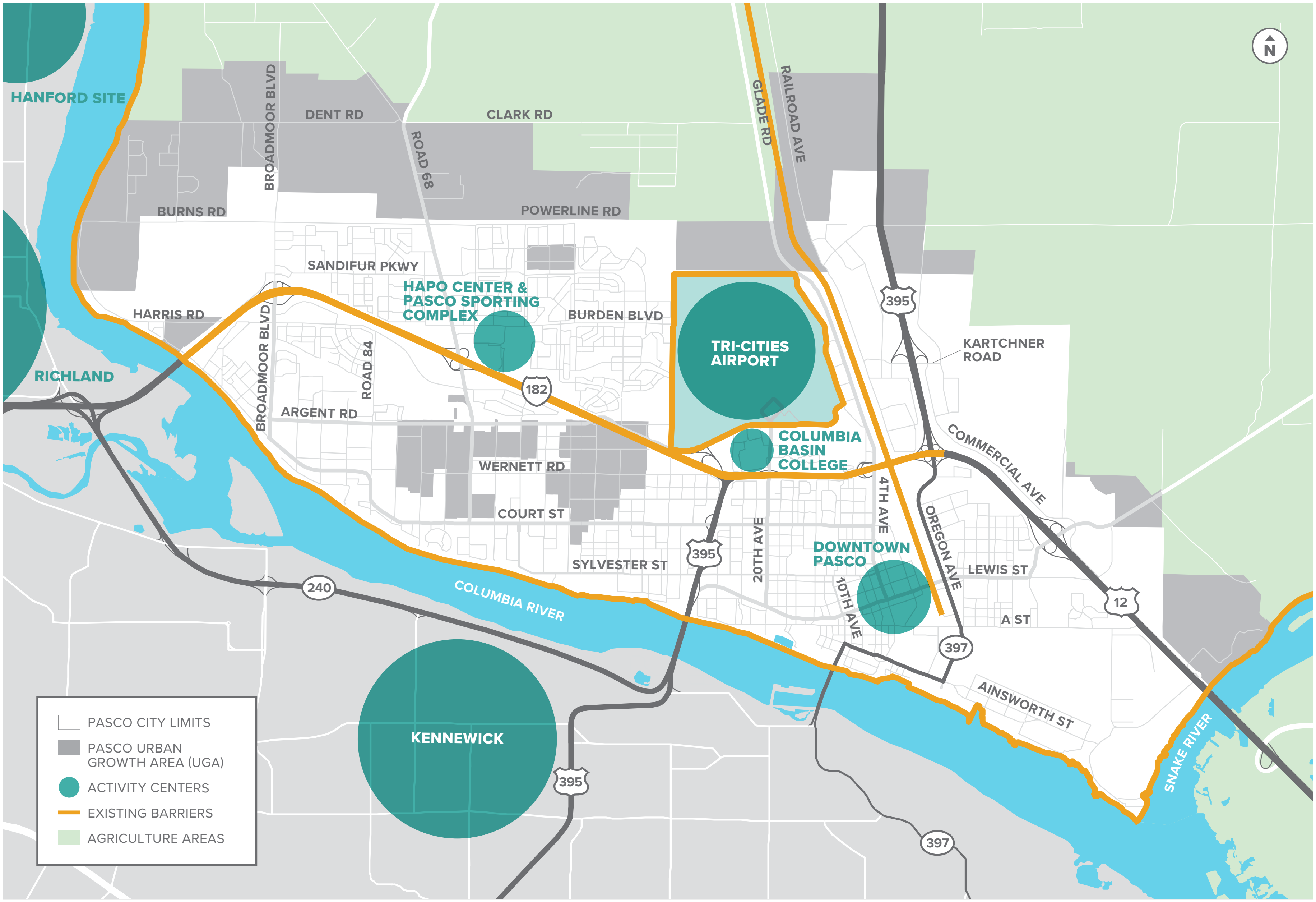


FIGURE 3. TRI-CITIES REGIONAL CONTEXT

About half of the city's residents use the three Columbia River bridges to commute to work, travel to shopping centers, and reach other regional destinations south or west of the river. This is a major constraint for vehicle traffic among the cities. Providing safe, convenient, and reliable travel across these bridges will be an important consideration in developing the Transportation System Master Plan for the City of Pasco.

Growth in Pasco has been rapid over the past 20 years, which has also increased the demand for travel across the river bridges, seen in Figure 5. The bridges with the highest traffic volumes are on Interstate 182 and US 395. They each carry about two to three times the number of cars and trucks as the other two river bridges entering Pasco, which are SR 397 and US 12. As the existing highway facilities become more congested during peak hours of the day, it extends travel times for commuters, freight traffic, and other trips made on these regional highway corridors.

Historic Growth

Pasco has experienced a population boom over the last 20 years during which time the population more than doubled, outpacing the rate of growth in neighboring Kennewick and Richland, and in Washington State overall. In recent years, development has been attracted to the lands north of Interstate 182 and west of Road 68, which offered significant vacant lands for development and convenient commuting access to regional work centers, such as the Hanford Site. Since 2010, Pasco's population has increased by 25 percent (3.1 percent annually), from 60,000 residents to 75,000 residents in 2018 while its Tri-Cities neighbors have grown by 15 percent, as illustrated in Figure 4. By way of comparison. Washington State's population grew by 12 percent during the same period.

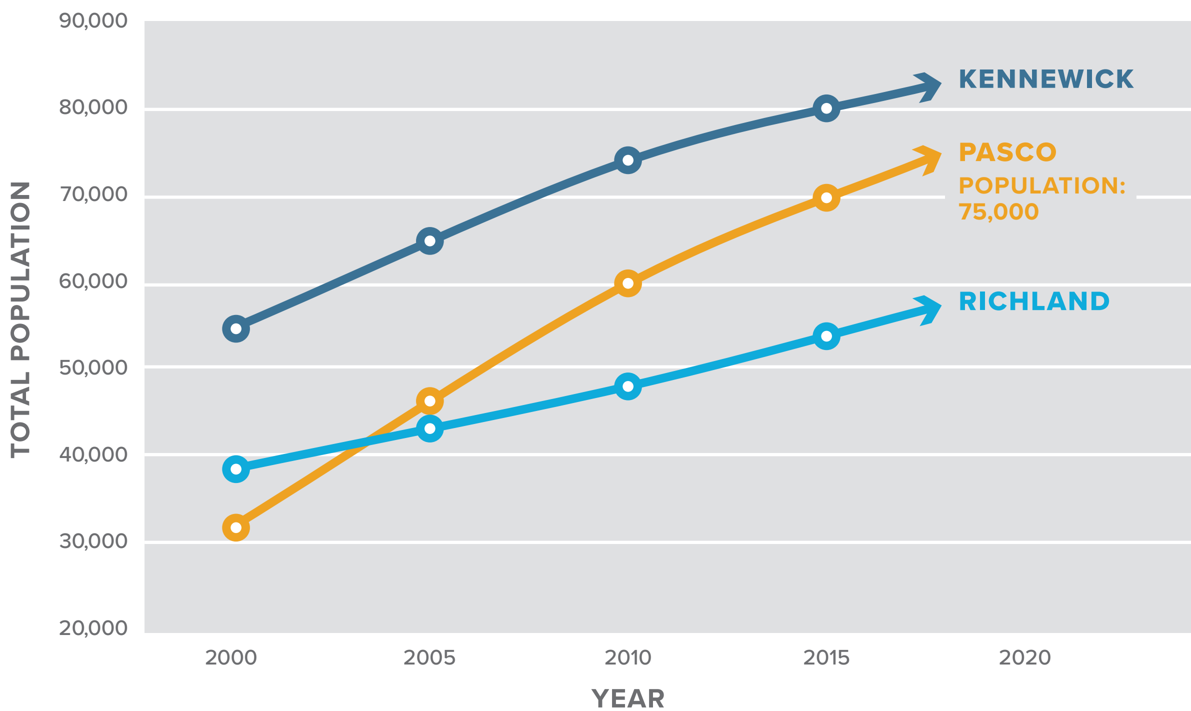


FIGURE 4. HISTORICAL POPULATION GROWTH TRENDS IN TRI-CITIES

The population growth in the Tri-Cities region and Pasco closely mirrors traffic trends on the I-182 and US 395 Columbia River bridges where volumes increased between 15 and 22 percent (2.5 to 3.7 percent annually) between 2012 and 2018 (see Figure 5).

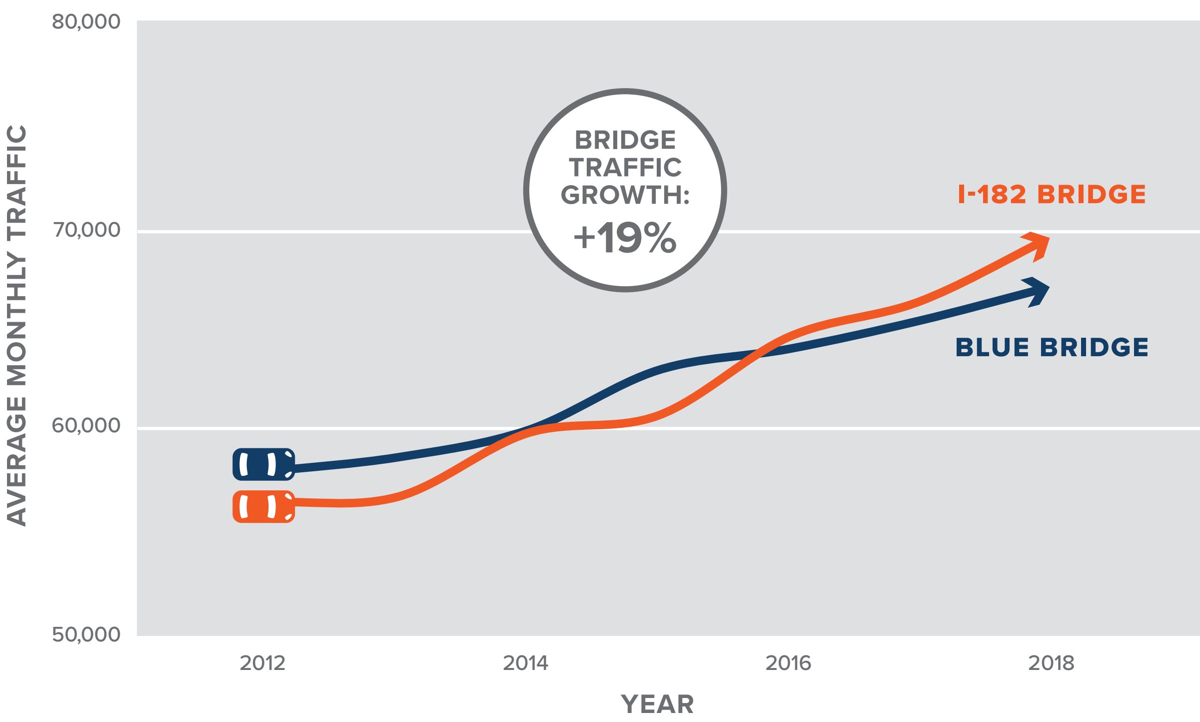


FIGURE 5. TRI-CITIES BRIDGE CROSSING TRAFFIC GROWTH TRENDS

Demographics

Pasco is a majority-minority community with a large Hispanic and Spanish-speaking population. Relative to Washington State, Pasco has a higher proportion of children under age 18 and a lower median household income; 17 percent of residents live in poverty. Within Pasco, over 40 percent of senior citizens are also living with a disability (see Figure 6). Pasco's population characteristics indicate a need for reliable alternative transportation modes to accommodate groups that cannot drive or those individuals who cannot afford to drive. This will be a significant consideration for transportation choices around community equity.

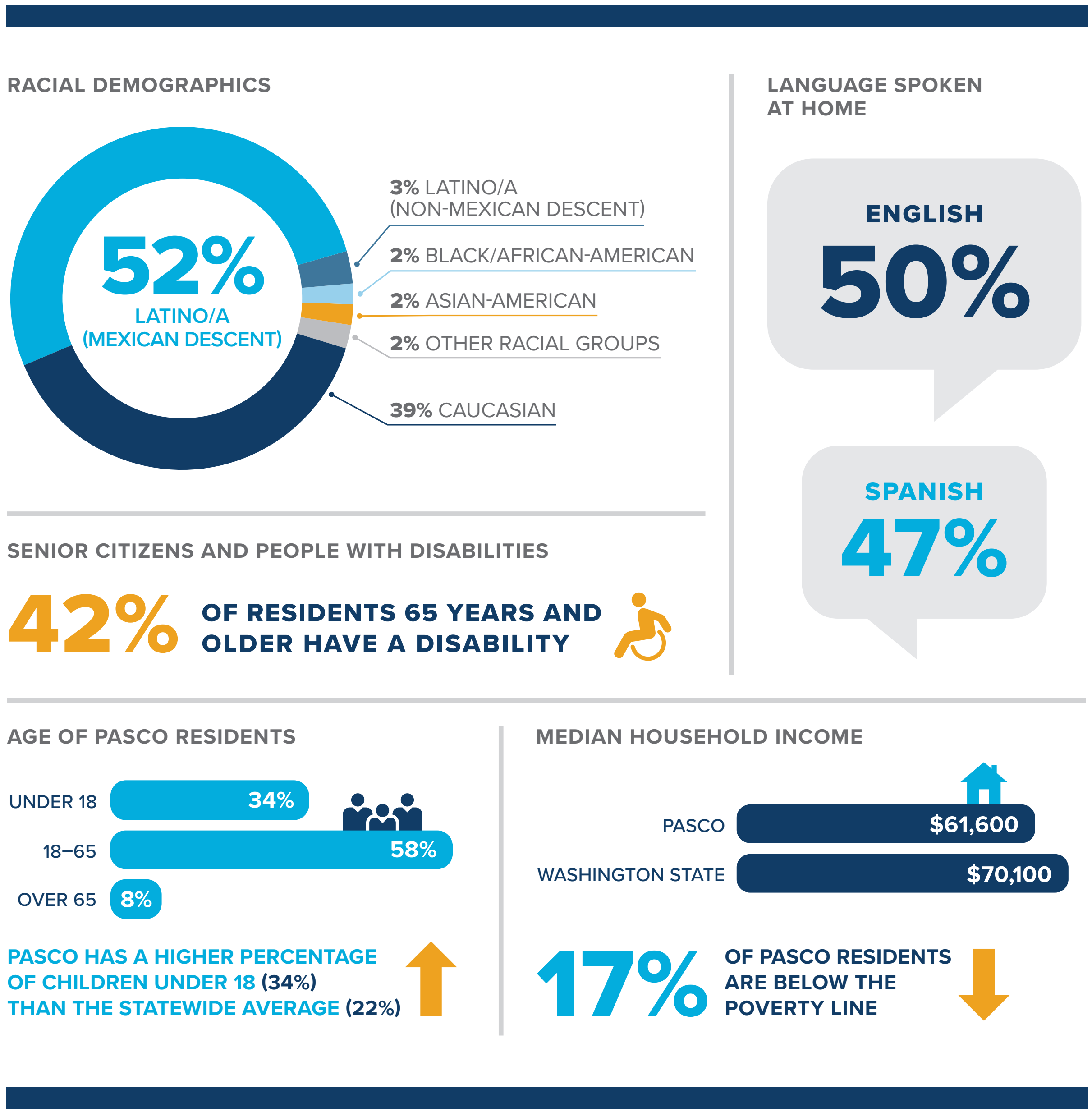


FIGURE 6. PASCO RESIDENTIAL DEMOGRAPHICS

Employment and School Travel Patterns

Based on mobility data[1] for the Tri-Cities region, we found that nearly half (48 percent) of Pasco's employed residents travel to job sites outside of Pasco. Residents that are commuting out of town use one of the four bridges to travel to jobs in Kennewick, Richland, or the Hanford Nuclear Site. As shown in Figure 7, bridge travel patterns mirror these destinations with the highest share (26 percent) on the Lee-Volpentest Bridge (I-182) to access jobs in Richland, Kennewick, or the Hanford site while 16 percent of commute trips use the Pioneer Memorial Bridge (US 395). The other two bridges carry a small share, three percent each.

The other half of the employed Pasco residents work in or near Central and Downtown Pasco, at commercial establishments along US 395, or in the industrial areas of eastern Pasco. Local job destinations are colored to show where the highest concentrations occur in Figure 7. Other major activity generators are the higher level schools including Chiawana High School, Pasco High School, and the Columbia Basin College.

1 *Employment and school travel patterns analysis conducted using StreetLight data for 2019.*

Freight Transportation

The Port of Pasco maintains and operates several key industrial sites for the Tri-Cities region, including the Tri-Cities Airport, the Big Pasco Industrial Center, and a container barge terminal on the Columbia River. Burlington Northern-Santa Fe Railroad also maintains a major switchyard within Pasco. Freight activity is concentrated within eastern Pasco along the existing rail alignment, US 395, and SR 397/Oregon Avenue adjacent to these major industrial centers.

The composition of vehicle types using city streets was evaluated in the same StreetLight Data set to show which areas had the highest share of trucks. As shown in Figure 8, higher shares of heavy trucks were found to be concentrated east of US 395, with the highest share of truck traffic east of US 12. Bridge crossings were reviewed as well, and it was discovered that the percent of heavy freight over the Columbia and Snake Rivers ranges from six to 20 percent with the highest percent share being on the Snake River Bridge in eastern Pasco, with 20 percent of its 19,000 daily vehicles being freight trucks. By contrast, the western and northern sectors of the city had relatively light truck traffic. The truck volumes north of I-182 and west of US 395 were much lower, typically less than five percent of the total vehicle traffic, while the river bridge shares were between eight and nine percent.

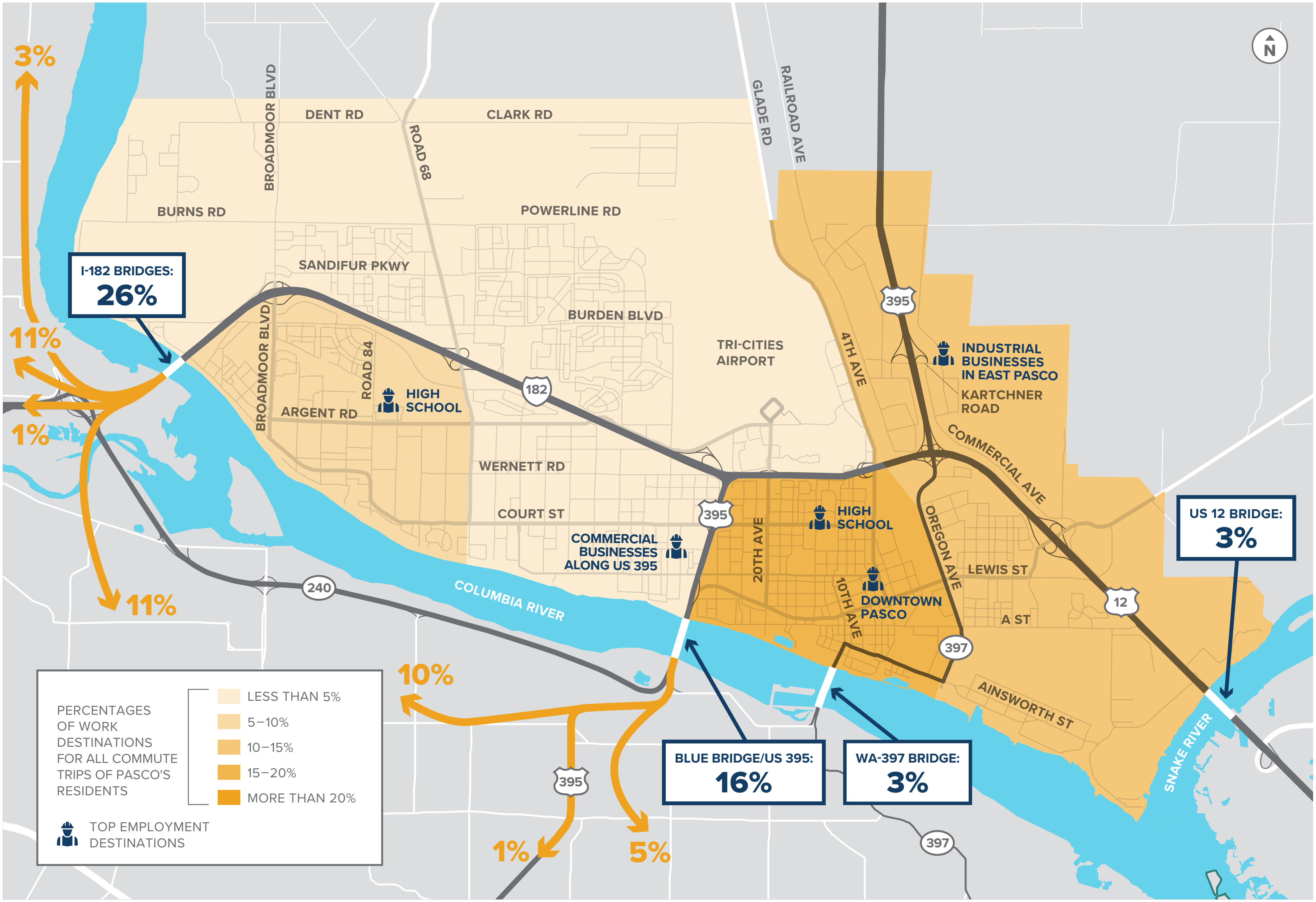


FIGURE 7. EMPLOYMENT TRAVEL PATTERNS TO/FROM PASCO (STREETLIGHT DATA, 2019)

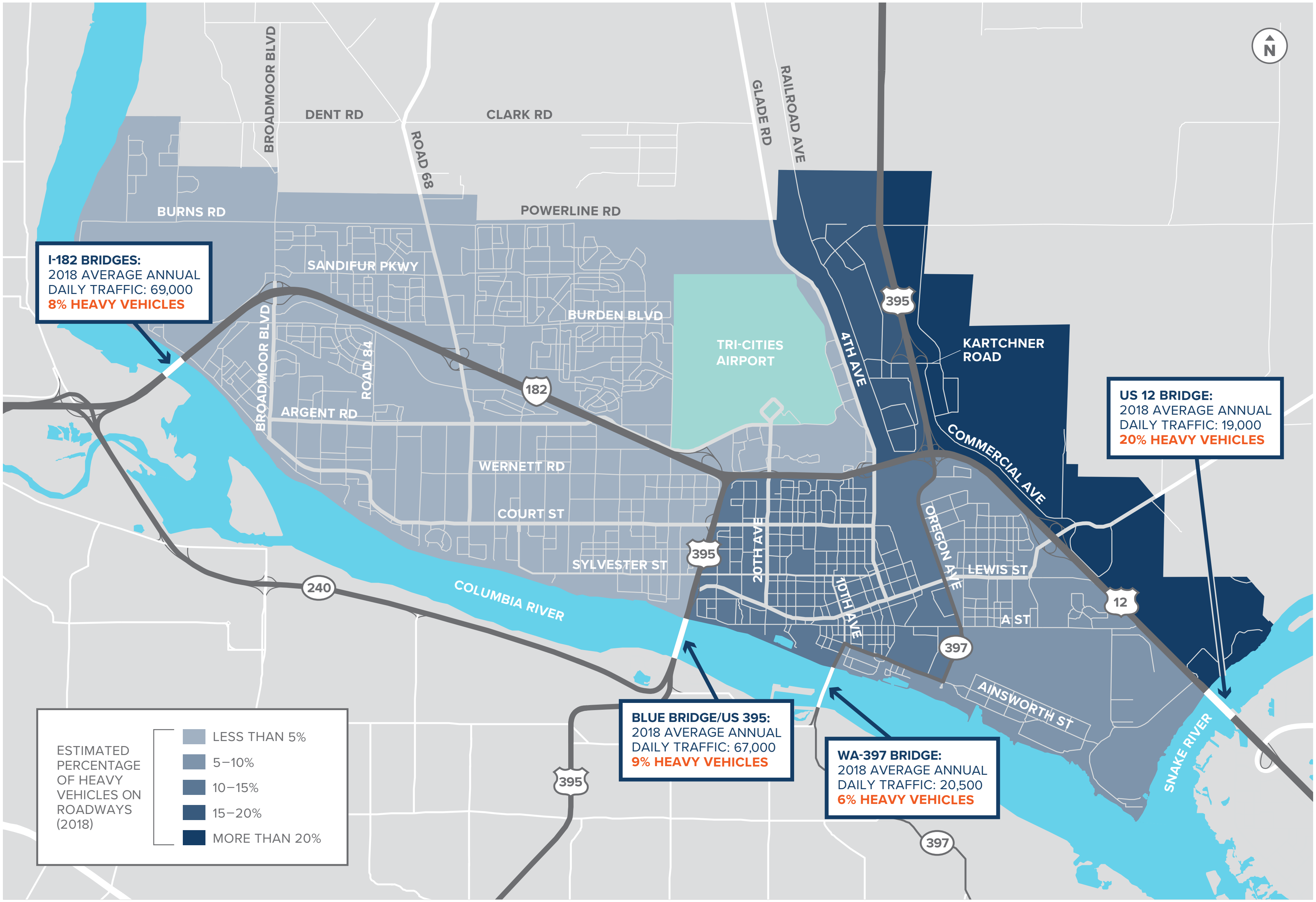


FIGURE 8. FREIGHT ACTIVITY CENTERS WITHIN PASCO (STREETLIGHT DATA, 2019)

Transit Services

The City of Pasco is served by Ben Franklin Transit (BFT) which operates fixed-route bus service, dial-a-ride, vanpool, and other demand responsive services within the Tri-Cities area. These transit options provide service within Pasco along with connections to Kennewick, Richland, and other regional destinations.

FIXED ROUTE SERVICE

BFT operates eight fixed route bus services within Pasco, including the following:

- Route 1: Pasco / Kennewick / Richland
- Route 3: Pasco / Kennewick
- Route 64: Pasco A Street
- Route 65: Pasco Lewis
- Route 66 & Route 67: Pasco Sylvester & Pasco Sandifur
- Route 225: Pasco / Richland
- Route 268: Pasco / Richland

See Figure 9 for these route locations and their existing transit stops.

Weekday service is provided between 6:00 a.m. and 10:00 p.m. although Route 64 and 268 both end service at 8:00 p.m. Service is similar for most routes for Saturday although service does not start until 7:00 a.m.; Route 268 does not provide Saturday service. Most routes operate on 30-minute headways for weekday and Saturday service, but Routes 1 and 3 operate on 15-minute headways, providing more frequent service to Kennewick and Richland from Downtown Pasco. Conversely, Routes 66 and 67 operate on hour headways, providing less frequent service to largely residential areas in western Pasco. Sunday service for Routes 1, 3, 64, and 225 began in August 2021.

BFT operates service for Pasco to and from the 22nd Avenue Transit Center which facilitates transfers between routes. Riders can park at both the 22nd Avenue Transit Center and the HAPO Center. BFT has received two multimodal transit center grants from WSDOT to further develop multimodal hubs in Downtown and West Pasco.

The bus stops within Pasco are indicated on Figure 9. Class 1 is a basic stop, which includes a sign that specifies the route number serving that location. Class 2 also has a bench for waiting riders, and Class 3 is a covered shelter with a bench.

The Class 2 and 3 bus stops often require more right-of-way space to construct these facilities consistent with ADA requirements than is provided in the current street standards. To address this, this plan update identified a wider sidewalk be built on collector and arterial roadways. In addition, the city has an exemption process to provide needed easements to BFT to accommodate these higher quality facilities.

According to the BFT Transit Development Plan, additional bus service is planned to extend coverage along Road 84 south of Argent Road, with continued service along the end of Court Street west of Road 68. The BFT plan also identified locations on the current service routes where stop upgrades are anticipated. Notable proposed changes are upgrades to Class 3 (sheltered) stops along Sandifur Parkway, and along Road 68 in the commercial area. Refer to Figure 10 for more information.

DIAL-A-RIDE SERVICE

Ben Franklin Transit operates Dial-A-Ride service for individuals with a disability between 6:00 a.m. and 10:00 p.m. Monday to Friday and between 7:00 a.m. and 10:00 p.m. on Saturday. There is no Sunday service.

VANPOOL

Vanpool services are also available for commuters traveling to Walla Walla, the Hanford Nuclear Site, and other major employment destinations.

OTHER TRANSIT SERVICES

BFT also offers CONNECT and general demand service which allows residents of Pasco to schedule rides to and from transit stops or other destinations within specific areas. These services make transit more accessible for all residents, especially those who lack convenient access to transit.

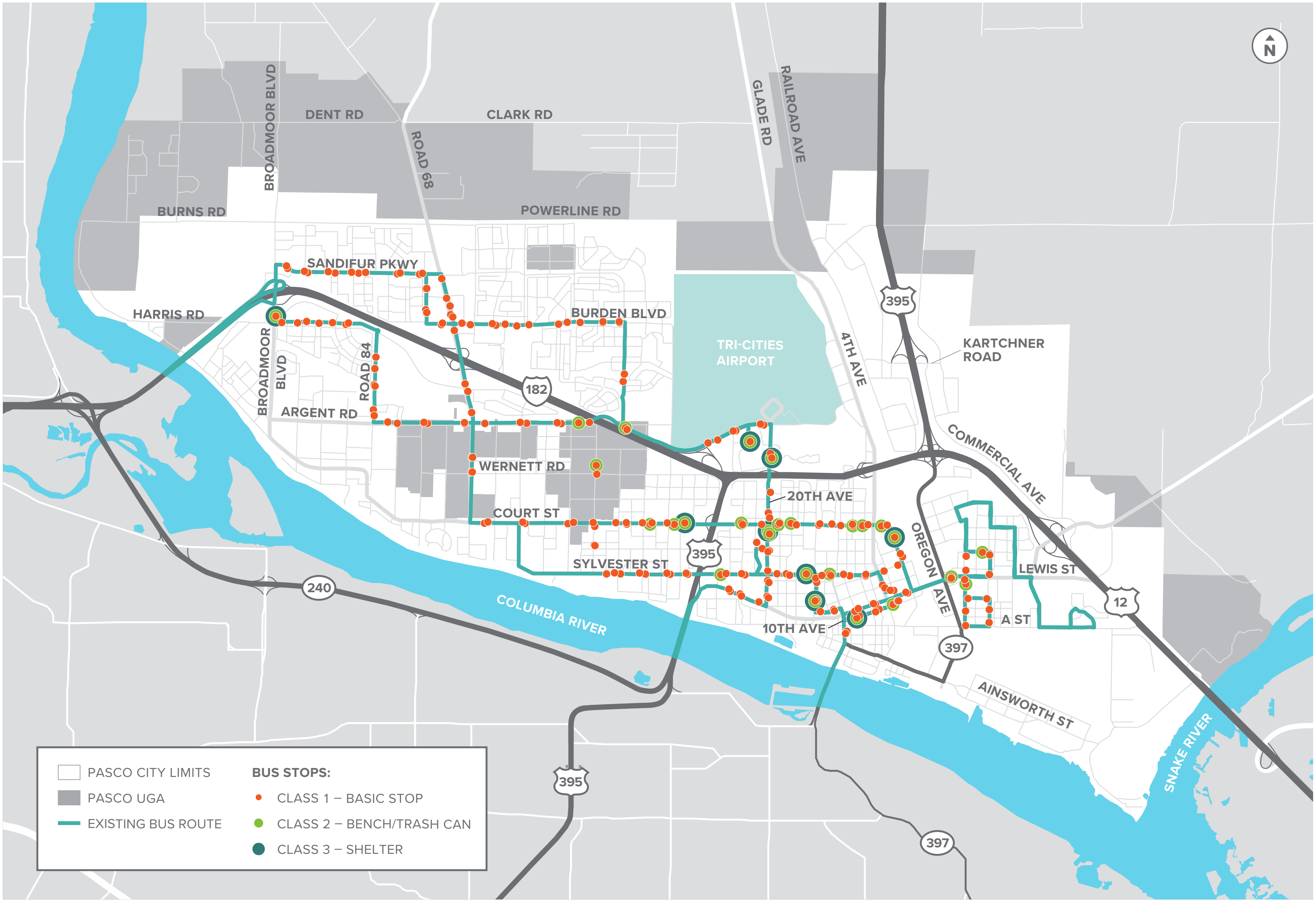


FIGURE 9. EXISTING BEN FRANKLIN TRANSIT SERVICES

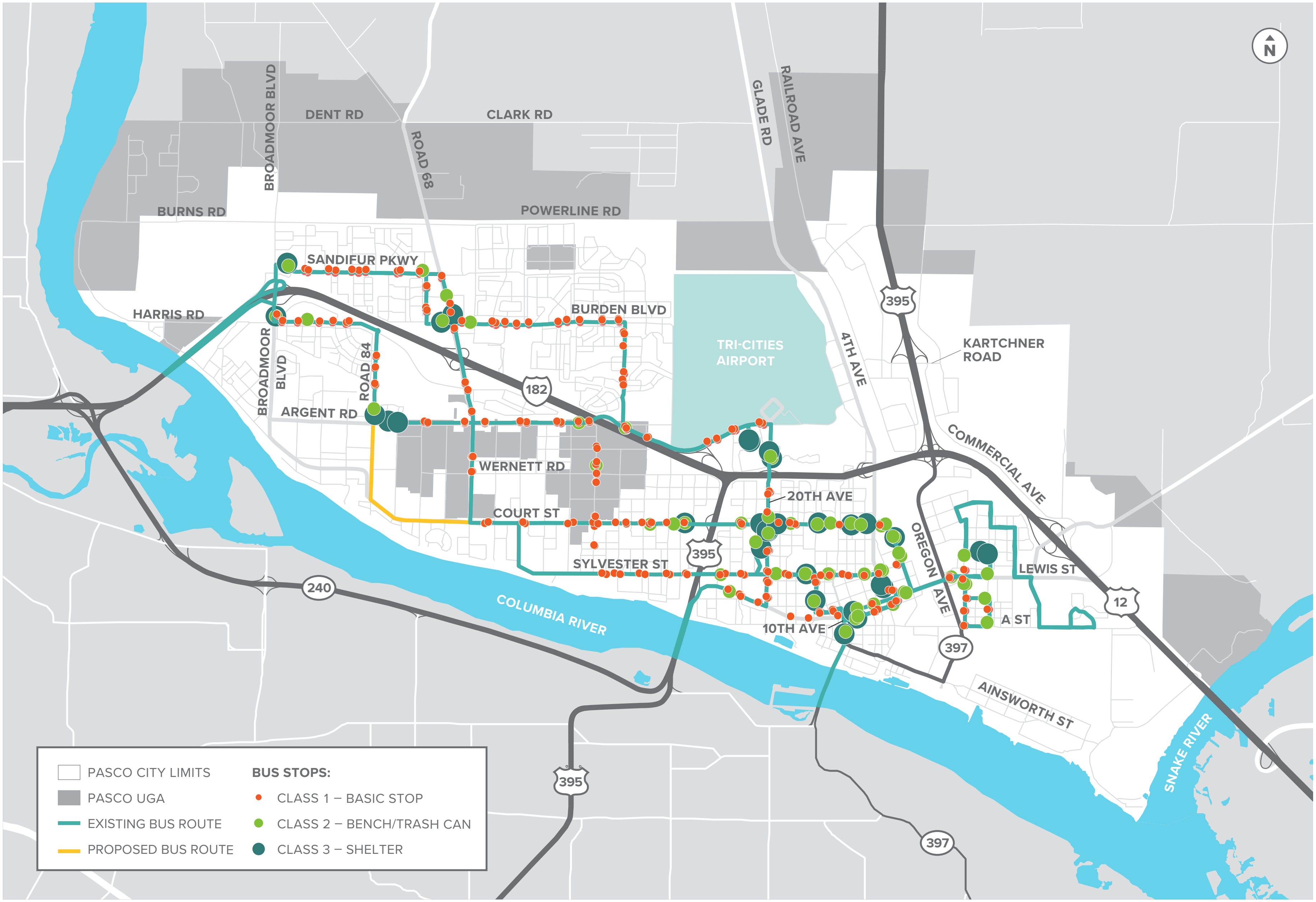


FIGURE 10. PLANNED BEN FRANKLIN STOP UPGRADES AND ROUTE EXTENSIONS

Transportation System Challenges

The transportation system performance was reviewed to understand where the system experiences high levels of congestion during weekday peak travel hours, where higher than expected crash rates occur, and where there are barriers to safe and convenient travel for all users. These issues were observed even with the short-term transportation improvements that are expected for Pasco. Figure 11 shows a compilation of our system performance findings for Pasco. The following sections highlight a few key findings that will be considered during the plan development.

For more details on how the performance assessment was completed and full listing of the findings, please refer to the Technical Memorandum #3 in Appendix B.

CONGESTION

Traffic congestion for motor vehicles is significant today at the two western interchanges (Broadmoor Boulevard and Road 68) on I-182 during typical weekday commute hours. The Road 68 interchange was observed to regularly have excessive vehicle queues blocking access to adjoining intersections and driveways. Whenever traffic has significant delays during peak travel hours, it can impact the safe and convenient traffic operations in those areas.

Fourteen intersections also had significant congestion. A total of 52 locations were monitored around the city, however, the rest of the locations all operated with low to moderate delays during the busiest hours of the day. The list of 14 intersections with concerns are noted in Figure 10. The Road 68 corridor from Sandifur Parkway, across I-182 and ending at Court Street has the highest group of congested locations. Several key locations along Argent Road, Sylvester Street, and Court Street are also noted as being congested on a regular basis.

INTERSECTIONS WITH BOTH HIGH CONGESTION AND HIGH CRASH RATES:

- **ROAD 68 AT BURDEN BOULEVARD**
- **ROAD 68 AT COURT STREET**
- **20TH AVENUE AT COURT STREET**

SAFETY

Traffic safety was reviewed by considering how often crashes occurred at intersections and along roadways around the city along with the type and severity of crashes. Locations with the highest crash rates were flagged and mapped on Figure 11 (a total of five intersections). A crash rate calculation considers both the number and severity of crashes along with the traffic count at a given location. In this way, intersections with different traffic counts can be reasonably compared to each other. We found several intersections had both high congestion and high crash rates, which occurred at Road 68 at Burden Boulevard, Road 68 at Court Street, and 20th Avenue at Court Street. In addition, four corridors were flagged that had a significantly higher rate of crashes, especially between intersections. Those included Burden Boulevard, Court Street, Sylvester Street, and Lewis Street. These corridors had a total of 33 crashes involving pedestrians and bicycle riders. Each of these streets are arterial roadways that carry higher traffic volumes at increased speeds. Field observations showed that portions of these high crash corridors had frequent driveways and side streets which adds opportunities for conflicts.

In addition, the city prepared a Local Road Safety Plan in February, 2020, that confirmed these findings, and recommended safety projects at North Road 28 and West Sylvester Street; South 10th Avenue and West Lewis Street; and a road diet project on West Sylvester Street. All of these projects are included in this TSMP.

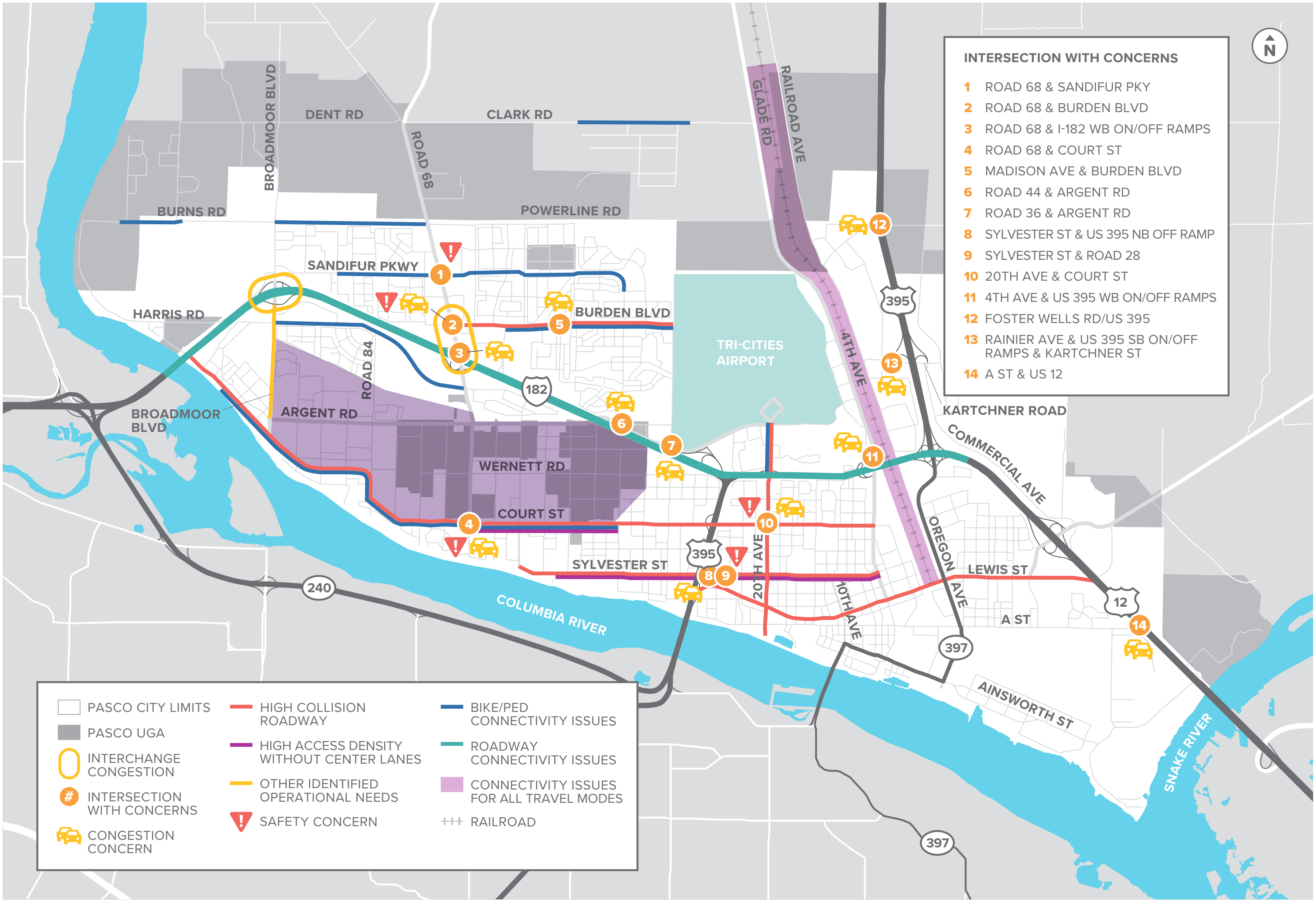


FIGURE 11. PASCO TRANSPORTATION SYSTEM CHALLENGES – TODAY

CONNECTIVITY

Connectivity describes how efficiently, directly, and conveniently a system is designed to serve its intended users. A well-connected multimodal system promotes resiliency, reduces congestion, and enhances equity for local travelers, whether they are driving, accessing transit, bicycling, or walking. For example, a well-connected roadway network provides more routes for drivers to travel between a trip's start and end points which can reduce congestion. Improving system connectivity for drivers can spread traffic more evenly across the existing roadway network, mitigate congestion due to system disruptions, and reduce the overall distance traveled by drivers. Pedestrians, bicyclists, and transit riders also benefit from a well-connected transportation system. Providing local circulation options for short trips also helps freight traffic that otherwise must compete with autos that are forced onto the arterial roadways, such as Road 68 and Broadmoor Boulevard. Long block lengths and out-of-direction travel can dissuade potential multimodal system users and incur significant costs in both time and safety for existing users who depend on these systems.

A technical review of Pasco's existing transportation system highlighted many arterial or collector corridors and areas without access for pedestrians, vehicles, transit riders, and bicyclists. In addition, public feedback identified dozens of locations where residents felt unsafe or unable to conveniently reach their intended destination. A few specific examples where connectivity challenges were flagged include the following:

- The I-182 freeway corridor divides Pasco in half and provides very limited opportunities to cross over the freeway. Local freeway interchanges have inadequate facilities for walking and biking, which compound the barriers for non-motorized travel. Further, the long spacing between these interchanges exacerbates the barrier for walking and bicycling travel between either sides of the highway.
- The Pasco Airport, and the Pasco rail yards represent major barriers to intra-city travel.
- In portions of unincorporated Franklin County within Pasco (for example, south of I-182), historical rural development has created a roadway network with limited east-west street connections and limited north-south street connections across the Franklin County Irrigation Canal.
- Newer residential developments adjacent to Burden Boulevard and Sandifur Parkway have limited connections to adjoining services and neighborhoods.

It is acknowledged that the city does have two extensive east-west trail corridors to serve walking and bicycling. These include the trail immediately north of I-182 between Broadmoor Boulevard and Argent Road. This provides connections to adjoining neighborhoods and to Road 58. Another regional trail borders the Columbia River between Sacajewea State Park and Road 100 with intermittent connections to city streets.

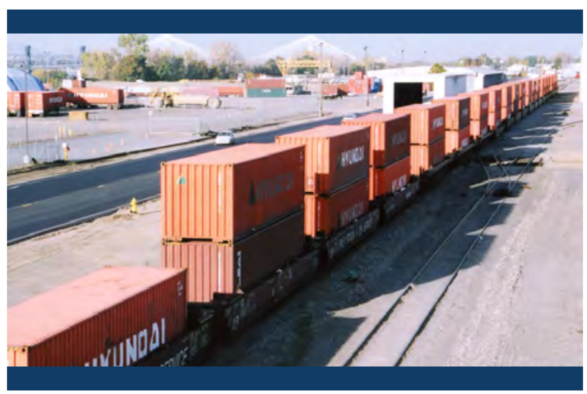


Photo Credit: City of Pasco

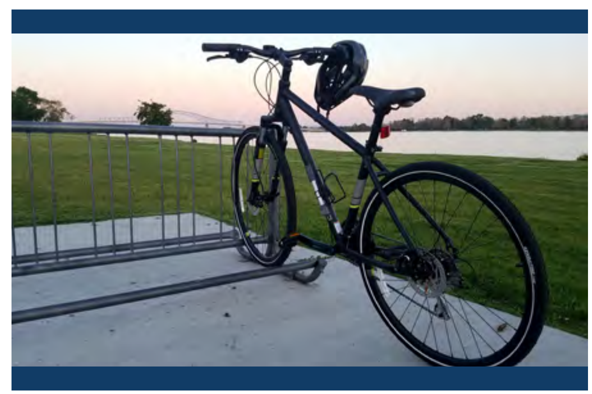


Photo Credit: Jacob Gonzalez

In many areas of the city, the transportation system does not support travel for Pasco residents without a car. Notable corridors that require attention are portions of Burns Road, Sandifur Parkway, Burden Boulevard, Court Street and Sylvester Street. For automobile drivers, long block lengths and limited access options increase out-of-direction travel and concentrate higher traffic volumes at the entry points to the neighborhoods. The residents that live adjacent to these entry/exit points experience significantly higher traffic volumes than others in the same neighborhood. These same features also significantly increase the distance that must be traveled by pedestrians or bicyclists to access transit or other destinations, making it more difficult to walk or bike in Pasco.

The current transit service routes generally are within one-quarter to one-half mile as the crow flies, to many of the key destinations and neighborhoods within the existing city limits, as shown in Figure 8, but limited street connectivity in certain areas puts these stops beyond a reasonable walking distance for many residents. Today, the exceptions are in the industrial areas east of US 12, and the edges of the urban area, particularly in the southern portions of Broadmoor Boulevard and westerly end of Argent Road. As noted previously, BFT is planning to extend bus route services along Road 84 south of Argent Road connecting to Court Street.

In general, as new development occurs, there is an opportunity for the city and its regional partners to provide better quality and more consistent connection options as part of the new neighborhood designs. This will enable city residents, employees, and visitors to have safer and more convenient access to transit services and general walking and biking trips. The primary growth area is north of I-182 in the greater Broadmoor Boulevard Area. As new streets and neighborhoods are developed, providing direct, safe, and convenient walking and bicycling access to existing and planned transit routes will be critical to maintaining a safe and reliable transportation options for our residents.

Forecasted Growth In Pasco

The Benton-Franklin Council of Governments (BFCG) travel demand model was applied to forecast 2040 travel demand within the City of Pasco, and the resulting traffic volumes were evaluated at study intersections by the project team to flag major degradations or changes in traffic operations compared to present day conditions.

Forecasts were developed from the Base Year (2015) and Future No-Build (2040) BFCG regional travel demand model, following the process described in the Traffic Analysis and Forecasting Methodology memo.[2] Key assumptions are highlighted in the following sections along with performance results.

The travel demand forecasting is directly influenced by expected land use growth throughout the Tri-Cities region. For this Transportation System Master Plan, the BFCG model was updated to a 2040 horizon year, by refining the previous 2017–2037 Pasco Comprehensive Plan Update land use to reflect the Broadmoor Master Plan and Urban Growth Area (UGA) expansion that was identified during the Comprehensive Plan Update. The updated 2040 land use significantly changed both the geographic distribution of growth and population and employment projections for the City of Pasco and its UGA. The land use totals are summarized in Table 1.

The 2040 land use assumptions are the catalyst for the forecasted growth and changes of traffic patterns within the City of Pasco. Significant shifts are expected north of I-182 as higher office, retail, and mixed-use growth in the Broadmoor area reduced the number of residents traveling out of Pasco for jobs, goods, and services. Reduced regional travel was also shown to reduce peak demands at interchanges with I-182, compared to historical growth patterns in Pasco where a high share of local residents left
the city for employment and shopping purposes. Overall, households are predicted to grow by 81 percent from 2015 (the BFCG model base year) to 2040, while employment is predicted to grow by about 73 percent during the same period.

TABLE 1. PASCO COMPREHENSIVE PLAN URBAN GROWTH AREA

LAND USE TOTAL	2015	2040	PERCENT GROWTH
HOUSEHOLDS	22,500	39,645	81%
POPULATION	70,855	120,275	71%
EMPLOYMENT	19,765	33,895	73%

2 *DKS Associates. Traffic Analysis & Forecasting Methodology memo. July, 2020*
3 *Benton-Franklin Council of Governments. Transition 2040, Appendix F. 2018.*

EXPECTED TRANSPORTATION IMPROVEMENTS

It was assumed that near-term transportation improvements that are reasonably likely to be funded and constructed by the cities of Pasco, Kennewick, Richland, West Richland, and WSDOT will be operational by 2040. These new improvements projects within Pasco include the following. As noted, several of these projects have been recently completed, while others are actively in development or preparing for construction:

- Argent Road Improvements (Road 40 to 20th Avenue) - under construction
- Wrigley Drive Extension (Convention Drive to Clemente Lane) - completed
- Chapel Hill Boulevard Extension (Road 84 to Road 68) - completed
- Sandifur Parkway Improvements (Road 68 to Convention Drive)
- Road 68 Widening (I-182 to Argent Road) – in progress
- Burns Road Improvements/Extension (Road 52 to Pasco City Limits)
- Lewis Street Downtown Overpass – in progress

Other projects included in the 2040 BFCG model outside of Pasco are summarized in Transition 2040, the Tri-Cities Metropolitan Area Regional Transportation Plan.[3]

System Conditions After Growth

The system performance with growth in 2040 was re-evaluated to determine if traffic congestion would reach unacceptable levels with the added traffic volumes. We found that sixteen intersections would drop below the agency's target, which is LOS D. This corresponds to significant delay for the average vehicle using that location during commute hours. The locations that are expected to have major congestion issues are mapped in Figure 12 and listed in Table 2. These locations and the roadways serving them were further reviewed to help gauge the scale and nature of system improvements that would adequately serve the higher travel demands, and recommendations are made in the following section.

The traffic operations results showed increased congestion and below standard operating conditions throughout much of the City of Pasco west of US 395 (south), and in and around the industrial employment growth expected to occur along US 395 (north) and US 12. The Broadmoor Boulevard and I-182 interchange ramp terminal intersection failures were particularly concerning, as ramp queues could lead to safety and operations issues on I-182. The operations issues at the US 12 and A Street intersection, the US 395 and Kartchner Street interchange, and the 4th Avenue and I-182 interchange are of particular concern for freight movement, as these are all key gateways into the City of Pasco's industrial growth centers.

LEVEL OF SERVICE (LOS) For motor vehicles, the LOS is an indicator of how much extra time it takes to travel through an intersection during busy travel hours. The LOS scale ranges from little or no delay (LOS A) to extreme delay (LOS F). Pasco's target is LOS D, which is moderate delay. During off-peak hours, delay conditions improve significantly. See Appendix C for more information.

TABLE 2. INTERSECTIONS WITH MAJOR CONGESTION BY 2040 (OPERATING AT LOS E OR F)

#	STUDY INTERSECTION	AM PEAK HOUR LEVEL OF SERVICE		PM PEAK HOUR LEVEL OF SERVICE	
		EXISTING	FUTURE NO-BUILD	EXISTING	FUTURE NO-BUILD
1	BROADMOOR BOULEVARD & I 182 WB ON RAMP/I 182 WB ON/OFF RAMP	B	B	A	**E**
2	BROADMOOR BOULEVARD & I 182 EB OFF RAMP/I 182 EB ON RAMP	B	C	B	**F**
8	SYLVESTER ST & US 395 NB OFF RAMP	A/C	A/C	**A/E**	**A/F**
11	4TH AVE & US 395 WB ON/OFF RAMP	A	B	D	**E**
13	US 395 & FOSTER WELLS RD	**A/F**	**C/F**	**B/F**	**C/F**
14	RAINIER AVE/US 395 SB ON/OFF RAMP & KARTCHNER ST	A/C	A/D	**B/F**	**B/F**
15	COMMERCIAL AVE/US 395 NB ON/OFF RAMP & KARTCHNER ST	A/D	**A/E**	A/D	**A/F**
18	HWY 12 & E A ST	A/C	**A/E**	A/C	**A/F**
19	ROAD 68 & BURDEN BLVD	**E**	**E**	**E**	**E**
20	BROADMOOR BOULEVARD & DENT RD/ EDELMAN RD			A/C	**A/F**
27	ROAD 68 & SANDIFUR PKWY			C	**E**
30	ROAD 68 & COURT ST			A/D	**A/F**
31	ROAD 60 & COURT ST			A/C	**A/F**
32	MADISON AVE & BURDEN BLVD			**A/F**	**A/F**
33	ARGENT RD & RD 44			**A/F**	**B/F**
52	CEDAR AVE & LEWIS ST			A/C	**A/E**

Red text indicates where conditions will exceed accepted LOS limits.

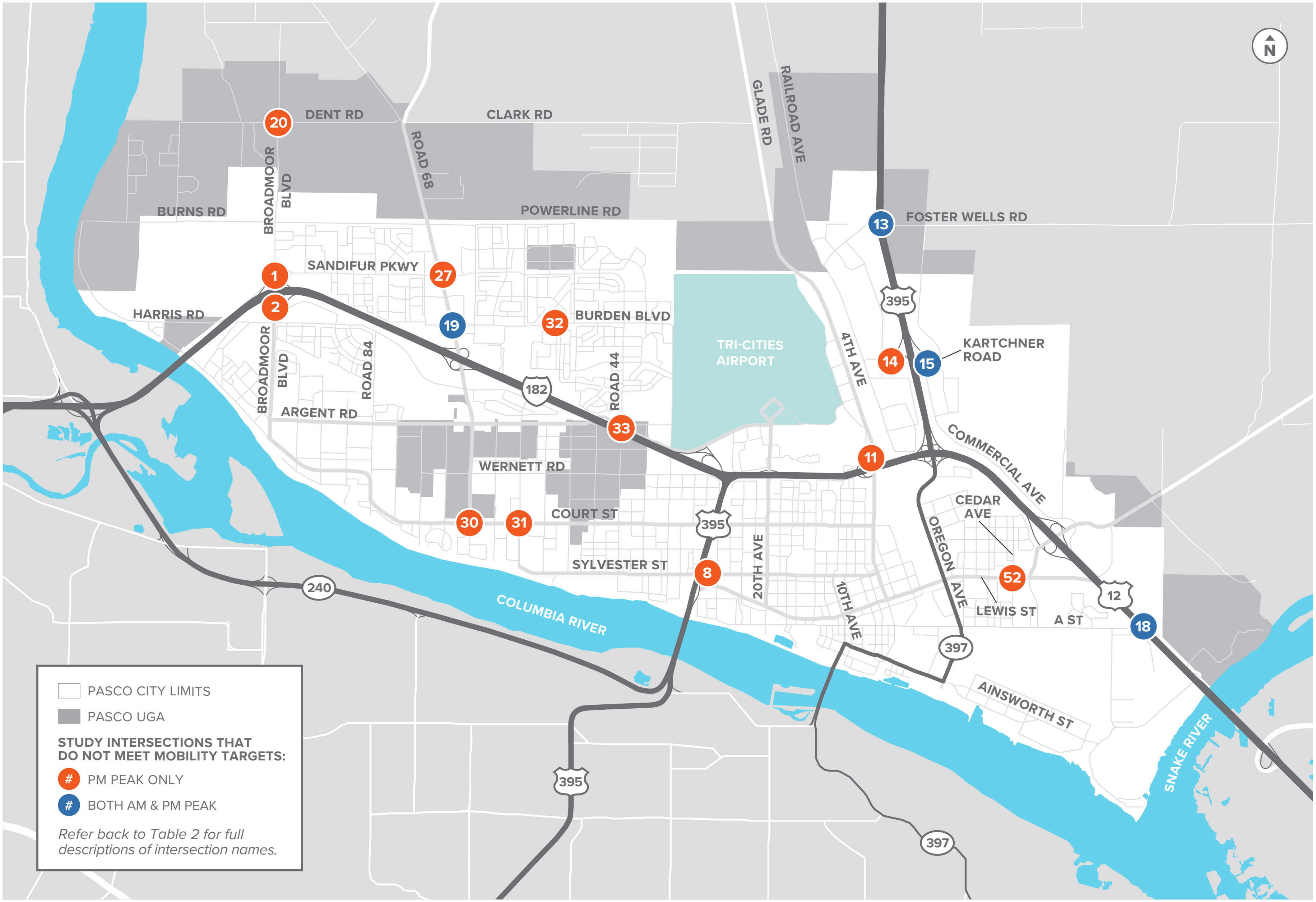


FIGURE 12. INTERSECTIONS WITH MAJOR CONGESTION BY 2040

CHAPTER 3

Recommended Transportation System Improvements

Photo Credit: City of Pasco

THE RECOMMENDED IMPROVEMENTS TO PASCO'S TRANSPORTATION SYSTEM WILL IDENTIFY UPGRADES TO EXISTING STREETS AND INTERSECTIONS, AS WELL AS THE CONSTRUCTION OF NEW ROADWAYS, TO SUPPORT THE MULTIMODAL NEEDS OF THE COMMUNITY.

Not all recommended improvements are required to be in place prior to developing land within the UGA. The need to upgrade the existing streets or construct new ones will be driven by the multimodal access needs of the adjacent properties. The project design elements depicted are identified for the purpose of creating a reasonable cost estimate for planning purposes. The actual design elements for any project are subject to change and will ultimately be determined through a project scoping process.

The recommended improvements are listed by category in Figure 13 (Motor Vehicle System Improvements) and Figure 14 (Bicycle/Pedestrian Projects), with the project IDs corresponding with those in Table 3 through Table 7. Note that the project IDs were created in numerical order, and do not correspond with priority. While the estimated project costs are shown, the responsibility will be shared by the city, Franklin County, WSDOT, and private development, with the cost shares to be determined as applicable.

Photo Credit: Tri-City Herald

Motor Vehicle System Improvements

The first major category of system improvements to the motor vehicle system is for at-grade intersection traffic control upgrades and channelization improvements, or for major freeway interchange upgrades and re-configuration projects. As shown in Table 3, many projects are identified to upgrade existing intersections traffic controls to better serve higher traffic volumes with planned growth. This typically includes installing traffic signals or roundabouts to make those locations more efficient and safer under higher usage levels. One of the more complex intersection solutions is on Broadmoor Boulevard at Sandifur Parkway (INT42); this includes extensive additions of dedicated right- and left-turning lanes and upgrades to the existing traffic signal equipment to serve these wider street approaches. The cost estimate for these improvements is $3.6 million.

In addition, there are several freeway interchanges on I-182 that require improvement to the existing off and on ramps serving the local city streets, or they require a major upgrade of the interchange itself to better service long-range multimodal travel demands (INT1, INT24, INT25, INT30). The Broadmoor Boulevard interchange (INT25) improvement project would add a loop off-ramp for eastbound freeway travel bound for northbound Broadmoor Boulevard. This will significantly reduce demands on the existing eastbound off-ramp, which queues heavily during peak periods. As noted previously, the existing freeway overcrossings of I-182 have very limited walking and bicycling facilities, and any upgrade to those interchanges would provide improved accommodations for all modes of travel consistent with City of Pasco and WSDOT design standards.

TO BETTER SERVE THE HIGHER TRAFFIC VOLUMES EXPECTED WITH COMMUNITY GROWTH, MANY MOTOR VEHICLE SYSTEM IMPROVEMENTS INCLUDE UPGRADING EXISTING INTERSECTION TRAFFIC CONTROLS.

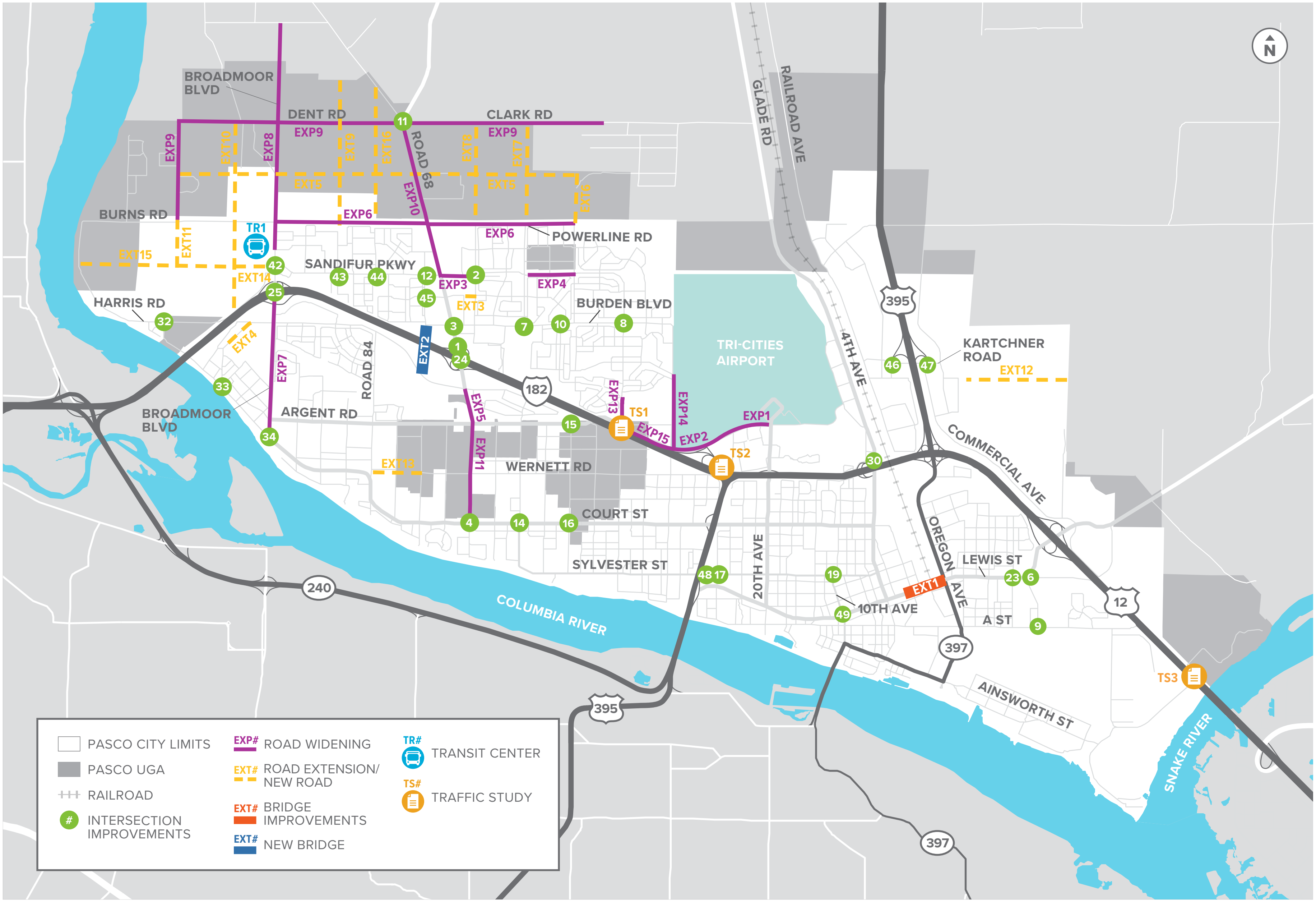


FIGURE 13. MOTOR VEHICLE SYSTEM IMPROVEMENTS

TABLE 3. INTERSECTION IMPROVEMENTS (INT)

ID	NAME	DESCRIPTION	COST
INT1	Road 68/I-182 WB Ramp Terminal Improvements	Expand capacity of westbound ramp terminal	$1,915,000
INT2	Sandifur Parkway/Convention Drive Improvements	Install a traffic signal; restripe Convention Drive to include northbound and southbound left turn pockets	$1,045,000
INT3	Road 68/Burden Boulevard Intersection Improvements	Channelization improvements to reduce queueing on westbound approach and access to I-182	$260,000
INT4	Court Street/Road 68 Intersection Improvements	Construct a roundabout or traffic signal to improve safety, intersection control, and capacity	$2,000,000
INT6	Lewis St/Heritage Ave Intersection Improvements	Install traffic signal	$480,000
INT7	Burden Blvd/Road 60 Intersection Improvements	Install traffic signal	$480,000
INT8	Road 44/Burden Blvd Intersection Improvements	Install traffic signal	$480,000
INT9	Heritage Ave/A St Intersection Improvements	Install traffic signal	$795,000
INT10	Madison Ave/Burden Blvd Intersection Improvements	Install traffic signal	$480,000
INT11	Dent Rd/Road 68/Columbia River Rd/Taylor Flats Rd/Clark Rd Intersection Improvements	Realign Columbia River Road south to Dent Road and close existing connection to Road 68; construct a 1-lane roundabout at Columbia River Road/Dent Road; construct a 2-lane four leg roundabout at Dent Road/Clark Road/Road 68/Taylor Flats Road with eastbound and northbound right turn slip lanes; widen Taylor Flats Road to 4 lanes immediately north of roundabout	$4,865,000
INT12	Sandifur Pkwy/Road 76 Intersection Improvements	Install a traffic signal; remove existing channelized northbound right turn lane and convert to shared northbound through/right turn lane	$480,000
INT14	Court St/Road 60 Intersection Improvements	Construct a traffic signal	$480,000
INT15	Argent Rd/Road 52 Intersection Improvements	Construct turn pockets or traffic signal	$350,000
INT16	Court St/Road 52 Intersection Improvements	Construct turn pockets (included as part of road diet project)	$350,000
INT17	Sylvester St/Road 28 Intersection Improvements	Redesign traffic signal and install a northbound left turn lane	$700,000
INT19	10th Ave/Sylvester St Intersection Improvements	Installation of a northbound advance signal and warning sign on S. 10th Avenue	$50,000
INT23	Cedar Ave/Lewis St Intersection Improvements	Construct a traffic signal and restripe Lewis Street to three lanes	$350,000

ID	NAME	DESCRIPTION	COST
INT24	I-182/Road 68 Interchange Improvements	Interchange reconstruction, improve on and off capacity for EB and WB traffic, widen bridge structure	$15,850,000
INT25	I-182/Broadmoor Blvd Interchange Improvements	Construct a 1-lane loop ramp from eastbound I-182 to northbound Broadmoor Boulevard within existing right of way; widen westbound approaches at I-182 westbound and eastbound ramp terminals to include dual right turn lanes	$3,300,000
INT30	4th Ave/I-182 WB ramps	Construct a southbound right turn lane at intersection	$220,000
INT32	Court St/Harris Rd	Install a traffic signal	$480,000
INT33	Court St/Road 108	Restripe southbound approach to create a southbound left turn lane	$35,000
INT34	Court St/Broadmoor Boulevard	Install a traffic signal	$480,000
INT42	Broadmoor Boulevard/Sandifur Parkway Intersection Improvements	Widen approaches as needed to construct new dual northbound left turn lanes, a westbound through lane, a channelized southbound right turn lane, and dual eastbound right turn lanes; widen to add an additional southbound receiving lane on Broadmoor Boulevard between Sandifur Parkway and the old Harris Road intersection	$3,600,000
INT43	Sandifur Parkway/Road 90 Intersection Improvements	Install a traffic signal	$795,000
INT44	Sandifur Parkway/Road 84 Intersection Improvements	Install a traffic signal	$480,000
INT45	Wrigley Drive/Road 76 Intersection Improvements	Install a traffic signal	$480,000
INT46	Rainier Ave/US 395 SB On/Off Ramp & Kartchner St	Install a traffic signal	$480,000
INT47	Commercial Ave/US 395 NB On/Off Ramp & Kartchner St	Install a traffic signal	$480,000
INT48	Sylvester St & US 395 NB Off Ramp	Install a traffic signal	$480,000
INT49	Lewis St/10th Avenue Intersection Improvements	Install an active signal ahead warning sign	$45,000

The next major category of motor vehicle system improvements is roadway extensions, which are newly constructed as development occurs, and overpasses. These projects are generally much larger investments than intersection upgrades because they are building the essential roadway network in the growth areas and addressing system limitations at key bottlenecks around the city.

The first two projects would construct new street overpasses at Lewis Street (EXT1) in downtown, and at Road 76 (EXT2) just west of the Road 68 interchange with I-182. The Lewis Street Overpass replaces the existing railroad underpass facility and began construction in 2021. The Road 76 Overpass project supplements the carrying capacity of the Road 68 overpass to allow local trips to cross the freeway without passing through the ramp intersections and provides quality walking and bicycling options that are not available at Road 68. The other EXT projects are new streets that extend the existing major roadway system to service growth areas.

