

CITY OF BUCKLEY

PIERCE COUNTY

WASHINGTON



COMPREHENSIVE PLAN TRANSPORTATION ELEMENT UPDATE

G&O #13473
DECEMBER 2016



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Gray & Osborne, Inc.
CONSULTING ENGINEERS

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OVERVIEW

This Comprehensive Plan Transportation Element establishes goals, policies, and implementation strategies to guide future decisions affecting the City of Buckley's transportation systems including pedestrian, bicycle, transit and vehicular facilities. This element is intended to reinforce Buckley's overall vision of being a safe and friendly historic small town that is an attractive place to live, work, and play.

Along with other elements in the Comprehensive Plan Transportation Element works to preserve Buckley's small town character, efficient provision of services, support diverse housing opportunities, protect the natural environment, foster a strong economic base, ensure safe access to goods and services and develop high quality public spaces that foster community interaction.

The focus of the transportation element is on ensuring safe and convenient access to goods and services through an efficient and environmentally sensitive multimodal transportation system. Pedestrian, bicycle, transit and vehicular facilities are all considered when answering the following questions:

- What are the strengths and weaknesses of Buckley's current transportation system?
- What is Buckley's projected transportation needs in the future?
- What is Buckley's overall strategy for meeting its future transportation needs?
- What are Buckley's goals, policies for improving its transportation system?
- What specific actions can Buckley begin to take to implement its vision?

PLANNING PROCESS

This Transportation Element update was prepared in the following series of steps:

- Historical information was collected including Pierce County Transportation Plans, traffic counts, and street inventory information.
- New traffic counts were taken in April 2013 and intersection approach volumes were determined.

- Both population growth rates and traffic count trends were collected from the Puget Sound Regional Council. Both were reviewed and a 3 percent per year growth rate was selected.
- Vehicle Levels of service (LOS) for 2013 and 2030 were calculated and analyzed using traffic model HCM2010 methods combined with Synchro, and HCS2010 models for high volume intersections.
- Pedestrian LOS was calculated for 2013 and 2030 using a rating equation that incorporates vehicle volumes, pedestrian use and type, vehicle speeds, shoulder widths, and roadway widths.
- Improvements were developed and tested to ascertain a minimum LOS of “D” in 2013. Cost estimates of the selected improvements were then prepared.
- Fair share mitigation fees were developed for each project using 2013 weekday total volumes.

EXISTING INFORMATION

Buckley’s historic neighborhoods are laid out in a traditional street grid pattern on approximately 320 feet by 550 feet street-blocks with alleys running down their middle. This street pattern provides strong pedestrian and vehicular connectivity within the community facilitating convenient access to goods and services. The alleys also enhance street aesthetics by providing alternative corridors for garbage pickup and utilities.

Some of Buckley’s more recent subdivisions are laid out in a loop and lollipop street pattern. This pattern discourages through traffic and increases out of direction travel. It consequently does not provide strong pedestrian or vehicular connectivity resulting in long circuitous routes to cover otherwise short distances. This street pattern developed after the advent of the automobile when accessibility by foot was thought to be no longer crucial. However, as a result of this pattern people’s transportation choices become severely limited. Children and the elderly were especially affected by the lack of safe and convenient pedestrian and bicycle access to activities, goods and services. It was also less recognized how automobile dependence could affect our health. Our country’s obesity epidemic not to mention environmental and safety concerns over the burning of fossil fuels have all been tied to our nation’s heavy reliance upon the automobile.

With the growing awareness of the adverse health, environmental and social impacts of automobile dependence, communities around the country are working to create more walk able and pedestrian friendly neighborhoods to loosen dependence upon the automobile by increasing transportation choices. As residential development continues to occur within Buckley, street patterns will continue to have strong effects upon accessibility and neighborhood character. Finding ways to ensure safe and convenient

multi-modal access and preserve Buckley's small town character is the primary goal of this Transportation Element.

PEDESTRIAN FACILITIES

Pedestrian facilities include sidewalks, crosswalks and trails throughout the City along with pedestrian amenities such as benches, and lighting within Buckley's historic area. All are intended to provide safe and convenient access to goods and services by foot.

Currently, the sidewalk system in Buckley is discontinuous with many sidewalks existing in the older and more developed neighborhoods and fewer in the less populated areas. Planting strips run along many sidewalks, but not all and they vary in width. Crosswalks are marked in the historic district but intersections in other areas are not as well distinguished. Approximately 2 miles of the Foothills Trail runs through the middle of the City providing pedestrian and bicycle access to goods and services along the east side of SR 410 as well as providing opportunities for recreational walking and biking.

The LOS scale, reflects the level of comfort experienced by a pedestrian on a roadway, can be seen in Table 1 below. Three roadways currently do not meet Buckley's LOS D standard. Additional information regarding their deficiencies and suggestions for improvements can be found in the sections on projects.

TABLE 1

Pedestrian Level of Comfort Gradations

Level of Service	Pedestrian Rating
A	<40
B	40 – 50
C	50 – 70
D	70 – 90
E	90 – 110
F	>110

BICYCLE FACILITIES

Bicycle facilities consist of designated bicycle routes, marked bicycle lanes, trails and bicycle parking facilities. Currently Buckley does not have any designated bicycle routes, bicycle lanes, or bicycle parking facilities however, the street system is used by bicyclists of all ages for various types of trips including commuting to work and school, shopping, visiting friends and recreation. Low levels of automobile traffic make bicycle travel along most of Buckley's streets relatively safe. Certain streets, however, are too dangerous for bicycle travel and require significant improvements to make services along them accessible.

Buckley is especially fortunate to have the Foothills Trail running through the middle of town. The Foothills Trail is a 12-foot-wide non-motorized asphalt trail suitable for bicycles, walking, inline skates and wheel chairs. It also has a soft shoulder path for horses. When completed, the trail will extend through both Pierce and King Counties.

PUBLIC TRANSPORTATION FACILITIES

Public Transportation is not provided in the form of bus service in Buckley. Pierce Transit has had to cut service due to the recent economic recession. Mass transit opportunities still exist in the form of vanpool and other car sharing plans; however, there is no formal park and ride facility within the City.

FREIGHT FACILITIES

The Washington State department of Transportation has designated certain roads as crucial to freight mobility, which is known as the Freight and Goods Transportation System (FGTS). The FGTS classifies roadways using five truck gross tonnage classifications, T-1 through T-5, as follows:

- T-1: More than 10 million tons per year.
- T-2: 4 million to 10 million tons per year.
- T-3: 300,000 to 4 million tons per year.
- T-4: 100,000 to 300,000 tons per year.
- T-5: At least 20,000 tons in 60 days and less than 100,000 tons per year.

The City of Buckley has four freight corridors with this designation:

- State Route 410 (T-2)
- State Route 165 (T-3)
- 112th Street SE (T-3)
- Buckley-Sumner Highway/Mason Avenue (T-3)

MOTORIZED VEHICULAR FACILITIES

Vehicular facilities include the City's streets and their intersections. The City of Buckley's streets are classified in accordance with the National Functional Arterial Classification system into Principal Arterials, Minor Arterials, Collector Streets and Local Access Streets. Definitions of each can be found below:

Urban Principal Arterial System

The principal arterial connect cities that are spaced considerably far from each other with a minimum of access to ensure a good level of service. The primary purpose of this roadway is to serve the traveling public, and not accessing adjacent land.

Urban Minor Arterial Street System

The minor arterial street system should interconnect with and augment the urban principal arterial system and provide service to trips of moderate length at a somewhat lower level of travel mobility than principal arterials. The minor arterial also provides access to industrial, commercial, and large residential developments, however, will not travel into these developments.

Urban Collector Street System

The collector street system provides both land access service and traffic circulation within residential neighborhoods, commercial and industrial areas. It differs from the arterial system in that facilities on the collector system may be inclusive in residential neighborhoods, distributing trips from the arterials through the area to the ultimate destination.

Urban Local Street System

The local street system comprises all facilities not on one of the higher systems. It serves primarily to provide direct access to abutting land and access to the higher order systems. It offers the lowest level of mobility and usually contains no bus routes. Service to through traffic movement usually is deliberately discouraged.

Currently Buckley has:

- 2.93 miles of principal arterials;
- 7.66 miles of minor arterials;
- 1.00 mile of collector streets;
- 20.63 miles of local access streets; and
- 4.31 miles of alleyways within the City limits. An additional 2.13 miles of Local Access Streets exist within the Rainier School property.

VEHICLE LEVEL OF SERVICE (LOS) STANDARDS

To evaluate how well a transportation system functions, transportation engineers use what is referred to as Levels of Service (LOS). LOS is a concept developed to quantify the degree of comfort including such elements such as travel time, number of stops, amount of delay, and impediments caused by other vehicles. Six grades are used to denote the various LOS. These six grades are described qualitatively for signalized intersections in Table 2. Level of Service A denotes the best level of operation and grade F denotes the worst level of operation.

Levels range from A to F with A taking the shortest time and F taking the longest time. Cities decide upon the minimum levels of service (LOS) acceptable for each

transportation facility in their jurisdiction. These LOS are then adopted as standards to evaluate whether improvements are required.

The LOS for intersections is determined by measuring the time it takes a vehicle to pass through an intersection. The following table shows the intersection LOS ratings grades (A – F) along with their ranges of time.

TABLE 2

Highway Capacity Manual 2010 Intersection Level of Service and Delay

Level of Service	Signalized (Seconds)	All-Way Stop Control and Two-Way Stop Control (Seconds)
LOS A	<10	<10
LOS B	10 – 20	10 – 15
LOS C	20 – 35	15 – 25
LOS D	35 – 55	25 – 35
LOS E	55 – 80	35 – 50
LOS F	>80	>50

The City of Buckley utilizes the city standard traffic LOS D.

CONCURRENCY

Once a city has adopted LOS standards it is then required to ensure that it can maintain those standards over the planning period. New development which may negatively affect LOS is required to make improvements to the facilities to mitigate any adverse effects. This requirement is referred to as the concurrency requirement which is specified in RCW 36.70A.070(6). The statute provides “concurrent with development...shall mean that improvements or strategies are in place at the time of development, or that a financial commitment is in place to complete the improvements within 6 years.” WAC 365-195-210 also specifies that public transportation facilities are to be in place to meet adopted level of service standards within 6 years from the time of development.

State Route 410 and State Route 165 travel through the City of Buckley. The right-of-way for these routes is owned by the City, however, the facilities located between curb to curb is maintained by the state. The State has set a level of service standard for these routes, and identified SR 410 as a Tier 2, and will need a LOS D, while SR 165 is a Tier 3 and require a LOS C.

TRANSPORTATION STRATEGY

Buckley's strategy for maintaining and improving its transportation system is to ensure cost effective transportation projects are developed that meet the goals of the Transportation Element. Prioritization of projects is as follows:

1. Maintain the existing transportation network.
2. Improve safety of transportation system.
3. Improve system continuity by constructing missing sidewalk, bicycle route and street links.
4. Upgrade existing infrastructure to adopted LOS standards.
5. Extend infrastructure to accommodate new growth.

FUTURE TRANSPORTATION SAFETY STRATEGY

1. Record and analyze collision reports to identify traffic hazard patterns that can be corrected.
2. Conduct traffic counts to determine collision rates, capacity needs, and use in designing improvements.

FUTURE TRANSPORTATION CONVENIENCE STRATEGY

1. Monitor traffic volumes and LOS to identify capacity deficiencies.
2. Coordinate with Pierce Transit to reinstate public transportation services with Buckley.
3. Coordinate with WSDOT on plans for improving the SR 410 corridor.

MITIGATION FEES

Cost estimates are made for improvements and are used to calculate fair share mitigation fees for new development.

Both vehicular and pedestrian improvements and mitigation fees are identified.

Mitigation improvements and fair share fees identified in this study are intended to be used with grants and other funding sources for the projects. Mitigation fees provide fair share funding identified as development's portion of improvement costs.

Pedestrian traffic varies with weather and season and the Pedestrian LOS recognizes this and is based on daily traffic volumes.

Both the vehicle and pedestrian fair share mitigation fees are determined using 2013 weekday volumes because the improvements provide 24 hour a day capacity.

CITY OPERATING COST

The City sets aside an annual budget for the operation and maintenance of the transportation system through a Transportation Benefit District, which was established by Ordinance No. 13-12 in November of 2012. The Transportation Benefit District Funds:

- City of Buckley Street Fund 101 (operation and maintenance).
- Pavement Preservation and Overlay Program.
- Transportation Projects, described in detail within the (2014 – 2019) 6-Year Transportation Improvement Program.

TRANSPORTATION GOALS AND POLICIES

Goals and policies are intended to provide the City of Buckley with a vision and outline for both preserving and improving its transportation facilities. They will also help guide the State's transportation activities (i.e., plans, improvements, and expenditures) within the City. While general in nature, they are sufficiently specific to assist in prioritizing individual transportation projects. During a time when transportation budgets are stretched, these guidelines will be very helpful in selecting what can best be achieved through the City of Buckley's transportation vision.

During development of the goals and policies, City staff identified several overriding guidelines that have helped structure this effort. These comprehensive guidelines are reflected in the City-wide goals, with one of the most important being the fiscal and efficiency concerns of the transportation plan. The Goals, Policies and Projects must recognize the cost-effectiveness and prudence of preserving and improving existing facilities versus the costs and environmental concerns of building new transportation projects.

What follows is the identification and discussion of goals and policies developed by City staff and the Consultant, with additional input from the City Planning Commission and City Council.

The relationship between goals and policies is defined as follows:

- Goals are broad statements which describe what the City aspires to provide for residents, as well as what they hope to achieve.

- Policies are more specific statements that outline methods of accomplishing goals.
- Projects are specific actions or standards designed to implement Policies.

SAFETY

Goal 5.1 Ensure all transportation modes are designed for safety.

- Policy 5.1.1 All transportation modes throughout the City should provide safe access to goods and services.
- Policy 5.1.2 Right-of-way improvements shall be done to the latest accepted design standards. If the design standards cannot be met, a deviation shall be prepared by the designer and shall be reviewed for possible approval by the City Engineer.
- Policy 5.1.3 Provide needed roadway striping and signing to maintain safe traffic operation service levels that are consistent with the most recent Manual of Uniform Traffic Control Devices (MUTCD).
- Policy 5.1.4 The City should ensure adequate visibility for automobiles by enforcing landscape and fence height standards.
- Policy 5.1.5 A code enforcement officer should be responsible for enforcing the vegetation height and breadth over sidewalks as well as beside roads.