TABLE 4. NEW ROADWAY EXTENSIONS (EXT)

ID	NAME	EXTENTS	DESCRIPTION	COST
EXT1	Lewis Street Overpass	2nd Avenue to Oregon Avenue	Construct a new railroad overpass between 2nd Avenue and Oregon Avenue to replace existing deteriorating underpass ***(Built)***	$32,016,000
EXT2	Road 76 Overpass	Chapel Hill Boulevard to Burden Boulevard	Construct a new 2-lane overpass and roadway to extend Road 76 over I-182 with bicycle and pedestrian facilities; install traffic signal at Road 76/ Burden Boulevard, restripe southbound approach to include a separate left turn pocket, and construct a northbound right turn lane; complete existing roundabout at Road 76/Chapel Hill Boulevard	$30,000,000
EXT3	Wrigley Drive Extension	Clemente Lane to Convention Drive	Extend Wrigley Drive from Clemente Lane to Convention Drive ***(Built)***	$960,000
EXT4	Crescent Road	Chapel Hill Boulevard to Road 108	Construct a new 3-lane road in the existing Crescent Road ROW to connect Road 108 and Chapel Hill Boulevard	$3,085,000
EXT5	Future East-West Connection (Deseret Drive)	Dent Road to Road 52	Construct a 3-lane roadway and upgrade existing segments of Deseret Drive; construct two-way stop control intersection at Deseret Drive/Dent Road, Deseret Drive/Future North-South Connection (Halfway between Broadmoor Boulevard and Dent Road), Deseret Drive/Convention Drive, and Deseret Drive/Road 60; install new signals at Broadmoor Boulevard/Deseret Drive and Road 68/Deseret Drive; construct new 1-lane roundabout at Deseret Drive/ Road 90 and Deseret Drive/Road 84	$63,640,000
EXT6	Road 52 Extension	Burns Road through to UGA	Construct a 3-lane roadway	$24,885,000

ID	NAME	EXTENTS	DESCRIPTION	COST
EXT7	Road 60 Extension	Burns Road through to UGA	Construct a 3-lane roadway; install two-way stop control at Clark Road/Road 60	$24,270,000
EXT8	Convention Drive Extension	Burns Road through to UGA	Construct a 3-lane roadway; install two-way stop control at Clark Road/ Convention Drive; restripe northbound approach at Burns Road/Convention Drive to include a dedicated left turn lane	$24,330,000
EXT9	Road 90 Extension	Burns Road through to UGA	Construct a 3-lane roadway; install a traffic signal at Road 90/Burns Road; construct a 1-lane roundabout at Road 90/Dent Road	$26,795,000
EXT10	Future North-South Connection (Halfway between Broadmoor Boulevard and Dent Road)	Harris Road to Dent Road	Construct a 3-lane roadway; install two-way stop control at Future North-South Connection/Harris Road and Future North-South Connection/Dent Road; install a traffic signal at Future North-South Connection/Burns Road	$28,105,000
EXT11	Dent Road Extension	Burns Road to Harris Road	Construct a 3-lane roadway; install a traffic signal at Dent Road/Burns Road	$14,505,000
EXT12	Hillsboro Rd Extension	King Avenue to UGA	New road from east of King Ave to UGA	$34,940,000
EXT13	Wernett Rd Extension	Road 76 to Road 84	New road from Rd 76 to Road 84	$6,075,000
EXT14	Sandifur Parkway Extension - Phase 1	Broadmoor Boulevard to Future North-South Connection (Between Broadmoor Boulevard and Dent Road)	Construct a 5-lane roadway; realign Harris Road to Sandifur Parkway Extension as 2-lane road and close the existing Harris Road/Broadmoor Boulevard intersection; construct a 2-lane roundabout at Sandifur Parkway Extension/ Harris Road and a 1-lane roundabout at Sandifur Parkway/Future North-South Connection (Between Broadmoor Boulevard and Dent Road) with a westbound right turn slip lane	$12,140,000
EXT15	Sandifur Parkway Extension - Phase 2	Future North-South Connection (Between Broadmoor Boulevard and Dent Road) and Shoreline	Construct a 3-lane roadway; construct a 1-lane roundabout at Sandifur Parkway/ Dent Road; install two-way stop control at Sandifur Parkway/Shoreline	$23,740,000
EXT16	Road 84 Extension	Burns Road to UGA	Construct a 3-lane roadway; install a traffic signal at Road 84/Burns Road; construct a 1-lane roundabout at Road 84/Dent Road	$25,585,000

A series of focused traffic studies (TS1, TS2, and TS3) was also identified to develop conceptual plans for solutions at major intersections and freeway interchanges to better understand trade-offs and cost efficiencies. In addition, two safety studies (TS4 and TS5) were identified to help the City leverage access to grant funding for local safety improvements. The master plan also shows a potential transit park and ride lot in the general Broadmoor Road area. In addition, the city will develop and adopt a master plan that focuses on active transportation needs of the community. This will refine the findings of the TSMP projects to include a priority citywide network, and to amend plans and standards, as needed, to support safe and convenient non-motorized travel. Further study is required to fully understand the investment required for improvements to support the park-and-ride lot.

TABLE 5. TRAFFIC STUDIES AND TRANSIT AMENITIES (TS & TR)

ID	NAME	DESCRIPTION	COST
TS1	Study Road 44/Argent Road Intersection	Study Road 44/Argent Road Intersection	$65,000
TS2	Traffic Analysis for I-182/US 395 Interchange	Traffic Analysis for I-182/US 395 Interchange	$265,000
TS3	Traffic Analysis for US 12/Tank Farm Road	Traffic Analysis for US 12/Tank Farm Road	$250,000
TS4	Intersection Safety Implementation Plan	Develop a program to analyze intersection safety needs, including identification of automated enforcement locations and identifying projects for safety grants	$80,000
TS5	Local Roads Safety Plan (LRSP)	Update the 2020 LRSP in even-numbered years (2022 and following) to gain eligibility for Highway Safety Improvement Program (HSIP) grant funding	$60,000
TS6	Bicycle and Pedestrian Master Plan	Develop a master plan specific to the active transportation needs of the community.	$200,000
TR1	Broadmoor Park and Ride Location	Construct a park-and-ride facility in the Broadmoor Area	TBD

The next category of motor vehicle improvements is expansions to the existing system, which generally add more motor vehicle travel lanes to serve 2040 traffic conditions consistent with the mobility targets in place by the City and its local partners (WSDOT and Franklin County). Some expansion projects were also identified as key components to complete a comprehensive bicycle network for Pasco. These projects are included on Figure 13. Several of these roadway widening projects also identify supporting intersection and traffic control upgrades based on initial performance studies done through the TSMP. Further traffic engineering evaluation will be required at the time of improvement design to fully understand the geometric requirements associated with intersection improvements, such as the length of the suggested dedicated turn lanes, at each location.

TABLE 6. ROADWAY WIDENING PROJECTS (EXP)

ID	NAME	EXTENTS	DESCRIPTION	COST
EXP1	Argent Road Improvements - Phase 1	20th Avenue to Varney/Saraceno	Widen to 5 lanes with intersection improvements	$2,015,000
EXP2	Argent Road Improvements - Phase 2	Varney/Saraceno to Road 40	Widen to 5 lanes with intersection improvements; install a traffic signal or roundabout at Road 36/Argent	$8,150,000
EXP3	Sandifur Parkway Improvements	Convention Drive to Road 68	Widen to 5 lanes; construct a westbound right turn lane at Road 68/ Sandifur Parkway	$2,265,000
EXP4	Sandifur Parkway Improvements	Road 60 to Road 52	Widen to 3 lanes; restripe westbound approach to Road 52 to include a shared through/right lane and a dedicated left turn pocket; restripe southbound and eastbound approaches to Road 60 to include dedicated left turn lanes	$3,505,000
EXP5	Road 68 Improvements	I-182 Eastbound Ramp Terminal to Argent Road	Widen to 5 lanes; construct a southbound right turn lane at Road 68/Chapel Hill Boulevard	$307,628
EXP6	Burns Road Improvements	Broadmoor Boulevard to Road 44	Widen to 3 lanes; construct new 3-lane roadway between Road 68 and Rio Grande Lane; install all-way stop control at Road 52/Burns Road intersection; install a traffic signal at Burns Road/Road 68	$13,804,000
EXP7	Broadmoor Boulevard Improvements	I-182 Eastbound Ramp Terminal to Court Street	Widen to 3 lanes as needed; convert existing right turn pockets and acceleration lanes to a continuous through travel lane	$7,905,000
EXP8	Broadmoor Boulevard Widening	I-182 Westbound Ramp Terminal to Dent Road	Widen to 5 lanes between I-182 Westbound Ramp Terminal and Burns Road; widen to 3 lanes between Burns Road and Dent Road; install traffic signal at Broadmoor Boulevard/Burns Road and widen eastbound approach to include dedicated left and right turn lanes; install traffic signal at Broadmoor Boulevard/Dent Road	$8,035,000
EXP9	Clark Road/Dent Road Improvements	Burns Road to Road 52	Widen to 3 lanes	$43,225,000

ID	NAME	EXTENTS	DESCRIPTION	COST
EXP10	Road 68 Improvements	Sandifur Parkway to Clark Road	Widen to 5 lanes	$13,085,000
EXP11	Road 68 Improvements	Court Street to Argent Road	Extend 5-lane section immediately south of Argent Road; convert existing southbound right turn lane to a shared southbound through/right turn lane	$9,740,000
EXP13	Road 44 Improvements	Madison Avenue to Argent Road	Widen to 3 lanes; install a traffic signal at Road 44/Argent Road intersection	$1,225,000
EXP14	Road 36 Improvements	Desert Plateau Drive to Argent Road	Widen to 3 lanes	$3,345,000
EXP15	Argent Road Improvements - Phase 3	Road 40 to Road 44	Widen to 5 lanes	$600,000
EXP23	Burns Road	Shoreline to Broadmoor Boulevard	Widen to complete a residential minor arterial cross section	$13,795,000
EXP26	Court Street	Harris Road to Broadmoor Boulevard	Widen to complete a residential minor arterial cross section	$9,920,000
EXP33	Road 84	Burns Road to Sandifur Parkway	Widen to complete a residential collector cross section	$25,000
EXP37	Road 76	Sandifur Parkway to Burden Boulevard	Widen to complete a commercial collector cross section	$1,925,000
EXP38	Wrigley Drive	Road 76 to Clemente Lane	Widen to complete a commercial neighborhood collector cross section	$560,000
EXP46	Hudson Drive	Road 84 to Okanogan Lane	Widen to complete a residential neighborhood collector cross section	$825,000
EXP47	Okanogan Lane	Hudson Drive to Chehalis Drive	Widen to complete a residential neighborhood collector cross section	$250,000
EXP48	Chehalis Drive	Okanogan Lane to Three Rivers Drive	Widen to complete a residential neighborhood collector cross section	$490,000
EXP49	Three Rivers Drive	Chehalis Drive to Road 68	Widen to complete a residential neighborhood collector cross section	$1,170,000
EXP53	Argent Road	Road 52 to Road 44	Widen to complete a residential minor arterial cross section	$3,840,000
EXP57	Road 76	Argent Road to Court Street	Widen to complete a residential neighborhood collector cross section	$5,520,000

ID	NAME	EXTENTS	DESCRIPTION	COST
EXP58	Court Street	Broadmoor Boulevard to Road 84	Widen to complete a residential 3-lane principal arterial cross section	$15,315,000
EXP74	Wrigley Drive	Road 68 Place to Roosevelt Drive	Widen to complete a residential neighborhood collector cross section	$4,350,000
EXP75	Roosevelt Drive	Wrigley Drive to Madison Avenue	Widen to complete a residential neighborhood collector cross section	$225,000
EXP76	Madison Avenue	Roosevelt Drive to Burden Boulevard	Widen to complete a residential neighborhood collector cross section	$140,000
EXP77	Madison Avenue	Burden Boulevard to Road 44	Widen to complete a residential neighborhood collector cross section	$50,000
EXP79	Road 60	Burns Road to Burden Boulevard	Widen to complete a residential collector cross section	$465,000
EXP82	Burden Boulevard	Road 60 to Road 36	Widen to complete a residential minor arterial cross section	$5,860,000
EXP89	Road 60	Court Street to Sylvester Street	Widen to complete a residential collector cross section	$3,305,000
EXP93	Sylvester Street	Road 60 To Road 54	Widen to complete a residential collector cross section	$2,125,000
EXP102	A Street	20th Avenue to Heritage Boulevard	Widen to complete an industrial minor arterial	$6,990,000
EXP103	A Street	Heritage Boulevard to US 12	Widen to complete an industrial minor arterial	$4,695,000
EXP111	10th Avenue	Lewis Street to Sylvester Street	Widen to complete a mixed use minor arterial cross section	$2,895,000
EXP112	10th Avenue	Ainsworth Street to Lewis Street	Widen to complete an industrial minor arterial cross section	$150,000
EXP115	4th Avenue	Ainsworth Street to Columbia Street	Widen to complete an industrial minor arterial cross section	$3,480,000
EXP126	Elm Avenue	Broadway Street to A Street	Widen to complete a residential neighborhood collector cross section	$445,000

Bicycle and Pedestrian System Improvements

The recommended bicycle and pedestrian system improvements are listed by category in Figure 14 (Bike/Pedestrian Projects), with the project IDs corresponding with those in Table 7. Note that the project IDs were created in numerical order, and do not correspond with priority. While the estimated project costs are shown, the responsibility will be shared by the City, Franklin County, WSDOT, and private development, with the cost shares to be determined as applicable.

In addition to the specific projects targeted for bicycle and pedestrian users (Table 7), Figure 14 illustrates motor vehicle projects that have bike and pedestrian elements, which were already listed in the previous sections' project tables. The compilation of dedicated bicycle/pedestrian and other projects illustrates the citywide bicycling and walking network that will be in place once these improvements have been completed.

Photo Credit: City of Pasco

Photo Credit: Port of Pasco

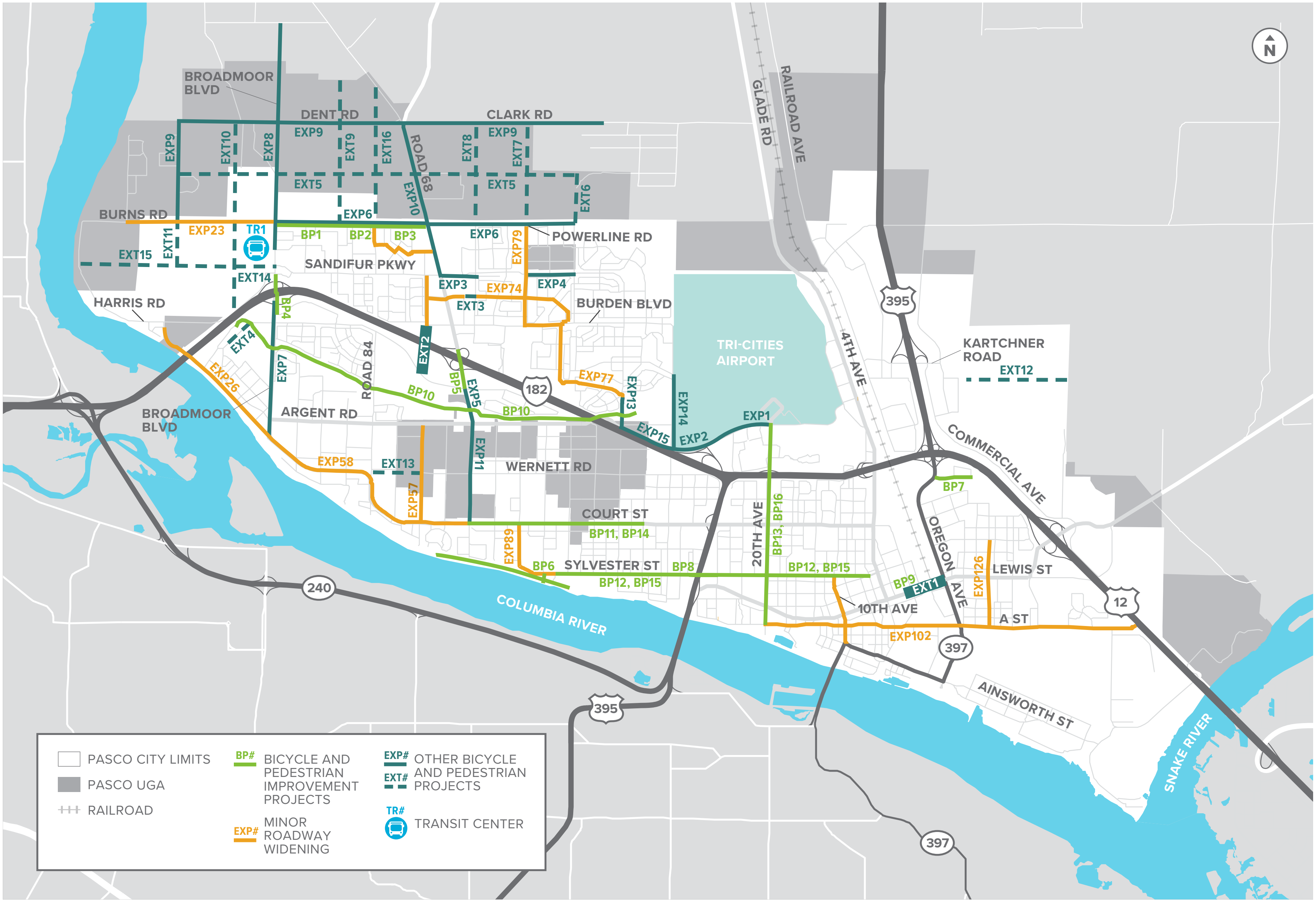


FIGURE 14. BICYCLE AND PEDESTRIAN PROJECTS

TABLE 7. BICYCLE AND PEDESTRIAN PROJECTS (BP)

ID	NAME	EXTENTS	DESCRIPTION	COST
BP1	Burns Road Pedestrian/ Bicycle Pathway Phase 1	Broadmoor Boulevard to Road 90	12-foot-wide Pedestrian/Bicycle pathway from Broadmoor Boulevard to Road 90 ***(Starting construction in 2022)***	$775,000
BP2	Burns Road Pedestrian/ Bicycle Pathway Phase 2	Road 90 to Road 84	12-foot-wide Pedestrian/Bicycle pathway from Road 90 to Road 84 ***(Starting construction in 2022)***	$455,000
BP3	Burns Road Pedestrian/ Bicycle Pathway Phase 3	Road 84 to Road 68	12-foot-wide Pedestrian/Bicycle pathway from Road 84 to Road 68 ***(Starting construction in 2022)***	$650,000
BP4	Pedestrian/Bicycle Access Broadmoor Boulevard Interchange	St Thomas Drive to Harris Road	Pedestrian/Bicycle facilities on Broadmoor Boulevard from St Thomas Dr to Harris Road	$2,320,000
BP5	Pedestrian/Bicycle Access Road 68 Interchange	Chapel Hill Boulevard to Burden Boulevard	Pedestrian/Bicycle facility on Road 68 from Chapel Hill Blvd to Burden Blvd	$1,100,000
BP6	Sacajawea Heritage Trail Levee	Road 52 to Road 72	Lower the levee and install pathways for pedestrians from Road 52 to Road 72	$4,731,000
BP7	James Street Improvements	Oregon Avenue to Frontier Loop	Improve safety and pedestrian features and consolidate accesses	$1,220,000
BP8	Pedestrian/Bicycle Access Sylvester Street Overpass	32nd Avenue to 28th Avenue	Pedestrian/Bicycle facility on Sylvester Street from 32nd Avenue to 28th Avenue	$1,845,000
BP9	Lewis Street Corridor Improvements	N/A	Tie Lewis Street Overpass into other downtown improvements for safety and Pedestrian/Bicycle accessibility	$1,625,000
BP10	FCID Canal Pedestrian/ Bicycle Pathway Study	N/A	FCID Canal Pedestrian/Bicycle Pathway Study	$870,000
BP11	Court Street Road Reconfiguration	Road 40 to Road 68	Reconfigure Court Street to one lane in each direction and a center turn lane; stripe bike lanes in both directions	$270,000
BP12	Sylvester Street Road Reconfiguration	5th Avenue to Road 54	Reconfigure Sylvester Street to one lane in each direction and a center turn lane; stripe bike lanes in both directions	$1,630,000
BP13	20th Ave Road Reconfiguration	A Street to Argent Road	Reconfigure 20th Avenue to one lane in each direction and a center turn lane; install buffered bikes lanes in both directions. Additional improvements (e.g. right turn lanes) may be provided at intersections	$1,990,000
BP14	Court Street Sidewalk Infill	Road 40 to Road 68	Complete sidewalk infill as needed	$8,275,000
BP15	Sylvester Street Sidewalk Infill	5th Avenue to Road 54	Complete sidewalk infill as needed	$9,795,000
BP16	20th Ave Sidewalk Infill	A Street to Argent Road	Complete sidewalk infill as needed	$3,180,000

Summary of Recommended Improvements

The previous lists of recommended multimodal system improvements represent an investment of about $665 million, as summarized in Table 8 below. Most of the costs are associated with Roadway Extensions (EXT) and Widenings (EXP), which together total $575 million. It is noted that these improvement costs will be shared among the City of Pasco, the local development community, and other local transportation agency partners, including WSDOT and Franklin County. The city will be updating its Traffic Impact Fee (TIF) program in 2022 to address these system investments. The TIF is a one-time fee which helps build system improvements. It is collected from local development applicants at the time of new construction.

TABLE 8. SYSTEM IMPROVEMENT PROJECTS SUMMARY

ID	CATEGORY	NUMBER OF PROJECTS	DESCRIPTION	ESTIMATED COST (MILLIONS)
INT	Intersections	31	Intersection expansions, multimodal improvements and upgraded traffic controls	$42.8 M
EXT	Roadway Extension Projects	16	New streets to extend or replace existing roadways and overpasses	$375.1 M
TS/TR	Traffic Studies and Transit Amenities	6	Future traffic and concept planning to refine the scope and cost of improvements	$0.9 M
EXP	Roadway Widening Projects	40	Expand existing roadway cross-sections to add motor vehicle through and turning lanes to support growth	$206.0 M
BP	Bicycle and Pedestrian Projects	16	Dedicated projects to enhance and connect the citywide system for walking and bicycling	$40.7 M
TOTAL		**108**		**$665.5 M**

CHAPTER 4

Transportation System Standards

THIS CHAPTER PROVIDES AN OVERVIEW OF THE TRANSPORTATION SYSTEM STANDARDS ADOPTED CONCURRENT WITH THE PASCO TRANSPORTATION SYSTEM MASTER PLAN. TOGETHER, THESE STANDARDS WILL HELP ENSURE FUTURE FACILITIES ARE DESIGNED APPROPRIATELY AND THAT ALL FACILITIES ARE MANAGED TO SERVE THEIR INTENDED PURPOSE.

The roadway functional classification system, special route designations, access spacing and mobility standards are also included in this chapter.

For a complete listing of the system standards including typical design standards for roadways, walkways and bikeways within the city, refer to Appendix D for Transportation System Standards memo.

In Pasco, all roadways are required to be multimodal or "complete streets", with each street serving the needs of the various travel modes. Streets in the city will not all be designed the same. Pasco classifies the street system into a hierarchy organized by functional classification and street type (representative of their places). These classifications ensure that the streets reflect the neighborhood through which they pass, consisting of a scale and design appropriate to the character of the abutting properties and land uses. The classifications also provide for and balance the needs of all travel modes including pedestrians, bicyclists, transit riders, motor vehicles and freight. Within these street classifications, context sensitive designs may result in alternative cross-sections.

Photo Credit: Tri-City Herald

Roadway Functional Classification

A city's street functional classification system is an important tool for managing the transportation system. It is based on a hierarchical system of roads in which streets of a higher classification, such as arterials, emphasize a higher level of mobility for through movements, while streets of a lower classification emphasize access to land uses.

Pasco currently has four functional classes:

1. **Principal Arterials** connect major activity centers as well as the interstate system. They will serve a variety of travel movements supporting longer/lengthier trips and are primarily intended to serve regional traffic movement.
2. **Minor Arterials** create direct connections through the city and can be found on the periphery of residential neighborhoods. They generally provide the primary connection to other Arterial or Collector Streets and access to larger developed areas and neighborhoods.
3. **Collectors** provide local traffic circulation throughout the city and serve to funnel traffic from the arterial street network to streets of the same or lower classification. They typically have minor access restrictions.
4. **Local Streets** provide local access and circulation for traffic, connect neighborhoods, and often function as through routes for pedestrians and bicyclists. Local Streets should maintain slow vehicle operating speeds while providing convenient access to multimodal travel.

The TSMP also introduced a new Neighborhood Collector functional classification to identify locations where local access needs should be balanced with enhanced pedestrian and bicycle amenities. These streets should maintain slow vehicle operating speeds to accommodate safe use by all modes and provide local neighborhood access.

Functional classification provides a helpful framework for managing the city's transportation system and supporting other standards summarized in the following sections, including connectivity, spacing, freight routes, cross-sections, and access management.

Table 9 lists the desired spacing of each facility type throughout Pasco to ensure a high level of connectivity. Figure 15 illustrates the desired spacing for the arterial and collector network. Deviations from these guidelines may be needed in locations where there are significant barriers, such as topography, rail lines, freeways, existing development, or the presence of natural areas.

TABLE 9. FACILITY SPACING GUIDELINES

FUNCTIONAL CLASSIFICATION	RECOMMENDED MAXIMUM SPACING[A]
PRINCIPAL ARTERIAL	1 to 2 miles
MINOR ARTERIAL	1 mile
COLLECTOR	½ mile
NEIGHBORHOOD COLLECTOR	¼ mile
LOCAL STREET	300–500 feet
BICYCLE AND PEDESTRIAN FACILITIES	300 feet

[A] *Recommended maximum spacing refers to distance between facilities with the same or higher functional classification. Deviations from the recommended maximum spacing are subject to approval by the City engineer.*

People walking and biking benefit the most from closely spaced facilities because their travel is most affected by variation in distance. By providing walking and biking facilities or accessways that are spaced no more than 300 feet apart, Pasco will support active transportation within and between its neighborhoods. These connections also support high quality access to transit.

The adopted reclassifications aim to create a consistent functional classification scheme and match a roadway's functional classification to their role in the transportation network. The existing road network was also reviewed to identify neighborhood collector routes. Neighborhood collectors were identified in locations where the functional classification map from the Pasco Comprehensive Plan previously identified two closely spaced, parallel collectors which serve similar land uses. Converting one of these routes to a neighborhood collector provides a classification that is more consistent with the actual use of the road and facilitates multimodal transportation. Neighborhood collectors were also designated on the local street system for routes which provide connections between several adjacent neighborhoods and the collector or arterial network.

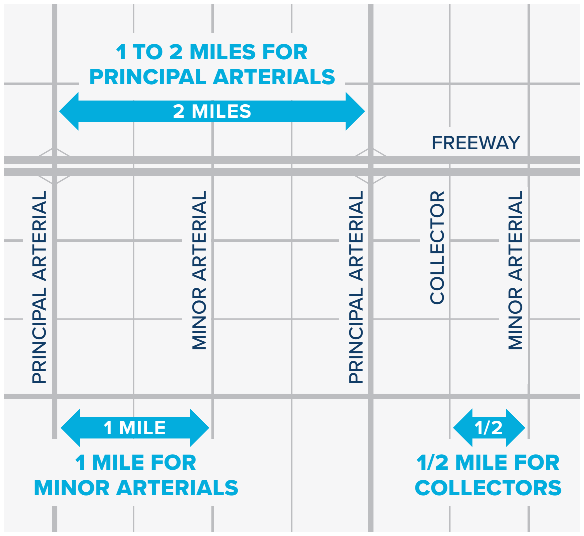


FIGURE 15. DESIRED FACILITY SPACING

The adopted reclassifications summarized in Figure 16 and Tables 10 and 11 will provide better system spacing and connectivity. It is important to note that many of the existing roadway cross-sections will not meet the standard cross-sections of their new functional classification. Cross-section improvements are not expected outside of redevelopment.

Note that Columbia River Road and Taylor Flats Road, north of Road 68, are classified as collectors, consistent with Franklin County's functional classification, even though Road 68 is classified as a principal arterial. These designations will be consistent for both roadways as they continue further north in rural Franklin County. Also, the easterly end of Burns Road, also called Powerline Road, is indicated with a possible easterly extension that crosses over the rail yard and eventually connects to US 395 north of Foster Wells Road. This is an illustrative concept of how east-west principal arterial level connections could be made north of I-182 to provide an alternative regional route. However, this connection is not included in the project list of the TSMP, and has not been assumed in the 2040 horizon year system.

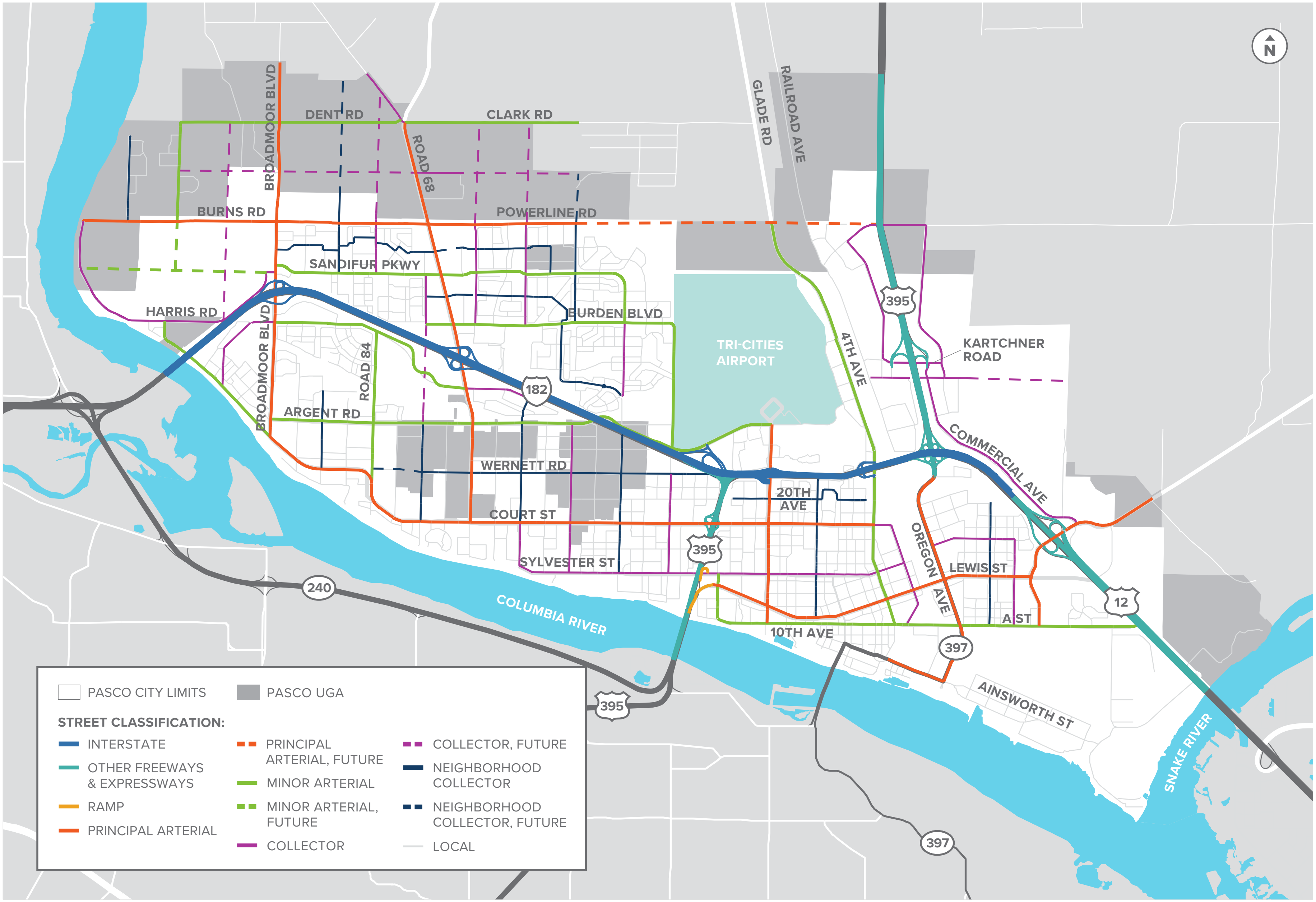


FIGURE 16. RECOMMENDED ROADWAY FUNCTIONAL CLASSIFICATION

TABLE 10. FUNCTIONAL CLASSIFICATION OF NEW ROADWAYS

ROADWAY	EXTENTS	RECOMMENDED FUNCTIONAL CLASSIFICATION
SANDIFUR PARKWAY EXTENSION	Broadmoor Boulevard to New North-South Collector	Principal Arterial
DENT ROAD EXTENSION	Burns Road to Harris Road	Minor Arterial
SANDIFUR PARKWAY EXTENSION	New North-South Collector to Shoreline Drive	Minor Arterial
SANDIFUR PARKWAY EXTENSION	New North-South Collector to Shoreline Drive	Collector
NEW NORTH-SOUTH COLLECTOR	Dent Road to Harris Road	Collector
ROAD 84 EXTENSION	Burns Road to Columbia River Road	Collector
CONVENTION DRIVE EXTENSION	Burns Road to Clark Road	Collector
ROAD 60 EXTENSION	Burns Road to Clark Road	Collector
DESERET DRIVE	Dent Road to Road 52	Collector
ROAD 76 EXTENSION	Burden Boulevard to Argent Road	Collector
ROAD 90 EXTENSION	Burns Road to UGA	Neighborhood Collector
THREE RIVERS DRIVE EXTENSION	Road 68 to Rio Grande Lane	Neighborhood Collector
WRIGLEY DRIVE EXTENSION	Clemente Lane to Road 68 Place	Neighborhood Collector
ROAD 52 EXTENSION	Burns Road Deseret Drive	Neighborhood Collector
WERNETT ROAD EXTENSION	Road 76 to Road 84	Neighborhood Collector

TABLE 11. ROADWAY FUNCTIONAL CLASSIFICATION CHANGES

EXISTING FUNCTIONAL CLASSIFICATION	ROADWAY	EXTENTS	RECOMMENDED FUNCTIONAL CLASSIFICATION
MINOR ARTERIAL	Broadmoor Boulevard	Dent Road to UGA	Principal Arterial
MINOR ARTERIAL	20th Avenue	Lewis Street to A Street	Principal Arterial
PRINCIPAL ARTERIAL	10th Avenue	Ainsworth Street to A street	Minor Arterial
PRINCIPAL ARTERIAL	4th Avenue	A Street to I-182 Westbound Ramp Terminal	Minor Arterial
COLLECTOR	Court Street	Broadmoor Boulevard to Harris Road	Minor Arterial
COLLECTOR	Harris Road	Court Street to Dent Road Extension	Minor Arterial
COLLECTOR	Dent Road	Burns Road to Road 68	Minor Arterial
COLLECTOR	Clark Road	Road 68 to Road 52	Minor Arterial
COLLECTOR	Chapel Hill Boulevard	Road 82 to Road 68	Minor Arterial
COLLECTOR	A Street	20th Avenue to 28th Avenue	Minor Arterial
COLLECTOR	28th Avenue	A Street to Sylvester street	Minor Arterial
MINOR ARTERIAL	Chapel Hill Boulevard	Crescent Road to Broadmoor Boulevard	Collector
MINOR ARTERIAL	Road 60	Court Street to Sylvester Street	Collector
MINOR ARTERIAL	Sylvester Street	Road 60 to 4th Avenue	Collector
MINOR ARTERIAL	Court Street	4th Avenue to 1st Avenue	Collector
MINOR ARTERIAL	1st Avenue	Court Street to A Street	Collector
LOCAL	Broadway Street	Wehe Avenue to Cedar Avenue	Collector
LOCAL	Cedar Avenue	Broadway Street to Lewis Street	Collector
LOCAL	Commercial Avenue	Kartchner Street to Hillsboro Road	Collector
MINOR ARTERIAL	Road 90	Sandifur Parkway to Burns Road	Neighborhood Collector
COLLECTOR	Wernett Road	Road 36 To Road 76	Neighborhood Collector
COLLECTOR	14th Avenue	Lewis Street to Court Street	Neighborhood Collector
COLLECTOR	Saratoga Lane	Chapel Hill boulevard to Argent Road	Neighborhood Collector
COLLECTOR	Road 44	Argent Road to Madison Avenue	Neighborhood Collector
COLLECTOR	Madison Avenue	Road 44 to Burden Boulevard	Neighborhood Collector

EXISTING FUNCTIONAL CLASSIFICATION	ROADWAY	EXTENTS	RECOMMENDED FUNCTIONAL CLASSIFICATION
COLLECTOR	Road 52	Burden Boulevard to Burns Road	Neighborhood Collector
COLLECTOR	Wrigley Drive	Road 76 to Clemente Lane	Neighborhood Collector
LOCAL	Kohler Road	Dent Road to Hillcrest Drive	Neighborhood Collector
LOCAL	Road 92	Court Street to Maple Drive	Neighborhood Collector
LOCAL	Road 76	Argent Road to Court Street	Neighborhood Collector
LOCAL	Road 60	Argent Road to Court Street	Neighborhood Collector
LOCAL	Road 48	Argent Road to Sylvester Street	Neighborhood Collector
LOCAL	Wernett Road	Road 36 to Road 30	Neighborhood Collector
LOCAL	14th Avenue	Court Street to Lincoln Drive	Neighborhood Collector
LOCAL	Pearl Street	24th Avenue to 13th Avenue & 10th Avenue to 5th Avenue	Neighborhood Collector
LOCAL	13th Avenue	Pearl Street to Riverview Drive	Neighborhood Collector
LOCAL	Riverview Drive	13th Avenue to 12th Avenue	Neighborhood Collector
LOCAL	10th Avenue	12th Avenue to Pearl Street	Neighborhood Collector
LOCAL	Elm Avenue	A Street to Shepperd Street	Neighborhood Collector
LOCAL	Wrigley Drive	Road 68 Place to Roosevelt Drive	Neighborhood Collector
LOCAL	Roosevelt Drive	Wrigley Drive to Madison Avenue	Neighborhood Collector
LOCAL	Madison Avenue	Roosevelt Drive to Burden Boulevard	Neighborhood Collector
LOCAL	Vincenzo Drive	Broadmoor Boulevard to Majestia Lane	Neighborhood Collector
LOCAL	Majestia Lane	Vincenzo Drive to Road 90	Neighborhood Collector
LOCAL	Road 90	Sandifur Parkway to Burns Road	Neighborhood Collector
LOCAL	Wilshire Drive	Road 90 to Westmoreland Lane	Neighborhood Collector
LOCAL	Westmoreland Lane	Wilshire Drive to Overland Court	Neighborhood Collector
LOCAL	Overland Court	Westmoreland Lane to Westminster Lane	Neighborhood Collector
LOCAL	Westminster Lane	Overland Court to Stutz Drive	Neighborhood Collector
LOCAL	Stutz Drive	Westminster Lane to Road 84	Neighborhood Collector

EXISTING FUNCTIONAL CLASSIFICATION	ROADWAY	EXTENTS	RECOMMENDED FUNCTIONAL CLASSIFICATION
LOCAL	Hudson Drive	Road 84 to Okanogan Lane	Neighborhood Collector
LOCAL	Okanogan Lane	Hudson Drive to Chehalis Drive	Neighborhood Collector
LOCAL	Chehalis Drive	Okanogan Lane to Three Rivers Drive	Neighborhood Collector
LOCAL	Three Rivers Drive	Chehalis Drive to Road 68 & Rio Grande Lane to Road 56	Neighborhood Collector
LOCAL	Road 56	Three Rivers Drive to Overton Road	Neighborhood Collector
LOCAL	Overton Road	Road 56 to Road 52	Neighborhood Collector

Freight Network

Freight routes play a vital role in the economical movement of raw materials and finished products, while maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. The Washington State Freight and Goods Transportation System (FGTS) tonnage classification system identifies different categories of freight corridors based on annual freight tonnage moved (refer to Figure 17). The freight corridors in Pasco are as follows:

- I-182
- US 12
- US 395
- WA 397
- Broadmoor Boulevard (I-182 to Harris Road)
- Road 68 (I-182 to Clark Road)
- 4th Avenue (I-182 to Glade Road)
- Ainsworth Avenue/Dock Street (WA 397 to Sacajawea Park Road)
- Harris Road (Broadmoor Blvd to Shoreline Road)
- Shoreline Road (Harris Road to Burns Road)
- Burns Road (Shoreline Road to Dent Road)
- Dent Road (Burns Road to Road 68)
- Clark Road (Road 68 to Glad Road)
- Taylor Flats Road (North of Road 68)
- Columbia River Road (North of Road 68)
- Glade Road (North of 4th Avenue)
- Railroad Avenue (North of Hillsboro Street)
- Foster Wells Road (East of US 395)
- Kartchner Street (Railroad Avenue to Commercial Avenue)
- Hillsboro Street (Railroad Avenue to Travel Plaza Way)
- Lewis Street (US 395 to 20th Avenue)
- 20th Avenue (Lewis Street to A Street)
- A Street (20th Avenue to US 12)
- Pasco Kahlotus Road (East of US 12)
- Lewis Street (WA 397 to US 12)
- 4th Avenue (Ainsworth Street to A Street)

As part of the revitalization of the downtown as envisioned in the current Master Planning, the existing Lewis Street freight corridor should be modified to divert freight traffic onto parallel routes along Ainsworth Street and A Street. Other critical freight corridors that are not currently included in the Washington FGTS, as shown in Figure 17, include Sacajawea Park Road from Ainsworth Avenue to US 12 and Commercial Avenue from Lewis Street to Kartchner Street. Including these routes in a future update to the Washington FGTS will recognize their significance to Pasco's freight system and connect key industrial areas to existing FGTS corridors.

The city's freight transportation system also includes a rail yard, port, and the Tri-Cities Airport. Intermodal connections between these freight hubs, Pasco's industrial areas, and the Tri-Cities region are necessary to support the movement of goods. Primary routes serving these existing freight transportation needs are identified through the Washington FGTS although additional development in these areas could generate new freight traffic demands.

Pasco will benefit from ensuring that its freight routes are designed to accommodate the needs of its industrial and commercial areas, while protecting its residential neighborhoods from freight traffic. Having designated freight routes will help the city better coordinate and improve its efforts regarding both freight and non-freight transportation system users, including the following:

- **Roadway and Intersection Improvements** can be designed for freight vehicles with adjustments for turn radii, sight distance, lane width and turn pocket lengths.
- **Bicycle and Pedestrian Improvements**—such as protected or separated bike facilities, enhanced pedestrian crossings, and other safety improvements—can be identified to reduce freight impacts to other users, particularly along bikeways and walkways.
- **Roadway Durability** can be increased by using concrete instead of asphalt for the pavement surface.
- **Railroad Connections** can be coordinated to support businesses that ship goods by rail, particularly in areas where railroad sidings can be provided.
- **Coordination with Businesses and Adjacent Jurisdictions** can ensure that local and regional freight traffic uses Pasco's freight routes to travel within the city.

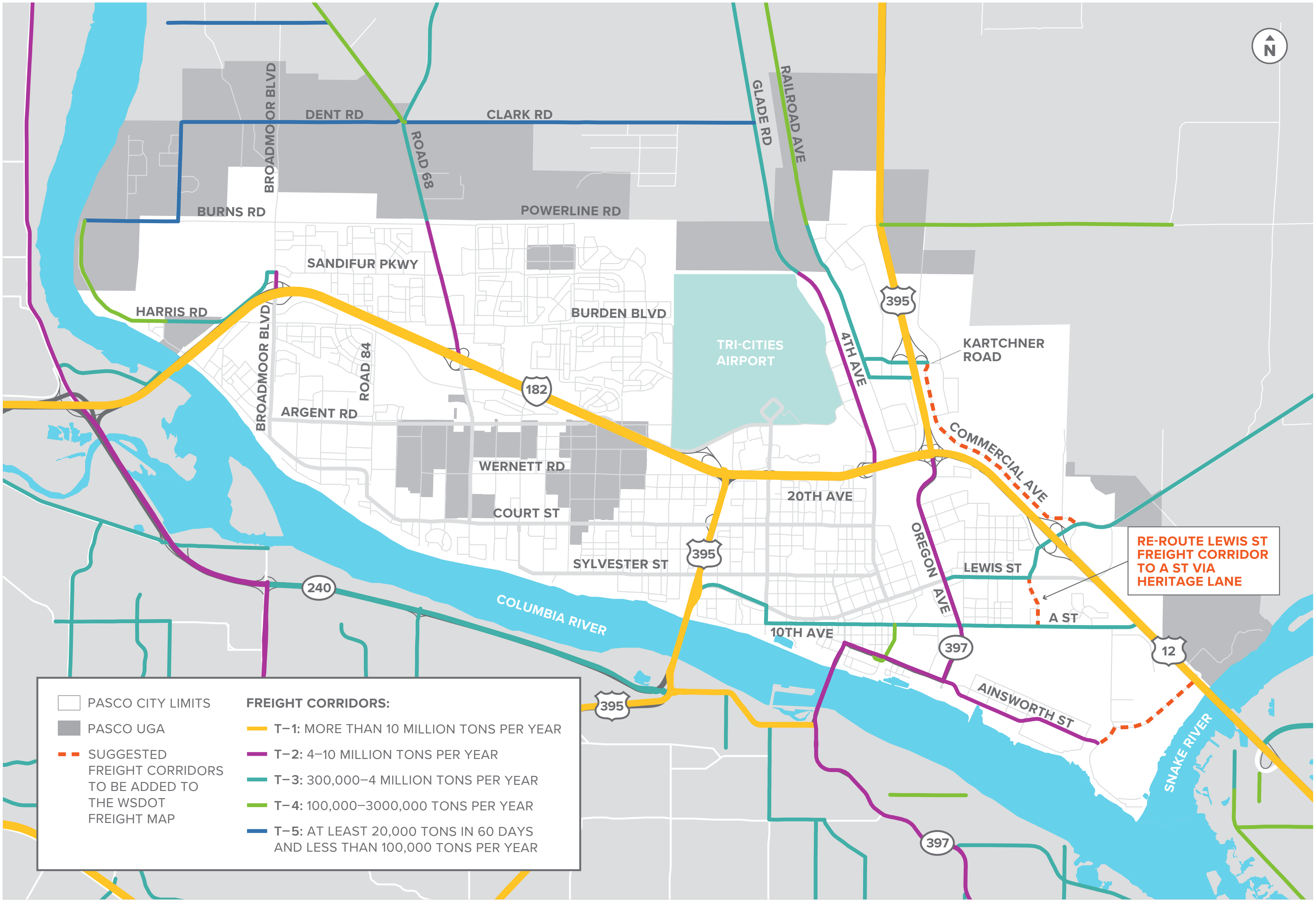


FIGURE 17. FREIGHT SYSTEM

Neighborhood Traffic Management Tools

Neighborhood Traffic Management (NTM) involves strategies to slow traffic, and potentially reduce volumes, creating a more inviting environment for pedestrians and bicyclists. NTM strategies focus on neighborhood livability on local streets, though a few can apply to collectors and arterials, such as raised median islands. Mitigation measures balance the need to manage vehicle speeds and volumes with the need to maintain mobility, circulation, and function for service providers, such as emergency responders. Examples of tools are shown in Figure 18.

Table 12 lists common NTM applications. Any NTM project should include coordination with emergency response staff to ensure that public safety is not compromised. NTM strategies implemented on a state facility would require coordination with WSDOT regarding freight mobility considerations.

FIGURE 18. SUMMARY OF NEIGHBORHOOD TRAFFIC MANAGEMENT STRATEGIES

Photo Sources: Chicanes, Chokers, Median Islands, and Speed Hump > www.pedbikeimages.org/Dan Burden; Curb Extensions and Traffic Circles > www.pedbikeimages.org/Carl Sundstrom; Diverters > www.pedbikeimages.org/Adam Fukushima; Raised Crosswalks > www.pedbikeimages.org/Tom Harned; Speed Cushions > NACTO Urban Street Design Guide.

TABLE 12. APPLICATION OF NEIGHBORHOOD TRAFFIC MANAGEMENT STRATEGIES

NEIGHBORHOOD TRAFFIC MANAGEMENT APPLICATION	USE BY FUNCTIONAL CLASSIFICATION			IMPACT	
	ARTERIALS	COLLECTORS	LOCAL STREETS	SPEED REDUCTION	TRAFFIC DIVERSION
CHICANES			●	●	●
CHOKERS			●	●	●
CURB EXTENSIONS	●	●	●	●	
DIVERTERS (WITH EMERGENCY VEHICLE PASS-THROUGH)		●	●		●
MEDIAN ISLANDS	●	●	●	●	
RAISED CROSSWALKS			●	●	●
SPEED CUSHIONS (WITH EMERGENCY VEHICLE PASS-THROUGH)			●	●	●
SPEED HUMP			●	●	●
TRAFFIC CIRCLES			●	●	●

The City of Pasco does not currently have a formal neighborhood traffic management program. Suggested elements of a new program to be developed and implemented can include:

- Provide a formalized process for citizens who are concerned about the traffic or safety on their neighborhood street. The process could include filing a citizen request with petition signatures and a preliminary evaluation. If the evaluation finds cause for concern, a neighborhood meeting would be held and formal data would be collected and evaluated. If a problem were found to exist, solutions would be identified and the process continued with neighborhood meetings, feedback from service and maintenance providers, cost evaluation, and traffic calming device implementation. Six months after implementation the device would be evaluated for effectiveness.
- For new development proposals, in addition to assessing impacts to the entire transportation network, traffic studies for new developments must also assess impacts to residential streets. A recommended threshold to determine if this additional analysis is needed is if the proposed project increases through traffic on residential streets by 40 or more vehicles during the evening peak hour or 200 vehicles per day. Once the analysis is performed, the threshold used to determine if residential streets are impacted would be if their daily traffic volume exceeds 1,800 vehicles.

NEIGHBORHOOD TRAFFIC MANAGEMENT STRATEGIES IMPROVE NEIGHBORHOOD LIVABILITY ON LOCAL STREETS, CREATING A MORE INVITING ENVIRONMENT FOR PEDESTRIANS AND BICYCLISTS.

Access Management & Street Connectivity Standards

Access management provides safe and efficient access to the transportation system for all users. Historically, the City of Pasco only managed access through restrictions on the placement of driveways. New residential driveways must be located 25 feet from an existing intersection, while new commercial driveways must be placed in coordination with the Public Works Director.[4] Expanded access management spacing standards which account for the different roadway functional classifications are adopted for the City of Pasco as part of the TSMP to better manage driveway construction. These standards are summarized in Table 13.

In addition to these access spacing standards, it is recommended that the city consider guidelines to enhance the system connectivity within the new neighborhoods to better balance access for all system users. As noted in previous sections of the TSMP, the public feedback during the open house events highlighted the challenges of navigating the city outside of a motor vehicle. Walking and biking and access to transit are significantly benefited by constructing neighborhoods with greater connectivity through better street and walkway spacing, and more direct routes to key destinations, such as schools, parks and transit stops. Today, the city does not provide this type of guidance, and new neighborhood circulation plans are left to the development applicants to decide.

4 *City of Pasco. Pasco Municipal Code Section 12.04.100 Driveway Standards. https://pasco.municipal.codes/PMC/12.04.090*

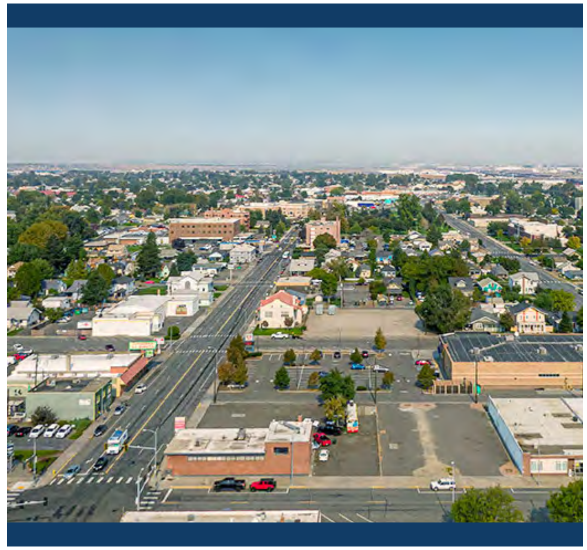


Photo Credit: Group Health Foundation

Photo Credit: Jacob Gonzalez

TABLE 13. ACCESS MANAGEMENT SPACING STANDARDS

SPACING GUIDELINES[A, B]	PRINCIPAL ARTERIALS	MINOR ARTERIALS	COLLECTORS	NEIGHBORHOOD COLLECTORS	LOCAL STREETS
MINIMUM DRIVEWAY SPACING (DRIVEWAY TO DRIVEWAY)[B]	300 feet	250 feet	150 feet	75 feet	N/A
MINIMUM FULL-ACCESS DRIVEWAY SPACING (SETBACK FROM INTERSECTION)	300 feet[C]	250 feet	150 feet	75 feet	25 feet
MINIMUM RIGHT-IN/ RIGHT-OUT DRIVEWAY SPACING (SETBACK FROM INTERSECTION)	150 feet[C]	125 feet	75 feet	50 feet	25 feet

[A] *All distances measured from the edge of adjacent approaches.*

[B] *A property must construct access to a lower classified roadway, where possible.*

[C] *WSDOT requires 1,320 between an interchange and the closest driveway. (Source: State of Washington. Washington Administrative Code Section 468-52-040 Access Control Classification System and Standards. https://app.leg.wa.gov/wac/default.aspx?cite=468-52-040)*

The public engagement process of the TSMP revealed a strong concern about the lack of connectivity in new neighborhoods north of I-182. To address this, guidelines were developed to clarify the community's expectation for better circulation options in growth areas. It was recognized that it is important to balance the economic objectives of a land developer with the community values of its future residents. City standards help to assure that the shape of the resulting walking, biking and travel systems will provide a framework for new neighborhoods to thrive in the long-term, since it plays a fundamental role in defining the character of that community for generations to come.

Specifically, it is recommended to apply new guidelines for the maximum block length, block size, block perimeter and access spacing as summarized in Table 14. Under this new guidance for most zoning designations, block lengths shall not exceed 660 feet and the block perimeter shall not exceed 1,760 feet. Previously blocks could not exceed 1,320 feet for residential uses or 600 feet for commercial uses.[5] The recommended complete street connectivity standards plus guidelines are summarized below in Table 14. To enact these recommended street spacing and connectivity changes, the city must conduct a public hearing and the city council must adopt them to become a part of the municipal code.

5 *City of Pasco. Street Connectivity – Supplemental Memorandum for CA2019-013. September 17, 2020.*

TABLE 14. RECOMMENDED STREET CONNECTIVITY STANDARDS

SPACING GUIDELINES	PRINCIPAL ARTERIALS	MINOR ARTERIALS	COLLECTORS	NEIGHBORHOOD COLLECTORS	LOCAL STREETS
MAXIMUM BLOCK SIZE (PUBLIC STREET TO PUBLIC STREET)	660 feet	660 feet	660 feet	660 feet	660 feet
MINIMUM BLOCK SIZE (PUBLIC STREET TO PUBLIC STREET)	300 feet	250 feet	200 feet	150 feet	125 feet
MAXIMUM BLOCK PERIMETER	1,760 feet	1,760 feet	1,760 feet	1,760 feet	1,760 feet
MAXIMUM DISTANCE BETWEEN PEDESTRIAN/ BICYCLE ACCESSWAYS[A]	330 feet	330 feet	330 feet	330 feet	330 feet

[A] *Spacing is the maximum of public street to public street, public street to accessway, or accessway to accessway distance.*

Vehicle Mobility Targets

For the motor vehicle system, the city applies a list of performance targets to track how well the system works. These mobility targets are used in long-range planning and development review to identify deficiencies on the transportation network and can be used to identify needed improvements as growth occurs.

TWO COMMON METHODS USED TO GAUGE TRAFFIC OPERATIONS FOR MOTOR VEHICLES ARE:

VOLUME-TO-CAPACITY (V/C) RATIO

A v/c ratio is a decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used at a turn movement, approach leg, or intersection. The ratio is the peak hour traffic volume divided by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. A ratio approaching 1.00 indicates increased congestion and reduced performance.

LEVEL OF SERVICE (LOS)

LOS is a "report card" rating (A through F) based on the average delay experienced by vehicles at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay is excessive, and demand exceeds capacity, typically resulting in long queues and delays.

Mobility targets are adopted by the City of Pasco in their comprehensive plan. The City of Pasco uses a Level of Service (LOS) standard which evaluates the average delay at signalized and unsignalized intersections. This calculation is made by using a national methodology for assessing intersection performance, as published in the Highway Capacity Manual (HCM). The current mobility targets, which apply to the weekday peak hour, are summarized below in Table 15. The City requires a lower level of service for arterial and collector roadways where higher traffic leads to higher delays. The arterial and collector standards are consistent with the mobility targets applied by BFCG and WSDOT.

TABLE 15. EXISTING MOBILITY TARGETS FOR WEEKDAY PEAK HOUR PERIODS

FUNCTIONAL CLASSIFICATION	MOBILITY TARGET
LOCAL STREETS	Level of Service C
ARTERIALS AND COLLECTORS	Level of Service D
WSDOT FACILITIES	Level of Service D

Typically, these LOS targets are applied at individual intersections. It is recommended that these targets be modified to account for the type of traffic controls being applied at each intersection, since the impact of delay differs between signals, roundabouts and stop sign controlled locations. In addition, it is recommended that another metric be added, the Volume-to-Capacity (v/c) Ratio, which measures how close to capacity a location operates at a given time of day. Using both a LOS (delay-based) and v/c (congestion-based) standard which can be helpful in situations where one metric may not be enough, such as an all-way stop where one approach is over capacity, but overall intersection delay meets standards. Each of these metrics is readily calculated by applying the appropriate HCM methods. Table 16 summarizes recommended changes to Pasco's mobility targets. Also noted is the current target used for WSDOT intersections, which will remain at Level of Service D for all cases.

TABLE 16. RECOMMENDED MOBILITY TARGETS

TRAFFIC CONTROL TYPE	MOBILITY TARGETS	APPLICABLE ELEMENT
SIGNALIZED	Level of Service D and Volume-to-Capacity Ratio ≤0.90	Average for all vehicles using the intersection
ALL-WAY STOP OR ROUNDABOUTS	Level of Service D and Volume-to-Capacity Ratio ≤0.90	Worst Approach
TWO-WAY STOP[A]	Level of Service E and Volume-to-Capacity Ratio ≤0.95	Worst Major Approach/ Worst Minor Approach
WSDOT INTERSECTIONS	Level of Service D	Intersection or Worst Approach depending on control type

[A] Applies to approaches that serve more than 20 vehicles; there is no standard for approaches serving lower volumes.

Demand Management Policies

Pasco experiences peak congestion due to single-occupant trips during peak demand times. Transportation Demand Management (TDM) aims to remove single occupant motor vehicle trips from the roadway network during peak travel demand periods which could provide one avenue for reducing pressure on key facilities. Changing users' travel behavior and providing alternative choices will help accommodate the expected growth in travel demand identified for Pasco.

Generally, TDM focuses on reducing vehicle miles traveled for large employers by promoting active and shared modes of travel. Research has shown that a comprehensive set of complementary policies implemented over a large geographic area can affect the number of vehicle miles traveled to/from that area. For TDM measures to be effective, strategies should go beyond the low-cost, uncontroversial measures commonly used such as carpooling, transportation coordinators/associations, and priority parking spaces.

Effective TDM measures include parking strategies (limiting or increasing supply in strategic locations), improved services for alternative modes of travel, and market-based incentives to encourage travel behavior changes. TDM can also include a variety of actions that are tailored to the specific needs of an area.

EFFECTIVE TDM STRATEGIES INCLUDE:

- Develop standards and policies that support alternative vehicle types and travel methods, including a network of electric vehicle charging stations, or other facilities that support Pasco's Green House Gas Emissions Reductions Policy Resolution 3853.
- Encouraging/supporting rideshare/vanpool to major employers in Benton or Franklin County and Kennewick or Richland (e.g. Hanford Nuclear Site) for employees living in Pasco.
- Establishing site development standards that require pedestrian and bicycle access through sites and connections to adjacent sites and transportation facilities, to the extent the development impacts existing access.
- Improving amenities and access for transit stops. Actions could include instituting site design requirements allowing redevelopment of parking areas for transit amenities; requiring safe and direct pedestrian connections to transit; and permitting transit-supportive uses outright in commercial and institutional zones.
- Improving street connectivity to support direct connections between residential areas and activity centers.
- Investing in pedestrian/bicycle facilities.

Opportunities to expand TDM and other measures in Pasco include developing requirements for long-term bicycle parking for places of employment above a certain size, park-and-ride facilities, major transit stops, and multi-family residential developments. Other land uses, especially activity generators, should be required to provide short-term bike parking and are encouraged to implement the long-term options.

Long-term bicycle parking options include:

- Individual lockers for one or two bicycles
- Racks in an enclosed, lockable room
- Racks in an area that is monitored by security cameras or guards (within 100 feet)
- Racks or lockers in an area always visible to employees

CHAPTER 5

Implementation and On-Going Strategies

Photo Credit: Jacob Gonzalez

THE FOREGOING CHAPTERS PRESENTED THE GOALS, POLICIES, PLANS AND PROGRAMS THAT DEFINE THE KEY ELEMENTS OF PASCO'S TRANSPORTATION SYSTEM MASTER PLAN. THE TSMP DESCRIBES THE CITY'S VISION FOR HOW IT WILL ADDRESS MANY TRANSPORTATION SYSTEM WEAKNESSES AND GAPS IDENTIFIED TODAY, AND HOW IT PLANS TO MAKE IMPROVEMENTS TO SUPPORT COMMUNITY GROWTH TO 2040.

It is important to recognize that because this is the first of its kind transportation planning process for the City of Pasco, additional work will be required to carry this strategic vision into practice. This chapter identifies the recommended implementation actions.

Furthermore, it is recognized that the primary purpose of the TSMP is to guide how the city will make strategic transportation investments in the years to come. It is acknowledged that there are a host of on-going community issues related to general transportation needs that may not be resolved by this TSMP process and outcomes, and further studies may be required to help to inform how best to respond to each of those situations. Several of the most prominent on-going transportation issues that face Pasco are acknowledged in the final section of this chapter along with a summary of their status, applicable on-going strategies, and the expected path forward.

Steps to Support Plan Implementation

To effectively implement the TSMP citywide will require a series of updates and amendments to existing city policies, codes and regulations related to land development, transportation management and capital project funding. The major actions to be taken fall into these categories:

- Secure Necessary Funding for Transportation Improvements
- Implement Neighborhood Transportation Management Tools
- Update Vehicle Mobility Standards
- Update Engineering Design Standards for Roadways, Bikeways and Walkways
- Amend the Municipal Development Code to incorporate TSMP changes regarding Streets and Sidewalks, Subdivision Regulations and Zoning

The specific recommendations for each action are described in the following sections.

SECURE NECESSARY LOCAL FUNDING PROGRAMS

Providing adequate city funding for capital investments and on-going maintenance of transportation systems and services is a major challenge throughout the State of Washington. The City's current funding programs are expected to allocate about $20 million annually ($360 million over 18 years) for transportation system improvements through 2040, not including other allocations from gas tax revenues that support maintenance operations. The current Traffic Impact Fee program is expected to collect about $12 million. However, when compared to the full list of capital improvement projects identified through this TSMP, which totals $665 million, additional funding options are needed to bridge the $293 million gap.

If the city decides to supplement the transportation funding beyond what is currently available to advance more projects, it is recommended to further consider one of the above options. This could include more general funding allocated to the transportation improvement program, and/or increasing the current Traffic Impact Fee (TIF). A separate study was conducted to recommend update options for the city's Traffic Impact Fee (FCS Group, October 2021). If the full amount was authorized, the new TIF would generate about $350 million in additional fees, which would fully bridge the funding gap shown in Table 17.

It will be vital for the City Council to consider the proposed TIF rate and recommend a fee that ensures new development accommodates the necessary transportation infrastructure without burdening existing residents and businesses. Without significant additional funding resources, the great majority of projects identified in the TSMP will not be able to be constructed within the timeframe of the TSMP.

In addition, the city should consider developing a proportionate share methodology and funding strategy for specific transportation improvements that are not funded through the TIF or other existing programs.

ACTION: PURSUE AND ENACT SUPPLEMENTAL LOCAL TRANSPORTATION FUNDING OPTIONS TO BRIDGE FORECASTED FUNDING GAP.

TABLE 17. FILLING THE TRANSPORTATION FUNDING GAP

DESCRIPTION	TOTAL FUNDING THOUGH 2040
TRANSPORTATION CITYWIDE INVESTMENT RECOMMENDED IN THE PASCO TSMP	$665 M
CURRENT CITY IMPROVEMENT PROGRAM	– $360 M
CURRENT CITY TRAFFIC IMPACT FEE PROGRAM	– $12 M
TRANSPORTATION FUNDING SHORTFALL	**$293 M**

IMPLEMENT NEIGHBORHOOD TRAFFIC MANAGEMENT TOOLS

The Transportation System Management Plan identifies a new classification of city streets that are the best candidates for applying neighborhood traffic management (NTM) strategies. The primary purpose of this new classification is to address community concerns about autos speeding through neighborhoods or diverting away from state highways while they are under severe congestion. These streets are referred to as Neighborhood Collector routes, and they are shown in Figure 15, and listed in the supporting technical memorandum . Potential management strategies include traffic humps, traffic circles and raised crosswalks, which are illustrated in the memorandum.

The challenge with a NTM program is to identify a clear and objective process for collecting community inputs, assessing the prevailing concerns, and evaluating which, if any, NTM solution is appropriate to be installed. This will require developing guidelines about which NTM strategies are best for Pasco, and where and how they are to be applied. In addition, many cities balance the technical review process with a consensus opinion of the affected neighbors to help ensure community satisfaction with the NTM decision.

The City of Pasco does not currently have a formal neighborhood traffic management program. If such a program were desired to help respond to future NTM issues, suggested elements include:

- Provide a formalized process for citizens who are concerned about the traffic on their neighborhood street. The process could include filing a citizen request with petition signatures and a preliminary evaluation. If the evaluation finds cause for concern, a neighborhood meeting would be held, and formal data would be collected and evaluated. If a problem were found to exist, solutions would be identified and the process continued with neighborhood meetings, feedback from service and maintenance providers, cost evaluation, and traffic calming device implementation. Six months after implementation the device would be evaluated for effectiveness.
- For land use proposals, in addition to assessing impacts to the entire transportation network, traffic studies for new developments must also assess impacts to residential streets. A recommended threshold to determine if this additional analysis is needed is if the proposed project increases through traffic on residential streets by 40 or more vehicles during the evening peak hour or 200 vehicles per day. Once the analysis is performed, the threshold used to determine if residential streets are impacted would be if their daily traffic volume exceeds 1,800 vehicles.

ACTION: IT IS RECOMMENDED THAT CITY DEVELOP AND IMPLEMENT A NTM PROGRAM THAT FORMALIZES THESE PROCESSES.

Photo Credit: Ben Franklin Transit

UPDATE VEHICLE MOBILITY STANDARDS

Mobility standards for streets and intersections in Pasco provide a metric for assessing the impacts of new development on the existing transportation system and for identifying where capacity improvements may be needed. They are the basis for requiring improvements needed to sustain the transportation system as growth and development occur. Two common methods currently used in Oregon to gauge traffic operations for motor vehicles are volume-to-capacity (v/c) ratios and level of service (LOS). For State facilities, mobility targets are v/c ratio based.

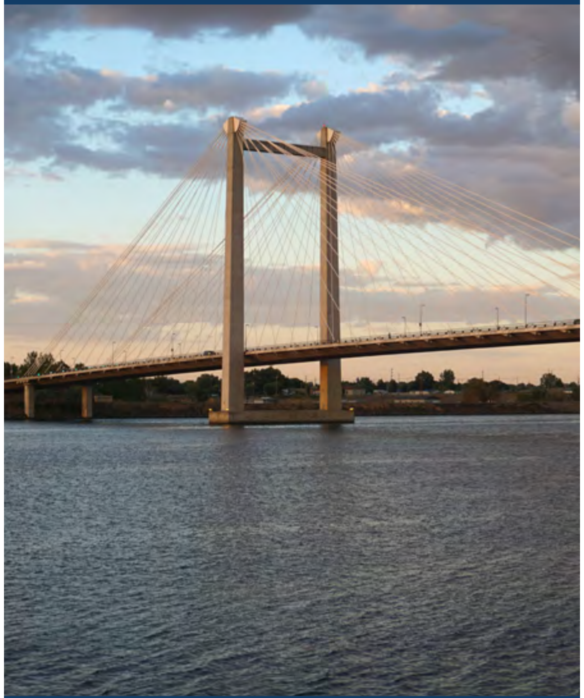
The City of Pasco does not have adopted mobility standards for motor vehicles. It is recommended that the city consider adopting mobility standards to include both a v/c ratio and LOS standard. Having both a LOS (delay-based) and v/c (congestion-based) standard can be helpful in situations where one metric may not be enough, such as an all-way stop where one approach is over capacity, but the overall intersection delay meets standards. The City of Pasco should also introduce mobility standards that depend on the intersection control which can better capture acceptable levels of performance across different intersection control types. The recommended mobility standards shown in Table 18 should be incorporated into the Traffic Impact Analysis guidelines and applied for the next update to the comprehensive plan.

TABLE 18. RECOMMENDED VEHICLE MOBILITY STANDARDS FOR LOCAL STREETS

TRAFFIC CONTROL TYPE	MOBILITY TARGETS	REPORTING MEASURE
SIGNALIZED	Level of Service D and Volume-to-Capacity Ratio ≤0.90	Intersection
ALL-WAY STOP OR ROUNDABOUTS	Level of Service D and Volume-to-Capacity Ratio ≤0.90	Worst Approach
TWO-WAY STOP[A]	Level of Service E and Volume-to-Capacity Ratio ≤0.95	Worst Major Approach/ Worst Minor Approach
WSDOT INTERSECTIONS	Level of Service D	Intersection or Worst Approach depending on control type

[A] *Applies to approaches that serve more than 20 vehicles per hour; below that amount, there is no standard.*

ACTION: AMEND CITY DEVELOPMENT CODE TO INTRODUCE VEHICLE MOBILITY STANDARDS ON CITY STREETS CONSISTENT WITH THE TSMP.



UPDATE ENGINEERING ROADWAY STANDARDS

The City Engineer maintains the recommended design standards for all city-maintained facilities, which include roadway, bikeway, walkway and trail cross-sections. The configurations of several elements of these facilities were modified during the TSMP process, primarily to provide better quality bicycling and walking facilities on lower class roadways. The specific facility cross-sections and new right-of-way requirements should be incorporated into the city's design standards to guide construction of future street improvement projects.

ACTION: AMEND THE CITY DESIGN STANDARDS TO INCLUDE THE MINIMUM STANDARDS FOR ARTERIAL, COLLECTOR, AND LOCAL ACCESS ROADWAYS AS DESCRIBED IN THE TSMP.

MUNICIPAL CODE REVISIONS AND AMENDMENTS

A variety of changes and amendments were recommended that influence the city's municipal code as it relates to streets and sidewalks, subdivisions regulations and zoning. The city council should take action to modify the appropriate sections of the code to address these amendments, as stipulated in a memorandum (Angelo Planning Group, 20 Aug 2021) and summarized below:

1. Title 12 Streets and Sidewalks:

a. Increase minimum sidewalk width in residential and mix-used areas

b. Update driveway design standards to be consistent with current best practices

c. Implement Complete Street guidelines and clear and objective minimum standards

d. Add a fee-in-lieu provision for roadway improvements

2. Title 21 Pasco Urban Area Subdivision Regulations:

a. Require a future street plan with proposed subdivision to demonstrate how it will accommodate future street extensions

b. Amend arterial minimum standards consistent with the TSMP

c. Amend collector minimum standards consistent with the TSMP

d. Amend local access roadway minimum standards consistent with the TSMP

e. Provide guidance for constrained roadway designs to enable connectivity in challenging topographical or environmental situations.

f. Require pedestrian ways in areas of exceptionally long blocks or for access to recreational facilities or schools.