DESIGN

Goal 5.2 Enhance the appearance, quality, and function of the transportation system in residential and commercial districts.

General

- Policy 5.2.1 Streets, trails, bikeways, and sidewalks should coordinate with a City theme (coal mining/brick buildings/logging).
- Policy 5.2.2 All materials used for a project should meet the accepted design standards of the City.
- Policy 5.2.3 Public art should be provided on public rights-of-way by new development to enhance the City's sense of place and/or the City theme.

- Policy 5.2.4 All new transportation facilities shall meet current ADA guidelines. All existing facilities shall be inventoried for ADA compliance and prioritized for enhancement where necessary.

Street Grids

- Policy 5.2.4 Street patterns should be planned as grid systems without dead ends or long blocks; clustered development, such as planned unit developments, should provide a trail system through the property and connect with adjacent rights-of-way or developed trails.
- Policy 5.2.5 Future streets and their classifications should follow a regular distribution pattern that anticipates potential land uses and provides for orderly development.

Alleys

- Policy 5.2.6 Alleys should be included in plat plans to eliminate the need for placing overhead wires, garages, and garbage cans in front of residences.
- Policy 5.2.7 The sizes and capacities of transportation facilities should be appropriately matched to the surrounding land uses.
- Policy 5.2.8 The City should consider the costs and benefits of both construction and maintenance when setting guidelines for street dimensions and rights-of-way.

Sidewalks

- Policy 5.2.9 Sidewalks should be designed to eliminate sheet flow and ponding on the walkway surface.
- Policy 5.2.10 Crosswalks should be paved differently to ensure visibility.
- Policy 5.2.11 Sidewalks that are likely to serve as parking areas or driveways should be designed as driveways to prevent the sidewalk from crumbling through use.
- Policy 5.2.12 Sidewalks should have standard curbs (not rolled curbs).
- Policy 5.2.13 Sidewalks should be sloped toward the street for drainage.
- Policy 5.2.14 Pavement materials and landscaping should be used to create visual connections between trails and downtown.

CONNECTIVITY

Goal 5.3 Provide a variety of ways to get from one part of the City to another part of the City using a variety of transportation modes.

Walkways

- Policy 5.3.1 Sidewalks also should be part of the City's trail system.
- Policy 5.3.2 Create a coordinated system of trails and walkways within the City.
- Policy 5.3.3 Trails should lead downtown and to the shoreline.
- Policy 5.3.4 Streets that dead end or end in cul-de-sacs should contain pedestrian links to the next street.

New Development

- Policy 5.3.5 Developers should provide bike and pedestrian connections to adjoining neighborhoods.
- Policy 5.3.6 New development should provide links and signs to the trail system.
- Policy 5.3.7 All new development should provide pedestrian and bicycle infrastructure, such as sidewalks, crosswalks, and bike paths.

NON-MOTORIZED FACILITIES

Goal 5.4 Create a continuous network of non-motorized facilities.

Pedestrian

- Policy 5.4.1 Increase non-motorized trips within the City of Buckley.
- Policy 5.4.2 The City of Buckley should implement transportation demand management measures that provide incentives for walking, biking, and public transportation and disincentives for automobile use.
- Policy 5.4.3 The City should work with the Washington State Department of Transportation (WSDOT) to make State Route (SR) 410 safer for pedestrians.
- Policy 5.4.4 Non-motorized links across SR 410 should be by signalized crosswalks or a pedestrian route that is grade separated.

Policy 5.4.5 The City should ensure safe and secure access to non-motorized amenities.

Policy 5.4.6 Cars should not park on sidewalks.

Policy 5.4.7 Crosswalk safety at major intersections should be enhanced through the addition of visual cues, such as paving and painting treatments, lighting, and/or signage. Where crossing distances are long, i.e., across SR 410, raised medians should be constructed to serve as places of refuge for pedestrians.

Policy 5.4.8 Future transit areas should include covered transit shelters.

Education

Policy 5.4.9 Provide educational opportunities to provide information about Northwest ecology along bicycling and walking routes as well as the Foothills Trail.

Policy 5.4.10 The City should work with outside cycling and walking groups, such as Feet First or Cascade Cycling Group, to provide outreach and education regarding the different modes of transportation to schools and other public facilities.

Bicycles

Policy 5.4.11 The City should create a continuous bicycle route system linked to the Foothills Trail and other City facilities. These routes should be part of a public outreach effort that creates knowledge of the system. The outcome of the public outreach can then be transferred to City and County maps and other publications for circulation.

Policy 5.4.12 All new commercial and office developments and facilities shall include bicycle parking. Park-and-ride areas and areas for future transit facilities should include covered bicycle parking.

Policy 5.4.13 The City should foster Buckley's role as a destination point for recreational cycling by enhancing the town's visibility and identity.

Center of Local Interest

Policy 5.4.14 The City should use the Foothills Trail between Park Street and Ryan Road as a Center of Local Importance to enhance provision of businesses, recreational activities, and public services.

TRANSIT

Goal 5.5 The City should create park-and-ride lots that are connected to the trail system and will serve to connect with future transit services within the City's downtown and the SR 410 corridor.

Park and Rides

- Policy 5.5.1 The City should ensure safe and secure access to park-and-ride lots by prioritizing areas around park-and-ride lots for lighting and other pedestrian amenity improvements.
- Policy 5.5.2 The City should create a park-and-ride lot near downtown.
- Policy 5.5.3 The City should examine opportunities for combining park-and-ride lots with a variety of land use activities to enhance the convenience of carpooling.

Funding

- Policy 5.5.4 The City should continue to work with regional transit operators for future placement of transit stops within Buckley.
- Policy 5.5.5 The City should continue working with WSDOT and Pierce County to jointly compete for funds to support mass transit funding to and from the City, as well as associated transportation improvements.

ENVIRONMENT

Goal 5.6 Transportation improvements should be constructed with reduced environmental impacts.

- Policy 5.6.1 All transportation improvements should minimize impervious footprints and use current stormwater techniques as required in Title 14 of the Buckley Municipal Code.
- Policy 5.6.2 The City shall pursue low-impact street and parking lot design, construction, and maintenance techniques to minimize impervious surface, water pollution, and water runoff.
- Policy 5.6.3 New roads and trails should be designed in such a way that they will not affect wetlands, natural preserves, parks and recreation areas, significant historical and cultural resources, and areas identified as critical wildlife habitat.

Policy 5.6.4 The City should provide plug-in charging stations for electric vehicles.

FINANCE

Goal 5.7 The City should finance improvements after considering which project will provide the most benefit for citizens.

Policy 5.7.1 The City should develop a list of roadway and non-motorized improvements to be accomplished within the next 6 years and updated annually. Council should consider prioritization of the roadway improvements each spring.

Policy 5.7.2 The City should use both traditional and innovative methods for financing roadway improvements such as public/private partnerships, impact fees, and so forth.

Policy 5.7.3 The City should explore funding tools such as road improvement districts (RIDs), local improvement districts (LIDs), and other local funding mechanisms to finance projects that provide a primary local benefit.

Policy 5.7.4 WSDOT, Pierce County, and the City of Buckley should work together to share transportation resources and reduce overlap in transportation expenditures.

Policy 5.7.5 The City should require maintenance agreements for private roads that are executed by the responsible landowners.

Policy 5.7.6 The City should continue to compete for funds for transportation improvements.

CONCURRENCY

Goal 5.8 The City should ensure developers pay for impacts to the roadway system, as required by concurrency.

Policy 5.8.1 Each development is financially responsible for related transportation costs.

Policy 5.8.2 A consistent level of service must be provided.

Policy 5.8.3 Transportation improvements needed to support new development shall be in place at the time of development to maintain transportation LOS standards.

Policy 5.8.4 New commercial and multifamily developments must provide roadway improvements as required by the future street map and the Development Guidelines and Public Works Standards.

Policy 5.8.5 A concurrency management system should be developed.

Policy 5.8.6 Alternatives for demand management should be explored.

MAINTENANCE

Goal 5.9 The City should minimize future maintenance costs by using technologies and techniques that increase pavement longevity.

Policy 5.9.1 Build and operate an efficient and cost-effective transportation system.

Policy 5.9.2 Design and construct improvements in a manner that likely will require the least amount of maintenance.

Policy 5.9.3 The City should investigate relinquishing street facilities that are no longer needed to serve City residents.

Policy 5.9.4 Create roadway pavement log of existing sidewalks and roadways to record deficiencies and repairs of roadways.

Policy 5.9.5 The City should provide budget funding for annual roadway paving improvements, such as potholes.

Policy 5.9.6 Obstructions blocking pedestrian walkways, such as vegetation over trails or sidewalks, should be maintained to eliminate barriers to pedestrians.

CONSTRUCTION

Goal 5.10 Ensure transportation construction needs are met during and after construction.

Policy 5.10.1 Additional rights-of-way may be required for additional roads and pedestrian ways, as shown on adopted plans of the City.

Policy 5.10.2 Public notice of traffic impacts that will occur during construction activities should be provided 2 weeks in advance of the traffic impact.

Policy 5.10.3 Each transportation mode's right-of-way needs should be addressed when roads are constructed or upgraded with the appropriate traffic control measure as outlined by the Buckley City Development Guidelines and Public Works Standards and MUTCD.

Policy 5.10.4 Temporary erosion and sediment control measures shall be used in accordance with an approved stormwater pollution prevention plan. Final approval of the permit should depend on permanent stormwater detention and pollution prevention measures being in place.

PROJECTS

This Transportation Element update considers facilities impacted by growth projected to occur within the City of Buckley over the next 20 years. Improvement projects will occur in a sequential manner as funding accrues with development planning, design, right-of-way acquisition, construction mitigations, grants, and other City sources.

The element focuses on pedestrian and vehicle capacity deficiencies and suggests improvements to bring them in line with Buckley's LOS standard of D. Current and future pedestrian and vehicle capacity deficiencies were identified through forecasting and LOS analysis, and they primarily consist of capacity constraints due to a lack of walkways for pedestrians and inadequate intersections for vehicles. Capacity improvement projects were developed and LOS was tested using projected 2030 volumes.

Three areas for improvement have been prioritized as follows:

- Walkway improvements;
- Intersection improvements; and
- SR 410 improvements.

Four pedestrian routes are projected to fall below LOS D in 2035 with pedestrian ratings exceeding 90. Table 3 identifies the Pedestrian Level of Service and Ratings for each.

TABLE 3

Pedestrian Level of Service and Ratings

Road Segment	2013 LOS Rating	2035 LOS Rating	2035 Mitigated LOS Rating
1. Mundy Loss Road (112 th Street East – SR 410)	D (92)	F (179)	D (90)
2. Ryan Road (Spiketon Road – Levesque Road)	D (79)	F (137)	C (72)
3. West Mason Road (Natches – Hinkleman Extension)	C (76)	F (132)	C (70)

The following table lists the street segments needing improvement, the mitigation costs, and the fair share trip fees.

TABLE 4**Pedestrian Mitigations and Costs**

Street	Improvement	Mitigation Cost	2013 ADT	Cost per ADT
Mundy Loss (112 th Street East – SR 410)	Curb, gutter, sidewalk one side	\$669,000	6,230	\$108
Ryan Road (Spiketon – Levesque)	Curb, gutter, sidewalk one side	\$1,584,000	2,770	\$572
Spiketon Road (South of Mt. View Avenue)	Curb, gutter, sidewalk one side	\$588,000	1,020	\$576
Total		\$2,841,000		\$1,256

The high pedestrian mitigation costs are a concern for being disproportionate compared to the intersection mitigation costs. The mitigation fee needs to be economically feasible. Pedestrian improvements are to provide walking capacity and safety but their construction provides a substantial portion of the roadway improvement.

INTERSECTION IMPROVEMENTS

Five intersections within the City of Buckley are projected to exceed LOS “D” in 2035 not including intersections along the SR 410 corridor. Appendix B shows the map and table identifying the failing intersections along with the improvements needed to maintain them at a LOS of D or higher.

These intersection improvements include signalization, turn lanes, and traffic operational improvements. The improvements frequently result in LOS higher than level D since half a lane or half a signal cannot be constructed to exactly achieve LOS D.

TABLE 5**Intersection LOS and Improvements**

Intersection	2013 LOS	2035 LOS	Improvements	Mitigated LOS
Mundy Loss and 112 th Street East	B	F	Signal, turn lanes, sidewalks	C
North River Road and A Street	B	F	Signal, turn lanes, sidewalks	B
South River Road and Main Street	C	F	Signal, turn lanes, sidewalks	C
Main Street and A Street	C	F	Signal, turn lanes, sidewalks	B
SR 410 and Mundy Loss	B	F	Widen to five lanes, signal	B
SR 410 and Main	B	F	Widen to five lanes, signal	A
SR 410 and SR 165	F	F	Widen to five lanes, signal	C
SR 410 and Chamberlin, Butler, Hinkleman Extension, Jefferson, or Wickersham			New or existing stop controlled streets will require signalization and five lanes to meet LOS "D."	

The identified intersection improvements were determined using PM Peak capacity; however, the school hours, the noon hour, the AM Peak hour and other hours of the day, as well as weekends all have capacity constraints that the improvements will serve. Improvements include traffic signals that provide capacity 24 hours a day. They will serve existing traffic and increasing "through" traffic as well as new traffic associated with growth. Mitigation fair share fee estimates were prepared for the improvements as listed in the table below.

TABLE 6**Intersection Mitigations and Costs**

Intersection	Improvements	Mitigation Cost	2013 AWDT	Cost per AWDT
Mundy Loss and 112 th Street East	Signal, turn lanes, sidewalks	\$1,364,000	9,070	\$150
SR 410 and SR 165	Realign SR 165	\$2,114,000	30,590	\$69
South River Road and A Street	Signal, turn lanes, sidewalks	\$797,000	7,160	\$111
South River Road and Main Street	Signal, turn lanes, sidewalks	\$789,000	5,580	\$141
Main Street and A Street	Signal, turn lanes, sidewalks	\$498,000	6,470	\$77
SR 410 and Mundy Loss	Widen to five lanes, signal	\$1,170,000	26,730	\$44
SR 410 and Main	Widen to five lanes, signal	\$1,006,000	26,150	\$38
Total		\$8,054,000		\$618

The intersection trip fee was calculated by dividing the project improvement cost by the total 2013 Average Weekday Daily traffic (AWDT) volume. Utilizing the AWDT as the fair share fee calculation denominator recognizes the multiple service capacities provided by the improvements since all traffic will be using the improvement and other sources such as grants will be funding portions of the improvements. Development traffic is to be charged for their fair share of traffic improvements based on traffic generated by the development.

The total mitigation fee would be the sum of the pedestrian and intersection improvement fees:

Intersections:	\$618
Pedestrian Improvements:	\$20
Total:	\$638

SR 410/SR 165/Ryan Road/South River Road/112th Street East Improvements

The intersection of SR 410 and SR 165 consist of a complex junction of roads. Recently, improvements to 112th Street East have improved the network by realigning it to intersection with SR 165. Currently, the City is planning on realigning SR 165 to realign its intersection with SR 410, which is expected to improve both level of service and safety. Figure 1 depicts the proposed improvements.

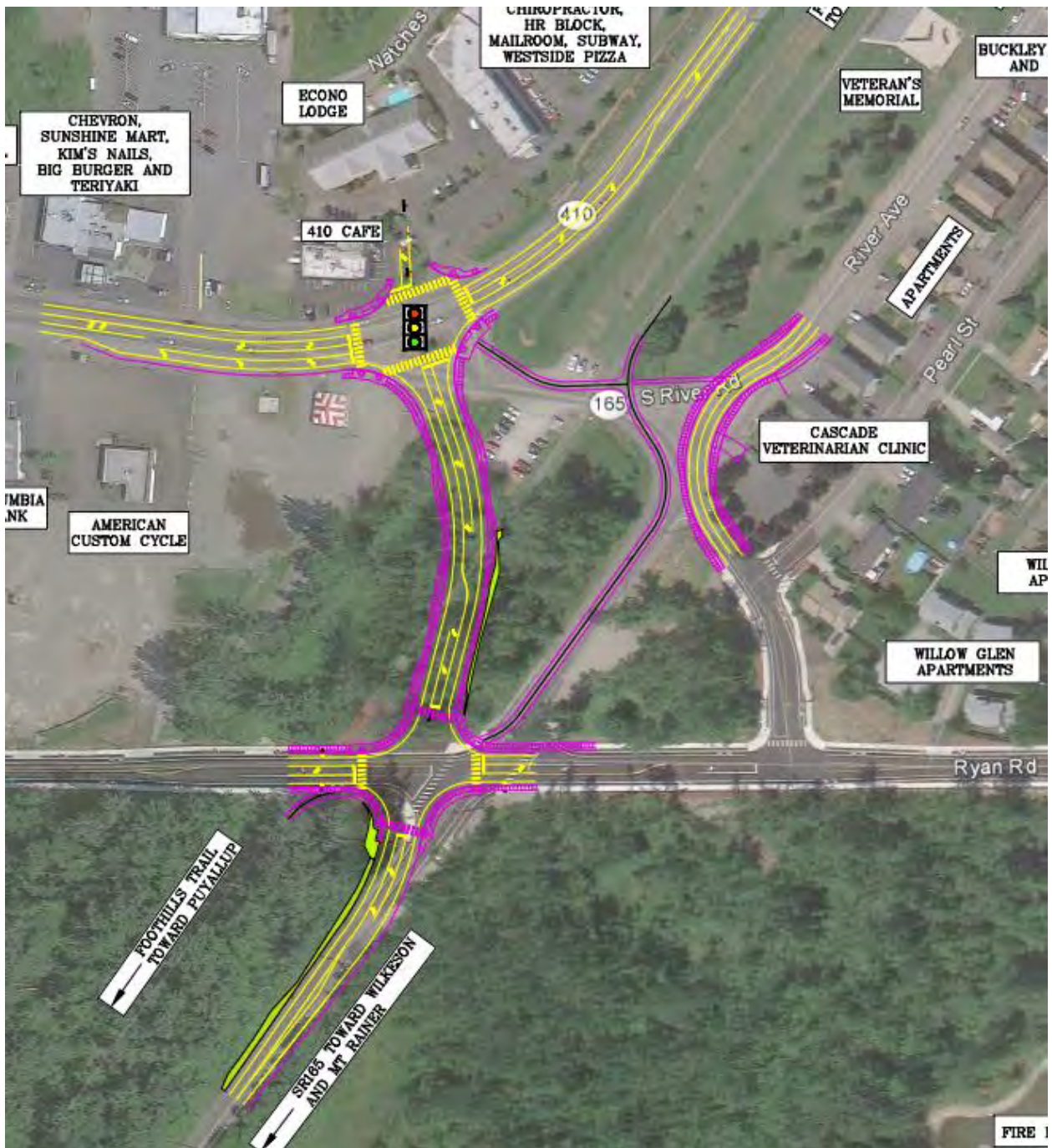


FIGURE 1

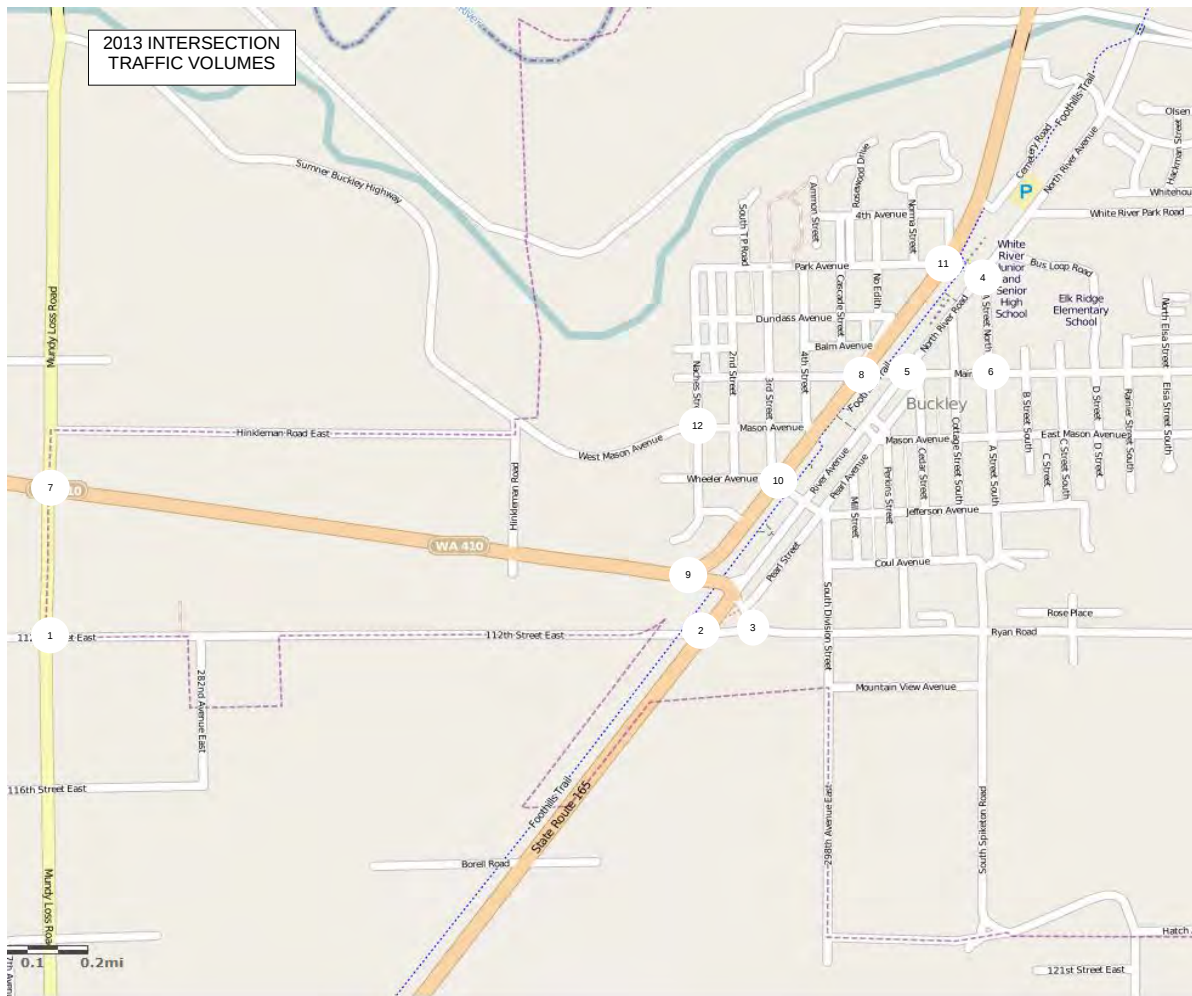
Proposed SR 410 and SR 165 Improvements

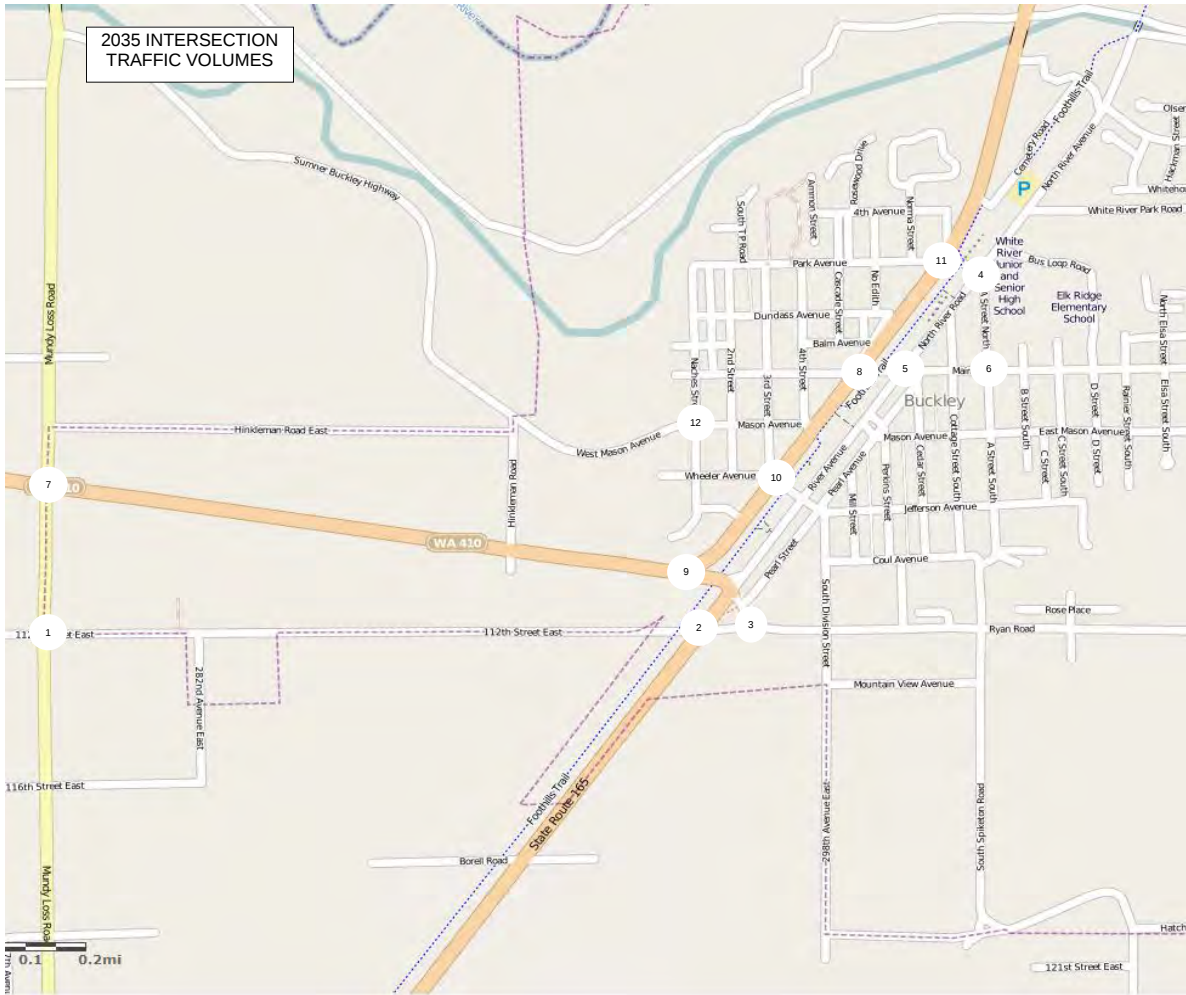
Other SR 410 Corridor Improvements

SR 410 and Chamberlin, Butler, Hinkleman Extension, Jefferson, and/or Wickersham are facilities where additional planning, design, development, and regional corridor evaluation are needed to determine future improvements. Since the SR 410 corridor is controlled by WSDOT and serves predominantly regional traffic, and since regional traffic impacts substantially exceed those of the City of Buckley, improvements along the SR 410 corridor will be administered by WSDOT with the City of Buckley being a participant along with other jurisdictions in the planning process.