3. Title 25 Zoning:

a. Require safe connections on all non-single-family residential development sites to: main building entries, adjacent streets and sidewalks, transit stops, and adjacent uses such as schools and parks

b. Reduce minimum off-street parking standards and consider maximums

c. Establish bike parking standards

d. Codify recommended TSMP access management spacing standards to better manage driveway construction

e. Require safe and direct pedestrian connections to existing and planning transit stops.

f. Permit transit supportive uses outright in commercial and institutional zones.

On-Going Plan Review and Updates

This is the first Transportation System Master Plan that has been prepared by the City of Pasco. As noted earlier in this section, to fully realize the vision of this TSMP to be “a safe and balanced multimodal transportation system which equitability serves pedestrians, bicyclists, transit, freight and drivers” will require several regulatory and administrative changes to be made by the city. Once these changes have been implemented, the shape and amenities of new transportation projects will more readily support these objectives.

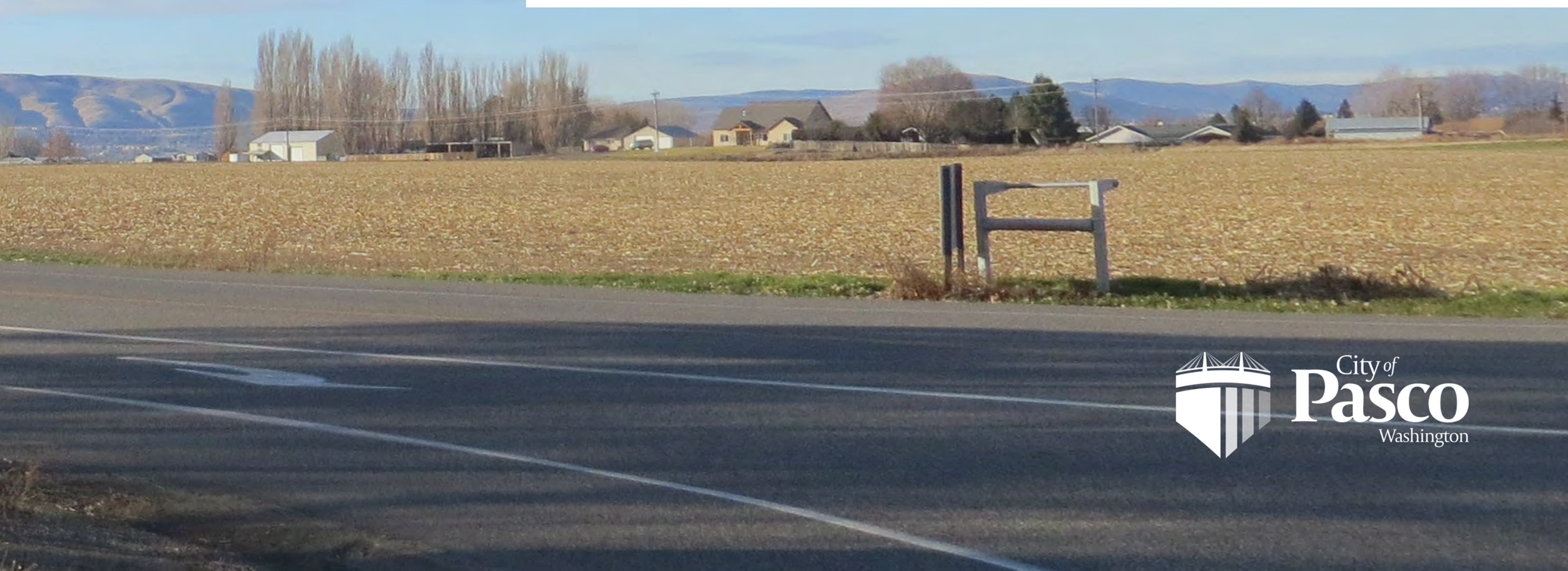
However, as with any long-range planning process, the TSMP should be reviewed and updated periodically to address any unanticipated major changes that could significantly influence the land development patterns or the local transportation system. Examples of possible issues that trigger a review might include new state and federal transportation regulations and funding priorities, or significant changes to the city or regional growth forecasts that are associated with comprehensive plan updates, or major urban growth area adjustments.

Aside from these types of triggering events, it is recommended that the TSMP be reviewed every five to 10 years to update the growth and funding assumptions that were made in this plan. The update process should align with the requirements stipulated in the Growth Management Act for transportation elements (RCW 36.70A.070, subsection 6).

CITY OF PASCO

Transportation System Master Plan **Appendices**

JUNE 2022

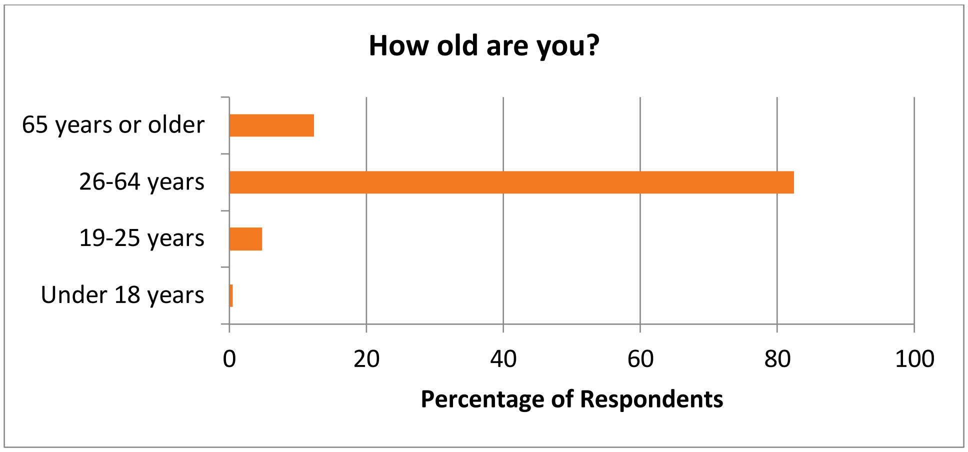


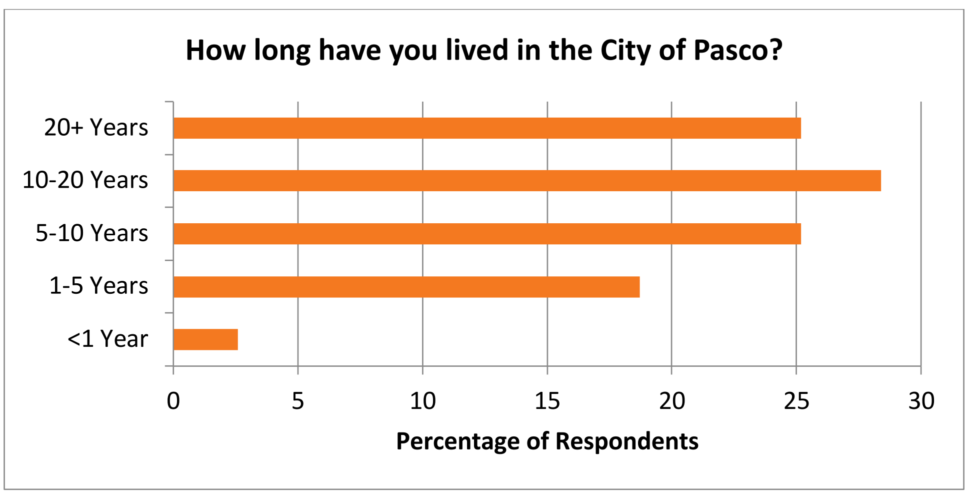
Appendix A

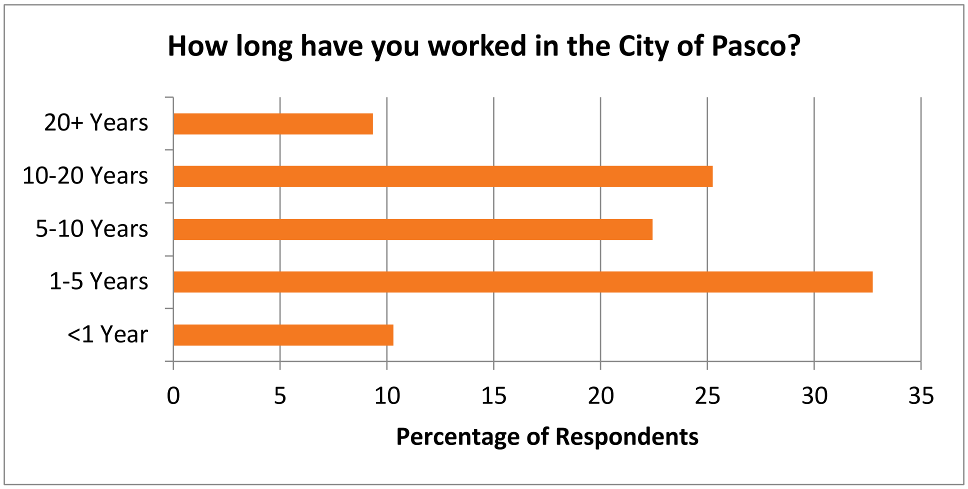
These are the results of the online survey in June and July of 2020. The Pasco community provided a total of 225 responses and we summarized the information below.

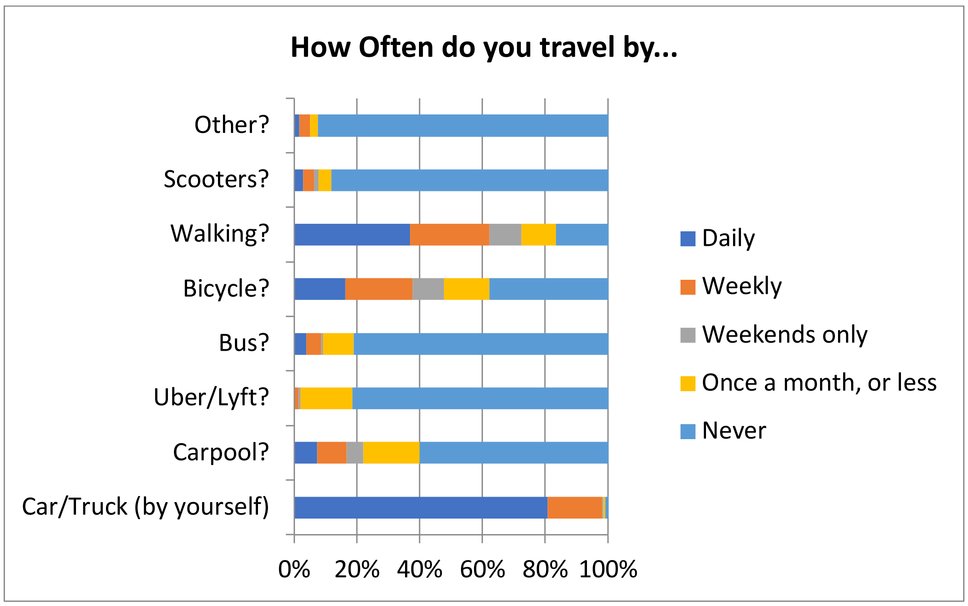
THE PASCO COMMUNITY

- 74% of respondents live in Pasco
- 54% of respondents work in Pasco
- 10% of respondents attend school in Pasco



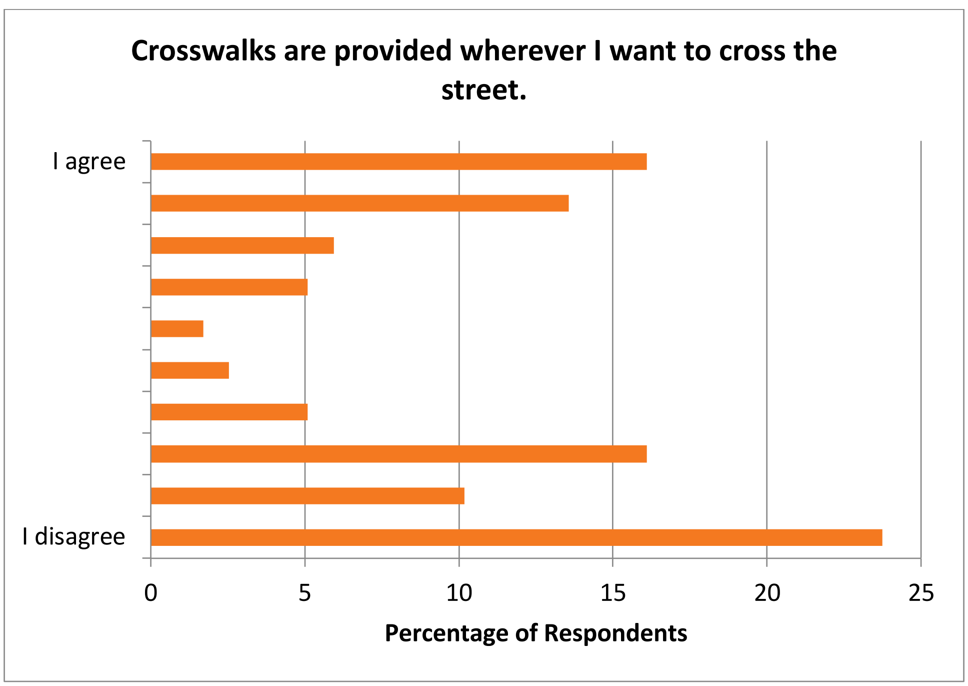


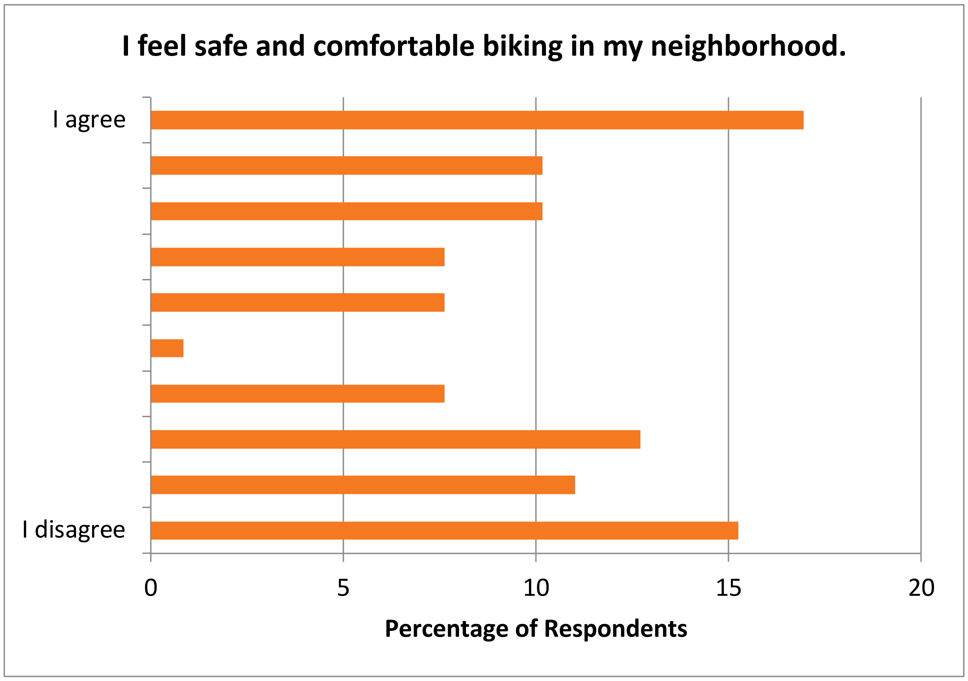

How long have you worked in the City of Pasco?
20+ Years
10-20 Years
5-10 Years
1-5 Years
<1 Year
0
5
10
15
20
25
30
35
Percentage of Respondents


How Often do you travel by...
Other?
Scooters?
Walking?
Bicycle?
Bus?
Uber/Lyft?
Carpool?
Car/Truck (by yourself)
0%
20%
40%
60%
80%
100%
Daily
Weekly
Weekends only
Once a month, or less
Never

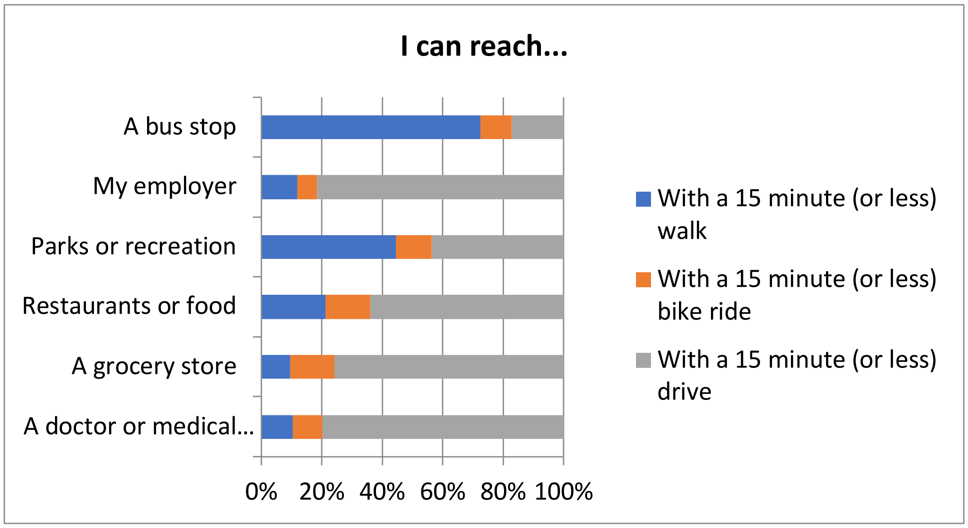
WALKING

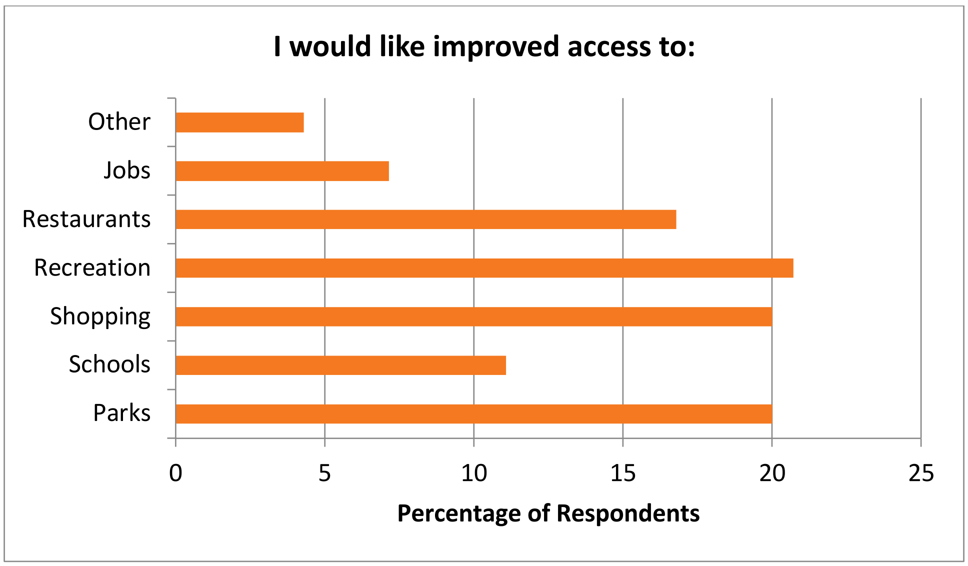
Where residents of Pasco note issues with sidewalks:



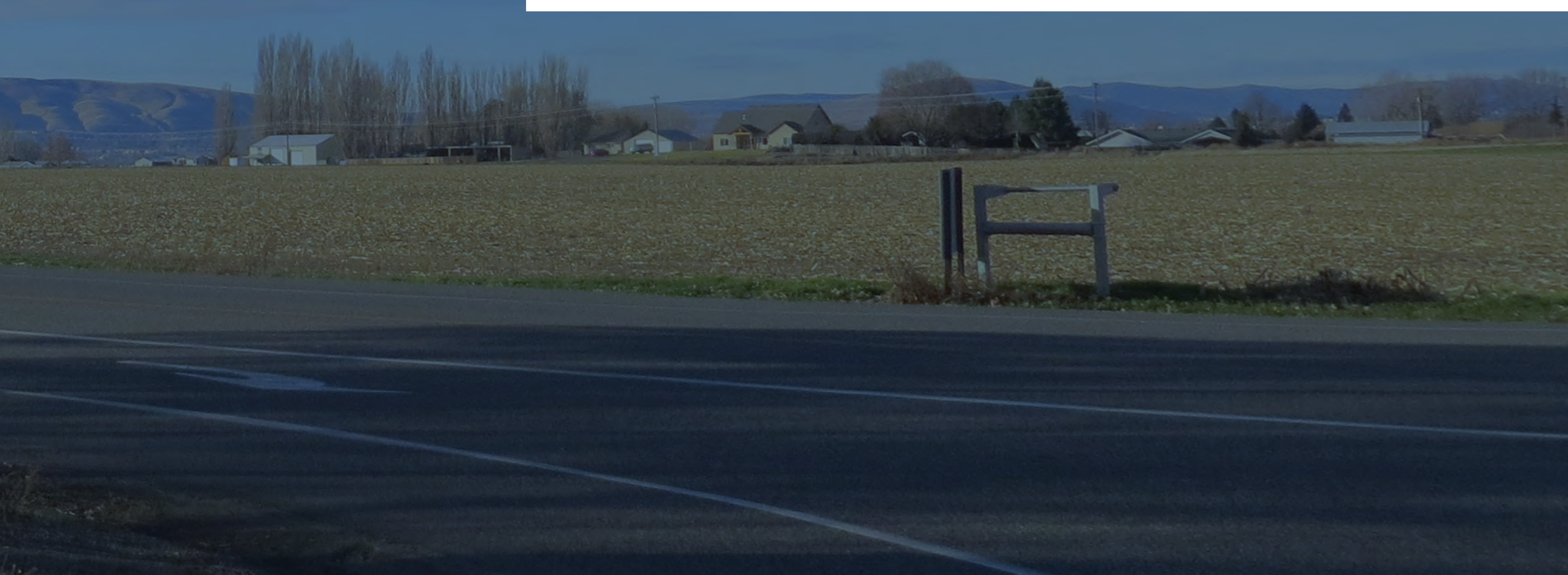


Transportation System Accessibility


I can reach...
A bus stop
My employer
Parks or recreation
Restaurants or food
A grocery store
A doctor or medical...
0%
20%
40%
60%
80%
100%
With a 15 minute (or less) walk
With a 15 minute (or less) bike ride
With a 15 minute (or less) drive


I would like improved access to:
Other
Jobs
Restaurants
Recreation
Shopping
Schools
Parks
0
5
10
15
20
25
Percentage of Respondents

Appendix B



720 SW WASHINGTON STREET, SUITE 500, PORTLAND, OR 97205 • 503.243.3500 • DKSASSOCIATES.COM

SYSTEM INVENTORY AND EXISTING PERFORMANCE

DATE: May 18, 2020

TO: Dan Ford, Jacob Gonzalez | City of Paso

FROM: Rochelle Starrett, Carl Springer, Aaron Berger | DKS Associates

SUBJECT: Pasco Transportation System Master Plan

Task 3: System Inventory and Existing Conditions

Project #19209-000

BACKGROUND

The City of Pasco is developing its first transportation system master plan (TSMP) which includes a baseline for measuring transportation system conditions. This memorandum provides an overview of the transportation system performance which includes a detailed review of operating characteristics for pedestrians, bicyclists, transit riders, and drivers. This analysis focuses on arterial and collector roadways within Pasco's Urban Growth Area (UGA).

Study intersections were identified in coordination with the City of Pasco and are listed below and mapped in Figure 1. Note that only some locations were analyzed for both weekday AM and PM peak period conditions.

AM/PM Study Intersection Locations

1. Broadmoor Blvd & I-182 WB Ramps
2. Broadmoor Blvd & I-182 EB Ramps
3. Road 68 & I-182 WB Ramps
4. Road 68 & I-182 EB Ramps
5. US 395/Morasch Ln & Argent Rd
6. US 395 SB Ramps & Court St
7. US 395 NB Ramps & Court St
8. US 395 NB Ramps & Sylvester St
9. 20th Ave & I-182 WB Ramps
10. 20th Ave & I-182 EB Ramps
11. 4th Ave & I-182 WB Ramps
12. 4th Ave & I-182 EB Ramps
13. Foster Wells Rd & US 395
14. US 395 SB Ramps/Rainier Ave & Kartchner St
15. US 395 NB Ramps/Commercial Ave & Kartchner St
16. Hwy 12 SB Ramps & Heritage Blvd/Pasco Kahlotus Rd
17. Hwy 12 NB Ramps & Heritage Blvd/Pasco Kahlotus Rd
18. Hwy 12 & A St
19. Road 68 & Burden

PM Only Study Intersection Locations

20. Broadmoor Blvd & Burns Rd
21. Broadmoor Blvd & Sandifur Pkwy
22. Broadmoor Blvd & Chapel Hill Blvd
23. Broadmoor Blvd/Road 100 & Argent Rd
24. Road 84 & Argent Rd
25. Road 84 & Court St
26. Road 68 & Powerline Rd
27. Road 68 & Sandifur Pkwy
28. Road 68 & Chapel Hill Blvd
29. Road 68 & Argent Rd
30. Road 68 & Court St
31. Road 60 & Court St
32. Madison Ave & Burden Blvd
33. Road 44 & Argent Rd
34. 20th Ave & Argent Rd
35. 20th Ave & Court St
36. 20th Ave & Sylvester St
37. 20th Ave & Lewis St
38. 10th Ave & Sylvester St
39. 10th Ave & Lewis St
40. 10th Ave & A St
41. 10th Ave & Ainsworth St
42. 4th Ave & Court St
43. 4th Ave & Sylvester St
44. 4th Ave & Lewis St
45. 4th Ave & A St
46. 4th Ave & Ainsworth St
47. Oregon Ave & Lewis St
48. Oregon Ave & A St
49. Oregon Ave & Ainsworth St
50. Heritage Blvd & Lewis St/Avery Ave
51. Heritage Blvd & A St
52. Cedar Ave & Lewis St

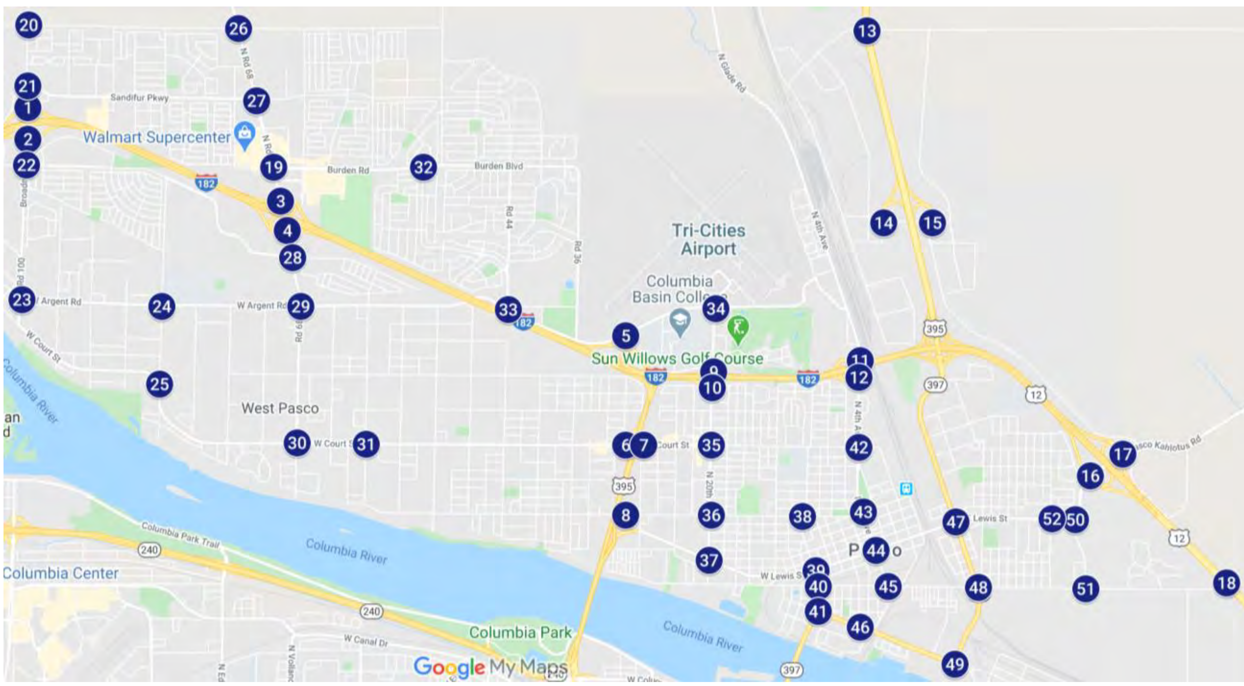


FIGURE 1. [PASCO TSMP STUDY INTERSECTIONS]

ANALYSIS METHODS USED

The system performance evaluation applied several technical methods consistent with transportation planning practices. The following section describes the methods used and they are consistent with the Street Light Analysis Approach Memo, the Traffic Forecast Methodology Memorandum, national guidance, and best practice.

SAFETY ANALYSIS

Crash data for the last five years (2014-2018) was obtained from WSDOT to analyze crash trends within the City of Pasco[1]. This data was used to flag typical crash patterns (e.g. crash type, severity, underlying factors) and screen the transportation system for corridors and intersections with high crash rates. Crashes involving pedestrians or bicyclists were also flagged for separate evaluation. Results of this analysis are documented in the Traffic Safety Assessment, provided in the appendix.

SYSTEM CONNECTIVITY ANALYSIS

Pasco's existing road network and functional classification was reviewed to identify transportation barriers and other missing elements of Pasco's existing transportation system. Pasco does not have spacing standards for different street types, so system connectivity was assessed using a 1-mile spacing standard for arterial roadways and a ½-mile spacing standard for collectors. Connections for both pedestrians and bicyclists should be provided more frequently to promote walkability and bikeability. Bicycle and pedestrian connectivity gaps were identified when existing block lengths along arterial or collector roadways exceeded 500 feet. The gap analysis was used to identify corridors and areas that lack critical bicycle or pedestrian connections.

STREET LIGHT ANALYSIS

Street Light data uses GPS traces from personal devices (*e.g.* cell phones) or other location-based services to infer travel patterns. The personal identity of the user is kept anonymous at all times. The data is used as a sample to represent patterns and trends for all types of travel around the City. Additional details on the Street Light analysis are provided in the Street Light Analysis Approach Memo.

Each Street Light analysis was set up to consider an entire year of available data (typically 2019) which can provide a clearer picture of typical travel patterns. Trip metrics (*e.g.* trip length or distance) and traveler attributes (*e.g.* trip purpose or income) were also evaluated in conjunction with different analyses to provide additional insights to travel behavior. Existing data, such as freight volumes from WSDOT, was also used to calibrate the estimated Street Light freight volumes.

[1] Crash data provided from the 2020 City Safety Program: https://www.wsdot.wa.gov/LocalPrograms/Traffic/CitySafetyProgram

OPERATIONS ANALYSIS

Traffic operations at study intersections were reported using Synchro 10 and HCM 6th Edition Methodology based on recent traffic counts and new counts collected December 2019 and January 2020. Since traffic counts are typically lower during the winter, these counts were factored to represent average traffic conditions in Pasco. Specific methods used for seasonal factoring and adjusting traffic counts are summarized in the Traffic Forecast Methodology Memorandum. Intersection geometry and traffic control types were collected using Google Maps/Streetview and field verified, if necessary. Traffic signal timings were provided by both the City of Pasco and WSDOT.

Signalized intersection v/c ratios were post-processed at signalized intersections based on HCM 6th Edition Chapter 19[2]. If HCM 6th Edition results could not be reported for signals, v/c ratios were reported using HCM 2000. Mainline through movement v/c ratios were post-processed at unsignalized intersections consistent with the Highway Capacity Manual[3].

Planning mobility targets for all study intersections utilize a LOS D standard for all arterial and collector roadways, consistent with state transportation plans and adopted regional standards[4].

EXISTING TRANSPORTATION CONDITIONS

EXISTING TRANSPORTATION SYSTEM CONNECTIVITY

ROADWAY SYSTEM CONNECTIVITY

Pasco's existing roadway network is arranged largely on a grid system which establishes a system of arterial and collector streets. Within Pasco's older downtown core (generally between US 395 and Oregon Avenue, south of I-182), the existing functional classification system establishes a traditional urban arterial and collector street system that adheres to the recommended spacing standards, seen below in Figure 2. Existing arterials in the downtown core also distribute traffic to and from existing interchanges along US 395 and I-182.

The roadway system in areas of Pasco outside the downtown core have more limited opportunities for developing an arterial and collector street system. The existing road network is constrained by post-1980s suburban-style residential developments (including new subdivisions north of I-182 and developments that remain within Franklin County south

[2] TRB. *Highway Capacity Manual, 6th Ed., Ch. 19 Signalized Intersections.* 2016.
[3] TRB. *Highway Capacity Manual, 6th Ed., Ch. 20 Two-Way Stop-Controlled Intersections.* 2016.
[4] City of Pasco. 2018 to 2038 Comprehensive Plan Goals and Policies. 2020.

of I-182). The recent development in Pasco have a markedly different development style, seen below in Figure 2, which includes longer block lengths and limited access points. Limited crossing opportunities for I-182, the Pasco airport, and other geographical features (*e.g.* the Franklin County Irrigation Canal) also constrain the existing roadway network within Pasco.

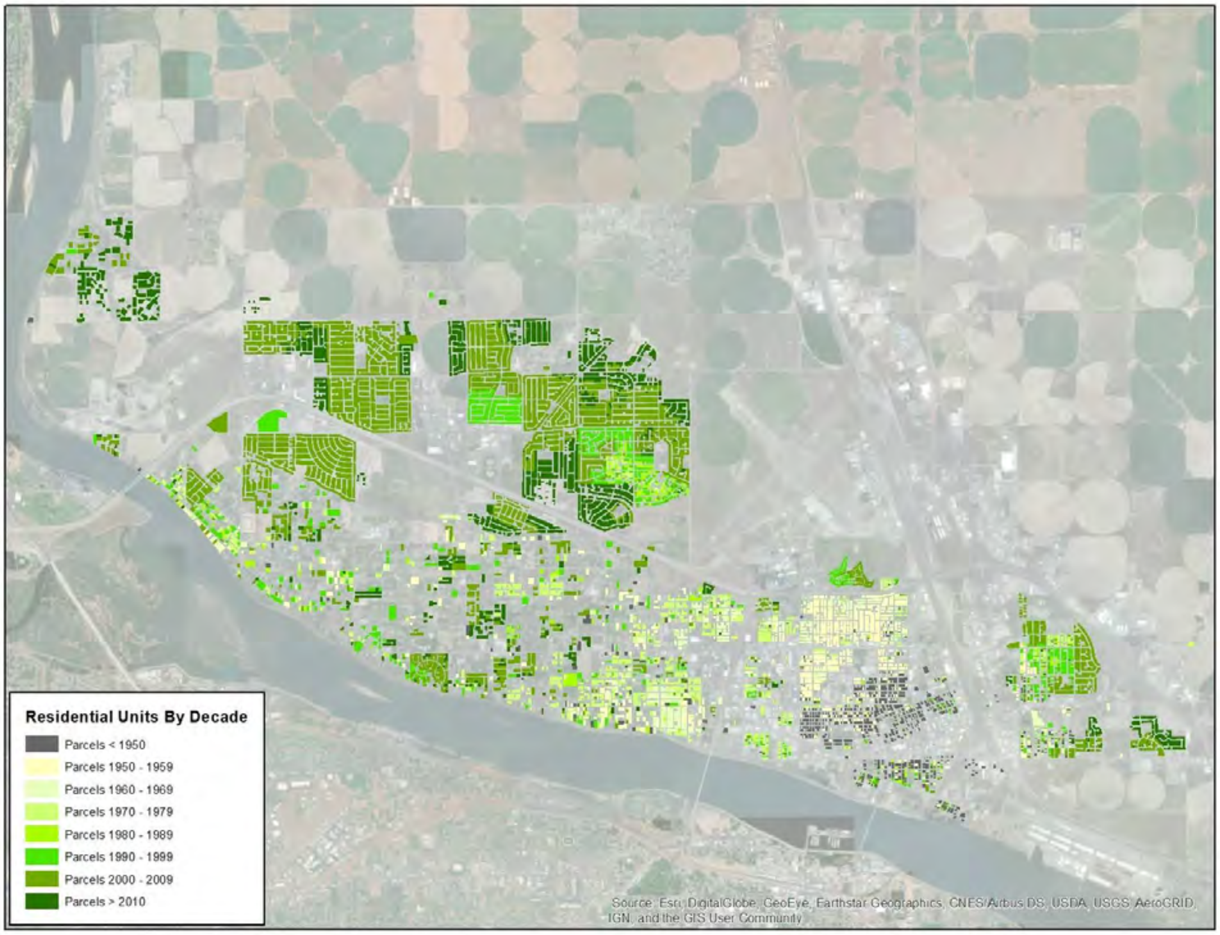


FIGURE 2. LOCATION OF RESIDENTIAL UNITS CONSTRUCTED EACH DECADE IN CITY OF PASCO

The constraints to circulation and access affect the City's ability to provide convenient and safe services for all travelers. Through this plan update process, there are opportunities to address these system weaknesses. The first is through re-classifying roadways to better represent that scale and character of facilities for a given area. As new streets are built and existing streets are upgraded to match revised standards, those improvements will better align with what is important for residents and businesses alike. However, the long blocks and sealed off neighborhoods that are borderd by the arterial and collector network will remain, particularly in recently developed areas and across I-182. Housing construction in Pasco has built approximately 11,000 units over the past 20 years (see Figure 3). As the

City continues to grow, it will be important to consider how system connectivity could be enhanced, especially in the new neighborhoods, to achieve the City's community values.

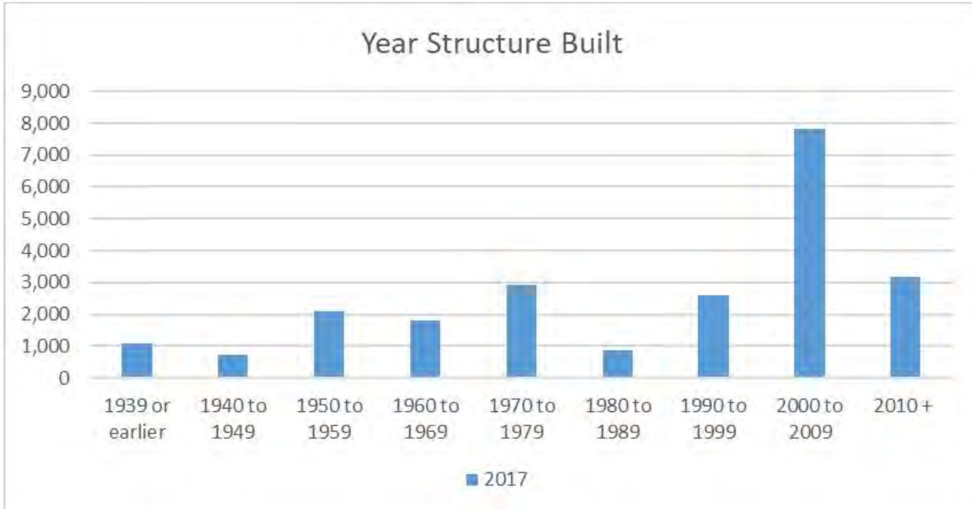


FIGURE 3. TOTAL NUMBER OF RESIDENTIAL UNITS CONSTRUCTED IN CITY OF PASCO BY DECADE

MULTIMODAL SYSTEM CONNECTIVITY

The same development patterns also limit connectivity for pedestrians and bicyclists who depend on more frequent system spacing. Key facility gaps were identified when the distance between local streets or existing trails exceeded 500' on arterial and collector roadways. Since these gaps occur more frequently than for the arterial and collector street system, the gap analysis was used to flag arterial and collector segments with several facility gaps. The following arterial and collector corridors (adjacent to existing developments) were identified as segments with poor pedestrian or bicyclist accessibility:

- Court Street (Road 44 to Road 108)
- Wernett Road (Road 48 to Road 76)
- Argent Road (Road 48 to Road 100)
- Chapel Hill Boulevard (Road 68 to Road 100)
- Burden Boulevard (Road 36 to Road 60)
- Sandifur Parkway (Porto Lane to Road 90)
- Road 44 (Laredo Drive to Porto Lane)
- Burns Road (Road 68 to Road 100; Dent Road to Kohler Road)
- Clark Road (Road 36 to Lentz Road/Janet Street)
- Road 100/I-182 overpass
- Road 68/I-182 overpass

Areas within Franklin County, south of I-182, also have limited local street connectivity which further limits the existing multimodal transportation system in these areas. Figure 4, below, shows identified corridors and areas with limited multimodal access.

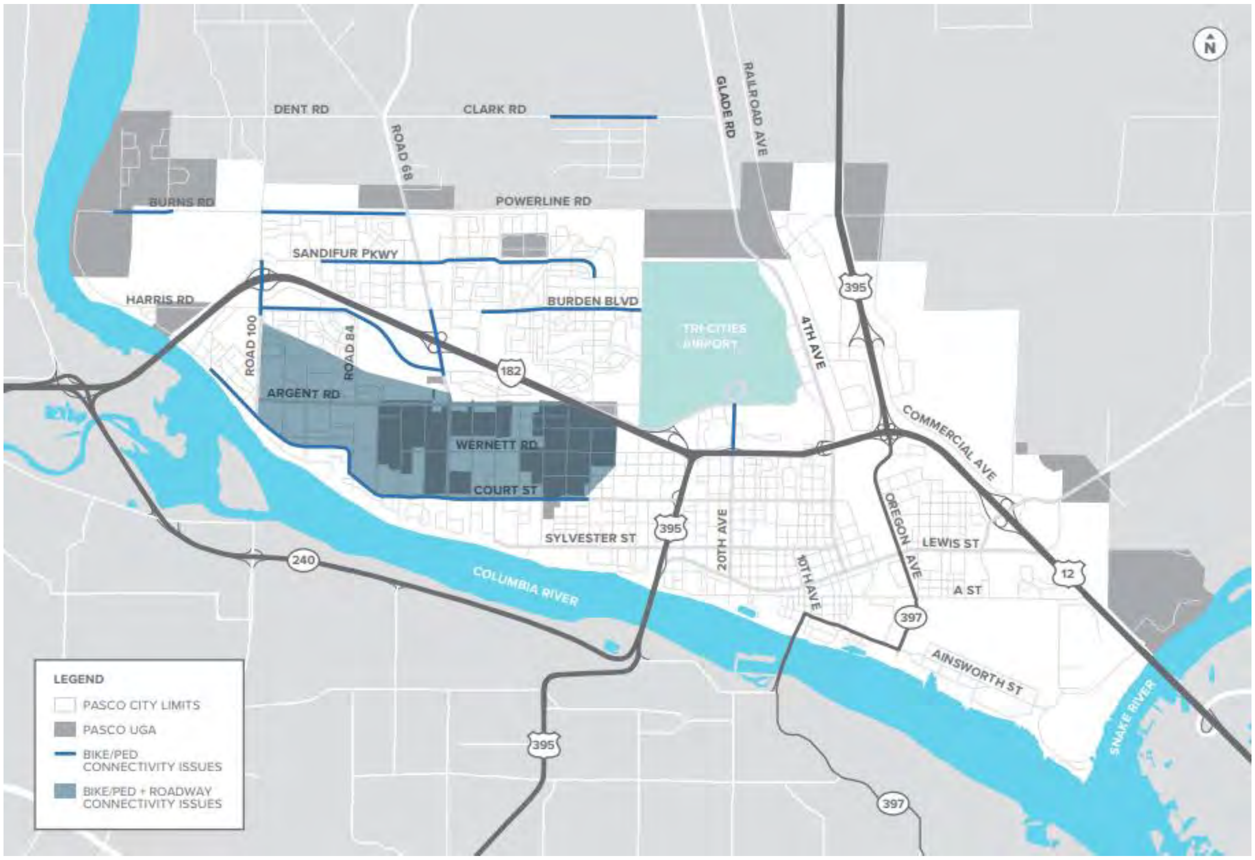


FIGURE 4. MULTIMODAL SYSTEM CONNECTIVITY CONSTRAINTS

The multimodal system connectivity assessment did not consider existing crossing opportunities for arterial or collector roadways which can further limit the connectivity of a multimodal transportation system. Limited crossing opportunities exist on 20th Avenue between Argent Road and I-182, which divides existing student housing from the Columbia Basin Community College Campus. Other arterial and collector roadways within Pasco are also expected to provide limited crossing opportunities for multimodal system users.

EXISTING TRAVEL PATTERNS (PER STREET LIGHT DATA FINDINGS)

BRIDGE TRAVEL

Travel on the Columbia and Snake River Bridges between Pasco and the Tri-Cities is tied to the geographic location of each regional trip’s origin or destination. The US 12 Bridge serves travel between Pasco, the eastern Tri-Cities, and other destinations to the east. The Blue Bridge/US 395 Bridge and WA-397 Bridge primarily serve travel between Pasco (especially the largely residential areas near these bridges), Kennewick, and eastern Richland. However, the Blue Bridge/US 395 Bridge also serves regional traffic between US 395 north of Pasco and I-82 south of Pasco which accounts for 4% of this bridge’s AADT. The I-182 Bridges serve travel between Pasco, Hanford, Richland, western Kennewick, and West

Richland. Within Pasco, the I-182 Bridges serve residential zones within western Pasco and the Road 68 commercial core. The I-182 Bridges also serve regional traffic to I-82 west of the Tri-Cities which accounts for 2% of these bridges' AADT.

Traffic within the Tri-Cities region primarily uses the I-182 Bridges, the Blue Bridge/US 395 Bridge, and the WA-397 Bridge. The great majority of trips on all three Columbia River bridges are less than 30 miles in length, 65% of trips on the I-182 Bridges, 78% of trips on the Blue Bridge/US 395 Bridge, and 75% of trips on the WA-397 Bridge. Conversely, the vehicle trips are longest on the US 12 Bridge where only 38% of trips are less than 30 miles and 9% of trips are longer than 100 miles. The distribution of trip lengths for each bridge is below in Figure 5.

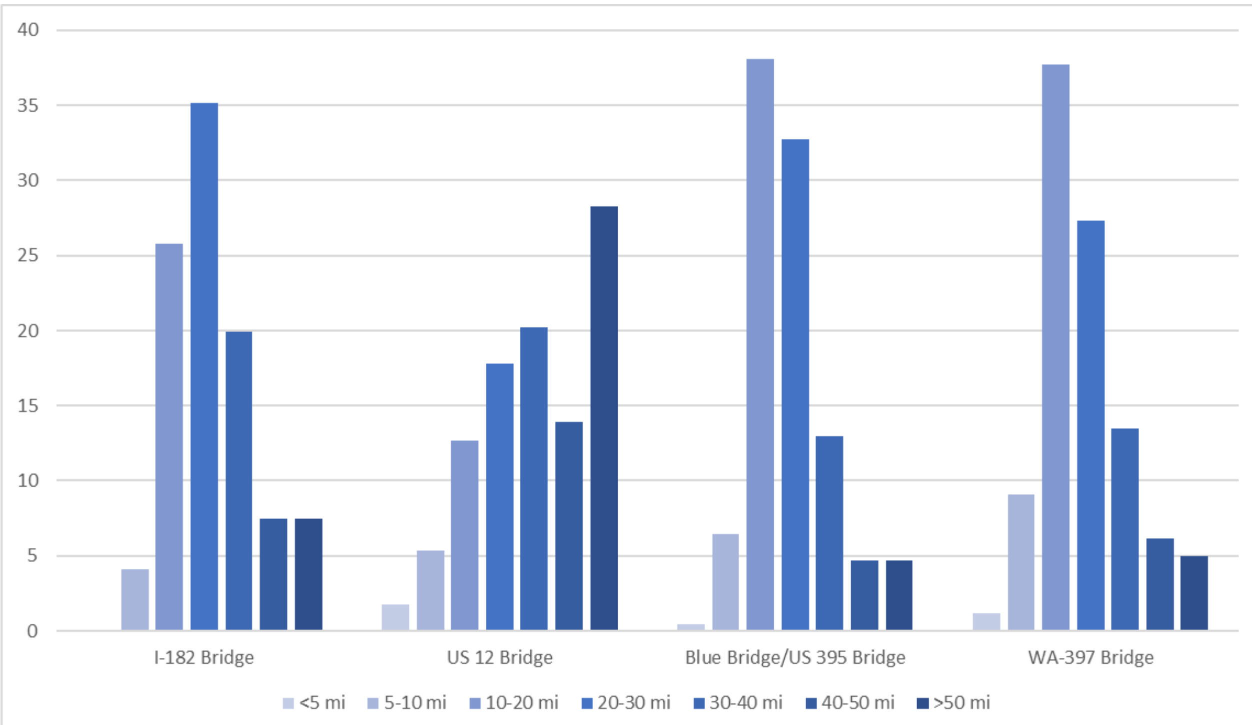


FIGURE 5. VEHICLE TRIPS LENGTH CROSSING RIVER BRIDGES (% of Total Bridge Trips, StreetLight Data)

FREIGHT TRAVEL

Freight transportation plays a significant role in Pasco's economy and serves trips between the Columbia River Basin agricultural region and other major cities within the Pacific Northwest, including Seattle, Portland, Spokane, Moses Lake, and Walla Walla. Freight is concentrated on Pasco's highway system which is primarily accessed at the following interchanges/intersections:

- US 395/Kartchner Street interchange

- US 12/Lewis Street interchange
- US 12/Sacajawea Park intersection
- US 395/Oregon Avenue interchange

Freight traffic on local roadways is concentrated in eastern Pasco, adjacent to major industrial centers, including Kartchner Street, Ainsworth Street, Oregon Avenue, Heritage Boulevard, A Street, Lewis Street, and Sacajawea Park Road. Freight traffic on the bridges over the Columbia and Snake Rivers ranges from 6-20%. Figure 6 summarizes freight activity within Pasco.

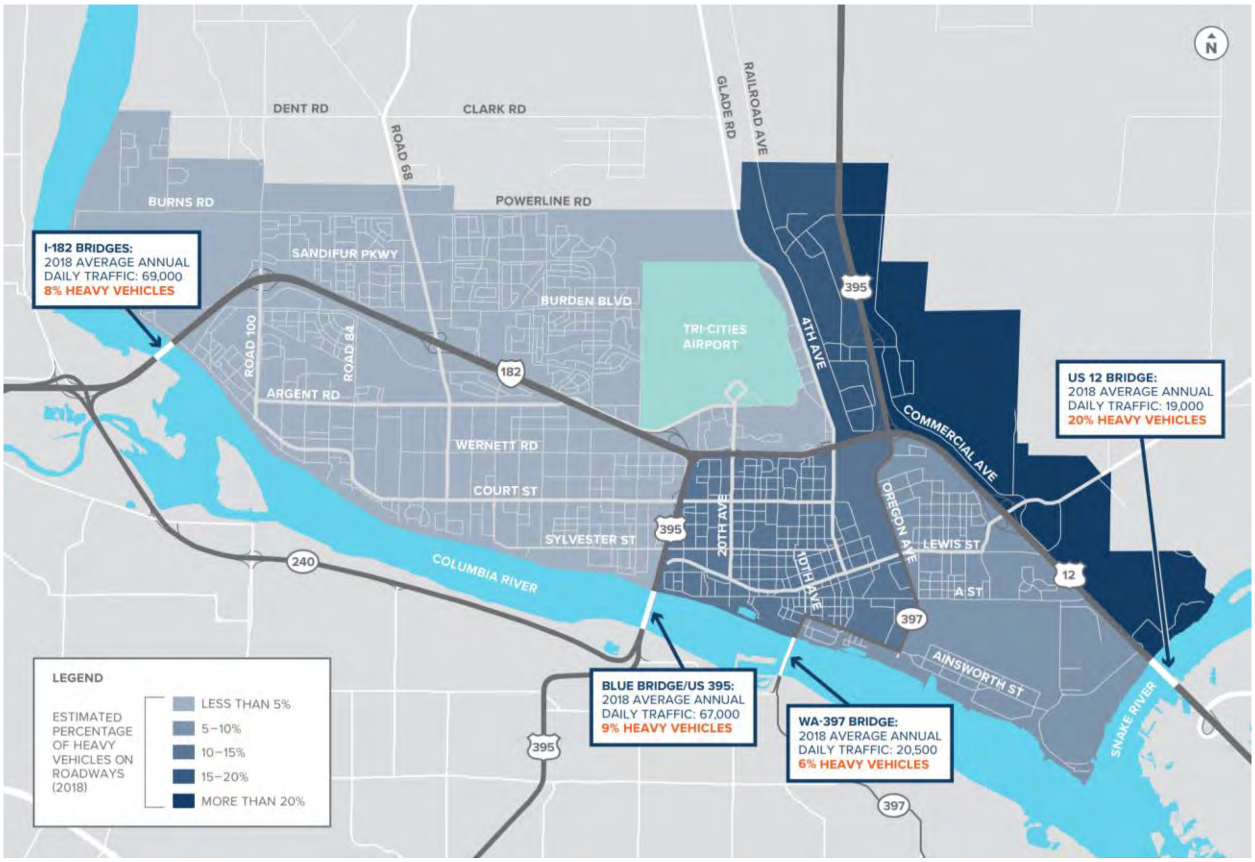


FIGURE 6. FREIGHT TRAVEL PATTERNS IN PASCO (Source: StreetLight Data)

Although the distribution of freight traffic for Pasco remains similar throughout the year, the total volume of freight traffic increases during summer and early fall months, as seen in Figure 7. Freight traffic peaks in the spring and summer months (April to September) where it is 7-8% above average; the months of June, August, and September have the highest freight traffic. Freight traffic is lower in the fall and winter months (October to March) where it is 6-10% below average. The seasonal variation in freight volumes mirrors the growing and harvest season within the Columbia River Basin which suggests the importance of regional agriculture for Pasco's economy.

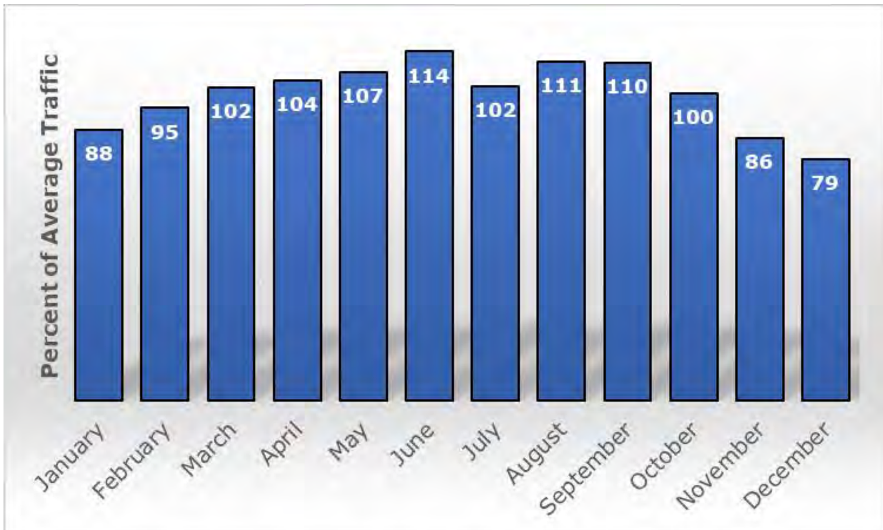


FIGURE 7. SEASONAL VARIATION IN FREIGHT TRAFFIC FOR PASCO (Source: StreetLight Data)

COMMUTE PATTERNS

Street Light data can also infer trip purpose using a device's identified "home" or "work" location. Inferred home-based work trips that begin in Pasco during the AM peak (6-10 AM) were used to understand typical commute trends for residents of Pasco. Since Street Light flags "home" and "work" locations based on where a device typically spends daylight or evening hours, this data set does count students travelling to school or overnight shift works in Pasco who travel home during the AM peak as home-based work trips. Street Light data estimates about 50% of Pasco's residents have local jobs within Pasco for work which is twice the percentage estimated by the US Census (25%)[5]. The top Pasco employers include the following:

- Downtown Pasco area businesses
- Chiawana High School (including students)
- Industrial businesses in eastern Pasco
- Commercial businesses along US 395

Within the Tri-Cities region, other major employment destinations include the cities of Kennewick, Richland, and the Hanford Nuclear Site. Commute patterns for Pasco residents on the Columbia River bridges mirror these destinations. 26% of commute trips to jobs outside of Pasco use the I-182 Bridges to access jobs in Richland, Kennewick, and the Hanford site while 16% of commute trips use the Blue Bridge/US 395 Bridge, primarily to access jobs within Kennewick or Richland. Existing commute patterns are summarized in

[5] US Census On the Map. *Work Destination Report – Home Selection Area to Work Places.* https://onthemap.ces.census.gov/cgi-bin/report.py?mode=serve_page&t=otm_23e9532e0d994c57afb714237fd6325d&download=false&format=pdf Accessed. May 11, 2020.

Figure 8. These numbers were estimated using a full year of observed Street Light data, so high school or community college students are also captured within this commute data.

Residents of West Pasco (west of US 395 or north of I-182) are more likely to travel outside of Pasco for work, and more West Pasco residents travel to Hanford, Richland, West Richland, and Kennewick/Richland than East Pasco residents. Conversely, residents of East Pasco who travel outside of Pasco for work are more likely to be employed in Kennewick or the eastern Tri-Cities area than residents of West Pasco. Within Pasco, employment is also geographically concentrated; residents are more likely to be employed near their home. A higher percentage of residents of East Pasco work at the industrial businesses of east Pasco compared to residents of West Pasco.

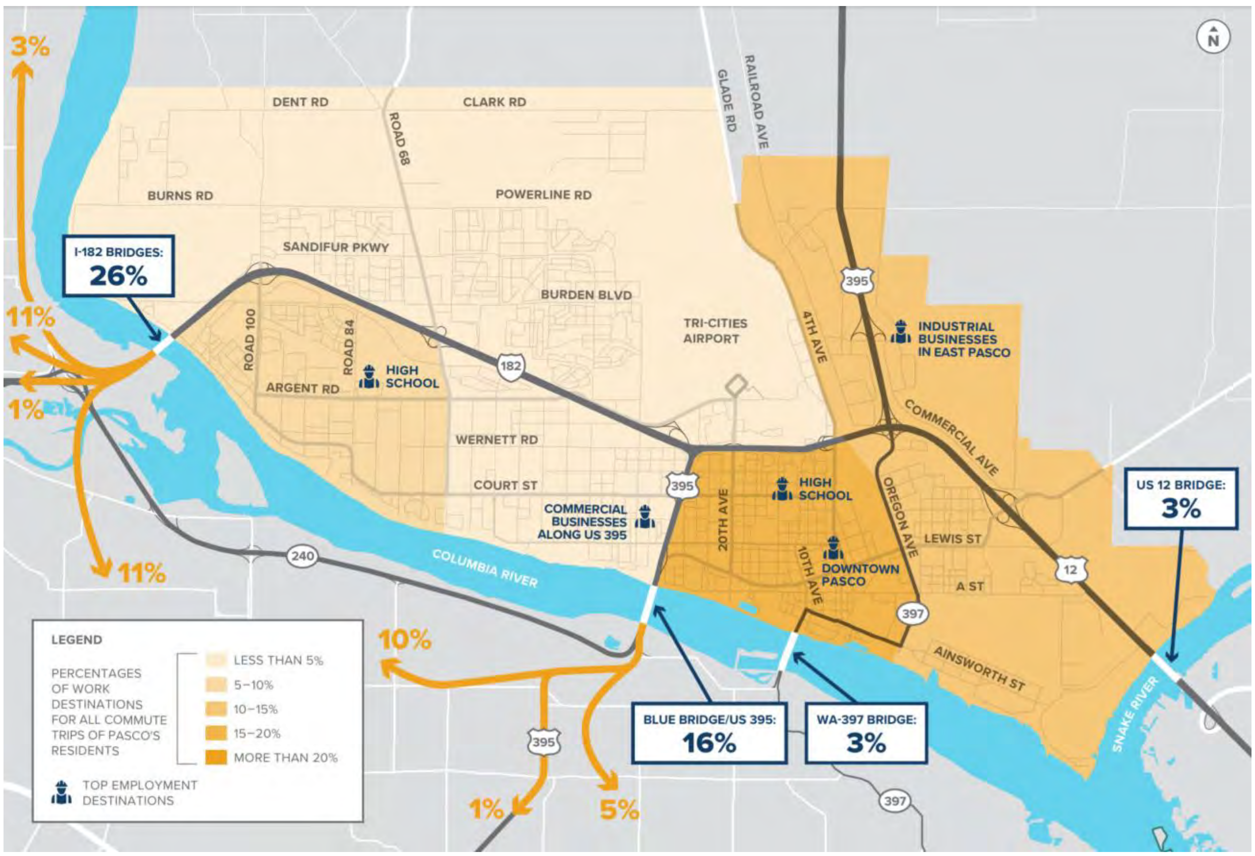


FIGURE 8. COMMUTE PATTERNS FOR PASCO RESIDENTS (Source: Street Light Data)

Commuters from the Tri-Cities region who are employed in Pasco tend to live in Kennewick (13% of Pasco workers) or in the western Kennewick/eastern Richland area (16% of Pasco workers). 5% of workers commute from Richland and 6% of workers commute from West Richland. Residents of Pasco who stay within Pasco fork work tend to live south of I-182 although some of Pasco’s workers do live in the newer residential developments around the Road 68 commercial core.

EXISTING TRANSIT SERVICES

Local transit services are provided by Ben Franklin Transit which operates 8 fixed route bus services within Pasco, including:

- Route 64: Pasco A Street
- Route 65: Pasco Lewis
- Route 66 & Route 67: Pasco Sylvester & Pasco Sandifur
- Route 150: Pasco / Kennewick
- Route 160 / Kennewick
- Route 225: Pasco / Richland
- Route 268: Pasco / Richland

Weekday service is typically provided between 5:45 AM and 8:15 PM on all routes with half hour headways. Select routes run until 10:15 PM on weekdays, including inter-city routes to both Kennewick and Richland. Service is similar on most routes for Saturday although service does not start until 6:45. Transit service ends an hour earlier on Saturdays for Routes 64 and 160, and Route 268 does not provide Saturday Service. No transit services are available on Sunday. Ben Franklin Transit operates service for Pasco to and from the 22nd Avenue Transit Center which facilitates transfers between routes. Riders can currently park at both the 22nd Avenue Transit Center and the HAPO Event Center.

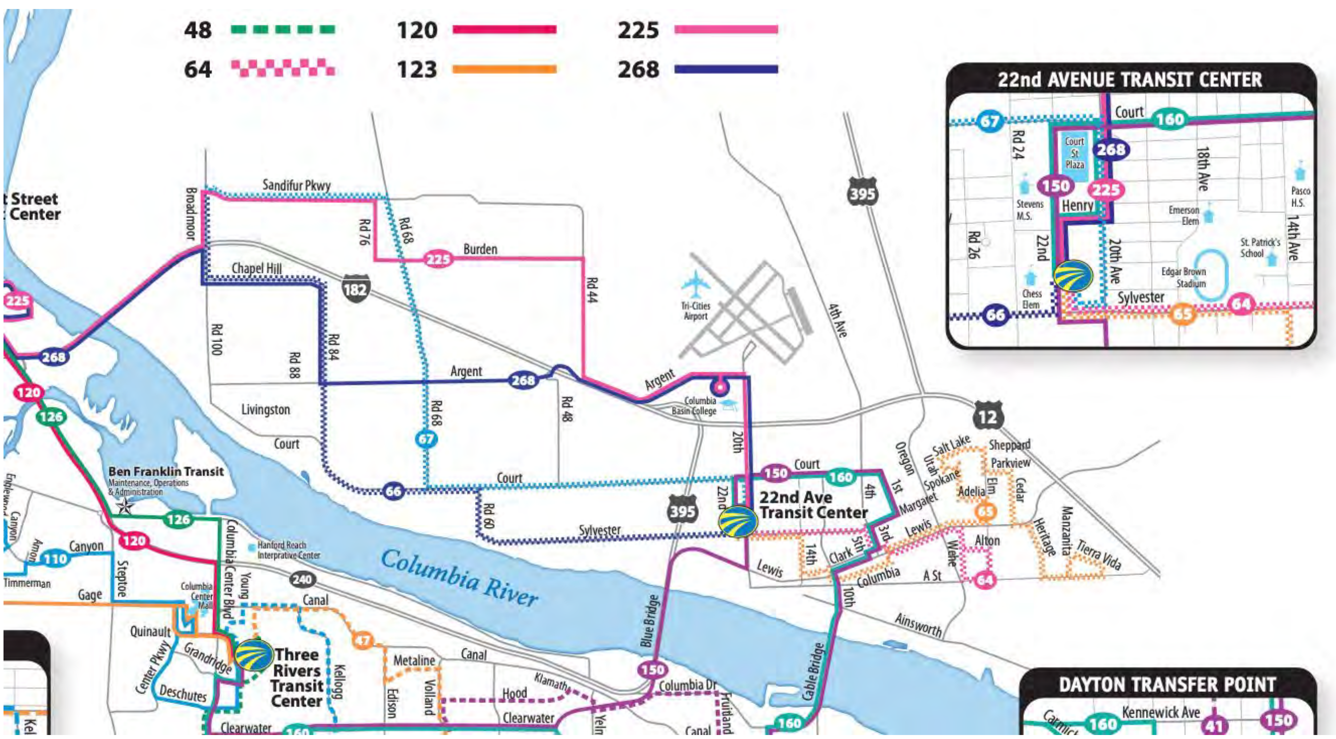


FIGURE 9. BEN FRANKLIN TRANSIT ROUTES

Ben Franklin Transit also operates Dial-A-Ride service for individuals with a disability between 6 AM and 10 PM Monday to Friday and between 7 AM and 10 PM on Saturday. Vanpool services are also available for commuters travelling to Pendleton, Walla Walla, Connell, Patterson, and the Hanford Nuclear Site.

EXISTING TRANSPORTATION SYSTEM OPERATIONS

Most study intersections on WSDOT facilities currently operate within their mobility target during the morning peak period, including all US highway or interstate ramp terminals within Pasco. Two study intersections exceed their mobility target during the AM peak: US 12/E A Street and US 395/Foster Wells Road. These intersections are two at-grade intersections on US highways within Pasco, and the intersection of US 12/E A Street has previously been identified as a future interchange. The intersection of Road 68/Burden Boulevard, under the City of Pasco's jurisdiction, also has major delays during the AM peak. Existing Weekday AM Peak Hour intersection operations is summarized below in Table 1.

TABLE 1: EXISTING WEEKDAY AM PEAK HOUR WEEKDAY INTERSECTION OPERATIONS

#	CONTROL	INTERSECTION	LEVEL OF SERVICE*	DELAY (SECONDS PER VEHICLE)	VOLUME TO CAPACITY RATIO
1	Signal	Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp	B	16	0.40
2	Signal	Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp	B	17	0.68
3	Signal	Road 68 & I 182 WB On/Off Ramp/I 182 WB On Ramp	B	16	0.84
4	Signal	Road 68 & I 182 EB On/Off Ramp/I 182 EB On Ramp	A	7	0.50
5	Signal	US 395 On/Off Ramp/Morasch Ln & Argent Rd	B	13	0.44
6	Signal	US 395 SB On Ramp/US 395 SB On/Off Ramp & Court St	A	9	0.48

7	Signal	US 395 NB Off Ramp/US 395 NB On Ramp & Court St	B	12	0.74
8	TWSC	Sylvester St & US 395 NB Off Ramp	A/C	0/15	0.26/0.46
9	Signal	20th Ave & I 182 WB On Ramp/I 182 WB Off Ramp	B	14	0.72
10	Signal	20th Ave & I 182 EB On/Off Ramp	B	18	0.68
11	Signal	4th Ave & US 395 WB On/Off Ramp	B	10	0.44
12	Signal	4th Ave & US 395 EB On/Off Ramp	B	20	0.75
13	TWSC	US 395 & Foster Wells Rd	A/F	10/54	0.23/0.22
14	TWSC	Rainier Ave/US 395 SB On/Off Ramp & Kartchner St	A/C	9/21	0.16/0.19
15	TWSC	Commercial Ave/US 395 NB On/Off Ramp & Kartchner St	A/D	8/33	0.06/0.5
16	TWSC	Hwy 12 EB On/Off Ramp & Lewis St & Hwy 12 EB Off Ramp	A/C	10/22	0.29/0.63
17	TWSC	Hwy 12 WB Off Ramp/Hwy 12 WB On/Off Ramp & Lewis St	A/B	9/14	0.31/0.18
18	TWSC	Hwy 12 & E A St	B/F	11/129	0.25/0.89
19	Signal	Road 68 & Burden Blvd	D	52	0.87

*Shaded values indicate an intersection that exceeds its mobility target

During the Weekday PM peak period, WSDOT study locations, including freeway ramp terminals, handle the bulk of traffic; these locations tend to have the most severe operational issues, while most local street intersections currently operate with tolerable congestion, as defined by their mobility target. The few ramp terminals that have severe congestion are either two-way stop control (TWSC) or at-grade intersections which have high side street delay. The intersections of US 12/E A Street and Rainier Ave & US 395 SB Ramps/Kartchner Street both currently operate over-capacity on their minor street approach with excessive vehicle delays. During the PM peak, the traffic signals at I-182 WB Ramps/Road 68 and 4th Ave/US 395 WB Ramps also both exceed their mobility targets.

Most City streets operate well within their mobility target during the PM peak. Only the intersection of Road 68/Burden Boulevard exceeds its mobility target during the PM peak. PM peak vehicle operations for all study intersections are summarized below in Table 2.

TABLE 2: EXISTING WEEKDAY PM PEAK HOUR INTERSECTION OPERATIONS

#	CONTROL	INTERSECTION	LEVEL OF SERVICE*	DELAY (SECONDS PER VEHICLE)	VOLUME TO CAPACITY RATIO
1	Signal	Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp	A	9	0.72
2	Signal	Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp	C	21	0.86
3	Signal	Road 68 & I 182 WB On/Off Ramp/I 182 WB On Ramp	F	136	1.43
4	Signal	Road 68 & I 182 EB On/Off Ramp/I 182 EB On Ramp	B	16	0.77
5	Signal	US 395 On/Off Ramp/Morasch Ln & Argent Rd	B	17	0.49
6	Signal	US 395 SB On Ramp/US 395 SB On/Off Ramp & Court St	A	10	0.54
7	Signal	US 395 NB Off Ramp/US 395 NB On Ramp & Court St	B	17	0.89
8	TWSC	Sylvester St & US 395 NB Off Ramp	A/E	0/38	0.23/0.82
9	Signal	20th Ave & I 182 WB On Ramp/I 182 WB Off Ramp	C	26	0.91

10	Signal	20th Ave & I 182 EB On/Off Ramp	C	21	0.73
11	Signal	4th Ave & US 395 WB On/Off Ramp	E	58	1.04
12	Signal	4th Ave & US 395 EB On/Off Ramp	B	16	0.69
13	TWSC	US 395 & Foster Wells Rd	B/F	12/74	0.26/0.53
14	TWSC	Rainier Ave/US 395 SB On/Off Ramp & Kartchner St	B/F	11/363	0.38/1.51
15	TWSC	Commercial Ave/US 395 NB On/Off Ramp & Kartchner St	A/D	8/31	0.08/0.61
16	TWSC	Hwy 12 EB On/Off Ramp & Lewis St & Hwy 12 EB Off Ramp	A/B	8/11	0.28/0.18
17	TWSC	Hwy 12 WB Off Ramp/Hwy 12 WB On/Off Ramp & Lewis St	B/B	11/13	0.24/0.32
18	TWSC	Hwy 12 & E A St	B/F	14/1688	0.44/3.88
19	Signal	Road 68 & Burden Blvd	E	62	1.12
20	TWSC	Road 100 & Dent Rd/Edelman Rd	A/D	8/26	0.13/0.35
21	Signal	Road 100 & Sandifur Parkway	B	12	0.50
22	Signal	Road 100 & Chapel Hill Rd	C	21	0.69
23	TWSC	Road 100 & Argent Road	A/C	8/18	0.24/0.12
24	Signal	Road 84 & Argent Road	B	12	0.28

25	TWSC	Court Street & Road 84	A/B	8/11	0.12/0.12
26	TWSC	Road 68 & Edelman Road/Powerline Rd	A/C	8/18	0.24/0.13
27	Signal	Road 68 & Sandifur Pkwy	C	22	0.70
28	Signal	Road 68 & Chapel Hill Rd	C	20	0.74
29	Signal	Road 68 & Argent Road	C	22	0.69
30	TWSC	Road 68 & Court Street	A/D	8/34	0.13/0.73
31	TWSC	Road 60 & Court Street	A/C	8/21	0.13/0.36
32	TWSC	Madison Ave & Burden Blvd	A/F	9/72	0.35/0.71
33	TWSC	Argent Rd & Rd 44	A/B	0/15	0.17/0.47
34	Signal	20th Ave & Argent Rd	B	20	0.66
35	Signal	20th Ave & Court St	C	25	0.71
36	Signal	20th Ave & Sylvester St	C	23	0.51
37	Signal	20th Ave & Lewis Street	C	22	0.54
38	Signal	10th Ave & Sylvester St	B	12	0.59
39	Signal	10th Ave & Lewis St	C	22	0.45
40	Signal	10th Ave & A St	B	17	0.36

41	Signal	10th Ave & Ainsworth St	B	19	0.62
42	Signal	4th Ave & Court St	B	19	0.70
43	Signal	4th Ave & Sylvester St	A	8	0.24
44	Signal	4th Ave & W Lewis St	B	14	0.56
45	Signal	4th Ave & A St	A	5	0.29
46	TWSC	4th Ave & Ainsworth St	A/A	8/9	0.29/0.02
47	Signal	N Oregon Ave & E Lewis St	B	17	0.43
48	Signal	Oregon Ave/S Oregon Ave & E A St	B	11	0.23
49	TWSC	Oregon Ave & Ainsworth St	A/C	8/17	0.12/0.41
50	TWSC	Heritage Blvd & Lewis St & Avery Ave	A/C	8/19	0.29/0.4
51	TWSC	E A St & Heritage Blvd	A/C	8/17	0.12/0.43
52	TWSC	Cedar Ave & Lewis St	A/C	9/24	0.15/0.48

*Shaded values indicate an intersection that exceeds its mobility target

KEY TRANSPORTATION ISSUES

The review of Pasco's existing transportation system was used to identify key operational, safety, and connectivity issues to inform an assessment of Pasco's existing transportation system. This review identified locations that had high levels of congestion during peak travel hours, higher than expected crash rates, and barriers to safe and convenient travel for all users.

Figure 10 shows a composite of our system performance findings for Pasco which will be considered during the plan development. Detailed findings for each travel mode are also summarized below.

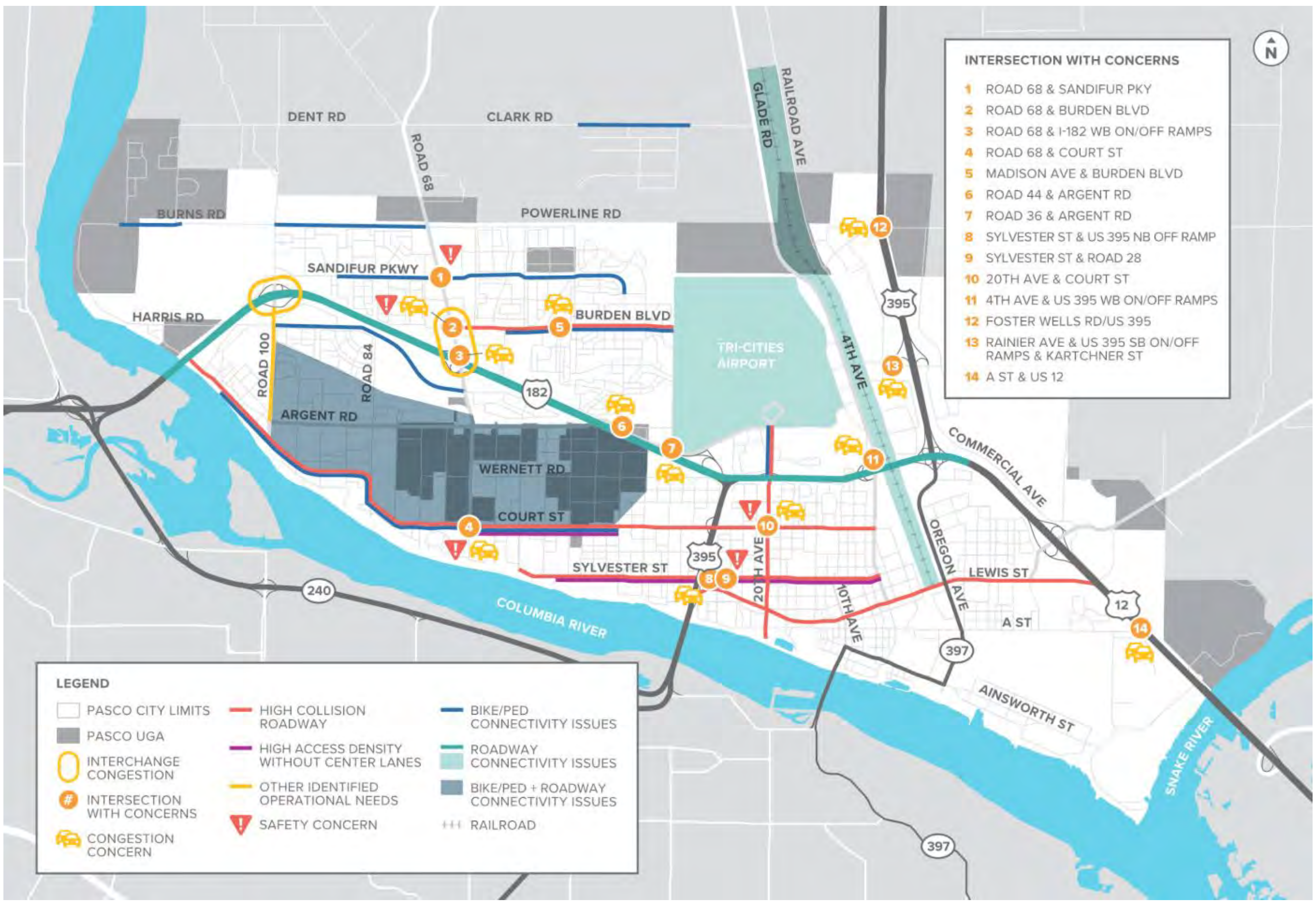


FIGURE 10. **PASCO'S EXISTING TRANSPORTATION SYSTEM CHALLENGES**

PEDESTRIANS AND BICYCLISTS

- Limited system connectivity; key barriers include:
    - Highway crossings without pedestrian or bicycle facilities (*e.g.* Road 100, Road 68)
    - Long blocks (up to 2,000 feet) without any pedestrian connections

    - Limited sidewalks and bike facilities, including along arterial and collector roadways
    - Rural roadway standards which do not include multimodal facilities
- Corridors without adequate pedestrian or bicyclist connections, including:
    - Court Street (Road 44 to Road 108)
    - Wernett Road (Road 48 to Road 76)
    - Argent Road (Road 48 to Road 100)
    - Chapel Hill Boulevard (Road 68 to Road 100)
    - Burden Boulevard (Road 36 to Road 60)
    - Sandifur Parkway (Porto Lane to Road 90)
    - Road 44 (Laredo Drive to Porto Lane)
    - Burns Road (Road 68 to Road 100; Dent Road to Kohler Road)
    - Clark Road (Road 36 to Lentz Road/Janet Street)
- Limited crossing opportunities on high-speed roadways, outside of existing signals
- High crash risk
    - Over two hit and run crashes annually involve pedestrians
    - Nearly half of pedestrian crashes occurred at marked crosswalks
    - Over 60% of bicyclists crashes were caused by drivers failing to yield the right of way when turning or crossing

TRANSIT

- Basic transit service
- Limited stop amenities
- Limited access from new residential developments to transit
- Limited, safe crossing opportunities near stops
- Limited existing park and ride locations

VEHICLES

- Limited system connectivity; key barriers include:
    - Long blocks (up to 2,000 feet) without any local street connections
    - Limited arterial or collector roadway access points for large residential developments
    - I-182
    - Pasco Rail Yard
- Peak period intersection congestion near ramp terminals and at critical intersections in Pasco, including at:
    - Road 100/I-182 Interchange
    - Road 68/I-182 Interchange
    - Road 68/Burden Boulevard
    - Road 68/Court Street
    - Madison Avenue/Burden Boulevard
    - Road 36/Argent Road
    - Road 44/Argent Road

- 20th Avenue/ Court Street
  - 4th Avenue/I-182 WB ramp terminal
  - US 12/A Street
  - US 395 SB ramp terminal/Rainier Avenue/Kartchner Street
  - US 395/Foster Wells Road
- AM peak period congestion on Road 100 between the I-182 interchange and Argent Road from Chiawana High School traffic
- Existing at-grade intersections on national highways, including US 12/A Street and US 395/Foster Wells Road
- High access density without a center, two-way left turn lane on Court Street and Sylvester Street
- Vehicle speeding
- Existing, multi-lane half street connections without striping to denote travel lanes

APPENDIX

719 SECOND AVENUE, SUITE 1250, SEATTLE, WA 98104 · 206.382.9800 · DKSASSOCIATES.COM

TRAFFIC SAFETY ASSESSMENT

DATE: Feb 12, 2020

TO: Project Management Team | City of Pasco

FROM: Veronica Sullivan, Carl Springer | DKS Associates

SUBJECT: Pasco Transportation System Master Plan Project #19209-000

SUMMARY

Traffic safety was evaluated on major roadways within the City of Pasco. Collision data was provided by WSDOT for the five-year period from 2014 to 2018[1]. The study team identified the following findings related the existing safety conditions:

- The most common collision types were rear-end and entering at angle crashes.
- 75% of rear-end crashes and 64% of all crashes occurred at intersections[2].
- The five intersections with the highest crash rate were W Court Street/ Road 68, Sylvester Street/Road 28, Burden Boulevard/Road 68, 20th Avenue/ W Court Street and Sandifur Parkway/ Road 68.
- The six roadway segments with highest crash rate accounted for 57% of all collisions within the city were Burden Boulevard, 20th Avenue, Sylvester Street, Lewis Street, Road 68 and Court Street.
- For most crashes, neither speeding nor alcohol/drug use were documented as significant contributors, and only reported in less than 8% of all crashes.

[1] Crash data provided from the 2020 City Safety Program:

https://www.wsdot.wa.gov/LocalPrograms/Traffic/CitySafetyProgram

[2] Intersection related crash includes "at intersection and related", "at intersection and not related" and "intersection related but not at intersection".

- The most common driver errors reported were inattention, failed to yield right-of-way and following too closely.
- 42% of pedestrian crashes involved a driver that reported inattention or field to yield right-of way to pedestrian.
- 77% of bicycle crashes occurred at intersections and 54% involved a vehicle making a turning movement.

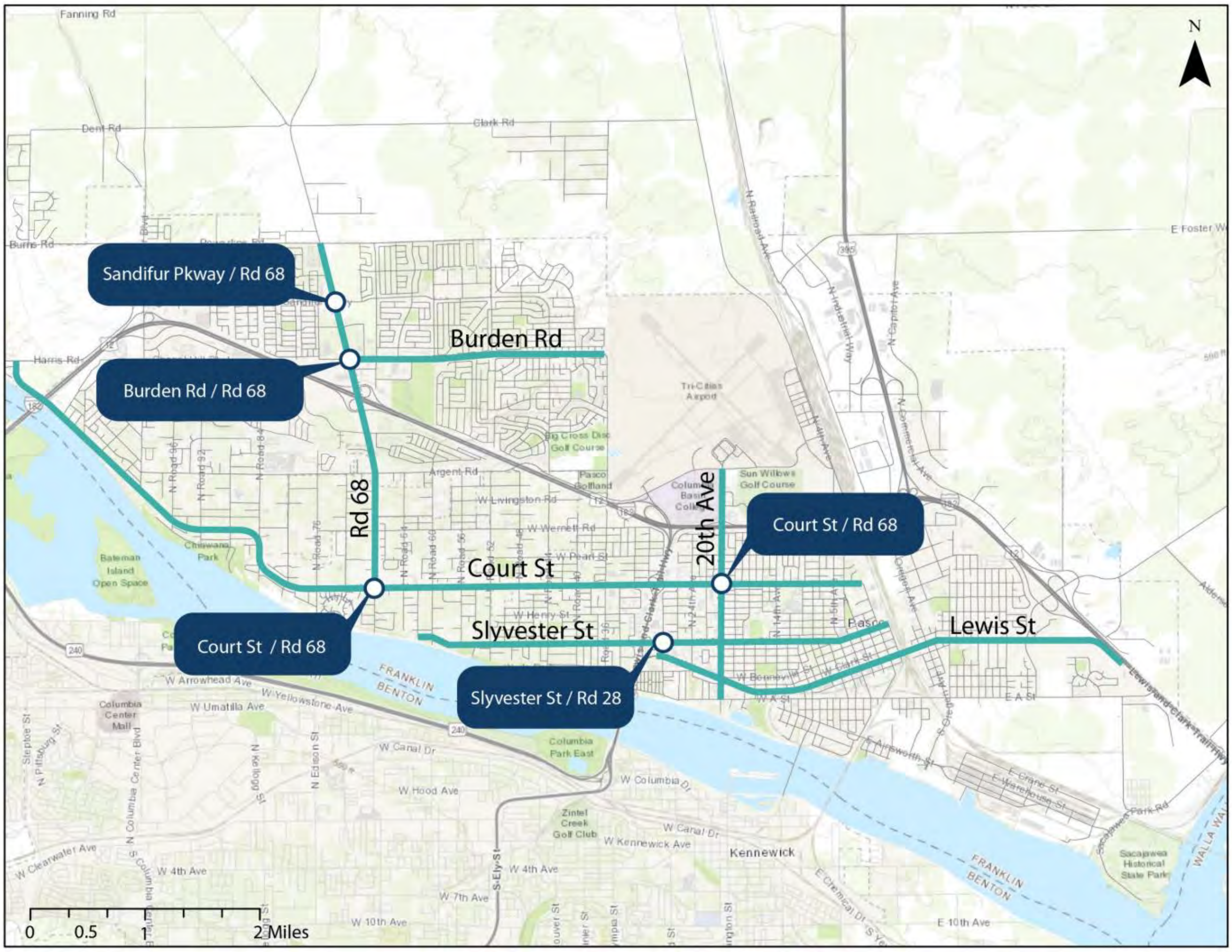


Figure 1: Identified high crash rate intersections and roadway segments.

TRAFFIC SAFETY ANALYSIS RESULTS

TRENDS OVER LAST FIVE YEARS

There were 3,984 total crashes reported (797 per year) within the City of Pasco on all roadway facilities. The type, severity, and reported driver errors are summarized in the following discussion.

- 1159 rear-end crashes (29% of crashes)
- 1087 entering at angle crashes (27% of crashes)
- 54 pedestrian-related crashes (1.4% of crashes)
- 26 bicycle-related crashes (0.01% of crashes)

Crashes within the City of Pasco; over the past five years:

- 7 crashes resulted in fatalities
- 43 crashes resulted in serious injuries (Injury A)
- 72% of crashes are property damage only or lead to minor injuries (Injury C)

The most common driver errors are responsible for nearly 65 percent of all crashes including:

- 1019 Inattention (26%)
- 627 Did Not Yield Right-of-Way (16%)
- 561 Followed Too Closely (14%)
- 225 Improper Turn or U-turn (6%)
- 121 Disregard Stop and Go Light (3%)

Risky behavior, including alcohol/drug use or speeding was implicated in 141 and 175 crashes, respectively. These crashes tend to be less severe; alcohol/drug use and speeding is involved in 64% and 80% of property damage only crashes.

PEDESTRIAN SAFETY

54 crashes involved at least one pedestrian. Crashes were most common in along major arterials, including W Court Street (13 crashes), W Sylvester Street (7 crashes) and W Lewis Street (5 crashes).

- About two-thirds (61%) of pedestrian-involved crashes occurred during daylight conditions.
- 22% (12 crashes) were caused by drivers failing to yield the right of way and 20% were caused by driver inattention.
- 11 crashes were hit and run
- 26 crashes occurred at a marked crosswalk
- 16 crashes involved a ped crossing at an intersection with a signal
- 6 crashes involved a ped crossing at an intersection with no signal

BICYCLE SAFETY

26 crashes involved a bicyclist over the past five years.

- 77% of crashes occurred at an intersection.
- 2 crashes occurred at the intersections of W Argent Rd/ Road 100 and W Court St/Route 395 Northbound off ramps.
- 3 crashes occurred along these two segments: N 4th Ave and N 20th Ave.
- 54% of crashes involved a vehicle that was making a turning movement: 8 crashes making a left turn and 6 crashes making a right turn.
- 5 crashes occurred in dark conditions, including one reported with no streetlights on. The remaining crashes occurred during daylight conditions.
- 8 crashes reported the cyclist with "inattention" and 4 crashes where the cyclist did not grant right-of-way to vehicle.

Most of the crashes involving a bicyclist were caused by drivers failing to yield the right of way when turning or crossing (64 percent). The remaining crashes were caused by either a bicycle or motorist failing to obey traffic control devices. All bicycle crashes occurred during the day.

INTERSECTION SAFETY

52% of crashes occur at intersections and 27% of crashes were within 75 feet of a signalized intersection. Table 1 shows the weighted crash rate based on crash severity and frequency.

TABLE 1: INTERSECTIONS WITH HIGH CRASH RATES

#	LOCATION	NO APPARENT INJURY	POSSIBLE INJURY	SUSPECTED MINOR INJURY	SUSPECTED SERIOUS INJURY	GRAND TOTAL	WEIGHTED TOTAL*	APPROXIMATE AADT	CRASH RATE[3]
1	W COURT ST AND RD 68	20	13	3	0	36	180	9830	2.01
2	SYLVESTER ST AND RD 28	28	9	1	1	39	228	14640	1.46
3	BURDEN BLVD AND RD 68	77	22	2	2	103	517	48370	1.17
4	20TH AVE AND W COURT ST	45	18	4	0	67	265	26990	1.36
5	SANDIFUR PKWY AND RD 68	26	13	2	0	41	176	23070	0.97
6	BURDEN BLVD AND CONVENTION PL	32	16	1	1	50	302	43960	0.62
7	W COURT ST AND 26TH AVE	21	8	4	0	33	141	25340	0.71
8	RD 68 AND EB RAMPS	55	13	2	0	70	205	42970	0.89
9	RD 68 AND WB RAMPS	46	15	3	0	64	226	48260	0.73
10	BURDEN BLVD AND CLEMENTE LN	39	11	1	0	51	159	43560	0.64

* Weighted total is based on the severity of the crash = PDO+ 10(Possible Injury +Suspected Minor Injury) + 100*(Suspected Serious Injury).

[3] Intersection Crash Rate Formula in Section 3.2.2:

https://safety.fhwa.dot.gov/local_rural/training/fhwasa1210/s3.cfm

SEGMENT SAFETY

Six study segments were selected based on the number of crashes per mile, as summarized in Table 2 below. The combined number of crashes for all six segments make up 57% of total crashes within the City of Pasco.

TABLE 2: STUDY SEGMENTS CRASH DATA SUMMARY

#	STUDY SEGMENT	UNKNOWN	NO APPARENT INJURY	POSSIBLE INJURY	SUSPECTED MINOR INJURY	SUSPECTED SERIOUS INJURY	DIED IN HOSPITAL	GRAND TOTAL	PEDESTRIAN CRASHES	BICYCLIST CRASHES	APPROX. STUDY CORRIDOR LENGTH IN MILES	AVERAGE AADT[4]	CRASH RATE[5]
1	BURDEN BLVD	0	253	67	6	4	0	330	1	0	0.48	9447	3987.64
2	20TH AVE	0	236	58	12	3	0	309	6	4	2.0	7046	1201.50
3	SYLVESTER ST	6	177	61	13	4	1	262	7	0	4.12	3673	948.68
4	LEWIS ST	4	227	79	12	3	0	325	6	6	4.22	4828	874.06
5	RD 68	2	391	119	18	3	0	533	0	0	3.07	13687	695.05
6	COURT ST	5	373	126	25	2	0	531	11	2	6.68	6710	522.43

[4] Average AADT was an average of the volume collected from Pasco Tube Counts in 2018: https://data-cityofpasco.opendata.arcgis.com/datasets/pasco-tube-counts-2018

[5] Crash rate was calculated using Section 3.2.1 Road Segment Rate Calculation: https://safety.fhwa.dot.gov/local_rural/training/fhwasa1210/s3.cfm

APPENDIX A – DETAILED DIAGRAMS OF CRASH DATA

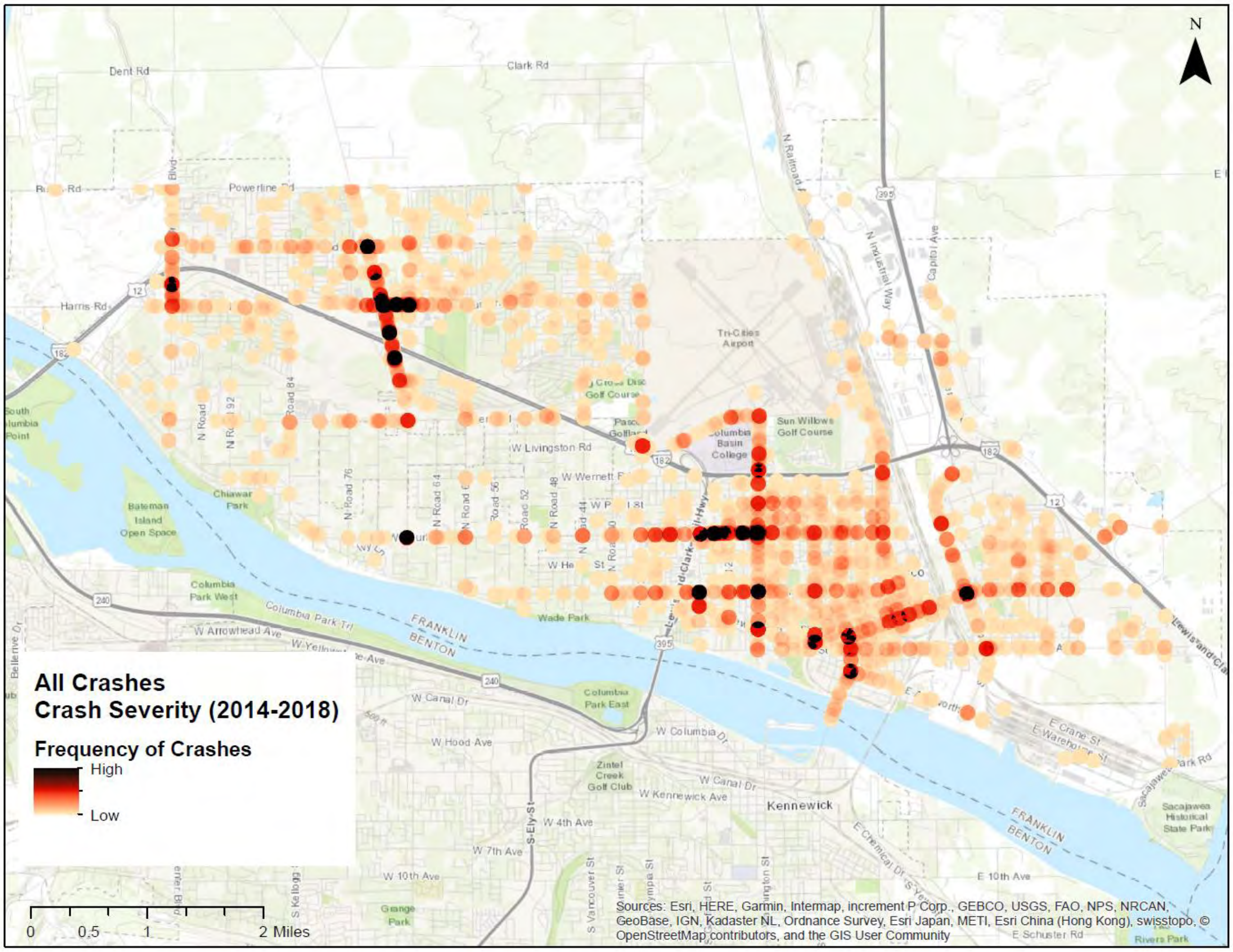


Figure 2: Heat Map of All Crashes within the City of Pasco.

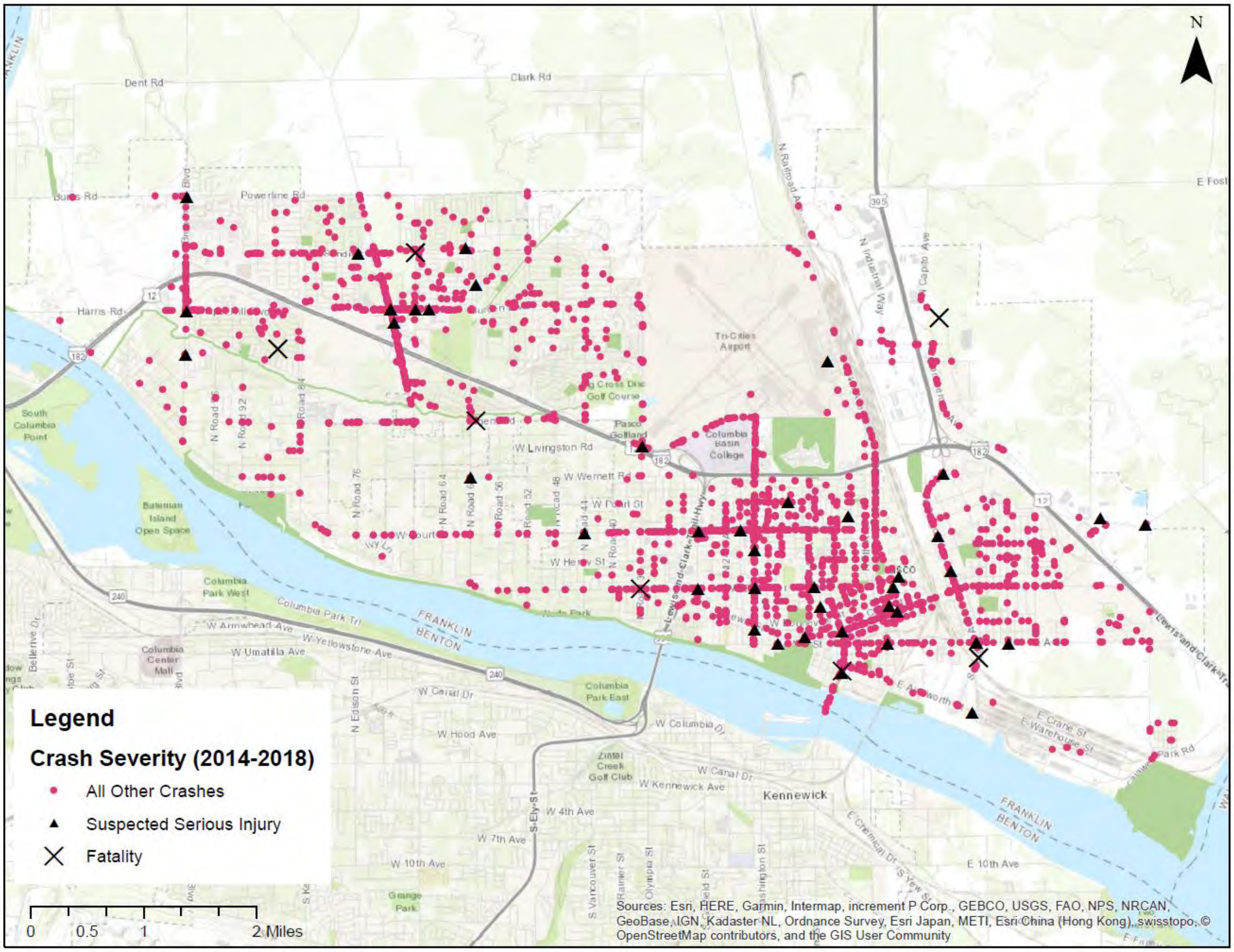


Figure 3: Location of Crashes Including Suspected Serious Injury and Fatality.

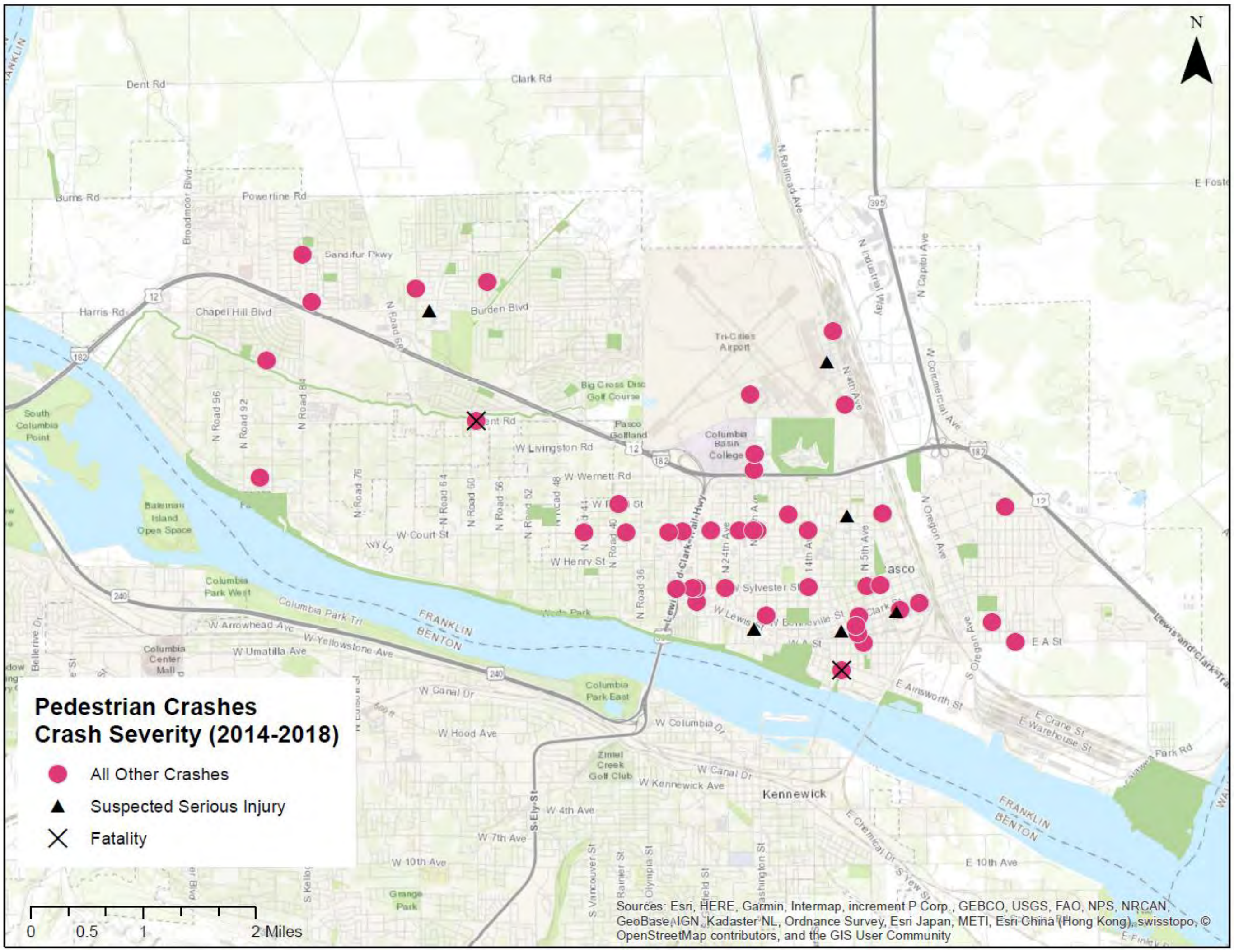


Figure 4: Location of Pedestrian Crashes Based on Crash Severity.

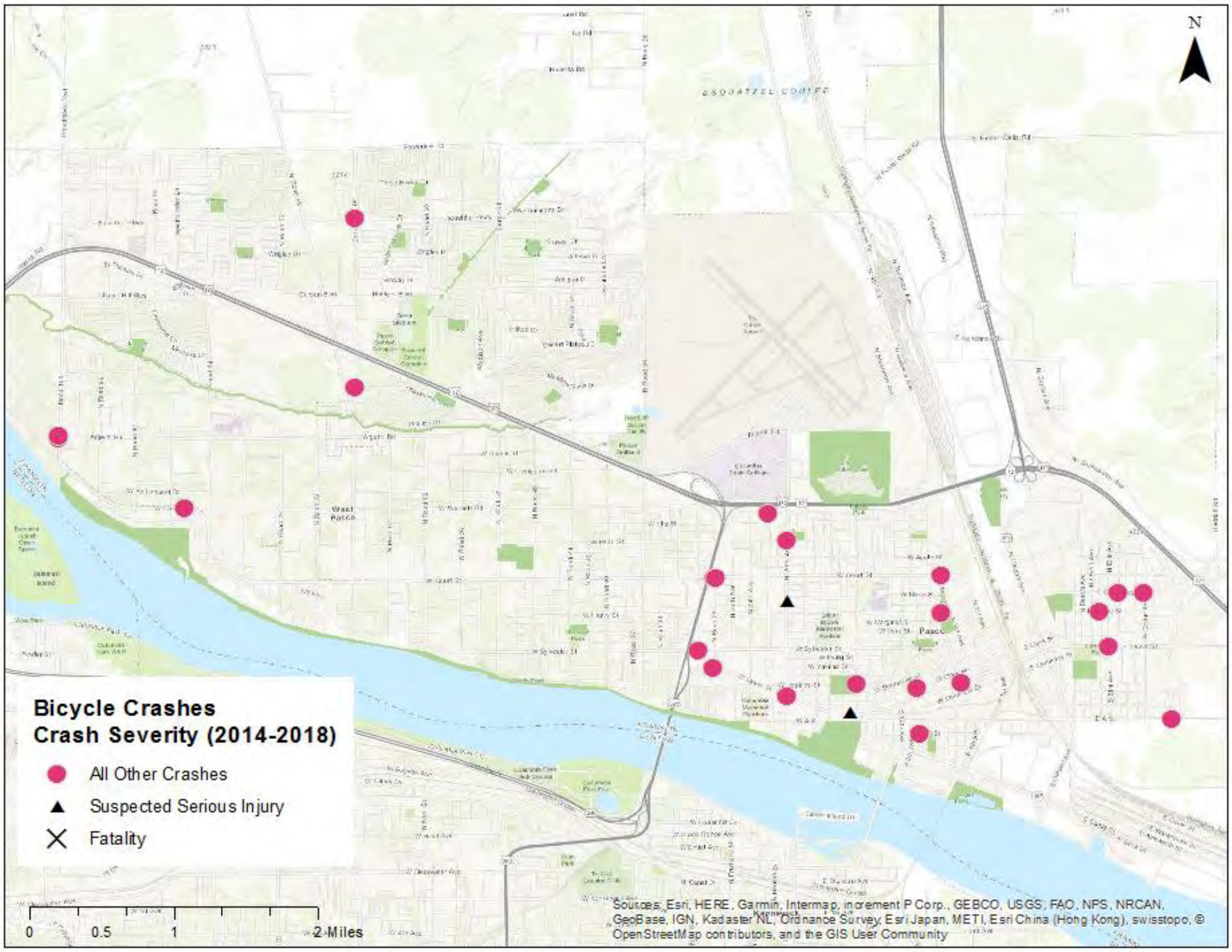
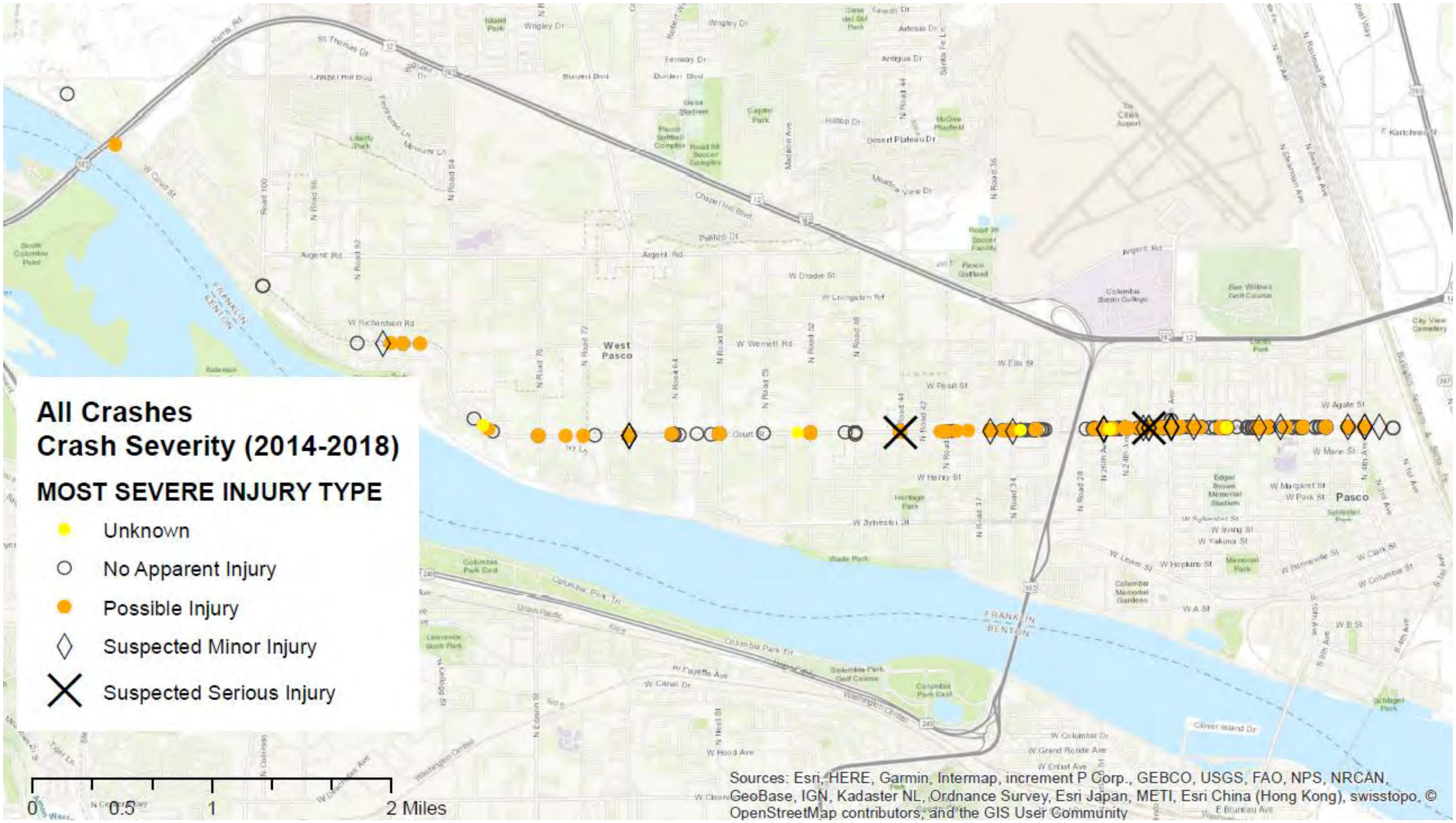
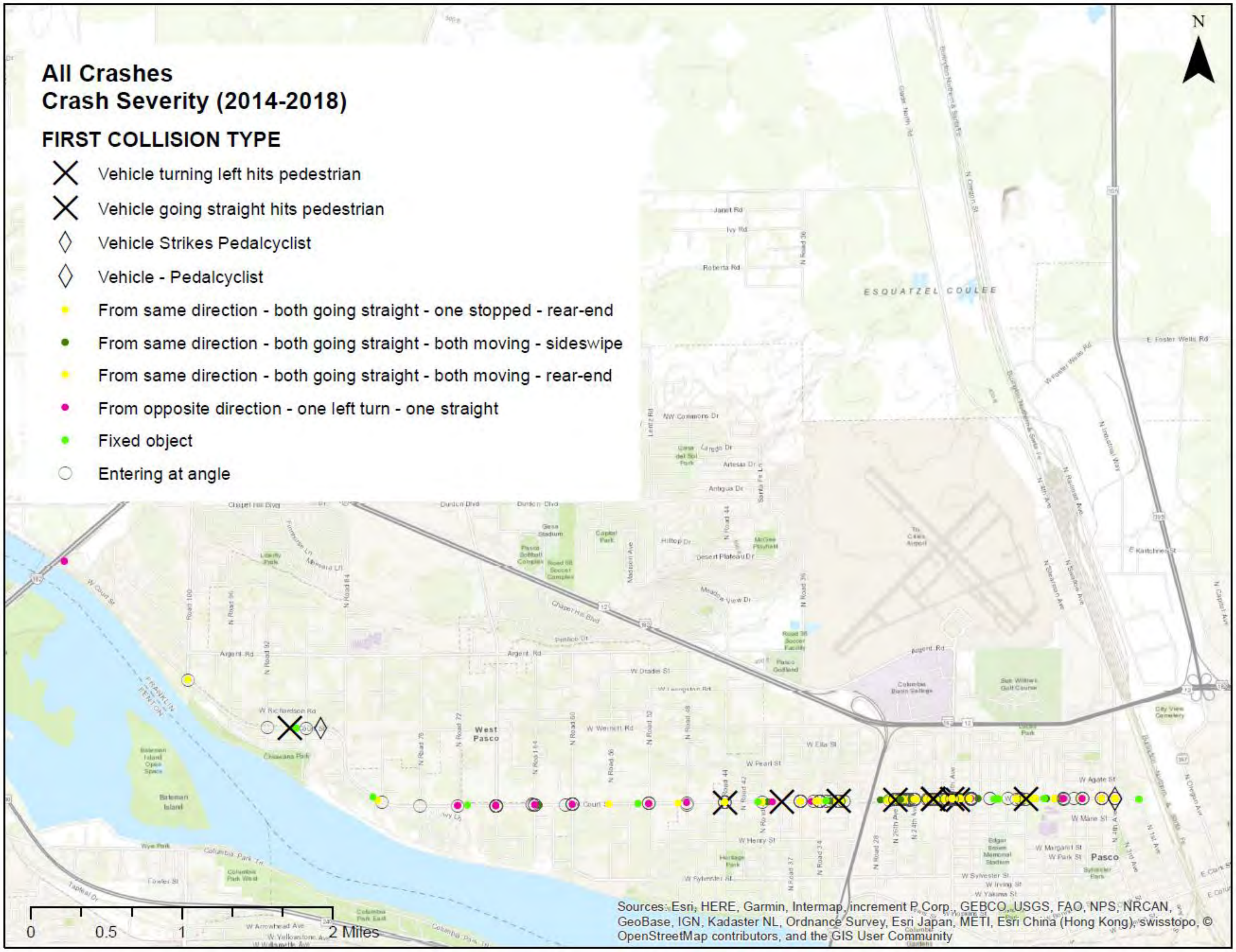


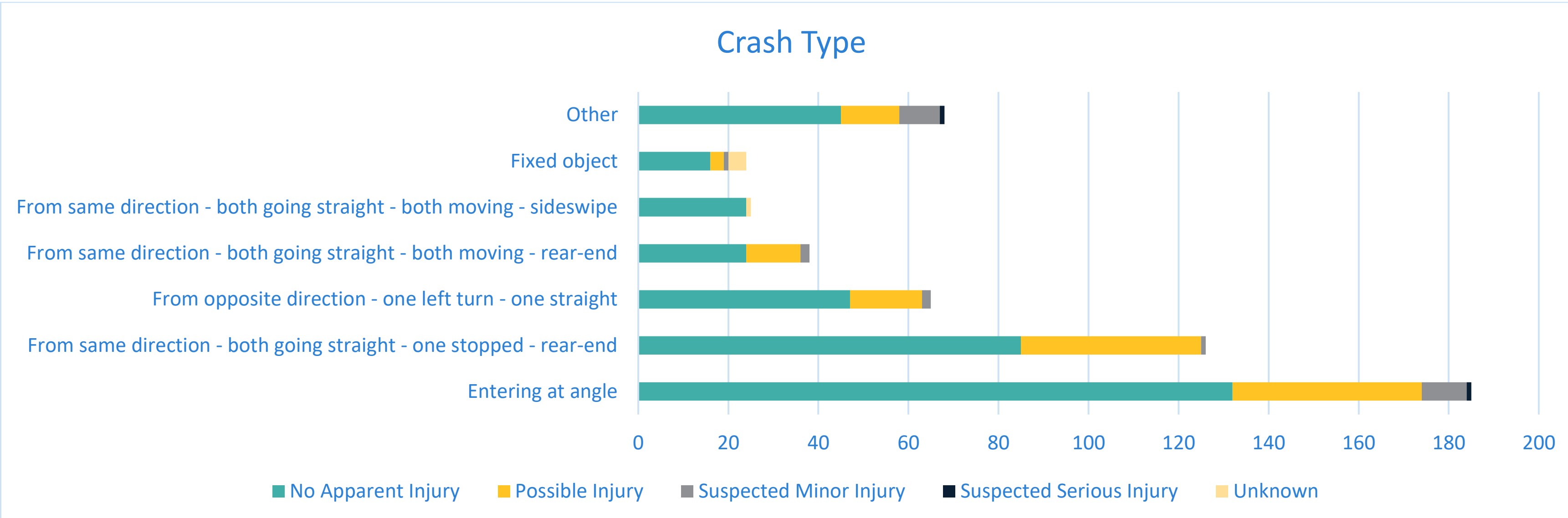
Figure 5: Location of Bicycle Crashes Based on Crash Severity.

COURT ST


All Crashes
Crash Severity (2014-2018)
MOST SEVERE INJURY TYPE
Unknown
No Apparent Injury
Possible Injury
Suspected Minor Injury
Suspected Serious Injury
0 0.5 1 2 Miles
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community
West Pasco
Pasco


All Crashes
Crash Severity (2014-2018)
FIRST COLLISION TYPE
Vehicle turning left hits pedestrian
Vehicle going straight hits pedestrian
Vehicle Strikes Pedalcyclist
Vehicle - Pedalcyclist
From same direction - both going straight - one stopped - rear-end
From same direction - both going straight - both moving - sideswipe
From same direction - both going straight - both moving - rear-end
From opposite direction - one left turn - one straight
Fixed object
Entering at angle
N
0
0.5
1
2 Miles
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Top 6 Crash types along the Corridor:



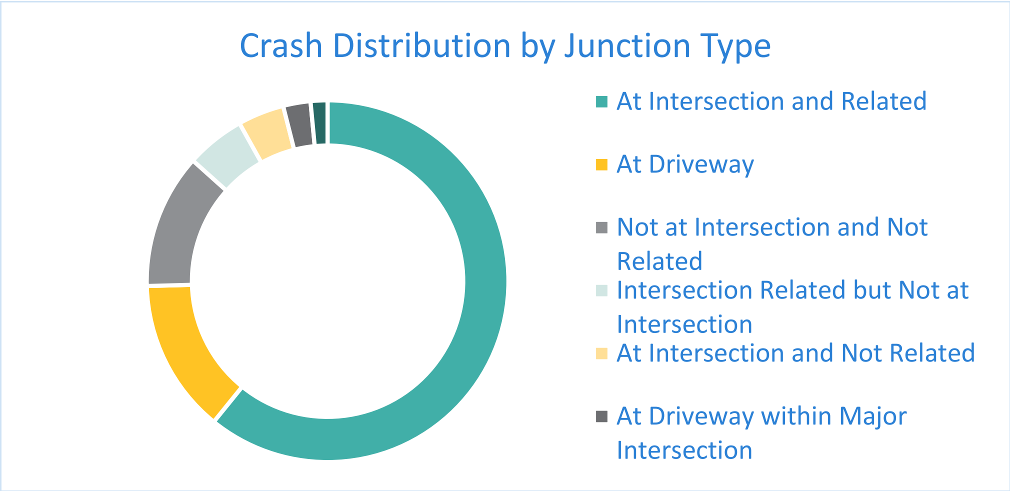
Reasons for Collison Type:

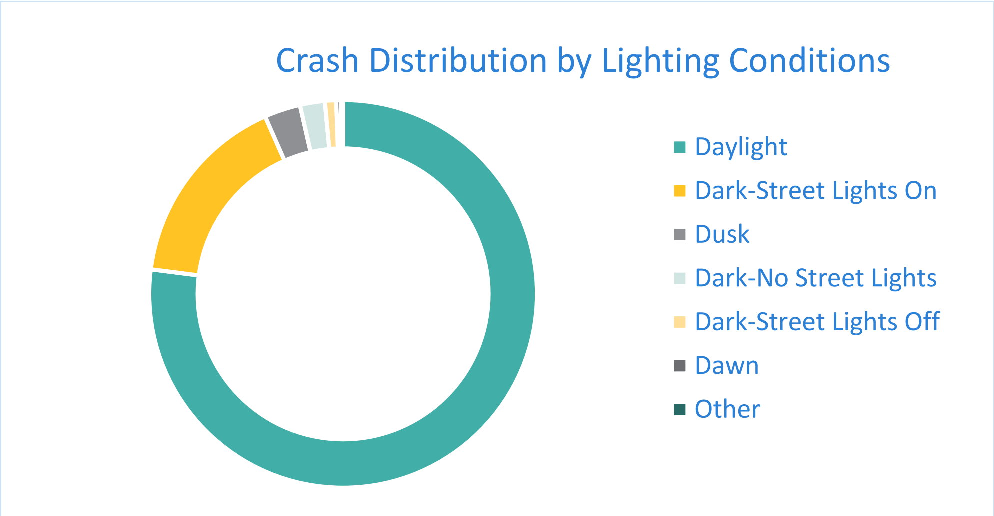
COLLISON TYPE	NUMBER OF CRASHES
ENTERING AT ANGLE	185
➢ DID NOT GRANT RW TO VEHICLE	66
➢ INATTENTION	50
➢ DISREGARD STOP AND GO LIGHT	19
➢ IMPROPER TURN	14
➢ DISREGARD STOP SIGN - FLASHING RED	8
➢ NONE	7
➢ OTHER	6

➢ EXCEEDING REAS. SAFE SPEED	5
➢ UNKNOWN DRIVER DISTRACTION	5
➢ UNDER INFLUENCE OF ALCOHOL	1
➢ OTHER DRIVER DISTRACTIONS INSIDE VEHICLE	1
➢ DRIVER DISTRACTIONS OUTSIDE VEHICLE	1
➢ DRIVER NOT DISTRACTED	1
➢ IMPROPER BACKING	1
FROM SAME DIRECTION - BOTH GOING STRAIGHT - ONE STOPPED - REAR-END	126
➢ FOLLOW TOO CLOSELY	56
➢ INATTENTION	35
➢ OPERATING DEFECTIVE EQUIPMENT	7
➢ OTHER	6
➢ NONE	5
➢ EXCEEDING REAS. SAFE SPEED	4
➢ DID NOT GRANT RW TO VEHICLE	2
➢ UNKNOWN DRIVER DISTRACTION	2
➢ APPARENTLY ASLEEP	1
➢ DRIVER OPERATING HANDHELD TELECOMMUNICAT	1
➢ DRIVER NOT DISTRACTED	1
➢ APPARENTLY FATIGUED	1
➢ UNDER INFLUENCE OF ALCOHOL	1
➢ DRIVER DISTRACTIONS OUTSIDE VEHICLE	1
➢ DRIVER INTERACTING WITH PASSENGERS, ANIM	1
➢ DRIVER OPERATING OTHER ELECTRONIC DEVICE	1
➢ DRIVER READING OR WRITING	1
FROM OPPOSITE DIRECTION - ONE LEFT TURN - ONE STRAIGHT	65
➢ DID NOT GRANT RW TO VEHICLE	27
➢ IMPROPER TURN	12
➢ INATTENTION	10
➢ NONE	6
➢ OTHER	3
➢ UNDER INFLUENCE OF ALCOHOL	2

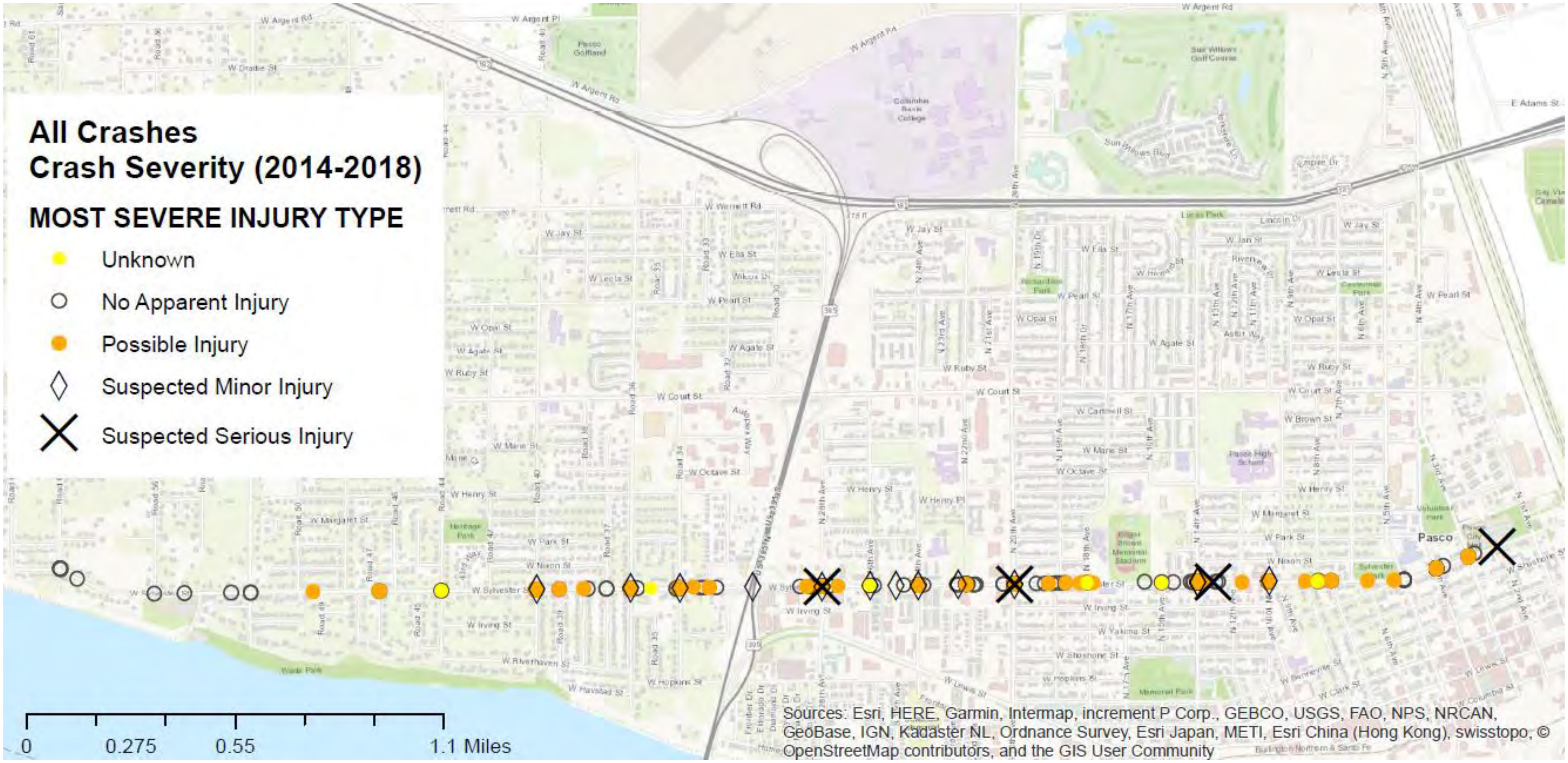
➢	DISREGARD STOP AND GO LIGHT	2
➢	DISREGARD YIELD SIGN - FLASHING YELLOW	2
➢	DISREGARD STOP SIGN - FLASHING RED	1

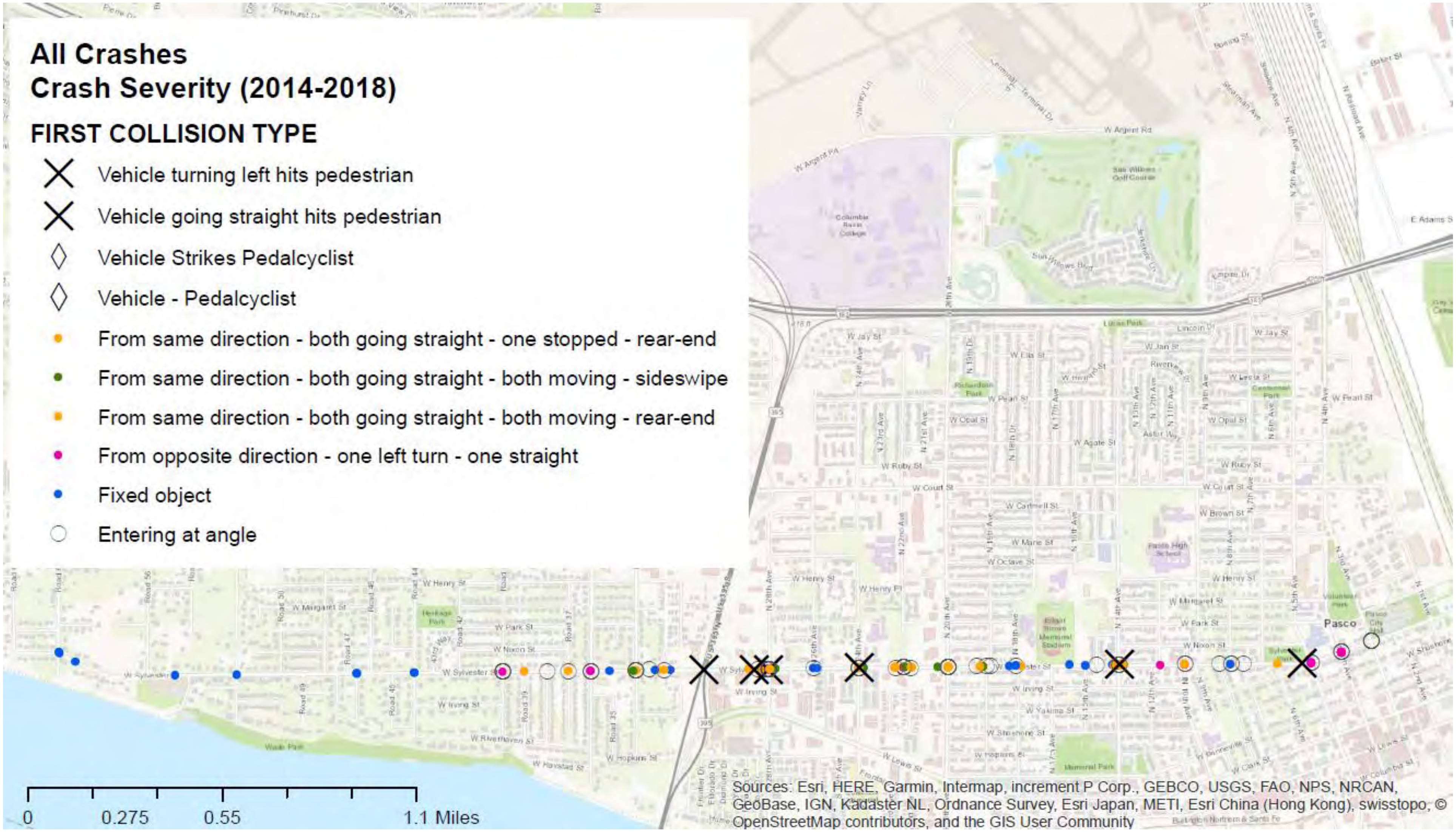
Other Crash Data:



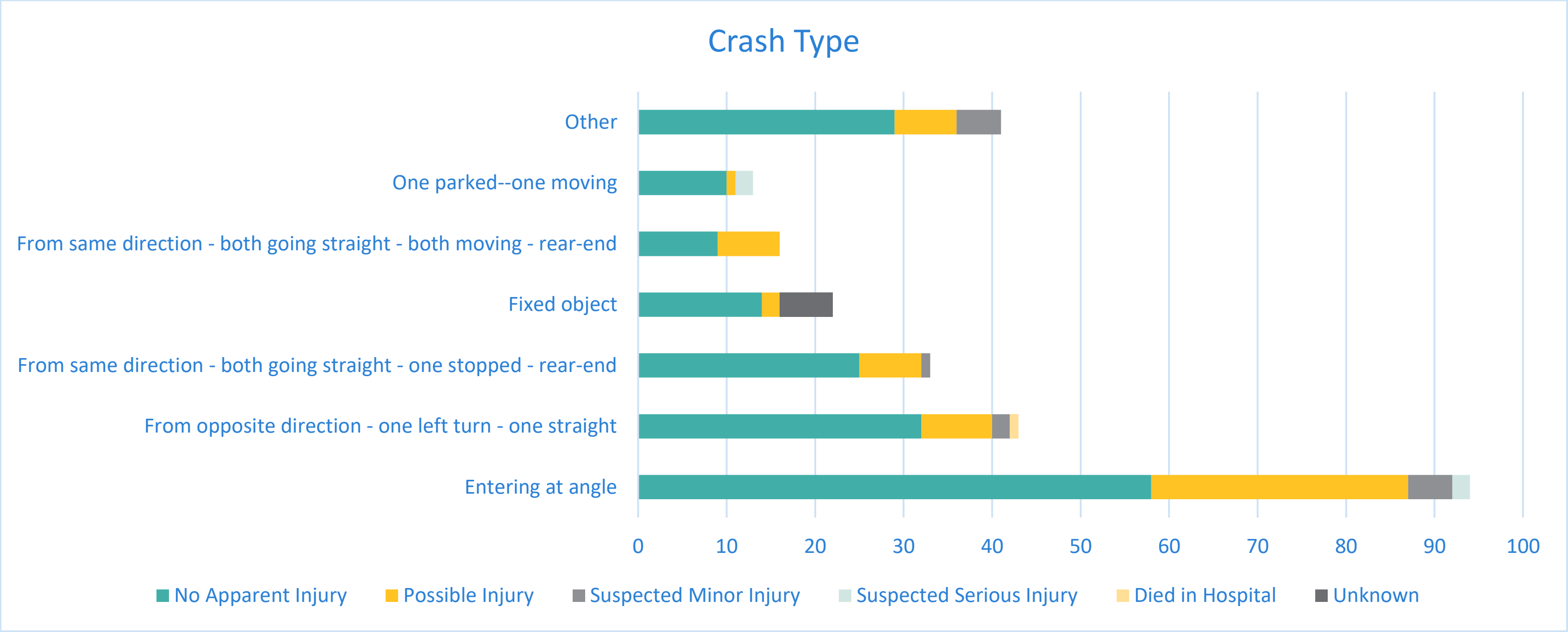


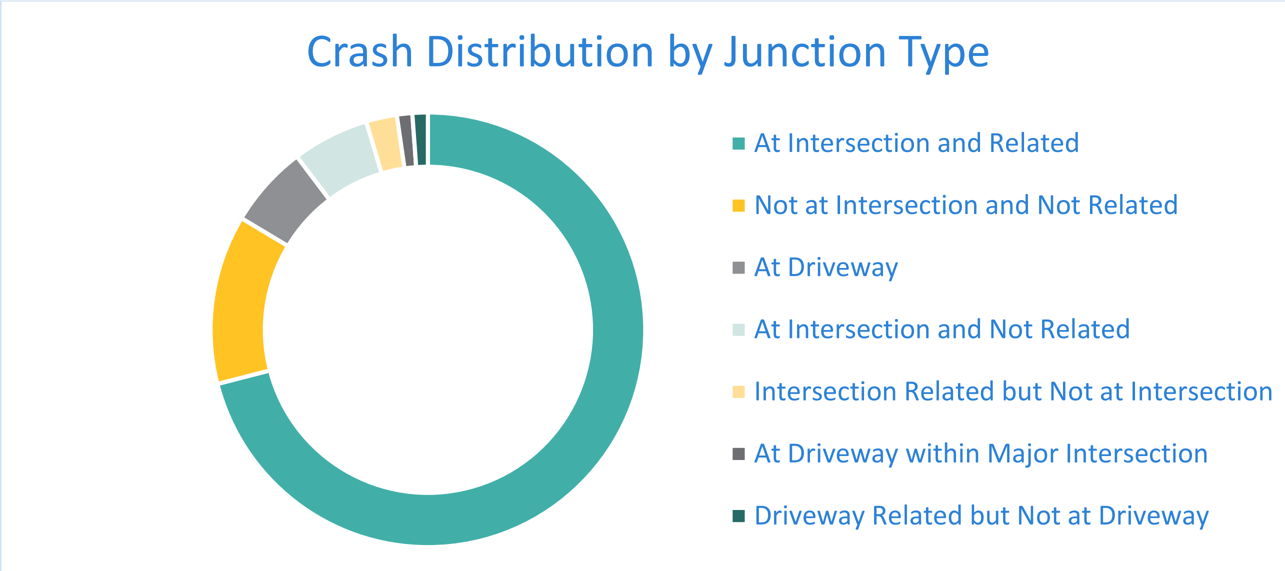
SYLVESTER ST

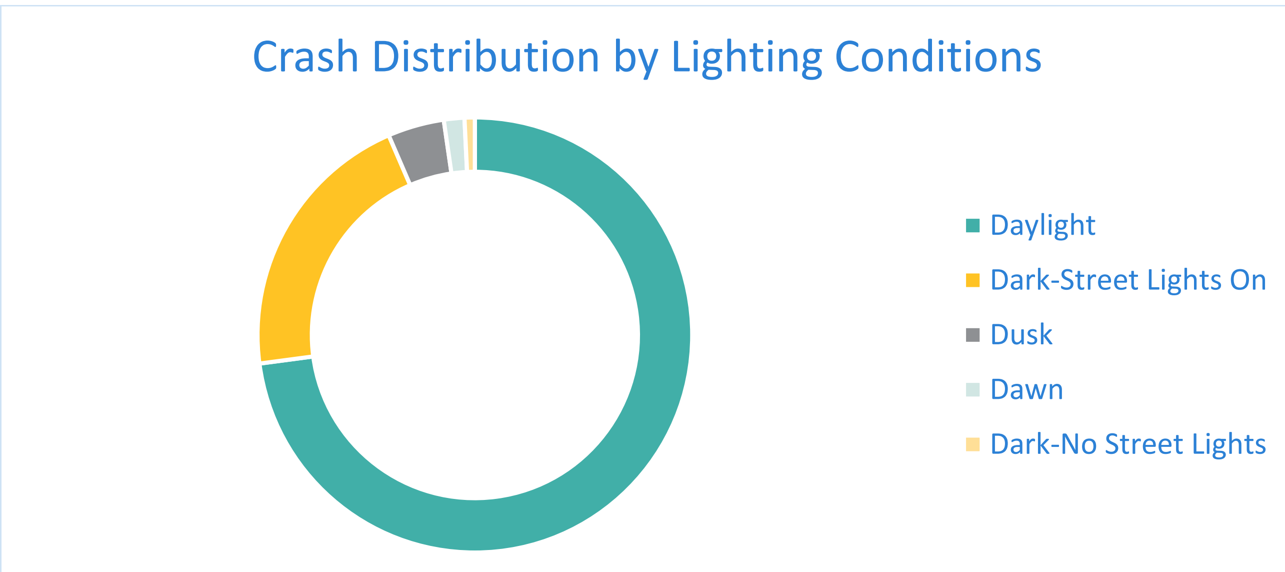



All Crashes
Crash Severity (2014-2018)
FIRST COLLISION TYPE
Vehicle turning left hits pedestrian
Vehicle going straight hits pedestrian
Vehicle Strikes Pedalcyclist
Vehicle - Pedalcyclist
From same direction - both going straight - one stopped - rear-end
From same direction - both going straight - both moving - sideswipe
From same direction - both going straight - both moving - rear-end
From opposite direction - one left turn - one straight
Fixed object
Entering at angle
0
0.275
0.55
1.1 Miles
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Top 6 Crash types along the Sylvester Corridor:




Crash Distribution by Junction Type
At Intersection and Related
Not at Intersection and Not Related
At Driveway
At Intersection and Not Related
Intersection Related but Not at Intersection
At Driveway within Major Intersection
Driveway Related but Not at Driveway


Crash Distribution by Lighting Conditions
Daylight
Dark-Street Lights On
Dusk
Dawn
Dark-No Street Lights

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	220	0	185	0	631	559	0	502	839
Future Volume (veh/h)	0	0	0	220	0	185	0	631	559	0	502	839
Initial Q (Qb), veh				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
Parking Bus, Adj				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	
Adj Sat Flow, veh/h/ln				1856	0	1781	0	1781	1885	0	1811	1856
Adj Flow Rate, veh/h				250	0	210	0	717	0	0	570	0
Peak Hour Factor				0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %				3	0	8	0	8	1	0	6	3
Cap, veh/h				295	0	252	0	2430		0	2470	
Arrive On Green				0.17	0.00	0.17	0.00	0.24	0.00	0.00	0.72	0.00
Sat Flow, veh/h				1767	0	1510	0	3474	1598	0	3532	1572
Grp Volume(v), veh/h				250	0	210	0	717	0	0	570	0
Grp Sat Flow(s),veh/h/ln				1767	0	1510	0	1692	1598	0	1721	1572
Q Serve(g_s), s				11.0	0.0	10.8	0.0	13.9	0.0	0.0	4.5	0.0
Cycle Q Clear(g_c), s				11.0	0.0	10.8	0.0	13.9	0.0	0.0	4.5	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				295	0	252	0	2430		0	2470	
V/C Ratio(X)				0.85	0.00	0.83	0.00	0.30		0.00	0.23	
Avail Cap(c_a), veh/h				539	0	460	0	2430		0	2470	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.77	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				32.3	0.0	32.2	0.0	13.9	0.0	0.0	3.8	0.0
Incr Delay (d2), s/veh				2.6	0.0	2.7	0.0	0.2	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				4.7	0.0	3.9	0.0	6.2	0.0	0.0	1.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				34.9	0.0	35.0	0.0	14.2	0.0	0.0	4.0	0.0
LnGrp LOS				C	A	C	A	B		A	A	
Approach Vol, veh/h					460			717	A		570	A
Approach Delay, s/veh					34.9			14.2			4.0	
Approach LOS					C			B			A	
Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		62.0				62.0		18.0				
Change Period (Y+Rc), s		4.6				4.6		4.6				
Max Green Setting (Gmax), s		46.4				46.4		24.4				
Max Q Clear Time (g_c+I1), s		15.9				6.5		13.0				
Green Ext Time (p_c), s		4.9				4.2		0.4				
Intersection Summary												
HCM 6th Ctrl Delay			16.3									
HCM 6th LOS			B									