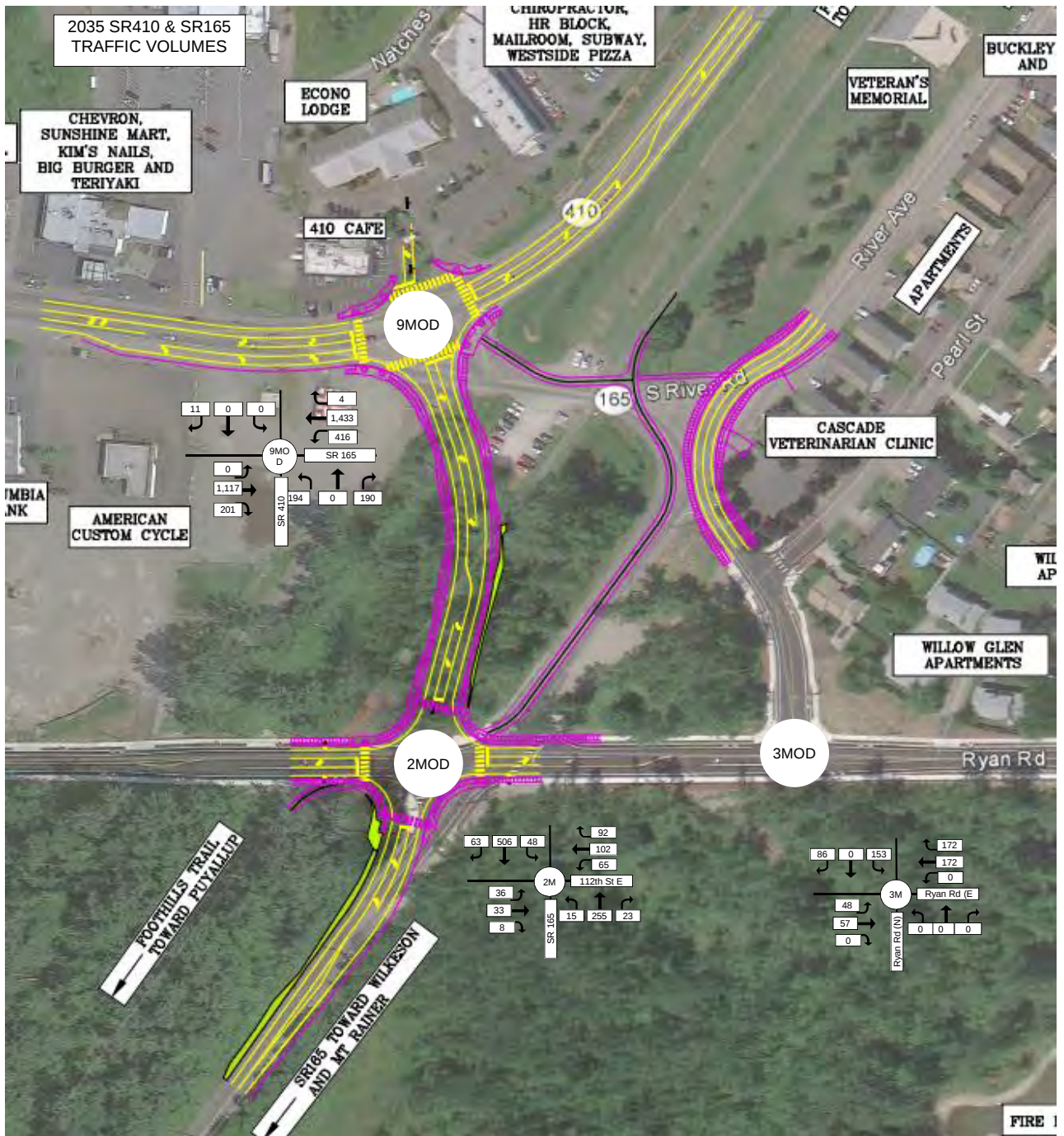
APPENDIX A

VOLUME MAPS





INTERSECTION 1										INTERSECTION 2										INTERSECTION 3										INTERSECTION 4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Mundy Loss Rd										SR 165 (River Ave)										Ryan Rd (N)										N River Rd																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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APPENDIX B

LEVEL OF SERVICE ANALYSIS

Intersection												
Intersection Delay, s/veh	8.6											
Intersection LOS	A											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	134	25	12	6	45	2	7	53	5	0	18	81
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
Heavy Vehicles, %	2	2	2	6	6	6	2	2	2	0	0	0
Mvmt Flow	165	31	15	7	56	2	9	65	6	0	22	100
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	9.3	8.2	8.3	7.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	11%	78%	11%	0%
Vol Thru, %	82%	15%	85%	18%
Vol Right, %	8%	7%	4%	82%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	65	171	53	99
LT Vol	53	25	45	18
Through Vol	5	12	2	81
RT Vol	7	134	6	0
Lane Flow Rate	80	211	65	122
Geometry Grp	1	1	1	1
Degree of Util (X)	0.105	0.268	0.085	0.141
Departure Headway (Hd)	4.701	4.576	4.699	4.163
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	762	785	762	862
Service Time	2.728	2.602	2.73	2.188
HCM Lane V/C Ratio	0.105	0.269	0.085	0.142
HCM Control Delay	8.3	9.3	8.2	7.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	1.1	0.3	0.5

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection												
Intersection Delay, s/veh		0.9										
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	0	4	9	1	17	3	623	33	31	958	2
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	95	95	95	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	2	2	2	2	2	2
Mvmt Flow	0	0	4	9	1	18	3	677	36	34	1041	2
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	1821	1830	1042	1814	1813	695	1043	0	0	713	0	0
Stage 1	1110	1110	-	702	702	-	-	-	-	-	-	-
Stage 2	711	720	-	1112	1111	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	60	77	281	61	79	446	667	-	-	887	-	-
Stage 1	256	287	-	432	443	-	-	-	-	-	-	-
Stage 2	427	435	-	256	287	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	53	70	281	56	71	446	667	-	-	887	-	-
Mov Capacity-2 Maneuver	53	70	-	56	71	-	-	-	-	-	-	-
Stage 1	254	261	-	429	440	-	-	-	-	-	-	-
Stage 2	406	432	-	229	261	-	-	-	-	-	-	-
Approach	SE		NW			NE			SW			
HCM Control Delay, s	18		41.3			0			0.3			
HCM LOS	C		E									
Minor Lane / Major Mvmt		NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR			
Capacity (veh/h)		667	-	-	127	281	887	-	-			
HCM Lane V/C Ratio		0.005	-	-	0.224	0.015	0.038	-	-			
HCM Control Delay (s)		10.424	0	-	41.3	18	9.219	0	-			
HCM Lane LOS		B	A		E	C	A	A				
HCM 95th %tile Q(veh)		0.015	-	-	0.811	0.046	0.118	-	-			
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

HCM 2010 Signalized Intersection Capacity Analysis

3: Mundy Loss Road & SR 410

2013 Mundy Loss Road Volumes

9/15/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	730	25	13	540	84	88	21	86	42	28	12
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A _{pbT})	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1881	1881	1900	1900	1900	1900	1900	1900	1900
Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Lane Assignment												
Cap, veh/h	157	1013	861	23	744	116	93	13	439	82	37	439
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
Prop Arrive On Green	0.09	0.54	0.54	0.01	0.47	0.47	0.27	0.27	0.27	0.27	0.27	0.27
Ln Grp Delay, s/veh	39.2	13.3	7.4	54.6	0.0	16.6	133.5	0.0	20.6	46.4	0.0	18.8
Ln Grp LOS	D	B	A	D		B	F		C	D		B
Approach Vol, veh/h		893			650			199			84	
Approach Delay, s/veh		16.6			17.3			83.6			42.4	
Approach LOS		B			B			F			D	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs			2	3	4		6	7	8			
Case No			7.0	2.0	3.0		7.0	2.0	4.0			
Phs Duration (G+Y+Rc), s			23.0	4.9	42.0		23.0	10.2	36.7			
Change Period (Y+Rc), s			4.0	4.0	4.0		4.0	4.0	4.0			
Max Allow Headway (MAH), s			4.9	3.8	5.1		4.9	3.8	5.1			
Max Green (Gmax), s			19.0	4.0	55.0		19.0	12.0	47.0			
Max Q Clear (g _{c+I1}), s			21.0	2.5	23.3		21.0	6.7	21.7			
Green Ext Time (g _e), s			0.0	0.0	12.0		0.0	0.1	11.0			
Prob of Phs Call (p _c)			1.00	0.22	1.00		1.00	0.91	1.00			
Prob of Max Out (p _x)			1.00	1.00	0.20		1.00	0.22	0.30			
Left-Turn Movement Data												
Assigned Mvmt			5	3			1	7				
Mvmt Sat Flow, veh/h			0	1792			0	1774				
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			47		1863		135		1589			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1615		1583		1615		248			
Left Lane Group Data												
Assigned Mvmt		0	5	3	0	0	1	7	0			
Lane Assignment			L+T	L (Prot)			L+T	L (Prot)				
Lanes in Grp		0	1	1	0	0	1	1	0			
Grp Vol (v), veh/h		0	111	13	0	0	72	122	0			
Grp Sat Flow (s), veh/h/ln		0	47	1792	0	0	135	1774	0			
Q Serve Time (g _s), s		0.0	0.0	0.5	0.0	0.0	0.0	4.7	0.0			

HCM 2010 Signalized Intersection Capacity Analysis

3: Mundy Loss Road & SR 410

2013 Mundy Loss Road Volumes

9/15/2014

Cycle Q Clear Time (g_c), s	0.0	19.0	0.5	0.0	0.0	19.0	4.7	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	1388	0	0	0	1305	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	19.0	0.0	0.0	0.0	19.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.5	0.0	0.0	0.0	1.3	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.5	0.0	0.0	0.0	1.3	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.81	1.00	0.00	0.00	0.60	1.00	0.00
Lane Grp Cap (c), veh/h	0	106	23	0	0	119	157	0
V/C Ratio (X)	0.00	1.05	0.57	0.00	0.00	0.61	0.78	0.00
Avail Cap (c_a), veh/h	0	106	103	0	0	119	305	0
Upstream Filter (I)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d1), s/veh	0.0	32.7	34.3	0.0	0.0	25.6	31.2	0.0
Incr Delay (d2), s/veh	0.0	100.8	20.3	0.0	0.0	20.8	8.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	133.5	54.6	0.0	0.0	46.4	39.2	0.0
1st-Term Q (Q1), veh/ln	0.0	1.8	0.2	0.0	0.0	0.9	2.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	3.0	0.1	0.0	0.0	0.7	0.3	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	4.8	0.3	0.0	0.0	1.6	2.3	0.0
%ile Storage Ratio (RQ%)	0.00	0.09	0.09	0.00	0.00	0.06	0.60	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T							
Lanes in Grp	0	0	0	1	0	0	0	0
Grp Vol (v), veh/h	0	0	0	745	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1863	0	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	21.3	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	21.3	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	1013	0	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.74	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	1466	0	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	12.1	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.1	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
Control Delay (d), s/veh	0.0	0.0	0.0	13.3	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	7.9	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	8.2	0.0	0.0	0.0	0.0

2013 Mundy Loss Road Volumes 11/19/2013 2013 Baseline
Rory Cameron

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HCM 2010 Signalized Intersection Capacity Analysis
3: Mundy Loss Road & SR 410

2013 Mundy Loss Road Volumes

9/15/2014

%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		R		R		R		T+R
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	88	0	26	0	12	0	637
Grp Sat Flow (s), veh/h/ln	0	1615	0	1583	0	1615	0	1837
Q Serve Time (g_s), s	0.0	2.9	0.0	0.5	0.0	0.4	0.0	19.7
Cycle Q Clear Time (g_c), s	0.0	2.9	0.0	0.5	0.0	0.4	0.0	19.7
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.14
Lane Grp Cap (c), veh/h	0	439	0	861	0	439	0	860
V/C Ratio (X)	0.00	0.20	0.00	0.03	0.00	0.03	0.00	0.74
Avail Cap (c_a), veh/h	0	439	0	1246	0	439	0	1236
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	19.6	0.0	7.4	0.0	18.7	0.0	15.1
Incr Delay (d2), s/veh	0.0	1.0	0.0	0.0	0.0	0.1	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
Control Delay (d), s/veh	0.0	20.6	0.0	7.4	0.0	18.8	0.0	16.6
1st-Term Q (Q1), veh/ln	0.0	1.1	0.0	0.2	0.0	0.1	0.0	7.8
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	1.2	0.0	0.2	0.0	0.2	0.0	8.1
%ile Storage Ratio (RQ%)	0.00	0.30	0.00	0.04	0.00	0.04	0.00	0.34
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	25.4							
HCM 2010 LOS	C							
Notes								

Intersection												
Intersection Delay, s/veh	10.3											
Intersection LOS	B											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	24	90	96	32	13	40	31	146	6	7	204	46
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
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	1	1	1
Mvmt Flow	26	97	103	34	14	43	33	157	6	8	219	49
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.3	9.1	10.1	10.8
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	17%	11%	38%	3%
Vol Thru, %	80%	43%	15%	79%
Vol Right, %	3%	46%	47%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	183	210	85	257
LT Vol	146	90	13	204
Through Vol	6	96	40	46
RT Vol	31	24	32	7
Lane Flow Rate	197	226	91	276
Geometry Grp	1	1	1	1
Degree of Util (X)	0.276	0.309	0.134	0.372
Departure Headway (Hd)	5.151	4.927	5.281	4.852
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	702	720	683	732
Service Time	3.151	3.024	3.281	2.948
HCM Lane V/C Ratio	0.281	0.314	0.133	0.377
HCM Control Delay	10.1	10.3	9.1	10.8
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	1.1	1.3	0.5	1.7

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

HCM 2010 Signalized Intersection Capacity Analysis

3: SR410 & W Main St/E Main St

2013 Volumes Baseline

9/15/2014

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	21	54	1	123	34	28	5	535	80	46	875	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1881	1900	1881	1881	1900	1863	1863	1900
Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Lane Assignment												
Cap, veh/h	167	378	6	348	94	61	247	960	143	424	1103	12
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
Prop Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.60	0.60	0.60	0.60	0.60	0.60
Ln Grp Delay, s/veh	17.4	0.0	0.0	20.4	0.0	0.0	19.2	0.0	9.6	12.6	0.0	16.5
Ln Grp LOS	B			C			B		A	B		B
Approach Vol, veh/h		79			192			645			969	
Approach Delay, s/veh		17.4			20.4			9.7			16.3	
Approach LOS		B			C			A			B	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs			2		4		6		8			
Case No			6.0		8.0		6.0		8.0			
Phs Duration (G+Y+Rc), s			40.0		20.0		40.0		20.0			
Change Period (Y+Rc), s			4.0		4.0		4.0		4.0			
Max Allow Headway (MAH), s			5.2		5.3		5.2		5.3			
Max Green (Gmax), s			36.0		16.0		36.0		16.0			
Max Q Clear (g_c+I1), s			26.0		3.9		25.6		8.1			
Green Ext Time (g_e), s			7.2		1.2		7.4		0.9			
Prob of Phs Call (p_c)			1.00		1.00		1.00		1.00			
Prob of Max Out (p_x)			0.83		0.06		0.82		0.35			
Left-Turn Movement Data												
Assigned Mvmt			5		7		1		3			
Mvmt Sat Flow, veh/h			610		337		786		930			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			1601		1419		1839		352			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			239		23		20		228			
Left Lane Group Data												
Assigned Mvmt		0	5	0	7	0	1	0	3			
Lane Assignment			L		L+T+R		L		L+T+R			
Lanes in Grp		0	1	0	1	0	1	0	1			
Grp Vol (v), veh/h		0	5	0	79	0	48	0	192			
Grp Sat Flow (s), veh/h/ln		0	610	0	1779	0	786	0	1510			
Q Serve Time (g_s), s		0.0	0.4	0.0	0.0	0.0	2.4	0.0	4.1			