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
2: Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp

04/14/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	409	0	319	0	0	0	0	781	345	210	512	0
Future Volume (veh/h)	409	0	319	0	0	0	0	781	345	210	512	0
Initial Q (Qb), veh	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
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	1796	0	1841				0	1841	1870	1796	1841	0
Adj Flow Rate, veh/h	481	0	0				0	919	406	247	602	0
Peak Hour Factor	0.85	0.85	0.85				0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	7	0	4				0	4	2	7	4	0
Cap, veh/h	580	0					0	2006	909	393	1307	0
Arrive On Green	0.17	0.00	0.00				0.00	0.57	0.57	0.03	0.23	0.00
Sat Flow, veh/h	3319	0	1560				0	3589	1585	1711	1841	0
Grp Volume(v), veh/h	481	0	0				0	919	406	247	602	0
Grp Sat Flow(s),veh/h/ln	1659	0	1560				0	1749	1585	1711	1841	0
Q Serve(g_s), s	11.2	0.0	0.0				0.0	12.2	11.7	4.1	22.5	0.0
Cycle Q Clear(g_c), s	11.2	0.0	0.0				0.0	12.2	11.7	4.1	22.5	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	580	0					0	2006	909	393	1307	0
V/C Ratio(X)	0.83	0.00					0.00	0.46	0.45	0.63	0.46	0.00
Avail Cap(c_a), veh/h	1054	0					0	2006	909	565	1307	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	0.33	0.33	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	0.92	0.92	0.00
Uniform Delay (d), s/veh	31.9	0.0	0.0				0.0	9.9	9.8	9.0	17.5	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.0				0.0	0.8	1.6	0.6	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	0.0	0.0				0.0	3.9	3.6	1.2	11.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.0	0.0	0.0				0.0	10.6	11.4	9.5	18.6	0.0
LnGrp LOS	C	A					A	B	B	A	B	A
Approach Vol, veh/h		481	A					1325			849	
Approach Delay, s/veh		33.0						10.9			15.9	
Approach LOS		C						B			B	

Timer - Assigned Phs	1	2	4	6
Phs Duration (G+Y+Rc), s	10.9	50.5	18.6	61.4
Change Period (Y+Rc), s	4.6	4.6	4.6	4.6
Max Green Setting (Gmax), s	11.4	26.4	25.4	45.4
Max Q Clear Time (g_c+I1), s	6.1	14.2	13.2	24.5
Green Ext Time (p_c), s	0.2	5.8	0.8	3.6

Intersection Summary	
HCM 6th Ctrl Delay	16.5
HCM 6th LOS	B

Notes

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

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	193	3	463	0	620	329	0	1231	667
Future Volume (veh/h)	0	0	0	193	3	463	0	620	329	0	1231	667
Initial Q (Qb), veh				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
Parking Bus, Adj				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	
Adj Sat Flow, veh/h/ln				1826	1826	1826	0	1856	1856	0	1870	1870
Adj Flow Rate, veh/h				212	3	509	0	681	0	0	1353	0
Peak Hour Factor				0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %				5	5	5	0	3	3	0	2	2
Cap, veh/h				1229	665	564	0	1662		0	1675	
Arrive On Green				0.36	0.36	0.36	0.00	0.63	0.00	0.00	0.47	0.00
Sat Flow, veh/h				3374	1826	1547	0	3618	1572	0	3647	1585
Grp Volume(v), veh/h				212	3	509	0	681	0	0	1353	0
Grp Sat Flow(s),veh/h/ln				1687	1826	1547	0	1763	1572	0	1777	1585
Q Serve(g_s), s				2.4	0.1	17.5	0.0	5.4	0.0	0.0	18.2	0.0
Cycle Q Clear(g_c), s				2.4	0.1	17.5	0.0	5.4	0.0	0.0	18.2	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				1229	665	564	0	1662		0	1675	
V/C Ratio(X)				0.17	0.00	0.90	0.00	0.41		0.00	0.81	
Avail Cap(c_a), veh/h				1410	763	647	0	1662		0	1675	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	0.00	0.86	0.00	0.00	0.53	0.00
Uniform Delay (d), s/veh				12.1	11.3	16.9	0.0	6.5	0.0	0.0	12.6	0.0
Incr Delay (d2), s/veh				0.0	0.0	14.4	0.0	0.6	0.0	0.0	2.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	7.6	0.0	1.6	0.0	0.0	6.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				12.1	11.3	31.2	0.0	7.2	0.0	0.0	15.0	0.0
LnGrp LOS				B	B	C	A	A		A	B	
Approach Vol, veh/h					724			681	A		1353	A
Approach Delay, s/veh					25.6			7.2			15.0	
Approach LOS					C			A			B	

Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		31.0				31.0		25.0				
Change Period (Y+Rc), s		4.6				4.6		4.6				
Max Green Setting (Gmax), s		23.4				23.4		23.4				
Max Q Clear Time (g_c+I1), s		7.4				20.2		19.5				
Green Ext Time (p_c), s		2.8				2.7		0.9				

Intersection Summary	
HCM 6th Ctrl Delay	15.8
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.
Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	287	0	131	0	0	0	0	662	361	0	539	885
Future Volume (veh/h)	287	0	131	0	0	0	0	662	361	0	539	885
Initial Q (Qb), veh	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
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	1856	0	1856				0	1856	1856	0	1841	1841
Adj Flow Rate, veh/h	305	0	0				0	704	384	0	573	0
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	0	3				0	3	3	0	4	4
Cap, veh/h	432	0					0	1535	836	0	2438	
Arrive On Green	0.13	0.00	0.00				0.00	0.70	0.70	0.00	1.00	0.00
Sat Flow, veh/h	3428	0	1572				0	2295	1200	0	3589	1560
Grp Volume(v), veh/h	305	0	0				0	563	525	0	573	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1763	1640	0	1749	1560
Q Serve(g_s), s	4.8	0.0	0.0				0.0	8.0	8.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	4.8	0.0	0.0				0.0	8.0	8.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00				0.00		0.73	0.00		1.00
Lane Grp Cap(c), veh/h	432	0					0	1229	1143	0	2438	
V/C Ratio(X)	0.71	0.00					0.00	0.46	0.46	0.00	0.24	
Avail Cap(c_a), veh/h	1433	0					0	1229	1143	0	2438	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.67	1.67
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	0.00	0.65	0.00
Uniform Delay (d), s/veh	23.5	0.0	0.0				0.0	3.8	3.8	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0				0.0	1.2	1.3	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	0.0				0.0	1.9	1.8	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.3	0.0	0.0				0.0	5.0	5.1	0.0	0.1	0.0
LnGrp LOS	C	A					A	A	A	A	A	
Approach Vol, veh/h		305	A					1088			573	A
Approach Delay, s/veh		24.3						5.1			0.1	
Approach LOS		C						A			A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		44.3		11.7		44.3
Change Period (Y+Rc), s		5.3		4.6		5.3
Max Green Setting (Gmax), s		22.7		23.4		22.7
Max Q Clear Time (g_c+I1), s		10.0		6.8		2.0
Green Ext Time (p_c), s		4.3		0.3		3.1

Intersection Summary	
HCM 6th Ctrl Delay	6.6
HCM 6th LOS	A

Notes

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

Unsignalized Delay for [EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	818	102	42	165	3	154	3	385	3	0	0
Future Volume (veh/h)	1	818	102	42	165	3	154	3	385	3	0	0
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	1870	1870	1870	1796	1796	1796	1870	1870	1870	1900	1900	1900
Adj Flow Rate, veh/h	1	1010	0	52	204	4	190	4	0	4	0	0
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	7	7	7	2	2	2	0	0	0
Cap, veh/h	634	1476		346	1627	32	382	401		161	24	0
Arrive On Green	0.00	0.42	0.00	0.06	0.48	0.48	0.11	0.21	0.00	0.01	0.00	0.00
Sat Flow, veh/h	1781	3554	1585	1711	3424	67	3456	1870	1585	1435	1900	0
Grp Volume(v), veh/h	1	1010	0	52	101	107	190	4	0	4	0	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1711	1706	1784	1728	1870	1585	1435	1900	0
Q Serve(g_s), s	0.0	11.7	0.0	0.8	1.7	1.7	2.6	0.1	0.0	0.1	0.0	0.0
Cycle Q Clear(g_c), s	0.0	11.7	0.0	0.8	1.7	1.7	2.6	0.1	0.0	0.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	634	1476		346	811	848	382	401		161	24	0
V/C Ratio(X)	0.00	0.68		0.15	0.13	0.13	0.50	0.01		0.02	0.00	0.00
Avail Cap(c_a), veh/h	1335	2603		918	1250	1307	2052	1651		427	376	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.6	12.1	0.0	8.6	7.4	7.4	21.1	15.6	0.0	24.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.6	0.0	0.1	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.5	0.0	0.2	0.4	0.5	1.0	0.0	0.0	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.6	12.6	0.0	8.7	7.5	7.5	21.5	15.6	0.0	24.7	0.0	0.0
LnGrp LOS	A	B		A	A	A	C	B		C	A	A
Approach Vol, veh/h		1011	A		260			194	A		4	
Approach Delay, s/veh		12.6			7.7			21.4			24.7	
Approach LOS		B			A			C			C	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	8.2	26.4	10.2	5.7	5.2	29.4		15.9
Change Period (Y+Rc), s	5.1	5.4	4.6	5.1	5.1	5.4		5.1
Max Green Setting (Gmax), s	20.0	37.0	30.0	10.0	20.0	37.0		44.6
Max Q Clear Time (g_c+I1), s	2.8	13.7	4.6	2.1	2.0	3.7		2.1
Green Ext Time (p_c), s	0.0	7.3	0.3	0.0	0.0	1.1		0.0

Intersection Summary	
HCM 6th Ctrl Delay	12.9
HCM 6th LOS	B

Notes

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

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	605	373	0	398	193	0	0	0	255	0	285
Future Volume (veh/h)	0	605	373	0	398	193	0	0	0	255	0	285
Initial Q (Qb), veh	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
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1856	1856	0	1856	1856				1870	0	1870
Adj Flow Rate, veh/h	0	747	0	0	491	0				315	0	352
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81				0.81	0.81	0.81
Percent Heavy Veh, %	0	3	3	0	3	3				2	0	2
Cap, veh/h	0	1508		0	1508					514	0	457
Arrive On Green	0.00	0.43	0.00	0.00	0.43	0.00				0.29	0.00	0.29
Sat Flow, veh/h	0	3711	0	0	3711	0				1781	0	1585
Grp Volume(v), veh/h	0	747	0	0	491	0				315	0	352
Grp Sat Flow(s),veh/h/ln	0	1763	0	0	1763	0				1781	0	1585
Q Serve(g_s), s	0.0	5.4	0.0	0.0	3.3	0.0				5.4	0.0	7.2
Cycle Q Clear(g_c), s	0.0	5.4	0.0	0.0	3.3	0.0				5.4	0.0	7.2
Prop In Lane	0.00		0.00	0.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1508		0	1508					514	0	457
V/C Ratio(X)	0.00	0.50		0.00	0.33					0.61	0.00	0.77
Avail Cap(c_a), veh/h	0	5502		0	5502					1264	0	1124
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	7.3	0.0	0.0	6.7	0.0				10.8	0.0	11.5
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	0.0				0.4	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.3	0.0	0.0	0.8	0.0				1.5	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	7.4	0.0	0.0	6.8	0.0				11.3	0.0	12.5
LnGrp LOS	A	A		A	A					B	A	B
Approach Vol, veh/h		747	A		491	A					667	
Approach Delay, s/veh		7.4			6.8						11.9	
Approach LOS		A			A						B	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		20.1		15.2		20.1
Change Period (Y+Rc), s		5.0		5.0		5.0
Max Green Setting (Gmax), s		55.0		25.0		55.0
Max Q Clear Time (g_c+I1), s		7.4		9.2		5.3
Green Ext Time (p_c), s		3.9		1.0		2.4

Intersection Summary	
HCM 6th Ctrl Delay	8.8
HCM 6th LOS	A

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑			↑↑	↱	↰		↱			
Traffic Volume (veh/h)	280	580	0	0	416	428	175	0	213	0	0	0
Future Volume (veh/h)	280	580	0	0	416	428	175	0	213	0	0	0
Initial Q (Qb), veh	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			
Parking Bus, Adj	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				
Adj Sat Flow, veh/h/ln	1856	1856	0	0	1841	1841	1870	0	1870			
Adj Flow Rate, veh/h	318	659	0	0	473	486	199	0	242			
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88			
Percent Heavy Veh, %	3	3	0	0	4	4	2	0	2			
Cap, veh/h	559	2185	0	0	1324	591	345	0	307			
Arrive On Green	0.15	0.62	0.00	0.00	0.38	0.38	0.19	0.00	0.19			
Sat Flow, veh/h	1767	3618	0	0	3589	1560	1781	0	1585			
Grp Volume(v), veh/h	318	659	0	0	473	486	199	0	242			
Grp Sat Flow(s),veh/h/ln	1767	1763	0	0	1749	1560	1781	0	1585			
Q Serve(g_s), s	5.1	4.7	0.0	0.0	5.2	15.1	5.4	0.0	7.8			
Cycle Q Clear(g_c), s	5.1	4.7	0.0	0.0	5.2	15.1	5.4	0.0	7.8			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	559	2185	0	0	1324	591	345	0	307			
V/C Ratio(X)	0.57	0.30	0.00	0.00	0.36	0.82	0.58	0.00	0.79			
Avail Cap(c_a), veh/h	957	3549	0	0	3521	1570	797	0	709			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	7.3	4.8	0.0	0.0	12.0	15.0	19.6	0.0	20.6			
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.0	0.1	1.1	0.6	0.0	1.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.4	1.1	0.0	0.0	1.8	4.7	2.0	0.0	2.7			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.6	4.8	0.0	0.0	12.0	16.2	20.2	0.0	22.3			
LnGrp LOS	A	A	A	A	B	B	C	A	C			
Approach Vol, veh/h		977			959			441				
Approach Delay, s/veh		5.7			14.1			21.3				
Approach LOS		A			B			C				

Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		38.2			12.9	25.3		15.4				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		54.0			20.0	54.0		24.0				
Max Q Clear Time (g_c+I1), s		6.7			7.1	17.1		9.8				
Green Ext Time (p_c), s		3.4			0.4	3.2		0.6				

Intersection Summary			
HCM 6th Ctrl Delay			12.0
HCM 6th LOS			B

Notes

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

Intersection						
Int Delay, s/veh	4.8					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	388	161	0	85	163
Future Vol, veh/h	0	388	161	0	85	163
Conflicting Peds, #/hr	3	0	0	3	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	3	3	12	12	2	2
Mvmt Flow	0	456	189	0	100	192

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	192	0	-	0	648	192
Stage 1	-	-	-	-	192	-
Stage 2	-	-	-	-	456	-
Critical Hdwy	4.13	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.227	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1375	-	-	-	435	850
Stage 1	-	-	-	-	841	-
Stage 2	-	-	-	-	638	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1371	-	-	-	432	848
Mov Cap-2 Maneuver	-	-	-	-	432	-
Stage 1	-	-	-	-	838	-
Stage 2	-	-	-	-	636	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	15.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1371	-	-	-	638
HCM Lane V/C Ratio	-	-	-	-	0.457
HCM Control Delay (s)	0	-	-	-	15.3
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	114	0	259	211	980	0	0	493	229
Future Volume (veh/h)	0	0	0	114	0	259	211	980	0	0	493	229
Initial Q (Qb), veh				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
Parking Bus, Adj				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	
Adj Sat Flow, veh/h/ln				1856	1856	1856	1870	1870	0	0	1856	1856
Adj Flow Rate, veh/h				144	0	328	267	1241	0	0	624	290
Peak Hour Factor				0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Percent Heavy Veh, %				3	3	3	2	2	0	0	3	3
Cap, veh/h				447	0	398	425	2067	0	0	888	413
Arrive On Green				0.25	0.00	0.25	0.12	0.58	0.00	0.00	0.38	0.38
Sat Flow, veh/h				1767	0	1572	1781	3647	0	0	2429	1085
Grp Volume(v), veh/h				144	0	328	267	1241	0	0	471	443
Grp Sat Flow(s),veh/h/ln				1767	0	1572	1781	1777	0	0	1763	1658
Q Serve(g_s), s				4.0	0.0	11.9	5.0	13.6	0.0	0.0	13.6	13.7
Cycle Q Clear(g_c), s				4.0	0.0	11.9	5.0	13.6	0.0	0.0	13.6	13.7
Prop In Lane				1.00		1.00	1.00		0.00	0.00		0.65
Lane Grp Cap(c), veh/h				447	0	398	425	2067	0	0	670	631
V/C Ratio(X)				0.32	0.00	0.82	0.63	0.60	0.00	0.00	0.70	0.70
Avail Cap(c_a), veh/h				848	0	755	656	2942	0	0	1459	1373
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				18.4	0.0	21.3	11.3	8.1	0.0	0.0	15.8	15.8
Incr Delay (d2), s/veh				0.3	0.0	3.3	0.6	0.3	0.0	0.0	1.4	1.4
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.6	0.0	4.4	1.6	4.0	0.0	0.0	5.1	4.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				18.7	0.0	24.6	11.9	8.4	0.0	0.0	17.2	17.3
LnGrp LOS				B	A	C	B	A	A	A	B	B
Approach Vol, veh/h					472			1508			914	
Approach Delay, s/veh					22.8			9.0			17.2	
Approach LOS					C			A			B	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		40.1			12.2	28.0		20.3				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		50.0			15.0	50.0		29.0				
Max Q Clear Time (g_c+I1), s		15.6			7.0	15.7		13.9				
Green Ext Time (p_c), s		11.9			0.3	7.2		1.4				
Intersection Summary												
HCM 6th Ctrl Delay			13.9									
HCM 6th LOS			B									

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	663	335	116	528	440	167
Future Volume (veh/h)	663	335	116	528	440	167
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1885	1885	1856	1856	1841	1841
Adj Flow Rate, veh/h	850	429	149	677	564	214
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %	1	1	3	3	4	4
Cap, veh/h	1104	506	414	1848	830	314
Arrive On Green	0.32	0.32	0.11	0.52	0.33	0.33
Sat Flow, veh/h	3483	1598	1767	3618	2572	939
Grp Volume(v), veh/h	850	429	149	677	397	381
Grp Sat Flow(s),veh/h/ln	1742	1598	1767	1763	1749	1670
Q Serve(g_s), s	12.8	14.5	2.8	6.5	11.3	11.4
Cycle Q Clear(g_c), s	12.8	14.5	2.8	6.5	11.3	11.4
Prop In Lane	1.00	1.00	1.00			0.56
Lane Grp Cap(c), veh/h	1104	506	414	1848	585	559
V/C Ratio(X)	0.77	0.85	0.36	0.37	0.68	0.68
Avail Cap(c_a), veh/h	1204	552	678	3046	1511	1443
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	17.9	18.5	10.5	8.1	16.6	16.6
Incr Delay (d2), s/veh	2.9	11.1	0.2	0.1	1.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.0	13.2	0.9	2.0	4.2	4.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	20.7	29.5	10.7	8.2	18.0	18.1
LnGrp LOS	C	C	B	A	B	B
Approach Vol, veh/h	1279			826	778	
Approach Delay, s/veh	23.7			8.7	18.0	
Approach LOS	C			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		34.9		22.9	11.0	24.0
Change Period (Y+Rc), s		4.6		4.6	4.6	4.6
Max Green Setting (Gmax), s		50.0		20.0	15.0	50.0
Max Q Clear Time (g_c+I1), s		8.5		16.5	4.8	13.4
Green Ext Time (p_c), s		5.5		1.8	0.1	5.9

Intersection Summary			
HCM 6th Ctrl Delay			17.8
HCM 6th LOS			B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	42	111	140	243	202	100
Future Volume (veh/h)	42	111	140	243	202	100
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1633	1633	1781	1781	1707	1707
Adj Flow Rate, veh/h	44	117	147	256	213	105
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	18	18	8	8	13	13
Cap, veh/h	333	297	538	971	302	149
Arrive On Green	0.21	0.21	0.14	0.54	0.28	0.28
Sat Flow, veh/h	1555	1384	1697	1781	1079	532
Grp Volume(v), veh/h	44	117	147	256	0	318
Grp Sat Flow(s),veh/h/ln	1555	1384	1697	1781	0	1612
Q Serve(g_s), s	0.9	2.8	1.9	2.9	0.0	6.8
Cycle Q Clear(g_c), s	0.9	2.8	1.9	2.9	0.0	6.8
Prop In Lane	1.00	1.00	1.00			0.33
Lane Grp Cap(c), veh/h	333	297	538	971	0	451
V/C Ratio(X)	0.13	0.39	0.27	0.26	0.00	0.71
Avail Cap(c_a), veh/h	1221	1087	1180	1399	0	1265
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.1	12.9	6.9	4.6	0.0	12.3
Incr Delay (d2), s/veh	0.1	0.6	0.1	0.1	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.1	0.4	0.6	0.0	2.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.3	13.5	7.0	4.8	0.0	14.4
LnGrp LOS	B	B	A	A	A	B
Approach Vol, veh/h	161			403	318	
Approach Delay, s/veh	13.2			5.6	14.4	
Approach LOS	B			A	B	
Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		25.4		12.8	10.1	15.3
Change Period (Y+Rc), s		4.6		4.6	4.6	4.6
Max Green Setting (Gmax), s		30.0		30.0	20.0	30.0
Max Q Clear Time (g_c+I1), s		4.9		4.8	3.9	8.8
Green Ext Time (p_c), s		1.5		0.4	0.2	2.0
Intersection Summary						
HCM 6th Ctrl Delay			10.1			
HCM 6th LOS			B			

Notes

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	131	458	154	252	247	66
Future Volume (veh/h)	131	458	154	252	247	66
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1811	1811	1767	1767	1707	1707
Adj Flow Rate, veh/h	154	539	181	296	291	78
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	6	6	9	9	13	13
Cap, veh/h	672	598	394	774	407	343
Arrive On Green	0.39	0.39	0.11	0.44	0.24	0.24
Sat Flow, veh/h	1725	1535	1682	1767	1707	1441
Grp Volume(v), veh/h	154	539	181	296	291	78
Grp Sat Flow(s),veh/h/ln	1725	1535	1682	1767	1707	1441
Q Serve(g_s), s	3.5	19.2	4.3	6.6	9.1	2.5
Cycle Q Clear(g_c), s	3.5	19.2	4.3	6.6	9.1	2.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	672	598	394	774	407	343
V/C Ratio(X)	0.23	0.90	0.46	0.38	0.72	0.23
Avail Cap(c_a), veh/h	891	793	781	912	1046	883
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	11.9	16.7	13.6	11.0	20.3	17.8
Incr Delay (d2), s/veh	0.1	10.3	0.3	0.3	2.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	15.7	1.4	2.3	3.6	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	12.0	27.0	13.9	11.3	22.7	18.2
LnGrp LOS	B	C	B	B	C	B
Approach Vol, veh/h	693			477	369	
Approach Delay, s/veh	23.7			12.3	21.7	
Approach LOS	C			B	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		30.5		27.6	11.6	18.8
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		30.0		30.0	20.0	35.6
Max Q Clear Time (g_c+I1), s		8.6		21.2	6.3	11.1
Green Ext Time (p_c), s		1.7		1.4	0.2	2.0

Intersection Summary			
HCM 6th Ctrl Delay			19.7
HCM 6th LOS			B

Notes

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

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	2	59	6	5	6	202	591	6	5	446	13
Future Vol, veh/h	8	2	59	6	5	6	202	591	6	5	446	13
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	-	-	Stop	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	250	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	20	20	20	36	36	36	21	21	21	25	25	25
Mvmt Flow	9	2	63	6	5	6	215	629	6	5	474	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1238	1556	244	1310	1560	318	488	0	0	635	0	0
Stage 1	491	491	-	1062	1062	-	-	-	-	-	-	-
Stage 2	747	1065	-	248	498	-	-	-	-	-	-	-
Critical Hdwy	7.9	6.9	7.3	8.22	7.22	7.62	4.52	-	-	4.6	-	-
Critical Hdwy Stg 1	6.9	5.9	-	7.22	6.22	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.9	5.9	-	7.22	6.22	-	-	-	-	-	-	-
Follow-up Hdwy	3.7	4.2	3.5	3.86	4.36	3.66	2.41	-	-	2.45	-	-
Pot Cap-1 Maneuver	114	94	704	87	80	587	949	-	-	804	-	-
Stage 1	483	504	-	186	234	-	-	-	-	-	-	-
Stage 2	333	261	-	646	465	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	87	72	704	64	61	587	949	-	-	804	-	-
Mov Cap-2 Maneuver	87	72	-	64	61	-	-	-	-	-	-	-
Stage 1	373	501	-	144	181	-	-	-	-	-	-	-
Stage 2	247	202	-	582	462	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.5	54.1	2.5	0.1
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	949	-	-	339	91	804	-	-
HCM Lane V/C Ratio	0.226	-	-	0.217	0.199	0.007	-	-
HCM Control Delay (s)	9.9	-	-	18.5	54.1	9.5	-	-
HCM Lane LOS	A	-	-	C	F	A	-	-
HCM 95th %tile Q(veh)	0.9	-	-	0.8	0.7	0	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	31	0	86	235	139	0	35	11	27	9	2
Future Vol, veh/h	59	31	0	86	235	139	0	35	11	27	9	2
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	190	-	-	550	-	550	200	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	26	26	26	22	22	22	38	38	38	24	24	24
Mvmt Flow	69	36	0	101	276	164	0	41	13	32	11	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	440	0	0	37	0	0	742	817	37	679	653	276
Stage 1	-	-	-	-	-	-	175	175	-	478	478	-
Stage 2	-	-	-	-	-	-	567	642	-	201	175	-
Critical Hdwy	4.36	-	-	4.32	-	-	7.48	6.88	6.58	7.34	6.74	6.44
Critical Hdwy Stg 1	-	-	-	-	-	-	6.48	5.88	-	6.34	5.74	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.48	5.88	-	6.34	5.74	-
Follow-up Hdwy	2.434	-	-	2.398	-	-	3.842	4.342	3.642	3.716	4.216	3.516
Pot Cap-1 Maneuver	1004	-	-	1454	-	-	290	274	941	338	360	713
Stage 1	-	-	-	-	-	-	750	691	-	529	520	-
Stage 2	-	-	-	-	-	-	450	417	-	753	714	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1004	-	-	1453	-	-	253	237	940	260	311	713
Mov Cap-2 Maneuver	-	-	-	-	-	-	253	237	-	260	311	-
Stage 1	-	-	-	-	-	-	698	643	-	492	484	-
Stage 2	-	-	-	-	-	-	408	388	-	647	664	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.8	1.4	20.3	19.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	289	1004	-	-	1453	-	-	260	347
HCM Lane V/C Ratio	-	0.187	0.069	-	-	0.07	-	-	0.122	0.037
HCM Control Delay (s)	0	20.3	8.9	-	-	7.7	-	-	20.8	15.8
HCM Lane LOS	A	C	A	-	-	A	-	-	C	C
HCM 95th %tile Q(veh)	-	0.7	0.2	-	-	0.2	-	-	0.4	0.1

Intersection	
Int Delay, s/veh	12.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	13	42	2	80	4	106	45	9	141	149	273
Future Vol, veh/h	12	13	42	2	80	4	106	45	9	141	149	273
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	200	-	-	225	-	-	260	-	110
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	44	44	44	29	29	29	54	54	54	10	10	10
Mvmt Flow	14	15	49	2	93	5	123	52	10	164	173	317

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	98	0	0	64	0	0	413	170	40	199	192	96
Stage 1	-	-	-	-	-	-	68	68	-	100	100	-
Stage 2	-	-	-	-	-	-	345	102	-	99	92	-
Critical Hdwy	4.54	-	-	4.39	-	-	7.64	7.04	6.74	7.2	6.6	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	6.64	6.04	-	6.2	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.64	6.04	-	6.2	5.6	-
Follow-up Hdwy	2.596	-	-	2.461	-	-	3.986	4.486	3.786	3.59	4.09	3.39
Pot Cap-1 Maneuver	1269	-	-	1383	-	-	468	639	901	743	689	939
Stage 1	-	-	-	-	-	-	827	747	-	887	797	-
Stage 2	-	-	-	-	-	-	575	720	-	888	803	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1269	-	-	1383	-	-	247	631	901	681	681	939
Mov Cap-2 Maneuver	-	-	-	-	-	-	247	631	-	681	681	-
Stage 1	-	-	-	-	-	-	818	739	-	877	796	-
Stage 2	-	-	-	-	-	-	297	719	-	807	794	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.2	25.8	11.4
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	247	664	1269	-	-	1383	-	-	681	681	939
HCM Lane V/C Ratio	0.499	0.095	0.011	-	-	0.002	-	-	0.241	0.254	0.338
HCM Control Delay (s)	33.3	11	7.9	-	-	7.6	-	-	12	12.1	10.8
HCM Lane LOS	D	B	A	-	-	A	-	-	B	B	B
HCM 95th %tile Q(veh)	2.6	0.3	0	-	-	0	-	-	0.9	1	1.5

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations										
Traffic Vol, veh/h	0	381	58	61	72	0	0	268	0	0
Future Vol, veh/h	0	381	58	61	72	0	0	268	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None	-	-
Storage Length	-	-	275	350	-	-	-	0	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	76	76	76	76	76	76	76	76	92	92
Heavy Vehicles, %	7	7	7	27	27	27	8	8	2	2
Mvmt Flow	0	501	76	80	95	0	0	353	0	0

Major/Minor	Major1			Major2			Minor1		Minor2	
Conflicting Flow All	-	0	0	577	0	0	-	501	-	95
Stage 1	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	4.37	-	-	-	6.28	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	2.443	-	-	-	3.372	-	3.318
Pot Cap-1 Maneuver	0	-	-	884	-	0	0	558	0	962
Stage 1	0	-	-	-	-	0	0	-	0	-
Stage 2	0	-	-	-	-	0	0	-	0	-
Platoon blocked, %		-	-		-					
Mov Cap-1 Maneuver	-	-	-	884	-	-	-	558	-	962
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SE
HCM Control Delay, s	0	4.3	21.9	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	SELn1
Capacity (veh/h)	558	-	-	884	-	-
HCM Lane V/C Ratio	0.632	-	-	0.091	-	-
HCM Control Delay (s)	21.9	-	-	9.5	-	0
HCM Lane LOS	C	-	-	A	-	A
HCM 95th %tile Q(veh)	4.4	-	-	0.3	-	-

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	183	466	0	0	119	176	0	0	74	0	0	14
Future Vol, veh/h	183	466	0	0	119	176	0	0	74	0	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	330	-	-	-	-	270	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	8	8	8	27	27	27	33	33	33	17	17	17
Mvmt Flow	213	542	0	0	138	205	0	0	86	0	0	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	343	0	-	-	-	0	-	-	542	-	-	138
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.18	-	-	-	-	-	-	-	6.53	-	-	6.37
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.272	-	-	-	-	-	-	-	3.597	-	-	3.453
Pot Cap-1 Maneuver	1183	-	0	0	-	-	0	0	485	0	0	872
Stage 1	-	-	0	0	-	-	0	0	-	0	0	-
Stage 2	-	-	0	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-			-	-						
Mov Cap-1 Maneuver	1183	-	-	-	-	-	-	-	485	-	-	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.5	0	14	9.2
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	485	1183	-	-	-	872
HCM Lane V/C Ratio	0.177	0.18	-	-	-	0.019
HCM Control Delay (s)	14	8.7	-	-	-	9.2
HCM Lane LOS	B	A	-	-	-	A
HCM 95th %tile Q(veh)	0.6	0.7	-	-	-	0.1

Intersection						
Int Delay, s/veh	7.8					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	96	167	79	734	787	55
Future Vol, veh/h	96	167	79	734	787	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	0	-	290	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	12	12	13	13	18	18
Mvmt Flow	100	174	82	765	820	57

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1367	-	820	0	-	0
Stage 1	820	-	-	-	-	-
Stage 2	547	-	-	-	-	-
Critical Hdwy	7.04	-	4.36	-	-	-
Critical Hdwy Stg 1	6.04	-	-	-	-	-
Critical Hdwy Stg 2	6.04	-	-	-	-	-
Follow-up Hdwy	3.62	-	2.33	-	-	-
Pot Cap-1 Maneuver	126	0	738	-	-	0
Stage 1	369	0	-	-	-	0
Stage 2	516	0	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	112	-	738	-	-	-
Mov Cap-2 Maneuver	112	-	-	-	-	-
Stage 1	328	-	-	-	-	-
Stage 2	516	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	129.2	1	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT
Capacity (veh/h)	738	-	112	-
HCM Lane V/C Ratio	0.112	-	0.893	-
HCM Control Delay (s)	10.5	-	129.2	-
HCM Lane LOS	B	-	F	-
HCM 95th %tile Q(veh)	0.4	-	5.4	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	43	319	875	92	91	265	537	421	62	522	15
Future Volume (veh/h)	24	43	319	875	92	91	265	537	421	62	522	15
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	1856	1856	1856	1885	1885	1885	1841	1841	1841	1856	1856	1856
Adj Flow Rate, veh/h	26	46	343	941	99	98	285	577	0	67	561	16
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	1	1	1	4	4	4	3	3	3
Cap, veh/h	241	253	371	1006	545	461	339	1259		85	1066	30
Arrive On Green	0.14	0.14	0.14	0.29	0.29	0.29	0.10	0.36	0.00	0.05	0.30	0.30
Sat Flow, veh/h	1767	1856	1569	3483	1885	1596	3401	3497	1560	1767	3500	100
Grp Volume(v), veh/h	26	46	343	941	99	98	285	577	0	67	282	295
Grp Sat Flow(s),veh/h/ln	1767	1856	1569	1742	1885	1596	1700	1749	1560	1767	1763	1837
Q Serve(g_s), s	1.7	2.9	18.0	34.7	5.2	6.1	10.9	16.7	0.0	5.0	17.5	17.5
Cycle Q Clear(g_c), s	1.7	2.9	18.0	34.7	5.2	6.1	10.9	16.7	0.0	5.0	17.5	17.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.05
Lane Grp Cap(c), veh/h	241	253	371	1006	545	461	339	1259		85	537	560
V/C Ratio(X)	0.11	0.18	0.93	0.94	0.18	0.21	0.84	0.46		0.79	0.53	0.53
Avail Cap(c_a), veh/h	241	253	371	1108	600	508	696	1259		187	537	560
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	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.0	50.5	49.3	45.7	35.2	35.6	58.4	32.4	0.0	62.1	38.0	38.0
Incr Delay (d2), s/veh	0.1	0.1	28.1	12.9	0.1	0.1	2.2	1.2	0.0	5.8	3.7	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	1.4	13.9	16.8	2.4	2.4	4.8	7.2	0.0	2.4	8.1	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.0	50.6	77.4	58.7	35.3	35.6	60.5	33.6	0.0	68.0	41.7	41.5
LnGrp LOS	D	D	E	E	D	D	E	C		E	D	D
Approach Vol, veh/h		415			1138			862	A		644	
Approach Delay, s/veh		72.7			54.6			42.5			44.3	
Approach LOS		E			D			D			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	19.2	45.7		43.6	11.9	53.0		23.5				
Change Period (Y+Rc), s	6.0	5.5		5.5	5.5	5.5		5.5				
Max Green Setting (Gmax), s	27.0	34.0		42.0	14.0	47.5		18.0				
Max Q Clear Time (g_c+I1), s	12.9	19.5		36.7	7.0	18.7		20.0				
Green Ext Time (p_c), s	0.3	1.0		1.4	0.0	1.4		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			51.5									
HCM 6th LOS			D									

Notes

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

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	325	0	238	0	1299	351	0	464	655
Future Volume (veh/h)	0	0	0	325	0	238	0	1299	351	0	464	655
Initial Q (Qb), veh				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
Parking Bus, Adj				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	
Adj Sat Flow, veh/h/ln				1885	0	1885	0	1885	1885	0	1885	1870
Adj Flow Rate, veh/h				378	0	277	0	1510	0	0	540	0
Peak Hour Factor				0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %				1	0	1	0	1	1	0	1	2
Cap, veh/h				429	0	382	0	2254		0	2254	
Arrive On Green				0.24	0.00	0.24	0.00	1.00	0.00	0.00	0.63	0.00
Sat Flow, veh/h				1795	0	1598	0	3676	1598	0	3676	1585
Grp Volume(v), veh/h				378	0	277	0	1510	0	0	540	0
Grp Sat Flow(s),veh/h/ln				1795	0	1598	0	1791	1598	0	1791	1585
Q Serve(g_s), s				14.2	0.0	11.2	0.0	0.0	0.0	0.0	4.6	0.0
Cycle Q Clear(g_c), s				14.2	0.0	11.2	0.0	0.0	0.0	0.0	4.6	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				429	0	382	0	2254		0	2254	
V/C Ratio(X)				0.88	0.00	0.72	0.00	0.67		0.00	0.24	
Avail Cap(c_a), veh/h				651	0	580	0	2254		0	2254	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.54	0.00	0.00	0.81	0.00
Uniform Delay (d), s/veh				25.7	0.0	24.5	0.0	0.0	0.0	0.0	5.7	0.0
Incr Delay (d2), s/veh				6.3	0.0	1.0	0.0	0.9	0.0	0.0	0.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				6.3	0.0	4.0	0.0	0.3	0.0	0.0	1.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				31.9	0.0	25.5	0.0	0.9	0.0	0.0	5.9	0.0
LnGrp LOS				C	A	C	A	A		A	A	
Approach Vol, veh/h					655			1510	A		540	A
Approach Delay, s/veh					29.2			0.9			5.9	
Approach LOS					C			A			A	

Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		48.7				48.7		21.3				
Change Period (Y+Rc), s		4.6				4.6		4.6				
Max Green Setting (Gmax), s		35.4				35.4		25.4				
Max Q Clear Time (g_c+I1), s		2.0				6.6		16.2				
Green Ext Time (p_c), s		13.8				3.8		0.5				

Intersection Summary	
HCM 6th Ctrl Delay	8.7
HCM 6th LOS	A

Notes

Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1005	0	716	0	0	0	0	645	281	194	595	0
Future Volume (veh/h)	1005	0	716	0	0	0	0	645	281	194	595	0
Initial Q (Qb), veh	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
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	1885	0	1885				0	1870	1870	1885	1885	0
Adj Flow Rate, veh/h	1142	0	0				0	733	319	220	676	0
Peak Hour Factor	0.88	0.88	0.88				0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	0	1				0	2	2	1	1	0
Cap, veh/h	1271	0					0	1192	529	375	949	0
Arrive On Green	0.36	0.00	0.00				0.00	0.34	0.34	0.14	0.67	0.00
Sat Flow, veh/h	3483	0	1598				0	3647	1578	1795	1885	0
Grp Volume(v), veh/h	1142	0	0				0	733	319	220	676	0
Grp Sat Flow(s),veh/h/ln	1742	0	1598				0	1777	1578	1795	1885	0
Q Serve(g_s), s	21.7	0.0	0.0				0.0	12.1	11.8	5.3	15.8	0.0
Cycle Q Clear(g_c), s	21.7	0.0	0.0				0.0	12.1	11.8	5.3	15.8	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1271	0					0	1192	529	375	949	0
V/C Ratio(X)	0.90	0.00					0.00	0.61	0.60	0.59	0.71	0.00
Avail Cap(c_a), veh/h	1562	0					0	1192	529	381	949	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.33	1.33	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	0.91	0.91	0.88	0.88	0.00
Uniform Delay (d), s/veh	21.0	0.0	0.0				0.0	19.5	19.4	13.2	8.4	0.0
Incr Delay (d2), s/veh	5.6	0.0	0.0				0.0	2.2	4.6	1.3	4.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	0.0	0.0				0.0	4.7	4.4	1.8	4.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.6	0.0	0.0				0.0	21.6	23.9	14.5	12.4	0.0
LnGrp LOS	C	A					A	C	C	B	B	A
Approach Vol, veh/h		1142	A					1052			896	
Approach Delay, s/veh		26.6						22.3			12.9	
Approach LOS		C						C			B	

Timer - Assigned Phs	1	2	4	6
Phs Duration (G+Y+Rc), s	11.8	28.1	30.1	39.9
Change Period (Y+Rc), s	4.6	4.6	4.6	4.6
Max Green Setting (Gmax), s	7.4	17.4	31.4	29.4
Max Q Clear Time (g_c+I1), s	7.3	14.1	23.7	17.8
Green Ext Time (p_c), s	0.0	1.8	1.9	3.2

Intersection Summary	
HCM 6th Ctrl Delay	21.2
HCM 6th LOS	C

Notes

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

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	195	0	1108	0	1749	219	0	1334	653
Future Volume (veh/h)	0	0	0	195	0	1108	0	1749	219	0	1334	653
Initial Q (Qb), veh				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
Parking Bus, Adj				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	
Adj Sat Flow, veh/h/ln				1900	1900	1900	0	1900	1900	0	1885	1885
Adj Flow Rate, veh/h				201	0	1142	0	1803	0	0	1375	0
Peak Hour Factor				0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %				0	0	0	0	0	0	0	1	1
Cap, veh/h				1429	774	656	0	1547		0	1535	
Arrive On Green				0.41	0.00	0.41	0.00	0.14	0.00	0.00	0.43	0.00
Sat Flow, veh/h				3510	1900	1610	0	3705	1610	0	3676	1598
Grp Volume(v), veh/h				201	0	1142	0	1803	0	0	1375	0
Grp Sat Flow(s),veh/h/ln				1755	1900	1610	0	1805	1610	0	1791	1598
Q Serve(g_s), s				2.0	0.0	22.8	0.0	24.0	0.0	0.0	19.9	0.0
Cycle Q Clear(g_c), s				2.0	0.0	22.8	0.0	24.0	0.0	0.0	19.9	0.0
Prop In Lane				1.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h				1429	774	656	0	1547		0	1535	
V/C Ratio(X)				0.14	0.00	1.74	0.00	1.17		0.00	0.90	
Avail Cap(c_a), veh/h				1429	774	656	0	1547		0	1535	
HCM Platoon Ratio				1.00	1.00	1.00	1.00	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	0.00	0.52	0.00	0.00	0.40	0.00
Uniform Delay (d), s/veh				10.4	0.0	16.6	0.0	24.0	0.0	0.0	14.8	0.0
Incr Delay (d2), s/veh				0.0	0.0	340.2	0.0	78.5	0.0	0.0	3.7	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.7	0.0	68.9	0.0	28.0	0.0	0.0	7.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				10.5	0.0	356.8	0.0	102.5	0.0	0.0	18.6	0.0
LnGrp LOS				B	A	F	A	F		A	B	
Approach Vol, veh/h					1343			1803	A		1375	A
Approach Delay, s/veh					305.0			102.5			18.6	
Approach LOS					F			F			B	

Timer - Assigned Phs		2				6		8				
Phs Duration (G+Y+Rc), s		28.6				28.6		27.4				
Change Period (Y+Rc), s		4.6				4.6		4.6				
Max Green Setting (Gmax), s		24.0				24.0		22.8				
Max Q Clear Time (g_c+I1), s		26.0				21.9		24.8				
Green Ext Time (p_c), s		0.0				1.8		0.0				

Intersection Summary	
HCM 6th Ctrl Delay	137.1
HCM 6th LOS	F

Notes
User approved pedestrian interval to be less than phase max green.
Unsignalized Delay for [NBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1225	0	539	0	0	0	0	743	167	0	708	821
Future Volume (veh/h)	1225	0	539	0	0	0	0	743	167	0	708	821
Initial Q (Qb), veh	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
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	1900	0	1900				0	1885	1885	0	1885	1885
Adj Flow Rate, veh/h	1289	0	0				0	782	176	0	745	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0				0	1	1	0	1	1
Cap, veh/h	1291	0					0	1328	299	0	1637	
Arrive On Green	0.37	0.00	0.00				0.00	0.46	0.46	0.00	0.76	0.00
Sat Flow, veh/h	3510	0	1610				0	2998	654	0	3676	1598
Grp Volume(v), veh/h	1289	0	0				0	482	476	0	745	0
Grp Sat Flow(s),veh/h/ln	1755	0	1610				0	1791	1767	0	1791	1598
Q Serve(g_s), s	20.5	0.0	0.0				0.0	11.2	11.2	0.0	4.2	0.0
Cycle Q Clear(g_c), s	20.5	0.0	0.0				0.0	11.2	11.2	0.0	4.2	0.0
Prop In Lane	1.00		1.00				0.00		0.37	0.00		1.00
Lane Grp Cap(c), veh/h	1291	0					0	819	808	0	1637	
V/C Ratio(X)	1.00	0.00					0.00	0.59	0.59	0.00	0.45	
Avail Cap(c_a), veh/h	1291	0					0	819	808	0	1637	
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.67	1.67
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	0.00	0.50	0.00
Uniform Delay (d), s/veh	17.7	0.0	0.0				0.0	11.3	11.3	0.0	4.1	0.0
Incr Delay (d2), s/veh	24.6	0.0	0.0				0.0	3.1	3.1	0.0	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	0.0	0.0				0.0	4.4	4.3	0.0	1.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.3	0.0	0.0				0.0	14.4	14.4	0.0	4.6	0.0
LnGrp LOS	D	A					A	B	B	A	A	
Approach Vol, veh/h		1289	A					958			745	A
Approach Delay, s/veh		42.3						14.4			4.6	
Approach LOS		D						B			A	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		30.9		25.1		30.9
Change Period (Y+Rc), s		5.3		4.5		5.3
Max Green Setting (Gmax), s		25.6		20.6		25.6
Max Q Clear Time (g_c+I1), s		13.2		22.5		6.2
Green Ext Time (p_c), s		3.5		0.0		4.1

Intersection Summary	
HCM 6th Ctrl Delay	24.0
HCM 6th LOS	C

Notes

Unsignalized Delay for [EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	448	46	142	527	11	473	10	125	12	2	16
Future Volume (veh/h)	18	448	46	142	527	11	473	10	125	12	2	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1767	1767	1767	1885	1885	1885	1870	1870	1870	1900	1900	1900
Adj Flow Rate, veh/h	20	509	0	161	599	12	538	11	0	14	2	18
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, %	9	9	9	1	1	1	2	2	2	0	0	0
Cap, veh/h	327	807		423	1137	23	708	655		219	9	81
Arrive On Green	0.03	0.24	0.00	0.11	0.32	0.32	0.20	0.35	0.00	0.06	0.06	0.06
Sat Flow, veh/h	1682	3357	1497	1795	3591	72	3456	1870	1585	1426	164	1472
Grp Volume(v), veh/h	20	509	0	161	299	312	538	11	0	14	0	20
Grp Sat Flow(s),veh/h/ln	1682	1678	1497	1795	1791	1872	1728	1870	1585	1426	0	1635
Q Serve(g_s), s	0.5	7.0	0.0	3.2	7.0	7.0	7.5	0.2	0.0	0.5	0.0	0.6
Cycle Q Clear(g_c), s	0.5	7.0	0.0	3.2	7.0	7.0	7.5	0.2	0.0	0.5	0.0	0.6
Prop In Lane	1.00		1.00	1.00		0.04	1.00		1.00	1.00		0.90
Lane Grp Cap(c), veh/h	327	807		423	567	593	708	655		219	0	91
V/C Ratio(X)	0.06	0.63		0.38	0.53	0.53	0.76	0.02		0.06	0.00	0.22
Avail Cap(c_a), veh/h	934	2422		935	1292	1351	2022	1627		418	0	319
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.9	17.4	0.0	12.2	14.4	14.4	19.2	10.9	0.0	23.1	0.0	23.2
Incr Delay (d2), s/veh	0.0	0.8	0.0	0.2	0.8	0.7	0.6	0.0	0.0	0.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	2.3	0.0	1.0	2.4	2.5	2.7	0.1	0.0	0.2	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.0	18.3	0.0	12.4	15.1	15.1	19.8	10.9	0.0	23.2	0.0	23.6
LnGrp LOS	B	B		B	B	B	B	B		C	A	C
Approach Vol, veh/h		529	A		772			549	A		34	
Approach Delay, s/veh		18.1			14.5			19.7			23.4	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	8
Phs Duration (G+Y+Rc), s	10.5	17.7	15.1	7.9	6.6	21.6	23.1
Change Period (Y+Rc), s	5.1	5.4	4.6	5.1	5.1	5.4	5.1
Max Green Setting (Gmax), s	20.0	37.0	30.0	10.0	20.0	37.0	44.6
Max Q Clear Time (g_c+I1), s	15.2	9.0	9.5	2.6	2.5	9.0	2.2
Green Ext Time (p_c), s	0.2	3.4	1.0	0.0	0.0	3.6	0.0

Intersection Summary	
HCM 6th Ctrl Delay	17.2
HCM 6th LOS	B

Notes

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

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	740	458	0	668	304	0	0	0	279	0	407
Future Volume (veh/h)	0	740	458	0	668	304	0	0	0	279	0	407
Initial Q (Qb), veh	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
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1870	1870	0	1885	1885				1885	0	1885
Adj Flow Rate, veh/h	0	787	0	0	711	0				297	0	433
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94				0.94	0.94	0.94
Percent Heavy Veh, %	0	2	2	0	1	1				1	0	1
Cap, veh/h	0	1428		0	1439					596	0	530
Arrive On Green	0.00	0.40	0.00	0.00	0.40	0.00				0.33	0.00	0.33
Sat Flow, veh/h	0	3741	0	0	3770	0				1795	0	1598
Grp Volume(v), veh/h	0	787	0	0	711	0				297	0	433
Grp Sat Flow(s),veh/h/ln	0	1777	0	0	1791	0				1795	0	1598
Q Serve(g_s), s	0.0	6.4	0.0	0.0	5.6	0.0				5.0	0.0	9.3
Cycle Q Clear(g_c), s	0.0	6.4	0.0	0.0	5.6	0.0				5.0	0.0	9.3
Prop In Lane	0.00		0.00	0.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	1428		0	1439					596	0	530
V/C Ratio(X)	0.00	0.55		0.00	0.49					0.50	0.00	0.82
Avail Cap(c_a), veh/h	0	5208		0	5250					1196	0	1064
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	0.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	8.6	0.0	0.0	8.4	0.0				10.0	0.0	11.5
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.1	0.0				0.2	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.7	0.0	0.0	1.5	0.0				1.4	0.0	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	8.7	0.0	0.0	8.5	0.0				10.3	0.0	12.7
LnGrp LOS	A	A		A	A					B	A	B
Approach Vol, veh/h		787	A		711	A					730	
Approach Delay, s/veh		8.7			8.5						11.7	
Approach LOS		A			A						B	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		20.1		17.4		20.1
Change Period (Y+Rc), s		5.0		5.0		5.0
Max Green Setting (Gmax), s		55.0		25.0		55.0
Max Q Clear Time (g_c+I1), s		8.4		11.3		7.6
Green Ext Time (p_c), s		4.2		1.1		3.7

Intersection Summary	
HCM 6th Ctrl Delay	9.6
HCM 6th LOS	A

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	341	678	0	0	749	585	223	1	302	0	0	0
Future Volume (veh/h)	341	678	0	0	749	585	223	1	302	0	0	0
Initial Q (Qb), veh	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			
Parking Bus, Adj	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				
Adj Sat Flow, veh/h/ln	1885	1885	0	0	1885	1885	1900	1900	1900			
Adj Flow Rate, veh/h	355	706	0	0	780	609	232	1	315			
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96			
Percent Heavy Veh, %	1	1	0	0	1	1	0	0	0			
Cap, veh/h	445	2296	0	0	1586	707	407	0	362			
Arrive On Green	0.13	0.64	0.00	0.00	0.44	0.44	0.22	0.22	0.22			
Sat Flow, veh/h	1795	3676	0	0	3676	1598	1810	0	1610			
Grp Volume(v), veh/h	355	706	0	0	780	609	232	0	315			
Grp Sat Flow(s),veh/h/ln	1795	1791	0	0	1791	1598	1810	0	1610			
Q Serve(g_s), s	7.3	6.6	0.0	0.0	11.5	25.6	8.5	0.0	14.0			
Cycle Q Clear(g_c), s	7.3	6.6	0.0	0.0	11.5	25.6	8.5	0.0	14.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	445	2296	0	0	1586	707	407	0	362			
V/C Ratio(X)	0.80	0.31	0.00	0.00	0.49	0.86	0.57	0.00	0.87			
Avail Cap(c_a), veh/h	692	3849	0	0	2646	1180	608	0	541			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	12.2	6.0	0.0	0.0	14.8	18.7	25.7	0.0	27.8			
Incr Delay (d2), s/veh	1.6	0.0	0.0	0.0	0.1	1.7	0.5	0.0	6.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	2.6	2.0	0.0	0.0	4.3	8.8	3.5	0.0	5.8			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.9	6.0	0.0	0.0	14.9	20.4	26.1	0.0	34.7			
LnGrp LOS	B	A	A	A	B	C	C	A	C			
Approach Vol, veh/h		1061			1389			547				
Approach Delay, s/veh		8.6			17.3			31.1				
Approach LOS		A			B			C				
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		52.7			14.7	38.0		21.7				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		80.0			20.0	55.0		25.0				
Max Q Clear Time (g_c+I1), s		8.6			9.3	27.6		16.0				
Green Ext Time (p_c), s		3.6			0.4	5.4		0.7				
Intersection Summary												
HCM 6th Ctrl Delay			16.7									
HCM 6th LOS			B									

Intersection						
Int Delay, s/veh	12.3					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	343	366	0	114	226
Future Vol, veh/h	0	343	366	0	114	226
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	3	3	1	1
Mvmt Flow	0	404	431	0	134	266

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	431	0	-	0	835	431
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	404	-
Critical Hdwy	4.12	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.218	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1129	-	-	-	339	626
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	676	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1129	-	-	-	339	626
Mov Cap-2 Maneuver	-	-	-	-	339	-
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	676	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	37.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1129	-	-	-	488
HCM Lane V/C Ratio	-	-	-	-	0.82
HCM Control Delay (s)	0	-	-	-	37.9
HCM Lane LOS	A	-	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	374	1	302	318	604	0	0	473	482
Future Volume (veh/h)	0	0	0	374	1	302	318	604	0	0	473	482
Initial Q (Qb), veh				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
Parking Bus, Adj				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	
Adj Sat Flow, veh/h/ln				1885	1885	1885	1885	1885	0	0	1885	1885
Adj Flow Rate, veh/h				420	1	339	357	679	0	0	531	542
Peak Hour Factor				0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %				1	1	1	1	1	0	0	1	1
Cap, veh/h				487	1	434	394	2195	0	0	746	664
Arrive On Green				0.27	0.27	0.27	0.14	0.61	0.00	0.00	0.42	0.42
Sat Flow, veh/h				1791	4	1598	1795	3676	0	0	1885	1594
Grp Volume(v), veh/h				421	0	339	357	679	0	0	531	542
Grp Sat Flow(s),veh/h/ln				1796	0	1598	1795	1791	0	0	1791	1594
Q Serve(g_s), s				19.3	0.0	17.0	9.8	7.8	0.0	0.0	21.3	26.1
Cycle Q Clear(g_c), s				19.3	0.0	17.0	9.8	7.8	0.0	0.0	21.3	26.1
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				488	0	434	394	2195	0	0	746	664
V/C Ratio(X)				0.86	0.00	0.78	0.91	0.31	0.00	0.00	0.71	0.82
Avail Cap(c_a), veh/h				622	0	553	455	2894	0	0	1034	920
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				30.0	0.0	29.2	18.7	8.0	0.0	0.0	21.0	22.4
Incr Delay (d2), s/veh				9.2	0.0	4.9	18.6	0.1	0.0	0.0	1.4	4.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				9.3	0.0	6.9	5.6	2.7	0.0	0.0	8.7	9.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				39.3	0.0	34.1	37.3	8.1	0.0	0.0	22.4	26.5
LnGrp LOS				D	A	C	D	A	A	A	C	C
Approach Vol, veh/h					760			1036			1073	
Approach Delay, s/veh					37.0			18.2			24.4	
Approach LOS					D			B			C	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		58.1			17.0	41.1		28.5				
Change Period (Y+Rc), s		5.0			5.0	5.0		5.0				
Max Green Setting (Gmax), s		70.0			15.0	50.0		30.0				
Max Q Clear Time (g_c+I1), s		9.8			11.8	28.1		21.3				
Green Ext Time (p_c), s		5.6			0.2	8.0		2.2				
Intersection Summary												
HCM 6th Ctrl Delay			25.5									
HCM 6th LOS			C									

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	285	450	134	637	748	99
Future Volume (veh/h)	285	450	134	637	748	99
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1885	1885	1870	1870
Adj Flow Rate, veh/h	297	469	140	664	779	103
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	1	1	2	2
Cap, veh/h	1084	497	381	1897	1106	146
Arrive On Green	0.31	0.31	0.10	0.53	0.35	0.35
Sat Flow, veh/h	3456	1585	1795	3676	3248	417
Grp Volume(v), veh/h	297	469	140	664	439	443
Grp Sat Flow(s),veh/h/ln	1728	1585	1795	1791	1777	1795
Q Serve(g_s), s	4.1	18.4	2.8	6.8	13.6	13.6
Cycle Q Clear(g_c), s	4.1	18.4	2.8	6.8	13.6	13.6
Prop In Lane	1.00	1.00	1.00			0.23
Lane Grp Cap(c), veh/h	1084	497	381	1897	623	629
V/C Ratio(X)	0.27	0.94	0.37	0.35	0.70	0.70
Avail Cap(c_a), veh/h	1084	497	622	3932	1393	1407
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	16.4	21.3	11.7	8.7	17.9	17.9
Incr Delay (d2), s/veh	0.1	26.8	0.2	0.1	1.5	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	17.7	1.0	2.2	5.3	5.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.6	48.1	11.9	8.8	19.3	19.3
LnGrp LOS	B	D	B	A	B	B
Approach Vol, veh/h	766			804	882	
Approach Delay, s/veh	35.9			9.3	19.3	
Approach LOS	D			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		38.8		25.0	11.4	27.4
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		70.0		20.0	15.0	50.0
Max Q Clear Time (g_c+I1), s		8.8		20.4	4.8	15.6
Green Ext Time (p_c), s		5.4		0.0	0.1	6.7

Intersection Summary			
HCM 6th Ctrl Delay			21.2
HCM 6th LOS			C

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	60	256	394	270	323	245
Future Volume (veh/h)	60	256	394	270	323	245
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1722	1722	1752	1752	1811	1811
Adj Flow Rate, veh/h	70	298	458	314	376	285
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	12	12	10	10	6	6
Cap, veh/h	377	336	481	1141	340	257
Arrive On Green	0.23	0.23	0.24	0.65	0.36	0.36
Sat Flow, veh/h	1640	1459	1668	1752	956	725
Grp Volume(v), veh/h	70	298	458	314	0	661
Grp Sat Flow(s),veh/h/ln	1640	1459	1668	1752	0	1681
Q Serve(g_s), s	2.9	16.7	18.4	6.4	0.0	30.0
Cycle Q Clear(g_c), s	2.9	16.7	18.4	6.4	0.0	30.0
Prop In Lane	1.00	1.00	1.00			0.43
Lane Grp Cap(c), veh/h	377	336	481	1141	0	597
V/C Ratio(X)	0.19	0.89	0.95	0.28	0.00	1.11
Avail Cap(c_a), veh/h	583	519	481	1141	0	597
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.1	31.4	23.9	6.2	0.0	27.2
Incr Delay (d2), s/veh	0.2	10.1	29.2	0.1	0.0	69.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.9	7.9	2.1	0.0	22.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	26.3	41.5	53.1	6.4	0.0	96.8
LnGrp LOS	C	D	D	A	A	F
Approach Vol, veh/h	368			772	661	
Approach Delay, s/veh	38.6			34.1	96.8	
Approach LOS	D			C	F	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		60.0		24.4	25.0	35.0
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		55.0		30.0	20.0	30.0
Max Q Clear Time (g_c+I1), s		8.4		18.7	20.4	32.0
Green Ext Time (p_c), s		2.1		0.8	0.0	0.0

Intersection Summary			
HCM 6th Ctrl Delay			58.0
HCM 6th LOS			E

Notes

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

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	133	271	92	531	498	81
Future Volume (veh/h)	133	271	92	531	498	81
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1707	1707	1841	1841	1826	1826
Adj Flow Rate, veh/h	151	308	105	603	566	92
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	13	13	4	4	5	5
Cap, veh/h	416	370	377	1040	685	579
Arrive On Green	0.26	0.26	0.10	0.57	0.38	0.38
Sat Flow, veh/h	1626	1447	1753	1841	1826	1543
Grp Volume(v), veh/h	151	308	105	603	566	92
Grp Sat Flow(s),veh/h/ln	1626	1447	1753	1841	1826	1543
Q Serve(g_s), s	4.3	11.3	1.7	11.8	15.7	2.2
Cycle Q Clear(g_c), s	4.3	11.3	1.7	11.8	15.7	2.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	416	370	377	1040	685	579
V/C Ratio(X)	0.36	0.83	0.28	0.58	0.83	0.16
Avail Cap(c_a), veh/h	872	776	828	1810	979	828
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	17.1	19.7	10.3	7.9	15.8	11.6
Incr Delay (d2), s/veh	0.4	3.7	0.1	0.5	4.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.4	0.5	3.6	6.4	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	17.5	23.3	10.5	8.4	19.8	11.7
LnGrp LOS	B	C	B	A	B	B
Approach Vol, veh/h	459			708	658	
Approach Delay, s/veh	21.4			8.7	18.7	
Approach LOS	C			A	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		36.6		19.3	10.6	26.0
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		55.0		30.0	20.0	30.0
Max Q Clear Time (g_c+I1), s		13.8		13.3	3.7	17.7
Green Ext Time (p_c), s		4.7		1.1	0.1	3.3

Intersection Summary		
HCM 6th Ctrl Delay		15.5
HCM 6th LOS		B

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	2	169	13	9	6	56	593	4	2	908	9
Future Vol, veh/h	11	2	169	13	9	6	56	593	4	2	908	9
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	-	-	Stop	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	250	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	17	17	17	21	21	21	17	17	17
Mvmt Flow	12	2	182	14	10	6	60	638	4	2	976	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1429	1747	493	1253	1750	321	986	0	0	642	0	0
Stage 1	985	985	-	760	760	-	-	-	-	-	-	-
Stage 2	444	762	-	493	990	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.84	6.84	7.24	4.52	-	-	4.44	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.84	5.84	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.84	5.84	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.67	4.17	3.47	2.41	-	-	2.37	-	-
Pot Cap-1 Maneuver	95	85	522	113	73	633	592	-	-	844	-	-
Stage 1	266	324	-	333	378	-	-	-	-	-	-	-
Stage 2	563	412	-	489	291	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	77	76	522	66	65	633	592	-	-	844	-	-
Mov Cap-2 Maneuver	77	76	-	66	65	-	-	-	-	-	-	-
Stage 1	239	323	-	299	340	-	-	-	-	-	-	-
Stage 2	487	370	-	316	290	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25.3	73.7	1	0
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	592	-	-	369	81	844	-	-
HCM Lane V/C Ratio	0.102	-	-	0.53	0.372	0.003	-	-
HCM Control Delay (s)	11.8	-	-	25.3	73.7	9.3	-	-
HCM Lane LOS	B	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	3	1.4	0	-	-

Intersection	
Int Delay, s/veh	45.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	296	55	1	34	121	243	0	86	15	26	2	6
Future Vol, veh/h	296	55	1	34	121	243	0	86	15	26	2	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	190	-	-	550	-	550	200	-	-	250	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	9	9	9	18	18	18	9	9	9	48	48	48
Mvmt Flow	395	73	1	45	161	324	0	115	20	35	3	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	485	0	0	74	0	0	1283	1439	74	1182	1115	161
Stage 1	-	-	-	-	-	-	864	864	-	251	251	-
Stage 2	-	-	-	-	-	-	419	575	-	931	864	-
Critical Hdwy	4.19	-	-	4.28	-	-	7.19	6.59	6.29	7.58	6.98	6.68
Critical Hdwy Stg 1	-	-	-	-	-	-	6.19	5.59	-	6.58	5.98	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.19	5.59	-	6.58	5.98	-
Follow-up Hdwy	2.281	-	-	2.362	-	-	3.581	4.081	3.381	3.932	4.432	3.732
Pot Cap-1 Maneuver	1042	-	-	1430	-	-	137	128	969	135	172	777
Stage 1	-	-	-	-	-	-	339	362	-	662	622	-
Stage 2	-	-	-	-	-	-	598	492	-	266	314	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1042	-	-	1430	-	-	92	~ 77	969	-	104	777
Mov Cap-2 Maneuver	-	-	-	-	-	-	92	~ 77	-	-	104	-
Stage 1	-	-	-	-	-	-	211	225	-	411	603	-
Stage 2	-	-	-	-	-	-	571	477	-	79	195	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	8.9	0.6	$ 363.1	
HCM LOS			F	-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	89	1042	-	-	1430	-	-	-	297
HCM Lane V/C Ratio	-	1.513	0.379	-	-	0.032	-	-	-	0.036
HCM Control Delay (s)	0	$ 363.1	10.5	-	-	7.6	-	-	-	17.6
HCM Lane LOS	A	F	B	-	-	A	-	-	-	C
HCM 95th %tile Q(veh)	-	10.5	1.8	-	-	0.1	-	-	-	0.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection												
Int Delay, s/veh	13											
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Lane Configurations												
Traffic Vol, veh/h	15	14	67	6	113	8	167	27	4	25	113	118
Future Vol, veh/h	15	14	67	6	113	8	167	27	4	25	113	118
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	200	-	-	225	-	-	260	-	110
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	43	43	43	15	15	15	21	21	21	32	32	32
Mvmt Flow	19	18	84	8	141	10	209	34	5	31	141	148

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	151	0	0	102	0	0	405	265	60	280	302	146
Stage 1	-	-	-	-	-	-	98	98	-	162	162	-
Stage 2	-	-	-	-	-	-	307	167	-	118	140	-
Critical Hdwy	4.53	-	-	4.25	-	-	7.31	6.71	6.41	7.42	6.82	6.52
Critical Hdwy Stg 1	-	-	-	-	-	-	6.31	5.71	-	6.42	5.82	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.31	5.71	-	6.42	5.82	-
Follow-up Hdwy	2.587	-	-	2.335	-	-	3.689	4.189	3.489	3.788	4.288	3.588
Pot Cap-1 Maneuver	1214	-	-	1413	-	-	524	609	954	616	564	828
Stage 1	-	-	-	-	-	-	864	778	-	774	710	-
Stage 2	-	-	-	-	-	-	664	726	-	819	727	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1214	-	-	1413	-	-	340	596	954	577	552	828
Mov Cap-2 Maneuver	-	-	-	-	-	-	340	596	-	577	552	-
Stage 1	-	-	-	-	-	-	850	766	-	762	706	-
Stage 2	-	-	-	-	-	-	434	722	-	767	715	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1.3			0.4			28			12		
HCM LOS							D			B		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	340	626	1214	-	-	1413	-	-	577	552	828
HCM Lane V/C Ratio	0.614	0.062	0.015	-	-	0.005	-	-	0.054	0.256	0.178
HCM Control Delay (s)	31.1	11.1	8	-	-	7.6	-	-	11.6	13.8	10.3
HCM Lane LOS	D	B	A	-	-	A	-	-	B	B	B
HCM 95th %tile Q(veh)	3.9	0.2	0	-	-	0	-	-	0.2	1	0.6

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Lane Configurations										
Traffic Vol, veh/h	0	183	26	45	392	0	0	101	0	0
Future Vol, veh/h	0	183	26	45	392	0	0	101	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None	-	-
Storage Length	-	-	275	350	-	-	-	0	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	73	73	73	73	73	73	73	73	92	92
Heavy Vehicles, %	5	5	5	4	4	4	12	12	2	2
Mvmt Flow	0	251	36	62	537	0	0	138	0	0

Major/Minor	Major1			Major2			Minor1		Minor2	
Conflicting Flow All	-	0	0	287	0	0	-	251	-	537
Stage 1	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	-	6.32	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	2.236	-	-	-	3.408	-	3.318
Pot Cap-1 Maneuver	0	-	-	1264	-	0	0	764	0	544
Stage 1	0	-	-	-	-	0	0	-	0	-
Stage 2	0	-	-	-	-	0	0	-	0	-
Platoon blocked, %		-	-		-					
Mov Cap-1 Maneuver	-	-	-	1264	-	-	-	764	-	544
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SE
HCM Control Delay, s	0	0.8	10.8	0
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	SELn1
Capacity (veh/h)	764	-	-	1264	-	-
HCM Lane V/C Ratio	0.181	-	-	0.049	-	-
HCM Control Delay (s)	10.8	-	-	8	-	0
HCM Lane LOS	B	-	-	A	-	A
HCM 95th %tile Q(veh)	0.7	-	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	129	155	0	0	289	314	2	0	68	0	0	146
Future Vol, veh/h	129	155	0	0	289	314	2	0	68	0	0	146
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	330	-	-	-	-	270	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	71	71	71	71	71	71	71	71	71	71	71
Heavy Vehicles, %	7	7	7	5	5	5	42	42	42	0	0	0
Mvmt Flow	182	218	0	0	407	442	3	0	96	0	0	206

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	849	0	-	-	-	0	1313	-	218	-	-	407
Stage 1	-	-	-	-	-	-	582	-	-	-	-	-
Stage 2	-	-	-	-	-	-	731	-	-	-	-	-
Critical Hdwy	4.17	-	-	-	-	-	7.52	-	6.62	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.52	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.52	-	-	-	-	-
Follow-up Hdwy	2.263	-	-	-	-	-	3.878	-	3.678	-	-	3.3
Pot Cap-1 Maneuver	768	-	0	0	-	-	112	0	731	0	0	648
Stage 1	-	-	0	0	-	-	435	0	-	0	0	-
Stage 2	-	-	0	0	-	-	357	0	-	0	0	-
Platoon blocked, %		-			-	-						
Mov Cap-1 Maneuver	768	-	-	-	-	-	62	-	731	-	-	648
Mov Cap-2 Maneuver	-	-	-	-	-	-	62	-	-	-	-	-
Stage 1	-	-	-	-	-	-	332	-	-	-	-	-
Stage 2	-	-	-	-	-	-	244	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.1	0	10.7	13.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	731	768	-	-	-	648
HCM Lane V/C Ratio	0.131	0.237	-	-	-	0.317
HCM Control Delay (s)	10.7	11.1	-	-	-	13.1
HCM Lane LOS	B	B	-	-	-	B
HCM 95th %tile Q(veh)	0.5	0.9	-	-	-	1.4

Intersection	
Int Delay, s/veh	51.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	69	96	270	1182	830	105
Future Vol, veh/h	69	96	270	1182	830	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	Free
Storage Length	0	-	290	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	6	6	8	8	10	10
Mvmt Flow	78	108	303	1328	933	118