HCM 2010 Signalized Intersection Capacity Analysis

3: SR410 & W Main St/E Main St

2013 Volumes Baseline

9/15/2014

Cycle Q Clear Time (g_c), s	0.0	24.0	0.0	1.9	0.0	15.2	0.0	6.1
Perm LT Sat Flow (s_l), veh/h/ln	0	610	0	1359	0	786	0	1368
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1900	0	0	0	1881
Perm LT Eff Green (g_p), s	0.0	36.0	0.0	16.0	0.0	36.0	0.0	16.0
Perm LT Serve Time (g_u), s	0.0	12.4	0.0	9.9	0.0	23.2	0.0	14.1
Perm LT Q Serve Time (g_ps), s	0.0	0.4	0.0	0.0	0.0	2.4	0.0	4.1
Time to First Blk (g_f), s	0.0	0.0	0.0	4.8	0.0	0.0	0.0	1.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	1.9	0.0	0.0	0.0	1.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.28	0.00	1.00	0.00	0.67
Lane Grp Cap (c), veh/h	0	247	0	551	0	424	0	503
V/C Ratio (X)	0.00	0.02	0.00	0.14	0.00	0.11	0.00	0.38
Avail Cap (c_a), veh/h	0	247	0	551	0	424	0	503
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	19.0	0.0	16.8	0.0	12.0	0.0	18.2
Incr Delay (d2), s/veh	0.0	0.2	0.0	0.5	0.0	0.5	0.0	2.2
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	19.2	0.0	17.4	0.0	12.6	0.0	20.4
1st-Term Q (Q1), veh/ln	0.0	0.1	0.0	0.8	0.0	0.4	0.0	2.2
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.3
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.1	0.0	0.9	0.0	0.5	0.0	2.5
%ile Storage Ratio (RQ%)	0.00	0.02	0.00	0.06	0.00	0.12	0.00	0.24
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment								
Lanes in Grp	0	0	0	0	0	0	0	0
Grp Vol (v), veh/h	0	0	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	0	0	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	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
Control Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

2013 Volumes-SR410-Main and Park Ave 11/17/2013 2013 Volumes Baseline

Synchro 8 Light Report
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HCM 2010 Signalized Intersection Capacity Analysis
3: SR410 & W Main St/E Main St

2013 Volumes Baseline
9/15/2014

%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	T+R				T+R			
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	640	0	0	0	921	0	0
Grp Sat Flow (s), veh/h/ln	0	1839	0	0	0	1859	0	0
Q Serve Time (g_s), s	0.0	12.8	0.0	0.0	0.0	23.6	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	12.8	0.0	0.0	0.0	23.6	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.13	0.00	0.01	0.00	0.01	0.00	0.15
Lane Grp Cap (c), veh/h	0	1103	0	0	0	1116	0	0
V/C Ratio (X)	0.00	0.58	0.00	0.00	0.00	0.83	0.00	0.00
Avail Cap (c_a), veh/h	0	1103	0	0	0	1116	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	7.4	0.0	0.0	0.0	9.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	2.2	0.0	0.0	0.0	7.0	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
Control Delay (d), s/veh	0.0	9.6	0.0	0.0	0.0	16.5	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.6	0.0	0.0	0.0	8.4	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.7	0.0	0.0	0.0	2.2	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	5.3	0.0	0.0	0.0	10.6	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.34	0.00	0.00	0.00	0.23	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	14.5							
HCM 2010 LOS	B							
Notes								

Intersection												
Intersection Delay, s/veh		5.4										
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	18	135	48	24	117	6	40	48	43	4	53	24
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	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	19	145	52	26	126	6	43	52	46	4	57	26
Major/Minor	Major1		Major2			Minor1			Minor2			
Conflicting Flow All	132	0	0	197	0	0	432	394	171	440	416	129
Stage 1	-	-	-	-	-	-	210	210	-	181	181	-
Stage 2	-	-	-	-	-	-	222	184	-	259	235	-
Follow-up Headway	2.2	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1466	-	-	1382	-	-	537	546	878	531	530	926
Stage 1	-	-	-	-	-	-	797	732	-	825	754	-
Stage 2	-	-	-	-	-	-	785	751	-	750	714	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1466	-	-	1382	-	-	465	527	878	453	512	926
Mov Capacity-2 Maneuver	-	-	-	-	-	-	465	527	-	453	512	-
Stage 1	-	-	-	-	-	-	785	721	-	813	739	-
Stage 2	-	-	-	-	-	-	690	736	-	650	703	-
Approach	EB		WB			NE			SW			
HCM Control Delay, s	0.7		1.2			13.2			12.2			
HCM LOS						B			B			
Minor Lane / Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1				
Capacity (veh/h)	579	1466	-	-	1382	-	-	586				
HCM Lane V/C Ratio	0.243	0.013	-	-	0.019	-	-	0.149				
HCM Control Delay (s)	13.2	7.489	0	-	7.654	0	-	12.2				
HCM Lane LOS	B	A	A		A	A		B				
HCM 95th %tile Q(veh)	0.948	0.04	-	-	0.057	-	-	0.519				
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

HCM 2010 Signalized Intersection Capacity Analysis
10: SR410 & Park Ave

2013 Volumes Baseline
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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	80	14	16	26	17	78	31	515	20	162	931	82
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1881	1881	1881	1863	1863	1900
Lanes	0	1	0	0	1	0	1	1	1	1	1	0
Lane Assignment												
Cap, veh/h	298	48	0	224	133	0	142	1380	1173	535	1238	109
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
Prop Arrive On Green	0.18	0.18	0.00	0.18	0.18	0.00	0.73	0.73	0.73	0.73	0.73	0.73
Ln Grp Delay, s/veh	35.3	0.0	0.0	32.2	0.0	0.0	41.1	6.0	3.3	12.1	0.0	24.1
Ln Grp LOS	D			C			D	A	A	B		C
Approach Vol, veh/h		118			53			708			1468	
Approach Delay, s/veh		35.3			32.2			7.8			22.5	
Approach LOS		D			C			A			C	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs			2		4		6		8			
Case No			5.0		8.0		6.0		8.0			
Phs Duration (G+Y+Rc), s			70.0		20.0		70.0		20.0			
Change Period (Y+Rc), s			4.0		4.0		4.0		4.0			
Max Allow Headway (MAH), s			5.1		5.3		5.1		5.3			
Max Green (Gmax), s			66.0		16.0		66.0		16.0			
Max Q Clear (g_c+I1), s			62.8		7.8		55.2		4.2			
Green Ext Time (g_e), s			3.0		0.5		9.4		0.6			
Prob of Phs Call (p_c)			1.00		1.00		1.00		1.00			
Prob of Max Out (p_x)			1.00		0.21		0.92		0.03			
Left-Turn Movement Data												
Assigned Mvmt			5		7		1		3			
Mvmt Sat Flow, veh/h			440		1260		765		899			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			1881		270		1689		746			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1599		0		148		0			
Left Lane Group Data												
Assigned Mvmt		0	5	0	7	0	1	0	3			
Lane Assignment			L		L+T		L		L+T			
Lanes in Grp		0	1	0	1	0	1	0	1			
Grp Vol (v), veh/h		0	39	0	118	0	202	0	53			
Grp Sat Flow (s), veh/h/ln		0	440	0	1530	0	765	0	1645			
Q Serve Time (g_s), s		0.0	7.5	0.0	3.6	0.0	13.1	0.0	0.0			

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Cycle Q Clear Time (g_c), s	0.0	60.8	0.0	5.8	0.0	25.6	0.0	2.2
Perm LT Sat Flow (s_l), veh/h/ln	0	440	0	1413	0	765	0	1417
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1900	0	0	0	1731
Perm LT Eff Green (g_p), s	0.0	66.0	0.0	16.0	0.0	66.0	0.0	16.0
Perm LT Serve Time (g_u), s	0.0	12.8	0.0	13.8	0.0	53.5	0.0	10.2
Perm LT Q Serve Time (g_ps), s	0.0	7.5	0.0	3.6	0.0	13.1	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.4	0.0	0.0	0.0	1.3
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.4	0.0	0.0	0.0	1.3
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.85	0.00	1.00	0.00	0.60
Lane Grp Cap (c), veh/h	0	142	0	346	0	535	0	357
V/C Ratio (X)	0.00	0.27	0.00	0.34	0.00	0.38	0.00	0.15
Avail Cap (c_a), veh/h	0	142	0	346	0	535	0	357
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	36.4	0.0	32.6	0.0	10.1	0.0	31.3
Incr Delay (d2), s/veh	0.0	4.7	0.0	2.7	0.0	2.0	0.0	0.9
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	41.1	0.0	35.3	0.0	12.1	0.0	32.2
1st-Term Q (Q1), veh/ln	0.0	0.8	0.0	2.3	0.0	2.2	0.0	1.0
2nd-Term Q (Q2), veh/ln	0.0	0.2	0.0	0.3	0.0	0.3	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	1.0	0.0	2.6	0.0	2.5	0.0	1.1
%ile Storage Ratio (RQ%)	0.00	0.26	0.00	0.12	0.00	0.65	0.00	0.21
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T							
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	644	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1881	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1380	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1380	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	1.1	0.0	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
Control Delay (d), s/veh	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0

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%ile Storage Ratio (RQ%)	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	R		T+R					
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	25	0	0	0	1266	0	0
Grp Sat Flow (s), veh/h/ln	0	1599	0	0	0	1837	0	0
Q Serve Time (g_s), s	0.0	0.4	0.0	0.0	0.0	53.2	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.4	0.0	0.0	0.0	53.2	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	0.00	0.00	0.08	0.00	0.00
Lane Grp Cap (c), veh/h	0	1173	0	0	0	1347	0	0
V/C Ratio (X)	0.00	0.02	0.00	0.00	0.00	0.94	0.00	0.00
Avail Cap (c_a), veh/h	0	1173	0	0	0	1347	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.3	0.0	0.0	0.0	10.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.0	13.8	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
Control Delay (d), s/veh	0.0	3.3	0.0	0.0	0.0	24.1	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.1	0.0	0.0	0.0	19.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	5.2	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.1	0.0	0.0	0.0	24.2	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.03	0.00	0.00	0.00	3.13	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	18.9							
HCM 2010 LOS	B							
Notes								

Intersection										
Intersection Delay, s/veh	4.3									
Movement	EBL	EBR	NBL	NBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	57	110	59	7	28	16	1	6	19	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None
Storage Length	25	0	0	-	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0	-	-	0	-
Grade, %	0	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	1	1	0	0	2	2	2	2	2	2
Mvmt Flow	60	116	62	7	30	17	1	7	21	47
Major/Minor	Major1		Major2		Minor1			Minor2		
Conflicting Flow All	69	0	166	0	363	333	141	338	354	66
Stage 1	-	-	-	-	261	261	-	68	68	-
Stage 2	-	-	-	-	102	72	-	270	286	-
Follow-up Headway	2.209	-	2.2	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Capacity-1 Maneuver	1538	-	1424	-	593	587	907	616	571	998
Stage 1	-	-	-	-	744	692	-	942	838	-
Stage 2	-	-	-	-	904	835	-	736	675	-
Time blocked-Platoon, %		-		-						
Mov Capacity-1 Maneuver	1538	-	1424	-	532	564	907	583	548	998
Mov Capacity-2 Maneuver	-	-	-	-	532	564	-	583	548	-
Stage 1	-	-	-	-	715	665	-	905	837	-
Stage 2	-	-	-	-	840	834	-	688	649	-
Approach	EB		NB		NE			SW		
HCM Control Delay, s	2		0.1		12.2			10.2		
HCM LOS					B			B		
Minor Lane / Major Mvmt	NELn1	NBL2	NBL	NBR	EBL	EBR	EBR2	SWLn1		
Capacity (veh/h)	548	1424	-	-	1538	-	-	772		
HCM Lane V/C Ratio	0.089	0.001	-	-	0.039	-	-	0.096		
HCM Control Delay (s)	12.2	7.53	0	-	7.436	-	-	10.2		
HCM Lane LOS	B	A	A		A			B		
HCM 95th %tile Q(veh)	0.293	0.002	-	-	0.122	-	-	0.316		
Notes										
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined										

Intersection												
Intersection Delay, s/veh	4.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	11	133	15	5	119	39	10	19	9	71	41	7
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	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	13	155	17	6	138	45	12	22	10	83	48	8
Major/Minor	Major1		Major2			Minor1			Minor2			
Conflicting Flow All	184	0	0	172	0	0	390	384	163	378	371	161
Stage 1	-	-	-	-	-	-	189	189	-	173	173	-
Stage 2	-	-	-	-	-	-	201	195	-	205	198	-
Follow-up Headway	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1397	-	-	1417	-	-	573	553	887	583	562	889
Stage 1	-	-	-	-	-	-	817	748	-	834	760	-
Stage 2	-	-	-	-	-	-	805	743	-	802	741	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1397	-	-	1417	-	-	524	545	887	552	554	889
Mov Capacity-2 Maneuver	-	-	-	-	-	-	524	545	-	552	554	-
Stage 1	-	-	-	-	-	-	809	741	-	826	756	-
Stage 2	-	-	-	-	-	-	744	739	-	761	734	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0.5		0.2			11.6			13.4			
HCM LOS						B			B			
Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	593	1397	-	-	1417	-	-	565				
HCM Lane V/C Ratio	0.075	0.009	-	-	0.004	-	-	0.245				
HCM Control Delay (s)	11.6	7.601	0	-	7.551	0	-	13.4				
HCM Lane LOS	B	A	A		A	A		B				
HCM 95th %tile Q(veh)	0.241	0.028	-	-	0.012	-	-	0.956				
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

Intersection

Intersection Delay, s/veh 3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	19	17	4	34	53	5	8	133	12	0	264	33
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	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	1	1	1	2	2	2	0	0	0
Mvmt Flow	19	17	4	35	54	5	8	136	12	0	269	34

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	474	450	286	455	461	142	303	0	0	148	0	0
Stage 1	286	286	-	158	158	-	-	-	-	-	-	-
Stage 2	188	164	-	297	303	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.509	4.009	3.309	2.218	-	-	2.2	-	-
Pot Capacity-1 Maneuver	504	508	758	517	499	908	1258	-	-	1446	-	-
Stage 1	726	679	-	847	769	-	-	-	-	-	-	-
Stage 2	818	766	-	714	665	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	457	504	758	498	496	908	1258	-	-	1446	-	-
Mov Capacity-2 Maneuver	457	504	-	498	496	-	-	-	-	-	-	-
Stage 1	721	679	-	841	764	-	-	-	-	-	-	-
Stage 2	751	761	-	692	665	-	-	-	-	-	-	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	12.6	13	0.4	0
HCM LOS	B	B		

Minor Lane / Major Mvmt	NEL	NET	NER	EBLn1	EBLn2	WBLn1	WBLn2	SWL	SWT	SWR
Capacity (veh/h)	1258	-	-	457	517	498	513	1446	-	-
HCM Lane V/C Ratio	0.006	-	-	0.028	0.054	0.046	0.138	-	-	-
HCM Control Delay (s)	7.88	0	-	13.1	12.4	12.6	13.1	0	-	-
HCM Lane LOS	A	A		B	B	B	B	A		
HCM 95th %tile Q(veh)	0.02	-	-	0.087	0.171	0.146	0.476	0	-	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection										
Intersection Delay, s/veh	9.6									
Intersection LOS	A									
Movement	SBL	SBR	NWL	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	63	254	0	80	120	37	0	20	43	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	68	276	0	87	130	40	0	22	47	0
Number of Lanes	1	0	0	1	0	1	0	0	1	0

Approach	SB	NW	NE	SW
Opposing Approach			SW	NE
Opposing Lanes	0	0	1	1
Conflicting Approach Left	SW	NE	SB	NW
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NE	SB	NW	SB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.1	8	9.8	8.8
HCM LOS	B	A	A	A

Lane	NELn1	NWLn1	SBLn1	SWLn1
Vol Left, %	76%	0%	20%	32%
Vol Thru, %	24%	0%	0%	68%
Vol Right, %	0%	100%	80%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	157	90	317	63
LT Vol	37	0	0	43
Through Vol	0	90	254	0
RT Vol	120	0	63	20
Lane Flow Rate	171	98	345	68
Geometry Grp	1	1	1	1
Degree of Util (X)	0.243	0.118	0.404	0.099
Departure Headway (Hd)	5.121	4.33	4.221	5.182
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	696	822	851	685
Service Time	3.188	2.388	2.262	3.258
HCM Lane V/C Ratio	0.246	0.119	0.405	0.099
HCM Control Delay	9.8	8	10.1	8.8
HCM Lane LOS	A	A	B	A
HCM 95th-tile Q	0.9	0.4	2	0.3

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection						
Intersection Delay, s/veh	2.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	30	90	90	80	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	0	38	112	112	100	4
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	225	0	-	0	207	169
Stage 1	-	-	-	-	169	-
Stage 2	-	-	-	-	38	-
Follow-up Headway	2.2	-	-	-	3.509	3.309
Pot Capacity-1 Maneuver	1356	-	-	-	784	878
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	987	-
Time blocked-Platoon, %	-	-	-	-	-	-
Mov Capacity-1 Maneuver	1356	-	-	-	784	878
Mov Capacity-2 Maneuver	-	-	-	-	784	-
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	987	-
Approach	EB	WB	SB			
HCM Control Delay, s	0	0	10.3			
HCM LOS			B			
Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1356	-	-	-	787	
HCM Lane V/C Ratio	-	-	-	-	0.132	
HCM Control Delay (s)	0	-	-	-	10.3	
HCM Lane LOS	A				B	
HCM 95th %tile Q(veh)	0	-	-	-	0.453	
Notes						
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined						

Intersection						
Intersection Delay, s/veh	5.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	105	101	99	217	0
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	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	117	110	108	236	0
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	217	0	-	0	281	164
Stage 1	-	-	-	-	164	-
Stage 2	-	-	-	-	117	-
Follow-up Headway	2.218	-	-	-	3.518	3.318
Pot Capacity-1 Maneuver	1353	-	-	-	709	881
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	908	-
Time blocked-Platoon, %	-	-	-	-	-	-
Mov Capacity-1 Maneuver	1353	-	-	-	709	881
Mov Capacity-2 Maneuver	-	-	-	-	709	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	908	-
Approach	EB	WB	SB			
HCM Control Delay, s	0	0	12.6			
HCM LOS			B			
Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1353	-	-	-	709	
HCM Lane V/C Ratio	-	-	-	-	0.333	
HCM Control Delay (s)	0	-	-	-	12.6	
HCM Lane LOS	A				B	
HCM 95th %tile Q(veh)	0	-	-	-	1.46	
Notes						
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined						

Intersection						
Intersection Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBR	SWL	SWR
Vol, veh/h	583	0	0	99	217	748
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	100	0
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	92	92	90	90	90	90
Heavy Vehicles, %	2	2	2	2	3	3
Mvmt Flow	634	0	0	110	241	831
Major/Minor	Major1	Minor1		Major2		
Conflicting Flow All	0	0	0	0	0	-
Stage 1	-	-	0	-	-	-
Stage 2	-	-	0	-	-	-
Follow-up Headway	-	-	-	-	-	-
Pot Capacity-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-
Mov Capacity-1 Maneuver	-	-	-	-	-	-
Mov Capacity-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	NB		SW		
HCM Control Delay, s	0	+		0		
HCM LOS		-				
Minor Lane / Major Mvmt	NBLn1	EBL	EBR	SWL	SWR	
Capacity (veh/h)	+	-	-	-	-	
HCM Lane V/C Ratio	+	-	-	-	-	
HCM Control Delay (s)	+	-	-	-	-	
HCM Lane LOS	+					
HCM 95th %tile Q(veh)	+	-	-	-	-	
Notes						
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined						

Intersection						
Intersection Delay, s/veh	0					
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	583	105	101	0	0	748
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	92	92	90	90
Heavy Vehicles, %	3	3	2	2	3	3
Mvmt Flow	648	117	110	0	0	831
Major/Minor	Major1	Minor1	Major2			
Conflicting Flow All	831	0	2243	117	117	-
Stage 1	-	-	1412	-	-	-
Stage 2	-	-	831	-	-	-
Follow-up Headway	-	-	4.018	3.318	2.227	-
Pot Capacity-1 Maneuver	-	-	# 42	935	1465	-
Stage 1	-	-	204	-	-	-
Stage 2	-	-	-	-	-	-
Time blocked-Platoon, %	-	-	-	-	-	-
Mov Capacity-1 Maneuver	-	-	# 0	935	1465	-
Mov Capacity-2 Maneuver	-	-	# 0	-	-	-
Stage 1	-	-	# 0	-	-	-
Stage 2	-	-	# 0	-	-	-
Approach	EB	WB	SW			
HCM Control Delay, s	0	+	0			
HCM LOS	-	-				
Minor Lane / Major Mvmt	EBL	EBT	WBLn1	SWL	SWR	
Capacity (veh/h)	-	-	+	1465	-	
HCM Lane V/C Ratio	-	-	+	-	-	
HCM Control Delay (s)	-	-	+	0	-	
HCM Lane LOS	-	-	+	A	-	
HCM 95th %tile Q(veh)	-	-	+	0	-	
Notes						
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined						

Intersection						
Intersection Delay, s/veh	0.4					
Movement	EBL	EBR	NEL	NET	SWT	SWR
Vol, veh/h	5	0	0	47	63	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	0	0	51	68	0
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	119	68	68	0	-	0
Stage 1	68	-	-	-	-	-
Stage 2	51	-	-	-	-	-
Follow-up Headway	3.518	3.318	2.218	-	-	-
Pot Capacity-1 Maneuver	877	995	1533	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	971	-	-	-	-	-
Time blocked-Platoon, %				-	-	-
Mov Capacity-1 Maneuver	877	995	1533	-	-	-
Mov Capacity-2 Maneuver	877	-	-	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	971	-	-	-	-	-
Approach	EB	NE		SW		
HCM Control Delay, s	9.1	0		0		
HCM LOS	A					
Minor Lane / Major Mvmt	NEL	NET	EBLn1	SWT	SWR	
Capacity (veh/h)	1533	-	877	-	-	
HCM Lane V/C Ratio	-	-	0.006	-	-	
HCM Control Delay (s)	0	-	9.1	-	-	
HCM Lane LOS	A	A				
HCM 95th %tile Q(veh)	0	-	0.019	-	-	
Notes						
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined						

Lanes, Volumes, Timings
3: SR165(River Rd)/SR165 & 112th St E/Ryan Rd

2013 Volumes

9/15/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	17	4	34	53	48	8	133	12	25	264	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.926			0.989			0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1845	0	1787	1734	0	1770	1842	0	1770	1831	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1845	0	1787	1734	0	1770	1842	0	1770	1831	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		745			456			374			611	
Travel Time (s)		16.9			10.4			8.5			13.9	
Peak Hour Factor	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	1%	1%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	21	17	4	35	54	52	8	145	12	27	287	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	21	0	35	106	0	8	157	0	27	323	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 36.0% ICU Level of Service A

Analysis Period (min) 15

Lanes and Geometrics
 3: SR165(River Rd)/SR165 & 112th St E/Ryan Rd

2013 Volumes

9/15/2014

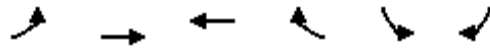
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%			0%			0%			0%		
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.971			0.926			0.989			0.983		
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1845	0	1787	1734	0	1770	1842	0	1770	1831	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1845	0	1787	1734	0	1770	1842	0	1770	1831	0
Link Speed (mph)	30			30			30			30		
Link Distance (ft)	745			456			374			611		
Travel Time (s)	16.9			10.4			8.5			13.9		
Intersection Summary												
Area Type:	Other											

Intersection												
Intersection Delay, s/veh		3.9										
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	19	17	4	34	53	48	8	133	12	25	264	33
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	100	-	-	100	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	98	98	98	98	92	98	92	98	92	92	92
Heavy Vehicles, %	2	0	0	1	1	2	2	2	2	2	2	2
Mvmt Flow	21	17	4	35	54	52	8	145	12	27	287	36
Major/Minor	Minor2	Minor1				Major1			Major2			
Conflicting Flow All	579	532	305	537	544	151	323	0	0	157	0	0
Stage 1	359	359	-	167	167	-	-	-	-	-	-	-
Stage 2	220	173	-	370	377	-	-	-	-	-	-	-
Follow-up Headway	3.518	4	3.3	3.509	4.009	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	426	456	740	456	448	895	1237	-	-	1423	-	-
Stage 1	659	631	-	837	762	-	-	-	-	-	-	-
Stage 2	782	760	-	652	618	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	356	444	740	432	437	895	1237	-	-	1423	-	-
Mov Capacity-2 Maneuver	356	444	-	432	437	-	-	-	-	-	-	-
Stage 1	655	619	-	832	757	-	-	-	-	-	-	-
Stage 2	679	755	-	618	606	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	14.3		13.2			0.4			0.6			
HCM LOS	B		B									
Minor Lane / Major Mvmt		NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR	
Capacity (veh/h)		1237	-	-	356	443	432	564	1423	-	-	
HCM Lane V/C Ratio		0.007	-	-	0.039	0.064	0.054	0.209	0.019	-	-	
HCM Control Delay (s)		7.93	-	-	15.5	13.7	13.8	13.1	7.579	-	-	
HCM Lane LOS		A			C		B	B	B	A		
HCM 95th %tile Q(veh)		0.02	-	-	0.12	0.204	0.169	0.781	0.058	-	-	
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

Lanes, Volumes, Timings
10: Ryan Rd & River Ave

2013 Volumes

9/15/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	25	30	90	90	80	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.932		0.952	
Flt Protected	0.950				0.969	
Satd. Flow (prot)	1805	1900	1753	0	1735	0
Flt Permitted	0.950				0.969	
Satd. Flow (perm)	1805	1900	1753	0	1735	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		456	975		612	
Travel Time (s)		10.4	22.2		13.9	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Adj. Flow (vph)	31	38	113	113	100	56
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	38	224	0	156	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

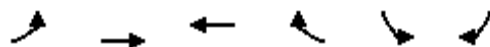
Control Type: Unsignalized

Intersection Capacity Utilization 30.8% ICU Level of Service A

Analysis Period (min) 15

Lanes and Geometrics
10: Ryan Rd & River Ave

2013 Volumes
9/15/2014



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.932		0.952	
Flt Protected	0.950				0.969	
Satd. Flow (prot)	1805	1900	1753	0	1735	0
Flt Permitted	0.950				0.969	
Satd. Flow (perm)	1805	1900	1753	0	1735	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		456	975		612	
Travel Time (s)		10.4	22.2		13.9	

Intersection Summary

Area Type: Other

Intersection						
Intersection Delay, s/veh	4.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	25	30	90	90	80	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	31	38	112	112	100	56
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	225	0	-	0	269	169
Stage 1	-	-	-	-	169	-
Stage 2	-	-	-	-	100	-
Follow-up Headway	2.2	-	-	-	3.509	3.309
Pot Capacity-1 Maneuver	1356	-	-	-	722	878
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	927	-
Time blocked-Platoon, %	-	-	-	-	-	-
Mov Capacity-1 Maneuver	1356	-	-	-	705	878
Mov Capacity-2 Maneuver	-	-	-	-	705	-
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	906	-
Approach	EB	WB	SB			
HCM Control Delay, s	3.5	0	11			
HCM LOS			B			
Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1356	-	-	-	759	
HCM Lane V/C Ratio	0.023	-	-	-	0.206	
HCM Control Delay (s)	7.717	-	-	-	11	
HCM Lane LOS	A				B	
HCM 95th %tile Q(veh)	0.071	-	-	-	0.77	
Notes						
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined						

Lanes, Volumes, Timings
12: SR165/Driveway & SR410

2013 Volumes

9/15/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	583	105	217	748	2	101	0	99	0	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		200	100		0	100		0	25		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997	0.850					0.850			0.850	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	1863	1764	1504	1770	1863	0	1770	1583	0	1863	1583	0
Flt Permitted				0.306			0.753					
Satd. Flow (perm)	1863	1764	1504	570	1863	0	1403	1583	0	1863	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3	103					276			184	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		715			623			611			116	
Travel Time (s)		16.3			14.2			13.9			2.6	
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
Adj. Flow (vph)	0	634	114	236	813	2	110	0	108	0	0	7
Shared Lane Traffic (%)			10%									
Lane Group Flow (vph)	0	645	103	236	815	0	110	108	0	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane					Yes			Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	