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2203	-	933	0	-	0
Stage 1	933	-	-	-	-	-
Stage 2	1270	-	-	-	-	-
Critical Hdwy	6.92	-	4.26	-	-	-
Critical Hdwy Stg 1	5.92	-	-	-	-	-
Critical Hdwy Stg 2	5.92	-	-	-	-	-
Follow-up Hdwy	3.56	-	2.28	-	-	-
Pot Cap-1 Maneuver	~ 36	0	693	-	-	0
Stage 1	334	0	-	-	-	0
Stage 2	220	0	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	~ 20	-	693	-	-	-
Mov Cap-2 Maneuver	~ 20	-	-	-	-	-
Stage 1	188	-	-	-	-	-
Stage 2	220	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 1688.3	2.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT
Capacity (veh/h)	693	-	20	-
HCM Lane V/C Ratio	0.438	-	3.876	-
HCM Control Delay (s)	14.2		$ 1688.3	-
HCM Lane LOS	B	-	F	-
HCM 95th %tile Q(veh)	2.2	-	10.1	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	164	482	731	163	114	677	1051	975	129	644	23
Future Volume (veh/h)	71	164	482	731	163	114	677	1051	975	129	644	23
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	1885	1885	1885	1885	1885	1885	1900	1900	1900	1885	1885	1885
Adj Flow Rate, veh/h	76	174	513	778	173	121	720	1118	0	137	685	24
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	1	1	1
Cap, veh/h	240	252	534	856	463	392	704	1326		161	892	31
Arrive On Green	0.13	0.13	0.13	0.25	0.25	0.25	0.20	0.37	0.00	0.09	0.25	0.25
Sat Flow, veh/h	1795	1885	1594	3483	1885	1596	3510	3610	1610	1795	3530	124
Grp Volume(v), veh/h	76	174	513	778	173	121	720	1118	0	137	347	362
Grp Sat Flow(s),veh/h/ln	1795	1885	1594	1742	1885	1596	1755	1805	1610	1795	1791	1863
Q Serve(g_s), s	5.2	11.9	18.0	29.2	10.3	8.3	27.0	38.2	0.0	10.1	24.2	24.2
Cycle Q Clear(g_c), s	5.2	11.9	18.0	29.2	10.3	8.3	27.0	38.2	0.0	10.1	24.2	24.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.07
Lane Grp Cap(c), veh/h	240	252	534	856	463	392	704	1326		161	453	471
V/C Ratio(X)	0.32	0.69	0.96	0.91	0.37	0.31	1.02	0.84		0.85	0.77	0.77
Avail Cap(c_a), veh/h	240	252	534	1087	588	498	704	1326		187	453	471
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	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.7	55.6	43.9	49.3	42.2	41.4	53.8	39.0	0.0	60.4	46.6	46.6
Incr Delay (d2), s/veh	0.3	6.5	29.0	8.3	0.2	0.2	39.6	6.7	0.0	24.0	11.8	11.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	6.1	20.9	13.7	4.8	3.3	15.7	17.9	0.0	5.7	12.2	12.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.0	62.1	73.0	57.6	42.3	41.6	93.4	45.7	0.0	84.4	58.4	58.1
LnGrp LOS	D	E	E	E	D	D	F	D		F	E	E
Approach Vol, veh/h		763			1072			1838	A		846	
Approach Delay, s/veh		68.5			53.4			64.4			62.5	
Approach LOS		E			D			E			E	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	33.0	39.5		38.6	17.6	54.9		23.5
Change Period (Y+Rc), s	6.0	5.5		5.5	5.5	5.5		5.5
Max Green Setting (Gmax), s	27.0	34.0		42.0	14.0	47.5		18.0
Max Q Clear Time (g_c+I1), s	29.0	26.2		31.2	12.1	40.2		20.0
Green Ext Time (p_c), s	0.0	1.1		1.9	0.0	2.1		0.0

Intersection Summary	
HCM 6th Ctrl Delay	62.1
HCM 6th LOS	E

Notes

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

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	32	82	52	36	1	163	166	78	4	151	3
Future Vol, veh/h	2	32	82	52	36	1	163	166	78	4	151	3
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	-	-	-	-	-	-	95	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	2	2	2	0	0	0	3	3	3
Mvmt Flow	2	33	85	54	38	1	170	173	81	4	157	3

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	740	761	159	780	722	214	160	0	0	254	0	0
Stage 1	167	167	-	554	554	-	-	-	-	-	-	-
Stage 2	573	594	-	226	168	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.12	6.52	6.22	4.1	-	-	4.13	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.518	4.018	3.318	2.2	-	-	2.227	-	-
Pot Cap-1 Maneuver	334	336	889	313	353	826	1432	-	-	1305	-	-
Stage 1	837	762	-	517	514	-	-	-	-	-	-	-
Stage 2	506	495	-	777	759	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	275	295	889	235	310	826	1432	-	-	1305	-	-
Mov Cap-2 Maneuver	275	295	-	235	310	-	-	-	-	-	-	-
Stage 1	737	760	-	455	453	-	-	-	-	-	-	-
Stage 2	408	436	-	670	757	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.2	26	3.1	0.2
HCM LOS	B	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1432	-	-	558	263	1305	-	-
HCM Lane V/C Ratio	0.119	-	-	0.217	0.353	0.003	-	-
HCM Control Delay (s)	7.9	-	-	13.2	26	7.8	0	-
HCM Lane LOS	A	-	-	B	D	A	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.8	1.5	0	-	-

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	728	44	532	945	30	391
Future Volume (veh/h)	728	44	532	945	30	391
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1885	1870	1870	1885	1856	1870
Adj Flow Rate, veh/h	827	50	605	0	34	444
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	2	2	1	3	2
Cap, veh/h	1177	597	999		341	1542
Arrive On Green	0.34	0.34	0.28	0.00	0.04	0.43
Sat Flow, veh/h	3483	1585	3647	1598	1767	3647
Grp Volume(v), veh/h	827	50	605	0	34	444
Grp Sat Flow(s),veh/h/ln	1742	1585	1777	1598	1767	1777
Q Serve(g_s), s	9.0	0.9	6.5	0.0	0.5	3.5
Cycle Q Clear(g_c), s	9.0	0.9	6.5	0.0	0.5	3.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	1177	597	999		341	1542
V/C Ratio(X)	0.70	0.08	0.61		0.10	0.29
Avail Cap(c_a), veh/h	1986	965	2026		1280	4458
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	12.6	8.8	13.6	0.0	9.9	8.0
Incr Delay (d2), s/veh	0.9	0.1	0.6	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	2.1	0.0	0.2	1.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.5	8.9	14.2	0.0	10.0	8.1
LnGrp LOS	B	A	B		A	A
Approach Vol, veh/h	877		605	A		478
Approach Delay, s/veh	13.3		14.2			8.3
Approach LOS	B		B			A

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		24.0		19.8	6.7	17.3
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		55.0		25.0	25.0	25.0
Max Q Clear Time (g_c+I1), s		5.5		11.0	2.5	8.5
Green Ext Time (p_c), s		3.2		3.8	0.1	3.6

Intersection Summary			
HCM 6th Ctrl Delay			12.3
HCM 6th LOS			B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	2	2	33	8	271	3	284	21	508	504	75
Future Volume (veh/h)	57	2	2	33	8	271	3	284	21	508	504	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	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	58	2	2	34	8	277	3	290	21	518	514	77
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	462	406	347	489	375	330	294	821	59	706	771	115
Arrive On Green	0.08	0.22	0.22	0.06	0.20	0.20	0.01	0.24	0.22	0.24	0.48	0.46
Sat Flow, veh/h	1810	1844	1577	1810	1900	1610	1810	3415	246	1810	1615	242
Grp Volume(v), veh/h	58	2	2	34	8	277	3	153	158	518	0	591
Grp Sat Flow(s),veh/h/ln	1810	1805	1616	1810	1900	1610	1810	1805	1856	1810	0	1856
Q Serve(g_s), s	1.6	0.1	0.1	1.0	0.2	11.3	0.1	4.8	4.9	14.0	0.0	16.8
Cycle Q Clear(g_c), s	1.6	0.1	0.1	1.0	0.2	11.3	0.1	4.8	4.9	14.0	0.0	16.8
Prop In Lane	1.00		0.98	1.00		1.00	1.00		0.13	1.00		0.13
Lane Grp Cap(c), veh/h	462	397	355	489	375	330	294	434	446	706	0	886
V/C Ratio(X)	0.13	0.00	0.01	0.07	0.02	0.84	0.01	0.35	0.36	0.73	0.00	0.67
Avail Cap(c_a), veh/h	585	397	355	705	415	364	546	829	852	793	0	1123
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	0.00	1.00
Uniform Delay (d), s/veh	18.6	20.9	20.9	19.5	22.2	26.2	20.6	21.6	21.7	13.1	0.0	13.8
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	15.7	0.0	0.7	0.7	3.1	0.0	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	0.7	0.0	0.0	0.4	0.1	5.5	0.0	1.9	2.0	5.1	0.0	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.7	20.9	20.9	19.6	22.2	41.9	20.6	22.3	22.4	16.2	0.0	15.2
LnGrp LOS	B	C	C	B	C	D	C	C	C	B	A	B
Approach Vol, veh/h		62			319			314			1109	
Approach Delay, s/veh		18.9			39.0			22.3			15.7	
Approach LOS		B			D			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	4.4	36.8	9.4	18.1	20.7	20.5	7.8	19.6
Change Period (Y+Rc), s	4.0	5.5	4.0	4.5	4.0	5.5	4.0	4.5
Max Green Setting (Gmax), s	10.0	40.0	10.0	15.0	20.0	30.0	12.0	13.0
Max Q Clear Time (g_c+I1), s	2.1	18.8	3.6	13.3	16.0	6.9	3.0	2.1
Green Ext Time (p_c), s	0.0	5.1	0.0	0.2	0.7	2.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	21.1
HCM 6th LOS	C

Notes

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

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	14	1	2	13	96	2	121	5	164	165	24
Future Vol, veh/h	9	14	1	2	13	96	2	121	5	164	165	24
Conflicting Peds, #/hr	1	0	0	0	0	1	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Stop	-	-	None	-	-	None
Storage Length	-	-	-	220	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	2	2	2	3	3	3	0	0	0
Mvmt Flow	10	16	1	2	14	107	2	134	6	182	183	27

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	711	706	198	710	716	138	211	0	0	140	0	0
Stage 1	562	562	-	141	141	-	-	-	-	-	-	-
Stage 2	149	144	-	569	575	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.12	6.52	6.22	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.518	4.018	3.318	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	351	363	848	348	356	910	1354	-	-	1456	-	-
Stage 1	515	513	-	862	780	-	-	-	-	-	-	-
Stage 2	858	782	-	507	503	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	265	310	847	298	304	909	1353	-	-	1456	-	-
Mov Cap-2 Maneuver	265	310	-	298	304	-	-	-	-	-	-	-
Stage 1	513	440	-	860	778	-	-	-	-	-	-	-
Stage 2	741	780	-	419	431	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.2	9	0.1	3.6
HCM LOS	C	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1353	-	-	299	298	1051	1456	-	-
HCM Lane V/C Ratio	0.002	-	-	0.089	0.007	0.115	0.125	-	-
HCM Control Delay (s)	7.7	0	-	18.2	17.2	8.9	7.8	0	-
HCM Lane LOS	A	A	-	C	C	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0	0.4	0.4	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	113	9	57	122	54	15	42	65	45	44	13
Future Volume (veh/h)	3	113	9	57	122	54	15	42	65	45	44	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1856	1856	1856	1856	1856	1856	1841	1841	1841
Adj Flow Rate, veh/h	4	133	11	67	144	64	18	49	76	53	52	15
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	4	4	4	3	3	3	3	3	3	4	4	4
Cap, veh/h	483	473	39	529	311	138	124	132	173	566	457	132
Arrive On Green	0.07	0.28	0.28	0.04	0.26	0.26	0.20	0.20	0.20	0.03	0.33	0.33
Sat Flow, veh/h	1753	1674	138	1767	1216	541	105	664	872	1753	1371	395
Grp Volume(v), veh/h	4	0	144	67	0	208	143	0	0	53	0	67
Grp Sat Flow(s),veh/h/ln	1753	0	1812	1767	0	1757	1642	0	0	1753	0	1766
Q Serve(g_s), s	0.1	0.0	2.4	1.1	0.0	3.9	0.0	0.0	0.0	0.9	0.0	1.0
Cycle Q Clear(g_c), s	0.1	0.0	2.4	1.1	0.0	3.9	2.9	0.0	0.0	0.9	0.0	1.0
Prop In Lane	1.00		0.08	1.00		0.31	0.13		0.53	1.00		0.22
Lane Grp Cap(c), veh/h	483	0	512	529	0	449	429	0	0	566	0	589
V/C Ratio(X)	0.01	0.00	0.28	0.13	0.00	0.46	0.33	0.00	0.00	0.09	0.00	0.11
Avail Cap(c_a), veh/h	1028	0	1836	1126	0	1780	923	0	0	1173	0	1745
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.2	0.0	11.0	10.1	0.0	12.4	13.9	0.0	0.0	10.5	0.0	9.1
Incr Delay (d2), s/veh	0.0	0.0	0.4	0.1	0.0	1.1	0.5	0.0	0.0	0.1	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.8	0.3	0.0	1.4	1.0	0.0	0.0	0.3	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.2	0.0	11.5	10.3	0.0	13.5	14.3	0.0	0.0	10.5	0.0	9.2
LnGrp LOS	A	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		148			275			143			120	
Approach Delay, s/veh		11.4			12.7			14.3			9.8	
Approach LOS		B			B			B			A	
Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.7	16.2		17.7	6.7	15.1	5.3	12.3				
Change Period (Y+Rc), s	4.0	5.0		4.5	4.0	5.0	4.0	4.5				
Max Green Setting (Gmax), s	15.0	40.0		39.0	15.0	40.0	15.0	20.0				
Max Q Clear Time (g_c+I1), s	3.1	4.4		3.0	2.1	5.9	2.9	4.9				
Green Ext Time (p_c), s	0.1	1.2		0.3	0.0	1.9	0.1	0.6				
Intersection Summary												
HCM 6th Ctrl Delay			12.2									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	152	136	68	55	14
Future Vol, veh/h	14	152	136	68	55	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	5	5
Mvmt Flow	16	169	151	76	61	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	227	0	-	0	390	189
Stage 1	-	-	-	-	189	-
Stage 2	-	-	-	-	201	-
Critical Hdwy	4.12	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.218	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1341	-	-	-	608	845
Stage 1	-	-	-	-	836	-
Stage 2	-	-	-	-	826	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1341	-	-	-	600	845
Mov Cap-2 Maneuver	-	-	-	-	600	-
Stage 1	-	-	-	-	825	-
Stage 2	-	-	-	-	826	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1341	-	-	-	638
HCM Lane V/C Ratio	0.012	-	-	-	0.12
HCM Control Delay (s)	7.7	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	1	45	5	2	1	26	279	3	1	366	16
Future Vol, veh/h	9	1	45	5	2	1	26	279	3	1	366	16
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	1	52	6	2	1	30	324	3	1	426	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	825	825	436	850	833	326	445	0	0	327	0	0
Stage 1	438	438	-	386	386	-	-	-	-	-	-	-
Stage 2	387	387	-	464	447	-	-	-	-	-	-	-
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	292	308	620	280	304	715	1115	-	-	1233	-	-
Stage 1	597	579	-	637	610	-	-	-	-	-	-	-
Stage 2	637	610	-	578	573	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	282	298	620	249	294	715	1115	-	-	1233	-	-
Mov Cap-2 Maneuver	282	298	-	249	294	-	-	-	-	-	-	-
Stage 1	577	578	-	616	590	-	-	-	-	-	-	-
Stage 2	613	590	-	528	572	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.1	18.2	0.7	0
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1115	-	-	510	283	1233	-	-
HCM Lane V/C Ratio	0.027	-	-	0.125	0.033	0.001	-	-
HCM Control Delay (s)	8.3	0	-	13.1	18.2	7.9	0	-
HCM Lane LOS	A	A	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	0.1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	367	162	171	258	90	321	316	233	136	341	44
Future Volume (veh/h)	52	367	162	171	258	90	321	316	233	136	341	44
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	1900	1900	1900	1900	1900	1900	1900	1900	1900	1885	1885	1885
Adj Flow Rate, veh/h	54	382	169	178	269	94	334	329	243	142	355	46
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, %	0	0	0	0	0	0	0	0	0	1	1	1
Cap, veh/h	415	482	741	359	553	631	486	519	375	293	491	63
Arrive On Green	0.07	0.25	0.25	0.10	0.29	0.29	0.21	0.26	0.26	0.10	0.15	0.15
Sat Flow, veh/h	1810	1900	1610	1810	1900	1610	1810	1999	1446	1795	3192	410
Grp Volume(v), veh/h	54	382	169	178	269	94	334	296	276	142	198	203
Grp Sat Flow(s),veh/h/ln	1810	1900	1610	1810	1900	1610	1810	1805	1640	1795	1791	1811
Q Serve(g_s), s	1.3	12.0	1.3	4.4	7.5	2.4	6.6	9.3	9.6	4.9	6.7	6.8
Cycle Q Clear(g_c), s	1.3	12.0	1.3	4.4	7.5	2.4	6.6	9.3	9.6	4.9	6.7	6.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.88	1.00		0.23
Lane Grp Cap(c), veh/h	415	482	741	359	553	631	486	469	426	293	275	279
V/C Ratio(X)	0.13	0.79	0.23	0.50	0.49	0.15	0.69	0.63	0.65	0.48	0.72	0.73
Avail Cap(c_a), veh/h	858	742	961	735	742	791	1102	987	897	673	560	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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.4	22.3	2.8	15.8	18.7	12.6	21.7	21.0	21.1	27.2	25.8	25.8
Incr Delay (d2), s/veh	0.1	3.3	0.2	1.1	0.7	0.1	2.5	2.0	2.4	0.5	1.3	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	0.5	5.4	0.5	1.8	3.1	0.8	4.4	3.8	3.6	1.9	2.7	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.6	25.6	3.0	16.9	19.4	12.7	24.1	23.0	23.4	27.7	27.1	27.2
LnGrp LOS	B	C	A	B	B	B	C	C	C	C	C	C
Approach Vol, veh/h		605			541			906			543	
Approach Delay, s/veh		18.4			17.4			23.5			27.3	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.2	14.3	8.3	23.1	10.9	21.6	10.7	20.7
Change Period (Y+Rc), s	5.0	4.5	4.0	4.5	4.5	5.0	4.0	4.5
Max Green Setting (Gmax), s	35.0	20.0	20.0	25.0	20.0	35.0	20.0	25.0
Max Q Clear Time (g_c+I1), s	8.6	8.8	3.3	9.5	6.9	11.6	6.4	14.0
Green Ext Time (p_c), s	1.7	1.0	0.1	1.6	0.1	5.0	0.4	2.2

Intersection Summary	
HCM 6th Ctrl Delay	21.8
HCM 6th LOS	C

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	13	13	43	10	205	9	630	22	333	834	80
Future Volume (veh/h)	75	13	13	43	10	205	9	630	22	333	834	80
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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	78	14	14	45	10	214	9	656	23	347	869	83
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	249	270	233	433	295	263	189	1351	47	554	976	917
Arrive On Green	0.06	0.15	0.15	0.07	0.16	0.16	0.01	0.38	0.38	0.15	0.52	0.52
Sat Flow, veh/h	1795	1823	1570	1795	1791	1598	1795	3530	124	1795	1885	1598
Grp Volume(v), veh/h	78	14	14	45	10	214	9	333	346	347	869	83
Grp Sat Flow(s),veh/h/ln	1795	1791	1603	1795	1791	1598	1795	1791	1863	1795	1885	1598
Q Serve(g_s), s	2.5	0.4	0.5	1.4	0.3	8.8	0.2	9.6	9.6	7.2	28.1	1.6
Cycle Q Clear(g_c), s	2.5	0.4	0.5	1.4	0.3	8.8	0.2	9.6	9.6	7.2	28.1	1.6
Prop In Lane	1.00		0.98	1.00		1.00	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	249	265	238	433	295	263	189	685	713	554	976	917
V/C Ratio(X)	0.31	0.05	0.06	0.10	0.03	0.81	0.05	0.49	0.49	0.63	0.89	0.09
Avail Cap(c_a), veh/h	542	394	353	697	394	352	563	1051	1093	686	1106	1028
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	23.0	24.9	25.0	21.2	23.9	27.4	15.2	16.0	16.0	10.0	14.7	6.5
Incr Delay (d2), s/veh	0.3	0.1	0.1	0.0	0.0	10.2	0.1	0.7	0.7	0.5	8.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.2	0.2	0.5	0.1	3.9	0.1	3.6	3.8	2.3	12.1	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.3	25.0	25.1	21.2	24.0	37.7	15.4	16.7	16.6	10.5	23.4	6.6
LnGrp LOS	C	C	C	C	C	D	B	B	B	B	C	A
Approach Vol, veh/h		106			269			688			1299	
Approach Delay, s/veh		23.7			34.4			16.6			18.9	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	4.8	39.8	7.9	15.7	14.0	30.6	9.0	14.6				
Change Period (Y+Rc), s	4.0	4.5	4.0	4.5	4.0	4.5	4.0	4.5				
Max Green Setting (Gmax), s	15.0	40.0	15.0	15.0	15.0	40.0	15.0	15.0				
Max Q Clear Time (g_c+I1), s	12.2	30.1	4.5	10.8	9.2	11.6	3.4	2.5				
Green Ext Time (p_c), s	0.0	5.2	0.0	0.5	0.3	5.9	0.0	0.1				
Intersection Summary												
HCM 6th Ctrl Delay			20.2									
HCM 6th LOS			C									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	214	77	28	11	97	118	22	316	10	241	399	211
Future Volume (veh/h)	214	77	28	11	97	118	22	316	10	241	399	211
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	1856	1856	1856	1870	1870	1870	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	230	83	30	12	104	127	24	340	11	259	429	227
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	2	2	2	1	1	1	2	2	2
Cap, veh/h	432	401	145	387	142	173	291	456	15	427	660	560
Arrive On Green	0.15	0.31	0.31	0.02	0.19	0.19	0.03	0.25	0.25	0.13	0.35	0.35
Sat Flow, veh/h	1767	1301	470	1781	766	936	1795	1816	59	1781	1870	1585
Grp Volume(v), veh/h	230	0	113	12	0	231	24	0	351	259	429	227
Grp Sat Flow(s),veh/h/ln	1767	0	1771	1781	0	1702	1795	0	1875	1781	1870	1585
Q Serve(g_s), s	6.4	0.0	3.2	0.4	0.0	8.6	0.7	0.0	11.6	6.7	12.9	7.3
Cycle Q Clear(g_c), s	6.4	0.0	3.2	0.4	0.0	8.6	0.7	0.0	11.6	6.7	12.9	7.3
Prop In Lane	1.00		0.27	1.00		0.55	1.00		0.03	1.00		1.00
Lane Grp Cap(c), veh/h	432	0	546	387	0	316	291	0	471	427	660	560
V/C Ratio(X)	0.53	0.00	0.21	0.03	0.00	0.73	0.08	0.00	0.75	0.61	0.65	0.41
Avail Cap(c_a), veh/h	961	0	790	1007	0	633	633	0	976	586	974	825
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.8	0.0	17.2	21.2	0.0	25.8	17.8	0.0	23.2	15.3	18.3	16.4
Incr Delay (d2), s/veh	1.0	0.0	0.4	0.0	0.0	6.8	0.1	0.0	4.0	1.4	1.9	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	1.2	0.1	0.0	3.8	0.3	0.0	5.2	2.5	5.3	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.8	0.0	17.6	21.2	0.0	32.6	17.9	0.0	27.2	16.7	20.1	17.2
LnGrp LOS	B	A	B	C	A	C	B	A	C	B	C	B
Approach Vol, veh/h		343			243			375			915	
Approach Delay, s/veh		17.7			32.1			26.6			18.4	
Approach LOS		B			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.2	29.2	13.9	18.0	13.0	22.4	5.6	26.2
Change Period (Y+Rc), s	4.0	5.5	4.0	5.5	4.0	5.5	4.0	5.5
Max Green Setting (Gmax), s	15.0	35.0	30.0	25.0	15.0	35.0	25.0	30.0
Max Q Clear Time (g_c+I1), s	2.7	14.9	8.4	10.6	8.7	13.6	2.4	5.2
Green Ext Time (p_c), s	0.0	5.6	0.6	1.9	0.4	3.3	0.0	1.0

Intersection Summary	
HCM 6th Ctrl Delay	21.7
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	10.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	176	8	14	228	213	3	15	8	285	22	51
Future Vol, veh/h	40	176	8	14	228	213	3	15	8	285	22	51
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	Free
Storage Length	250	-	-	100	-	0	-	-	-	130	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	5	5	5	2	2	2	12	12	12	1	1	1
Mvmt Flow	42	185	8	15	240	224	3	16	8	300	23	54

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	240	0	0	193	0	0	555	543	189	555	547	-
Stage 1	-	-	-	-	-	-	273	273	-	270	270	-
Stage 2	-	-	-	-	-	-	282	270	-	285	277	-
Critical Hdwy	4.15	-	-	4.12	-	-	7.22	6.62	6.32	7.11	6.51	-
Critical Hdwy Stg 1	-	-	-	-	-	-	6.22	5.62	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.22	5.62	-	6.11	5.51	-
Follow-up Hdwy	2.245	-	-	2.218	-	-	3.608	4.108	3.408	3.509	4.009	-
Pot Cap-1 Maneuver	1309	-	-	1380	-	-	427	433	828	444	446	0
Stage 1	-	-	-	-	-	-	712	666	-	738	688	0
Stage 2	-	-	-	-	-	-	704	668	-	724	683	0
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1309	-	-	1380	-	-	396	414	828	413	427	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	396	414	-	413	427	-
Stage 1	-	-	-	-	-	-	689	645	-	714	680	-
Stage 2	-	-	-	-	-	-	673	661	-	677	661	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.2	12.8	32.2
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	486	1309	-	-	1380	-	-	413	427	-
HCM Lane V/C Ratio	0.056	0.032	-	-	0.011	-	-	0.726	0.054	-
HCM Control Delay (s)	12.8	7.8	-	-	7.6	-	-	33.6	13.9	0
HCM Lane LOS	B	A	-	-	A	-	-	D	B	A
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	5.7	0.2	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	384	79	3	363	23	82	22	12	17	6	2
Future Vol, veh/h	3	384	79	3	363	23	82	22	12	17	6	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	4	4	4
Mvmt Flow	3	404	83	3	382	24	86	23	13	18	6	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	406	0	0	487	0	0	652	864	244	620	893	203
Stage 1	-	-	-	-	-	-	452	452	-	400	400	-
Stage 2	-	-	-	-	-	-	200	412	-	220	493	-
Critical Hdwy	4.14	-	-	4.12	-	-	7.62	6.62	7.02	7.58	6.58	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-	6.62	5.62	-	6.58	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.62	5.62	-	6.58	5.58	-
Follow-up Hdwy	2.22	-	-	2.21	-	-	3.56	4.06	3.36	3.54	4.04	3.34
Pot Cap-1 Maneuver	1149	-	-	1079	-	-	345	283	744	368	276	798
Stage 1	-	-	-	-	-	-	546	559	-	592	595	-
Stage 2	-	-	-	-	-	-	772	583	-	756	540	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1149	-	-	1079	-	-	336	281	744	337	274	798
Mov Cap-2 Maneuver	-	-	-	-	-	-	336	281	-	337	274	-
Stage 1	-	-	-	-	-	-	544	557	-	590	593	-
Stage 2	-	-	-	-	-	-	759	581	-	709	538	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	21.2	16.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	343	1149	-	-	1079	-	-	334
HCM Lane V/C Ratio	0.356	0.003	-	-	0.003	-	-	0.079
HCM Control Delay (s)	21.2	8.1	0	-	8.3	0	-	16.7
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.6	0	-	-	0	-	-	0.3

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	48	473	167	17	407	9	106	14	14	8	8	25
Future Vol, veh/h	48	473	167	17	407	9	106	14	14	8	8	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	200	-	-	130	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	2	2	2	3	3	3	0	0	0
Mvmt Flow	49	488	172	18	420	9	109	14	14	8	8	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	429	0	0	660	0	0	1150	1137	574	1147	1219	425
Stage 1	-	-	-	-	-	-	672	672	-	461	461	-
Stage 2	-	-	-	-	-	-	478	465	-	686	758	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.13	6.53	6.23	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.527	4.027	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	1136	-	-	928	-	-	174	201	516	178	182	634
Stage 1	-	-	-	-	-	-	444	453	-	584	569	-
Stage 2	-	-	-	-	-	-	566	561	-	441	418	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1136	-	-	928	-	-	153	189	516	155	171	634
Mov Cap-2 Maneuver	-	-	-	-	-	-	153	189	-	155	171	-
Stage 1	-	-	-	-	-	-	425	434	-	559	558	-
Stage 2	-	-	-	-	-	-	525	550	-	397	400	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.4	61.3	19.1
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	153	277	1136	-	-	928	-	-	297
HCM Lane V/C Ratio	0.714	0.104	0.044	-	-	0.019	-	-	0.142
HCM Control Delay (s)	72.4	19.5	8.3	-	-	9	-	-	19.1
HCM Lane LOS	F	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	4.2	0.3	0.1	-	-	0.1	-	-	0.5

Intersection						
Int Delay, s/veh	7.3					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	319	0	148	155
Future Vol, veh/h	0	0	319	0	148	155
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	96	92	96	96
Heavy Vehicles, %	2	2	1	2	7	7
Mvmt Flow	0	0	332	0	154	161

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	332	0	-	0	332	332
Stage 1	-	-	-	-	332	-
Stage 2	-	-	-	-	0	-
Critical Hdwy	4.12	-	-	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	2.218	-	-	-	3.563	3.363
Pot Cap-1 Maneuver	1227	-	-	-	653	698
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1227	-	-	-	653	698
Mov Cap-2 Maneuver	-	-	-	-	653	-
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	14.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1227	-	-	-	675
HCM Lane V/C Ratio	-	-	-	-	0.468
HCM Control Delay (s)	0	-	-	-	14.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	71	447	72	169	7	540	78	39	2	91	54
Future Volume (veh/h)	40	71	447	72	169	7	540	78	39	2	91	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		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	1796	1796	1796	1870	1870	1870	1885	1885	1885	1900	1900	1900
Adj Flow Rate, veh/h	49	87	0	88	206	9	659	95	0	2	111	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	7	7	7	2	2	2	1	1	1	0	0	0
Cap, veh/h	253	256		366	303	13	880	1727		275	445	
Arrive On Green	0.04	0.14	0.00	0.07	0.17	0.17	0.36	0.48	0.00	0.00	0.12	0.00
Sat Flow, veh/h	1711	1796	0	1781	1778	78	1795	3676	0	1810	3705	0
Grp Volume(v), veh/h	49	87	0	88	0	215	659	95	0	2	111	0
Grp Sat Flow(s),veh/h/ln	1711	1796	0	1781	0	1856	1795	1791	0	1810	1805	0
Q Serve(g_s), s	1.6	2.9	0.0	2.7	0.0	7.2	18.7	0.9	0.0	0.1	1.9	0.0
Cycle Q Clear(g_c), s	1.6	2.9	0.0	2.7	0.0	7.2	18.7	0.9	0.0	0.1	1.9	0.0
Prop In Lane	1.00		0.00	1.00		0.04	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	253	256		366	0	316	880	1727		275	445	
V/C Ratio(X)	0.19	0.34		0.24	0.00	0.68	0.75	0.06		0.01	0.25	
Avail Cap(c_a), veh/h	433	539		638	0	696	1174	2150		678	1083	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	22.9	25.7	0.0	21.7	0.0	25.9	12.6	9.2	0.0	25.5	26.4	0.0
Incr Delay (d2), s/veh	0.3	1.1	0.0	0.3	0.0	3.6	2.3	0.0	0.0	0.0	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.3	0.0	1.1	0.0	3.2	6.9	0.3	0.0	0.0	0.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.2	26.9	0.0	22.0	0.0	29.6	15.0	9.2	0.0	25.5	26.7	0.0
LnGrp LOS	C	C		C	A	C	B	A		C	C	
Approach Vol, veh/h		136	A		303			754	A		113	A
Approach Delay, s/veh		25.5			27.4			14.2			26.7	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	29.1	13.2	8.0	16.3	5.2	37.1	9.8	14.5
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	35.0	20.0	10.0	25.0	15.0	40.0	15.0	20.0
Max Q Clear Time (g_c+I1), s	20.7	3.9	3.6	9.2	2.1	2.9	4.7	4.9
Green Ext Time (p_c), s	3.3	0.5	0.0	1.3	0.0	0.6	0.1	0.4

Intersection Summary	
HCM 6th Ctrl Delay	19.5
HCM 6th LOS	B

Notes

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

Unsignalized Delay for [NBR, EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	445	192	148	521	117	231	353	105	173	453	123
Future Volume (veh/h)	137	445	192	148	521	117	231	353	105	173	453	123
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	143	464	200	154	543	122	241	368	109	180	472	128
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	2	2	2
Cap, veh/h	327	660	282	327	802	179	400	738	216	422	677	182
Arrive On Green	0.08	0.27	0.27	0.09	0.28	0.28	0.13	0.27	0.27	0.10	0.24	0.24
Sat Flow, veh/h	1795	2434	1041	1795	2902	649	1781	2708	791	1781	2763	744
Grp Volume(v), veh/h	143	340	324	154	334	331	241	240	237	180	302	298
Grp Sat Flow(s),veh/h/ln	1795	1791	1684	1795	1791	1760	1781	1777	1722	1781	1777	1730
Q Serve(g_s), s	4.2	12.8	13.0	4.5	12.4	12.5	7.3	8.5	8.7	5.5	11.6	11.8
Cycle Q Clear(g_c), s	4.2	12.8	13.0	4.5	12.4	12.5	7.3	8.5	8.7	5.5	11.6	11.8
Prop In Lane	1.00		0.62	1.00		0.37	1.00		0.46	1.00		0.43
Lane Grp Cap(c), veh/h	327	486	457	327	495	486	400	484	469	422	435	424
V/C Ratio(X)	0.44	0.70	0.71	0.47	0.68	0.68	0.60	0.49	0.51	0.43	0.69	0.70
Avail Cap(c_a), veh/h	540	718	675	532	718	705	644	712	690	715	712	693
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	18.3	24.6	24.6	18.3	24.1	24.1	18.2	22.9	23.0	18.1	25.7	25.8
Incr Delay (d2), s/veh	0.9	1.9	2.0	1.1	1.6	1.7	1.5	0.8	0.8	0.7	2.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	5.4	5.2	1.9	5.2	5.2	3.0	3.5	3.5	2.2	4.9	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.2	26.4	26.7	19.4	25.7	25.8	19.7	23.7	23.8	18.8	27.7	27.9
LnGrp LOS	B	C	C	B	C	C	B	C	C	B	C	C
Approach Vol, veh/h		807			819			718			780	
Approach Delay, s/veh		25.2			24.6			22.4			25.7	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	25.7	12.7	25.4	11.5	25.3	14.8	23.3
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	15.0	30.0	20.0	30.0	15.0	30.0	20.0	30.0
Max Q Clear Time (g_c+I1), s	6.2	14.5	7.5	10.7	6.5	15.0	9.3	13.8
Green Ext Time (p_c), s	0.2	3.7	0.4	2.8	0.2	3.7	0.5	3.4

Intersection Summary	
HCM 6th Ctrl Delay	24.5
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	206	84	45	251	153	85	421	24	122	441	129
Future Volume (veh/h)	94	206	84	45	251	153	85	421	24	122	441	129
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	101	222	90	48	270	165	91	453	26	131	474	139
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	4	4	4	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	654	257	60	483	285	119	870	50	172	770	224
Arrive On Green	0.08	0.27	0.27	0.03	0.23	0.23	0.07	0.25	0.25	0.10	0.28	0.28
Sat Flow, veh/h	1753	2448	960	1781	2141	1266	1781	3415	195	1781	2710	789
Grp Volume(v), veh/h	101	156	156	48	222	213	91	235	244	131	310	303
Grp Sat Flow(s),veh/h/ln	1753	1749	1660	1781	1777	1630	1781	1777	1834	1781	1777	1722
Q Serve(g_s), s	3.2	4.1	4.4	1.5	6.4	6.7	2.9	6.5	6.6	4.1	8.7	8.8
Cycle Q Clear(g_c), s	3.2	4.1	4.4	1.5	6.4	6.7	2.9	6.5	6.6	4.1	8.7	8.8
Prop In Lane	1.00		0.58	1.00		0.78	1.00		0.11	1.00		0.46
Lane Grp Cap(c), veh/h	132	467	444	60	401	368	119	453	467	172	505	490
V/C Ratio(X)	0.77	0.33	0.35	0.81	0.56	0.58	0.76	0.52	0.52	0.76	0.61	0.62
Avail Cap(c_a), veh/h	458	914	867	465	928	852	465	928	958	465	928	900
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	26.1	16.9	17.0	27.6	19.7	19.8	26.3	18.4	18.4	25.3	17.8	17.9
Incr Delay (d2), s/veh	9.0	0.6	0.7	21.7	1.7	2.0	9.7	1.3	1.3	6.9	1.7	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	1.6	1.6	1.0	2.5	2.5	1.5	2.6	2.7	2.0	3.4	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.0	17.5	17.7	49.3	21.4	21.8	36.1	19.7	19.7	32.2	19.5	19.7
LnGrp LOS	D	B	B	D	C	C	D	B	B	C	B	B
Approach Vol, veh/h		413			483			570			744	
Approach Delay, s/veh		21.9			24.4			22.3			21.8	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.3	17.9	10.5	19.6	6.9	20.3	8.8	21.3
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	15.0	30.0	15.0	30.0	15.0	30.0	15.0	30.0
Max Q Clear Time (g_c+I1), s	5.2	8.7	6.1	8.6	3.5	6.4	4.9	10.8
Green Ext Time (p_c), s	0.1	3.6	0.2	4.0	0.1	2.5	0.1	5.2

Intersection Summary	
HCM 6th Ctrl Delay	22.5
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	124	325	81	15	405	217	105	165	17	137	228	144
Future Volume (veh/h)	124	325	81	15	405	217	105	165	17	137	228	144
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		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	128	335	84	15	418	224	108	170	18	141	235	148
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	169	1157	286	17	727	385	141	503	53	182	377	228
Arrive On Green	0.10	0.41	0.41	0.01	0.32	0.32	0.08	0.16	0.16	0.10	0.18	0.18
Sat Flow, veh/h	1781	2823	698	1781	2243	1190	1781	3242	339	1781	2119	1280
Grp Volume(v), veh/h	128	209	210	15	330	312	108	92	96	141	195	188
Grp Sat Flow(s),veh/h/ln	1781	1777	1745	1781	1777	1656	1781	1777	1804	1781	1777	1622
Q Serve(g_s), s	4.3	4.9	5.0	0.5	9.5	9.7	3.7	2.9	2.9	4.8	6.3	6.6
Cycle Q Clear(g_c), s	4.3	4.9	5.0	0.5	9.5	9.7	3.7	2.9	2.9	4.8	6.3	6.6
Prop In Lane	1.00		0.40	1.00		0.72	1.00		0.19	1.00		0.79
Lane Grp Cap(c), veh/h	169	728	715	17	576	536	141	275	280	182	316	289
V/C Ratio(X)	0.76	0.29	0.29	0.91	0.57	0.58	0.77	0.33	0.34	0.78	0.62	0.65
Avail Cap(c_a), veh/h	519	1094	1074	433	1007	939	433	576	584	433	576	525
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	27.2	12.2	12.2	30.6	17.3	17.4	27.9	23.2	23.3	27.0	23.4	23.6
Incr Delay (d2), s/veh	8.0	0.3	0.3	79.2	0.9	1.0	6.4	0.3	0.3	5.2	0.7	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.6	1.6	0.6	3.6	3.4	1.7	1.1	1.2	2.2	2.5	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.2	12.5	12.5	109.7	18.2	18.4	34.3	23.5	23.5	32.2	24.2	24.5
LnGrp LOS	D	B	B	F	B	B	C	C	C	C	C	C
Approach Vol, veh/h		547			657			296			524	
Approach Delay, s/veh		17.8			20.4			27.4			26.5	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.9	25.0	11.3	14.6	5.6	30.3	9.9	16.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	18.0	35.0	15.0	20.0	15.0	38.0	15.0	20.0
Max Q Clear Time (g_c+I1), s	6.3	11.7	6.8	4.9	2.5	7.0	5.7	8.6
Green Ext Time (p_c), s	0.3	4.0	0.2	0.5	0.0	2.9	0.1	1.2

Intersection Summary	
HCM 6th Ctrl Delay	22.3
HCM 6th LOS	C

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	171	78	51	201	10	137	127	27	9	120	24
Future Volume (veh/h)	13	171	78	51	201	10	137	127	27	9	120	24
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	1695	1695	1695	1723	1723	1723	1736	1736	1736	1736	1736	1736
Adj Flow Rate, veh/h	14	190	87	57	223	11	152	141	30	10	133	27
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	4	2	2	2	1	1	1	1	1	1
Cap, veh/h	122	675	289	253	809	40	189	568	121	374	226	46
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.11	0.41	0.41	0.16	0.16	0.16
Sat Flow, veh/h	52	2093	896	375	2507	123	1654	1388	295	1125	1400	284
Grp Volume(v), veh/h	157	0	134	153	0	138	152	0	171	10	0	160
Grp Sat Flow(s),veh/h/ln	1662	0	1380	1461	0	1545	1654	0	1683	1125	0	1685
Q Serve(g_s), s	0.0	0.0	2.7	0.0	0.0	2.5	3.3	0.0	2.5	0.3	0.0	3.3
Cycle Q Clear(g_c), s	2.6	0.0	2.7	2.5	0.0	2.5	3.3	0.0	2.5	0.3	0.0	3.3
Prop In Lane	0.09		0.65	0.37		0.08	1.00		0.18	1.00		0.17
Lane Grp Cap(c), veh/h	641	0	445	604	0	498	189	0	689	374	0	272
V/C Ratio(X)	0.24	0.00	0.30	0.25	0.00	0.28	0.80	0.00	0.25	0.03	0.00	0.59
Avail Cap(c_a), veh/h	1413	0	1109	1261	0	1242	886	0	2254	947	0	1128
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.4	0.0	9.5	9.4	0.0	9.4	16.1	0.0	7.2	13.2	0.0	14.5
Incr Delay (d2), s/veh	0.3	0.0	0.5	0.3	0.0	0.4	3.0	0.0	0.2	0.0	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.6	0.7	0.0	0.7	1.2	0.0	0.7	0.1	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.7	0.0	10.0	9.7	0.0	9.8	19.2	0.0	7.4	13.3	0.0	16.5
LnGrp LOS	A	A	B	A	A	A	B	A	A	B	A	B
Approach Vol, veh/h		291			291			323			170	
Approach Delay, s/veh		9.9			9.8			12.9			16.3	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6	7	8				
Phs Duration (G+Y+Rc), s		17.0		20.3		17.0	9.3	11.0				
Change Period (Y+Rc), s		5.0		5.0		5.0	5.0	5.0				
Max Green Setting (Gmax), s		30.0		50.0		30.0	20.0	25.0				
Max Q Clear Time (g_c+I1), s		4.5		4.5		4.7	5.3	5.3				
Green Ext Time (p_c), s		2.5		1.1		2.4	0.0	0.8				

Intersection Summary			
HCM 6th Ctrl Delay			11.8
HCM 6th LOS			B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	240	86	122	276	39	175	286	76	66	233	44
Future Volume (veh/h)	37	240	86	122	276	39	175	286	76	66	233	44
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	1709	1709	1709	1723	1723	1723	1723	1723	1723
Adj Flow Rate, veh/h	39	253	91	128	291	41	184	301	0	69	245	46
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	3	3	3	2	2	2	2	2	2
Cap, veh/h	503	979	343	516	1307	182	361	774		321	467	86
Arrive On Green	0.02	0.41	0.41	0.07	0.46	0.46	0.12	0.24	0.00	0.05	0.17	0.17
Sat Flow, veh/h	1641	2374	832	1628	2860	399	1641	3359	0	1641	2756	509
Grp Volume(v), veh/h	39	172	172	128	164	168	184	301	0	69	144	147
Grp Sat Flow(s),veh/h/ln	1641	1637	1569	1628	1624	1635	1641	1637	0	1641	1637	1629
Q Serve(g_s), s	1.2	5.9	6.1	3.7	5.2	5.3	7.4	6.6	0.0	2.9	6.8	7.0
Cycle Q Clear(g_c), s	1.2	5.9	6.1	3.7	5.2	5.3	7.4	6.6	0.0	2.9	6.8	7.0
Prop In Lane	1.00		0.53	1.00		0.24	1.00		0.00	1.00		0.31
Lane Grp Cap(c), veh/h	503	675	647	516	742	747	361	774		321	277	276
V/C Ratio(X)	0.08	0.26	0.27	0.25	0.22	0.23	0.51	0.39		0.21	0.52	0.53
Avail Cap(c_a), veh/h	1045	675	647	982	742	747	752	1350		822	675	672
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	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.9	16.4	16.5	12.3	13.9	13.9	23.5	27.2	0.0	27.1	32.1	32.2
Incr Delay (d2), s/veh	0.1	0.9	1.0	0.2	0.1	0.2	1.1	0.3	0.0	0.3	1.5	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	0.4	2.3	2.3	1.3	1.9	1.9	2.9	2.5	0.0	1.1	2.8	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.9	17.3	17.5	12.6	14.1	14.1	24.6	27.6	0.0	27.5	33.6	33.8
LnGrp LOS	B	B	B	B	B	B	C	C		C	C	C
Approach Vol, veh/h		383			460			485	A		360	
Approach Delay, s/veh		17.0			13.7			26.4			32.5	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.9	43.8	9.1	25.1	10.7	40.0	14.8	19.4
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	30.0	35.0	30.0	35.0	30.0	35.0	30.0	35.0
Max Q Clear Time (g_c+I1), s	3.2	7.3	4.9	8.6	5.7	8.1	9.4	9.0
Green Ext Time (p_c), s	0.1	2.1	0.1	2.0	0.3	2.2	0.5	1.7

Intersection Summary	
HCM 6th Ctrl Delay	22.1
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	144	241	162	181	94	100	376	65	45	430	18
Future Volume (veh/h)	19	144	241	162	181	94	100	376	65	45	430	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	1870	1870	1870	1885	1885	1885	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	20	148	0	167	187	97	103	388	0	46	443	19
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	1	1	1	2	2	2	2	2	2
Cap, veh/h	26	425		227	536	266	137	1036		56	853	37
Arrive On Green	0.01	0.12	0.00	0.13	0.23	0.23	0.08	0.29	0.00	0.03	0.25	0.25
Sat Flow, veh/h	1781	3647	0	1795	2318	1151	1781	3647	0	1781	3471	149
Grp Volume(v), veh/h	20	148	0	167	143	141	103	388	0	46	226	236
Grp Sat Flow(s),veh/h/ln	1781	1777	0	1795	1791	1678	1781	1777	0	1781	1777	1843
Q Serve(g_s), s	0.5	1.6	0.0	3.7	2.8	3.0	2.4	3.6	0.0	1.1	4.6	4.6
Cycle Q Clear(g_c), s	0.5	1.6	0.0	3.7	2.8	3.0	2.4	3.6	0.0	1.1	4.6	4.6
Prop In Lane	1.00		0.00	1.00		0.69	1.00		0.00	1.00		0.08
Lane Grp Cap(c), veh/h	26	425		227	414	388	137	1036		56	437	453
V/C Ratio(X)	0.75	0.35		0.74	0.34	0.36	0.75	0.37		0.82	0.52	0.52
Avail Cap(c_a), veh/h	1279	2977		1289	1500	1406	1279	2977		1279	1489	1544
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.5	16.9	0.0	17.6	13.4	13.5	18.9	11.8	0.0	20.1	13.6	13.6
Incr Delay (d2), s/veh	34.4	0.6	0.0	4.6	0.6	0.7	7.9	0.3	0.0	25.0	1.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.6	0.0	1.6	1.0	1.0	1.2	1.2	0.0	0.8	1.7	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.9	17.5	0.0	22.1	14.0	14.2	26.8	12.0	0.0	45.1	14.8	14.7
LnGrp LOS	D	B		C	B	B	C	B		D	B	B
Approach Vol, veh/h		168	A		451			491	A		508	
Approach Delay, s/veh		21.9			17.1			15.1			17.5	
Approach LOS		C			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.7	14.8	5.1	14.2	5.8	16.7	9.8	9.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	30.0	35.0	30.0	35.0	30.0	35.0	30.0	35.0
Max Q Clear Time (g_c+I1), s	4.4	6.6	2.5	5.0	3.1	5.6	5.7	3.6
Green Ext Time (p_c), s	0.3	3.5	0.0	2.0	0.1	3.2	0.4	1.1

Intersection Summary	
HCM 6th Ctrl Delay	17.1
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	10	13	477	4	35	0	449	215	13	845	3
Future Volume (veh/h)	3	10	13	477	4	35	0	449	215	13	845	3
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	1841	1841	1841	1856	1856	1856	0	1841	1841	1885	1885	1885
Adj Flow Rate, veh/h	3	10	13	492	4	36	0	463	222	13	871	3
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	4	4	4	3	3	3	0	4	4	1	1	1
Cap, veh/h	15	49	55	574	52	467	0	664	316	18	1406	5
Arrive On Green	0.04	0.04	0.04	0.32	0.32	0.32	0.00	0.29	0.29	0.01	0.38	0.38
Sat Flow, veh/h	420	1400	1560	1767	160	1437	0	2390	1094	1795	3661	13
Grp Volume(v), veh/h	13	0	13	492	0	40	0	351	334	13	426	448
Grp Sat Flow(s),veh/h/ln	1820	0	1560	1767	0	1597	0	1749	1644	1795	1791	1883
Q Serve(g_s), s	0.4	0.0	0.5	15.3	0.0	1.0	0.0	10.5	10.6	0.4	11.3	11.3
Cycle Q Clear(g_c), s	0.4	0.0	0.5	15.3	0.0	1.0	0.0	10.5	10.6	0.4	11.3	11.3
Prop In Lane	0.23		1.00	1.00		0.90	0.00		0.67	1.00		0.01
Lane Grp Cap(c), veh/h	64	0	55	574	0	518	0	505	475	18	688	723
V/C Ratio(X)	0.20	0.00	0.24	0.86	0.00	0.08	0.00	0.70	0.70	0.74	0.62	0.62
Avail Cap(c_a), veh/h	311	0	266	1206	0	1090	0	1194	1122	460	1834	1928
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.5	0.0	27.5	18.5	0.0	13.7	0.0	18.5	18.6	28.9	14.6	14.6
Incr Delay (d2), s/veh	0.6	0.0	0.8	3.9	0.0	0.1	0.0	1.7	1.9	20.1	0.9	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.2	5.8	0.0	0.3	0.0	3.9	3.7	0.3	4.2	4.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.0	0.0	28.3	22.4	0.0	13.8	0.0	20.3	20.5	49.0	15.5	15.5
LnGrp LOS	C	A	C	C	A	B	A	C	C	D	B	B
Approach Vol, veh/h		26			532			685			887	
Approach Delay, s/veh		28.2			21.7			20.4			16.0	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	5.6	21.9		24.0		27.5		7.1
Change Period (Y+Rc), s	5.0	5.0		5.0		5.0		5.0
Max Green Setting (Gmax), s	15.0	40.0		40.0		60.0		10.0
Max Q Clear Time (g_c+I1), s	2.4	12.6		17.3		13.3		2.5
Green Ext Time (p_c), s	0.0	4.3		1.8		6.7		0.0

Intersection Summary	
HCM 6th Ctrl Delay	19.0
HCM 6th LOS	B

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	66	116	6	94	55	109	298	4	37	300	300
Future Volume (veh/h)	180	66	116	6	94	55	109	298	4	37	300	300
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1709	1709	1709	1668	1668	1668	1736	1736	1736	1723	1723	1723
Adj Flow Rate, veh/h	205	75	132	7	107	62	124	339	5	42	341	341
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, %	3	3	3	6	6	6	1	1	1	2	2	2
Cap, veh/h	498	641	539	67	156	87	334	593	9	341	512	434
Arrive On Green	0.13	0.37	0.37	0.16	0.16	0.16	0.08	0.35	0.35	0.03	0.30	0.30
Sat Flow, veh/h	1628	1709	1437	25	977	545	1654	1707	25	1641	1723	1460
Grp Volume(v), veh/h	205	75	132	176	0	0	124	0	344	42	341	341
Grp Sat Flow(s),veh/h/ln	1628	1709	1437	1547	0	0	1654	0	1732	1641	1723	1460
Q Serve(g_s), s	5.8	1.7	3.8	0.8	0.0	0.0	3.0	0.0	9.6	1.1	10.3	12.8
Cycle Q Clear(g_c), s	5.8	1.7	3.8	6.4	0.0	0.0	3.0	0.0	9.6	1.1	10.3	12.8
Prop In Lane	1.00		1.00	0.04		0.35	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	498	641	539	309	0	0	334	0	602	341	512	434
V/C Ratio(X)	0.41	0.12	0.25	0.57	0.00	0.00	0.37	0.00	0.57	0.12	0.67	0.79
Avail Cap(c_a), veh/h	693	1003	843	450	0	0	624	0	871	573	722	612
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.6	12.2	12.8	23.8	0.0	0.0	13.7	0.0	15.8	14.4	18.4	19.2
Incr Delay (d2), s/veh	0.5	0.1	0.3	2.0	0.0	0.0	0.7	0.0	1.0	0.2	1.8	5.0
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	0.6	1.1	2.4	0.0	0.0	1.1	0.0	3.6	0.4	4.0	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.1	12.3	13.1	25.7	0.0	0.0	14.4	0.0	16.9	14.6	20.2	24.2
LnGrp LOS	B	B	B	C	A	A	B	A	B	B	C	C
Approach Vol, veh/h		412			176			468			724	
Approach Delay, s/veh		14.5			25.7			16.2			21.7	
Approach LOS		B			C			B			C	

Timer - Assigned Phs	1	2	3	4		6	7	8
Phs Duration (G+Y+Rc), s	12.9	14.5	6.5	25.7		27.4	9.6	22.7
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s	15.0	15.0	10.0	30.0		35.0	15.0	25.0
Max Q Clear Time (g_c+I1), s	7.8	8.4	3.1	11.6		5.8	5.0	14.8
Green Ext Time (p_c), s	0.3	0.5	0.0	2.3		1.1	0.2	3.0

Intersection Summary	
HCM 6th Ctrl Delay	19.0
HCM 6th LOS	B

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	71	35	12	75	6	37	147	9	5	225	72
Future Volume (veh/h)	41	71	35	12	75	6	37	147	9	5	225	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.99	0.99		0.98	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1695	1695	1695	1668	1668	1668	1682	1682	1682	1736	1736	1736
Adj Flow Rate, veh/h	45	77	38	13	82	7	40	160	10	5	245	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	6	6	6	5	5	5	1	1	1
Cap, veh/h	363	499	245	207	868	72	491	537	34	538	848	263
Arrive On Green	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	562	1522	748	185	2648	219	946	1565	98	1123	2473	768
Grp Volume(v), veh/h	89	0	71	55	0	47	40	0	170	5	161	162
Grp Sat Flow(s),veh/h/ln	1437	0	1395	1579	0	1472	946	0	1663	1123	1650	1592
Q Serve(g_s), s	0.0	0.0	1.1	0.0	0.0	0.7	1.0	0.0	2.3	0.1	2.2	2.3
Cycle Q Clear(g_c), s	1.1	0.0	1.1	0.7	0.0	0.7	3.2	0.0	2.3	2.4	2.2	2.3
Prop In Lane	0.50		0.54	0.24		0.15	1.00		0.06	1.00		0.48
Lane Grp Cap(c), veh/h	649	0	457	664	0	482	491	0	570	538	565	546
V/C Ratio(X)	0.14	0.00	0.16	0.08	0.00	0.10	0.08	0.00	0.30	0.01	0.29	0.30
Avail Cap(c_a), veh/h	969	0	782	1012	0	825	666	0	877	745	870	839
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.2	0.0	7.2	7.1	0.0	7.1	8.5	0.0	7.3	8.2	7.3	7.3
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.1	0.0	0.1	0.3	0.0	1.1	0.0	1.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.2	0.2	0.0	0.2	0.2	0.0	0.7	0.0	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.4	0.0	7.4	7.2	0.0	7.2	8.7	0.0	8.4	8.2	8.3	8.4
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		160			102			210			328	
Approach Delay, s/veh		7.4			7.2			8.4			8.3	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		15.4		14.9		15.4		14.9
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0
Max Green Setting (Gmax), s		16.0		17.0		16.0		17.0
Max Q Clear Time (g_c+I1), s		5.2		3.1		4.4		2.7
Green Ext Time (p_c), s		1.7		0.9		3.0		0.5

Intersection Summary	
HCM 6th Ctrl Delay	8.0
HCM 6th LOS	A

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	259	16	25	299	46	12	68	28	65	67	63
Future Volume (veh/h)	69	259	16	25	299	46	12	68	28	65	67	63
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.96	0.99		0.98	0.98		0.96	0.97		0.94
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	1736	1736	1736	1736	1736	1736	1736	1736	1736	1736	1736	1736
Adj Flow Rate, veh/h	74	278	17	27	322	49	13	73	30	70	72	68
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	412	581	35	449	458	70	103	318	118	196	183	133
Arrive On Green	0.09	0.36	0.36	0.04	0.31	0.31	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1654	1615	99	1654	1468	223	69	1122	416	337	646	471
Grp Volume(v), veh/h	74	0	295	27	0	371	116	0	0	210	0	0
Grp Sat Flow(s),veh/h/ln	1654	0	1714	1654	0	1691	1607	0	0	1454	0	0
Q Serve(g_s), s	1.3	0.0	6.4	0.5	0.0	9.3	0.0	0.0	0.0	1.7	0.0	0.0
Cycle Q Clear(g_c), s	1.3	0.0	6.4	0.5	0.0	9.3	2.6	0.0	0.0	5.4	0.0	0.0
Prop In Lane	1.00		0.06	1.00		0.13	0.11		0.26	0.33		0.32
Lane Grp Cap(c), veh/h	412	0	616	449	0	527	538	0	0	512	0	0
V/C Ratio(X)	0.18	0.00	0.48	0.06	0.00	0.70	0.22	0.00	0.00	0.41	0.00	0.00
Avail Cap(c_a), veh/h	745	0	1469	859	0	1449	1073	0	0	992	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.9	0.0	11.9	10.3	0.0	14.5	13.2	0.0	0.0	14.2	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.6	0.1	0.0	1.7	0.2	0.0	0.0	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	2.2	0.2	0.0	3.3	0.9	0.0	0.0	1.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.1	0.0	12.4	10.3	0.0	16.2	13.4	0.0	0.0	14.7	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		369			398			116			210	
Approach Delay, s/veh		12.0			15.8			13.4			14.7	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.4	19.9		18.5	7.1	22.2		18.5
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	14.0	41.0		30.0	14.0	41.0		30.0
Max Q Clear Time (g_c+I1), s	3.3	11.3		4.6	2.5	8.4		7.4
Green Ext Time (p_c), s	0.1	2.6		0.6	0.0	2.0		1.3

Intersection Summary			
HCM 6th Ctrl Delay			14.1
HCM 6th LOS			B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	166	5	5	375	29	1	12	5	11	16	58
Future Volume (veh/h)	32	166	5	5	375	29	1	12	5	11	16	58
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	1736	1736	1736	1723	1723	1723	1586	1586	1586	1695	1695	1695
Adj Flow Rate, veh/h	36	187	6	6	421	33	1	13	6	12	18	65
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	2	2	2	12	12	12	4	4	4
Cap, veh/h	567	971	31	685	916	72	222	194	87	254	65	196
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	870	3263	104	1096	3076	240	45	996	446	131	333	1006
Grp Volume(v), veh/h	36	94	99	6	223	231	20	0	0	95	0	0
Grp Sat Flow(s),veh/h/ln	870	1650	1718	1096	1637	1679	1487	0	0	1470	0	0
Q Serve(g_s), s	0.6	0.8	0.8	0.1	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.6	0.8	0.8	0.8	2.0	2.0	0.2	0.0	0.0	1.0	0.0	0.0
Prop In Lane	1.00		0.06	1.00		0.14	0.05		0.30	0.13		0.68
Lane Grp Cap(c), veh/h	567	491	511	685	487	500	503	0	0	515	0	0
V/C Ratio(X)	0.06	0.19	0.19	0.01	0.46	0.46	0.04	0.00	0.00	0.18	0.00	0.00
Avail Cap(c_a), veh/h	1044	1394	1452	1285	1383	1420	1878	0	0	1870	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.1	4.6	4.6	5.0	5.1	5.1	5.8	0.0	0.0	6.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.1	0.0	0.3	0.2	0.0	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.2	4.7	4.7	5.0	5.3	5.3	5.9	0.0	0.0	6.3	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		229			460			20			95	
Approach Delay, s/veh		4.9			5.3			5.9			6.3	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		9.8		8.0		9.8		8.0
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		15.0		20.0		15.0		20.0
Max Q Clear Time (g_c+I1), s		4.0		2.2		4.6		3.0
Green Ext Time (p_c), s		1.3		0.0		0.5		0.5

Intersection Summary	
HCM 6th Ctrl Delay	5.3
HCM 6th LOS	A

Notes

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

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	211	1	4	497	5	8
Future Vol, veh/h	211	1	4	497	5	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	120	215	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	8	8	3	3	0	0
Mvmt Flow	232	1	4	546	5	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	233	0	786	232
Stage 1	-	-	-	-	232	-
Stage 2	-	-	-	-	554	-
Critical Hdwy	-	-	4.13	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.227	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1329	-	364	812
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	580	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1329	-	363	812
Mov Cap-2 Maneuver	-	-	-	-	363	-
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	578	-

Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		8.9	
HCM LOS					A	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	944	-	-	1329	-
HCM Lane V/C Ratio	0.015	-	-	0.003	-
HCM Control Delay (s)	8.9	-	-	7.7	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	288	49	27	254	44	65	175	14	37	203	161
Future Volume (veh/h)	86	288	49	27	254	44	65	175	14	37	203	161
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	1870	1870	1870	1856	1856	1856	1693	1693	1693	1752	1752	1752
Adj Flow Rate, veh/h	88	294	50	28	259	45	66	179	14	38	207	164
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	3	3	3	14	14	14	10	10	10
Cap, veh/h	330	724	122	350	382	323	311	669	52	391	372	280
Arrive On Green	0.06	0.24	0.24	0.03	0.21	0.21	0.05	0.22	0.22	0.03	0.21	0.21
Sat Flow, veh/h	1781	3043	511	1767	1856	1570	1612	3023	234	1668	1807	1360
Grp Volume(v), veh/h	88	170	174	28	259	45	66	94	99	38	190	181
Grp Sat Flow(s),veh/h/ln	1781	1777	1778	1767	1856	1570	1612	1608	1650	1668	1664	1503
Q Serve(g_s), s	1.9	4.0	4.1	0.6	6.4	1.2	1.6	2.4	2.5	0.9	5.1	5.4
Cycle Q Clear(g_c), s	1.9	4.0	4.1	0.6	6.4	1.2	1.6	2.4	2.5	0.9	5.1	5.4
Prop In Lane	1.00		0.29	1.00		1.00	1.00		0.14	1.00		0.90
Lane Grp Cap(c), veh/h	330	423	423	350	382	323	311	356	365	391	343	310
V/C Ratio(X)	0.27	0.40	0.41	0.08	0.68	0.14	0.21	0.27	0.27	0.10	0.55	0.59
Avail Cap(c_a), veh/h	944	1428	1429	1014	1492	1262	881	969	995	1007	1003	906
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	14.6	16.0	16.0	15.0	18.2	16.1	14.8	16.0	16.0	14.8	17.7	17.8
Incr Delay (d2), s/veh	0.4	0.2	0.2	0.1	0.8	0.1	0.3	0.1	0.1	0.1	0.5	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	1.5	1.5	0.2	2.6	0.3	0.5	0.7	0.8	0.3	1.6	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.1	16.2	16.3	15.1	19.0	16.2	15.1	16.2	16.2	14.9	18.2	18.5
LnGrp LOS	B	B	B	B	B	B	B	B	B	B	B	B
Approach Vol, veh/h		432			332			259			409	
Approach Delay, s/veh		16.0			18.3			15.9			18.0	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.3	17.8	8.4	16.3	8.9	16.3	7.6	17.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	20.0	40.0	20.0	30.0	20.0	40.0	20.0	30.0
Max Q Clear Time (g_c+I1), s	2.6	6.1	3.6	7.4	3.9	8.4	2.9	4.5
Green Ext Time (p_c), s	0.0	1.5	0.1	1.2	0.2	1.1	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	17.1
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	126	13	137	195	49	5	95	114	36	183	46
Future Volume (veh/h)	37	126	13	137	195	49	5	95	114	36	183	46
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	1856	1856	1856	1826	1826	1826	1618	1618	1618	1752	1752	1752
Adj Flow Rate, veh/h	39	133	14	144	205	52	5	100	0	38	193	48
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	5	5	5	19	19	19	10	10	10
Cap, veh/h	548	822	85	631	861	213	0	791		0	683	166
Arrive On Green	0.04	0.26	0.26	0.10	0.31	0.31	0.00	0.26	0.00	0.00	0.26	0.26
Sat Flow, veh/h	1767	3223	335	1739	2755	683	0	3156	0	0	2655	645
Grp Volume(v), veh/h	39	72	75	144	127	130	0	100	0	0	119	122
Grp Sat Flow(s),veh/h/ln	1767	1763	1795	1739	1735	1703	0	1537	0	0	1664	1636
Q Serve(g_s), s	0.6	1.2	1.3	2.3	2.1	2.2	0.0	1.0	0.0	0.0	2.2	2.3
Cycle Q Clear(g_c), s	0.6	1.2	1.3	2.3	2.1	2.2	0.0	1.0	0.0	0.0	2.2	2.3
Prop In Lane	1.00		0.19	1.00		0.40	0.00		0.00	0.00		0.39
Lane Grp Cap(c), veh/h	548	450	458	631	542	532	0	791		0	428	421
V/C Ratio(X)	0.07	0.16	0.16	0.23	0.23	0.24	0.00	0.13		0.00	0.28	0.29
Avail Cap(c_a), veh/h	1152	1814	1848	1126	1786	1753	0	3561		0	1713	1684
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	0.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	9.8	11.2	11.2	8.8	9.9	9.9	0.0	11.1	0.0	0.0	11.5	11.6
Incr Delay (d2), s/veh	0.1	0.2	0.2	0.2	0.3	0.3	0.0	0.1	0.0	0.0	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.4	0.4	0.6	0.6	0.7	0.0	0.2	0.0	0.0	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.8	11.5	11.5	9.0	10.2	10.3	0.0	11.2	0.0	0.0	12.0	12.1
LnGrp LOS	A	B	B	A	B	B	A	B		A	B	B
Approach Vol, veh/h		186			401			100	A		241	
Approach Delay, s/veh		11.1			9.8			11.2			12.1	
Approach LOS		B			A			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	14.9	0.0	15.0	6.7	17.1	0.0	15.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	15.0	40.0	25.0	40.0	15.0	40.0	20.0	45.0
Max Q Clear Time (g_c+I1), s	4.3	3.3	0.0	4.3	2.6	4.2	0.0	3.0
Green Ext Time (p_c), s	0.3	1.2	0.0	1.9	0.0	2.2	0.0	0.8

Intersection Summary		
HCM 6th Ctrl Delay		10.8
HCM 6th LOS		B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	133	76	0	1	190	35	2	11	0	21	0	280
Future Vol, veh/h	133	76	0	1	190	35	2	11	0	21	0	280
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	Yield
Storage Length	300	-	-	-	-	0	-	-	100	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	8	8	8	8	8	8	0	0	0	5	5	5
Mvmt Flow	158	90	0	1	226	42	2	13	0	25	0	333

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	226	0	0	90	0	0	634	634	90	641	634	226
Stage 1	-	-	-	-	-	-	406	406	-	228	228	-
Stage 2	-	-	-	-	-	-	228	228	-	413	406	-
Critical Hdwy	4.18	-	-	4.18	-	-	7.1	6.5	6.2	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.55	-
Follow-up Hdwy	2.272	-	-	2.272	-	-	3.5	4	3.3	3.545	4.045	3.345
Pot Cap-1 Maneuver	1308	-	-	1468	-	-	395	399	973	383	393	806
Stage 1	-	-	-	-	-	-	626	601	-	768	710	-
Stage 2	-	-	-	-	-	-	779	719	-	610	593	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1308	-	-	1468	-	-	210	350	973	337	345	806
Mov Cap-2 Maneuver	-	-	-	-	-	-	210	350	-	337	345	-
Stage 1	-	-	-	-	-	-	550	528	-	675	709	-
Stage 2	-	-	-	-	-	-	456	718	-	523	521	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.2	0	16.9	12.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	317	-	1308	-	-	1468	-	-	337	806
HCM Lane V/C Ratio	0.049	-	0.121	-	-	0.001	-	-	0.074	0.414
HCM Control Delay (s)	16.9	0	8.1	-	-	7.5	0	-	16.5	12.6
HCM Lane LOS	C	A	A	-	-	A	A	-	C	B
HCM 95th %tile Q(veh)	0.2	-	0.4	-	-	0	-	-	0.2	2

Intersection												
Int Delay, s/veh	4.6											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	114	9	52	12	19	33	43	62	8	15	137	378
Future Vol, veh/h	114	9	52	12	19	33	43	62	8	15	137	378
Conflicting Peds, #/hr	0	0	7	7	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	Yield	-	-	None	-	-	Yield
Storage Length	240	-	-	-	-	120	275	-	-	325	-	325
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	68	68	68	68	68	68	68	68	68	68	68	68
Heavy Vehicles, %	5	5	5	0	0	0	12	12	12	2	2	2
Mvmt Flow	168	13	76	18	28	49	63	91	12	22	201	556

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	482	474	208	482	468	97	201	0	0	103	0	0
Stage 1	245	245	-	223	223	-	-	-	-	-	-	-
Stage 2	237	229	-	259	245	-	-	-	-	-	-	-
Critical Hdwy	7.15	6.55	6.25	7.1	6.5	6.2	4.22	-	-	4.12	-	-
Critical Hdwy Stg 1	6.15	5.55	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.15	5.55	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.545	4.045	3.345	3.5	4	3.3	2.308	-	-	2.218	-	-
Pot Cap-1 Maneuver	490	485	825	498	496	965	1313	-	-	1489	-	-
Stage 1	752	698	-	784	723	-	-	-	-	-	-	-
Stage 2	760	709	-	750	707	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	423	455	820	418	465	965	1313	-	-	1489	-	-
Mov Cap-2 Maneuver	423	455	-	418	465	-	-	-	-	-	-	-
Stage 1	716	688	-	746	688	-	-	-	-	-	-	-
Stage 2	659	675	-	653	696	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.6			11.4			3			0.2		
HCM LOS	C			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1313	-	-	423	605	446	965	1489	-	-
HCM Lane V/C Ratio	0.048	-	-	0.396	0.148	0.102	0.05	0.015	-	-
HCM Control Delay (s)	7.9	-	-	19	12	14	8.9	7.5	-	-
HCM Lane LOS	A	-	-	C	B	B	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	1.9	0.5	0.3	0.2	0	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	167	0	0	314	57	0	0	0	96	0	86
Future Vol, veh/h	25	167	0	0	314	57	0	0	0	96	0	86
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	200	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	6	6	6	4	4	4	0	0	0	2	2	2
Mvmt Flow	30	201	0	0	378	69	0	0	0	116	0	104

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	447	0	0	201	0	0	450	708	101	574	674	224
Stage 1	-	-	-	-	-	-	261	261	-	413	413	-
Stage 2	-	-	-	-	-	-	189	447	-	161	261	-
Critical Hdwy	4.22	-	-	4.18	-	-	7.5	6.5	6.9	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.54	5.54	-
Follow-up Hdwy	2.26	-	-	2.24	-	-	3.5	4	3.3	3.52	4.02	3.32
Pot Cap-1 Maneuver	1082	-	-	1354	-	-	497	362	941	402	375	779
Stage 1	-	-	-	-	-	-	727	696	-	587	592	-
Stage 2	-	-	-	-	-	-	800	577	-	825	691	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1082	-	-	1354	-	-	422	352	941	394	365	779
Mov Cap-2 Maneuver	-	-	-	-	-	-	422	352	-	394	365	-
Stage 1	-	-	-	-	-	-	707	677	-	571	592	-
Stage 2	-	-	-	-	-	-	694	577	-	802	672	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0	0	17.1
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1082	-	-	1354	-	-	514
HCM Lane V/C Ratio	-	0.028	-	-	-	-	-	0.427
HCM Control Delay (s)	0	8.4	-	-	0	-	-	17.1
HCM Lane LOS	A	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	-	0.1	-	-	0	-	-	2.1

Intersection												
Int Delay, s/veh	6.1											

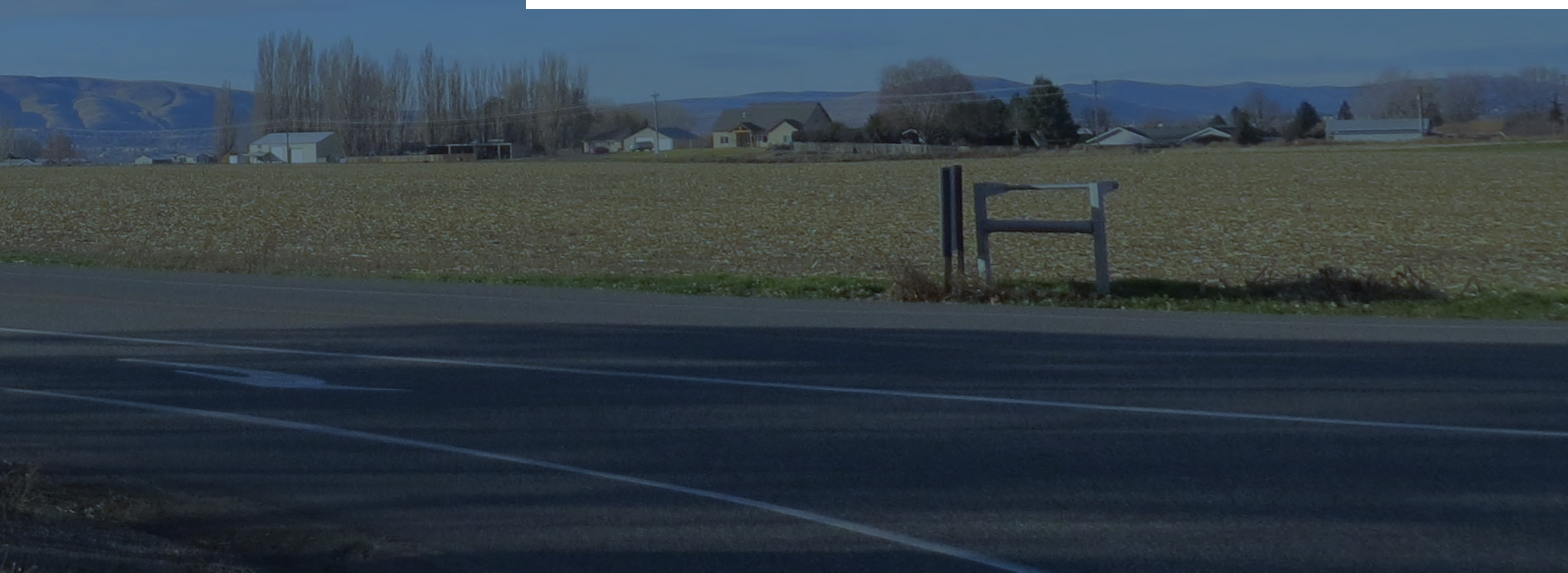
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	81	110	11	11	299	137	12	24	8	50	9	75
Future Vol, veh/h	81	110	11	11	299	137	12	24	8	50	9	75
Conflicting Peds, #/hr	4	0	6	6	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	3	3	3	2	2	2	0	0	0	6	6	6
Mvmt Flow	104	141	14	14	383	176	15	31	10	64	12	96

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	563	0	0	161	0	0	588	953	84	797	872	284
Stage 1	-	-	-	-	-	-	362	362	-	503	503	-
Stage 2	-	-	-	-	-	-	226	591	-	294	369	-
Critical Hdwy	4.16	-	-	4.14	-	-	7.5	6.5	6.9	7.62	6.62	7.02
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.62	5.62	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.62	5.62	-
Follow-up Hdwy	2.23	-	-	2.22	-	-	3.5	4	3.3	3.56	4.06	3.36
Pot Cap-1 Maneuver	998	-	-	1416	-	-	397	261	965	270	280	701
Stage 1	-	-	-	-	-	-	635	629	-	509	530	-
Stage 2	-	-	-	-	-	-	762	498	-	679	609	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	994	-	-	1408	-	-	296	225	959	215	242	698
Mov Cap-2 Maneuver	-	-	-	-	-	-	296	225	-	215	242	-
Stage 1	-	-	-	-	-	-	559	554	-	449	520	-
Stage 2	-	-	-	-	-	-	633	489	-	561	536	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.7	0.3	20.9	24.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	283	994	-	-	1408	-	-	355
HCM Lane V/C Ratio	0.199	0.104	-	-	0.01	-	-	0.484
HCM Control Delay (s)	20.9	9	0.2	-	7.6	0.1	-	24.3
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0.3	-	-	0	-	-	2.5

Appendix C



720 SW WASHINGTON ST, SUITE 500, PORTLAND, OR 97205 • 503.243.3500 • DKSASSOCIATES.COM

FUTURE TRAFFIC FORECAST

DATE: September 2, 2020

TO: Pasco TSMP Project Team

FROM: Carl Springer, Aaron Berger | DKS Associates

SUBJECT: Pasco TSMP Task 4.2: Technical Memo #4 — Project #19209-000

The City of Pasco is developing its first transportation system master plan (TSMP). Future forecasting is an important step in the transportation planning process and provides estimates of future travel demand. This memorandum documents the Future No-Build 2040 results associated with the travel demand model developed by Benton-Franklin Council of Governments (BFCG) for the Pasco area. The Pasco model was used to develop study intersection turn movement volumes for the 2040 TSMP horizon year.