2013 Volumes-SR410-SR165-Ryan Road-post realignment 11/17/2013 2013 Volumes

Synchro 8 Light Report
Page 7

Lanes, Volumes, Timings
12: SR165/Driveway & SR410

2013 Volumes

9/15/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	40.0	40.0	40.0	40.0	40.0		20.0	20.0		20.0	20.0	
Total Split (%)	66.7%	66.7%	66.7%	66.7%	66.7%		33.3%	33.3%		33.3%	33.3%	
Maximum Green (s)	36.0	36.0	36.0	36.0	36.0		16.0	16.0		16.0	16.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		Min	Min		Min	Min	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)		26.2	26.2	26.2	26.2		9.3	9.3			9.3	
Actuated g/C Ratio		0.59	0.59	0.59	0.59		0.21	0.21			0.21	
v/c Ratio		0.62	0.11	0.70	0.74		0.37	0.20			0.01	
Control Delay		8.7	1.4	20.5	11.3		21.8	0.8			0.0	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Delay		8.7	1.4	20.5	11.3		21.8	0.8			0.0	
LOS		A	A	C	B		C	A			A	
Approach Delay		7.7			13.4			11.4			0.0	
Approach LOS		A			B			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 44.3

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 11.0

Intersection LOS: B

Intersection Capacity Utilization 67.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 12: SR165/Driveway & SR410



Lanes and Geometrics
12: SR165/Driveway & SR410

2013 Volumes

9/15/2014

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%		0%		0%		0%		0%		0%	
Storage Length (ft)	150		200	100		0	100		0	25		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt	0.997		0.850					0.850			0.850	
Flt Protected			0.950				0.950					
Satd. Flow (prot)	1863	1764	1504	1770	1863	0	1770	1583	0	1863	1583	0
Flt Permitted			0.306				0.753					
Satd. Flow (perm)	1863	1764	1504	570	1863	0	1403	1583	0	1863	1583	0
Right Turn on Red			Yes				Yes		Yes		Yes	
Satd. Flow (RTOR)	3		103					276			184	
Link Speed (mph)	30				30			30			30	
Link Distance (ft)	715				623			611			116	
Travel Time (s)	16.3				14.2			13.9			2.6	

Intersection Summary

Area Type: Other

Queues
12: SR165/Driveway & SR410

2013 Volumes

9/15/2014

							
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	645	103	236	815	110	108	7
v/c Ratio	0.62	0.11	0.70	0.74	0.37	0.20	0.01
Control Delay	8.7	1.4	20.5	11.3	21.8	0.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.7	1.4	20.5	11.3	21.8	0.8	0.0
Queue Length 50th (ft)	84	0	32	114	26	0	0
Queue Length 95th (ft)	201	13	#160	275	69	0	0
Internal Link Dist (ft)	635			543		531	36
Turn Bay Length (ft)		200	100		100		
Base Capacity (vph)	1427	1236	461	1507	551	789	734
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.08	0.51	0.54	0.20	0.14	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

Two Way Analysis cannot be performed on Signalized Intersection.

Intersection

Intersection Delay, s/veh 3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	19	17	4	34	53	48	8	133	12	25	264	33
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	100	-	-	100	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	98	98	98	98	92	98	92	98	92	92	92
Heavy Vehicles, %	2	0	0	1	1	2	2	2	2	2	2	2
Mvmt Flow	21	17	4	35	54	52	8	145	12	27	287	36

Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	579	532	305	537	544	151	323	0	0	157	0	0
Stage 1	359	359	-	167	167	-	-	-	-	-	-	-
Stage 2	220	173	-	370	377	-	-	-	-	-	-	-
Follow-up Headway	3.518	4	3.3	3.509	4.009	3.318	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	426	456	740	456	448	895	1237	-	-	1423	-	-
Stage 1	659	631	-	837	762	-	-	-	-	-	-	-
Stage 2	782	760	-	652	618	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	356	444	740	432	437	895	1237	-	-	1423	-	-
Mov Capacity-2 Maneuver	356	444	-	432	437	-	-	-	-	-	-	-
Stage 1	655	619	-	832	757	-	-	-	-	-	-	-
Stage 2	679	755	-	618	606	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.3	13.2	0.4	0.6
HCM LOS	B	B		

Minor Lane / Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1237	-	-	356	443	432	564	1423	-	-
HCM Lane V/C Ratio	0.007	-	-	0.039	0.064	0.054	0.209	0.019	-	-
HCM Control Delay (s)	7.93	-	-	15.5	13.7	13.8	13.1	7.579	-	-
HCM Lane LOS	A			C	B	B	B	A		
HCM 95th %tile Q(veh)	0.02	-	-	0.12	0.204	0.169	0.781	0.058	-	-

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection						
Intersection Delay, s/veh	4.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	25	30	90	90	80	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	31	38	112	112	100	56
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	225	0	-	0	269	169
Stage 1	-	-	-	-	169	-
Stage 2	-	-	-	-	100	-
Follow-up Headway	2.2	-	-	-	3.509	3.309
Pot Capacity-1 Maneuver	1356	-	-	-	722	878
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	927	-
Time blocked-Platoon, %	-	-	-	-	-	-
Mov Capacity-1 Maneuver	1356	-	-	-	705	878
Mov Capacity-2 Maneuver	-	-	-	-	705	-
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	906	-
Approach	EB	WB	SB			
HCM Control Delay, s	3.5	0	11			
HCM LOS			B			
Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1356	-	-	-	759	
HCM Lane V/C Ratio	0.023	-	-	-	0.206	
HCM Control Delay (s)	7.717	-	-	-	11	
HCM Lane LOS	A				B	
HCM 95th %tile Q(veh)	0.071	-	-	-	0.77	
Notes						
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined						

Intersection												
Intersection Delay, s/veh	35.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	583	105	217	748	2	101	0	99	0	0	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	150	-	200	100	-	-	100	-	-	25	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	634	114	236	813	2	110	0	108	0	0	7
Major/Minor	Major1		Major2			Minor1			Minor2			
Conflicting Flow All	815	0	0	634	0	0	1923	1921	634	1974	1920	814
Stage 1	-	-	-	-	-	-	634	634	-	1286	1286	-
Stage 2	-	-	-	-	-	-	1289	1287	-	688	634	-
Follow-up Headway	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Capacity-1 Maneuver	812	-	-	949	-	-	# 51	67	479	47	67	378
Stage 1	-	-	-	-	-	-	467	473	-	202	235	-
Stage 2	-	-	-	-	-	-	201	235	-	436	473	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	812	-	-	949	-	-	# 41	50	479	29	50	378
Mov Capacity-2 Maneuver	-	-	-	-	-	-	# 41	50	-	29	50	-
Stage 1	-	-	-	-	-	-	467	473	-	202	177	-
Stage 2	-	-	-	-	-	-	148	177	-	338	473	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0		2.3			\$ 318			14.7			
HCM LOS						F			B			
Minor Lane / Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2		
Capacity (veh/h)	41	129	812	-	-	949	-	-	0	378		
HCM Lane V/C Ratio	1.785	1.118	-	-	-	0.249	-	-	+	0.017		
HCM Control Delay (s)	\$ 588.4	180.8	0	-	-	10.044	-	-	0	14.7		
HCM Lane LOS	F	F	A			B			A	B		
HCM 95th %tile Q(veh)	7.624	8.365	0	-	-	0.981	-	-	+	0.053		
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

Table 8. Pedestrian Ratings								
Multiply Pedestrian Safety Factors and divide by 100 to obtain index:								
$((\text{Ped Type} + \text{Ped Vol}) \times \text{AWDT} \times \text{SW} \times \text{Speed} \times \text{RW}) / 100 = \text{INDEX}$								
Ped Type Factor :			Ped Volume Factor:					
is 1.00 plus			1.0 < 10 peds/day					
0.75 if there are handicapped, or			1.1 < 50 peds/day					
school children, or elderly users			1.2 < 100 peds/day					
Assumed Horizon Year			2035					
Assumed growth factor:			3%					
Multiply Factors for rating:		(Add type+volume)		Vehicle Volume	Shoulder Width	Speed Limit	Road Width	Rating
		Ped Type	Ped Volume	(AWDT) ^{1/3}	2(10-SW) Shoulder Factor Range:	(SPD/2) ^{2/3} Speed Factor Range:	(30-RW) ^{1/3} Road Width Range:	PROD / 100
		1.00 + 0.75 if HC/sch	Ped Factor Range:	Volume Factor Range:				
		1.00 - 1.75	2.00 - 2.95	10-20	12-18	4-10	1.0 - 2.5	
1	Mundy Loss Rd (South of 112 St SE)	Ped Type	Ped Volume	Vehicle Volume	Shoulder Width	Speed Limit	Road Width	INDEX
	East Shoulder	1	1.1	6,150	0.5	35	21	102
	West Shoulder	1	1.1	6,150	0.5	35	21	102
	2013 Rating	1	1.1	6,150	0.5	35	21	102
	2035 Rating	1.75	1.2	11,780	0.5	35	21	179
Mitigated	2035 Rating	1.75	1.2	11,780	5	35	22	90
2	Mundy Loss Rd (112 St SE - SR410)	Ped Type	Ped Volume	Vehicle Volume	Shoulder Width	Speed Limit	Road Width	INDEX
	East Shoulder	1	1.1	6,220	1.5	35	21	92
	West Shoulder	1	1.1	6,220	1.5	35	21	92
	2013 Rating	1	1.1	6,220	1.5	35	21	92
	2035 Rating	1.75	1.2	11,920	1.5	35	21	161
Mitigated	2035 Rating	1.75	1.2	11,920	5	35	23	87

3	Ryan Road (Spiketon Rd- Levesque Rd)	Ped Type	Ped Volume	Vehicle Volume	Shoulder Width	Speed Limit	Road Width	INDEX
	East Shoulder	1	1.1	2,770	0.5	35	21	79
	West Shoulder	1	1.1	2,770	0.5	35	21	79
	2013 Rating	1	1.1	2,770	0.5	35	21	79
	2035 Rating	1.75	1.2	5,310	0.5	35	21	137
Mitigated	2035 Rating	1.75	1.2	5,310	5	35	21	72
4	Mundy Loss Rd (North of Hinkleman Rd)	Ped Type	Ped Volume	Vehicle Volume	Shoulder Width	Speed Limit	Road Width	INDEX
	East Shoulder	1	1.1	1,600	0.5	35	21	65
	West Shoulder	1	1.1	1,600	0.5	35	21	65
	2013 Rating	1	1.1	1,600	0.5	35	21	65
	2035 Rating	1.75	1.2	3,070	0.5	35	21	114
Mitigated	2035 Rating	1.75	1.2	3,070	5	35	21	60
5	W Mason Rd (Natches - Hinkleman Ext)	Ped Type	Ped Volume	Vehicle Volume	Shoulder Width	Speed Limit	Road Width	INDEX
	North Shoulder	1	1.1	2,500	0.5	35	21	76
	South Shoulder	1	1.1	2,500	5	35	21	40
	2013 Rating	1	1.1	2,500	0.5	35	21	76
	2035 Rating	1.75	1.2	4,790	0.5	35	21	132
Mitigated	2035 Rating	1.75	1.2	4,790	5	35	21	70
6	112 St SE (West of SR165)	Ped Type	Ped Volume	Vehicle Volume	Shoulder Width	Speed Limit	Road Width	INDEX
	North Shoulder	1	1.1	1,700	4	35	21	42
	South Shoulder	1	1.1	1,700	6	35	21	28

	2013 Rating	1	1.1	1,700	4	35	21	42
	2035 Rating	1.75	1.2	3,260	0.5	35	21	117
Mitigated	2035 Rating	1.75	1.2	3,260	5	35	21	61
7	Spiketon Rd (South of Mt View Ave)	Ped Type	Ped Volume	Vehicle Volume	Shoulder Width	Speed Limit	Road Width	INDEX
	East Shoulder	1	1.1	1020	0.5	35	21	56
	West Shoulder	1	1.1	1020	5	35	21	30
	2013 Rating	1	1.1	1020	0.5	35	21	56
	2035 Rating	1.75	1.2	1,950	0.5	35	21	98
Mitigated	2035 Rating	1.75	1.2	1,950	5	35	21	52
8	Collins Rd (Sergeant - Levesque Rd)	Ped Type	Ped Volume	Vehicle Volume	Shoulder Width	Speed Limit	Road Width	INDEX
	East Shoulder	1	1.1	820	0.5	25	21	42
	West Shoulder	1	1.1	820	0.5	25	21	42
	2013 Rating	1	1.1	820	0.5	25	21	42
	2035 Rating	1.75	1.2	1,570	0.5	25	21	73
	2035 Rating	1.75	1.2	2,900	0.5	25	21	90
Mitigated	2035 Rating	1.75	1.2	1,570	5	25	21	38
8	Levesque Rd	Ped Type	Ped Volume	Vehicle Volume	Shoulder Width	Speed Limit	Road Width	INDEX
	East Shoulder	1	1.1	430	0.5	25	21	34
	West Shoulder	1	1.1	430	0.5	25	21	34
	2013 Rating	1	1.1	430	0.5	25	21	34
	2035 Rating	1.75	1.2	820	0.5	25	21	59
Mitigated	2035 Rating	1.75	1.2	820	5	25	21	31

Pedestrian Rating	Level of Service
<40	A
40 –	50 B
50 –	70 C
70 –	90 D
90 –	110 E
>110	F

Intersection												
Intersection Delay, s/veh	13											
Intersection LOS	B											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	257	48	23	11	86	4	13	102	10	0	34	155
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
Heavy Vehicles, %	2	2	2	6	6	6	2	2	2	0	0	0
Mvmt Flow	317	59	28	14	106	5	16	126	12	0	42	191
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	16	10.2	10.7	10.8
HCM LOS	C	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	78%	11%	0%
Vol Thru, %	82%	15%	85%	18%
Vol Right, %	8%	7%	4%	82%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	125	328	101	189
LT Vol	102	48	86	34
Through Vol	10	23	4	155
RT Vol	13	257	11	0
Lane Flow Rate	154	405	125	233
Geometry Grp	1	1	1	1
Degree of Util (X)	0.247	0.599	0.198	0.334
Departure Headway (Hd)	5.763	5.324	5.726	5.148
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	620	676	625	695
Service Time	3.819	3.363	3.782	3.2
HCM Lane V/C Ratio	0.248	0.599	0.2	0.335
HCM Control Delay	10.7	16	10.2	10.8
HCM Lane LOS	B	C	B	B
HCM 95th-tile Q	1	4	0.7	1.5

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Two Way Analysis cannot be performed on an All Way Stop Intersection.