INTRODUCTION

This task considers how the City's transportation system will perform with the expected travel demand growth to 2040. The future baseline assessment will include any transportation improvement projects that have committed funding available. The BFCG travel demand model will be applied to forecast 2040 travel demands within the planning area, which was evaluated by the consulting team to flag major degradations compared to today's conditions. A summary of the Pasco Travel Demand Model results is provided in the following sections, including a discussion of the roadway network and land use assumptions included in the model.

FUTURE FORECASTS

Future 2040 PM traffic volumes at all study intersections were developed from the Benton-Franklin Council of Governments (BFCG) regional travel demand model. The BFCG regional travel demand model includes both existing (2015) and future (2040) model scenarios in TransCAD which formed the basis of all future traffic analysis. This model provides a regional picture of growth and transportation improvements identified as feasible and funded within the next 20 years which will be used to identify and refine projects within Pasco for the TSMP.

FUTURE TRANSPORTATION NETWORK

Transportation improvements assumed in the BFCG 2040 Model include projects submitted by the cities of Pasco, Kennewick, Richland, West Richland, and WSDOT that are reasonably expected to be complete by 2040 (*i.e.* financially constrained). Only new construction or projects that otherwise change a roadway's alignment or capacity in the RTP are included as network changes within the BFCG 2040 model. Projects within Pasco include:

- Argent Road Improvements (Road 40 to 20th Avenue)
- Wrigley Drive Extension (Convention Drive to Clemente Lane)
- Chapel Hill Boulevard Extension (Road 84 to Road 68)
- Sandifur Parkway Improvements (Road 68 to Convention Drive)
- Road 68 Widening (I-182 to Argent Road)
- Burns Road Improvements/Extension (Road 52 to Pasco City Limits)
- Lewis Street Rail Yard Overpass

Other projects included in the 2040 BFCG model outside of Pasco are summarized in Transition 2040, the Tri-Cities Metropolitan Area Regional Transportation Plan[1].

2040 TRAFFIC OPERATIONS ANALYSIS

The 2040 baseline analysis identifies how Pasco's transportation system is expected to operate with additional residents, businesses, and visitors. These conditions were assessed based on the forecasted increase in trips generated by future transportation growth without any new investments in the transportation infrastructure. This analysis describes where the transportation system will perform satisfactorily and identifies areas that will likely be congested without additional investments.

2040 NO BUILD TRANSPORATION SYSTEM OPERATIONS

Traffic operations (delay, LOS, and v/c) were analyzed for future (2040) conditions using Synchro. The Highway Capacity Manual (HCM) 6th Edition methodology was used for signalized and unsignalized intersection analyses, where possible; signalized intersection v/c ratios were post-processed to obtain intersection v/c ratios. If HCM 6th Edition results cannot be reported due to intersection geometry or other limitations, the capacity results were based on HCM 2000.

All intersections within the Pasco UGA were compared against the mobility targets identified by WSDOT, the City of Pasco, or Franklin County. These agencies currently use a Level of Service (LOS) D mobility standard which were applied at all study intersections as part of the TMP update.

---

[1] Benton-Franklin Council of Governments. *Transition 2040, Appendix F.* 2018.

Study intersection operations were analyzed using the methodology outlined in the traffic analysis and forecasting methodology memo[2]. Forecasted intersection operations were compared to applicable agency mobility targets to identify where significant congestion is likely to occur. Figure 1 shows the study intersections that do not meet mobility targets for both AM and PM peak hour in the 2040 no-build conditions. Also, Table 1 compares the existing and future no-build operational Level of Service (LOS) results for the study intersections that do not meet mobility targets for AM and PM peak periods. A complete listing of operating conditions (delay, LOS, and v/c) at study intersections is provided in the appendix.

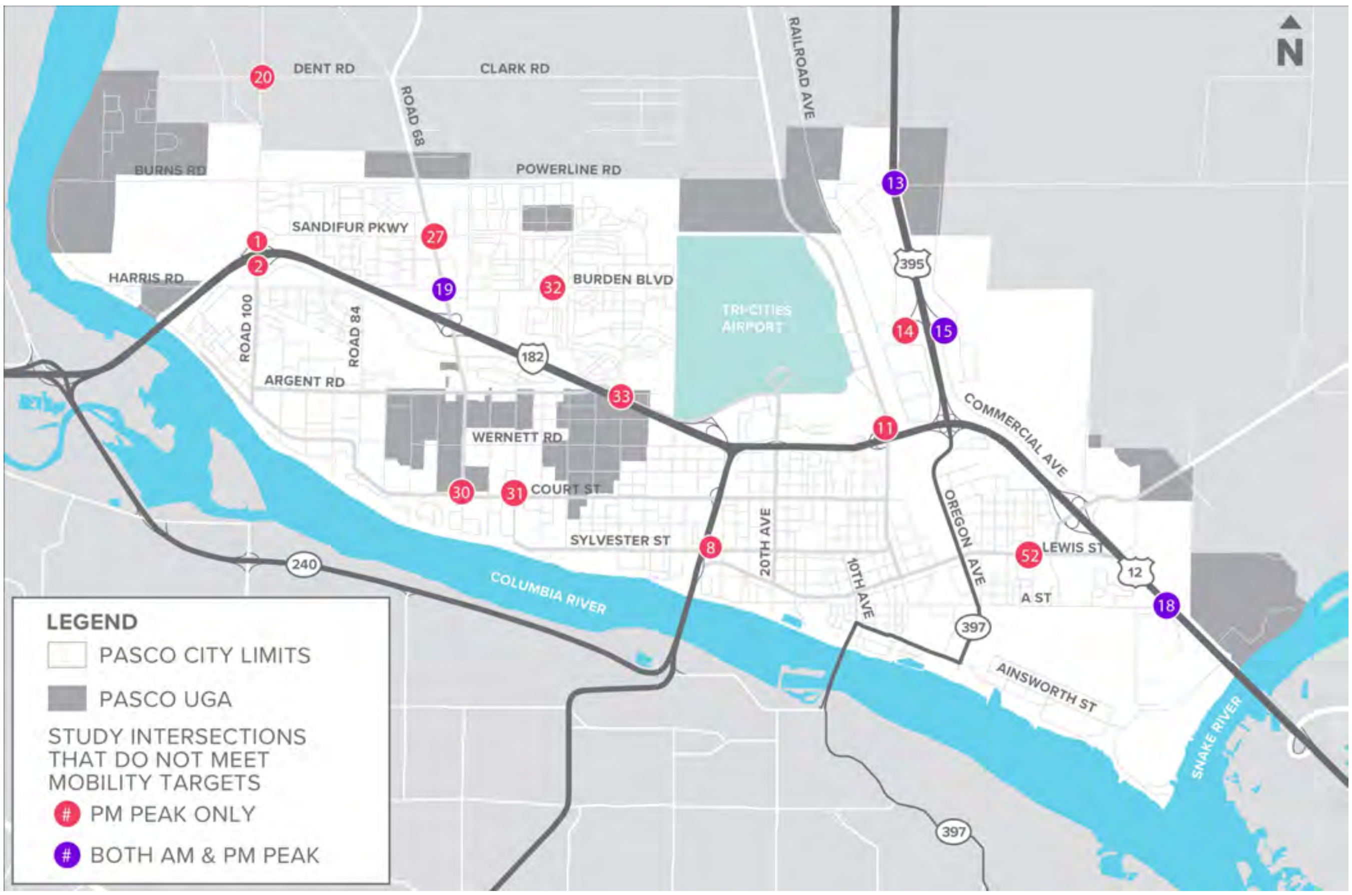


FIGURE 1: STUDY INTERSECTIONS THAT DO NOT MEET MOBILITY TARGETS FOR AM AND PM PEAK PERIODS (2040 DESIGN HOUR CONDITIONS)

[2] DKS Associates. Traffic Analysis & Forecasting Methodology memo . July, 2020.

TABLE 1: STUDY INTERSECTIONS THAT DO NOT MEET MOBILITY TARGET LEVEL OF SERVICE (LOS) D FOR EXISTING AND FUTURE NO-BUILD (AM AND PM PEAK)

			AM (LOS)		PM (LOS)	
#	Study Intersection	Mobility Target (LOS)	Existing	Future No-Build	Existing	Future No-Build
1	Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp	D	B	B	A	**E**
2	Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp	D	B	C	B	**F**
8	Sylvester St & US 395 NB Off Ramp	D	A/C	A/C	**A/E**	**A/F**
11	4th Ave & US 395 WB On/Off Ramp	D	A	B	D	**E**
13	US 395 & Foster Wells Rd	D	**A/F**	**C/F**	**B/F**	**C/F**
14	Rainier Ave/US 395 SB On/Off Ramp & Kartchner St	D	A/C	A/D	**B/F**	**B/F**
15	Commercial Ave/US 395 NB On/Off Ramp & Kartchner St	D	A/D	**A/E**	A/D	**A/F**
18	Hwy 12 & E A St	D	A/C	**A/E**	A/C	**A/F**
19	Road 68 & Burden Blvd	D	**E**	**E**	**E**	**E**
20	Road 100 & Dent Rd/Edelman Rd	D			A/C	**A/F**
27	Road 68 & Sandifur Pkwy	D			C	**E**
30	Road 68 & Court Street	D			A/D	**A/F**
31	Road 60 & Court Street	D			A/C	**A/F**
32	Madison Ave & Burden Blvd	D			**A/F**	**A/F**
33	Argent Rd & Rd 44	D			**A/F**	**B/F**
52	Cedar Ave & Lewis St	D			A/C	**A/E**

Overall, in comparison to the existing conditions, twice as many study intersections will not meet the mobility targets in the 2040 future no-build conditions. In other words, if future improvements are not made for the identified intersections that are currently operating less than LOS D, these intersections will continue to operate at a substandard level and additional intersections will not meet their mobility targets. For instance, the intersection of Road 68 and Burden Blvd reported LOS E for AM and PM peak periods for existing conditions and the LOS results will continue for the future no-build conditions. Also, the stop-controlled intersection of US 395 and Foster Wells Rd experienced significant delays for AM and PM peak periods in both existing and future no-build conditions, however there is a planned improvement project that may impact future operational results[3].

With regards to the future no-build results, of the 19 study intersections in the AM peak period, four will not meet their respective mobility target during the 2040 design hour conditions. For the PM peak period, 16 of the 52 study intersection will exceed the 2040 mobility target. The four study intersections that are substandard under 2040 conditions for both AM and PM peak periods include: US 395 and Foster Wells Rd, Commercial Ave/US 395 NB On/Off Ramp and Kartchner St, Hwy 12 and E A St, and Road 68 and Burden Blvd. The majority of the study intersections that exceed their mobility target are located near highway interchanges.

Significant corridors of concern for the future no-build operations include Rd 100 and Rd 68. Three study intersections on both Rd 100 and Rd 68 will not meet the mobility targets during the 2040 design hour conditions. In particular, the intersection of Rd 68 and Court Street experience LOS LOS A/F due to the side streets operating over capacity during the PM peak period.

Another area of concern for the future no-build conditions are located at ramp terminals. The ramp terminals along Rd 100 and Kartchner St both experienced LOS E or F. Significant improvements should be made at these ramp terminal locations or additional ramps terminals should be considered to alleviate some of the traffic.

---

[3] US 396 Safety Corridor Improvements visit: https://wsdot.wa.gov/projects/us395/safety-corridor/home

APPENDIX

TABLE 3: FUTURE NO-BUILD 2040 RESULTS FOR AM PEAK

			Existing			Future No-Build		
#	Study Intersection	Mobility Target (LOS)	Level of Service	Delay (secs)	Volume/ Capacity Ratio	Level of Service	Delay (secs)	Volume/ Capacity Ratio
1	Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp	D	B	14	0.40	B	19	0.69
2	Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp	D	B	15	0.68	C	35	0.98
3	Road 68 & I 182 WB On/Off Ramp/I 182 WB On Ramp	D	A	8	0.69	A	6	0.71
4	Road 68 & I 182 EB On/Off Ramp/I 182 EB On Ramp	D	A	7	0.47	A	6	0.61
5	US 395 On/Off Ramp/Morasch Ln & Argent Rd	D	B	13	0.44	B	16	0.63
6	US 395 SB On Ramp/US 395 SB On/Off Ramp & Court St	D	A	7	0.43	A	8	0.50
7	US 395 NB Off Ramp/US 395 NB On Ramp & Court St	D	A	9	0.49	A	8	0.45
8	Sylvester St & US 395 NB Off Ramp	D	A/C	0/15	0.26/0.45	A/C	0/19	0.35/0.51
9	20th Ave & I 182 WB On Ramp/I 182 WB Off Ramp	D	B	12	0.65	B	15	0.79
10	20th Ave & I 182 EB On/Off Ramp	D	B	15	0.63	B	19	0.72
11	4th Ave & US 395 WB On/Off Ramp	D	A	8	0.36	B	11	0.54

#	Study Intersection	Mobility Target (LOS)	Existing			Future No-Build		
			Level of Service	Delay (secs)	Volume/ Capacity Ratio	Level of Service	Delay (secs)	Volume/ Capacity Ratio
12	4th Ave & US 395 EB On/Off Ramp	D	B	11	0.44	B	12	0.60
13	US 395 & Foster Wells Rd	D	**A/F**	**10/54**	**0.23/0.22**	**C/F**	**16/596**	**0.47/1.33**
14	Rainier Ave/US 395 SB On/Off Ramp & Kartchner St	D	A/C	9/21	0.16/0.19	A/D	9/29	0.16/0.32
15	Commercial Ave/US 395 NB On/Off Ramp & Kartchner St	D	A/D	8/33	0.06/0.5	**A/E**	**8/45**	**0.06/0.6**
16	Hwy 12 EB On/Off Ramp & Lewis St & Hwy 12 EB Off Ramp	D	A/C	10/22	0.29/0.63	A/D	10/27	0.29/0.73
17	Hwy 12 WB Off Ramp/Hwy 12 WB On/Off Ramp & Lewis St	D	A/B	9/14	0.31/0.18	A/C	9/16	0.34/0.27
18	Hwy 12 & E A St	D	A/C	0/23	0.25/0.34	**A/E**	**0/46**	**0.33/0.62**
19	Road 68 & Burden Blvd	D	**E**	**64**	**0.90**	**E**	**59**	**0.95**

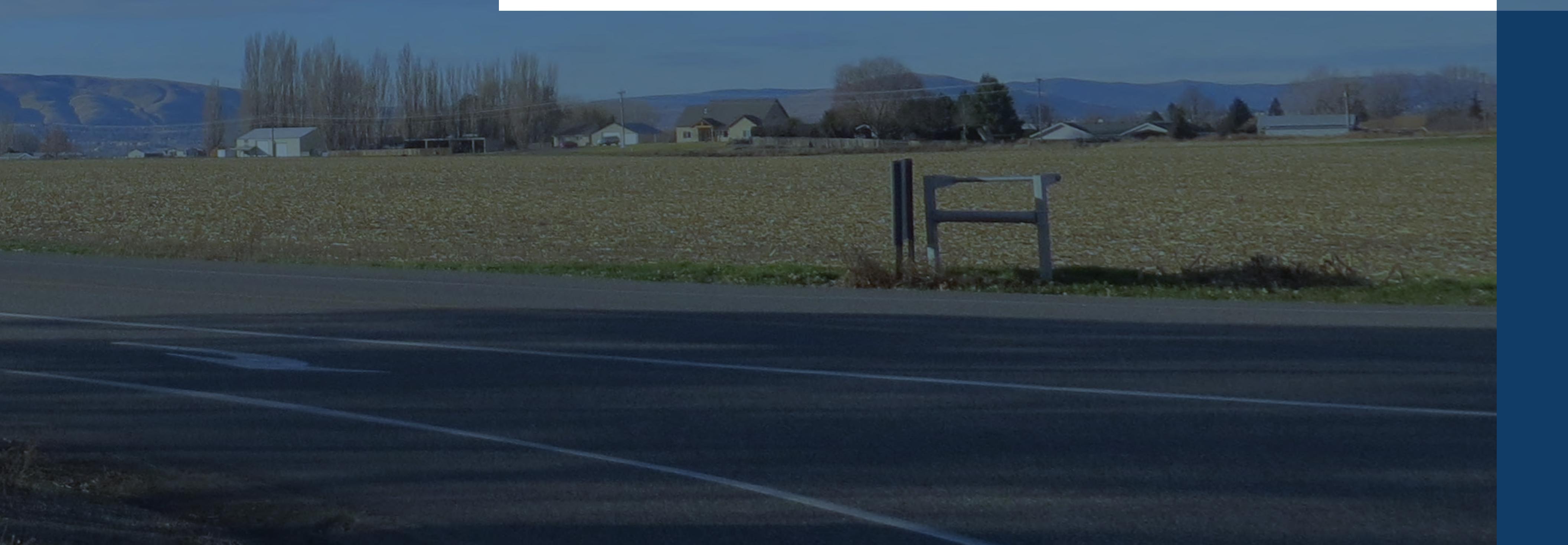
TABLE 4: FUTURE NO-BUILD 2040 RESULTS FOR PM PEAK

			Existing			Future No-Build		
#	Study Intersection	Mobility Target (LOS)	Level of Service	Delay (secs)	Volume/ Capacity Ratio	Level of Service	Delay (secs)	Volume/ Capacity Ratio
1	Road 100 & I 182 WB On Ramp/I 182 WB On/Off Ramp	D	A	9	0.72	**E**	**77**	**1.25**
2	Road 100 & I 182 EB Off Ramp/I 182 EB On Ramp	D	B	19	0.86	**F**	**125**	**1.24**
3	Road 68 & I 182 WB On/Off Ramp/I 182 WB On Ramp	D	B	15	0.97	A	9	0.88
4	Road 68 & I 182 EB On/Off Ramp/I 182 EB On Ramp	D	C	24	0.76	C	25	0.83
5	US 395 On/Off Ramp/Morasch Ln & Argent Rd	D	B	17	0.47	C	21	0.62
6	US 395 SB On Ramp/US 395 SB On/Off Ramp & Court St	D	A	8	0.44	A	9	0.53
7	US 395 NB Off Ramp/US 395 NB On Ramp & Court St	D	B	11	0.62	B	11	0.67
8	Sylvester St & US 395 NB Off Ramp	D	**A/E**	**0/38**	**0.23/0.82**	**A/F**	**0/97**	**0.31/1.06**
9	20th Ave & I 182 WB On Ramp/I 182 WB Off Ramp	D	B	18	0.82	C	22	0.86
10	20th Ave & I 182 EB On/Off Ramp	D	B	13	0.54	B	13	0.58
11	4th Ave & US 395 WB On/Off Ramp	D	D	42	0.82	**E**	**60**	**0.94**
12	4th Ave & US 395 EB On/Off Ramp	D	B	11	0.55	B	13	0.62

			Existing			Future No-Build		
#	Study Intersection	Mobility Target (LOS)	Level of Service	Delay (secs)	Volume/ Capacity Ratio	Level of Service	Delay (secs)	Volume/ Capacity Ratio
13	US 395 & Foster Wells Rd	D	**B/F**	**12/74**	**0.26/0.53**	**C/F**	**19/2514**	**0.39/4.78**
14	Rainier Ave/US 395 SB On/Off Ramp & Kartchner St	D	**B/F**	**11/363**	**0.38/1.51**	**B/F**	**11/496**	**0.4/1.81**
15	Commercial Ave/US 395 NB On/Off Ramp & Kartchner St	D	A/D	8/31	0.08/0.61	**A/F**	**8/55**	**0.08/0.8**
16	Hwy 12 EB On/Off Ramp & Lewis St & Hwy 12 EB Off Ramp	D	A/C	8/16	0.28/0.39	A/C	8/19	0.31/0.5
17	Hwy 12 WB Off Ramp/Hwy 12 WB On/Off Ramp & Lewis St	D	B/B	11/13	0.24/0.32	B/B	13/15	0.37/0.37
18	Hwy 12 & E A St	D	A/C	0/25	0.28/0.3	**A/F**	**0/112**	**0.4/0.88**
19	Road 68 & Burden Blvd	D	**E**	**73**	**1.15**	**E**	**75**	**1.09**
20	Road 100 & Dent Rd/Edelman Rd	**D**	A/C	8/25	0.13/0.23	**A/F**	**10/2121**	**0.34/5.44**
21	Road 100 & Sandifur Parkway	D	B	12	0.50	C	21	0.77
22	Road 100 & Chapel Hill Rd	D	B	12	0.77	B	15	0.62
23	Road 100 & Argent Road	D	A/C	8/18	0.24/0.12	A/D	8/29	0.31/0.23
24	Road 84 & Argent Road	D	B	12	0.245034	B	13	0.31
25	Court Street & Road 84	D	A/B	8/11	0.12/0.12	A/C	8/16	0.25/0.17
26	Road 68 & Edelman Road/Powerline Rd	D	A/C	8/18	0.24/0.13	B/A	11/0	0.62/0
27	Road 68 & Sandifur Pkwy	**D**	C	21	0.70	**E**	**58**	**0.98**
28	Road 68 & Chapel Hill Rd	D	B	15	0.61	B	19	0.55
29	Road 68 & Argent Road	D	C	21	0.67	C	31	0.87
30	Road 68 & Court Street	**D**	A/D	8/34	0.13/0.73	**A/F**	**9/278**	**0.25/1.48**
31	Road 60 & Court Street	**D**	A/C	8/21	0.13/0.36	**A/F**	**9/178**	**0.17/1.22**

			Existing			Future No-Build		
#	Study Intersection	Mobility Target (LOS)	Level of Service	Delay (secs)	Volume/ Capacity Ratio	Level of Service	Delay (secs)	Volume/ Capacity Ratio
32	Madison Ave & Burden Blvd	**D**	**A/F**	**9/72**	**0.35/0.71**	**A/F**	**9/312**	**0.37/1.44**
33	Argent Rd & Rd 44	**D**	**A/F**	**10/98**	**0.31/1.03**	**B/F**	**12/490**	**0.5/1.95**
34	20th Ave & Argent Rd	D	B	20	0.66	C	30	0.83
35	20th Ave & Court St	D	C	24	0.68	C	27	0.77
36	20th Ave & Sylvester St	D	C	21	0.46	C	21	0.45
37	20th Ave & Lewis Street	D	C	21	0.48	C	22	0.56
38	10th Ave & Sylvester St	D	B	12	0.52	B	12	0.52
39	10th Ave & Lewis St	D	C	22	0.44	C	23	0.45
40	10th Ave & A St	D	B	17	0.36	B	18	0.38
41	10th Ave & Ainsworth St	D	B	18	0.62	B	18	0.58
42	4th Ave & Court St	D	B	17	0.64	C	22	0.78
43	4th Ave & Sylvester St	D	A	8	0.56	A	8	0.56
44	4th Ave & W Lewis St	D	B	15	0.58	B	16	0.65
45	4th Ave & A St	D	A	4	0.20	A	5	0.24
46	4th Ave & Ainsworth St	D	A/A	8/9	0.29/0.02	A/A	8/9	0.3/0.02
47	N Oregon Ave & E Lewis St	D	B	17	0.38	B	20	0.58
48	Oregon Ave/S Oregon Ave & E A St	D	B	11	0.22	B	11	0.27
49	Oregon Ave & Ainsworth St	D	A/C	8/17	0.12/0.41	A/C	8/21	0.15/0.44
50	Heritage Blvd & Lewis St & Avery Ave	D	A/C	8/19	0.29/0.4	A/D	8/27	0.3/0.61
51	E A St & Heritage Blvd	D	A/C	8/17	0.12/0.43	A/D	9/28	0.16/0.6
52	Cedar Ave & Lewis St	**D**	A/C	9/24	0.15/0.48	**A/E**	**9/37**	**0.18/0.65**

Appendix D



TRANSPORTATION SYSTEM STANDARDS

DATE: February 22, 2021

TO: Dan Ford, Jacob Gonzalez | City of Pasco

FROM: Rochelle Starrett, Carl Springer | DKS

SUBJECT: Pasco Transportation System Master Plan: Technical Memo #5 Project #19209-000

This document provides an overview of the transportation system standards recommended for adoption as part of the Pasco Transportation System Master Plan (TSMP). Included is a detail of the roadway functional classification system, typical designs for roadways, and pedestrian and bicycle facilities, special route designations, access spacing and mobility standards, and guidance for Traffic Impact Analysis requirements. Together, these standards will help ensure future facilities are designed appropriately and that all facilities are managed to serve their intended purpose.

MULTI-MODAL STREET SYSTEM

Traditional roadway designs focus on the safety and flow of motor vehicle traffic. The one size fits all design approach is less effective at integrating the roadway with the character of the surrounding area and addressing the needs of other users of a roadway. For instance, the design of an arterial roadway through a commercial area has often traditionally been the same as one through a residential neighborhood, both primarily focused on the movement of motor vehicles.

In Pasco, all roadways are proposed to be multi-modal or “complete streets”, with each street serving the needs of the various travel modes. Streets in the city will not all be designed the same. It is recommended that Pasco classify the street system into a hierarchy organized by functional classification and street type (representative of their places). These classifications ensure that the streets reflect the neighborhood through which they pass, consisting of a scale and design appropriate to the character of the abutting properties and land uses. The classifications also provide for and balance the needs of all travel modes including pedestrians, bicyclists, transit riders, motor vehicles and freight. Within these street classifications, context sensitive designs may result in alternative cross-sections.

ROADWAY FUNCTIONAL CLASSIFICATION

A city's street functional classification system is an important tool for managing the transportation system. It is based on a hierarchical system of roads in which streets of a higher classification, such as arterials, emphasize a higher level of mobility for through movements, while streets of a lower classification emphasize access to land uses.

Pasco currently has four functional classes:

- Principal Arterials connect major activity centers as well as the interstate system. They provide limited access and are primarily intended to serve regional traffic movement.
- Minor Arterials create direct connections through the city and can be found on the periphery of residential neighborhoods. They generally provide the primary connection to other Arterial or Collector Streets and access to larger developed areas and neighborhoods.
- Collectors provide local traffic circulation throughout the city and serve to funnel traffic from the arterial street network to streets of the same or lower classification. They typically have minor access restrictions.
- Local Streets provide local access and circulation for traffic, connect neighborhoods, and often function as through routes for pedestrians and bicyclists. Local Streets should maintain slow vehicle operating speeds and discourage through traffic.

The TSMP also recommends adding a new Neighborhood Collector functional classification to identify locations where local access needs should be balanced with enhanced pedestrian and bicycle amenities. These streets should maintain slow vehicle operating speeds to accommodate safe use by all modes and through traffic should be discouraged.

Functional classification provides a helpful framework for managing the city's transportation system and supporting other standards discussed in the following sections, including connectivity, spacing, freight routes, cross-sections, and access management.

Table 1 lists the desired spacing of each facility type throughout Pasco to ensure a high level of connectivity. Figure 1 illustrates the desired spacing for the arterial and collector network. Deviations to these guidelines may be needed in locations where there are significant barriers, such as topography, rail lines, freeways, existing development, and the presence of natural areas.

TABLE 1: FACILITY SPACING GUIDELINES

FUNCTIONAL CLASSIFICATION	RECOMMENDED MAXIMUM SPACING[1,2]
PRINCIPAL ARTERIAL	1 to 2 miles
MINOR ARTERIAL	1 mile
COLLECTOR	½ mile

FUNCTIONAL CLASSIFICATION	RECOMMENDED MAXIMUM SPACING[1,2]
NEIGHBORHOOD COLLECTOR	¼ mile
LOCAL STREET	300-500 feet
BICYCLE AND PEDESTRIAN FACILITIES	300 feet

1. Recommended maximum spacing refers to distance between facilities with the same or higher functional classification.
2. Deviations from the recommended maximum spacing are subject to approval by the City engineer.

People walking and biking benefit the most from closely spaced facilities because their travel is most affected by variation in distance. By providing walking and biking facilities or accessways that are spaced no less than 300 feet apart, Pasco will support active transportation within and between its neighborhoods. These connections also support high quality access to transit.

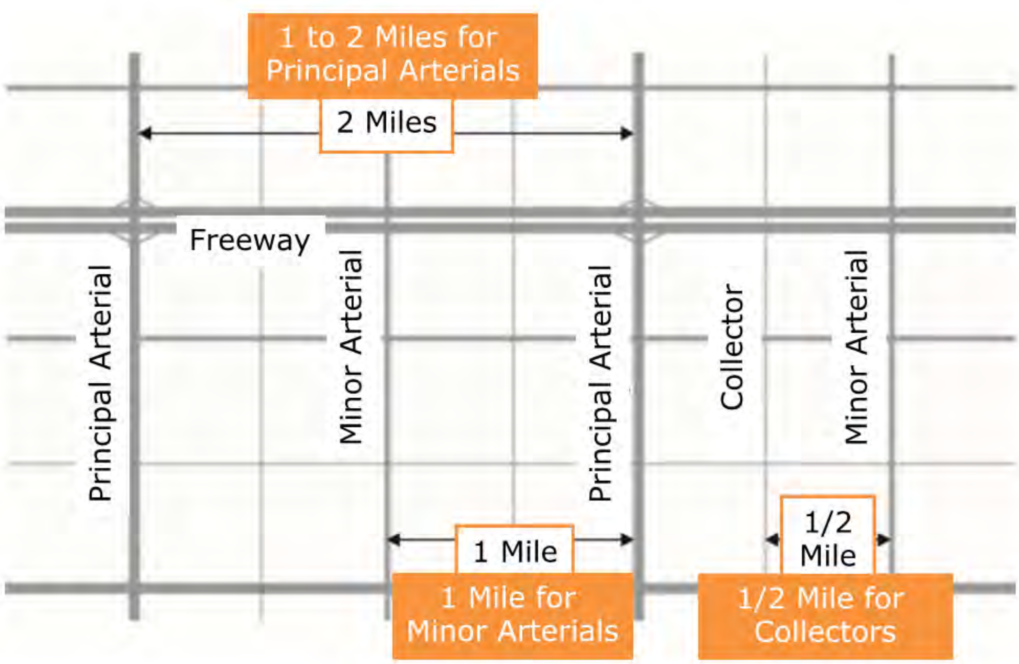


FIGURE 1: DESIRED FACILITY SPACING

The proposed roadway functional classification from the Pasco Comprehensive Plan was reviewed to identify locations where reclassifications should be considered to improve conformance with recommended spacing guidelines. The future functional classification map from the Comprehensive Plan includes instances of closely spaced arterials and sudden changes in functional classification. The recommended reclassifications aim to create a more consistent functional classification scheme and match a roadway's functional classification to their role in the transportation network. The existing road network was also reviewed to identify potential neighborhood collector routes. Neighborhood collectors were identified in locations where the functional classification map from the Pasco Comprehensive Plan previously identified two closely-spaced, parallel collectors which serve similar land uses. Converting one of these routes to a neighborhood collector provides a classification that is more consistent with the actual use of the road and facilitates multimodal transportation. Neighborhood collectors were also designated on the local street system for routes which provide connections between several adjacent neighborhoods and the collector or arterial network.

The recommended reclassifications summarized in Figure 2 and Table 2 will provide better system spacing and connectivity. It is important to note that many of the existing roadways cross-sections will not meet the standard cross-sections of their new functional classification. Cross-section improvements are not expected outside of redevelopment.

FIGURE 2: RECOMMENDED ROADWAY FUNCTIONAL CLASSIFICATION

A draft version of this figure identifying all recommended changes is also included for review

TABLE 2: FUNCTIONAL CLASSIFICATION OF NEW ROADWAYS

ROADWAY	EXTENTS	RECOMMENDED FUNCTIONAL CLASSIFICATION
SANDIFUR PARKWAY EXTENSION	Road 100 to New North-South Collector	Principal Arterial
DENT ROAD EXTENSION	Burns Road to Harris Road	Minor Arterial
SANDIFUR PARKWAY EXTENSION	New North-South Collector to Shoreline Drive	Minor Arterial
SANDIFUR PARKWAY EXTENSION	New North-South Collector to Shoreline Drive	Collector
NEW NORTH-SOUTH COLLECTOR	Dent Road to Harris Road	Collector
ROAD 84 EXTENSION	Burns Road to Columbia River Road	Collector
CONVENTION DRIVE EXTENSION	Burns Road to Clark Road	Collector
ROAD 60 EXTENSION	Burns Road to Clark Road	Collector
DESERET DRIVE	Dent Road to Road 52	Collector
ROAD 76 EXTENSION	Burden Boulevard to Argent Road	Collector
ROAD 90 EXTENSION	Burns Road to UGA	Neighborhood Collector
THREE RIVERS DRIVE EXTENSION	Road 68 to Rio Grande Lane	Neighborhood Collector
WRIGLEY DRIVE EXTENSION	Clemente Lane to Road 68 Place	Neighborhood Collector
ROAD 52 EXTENSION	Burns Road Deseret Drive	Neighborhood Collector
WERNETT ROAD EXTENSION	Road 76 to Road 84	Neighborhood Collector

TABLE 3: ROADWAY FUNCTIONAL CLASSIFICATION CHANGES

EXISTING FUNCTIONAL CLASSIFICATION	ROADWAY	EXTENTS	RECOMMENDED FUNCTIONAL CLASSIFICATION
MINOR ARTERIAL	Road 100	Dent Road to UGA	Principal Arterial
MINOR ARTERIAL	20th Avenue	Lewis Street to A Street	Principal Arterial
PRINCIPAL ARTERIAL	10th Avenue	Ainsworth Street to A street	Minor Arterial
PRINCIPAL ARTERIAL	4th Avenue	A Street to I-182 Westbound Ramp Terminal	Minor Arterial
COLLECTOR	Court Street	Road 100 to Harris Road	Minor Arterial
COLLECTOR	Harris Road	Court Street to Dent Road Extension	Minor Arterial
COLLECTOR	Dent Road	Burns Road to Road 68	Minor Arterial
COLLECTOR	Clark Road	Road 68 to Road 52	Minor Arterial
COLLECTOR	Chapel Hill Boulevard	Road 82 to Road 68	Minor Arterial
COLLECTOR	A Street	20th Avenue to 28th Avenue	Minor Arterial
COLLECTOR	28th Avenue	A Street to Sylvester street	minor arterial
MINOR ARTERIAL	Chapel Hill Boulevard	Crescent Road to Road 100	Collector
MINOR ARTERIAL	Road 60	Court Street to Sylvester Street	Collector
MINOR ARTERIAL	Sylvester Street	Road 60 to 4th Avenue	Collector
MINOR ARTERIAL	Court Street	4th Avenue to 1st Avenue	Collector
MINOR ARTERIAL	1st Avenue	Court Street to A Street	Collector
LOCAL	Broadway Street	Wehe Avenue to Cedar Avenue	Collector
LOCAL	Cedar Avenue	Broadway Street to Lewis Street	Collector
LOCAL	Commercial Avenue	Kartchner Street to Hillsboro Road	Collector
MINOR ARTERIAL	Road 90	Sandifur Parkway to Burns Road	Neighborhood Collector

EXISTING FUNCTIONAL CLASSIFICATION	ROADWAY	EXTENTS	RECOMMENDED FUNCTIONAL CLASSIFICATION
COLLECTOR	Wernett Road	Road 36 To Road 76	Neighborhood Collector
COLLECTOR	14th Avenue	Lewis Street to Court Street	Neighborhood Collector
COLLECTOR	Saratoga Lane	Chapel Hill boulevard to Argent Road	Neighborhood Collector
COLLECTOR	Road 44	Argent Road to Madison Avenue	Neighborhood Collector
COLLECTOR	Madison Avenue	Road 44 to Burden Boulevard	Neighborhood Collector
COLLECTOR	Road 52	Burden Boulevard to Burns Road	Neighborhood Collector
COLLECTOR	Wrigley Drive	Road 76 to Clemente Lane	Neighborhood Collector
LOCAL	Kohler Road	Dent Road to Hillcrest Drive	Neighborhood Collector
LOCAL	Road 92	Court Street to Maple Drive	Neighborhood Collector
LOCAL	Road 76	Argent Road to Court Street	Neighborhood Collector
LOCAL	Road 60	Argent Road to Court Street	Neighborhood Collector
LOCAL	Road 48	Argent Road to Sylvester Street	Neighborhood Collector
LOCAL	Wernett Road	Road 36 to Road 30	Neighborhood Collector
LOCAL	14th Avenue	Court Street to Lincoln Drive	Neighborhood Collector
LOCAL	Pearl Street	24th Avenue to 13th Avenue & 10th Avenue to 5th Avenue	Neighborhood Collector

EXISTING FUNCTIONAL CLASSIFICATION	ROADWAY	EXTENTS	RECOMMENDED FUNCTIONAL CLASSIFICATION
LOCAL	13th Avenue	Pearl Street to Riverview Drive	Neighborhood Collector
LOCAL	Riverview Drive	13th Avenue to 12th Avenue	Neighborhood Collector
LOCAL	10th Avenue	12th Avenue to Pearl Street	Neighborhood Collector
LOCAL	Elm Avenue	A Street to Shepperd Street	Neighborhood Collector
LOCAL	Wrigley Drive	Road 68 Place to Roosevelt Drive	Neighborhood Collector
LOCAL	Roosevelt Drive	Wrigley Drive to Madison Avenue	Neighborhood Collector
LOCAL	Madison Avenue	Roosevelt Drive to Burden Boulevard	Neighborhood Collector
LOCAL	Vincenzo Drive	Road 100 to Majestia Lane	Neighborhood Collector
LOCAL	Majestia Lane	Vincenzo Drive to Road 90	Neighborhood Collector
LOCAL	Road 90	Sandifur Parkway to Burns Road	Neighborhood Collector
LOCAL	Wilshire Drive	Road 90 to Westmoreland Lane	Neighborhood Collector
LOCAL	Westmoreland Lane	Wilshire Drive to Overland Court	Neighborhood Collector
LOCAL	Overland Court	Westmoreland Lane to Westminster Lane	Neighborhood Collector
LOCAL	Westminster Lane	Overland Court to Stutz Drive	Neighborhood Collector
LOCAL	Stutz Drive	Westminster Lane to Road 84	Neighborhood Collector

EXISTING FUNCTIONAL CLASSIFICATION	ROADWAY	EXTENTS	RECOMMENDED FUNCTIONAL CLASSIFICATION
LOCAL	Hudson Drive	Road 84 to Okanogan Lane	Neighborhood Collector
LOCAL	Okanogan Lane	Hudson Drive to Chehalis Drive	Neighborhood Collector
LOCAL	Chehalis Drive	Okanogan Lane to Three Rivers Drive	Neighborhood Collector
LOCAL	Three Rivers Drive	Chehalis Drive to Road 68 & Rio Grande Lane to Road 56	Neighborhood Collector
LOCAL	Road 56	Three Rivers Drive to Overton Road	Neighborhood Collector
LOCAL	Overton Road	Road 56 to Road 52	Neighborhood Collector

FREIGHT NETWORK

Freight routes play a vital role in the economical movement of raw materials and finished products, while maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. The Washington State Freight and Goods Transportation system (FGTS) tonnage classification system identifies different categories of freight corridors based on annual freight tonnage moved[1]. The following corridors are identified in Pasco and summarized below in Figure 3:

- I-182
- US 12
- US 395
- WA 397
- Road 100 (I-182 to Harris Road)
- Road 68 (I-182 to Clark Road)
- 4th Avenue (I-182 to Glade Road)
- Ainsworth Avenue/Dock Street (WA 397 to Sacajawea Park Road)
- Harris Road (Road 100 to Shoreline Road)
- Shoreline Road (Harris Road to Burns Road)
- Burns Road (Shoreline Road to Dent Road)

[1] WSDOT. *Freight Transportation System in WA.* https://wsdot.maps.arcgis.com/apps/webappviewer/index.html?id=0e37044a459244d9b6414826b46e8c46

- Dent Road (Burns Road to Road 68)
- Clark Road (Road 68 to Glad Road)
- Taylor Flats Road (North of Road 68)
- Columbia River Road (North of Road 68)
- Glade Road (North of 4th Avenue)
- Railroad Avenue (North of Hillsboro Street)
- Foster Wells Road (East of US 395)
- Kartchner Street (Railroad Avenue to Commercial Avenue)
- Hillsboro Street (Railroad Avenue to Travel Plaza Way)
- Lewis Street (US 395 to 20th Avenue)
- 20th Avenue (Lewis Street to A Street)
- A Street (20th Avenue to US 12)
- Pasco Kahlotus Road (East of US 12)
- Lewis Street (WA 397 to US 12)
- 4th Avenue (Ainsworth Street to A Street)

Other critical freight corridors that are not currently included in the Washington FGTS include Sacajawea Park Road from Ainsworth Avenue to US 12 and Commercial Avenue from Lewis Street to Kartchner Street. Including these routes in a future update to the Washington FGTS will recognize their significance to Pasco's freight system and connect key industrial areas to existing FGTS corridors.

The city's freight transportation system also includes a rail yard, port, and the Tri-Cities Airport. Intermodal connections between these freight hubs, Pasco's industrial areas, and the tri-cities region are necessary to support the movement of goods. Primary routes serving these existing freight transportation needs are identified through the Washington FGTS although additional development in these areas could generate new freight traffic demands.

Pasco will benefit from ensuring that its freight routes are designed to accommodate the needs of its industrial and commercial areas, while protecting its residential neighborhoods from freight traffic. Having designated freight routes will help the city better coordinate and improve its efforts regarding both freight and non-freight transportation system users, including the following:

- Roadway and Intersection Improvements can be designed for freight vehicles with adjustments for turn radii, sight distance, lane width and turn pocket lengths.
- Bicycle and Pedestrian Improvements – such as protected or separated bike facilities, enhanced pedestrian crossings, and other safety improvements – can be identified to reduce freight impacts to other users, particularly along bikeways and walkways.
- Roadway Durability can be increased by using concrete instead of asphalt for the pavement surface.

- Railroad Connections can be coordinated to support businesses that ship goods by rail, particularly in areas where railroad sidings can be provided.
- Coordination with Businesses and Adjacent Jurisdictions can ensure that local and regional freight traffic uses Pasco's freight routes to travel within the City.

FIGURE 3: WASHINGTON STATE FGTS FREIGHT NETWORK

This figure will be developed at a later date

PRIORITY BICYCLE NETWORK

Currently, Pasco does not maintain designated bicycle routes although residents of Pasco have provided numerous comments and input in support of bicycle facilities. These comments were received in both the online survey conducted for the TSMP and in the 2020 National Citizen Survey conducted by the City of Pasco[2]. Pasco's existing and planned bicycle facilities were reviewed to identify opportunities and constraints. Future bicycle facility gaps were identified and used to develop a comprehensive priority bicycle network for the City of Pasco. The priority bicycle network will be used to prioritize investments and develop a system that supports bicycle travel. The identified priority bicycle network for Pasco is shown in Figure 4.

The priority bicycle network includes a range of treatment types based on the roadway context (*e.g.,* vehicle speeds and volumes) and available right of way. This approach ensures that the proposed bicycle network fits within the existing neighborhood and street context.

FIGURE 4: RECOMMENDED PASCO PRIORITY BIKE NETWORK

A draft version of the priority bicycle network is available here:
https://www.google.com/maps/d/u/0/edit?mid=1ZQGKg1iS76ttbP7cpz4f7Iu983_Lvng1&usp=sharing

[2] The National Community Survey. *Pasco, WA, Community Livability Report.* 2019. https://www.pasco-wa.gov/DocumentCenter/View/62086/NCS-Community-Livability-Report-Pasco-2020

MULTIMODAL CROSS-SECTION STANDARDS

Different streets serve different purposes, and a functional classification system provides a framework for matching the size and type of various street elements with the intended purpose of the street. While a street's functional classification does not dictate which street elements to include, it does facilitate the selection of the multimodal facilities and widths that help the street fulfill its intended multimodal function. Adjacent land uses and available right-of-way also influence which elements are included in a specific segment.

Much of Pasco's street system is already built out and may not be easily reconfigured. However, cross-section standards should be applied to existing streets as significant redevelopment occurs and to new streets serving future development areas. For existing developed areas where significant redevelopment is not expected, the constrained cross-section standards will be applied. Constrained cross-sections may include narrower or limited travel lanes, and pedestrian and bicycle facilities, or accommodations that generally match those provided by the surrounding developed land uses. Cross-section standards can also provide a framework to guide design of existing facilities that may be candidates for future road diets or other reconfigurations.

Roadway cross-section design elements include travel lanes, curbs, planter strips, and pedestrian and bicycle facilities. The current standard cross-sections for the City of Pasco are summarized in the Pasco Design and Construction Standards[3] and summarized below for comparison with the recommended cross-sections.

The following cross-sections show current standards and recommended maximum elements and total facility widths for Pasco's functional classes. The recommended cross-sections were expanded to allow flexibility in the width of specific elements depending on the context of the adjacent land uses, as identified in the comprehensive plan zoning map. The cross-sections identified below include sections for each roadway type within each land use context to present the complete range of cross-section standards. These standards were compiled based on existing best practices for urban street design[4,5] and professional judgement. A specific roadway type may not exist within a specific land use context (*e.g.* there are currently no identified industrial neighborhood collectors).

ARTERIAL ROADWAY STANDARDS

Currently, the City of Pasco maintains a five-lane cross-section standard for all minor arterials which includes a 5-foot bike lane and 7-foot sidewalks on each side of the street, seen in Figure 5. The City of Pasco does not currently have a roadway standard for their principal arterial network.

---

[3] City of Pasco. *Pasco Design and Construction Standards.* https://www.pasco-wa.gov/DocumentCenter/View/3229/City-of-Pasco-Standard-Drawings-

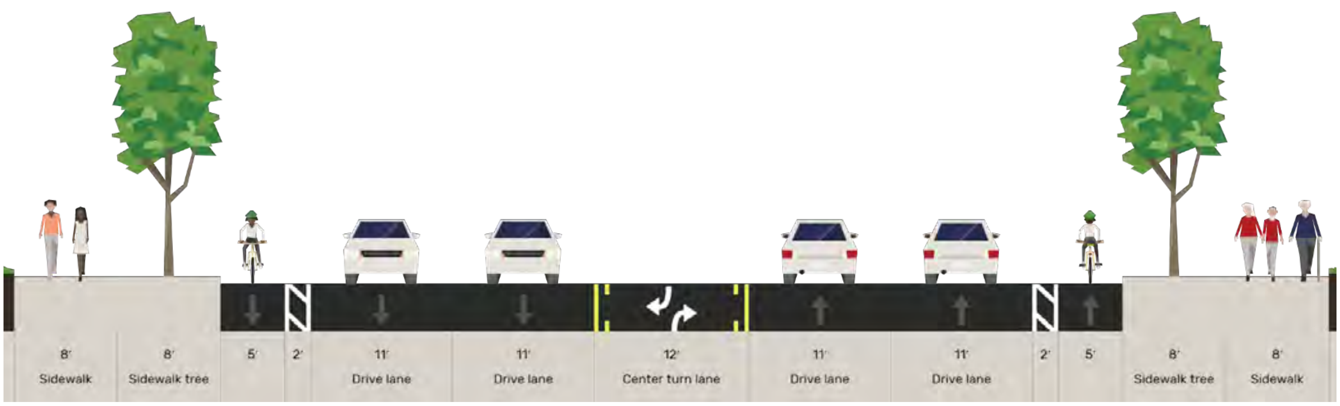
[4] NACTO. *Urban Street Design Guide.* https://nacto.org/publication/urban-street-design-guide/

[5] NACTO. *Urban Bikeway Design Guide.* https://nacto.org/publication/urban-bikeway-design-guide/

Paved Width: 68 feet, Right of Way: 83 feet

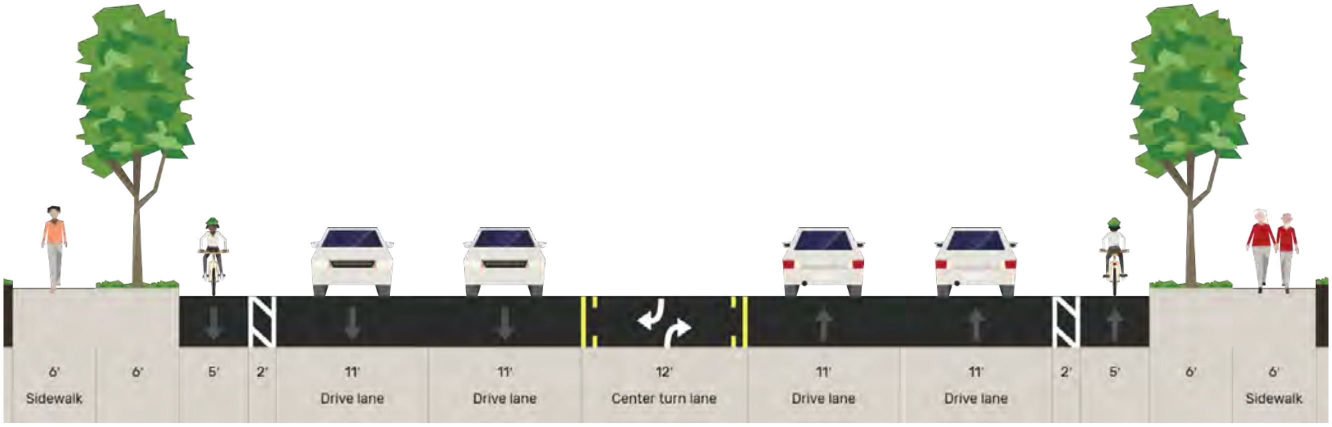
FIGURE 5: EXISTING MINOR ARTERIAL STREET CROSS-SECTION (SOURCE: STREETMIX)

The Pasco Transportation System Master Plan recommends converting the existing minor arterial roadway standard to the proposed principal arterial roadway standard and introducing a new three-lane minor arterial cross-section. Other key recommended changes include adding a planter strip between the sidewalk and street, on-street parking (for residential and mixed-use areas where less off-street parking is typically constructed), and a buffer between cyclists and adjacent travel lanes. The proposed principal arterial cross-sections, summarized in Figures 6A to 6D, and the proposed minor arterial cross-sections, summarized in Figures 7A to 7D, include flexible design standards for each cross-section element to accommodate the expected roadway users depending on the adjacent land use context. For example, the residential minor arterial cross-section standard will be applied as part of the proposed road reconfiguration on Court Street. A summary of the recommended widths for both the principal arterial and minor arterial cross-sections is also provided below in Tables 4 and 5.



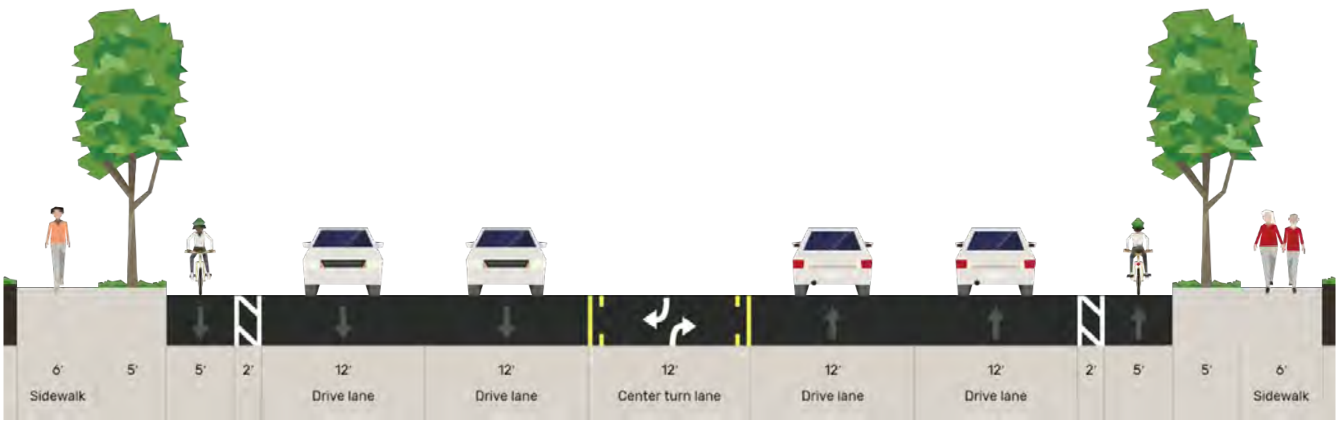
Paved Width: 70 feet, Right of Way: 102 feet

FIGURE 6A: RECOMMENDED PRINCIPAL ARTERIAL – MIXED USE STREET CROSS-SECTION (SOURCE: STREETMIX)



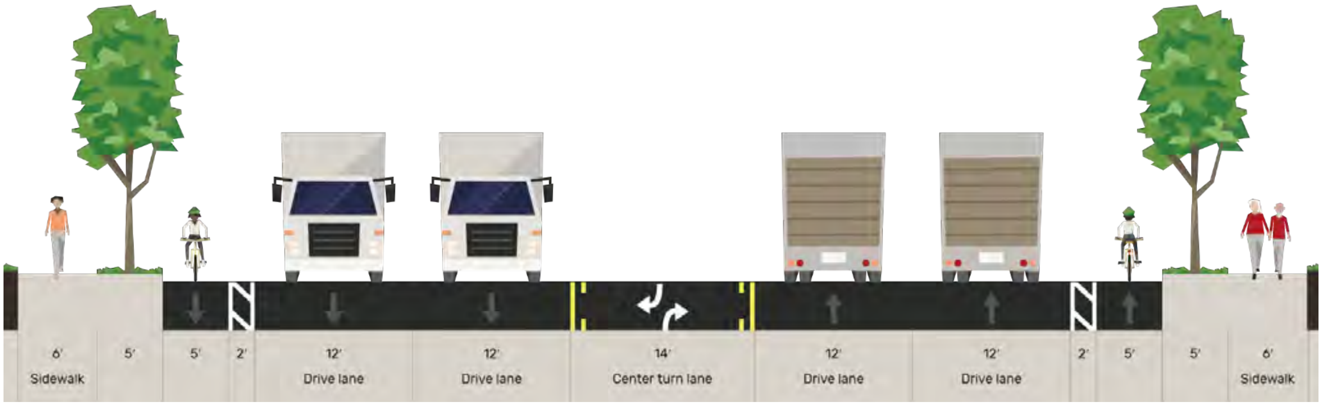
Paved Width: 70 feet, Right of Way: 94 feet

FIGURE 6B: PROPOSED PRINCIPAL ARTERIAL – RESIDENTIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 74 feet, Right of Way: 96 feet

FIGURE 6C: PROPOSED PRINCIPAL ARTERIAL – COMMERCIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 76 feet, Right of Way: 98 feet

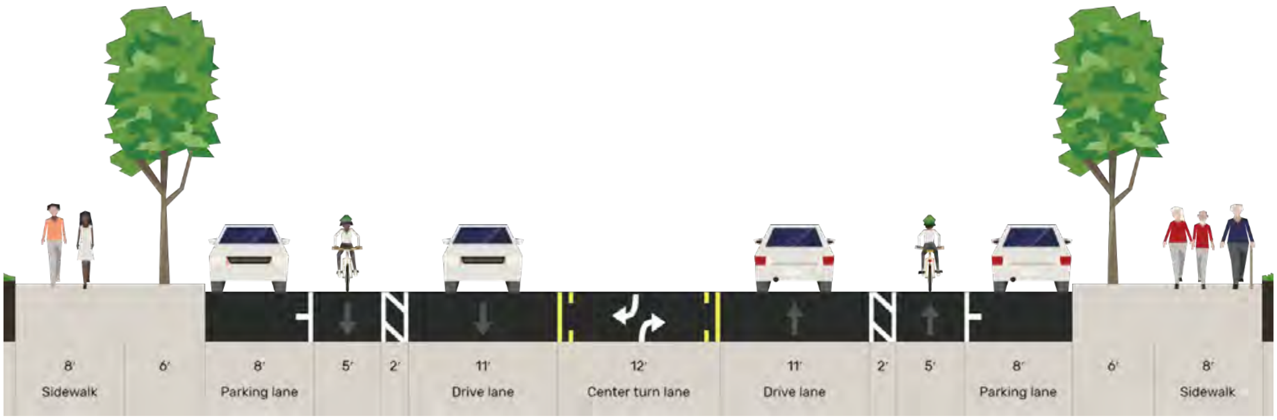
FIGURE 6D: PROPOSED PRINCIPAL ARTERIAL – INDUSTRIAL STREET CROSS-SECTION (SOURCE: STREETMIX)

TABLE 4: RECOMMENDED PRINCIPAL ARTERIAL CROSS-SECTION OPTIONS

Cross-Section Element	Mixed Use	Residential	Commercial	Industrial
Sidewalk	8 feet	6 feet	6 feet	6 feet
Furnishing Zone or Landscape Strip	8 feet	6 feet	5 feet	5 feet
Bike Lanes	5 feet	5 feet	5 feet	5 feet
Buffer Width	2 feet minimum	2 feet minimum	2 feet minimum	2 feet minimum
On-Street Parking	Optional[1]; 8 feet	None	None	None
Vehicle Travel Lanes[2]	2 to 4 lanes; 11 feet	2 to 4 lanes; 11 feet	2 to 4 lanes; 12 feet	2 to 4 lanes; 12 feet
Median or Center Turn Lane	12 feet	12 feet	12 feet	14 feet

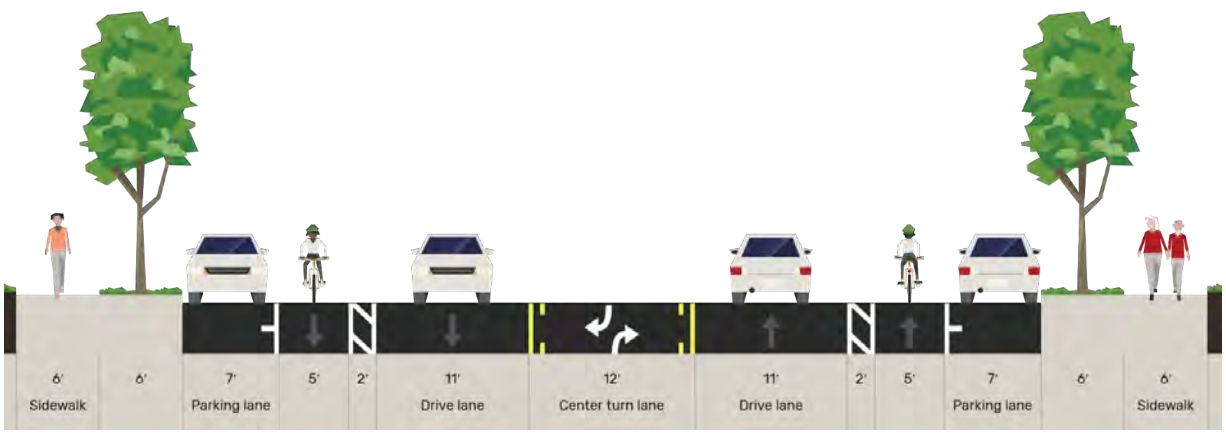
Note: Pasco's standard curb section is included as part of the furnishing zone or landscape strip width; Pasco's standard gutter section is included as part of the adjacent lane

1. On-street parking not recommended for a five-lane cross-section
2. The number of lanes is dependent on the expected street volume



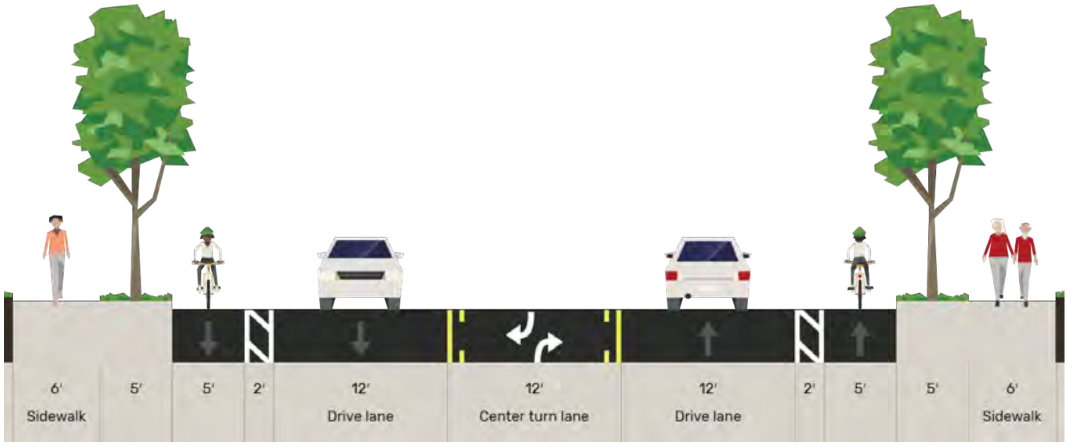
Paved Width: 64 feet, Right of Way: 92 feet

FIGURE 7A: PROPOSED MINOR ARTERIAL – MIXED USE STREET CROSS-SECTION (SOURCE: STREETMIX)



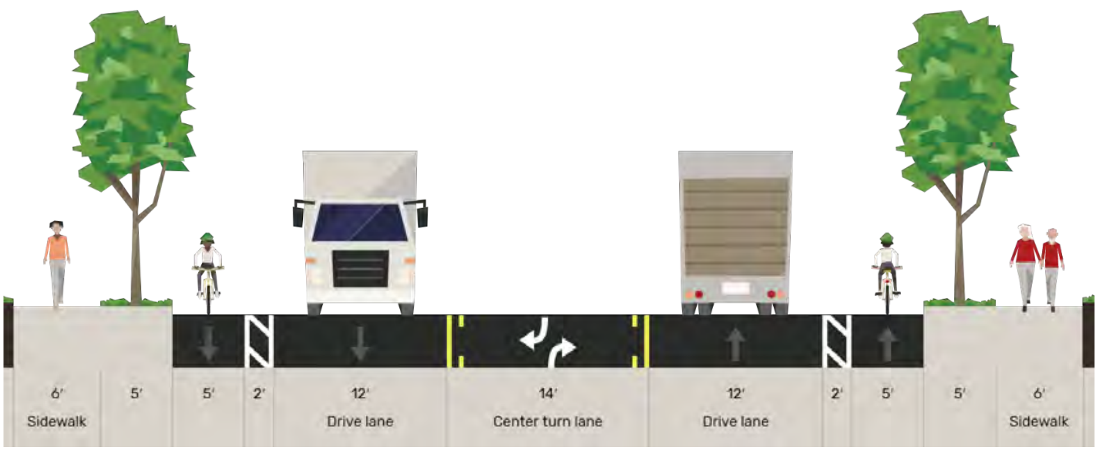
Paved Width: 62 feet, Right of Way: 86 feet

FIGURE 7B: PROPOSED MINOR ARTERIAL – RESIDENTIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 50 feet, Right of Way: 72 feet

FIGURE 7C: PROPOSED MINOR ARTERIAL – COMMERCIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 52 feet, Right of Way: 74 feet

FIGURE 7D: PROPOSED MINOR ARTERIAL – INDUSTRIAL STREET CROSS-SECTION (SOURCE: STREETMIX)

TABLE 5: RECOMMENDED MINOR ARTERIAL CROSS-SECTION OPTIONS

Cross-Section Element	Mixed Use	Residential	Commercial	Industrial
Sidewalk	8 feet	6 feet	6 feet	6 feet
Furnishing Zone or Landscape Strip	6 feet	6 feet	5 feet	5 feet
Bike Lanes	5 feet	5 feet	5 feet	5 feet
Buffer Width	2 feet minimum	2 feet minimum	2 feet minimum	2 feet minimum
On-Street Parking	Optional; 8 feet	Optional; 7 feet	None	None
Vehicle Travel Lanes	2 lanes; 11 feet	2 lanes; 11 feet	2 lanes; 12 feet	2 lanes; 12 feet
Median or Center Turn Lane	12 feet	12 feet	12 feet	14 feet

Note: Pasco's standard curb section is included as part of the furnishing zone or landscape strip width; Pasco's standard gutter section is included as part of the adjacent lane

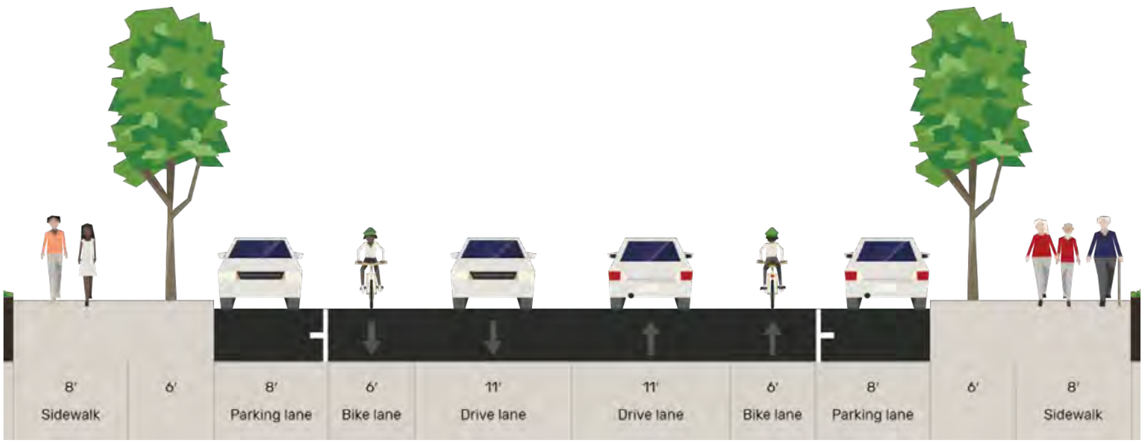
COLLECTOR ROADWAY STANDARDS

The City of Pasco's current collector cross-section includes three lanes for vehicles with 5-foot bike lanes and 7-foot sidewalks on each side. The existing collector cross-section is shown in Figure 8.

Paved Width: 48 feet, Right of Way: 63 feet

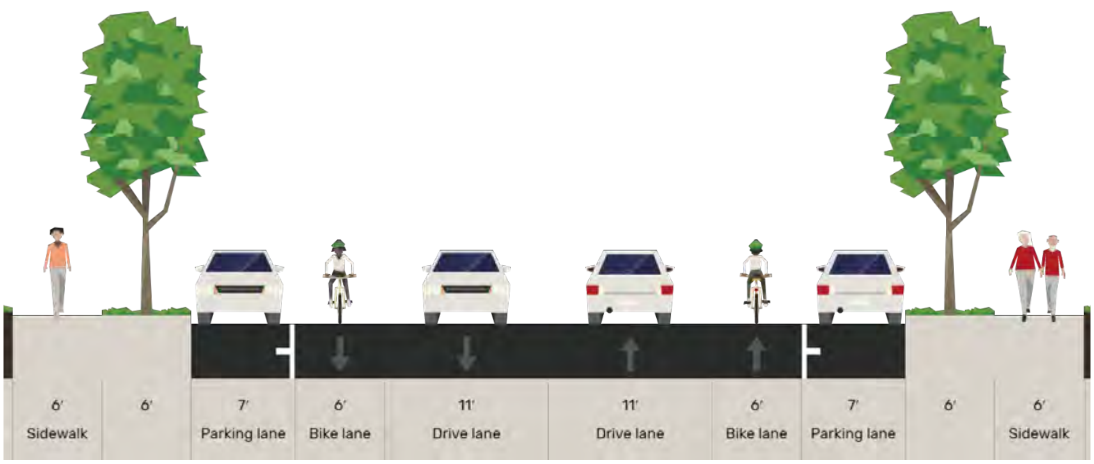
FIGURE 8: EXISTING COLLECTOR STREET CROSS-SECTION (SOURCE: STREETMIX)

The Pasco Transportation System Master Plan recommends maintaining the existing collector roadway standard for collectors constructed in commercial and industrial areas where a center two-way left turn lane can better balance through movements for vehicles and business or freight access. The recommended collector street cross-section for mixed use and residential areas does not include a center two-way left turn lane to minimize the cross-section width and to support a multimodal street character. Other key recommended changes include adding a planter strip between the sidewalk and street and including on-street parking (for residential and mixed-use areas where less off-street parking is typically constructed). The proposed collector cross-sections, summarized below in Figures 9A to 9D, include flexible design standards to accommodate the expected roadway users depending on the adjacent land use context. The proposed residential, commercial, or mixed-use standards will be applied to the planned road reconfiguration on Sylvester Street. The recommended widths are also summarized below in Table 6.



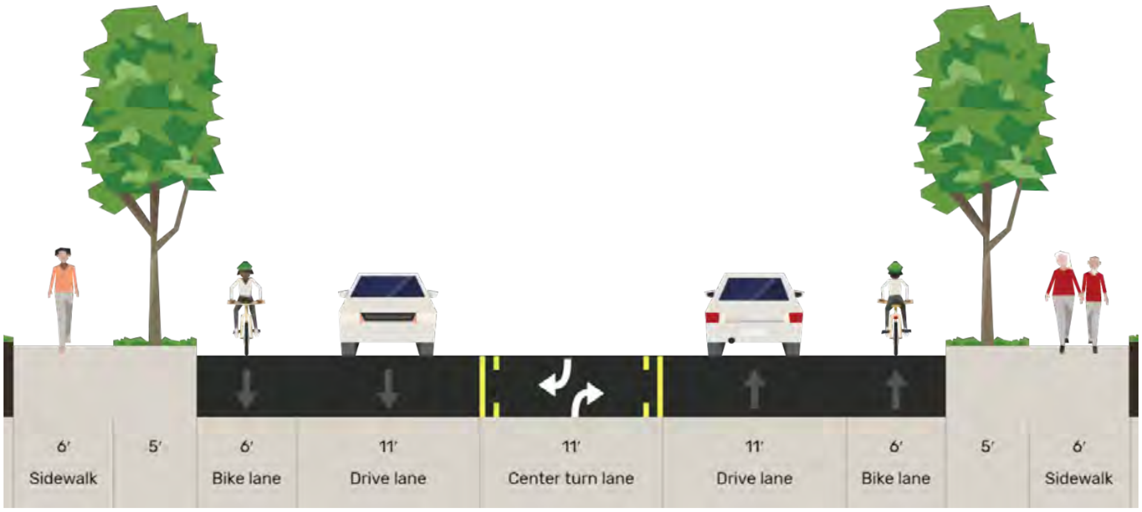
Paved Width: 50 feet, Right of Way: 78 feet

FIGURE 9A: PROPOSED COLLECTOR – MIXED USE STREET CROSS-SECTION (SOURCE: STREETMIX)



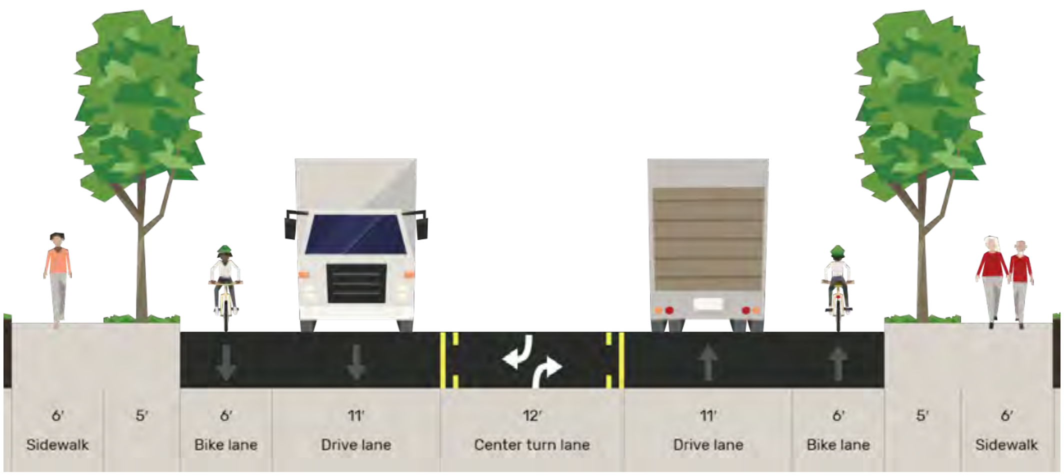
Paved Width: 48 feet, Right of Way: 72 feet

FIGURE 9B: PROPOSED COLLECTOR – RESIDENTIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 45 feet, Right of Way: 67 feet

FIGURE 9C: PROPOSED COLLECTOR – COMMERCIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 46 feet, Right of Way: 68 feet

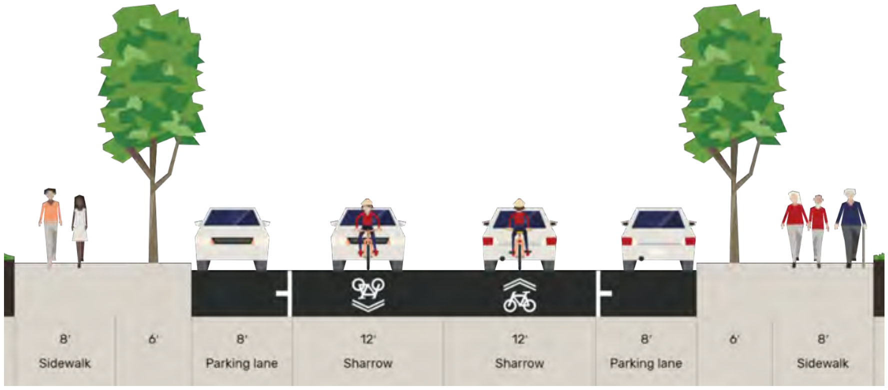
FIGURE 9D: PROPOSED COLLECTOR – INDUSTRIAL STREET CROSS-SECTION (SOURCE: STREETMIX)

TABLE 6: RECOMMENDED COLLECTOR CROSS-SECTION OPTIONS

Cross-Section Element	Mixed Use	Residential	Commercial	Industrial
Sidewalk	8 feet	6 feet	6 feet	6 feet
Furnishing Zone or Landscape Strip	6 feet	6 feet	5 feet	5 feet
Bike Lanes	6 feet	6 feet	6 feet	6 feet
Buffer Width	None	None	None	None
On-Street Parking	Optional; 8 feet	Optional; 7 feet	None	None
Vehicle Travel Lanes	2 lanes; 11 feet	2 lanes; 11 feet	2 lanes; 11 feet	2 lanes; 11 feet
Median or Center Turn Lane	None	None	11 feet	12 feet

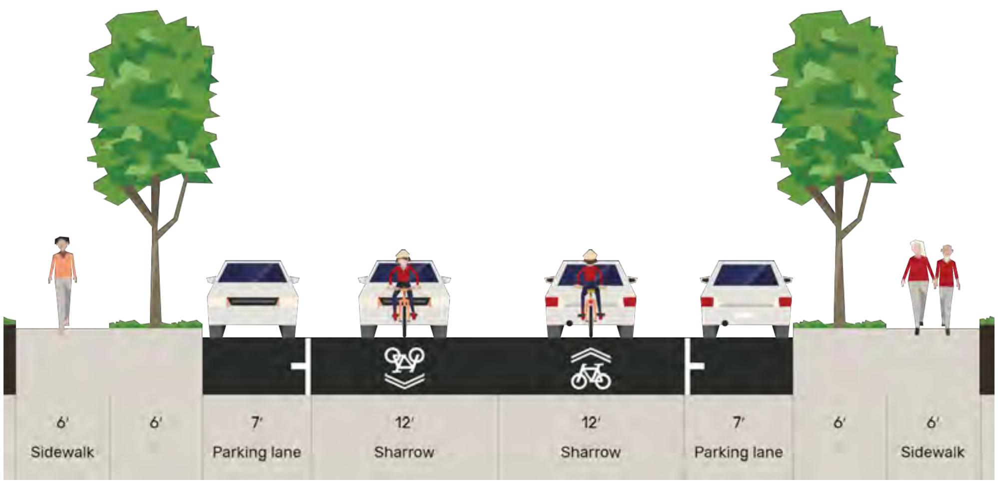
Note: Pasco's standard curb section is included as part of the furnishing zone or landscape strip width; Pasco's standard gutter section is included as part of the adjacent lane

The Pasco Transportation System Master Plan also recommends introducing a new neighborhood collector cross-section which balances mobility for all roadway users with home or business access. Neighborhood collectors are designed to provide more connectivity than local streets with slower vehicle speeds than a typical collector street through their design or other traffic calming treatments. These features make neighborhood collectors a critical component of a multimodal transportation system. This cross-section includes two vehicle travel lanes, on-street bike lanes (in commercial or industrial areas only), on-street parking (for residential and mixed-use areas where less off-street parking is typically constructed), a planter strip between the sidewalk and street, and sidewalks. The proposed neighborhood collector cross-sections, summarized below in Figures 10A to 10D, include flexible design standards for each cross-section element to accommodate the expected roadway users depending on the adjacent land use context. Recommended widths for each element are also summarized in Table 7. Potential traffic calming treatments which can be applied to neighborhood collectors is summarized below in the *Neighborhood Traffic Management Tools* section.



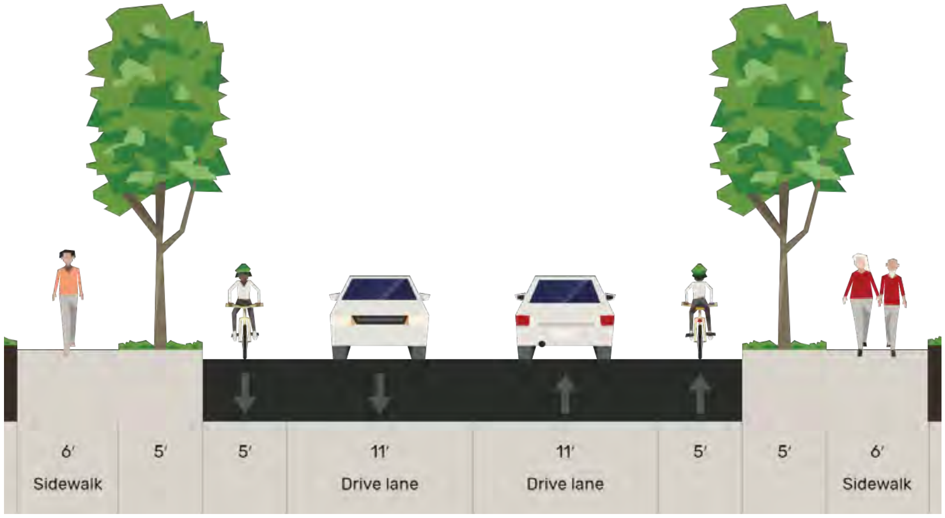
Paved Width: 40 feet, Right of Way: 68 feet

FIGURE 10A: PROPOSED NEIGHBORHOOD COLLECTOR – MIXED USE STREET CROSS-SECTION (SOURCE: STREETMIX)



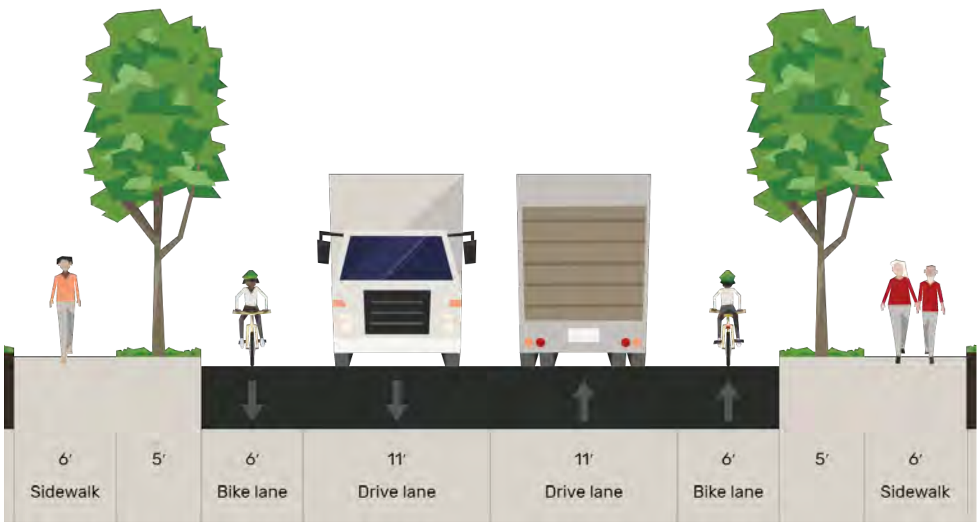
Paved Width: 38 feet, Right of Way: 62 feet

FIGURE 10B: PROPOSED NEIGHBORHOOD COLLECTOR – RESIDENTIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 32 feet, Right of Way: 54 feet

FIGURE 10C: PROPOSED NEIGHBORHOOD COLLECTOR – COMMERCIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 32 feet, Right of Way: 54 feet

FIGURE 10D: PROPOSED NEIGHBORHOOD COLLECTOR – INDUSTRIAL STREET CROSS-SECTION (SOURCE: STREETMIX)

TABLE 7: RECOMMENDED NEIGHBORHOOD COLLECTOR CROSS-SECTION OPTIONS

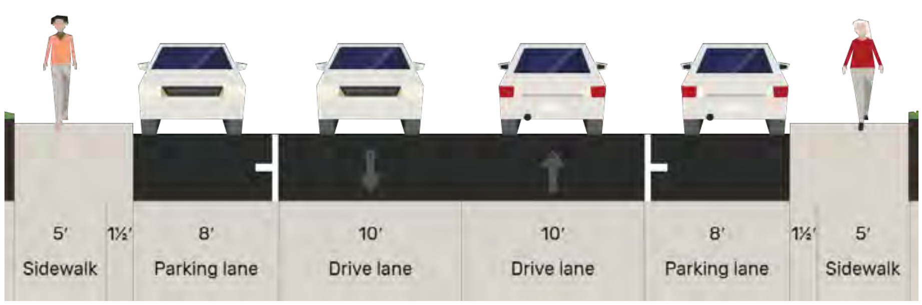
Cross-Section Element	Mixed Use	Residential	Commercial	Industrial
Sidewalk	8 feet	6 feet	6 feet	6 feet
Furnishing Zone or Landscape Strip	6 feet	6 feet	5 feet	5 feet
Bike Lanes	None	None	5 feet[1]	6 feet[1]
Buffer Width	None	None	None	None
On-Street Parking	Optional; 8 feet	Optional; 7 feet	None	None
Vehicle Travel Lanes	2 lanes; 12 feet	2 lanes; 12 feet	2 lanes; 11 feet	2 lanes; 11 feet
Median or Center Turn Lane	None	None	None	None

Note: Pasco's standard curb section is included as part of the furnishing zone or landscape strip width; Pasco's standard gutter section is included as part of the adjacent lane

1. Sharrows and traffic calming treatments can be provided in lieu of bike lanes

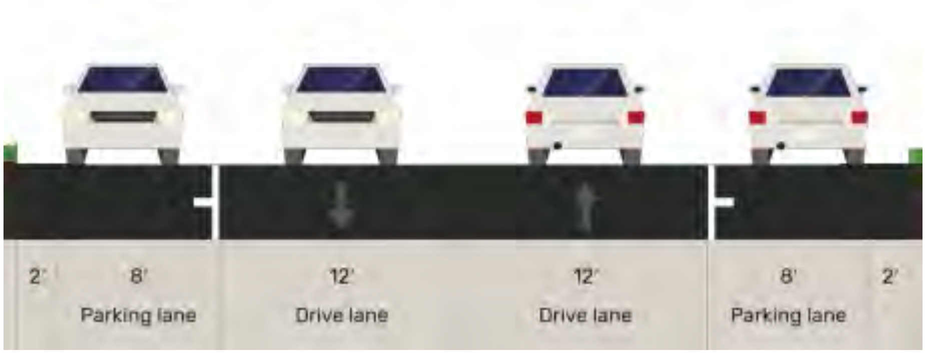
LOCAL ROADWAY STANDARDS

Existing local roadway standards for the City of Pasco are summarized in Figures 11A and 11B for local streets with and without curb. Both cross-sections include two travel lanes and parking on each side of the street. Sidewalks are only provided for sections that are constructed with curb. All new roadways within the City of Pasco are recommended to be constructed with curb, so the TSMP did not include a local street option without curb.



Paved Width: 38 feet, Right of Way: 49 feet

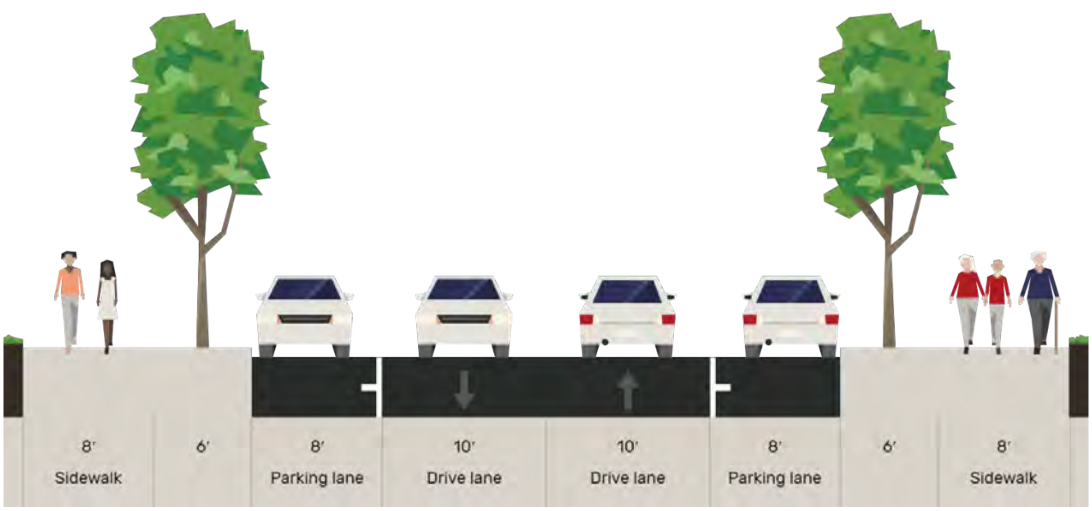
FIGURE 11A: EXISTING LOCAL STREET CROSS-SECTION WITH CURB (SOURCE: STREETMIX)



Paved Width: 44 feet, Right of Way: 44 feet

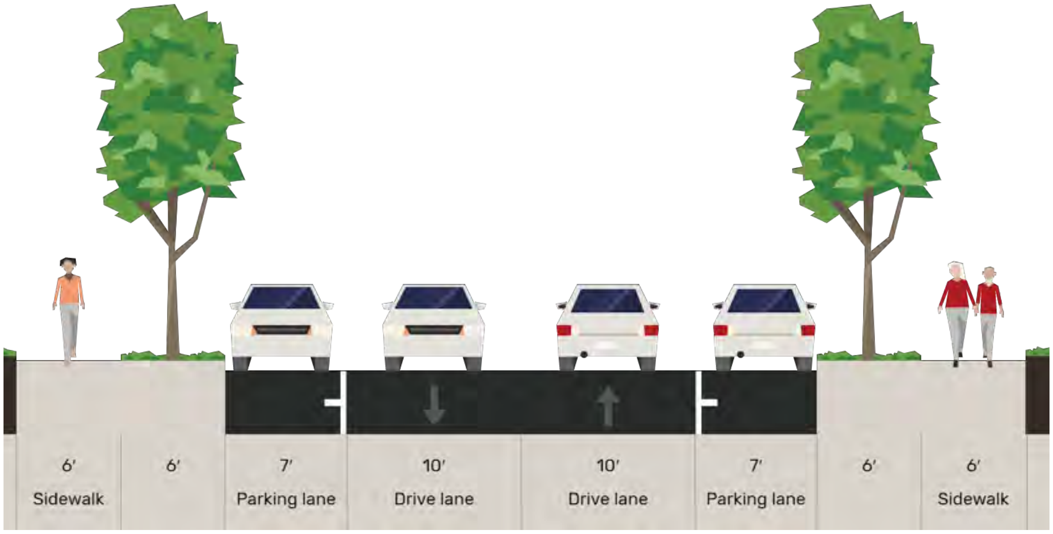
FIGURE 11B: EXISTING LOCAL STREET CROSS-SECTION WITHOUT CURB (SOURCE: STREETMIX)

The Pasco Transportation System Master Plan recommends maintaining the existing local roadway standard for streets constructed in mixed use and residential areas where on-street parking is needed to serve residences or businesses. On-street parking is less critical in commercial and industrial areas where large off-street parking areas are typically constructed, so the recommended local street cross-sections for commercial and industrial areas does not include parking. Other key recommended changes include adding a planter strip between the sidewalk and street. The proposed local street cross-sections, summarized below in Figures 12A to 12D, include flexible design standards for each cross-section element to accommodate the expected roadway users depending on the adjacent land use context. The recommended widths for each cross-section element is also summarized below in Table 8.



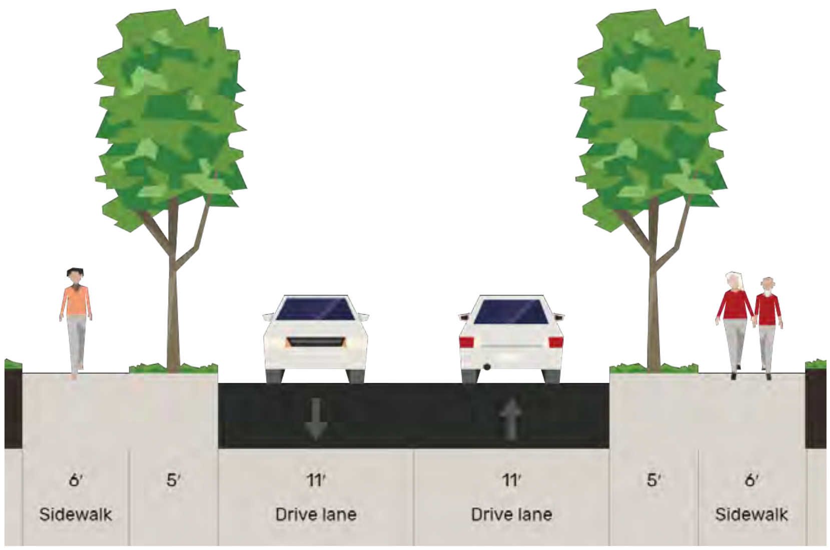
Paved Width: 36 feet, Right of Way: 64 feet

FIGURE 12A: PROPOSED LOCAL STREET WITH CURB – MIXED USE STREET CROSS-SECTION (SOURCE: STREETMIX)



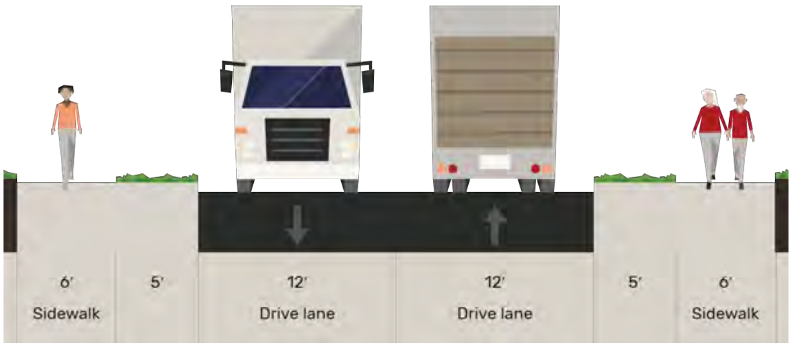
Paved Width: 34 feet, Right of Way: 58 feet

FIGURE 12B: PROPOSED LOCAL STREET WITH CURB – RESIDENTIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 22 feet, Right of Way: 44 feet

FIGURE 12C: PROPOSED LOCAL STREET WITH CURB – COMMERCIAL STREET CROSS-SECTION (SOURCE: STREETMIX)



Paved Width: 24 feet, Right of Way: 46 feet

FIGURE 12D: PROPOSED LOCAL STREET WITH CURB – INDUSTRIAL STREET CROSS-SECTION (SOURCE: STREETMIX)

TABLE 8: RECOMMENDED LOCAL STREET CROSS-SECTION OPTIONS

Cross-Section Element	Mixed Use	Residential	Commercial	Industrial
Sidewalk	8 feet	6 feet	6 feet	6 feet
Furnishing Zone or Landscape Strip	6 feet	6 feet	5 feet	5 feet
Bike Lanes	None	None	None	None
Buffer Width	None	None	None	None
On-Street Parking	Optional; 8 feet	Optional; 7 feet	None	None
Vehicle Travel Lanes	2 lanes; 10 feet	2 lanes; 10 feet	2 lanes; 11 feet	2 lanes; 12 feet[1]
Median or Center Turn Lane	None	None	None	None

Note: Pasco's standard curb section is included as part of the furnishing zone or landscape strip width; Pasco's standard gutter section is included as part of the adjacent lane

1. Additional width may be needed at intersections or driveways to accommodate truck turning movements

CONSTRAINED ROADWAY OPTIONS

Constrained Streets are generally those where the construction may be challenging due to topography, environmentally sensitive areas, or historic areas. The constrained street standards will also be applied in existing, developed areas where significant redevelopment is not expected. These streets may require modified designs that may not be to scale with the adjacent land use to allow for reasonable construction costs. Constrained elements may include narrower or limited travel lanes, and pedestrian and bicycle facilities, or accommodations that generally match those provided by the surrounding developed land uses. Recommended guidance for modifications to the standard designs is provided in Table 9. Any modification of a standard design requires approval prior to construction.

TABLE 9: RECOMMENDED CONSTRAINED ROADWAY OPTIONS

Cross-Section Element	Principal & Minor Arterials	Collectors & Neighborhood Collectors	Local Streets
Sidewalk	6 feet minimum width	5 feet minimum width	5 feet minimum width
Furnishing Zone or Landscape Strip	None[1]	None[1]	None[1]
Bike Lanes	6 feet minimum width, no buffer	5 feet minimum width or provide facility on adjacent corridor	N/A
On-Street Parking	None	None	None
Vehicle Travel Lanes	2 to 4[2] 11 feet minimum width	2 10 feet minimum width	2 10 feet minimum width
Median or Center Turn Lane	As needed[3]	As needed[3]	None

Note: Pasco's standard curb section is included as part of the furnishing zone or landscape strip width; Pasco's standard gutter section is included as part of the adjacent lane

1. Minimum 3 feet width for furnishing/landscape strip, if provided
2. The number of lanes is dependent on the expected street volume
3. Access restrictions required if no median is provided

COUNTY ROADWAY OPTIONS

County roadways within Pasco's UGA face several unique challenges, including inconsistent roadway widths, lack of multimodal facilities, and inadequate ROW designations which can make it challenging to bring these roadways up to urban standards as these areas are incorporated. Furthermore, there is no existing formal agreement between Franklin County and the City of Pasco to guide the process for requiring dedication and improvements in the UGA or for jurisdictional transfer of County roads to the City. As a result, within the UGA ROW dedication and improvements, including multimodal facilities, are provided in an inconsistent, ad hoc manner. Three different approaches can be considered for establishing road annexation (or jurisdictional transfer) standards that ensures consistency in ROW widths and promotes multimodal facility development:

1. Interim or phased approaches for upgrading ROW in urbanizing areas (*i.e.* within the UGA)

2. Interagency Agreements that establish a coordinated strategy for ROW improvements among the City and the County/State
3. Standards/Fee-in-lieu that offer developers or property owners an alternative to directly providing roadway improvements

These methods and examples will be used to codify a process to manage ROW dedications within the UGA as part of the TSMP.

PEDESTRIAN AND BICYCLE STANDARDS

The following sections detail various walking and biking facility standards and treatment guidelines.

WALKING AND BIKING FACILITIES

As shown in the multi-modal roadway cross-section standards, the existing city roadway design standards should be modified to require buffered bike lanes along principal arterial and minor arterial roadways for all land use types. Wider bike lanes will also be provided along collector roadways for all land use types and neighborhood collector roadways in industrial or commercial areas. Bicyclists should be accommodated with a 5-foot bike lane and 2-foot buffer along arterial roadways and a six-foot bike lane along collector roadways. Currently, the City of Pasco requires 5-foot bike lanes on all arterial and collector roadways, so the revised standards increase the total operating room for bicyclists. Shared streets for bikes are also recommended to be designated throughout the city and should include pavement markings/ signage.

All streets in mixed-use, residential, and industrial areas are also recommended to require wider sidewalks. Newly constructed roadways are recommended to include an 8-foot sidewalk in mixed-use areas and a 6-foot sidewalk in residential, commercial, and industrial areas. Additionally, each new street is recommended to include a landscape buffer strip or tree wells to create a more pleasant walking environment for pedestrians. Currently, the City of Pasco requires a 5-foot sidewalk in residential areas and a 7-foot sidewalk in commercial areas. The proposed cross sections increase the standard sidewalk width to 6 feet in residential areas and establish new standards for commercial areas that are based on the type of adjacent businesses. In mixed use areas (*e.g.,* downtown Pasco), wider 8-foot sidewalks will be supplemented with tree wells to accommodate increase pedestrian activity while auto-oriented commercial districts will provided narrower 6-foot sidewalks.

SHARED-USE PATHS

Shared-use paths provide off-roadway facilities for walking and biking travel. Depending on their location, they can serve both recreational and transportation needs. Shared-use path designs vary in surface types and widths. Hard surfaces are generally better for bicycle travel. Widths need to provide ample space for both walking and biking and should be able to accommodate maintenance vehicles. Currently, the City of Pasco does not have a standard cross-section for shared-use paths. The recommended cross-section is summarized in Figure 13. The proposed cross-section is 12 feet wide, with 2-foot shoulders on each side.

Paved Width: 14 feet, Right of Way: 16 feet

FIGURE 13: PROPOSED SHARED-USE PATH CROSS-SECTION (SOURCE: STREETMIX)

STREET CROSSINGS

Roadways with high traffic volumes and/or speeds in areas with nearby transit stops, residential uses, schools, parks, shopping and employment destinations generally require enhanced street crossings with treatments, such as marked crosswalks, high visibility crossings, and curb extensions to improve the safety and convenience. Crossing locations with higher volumes of pedestrians (either observed or projected) are also candidate locations for rectangular rapid flashing beacons or pedestrian hybrid beacons which increase the visibility of the crossing for drivers. Crossings should be consistent with the recommended block spacing standards shown in Table 5, and mid-block pedestrian and bicycle accessways are recommended to be provided at spacing no more than 300 feet. Exceptions include where the connection is impractical due to topography, inadequate sight distance, high vehicle travel speeds, lack of supporting land use or other factors that may prevent safe crossing (as determined by the city).

The city should consider adding enhanced pedestrian crossing treatments to increase protection where warranted by the combination of pedestrian demand volumes and cross traffic speeds and volumes. Candidate locations include trail crossings (*e.g.* Road 100/Planned FCID Canal Trail), parks or recreation, schools, or high-volume transit stops. Appendix A of National Cooperative Highway Research Program (NCHRP) Report 562, *Improving Pedestrian Safety at Unsignalized Crossings,* includes a procedure for treatment selection, with input variables including:

- Vehicle speed on the major street
- Pedestrian crossing distance
- Peak hour pedestrian volume
- Peak hour vehicle volume
- Local parameters such as motorist compliance, pedestrian walking speed, and pedestrian start-up and clearance time

NCHRP Report 562 includes worksheets for inputting the variables above and identifying the appropriate treatment type. A typical worksheet used for this evaluation is seen below in Figure 14.

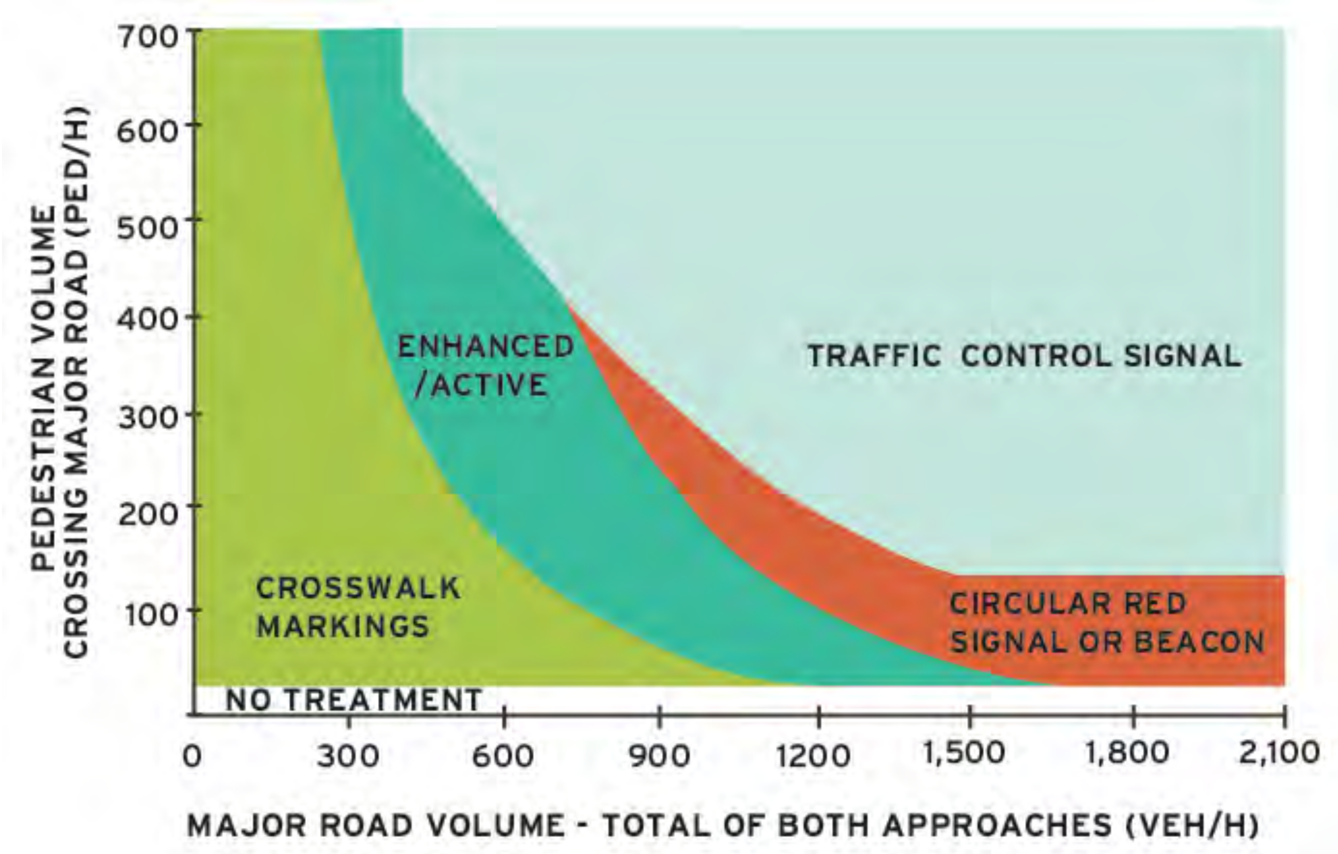


FIGURE 14: NCHRP 562 SAMPLE EVALUATION WORKSHEET

NEIGHBORHOOD TRAFFIC MANAGEMENT TOOLS

Neighborhood Traffic Management (NTM) involves strategies to slow traffic, and potentially reduce volumes, creating a more inviting environment for pedestrians and bicyclists. NTM strategies target neighborhood livability on local streets, though a few can apply to collectors and arterials, such as raised median islands. Mitigation measures balance the need to manage vehicle speeds and volumes with the need to maintain mobility, circulation, and function for service providers, such as emergency responders. Examples of tools are shown in Figure 15.

Chicanes

www.pedbikeimages.org/Dan Burden

Chokers

www.pedbikeimages.org/Dan Burden

Curb Extensions

www.pedbikeimages.org/Carl Sundstrom

Diverters

www.pedbikeimages.org/Adam Fukushima

Median Islands

www.pedbikeimages.org/Dan Burden

Raised Crosswalks

www.pedbikeimages.org/Tom Harned

Speed Cushions

NACTO Urban Street Design Guide

Speed Hump

www.pedbikeimages.org/Dan Burden

Traffic Circles

www.pedbikeimages.org/Carl Sundstrom

FIGURE 15: SUMMARY OF NEIGHBORHOOD TRAFFIC MANAGEMENT STRATEGIES

Table 10, below, lists common NTM applications. Any NTM project should include coordination with emergency response staff to ensure that public safety is not compromised. NTM strategies implemented on a state facility would require coordination with WSDOT regarding freight mobility considerations.

TABLE 10: APPLICATION OF NTM STRATEGIES

NTM Application	Use by Function Classification			Impact	
	Arterials	Collectors	Local Streets	Speed Reduction	Traffic Diversion
CHICANES			✓	✓	✓
CHOKERS			✓	✓	✓
CURB EXTENSIONS	✓	✓	✓	✓	
DIVERTERS (WITH EMERGENCY VEHICLE PASS-THROUGH)		✓	✓		✓
MEDIAN ISLANDS	✓	✓	✓	✓	
RAISED CROSSWALKS			✓	✓	✓
SPEED CUSHIONS (WITH EMERGENCY VEHICLE PASS-THROUGH)			✓	✓	✓
SPEED HUMP			✓	✓	✓
TRAFFIC CIRCLES			✓	✓	✓

The City of Pasco does not currently have a formal neighborhood traffic management program. If such a program were desired to help respond to future issues, suggested elements include:

- Provide a formalized process for citizens who are concerned about the traffic on their neighborhood street. The process could include filing a citizen request with petition signatures and a preliminary evaluation. If the evaluation finds cause for concern, a neighborhood meeting would be held and formal data would be collected and evaluated. If a problem were found to exist, solutions would be identified and the process continued with neighborhood meetings, feedback from service and maintenance providers, cost evaluation, and traffic calming device implementation. Six months after implementation the device would be evaluated for effectiveness.
- For land use proposals, in addition to assessing impacts to the entire transportation network, traffic studies for new developments must also assess impacts to residential streets. A recommended threshold to determine if this additional analysis is needed is if the proposed project increases through traffic on residential streets by 40 or more vehicles during the evening peak hour or 200 vehicles per day. Once the analysis is performed, the

threshold used to determine if residential streets are impacted would be if their daily traffic volume exceeds 1,800 vehicles.

ACCESS MANAGEMENT & STREET CONNECTIVITY STANDARDS

Access management provides safe and efficient access to the transportation system for all users. Currently, the City of Pasco only manages access through restrictions on the placement of driveways. New residential driveways must be located 25 feet from an existing intersection, while new commercial driveways must be placed in coordination with the Public Works Director[6]. Expanded access management spacing standards which account for the different roadway functional classifications are recommended for the City of Pasco to better manage driveway construction. These standards are summarized in Table 11.

TABLE 11: RECOMMENDED ACCESS MANAGEMENT SPACING STANDARDS

SPACING GUIDELINES[1 2]	PRINCIPAL ARTERIALS	MINOR ARTERIALS	COLLECTORS	NEIGHBORHOOD COLLECTORS	LOCAL STREETS
MINIMUM DRIVEWAY SPACING (DRIVEWAY TO DRIVEWAY) [2]	300 feet	250 feet	150 feet	75 feet	N/A
MINIMUM FULL-ACCESS DRIVEWAY SPACING (SETBACK FROM INTERSECTION)	300 feet[3]	250 feet	150 feet	75 feet	25 feet
MINIMUM RIGHT-IN/RIGHT-OUT DRIVEWAY SPACING (SETBACK FROM INTERSECTION)	150 feet[3]	125 feet	75 feet	50 feet	25 feet

1. All distances measured from the edge of adjacent approaches
2. A property must construct access to a lower classified roadway, where possible
3. WSDOT requires 1,320 between an interchange and the closest driveway[7]

The City of Pasco recently adopted block length and block perimeter guidelines to control access to their street network. Under this new guidance for most zoning designations, block lengths shall not exceed 660 feet and the block perimeter shall not exceed 1,760 feet. Previously blocks could not exceed 1,320 feet for residential uses or 600 feet for commercial uses[8]. In addition to these new standards, Pasco should consider adopting standards which govern the minimum block size and the

---

[6] City of Pasco. *Pasco Municipal Code Section 12.04.100 Driveway Standards.* https://pasco.municipal.codes/PMC/12.04.090

[7] State of Washington. *Washington Administrative Code Section 468-52-040 Access Control Classification System and Standards.* https://app.leg.wa.gov/wac/default.aspx?cite=468-52-040

[8] City of Pasco. *Street Connectivity – Supplemental Memorandum for CA2019-013.* September 17, 2020.

maximum distance between pedestrian or bicycle access points. The existing street connectivity standards plus these additional guidelines is summarized below in Table 12.

TABLE 12: EXISTING AND RECOMMENDED STREET CONNECTIVITY STANDARDS

SPACING GUIDELINES	PRINCIPAL ARTERIALS	MINOR ARTERIALS	COLLECTORS	NEIGHBORHOOD COLLECTORS	LOCAL STREETS
MAXIMUM BLOCK SIZE (PUBLIC STREET TO PUBLIC STREET)[1]	660 feet	660 feet	660 feet	660 feet	660 feet
MINIMUM BLOCK SIZE (PUBLIC STREET TO PUBLIC STREET)	300 feet	250 feet	200 feet	150 feet	125 feet
MAXIMUM BLOCK PERIMETER[1]	1,760 feet	1,760 feet	1,760 feet	1,760 feet	1,760 feet
MAXIMUM DISTANCE BETWEEN PEDESTRIAN/BICYCLE ACCESSWAYS[2]	330 feet	330 feet	330 feet	330 feet	330 feet

1. Existing standard for the City of Pasco
2. Spacing is the maximum of public street to public street, public street to accessway, or accessway to accessway distance

VEHICLE MOBILITY TARGETS

Mobility targets are used in long-range planning and development review to identify deficiencies on the transportation network and can be used to identify needed improvements as growth occurs. Two common methods used to gauge traffic operations for motor vehicles are volume to capacity (v/c) ratios and level of service (LOS):

- Volume-to-capacity (v/c) ratio: A v/c ratio is a decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used at a turn movement, approach leg, or intersection. The ratio is the peak hour traffic volume divided by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. A ratio approaching 1.00 indicates increased congestion and reduced performance.
- Level of service (LOS): LOS is a “report card” rating (A through F) based on the average delay experienced by vehicles at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay is excessive, and demand exceeds capacity, typically resulting in long queues and delays.

Mobility targets are adopted by the City of Pasco in their comprehensive plan. The City of Pasco currently uses a Level of Service (LOS) standard which is based on a Highway Capacity Manual calculation of delay that varies between signalized and unsignalized intersections. The current mobility targets, which apply to the daily peak hour, are summarized below in Table 13. The City requires a lower level of service for arterial and collector roadways where higher traffic leads to higher delays. The arterial and collector standards are consistent with the mobility targets applied by BFCG and WSDOT.

TABLE 13: EXISTING MOBILITY TARGETS

FUNCTIONAL CLASSIFIATION	EXISTING MOBILITY TARGET
LOCAL STREETS	LOS C
ARTERIALS AND COLLECTORS	LOS D
WSDOT FACILITIES	LOS D

The City of Pasco should consider expanding their current mobility targets to include a volume-to-capacity (v/c) standard. Having both a LOS (delay-based) and v/c (congestion-based) standard can be helpful in situations where one metric may not be enough, such as an all-way stop where one approach is over capacity but overall intersection delay meets standards. The City of Pasco should also introduce mobility targets which depend on the intersection control which can better capture acceptable levels of performance across different intersection control types. Table 14, below, summarizes recommended changes to Pasco's mobility targets.

TABLE 14: RECOMMENDED MOBILITY TARGETS

INTERSECTION TYPE	PROPOSED MOBILITY TARGET	REPORTING MEASURE
SIGNALIZED	LOS D and v/c ≤0.90	Intersection
ALL-WAY STOP OR ROUNDABOUTS	LOS D and v/c ≤0.90	Worst Approach
TWO-WAY STOP [1]	LOS E and v/c ≤0.95	Worst Major Approach/Worst Minor Approach
WSDOT INTERSECTIONS	LOS D	Intersection or Worst Approach depending on control type

1. Applies to approaches that serve more than 20 vehicles; there is no standard for approaches serving lower volumes

DEMAND MANAGEMENT POLICIES

Pasco experiences peak congestion due to single-occupant trips during peak demand times. Transportation Demand Management (TDM) aims to remove single occupant motor vehicle trips from the roadway network during peak travel demand periods which could provide one avenue for reducing pressure on key facilities. Changing a users' travel behavior and providing alternative choices will help accommodate the expected growth in travel demand identified for Pasco.

Generally, TDM focuses on reducing vehicle miles traveled for large employers by promoting active and shared modes of travel. Research has shown that a comprehensive set of complementary policies implemented over a large geographic area can affect the number of vehicle miles traveled to/from that area. In order for TDM measures to be effective, strategies should go beyond the low-cost, uncontroversial measures commonly used such as carpooling, transportation coordinators/associations, priority parking spaces, etc.

Effective TDM measures include parking strategies (limiting or increasing supply in strategic locations), improved services for alternative modes of travel, and market-based incentives to encourage travel behavior changes. However, TDM includes a wide variety of actions that are specifically tailored to the individual needs of an area. Effective TDM strategies include:

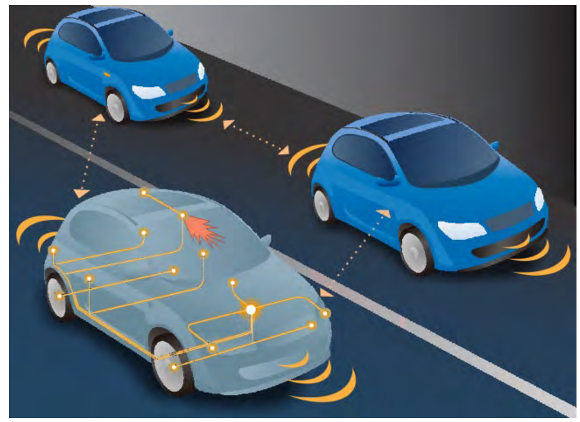
- Supporting alternative vehicle types by identifying potential electric vehicle plug-in stations and developing implementing code provisions.
- Encouraging/supporting rideshare/vanpool to major employers in Benton or Franklin County and Kennewick or Richland (e.g. Hanford Nuclear Site) for employees living in Pasco.
- Establishing site development standards that require pedestrian and bicycle access through sites and connections to adjacent sites and transportation facilities, to the extent the development impacts existing access.
- Improving amenities and access for transit stops. Actions could include instituting site design requirements allowing redevelopment of parking areas for transit amenities; requiring safe and direct pedestrian connections to transit and permitting transit-supportive uses outright in commercial and institutional zones.
- Improving street connectivity to support direct connections between residential areas and activity centers.
- Investing in pedestrian/bicycle facilities.

Opportunities to expand transportation demand management and other measures in Pasco include developing implementing requirements for long-term bicycle parking for places of employment above a certain size, park and ride facilities, major transit stops, and multi-family residential developments. Other land uses, especially activity generators, should be required to provide short-term bike parking and are encouraged to implement the long-term options. Long-term bicycle parking options include:

- Individual lockers for one or two bicycles
- Racks in an enclosed, lockable room
- Racks in an area that is monitored by security cameras or guards (within 100 feet)
- Racks or lockers in an area always visible to employees

ELECTRIC AND AUTONOMOUS VEHICLES

Emerging transportation technologies will shape roads, communities, and daily lives for generations. Vehicles are becoming more connected, automated, shared, and electric. While the timing of when these advances will occur is uncertain, they will have significant impacts on how a community plans, designs, builds, and uses the transportation system. Below are some important emerging transportation technology terms and definitions that provide the basis for the impacts, policies and action items discussed in the following sections.



Connected vehicles (CVs) will enable communications between vehicles, infrastructure, and other road users. This means that vehicles will be able to assist human drivers and prevent crashes while making the system operate more smoothly.

Automated vehicles (AVs) will, to varying degrees, take over driving functions and allow travelers to focus their attention on other matters. Vehicles with combined automated functions like lane keeping and adaptive cruise control exist today. In the future, more sophisticated sensing and programming technology will allow vehicles to operate with little to no operator oversight.

Shared vehicles (SVs) allow ride-hailing companies to offer customers access to vehicles through cell phone applications. Ride-hailing applications give on-demand transportation with comparable convenience to car ownership without the hassle of maintenance and parking. Examples of shared vehicles include companies like Uber and Lyft.

Electric Vehicles (EVs) have been on the road for decades and are becoming more economically feasible as the production costs of batteries decline and vehicle fuel prices increase.

Many of these technologies will not be exclusive of the others and it is important to think of the host of implications that arise from the combination of them. These vehicles are referred to as connected, automated, shared, and electric (CASE) vehicles.

IMPACTS OF CASE VEHICLES

CONGESTION AND ROAD CAPACITY

There are several competing forces that will unfold as connected, automated, and shared vehicles are deployed. It is difficult to predict how these vehicles will influence congestion and road capacity.

- AVs will provide a more relaxing or productive ride experience and people may have less resistance to longer commutes.
- Shared AVs are projected to have lower fuel and operating costs, making them less

expensive on a per mile basis than private vehicle ownership. This may increase demand for auto-based travel in the future.

- CV technology will allow vehicles to operate safely with closer following distance, less unnecessary braking, and better coordinated traffic control. This will increase road capacity in the long run when CVs and AVs comprise most of the public and private fleet of vehicles.
- In the near term, since AVs make up a fraction of the fleet of vehicles, road capacity could decrease as AVs will operate more slowly and cautiously than regular vehicles.
- A new class of traffic – zero-occupant vehicles – will increase traffic congestion. These could include AVs making deliveries or shared AVs circulating around the city and traveling to their next rider.
- Roadways may need to be redesigned or better maintained to accommodate the needs of automated driving systems. For instance, striping may need to be wider and more consistently maintained to ensure the vehicle's sensors can recognize it.

These points raise questions about the degree to which CASE vehicles will impact road capacity and congestion. The development and use of the technologies should be monitored closely.

TRANSIT

AVs could become cost competitive with transit and reduce transit ridership as riders prefer a more convenient alternative. However, transit will remain the most efficient way to move high volumes of people through constricted urban environments. AVs will not eliminate congestion and as discussed above, could exacerbate it – especially in the early phases of AV adoption. In addition, shared AVs may not serve all sectors of a community so many will still require access to transit to meet their daily needs.

PARKING

Because AVs will be able to park themselves, travelers will elect to get dropped off at their destination while their vehicle finds parking or its next passenger. Shared AVs will have an even greater impact on parking because parking next to the destination will no longer be a priority for the traveling public. This means that parking may be over-supplied in some areas and new opportunities to reconfigure land use will emerge. Outstanding questions related to parking include:

- How does vehicle ownership impact parking behavior?
- What portion of the AV fleet will be shared?
- How far out of the downtown area will AVs be able to park while remaining convenient and readily available?

CURB SPACE

In addition to parking impacts, the ability to be dropped off at the destination will create more potential for conflicts in the right-of-way between vehicles that are dropping passengers off or picking them up, vehicles moving through traffic, and vehicles parked on the street. This issue is already occurring in many urban areas with ride-hailing companies, where popular destinations are experiencing significant double-parking issues.

AVs will also be used to deliver packages and food. This may mean that delivery vehicles need to be accommodated in new portions of the right-of-way. For instance, if the AV parks at the curb in a neighborhood and smaller robots are used to deliver packages from door to door, new conflicts will arise between vehicles, pedestrians, robots, and bicyclists.

ELECTRIC VEHICLE CHARGING

To accommodate a future where electric vehicles are the majority of the vehicle fleet, additional charging infrastructure will be required. Cities, electric utilities, regions, and states will need to work together to create enough reliable electricity supply to fulfill the increased electrical demand.

TRAFFIC IMPACT ANALYSIS (TIA) GUIDELINES

The City of Pasco's existing TIA guidelines were reviewed to identify areas of improvement to ensure a consistent development review process that accurately anticipates traffic impacts due to ongoing development. Currently, Pasco requires a TIA to be completed if 100 or more weekday peak hour trips are generated by the development, or due to existing traffic/roadway conditions, existing and anticipated traffic volumes, trip distribution, accident history, property zoning, truck traffic percentage, event-based traffic, expressed community concern, and other factors relating to complexity, and location of proposed development.

Their current guidelines also allow for two tiers of TIAs to be completed depending on the anticipated level of development. A Tier 1 TIA can be completed when fewer than 50 PM peak hour net new trips will be generated by the development depending on the context of the development location. Tier 1 TIAs document the anticipated trip generation and detail the proposed site plans for the development at a minimum. Tier 2 TIAs are required when a development is expected to generate 50 or more net new trips during the PM peak hour. These documents include all details required for a Tier 1 TIA plus a full traffic study to document traffic conditions with the new development. The existing TIA guidelines do not provide specific details on methodologies that must be used to evaluate transportation impacts (*e.g.* appropriate background growth rate, appropriate trip generation resources).

Recommended modifications to the TIA guidelines are summarized in the supplemental document "Pasco Guidelines for Transportation Impact Analysis," provided in the appendix. These guidelines incorporate most material previously included in Pasco's TIA guidelines, but include additional details on best practice for conducting TIAs. Clearly specifying these methods in the TIA guidelines will increase the uniformity of TIAs received by the City of Pasco and ensure consistent development review standards are applied. Key changes include:

- Reducing the trips generated threshold to trigger a Tier 2 TIA from 50 to 25 for either the AM or PM peak hours
- Adding a daily trip generation threshold to trigger a Tier 2 TIA of 300 trips
- Specifying that all TIAs must be prepared by a licensed professional engineer or under the direct supervision of a licensed professional engineer registered in the State of Washington
- Providing recommendations for standard analysis methodologies (*e.g.* standard background growth rate)
- Adding additional guidelines for appropriate content to be documented in each TIA

The following section presents the TIA guidelines for the City of Pasco.

CITY OF PASCO

GUIDELINES FOR TRANSPORTATION IMPACT ANALYSIS

February 2021

This document describes the city's required content for a Transportation Impact Analysis (TIA). In general terms, TIA applies to developments that are presumed to have a transportation impact. A traffic study shall, at a minimum, be a thorough review of the intermediate and long-range effects of the proposed development on the City's transportation system and may result in mitigation of those resulting impacts. This is not to be confused with a Traffic Impact Fee.

A professional engineer must prepare the TIA and must use appropriate data, methods, and standards as documented in the Pasco Guidelines for Transportation Impact Analysis.

PURPOSE

The purpose of this section is to implement a process to apply conditions to land use proposals in order to minimize impacts on and protect transportation facilities.

In order to obtain sufficient and consistent information to assess a development's impact on the transportation system a TIA will be performed by the City of Pasco, and/or its agents, at the Developers expense. The City of Pasco requires two tiers (Tier 1 and Tier 2) of TIAs depending on the expected level of development. In order to perform an adequate TIA the following options are available to the developer, Once a direction is chosen by the developer and/or his/her representative. it cannot be changed. This is out of consideration for responsibilities and final cost for the developer:

- **The City and/or its agents perform the TIA, at the Developers expense, selecting the most efficient and cost-effective means and provide the analysis to the developer without further consideration.**
- **The Developer can perform the TIA utilizing their own licensed Traffic Engineer at the developer's expense and the City will perform a review, at the Developers sole expense, with any and all clarifications or modifications to the TIA resulting from the review being the Developers sole financial responsibility.**

The preparation of the TIA report is the responsibility of the landowner or applicant. Pasco assumes no liability for any costs or time delays (either direct or inconsequential) associated with the TIA report preparation and review. The applicant can choose any qualified professional engineer. All TIA reports shall be reviewed by the city Public Works Department and the Department of Community & Economic Development (referred to as "city" in this document). Studies that do not address these guidelines adequately shall be returned to the applicant for modification. It is the responsibility of the applicant to coordinate with local agencies and/or the Washington State Department of Transportation (WSDOT) for any potential impacts to county roadways or state highways.

WHEN IS A TIER 1 ANALYSIS REQUIRED?

A Tier 1 TIA may be required to be submitted to the city with a land use application at the request of the city or if the proposal is expected to involve one (1) or more of the following:

1. Changes in land use designation, or zoning designation that will generate more vehicle trip ends.
2. Projected increase in trip generation of less than 25 trips during both the AM or PM peak hour, or less than 300 daily trips.
3. No additional Tier 2 requirements are met.

WHEN IS A TIER 2 ANALYSIS REQUIRED?

A Tier 2 TIA may be required to be submitted to the city with a land use application at the request of the city or if the proposal is expected to involve one (1) or more of the following:

1. Changes in land use designation, or zoning designation that will generate more vehicle trip ends.
2. Projected increase in trip generation of 25 or more trips during either the AM or PM peak hour, or more than 300 daily trips.
3. Potential impacts to intersection operations.
4. Potential impacts to residential areas or local roadways, including any non-residential development that will generate traffic through a residential zone.
5. Potential impacts to pedestrian and bicycle routes, including, but not limited to school routes and multimodal roadway improvements identified in the Transportation System Master Plan (TSMP).
6. The location of an existing or proposed access driveway does not meet minimum spacing or sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles are likely to queue or hesitate at an approach or access connection, thereby creating a safety hazard.
7. A change in internal traffic patterns may cause safety concerns.
8. Projected increase of five trips by vehicles exceeding 26,000-pound gross vehicle weight (13 tons) per day, or an increase in use of adjacent roadways by vehicles exceeding 26,000-pound gross vehicle weight (13 tons) by 10 percent.
9. Potential event-based traffic that could impact adjacent intersections.
10. Expressed community concern.
11. Other factors as deemed appropriate by the Public Works Department or the Department of Community & Economic Development.

PROCESS

A landowner or developer seeking to develop/redevelop property shall contact the city at the project's outset. The city will review existing transportation data to establish whether a Tier 1 or Tier 2 TIA is required. It is the responsibility of the applicant to provide enough detailed information for the city to make a determination. An applicant should have the following prepared, preferably in writing:

- **Type of uses within the development**
- **The size of the development**
- **The location of the development**
- **Proposed new accesses or roadways**
- **Estimated trip generation and source of data**
- **Proposed study area**

If the city cannot properly evaluate a proposed development's impacts without a more detailed study, a Tier 2 TIA will be required. Within a reasonable time following the initial contact, the city will establish whether a TIA is required. If the developer chooses to use the city to complete the TIA, the city will provide a project specific scope with an estimated cost to the applicant that includes all of the requirements in this guideline document. If the developer chooses to use its own traffic engineer, it must submit a project specific scope to the city that includes all of the requirements in this guideline document for review and approval before starting the TIA.

TIER 1 REQUIREMENTS

The following sections detail the TIA requirements.

TIA REQUIREMENTS

The following requirements shall be included in each Tier 1 TIA submitted to the city. Additional information specified by the city through scoping or through other project meetings shall also be included.

1. The TIA shall be prepared by or prepared under the direct supervision of a Registered Professional Engineer who shall sign and stamp the TIA.
2. Study Area: An inventory of the existing transportation facilities (pedestrian, bicycle, transit, and vehicle) for all roadways fronting the proposed development will be included. The surrounding land use context and allowable zoning must also be reviewed.
3. Trip Generation: The proposed trip generation should be based on similar land uses reported in the latest version of the ITE Trip Generation Manual and shall include calculations for removed trips, pass-by trips, internal trip capture, and diverted trips, if applicable.
4. Trip Distribution and Assignment: Estimated site generated traffic for the proposed project should be distributed and assigned to intersections of existing or proposed arterial and collector roadways within three miles of the site. A summary by intersection movement should be provided in tabular format, at a minimum. Trip distribution methods should be based on a reasonable assumption of local travel patterns and the locations of off-site origin/destination points within the site vicinity. An analysis of local traffic patterns and intersection turning movement counts can be used as long as the data has been gathered

within the previous 12 months and reflect typical traffic volumes. Counts collected during periods with significant and/or extended traffic disruptions (i.e., COVID-19 pandemic, natural disasters, or other special events as determined by city staff) cannot be applied without adjustments to account for the impact on traffic volumes with approval by city staff.

5. Site plan review: A site plan for the proposed development shall be submitted detailing proposed access locations and documentation that they meet spacing and sight distance requirements; site circulation for bicycles, pedestrians, and vehicles; and the proposed parking.

TIER 2 REQUIREMENTS

The following sections detail the TIA requirements.

TIA REQUIREMENTS

The following requirements shall be included in each Tier 2 TIA submitted to the city. Additional information specified by the city through scoping or through other project meetings shall also be included. All additional Tier 1 criteria not specified must be satisfied.

1. The TIA shall be prepared by or prepared under the direct supervision of a Registered Professional Engineer who shall sign and stamp the TIA.
2. Study Area: The TIA should include all roadways adjacent to and through the site (e.g., all roadways used to access the site), and any roadway with a functional classification of collector and above within a quarter-mile of the site. Study intersections will generally include site-access points, and intersections of two roadways with a functional classification of collector and above (i.e., Principal Arterial, Minor Arterial, Collector, or Neighborhood Collector) within three-miles of the site with an expected increase of 20 peak hour trips generated from the proposed project. The intersection closest to the site of any roadway with a functional classification of collector and above with a Principal Arterial should also be included (if not already required), regardless of the distance or generated trip thresholds identified above. An inventory of the existing transportation facilities (pedestrian, bicycle, transit, and vehicle) for all study roadways will be included. The surrounding land use context and allowable zoning will also be reviewed.
3. The TIA should include the following horizon years:
   - **Existing Conditions**
   - **No Build Conditions. The conditions in the year in which the proposed project will be completed and occupied, but without the expected traffic from the proposed project. This shall include trips generated at study intersections from approved, but not fully occupied developments at the time traffic count data was collected.**
   - **Build Conditions. The no build condition, plus traffic from the proposed project**

assuming full build-out and occupancy. This shall also include phased years of completion resulting from the development, if applicable.

- **Mitigation Conditions (if necessary). The build conditions plus off-site (e.g. proportionate share of infrastructure improvements) and on-site (e.g. traffic management plan, parking management plan) improvements that mitigate undesirable impacts from the development.**

4. Analysis Periods: The TIA should analyze the weekday (Tuesday through Thursday) AM and/or PM peak periods in which the proposed project is expected to generate 25 or more trips. Additional periods may be required depending upon the proposed project and/or surrounding land uses. Turning movement counts during the weekday AM peak period should typically be between 7:00 AM and 9:00 AM, and 4:00 PM and 6:00 pm during the weekday PM peak period. Historical turning movement counts may be used if the data is not more than 12 months old. Historical counts shall be factored accordingly to meet the existing traffic conditions.
5. Trip Generation: The proposed trip generation should be based on similar land uses reported in the latest version of the ITE Trip Generation Manual and shall include calculations for removed trips, pass-by trips, internal trip capture, and diverted trips, if applicable.
6. Trip Distribution and Assignment: Estimated site generated traffic for the proposed project should be distributed and assigned to intersections of existing or proposed arterial and collector roadways within three miles of the site. Trip distribution methods should be based on a reasonable assumption of local travel patterns and the locations of off-site origin/destination points within the site vicinity. An analysis of local traffic patterns and intersection turning movement counts can be used as long as the data has been gathered within the previous 12 months.
7. Background Traffic Growth Rate: A 1 percent compound annual growth rate shall be applied to all movements at study intersections to develop background traffic growth for the horizon years. An applicant may propose an alternative background growth rate with appropriate documentation and references.
8. In-Process Developments: The TIA should add the trips generated at study intersections from approved, but not fully occupied developments at the time traffic count data was collected, to the future horizon years. The applicant should request the approved developments and their occupancy status from the city. Should the TIA not be submitted to the city within 12 months of the scoping summary, additional approved developments could be required. If multiple development applications are received by the city, but not yet approved, for projects in the same area, the city may require a sensitivity test for each subsequent applicant to ensure the adequacy of proposed improvements in the event all developments are approved. The need for any sensitivity tests will be determined based on the order of applications received and specified in the study scope.

9. Safety Analysis: crash patterns for the past five years will be reviewed for all study roadways. Crash trends and any specific recommendations to improve existing safety deficiencies will also be discussed.

TIA CONTENT

The following content should typically be included in each Tier 2 TIA submitted to the city. Additional information specified by the city in the scoping summary or through other project meetings shall also be included.

Section 1: Introduction

- **Proposed project summary, including site location, zoning, project size, and project scope. This should include a figure showing the project site and vicinity map, including any roadway with a functional classification of collector and above within a quarter-mile of the site and all study intersections.**

Section 2: Existing Conditions

- **Study area description, including a figure showing the project site, key roadways, and study intersections.**
- **Existing site conditions, current zoning, and adjacent land uses.**
- **Roadway characteristics of important transportation facilities and modal opportunities located within the study area, including roadway functional classifications, roadway cross-section, roadway condition, posted speeds, bicycle and pedestrian facilities, and transit facilities.**
- **Existing lane configurations and traffic control devices at the study area intersections.**
- **Existing traffic volumes and operational analysis of the study area roadways and intersections. This should include a figure of existing peak hour turn movement volumes.**
- **Roadway and intersection crash history analysis (most recent five years). This should include a discussion on crash trends, if any, and recommendations for safety improvements, if any.**

Section 3: Assumptions and Methodologies

- **Project description, including site location, zoning, project size, and project scope, and map showing the proposed site, building footprint, access driveways, active transportation connections, parking, and transit facilities.**
- **Transportation standards (e.g., roadway and access spacing standards, level-of-service standards). These can be found in the Pasco Transportation System Master Plan.**
- **Site access for vehicles, pedestrians, bicyclists, and transit riders, including access spacing and site distance review at site driveways, and summary of roadway grades and other vertical or horizontal obstructions.**
- **Site frontage improvements, including provisions for pedestrians and bicyclists.**

- **Trip generation summary. This section should also include a summary of the expected vehicles exceeding 26,000-pound gross vehicle weight (13 tons) that the proposed project will generate.**
- **Trip distribution and assignment assumptions, including a figure showing the trip distribution percentages. A summary of the distributed trips at intersections of existing or proposed arterial and collector roadways within three miles of the site should be provided in tabular format by intersection movement.**
- **Background traffic growth.**
- **In-process developments, if applicable.**
- **Funded transportation improvements in the study area, if applicable, including improvements found in the Pasco Transportation System Plan and the Ben Franklin Transit Development Plan.**
- **Future analysis years and scenarios (No Build Conditions, Build Conditions, Mitigation Conditions, and Phased Years of Completion, if necessary).**
- **Future traffic volumes. This should include a figure showing the future traffic volumes broken down by existing traffic volumes, background traffic growth, in-process trip growth (if applicable), project traffic growth, and total traffic volumes.**

Section 4: Future Conditions

- **Background traffic volumes and operational analysis.**
- **Full buildout traffic volumes and intersection operational analysis. This should also include a summary of roadway segment conditions with full buildout traffic volumes (e.g., roadway volumes, roadway condition and width).**
- **Signal and turn lane warrant analysis at site access points, if applicable.**
- **Intersection and site-access driveway queuing analysis.**
- **Site access considerations for pedestrians, bicyclists, and transit riders**
- **Impacts of non-residential traffic through a residential zone.**
- **Impacts from vehicles exceeding 26,000-pound gross vehicle weight (13 tons), including turning movements.**
- **Site circulation and parking.**

Section 5: Recommendations

- **Motor vehicle improvements, including proposed cross-section for site frontage improvements and intersection improvements (if necessary).**
- **Site access recommendations for all transportation modes, including summary of needed**

deviations to the code, cross-over easements and driveway consolidation, and proposed driveways widths.

- **Pedestrian, bicycle, and transit improvements, including provisions for pedestrians and bicyclists along the site frontage, and internally to the site. Recommendations must also consider future transit routes or stops and access to these facilities from the site.**

Appendix

- **Traffic count data.**
- **Crash analysis data.**
- **Traffic operational analysis worksheets, with detail to review capacity calculations.**
- **Signal, left-turn, and right-turn lane warrant evaluation calculations.**
- **Other analysis summary sheets, such as queuing.**