Intersection												
Intersection Delay, s/veh	55.7											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	0	8	17	2	33	6	1194	63	59	1836	4
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	95	95	95	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	2	2	2	2	2	2
Mvmt Flow	0	0	8	18	2	35	7	1298	68	64	1996	4
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	3490	3505	1998	3475	3473	1332	2000	0	0	1366	0	0
Stage 1	2126	2126	-	1345	1345	-	-	-	-	-	-	-
Stage 2	1364	1379	-	2130	2128	-	-	-	-	-	-	-
Follow-up Headway	3.5	4	3.3	3.5	4	3.3	2.218	-	-	2.218	-	-
Pot Capacity-1 Maneuver	4	6	76	# 4	7	191	286	-	-	503	-	-
Stage 1	66	91	-	189	222	-	-	-	-	-	-	-
Stage 2	184	214	-	66	91	-	-	-	-	-	-	-
Time blocked-Platoon, %								-	-		-	-
Mov Capacity-1 Maneuver	2	5	76	# 3	6	191	286	-	-	503	-	-
Mov Capacity-2 Maneuver	2	5	-	# 3	6	-	-	-	-	-	-	-
Stage 1	59	91	-	169	199	-	-	-	-	-	-	-
Stage 2	133	192	-	59	91	-	-	-	-	-	-	-
Approach	SE		NW		NE		SW					
HCM Control Delay, s	58.2		\$ 3533.9		0.1		0.4					
HCM LOS	F		F									
Minor Lane / Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR				
Capacity (veh/h)	286	-	-	8	76	503	-	-				
HCM Lane V/C Ratio	0.023	-	-	6.842	0.111	0.127	-	-				
HCM Control Delay (s)	17.881	0	-	\$ 3533.9	58.2	13.2	0	-				
HCM Lane LOS	C	A		F	F	B	A					
HCM 95th %tile Q(veh)	0.07	-	-	8.312	0.359	0.435	-	-				
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

Lanes, Volumes, Timings
3: Mundy Loss Road & SR 410

2035 Baseline

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	1035	161	230	1399	48	169	40	165	54	80	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		100	100		0	0		100	0		100
Storage Lanes	1		1	1		0	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.995				0.850			0.850
Flt Protected	0.950			0.950				0.961			0.980	
Satd. Flow (prot)	1770	1863	1583	1787	1872	0	0	1826	1615	0	1862	1615
Flt Permitted	0.950			0.950				0.580			0.566	
Satd. Flow (perm)	1770	1863	1583	1787	1872	0	0	1102	1615	0	1075	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		4				168			109
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		680			655			1371			719	
Travel Time (s)		13.2			12.8			31.2			16.3	
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
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	26	1056	164	235	1428	49	172	41	168	55	82	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	1056	164	235	1477	0	0	213	168	0	137	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		6

2035 Mundy Loss Road Volumes 11/17/2035 2035 Baseline
Rory Cameron

Synchro 8 Light Report
Page 1

Lanes, Volumes, Timings
3: Mundy Loss Road & SR 410

2035 Baseline

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4	4	3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0		20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	8.0	54.0	54.0	16.0	62.0		20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	8.9%	60.0%	60.0%	17.8%	68.9%		22.2%	22.2%	22.2%	22.2%	22.2%	22.2%
Maximum Green (s)	4.0	50.0	50.0	12.0	58.0		16.0	16.0	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0		0	0	0	0	0	0
Act Effect Green (s)	4.0	50.0	50.0	12.0	62.8		16.0	16.0		16.0	16.0	16.0
Actuated g/C Ratio	0.04	0.56	0.56	0.13	0.70		0.18	0.18		0.18	0.18	0.18
v/c Ratio	0.33	1.02	0.18	0.99	1.13		1.09	0.40		0.72	0.06	0.06
Control Delay	53.4	55.0	4.2	96.7	86.2		129.0	8.4		57.5	0.3	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	53.4	55.0	4.2	96.7	86.2		129.0	8.4		57.5	0.3	0.3
LOS	D	E	A	F	F		F	A		E	A	A
Approach Delay		48.3			87.7		75.8			49.3		
Approach LOS		D			F		E			D		

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 70.6

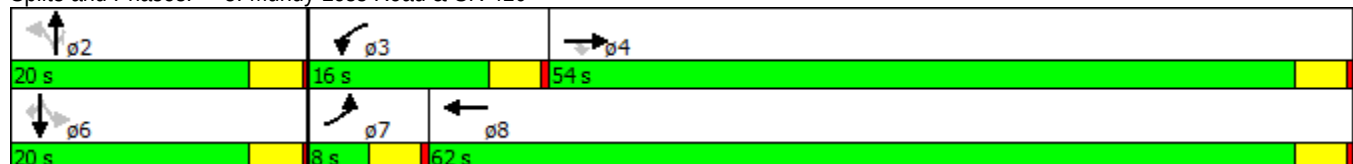
Intersection LOS: E

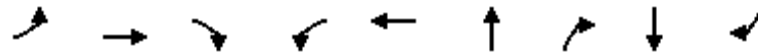
Intersection Capacity Utilization 108.0%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 3: Mundy Loss Road & SR 410





Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	26	1056	164	235	1477	213	168	137	23
v/c Ratio	0.33	1.02	0.18	0.99	1.13	1.09	0.40	0.72	0.06
Control Delay	53.4	55.0	4.2	96.7	86.2	129.0	8.4	57.5	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.4	55.0	4.2	96.7	86.2	129.0	8.4	57.5	0.3
Queue Length 50th (ft)	15	~604	14	135	~946	~138	0	74	0
Queue Length 95th (ft)	41	#881	42	#282	#1309	#276	53	#164	0
Internal Link Dist (ft)		600			575	1291		639	
Turn Bay Length (ft)	100		100	100			100		100
Base Capacity (vph)	78	1035	927	238	1307	195	425	191	376
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	1.02	0.18	0.99	1.13	1.09	0.40	0.72	0.06

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Capacity Analysis

3: Mundy Loss Road & SR 410

2035 Baseline
12/5/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	1035	161	230	1399	48	169	40	165	54	80	23
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1881	1881	1900	1900	1900	1900	1900	1900	1900
Lanes	1	1	1	1	1	0	0	1	1	0	1	1
Lane Assignment												
Cap, veh/h	38	1035	880	239	1207	41	72	0	287	56	62	287
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
Prop Arrive On Green	0.02	0.56	0.56	0.13	0.67	0.67	0.18	0.18	0.18	0.18	0.18	0.18
Ln Grp Delay, s/veh	63.8	53.2	10.0	92.4	0.0	105.7	956.9	0.0	42.4	170.1	0.0	31.4
Ln Grp LOS	E	F	B	F		F	F		D	F		C
Approach Vol, veh/h	1246			1712			381			160		
Approach Delay, s/veh	47.8			103.9			553.7			150.1		
Approach LOS	D			F			F			F		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6	7	8				
Case No		7.0	2.0	3.0		7.0	2.0	4.0				
Phs Duration (G+Y+Rc), s		20.0	16.0	54.0		20.0	5.9	64.1				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Allow Headway (MAH), s		4.9	3.8	5.1		4.9	3.8	5.1				
Max Green (Gmax), s		16.0	12.0	50.0		16.0	4.0	58.0				
Max Q Clear (g_c+I1), s		18.0	13.8	52.0		18.0	3.3	62.1				
Green Ext Time (g_e), s		0.0	0.0	0.0		0.0	0.0	0.0				
Prob of Phs Call (p_c)		1.00	1.00	1.00		1.00	0.48	1.00				
Prob of Max Out (p_x)		1.00	1.00	1.00		1.00	1.00	1.00				
Left-Turn Movement Data												
Assigned Mvmt		5	3			1	7					
Mvmt Sat Flow, veh/h		0	1792			0	1774					
Through Movement Data												
Assigned Mvmt		2	4			6	8					
Mvmt Sat Flow, veh/h		0	1863			348	1808					
Right-Turn Movement Data												
Assigned Mvmt		12	14			16	18					
Mvmt Sat Flow, veh/h		1615	1583			1615	62					
Left Lane Group Data												
Assigned Mvmt		0	5	3	0	0	1	7	0			
Lane Assignment		L+T L (Prot)					L+T L (Prot)					
Lanes in Grp		0	1	1	0	0	1	1	0			
Grp Vol (v), veh/h		0	213	235	0	0	137	26	0			
Grp Sat Flow (s), veh/h/ln		0	0	1792	0	0	348	1774	0			
Q Serve Time (g_s), s		0.0	0.0	11.8	0.0	0.0	0.0	1.3	0.0			

HCM 2010 Signalized Intersection Capacity Analysis

3: Mundy Loss Road & SR 410

2035 Baseline
12/5/2016

Cycle Q Clear Time (g_c), s	0.0	16.0	11.8	0.0	0.0	16.0	1.3	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	1309	0	0	0	1191	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	16.0	0.0	0.0	0.0	16.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.81	1.00	0.00	0.00	0.40	1.00	0.00
Lane Grp Cap (c), veh/h	0	72	239	0	0	118	38	0
V/C Ratio (X)	0.00	2.95	0.98	0.00	0.00	1.16	0.69	0.00
Avail Cap (c_a), veh/h	0	72	239	0	0	118	79	0
Upstream Filter (I)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d1), s/veh	0.0	45.0	38.9	0.0	0.0	37.4	43.7	0.0
Incr Delay (d2), s/veh	0.0	911.9	53.5	0.0	0.0	132.7	20.1	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	956.9	92.4	0.0	0.0	170.1	63.8	0.0
1st-Term Q (Q1), veh/ln	0.0	1.6	5.2	0.0	0.0	2.7	0.6	0.0
2nd-Term Q (Q2), veh/ln	0.0	18.3	3.5	0.0	0.0	4.3	0.2	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	20.0	8.7	0.0	0.0	7.0	0.8	0.0
%ile Storage Ratio (RQ%)	0.00	0.38	2.19	0.00	0.00	0.26	0.20	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	35.2	0.0	0.0	0.0	4.8	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.7	0.0	0.0	0.0	0.3	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T							
Lanes in Grp	0	0	0	1	0	0	0	0
Grp Vol (v), veh/h	0	0	0	1056	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	1863	0	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	1035	0	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	1.02	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	1035	0	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	33.2	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
Control Delay (d), s/veh	0.0	0.0	0.0	53.2	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	19.8	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	9.6	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	29.4	0.0	0.0	0.0	0.0

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Synchro 8 Light Report
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HCM 2010 Signalized Intersection Capacity Analysis

3: Mundy Loss Road & SR 410

2035 Baseline
12/5/2016

%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.18	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		R		R		R		T+R
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	168	0	164	0	23	0	1477
Grp Sat Flow (s), veh/h/ln	0	1615	0	1583	0	1615	0	1870
Q Serve Time (g_s), s	0.0	8.6	0.0	4.6	0.0	1.1	0.0	60.1
Cycle Q Clear Time (g_c), s	0.0	8.6	0.0	4.6	0.0	1.1	0.0	60.1
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.03
Lane Grp Cap (c), veh/h	0	287	0	880	0	287	0	1249
V/C Ratio (X)	0.00	0.59	0.00	0.19	0.00	0.08	0.00	1.18
Avail Cap (c_a), veh/h	0	287	0	880	0	287	0	1249
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	34.0	0.0	9.9	0.0	30.9	0.0	15.0
Incr Delay (d2), s/veh	0.0	8.5	0.0	0.1	0.0	0.5	0.0	90.7
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	42.4	0.0	10.0	0.0	31.4	0.0	105.7
1st-Term Q (Q1), veh/ln	0.0	3.4	0.0	1.5	0.0	0.4	0.0	21.9
2nd-Term Q (Q2), veh/ln	0.0	0.7	0.0	0.0	0.0	0.0	0.0	31.5
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	4.0	0.0	1.6	0.0	0.5	0.0	53.3
%ile Storage Ratio (RQ%)	0.00	1.01	0.00	0.40	0.00	0.11	0.00	2.20
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.1
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Intersection Summary								
HCM 2010 Ctrl Delay	135.0							
HCM 2010 LOS	F							
Notes								

Two Way Analysis cannot be performed on Signalized Intersection.

Lanes, Volumes, Timings
6: Mundy Loss Road & 112th ST E

2035 Baseline

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	25	77	46	84	42	59	280	11	13	391	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.936			0.967			0.996			0.976	
Flt Protected		0.982			0.987			0.992			0.999	
Satd. Flow (prot)	0	1729	0	0	1795	0	0	1877	0	0	1834	0
Flt Permitted		0.982			0.987			0.992			0.999	
Satd. Flow (perm)	0	1729	0	0	1795	0	0	1877	0	0	1834	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		647			701			660			1371	
Travel Time (s)		14.7			15.9			15.0			31.2	
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
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	66	27	83	49	90	45	63	301	12	14	420	95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	176	0	0	184	0	0	376	0	0	529	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	66.7%											
Analysis Period (min)	15											
	ICU Level of Service C											

Intersection												
Intersection Delay, s/veh	24.3											
Intersection LOS	C											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	61	25	77	46	84	42	59	280	11	13	391	88
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
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	1	1	1
Mvmt Flow	66	27	83	49	90	45	63	301	12	14	420	95
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	13.5	14	20.1	34.5
HCM LOS	B	B	C	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	17%	37%	27%	3%
Vol Thru, %	80%	15%	49%	79%
Vol Right, %	3%	47%	24%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	350	163	172	492
LT Vol	280	25	84	391
Through Vol	11	77	42	88
RT Vol	59	61	46	13
Lane Flow Rate	376	175	185	529
Geometry Grp	1	1	1	1
Degree of Util (X)	0.649	0.337	0.359	0.859
Departure Headway (Hd)	6.205	6.919	6.995	5.848
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	580	517	512	619
Service Time	4.272	5	5.075	3.907
HCM Lane V/C Ratio	0.648	0.338	0.361	0.855
HCM Control Delay	20.1	13.5	14	34.5
HCM Lane LOS	C	B	B	D
HCM 95th-tile Q	4.7	1.5	1.6	9.6

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Two Way Analysis cannot be performed on an All Way Stop Intersection.

Lanes, Volumes, Timings
3: SR410 & W Main St/E Main St

2035 Projection

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	40	103	2	236	65	54	10	1025	153	88	1677	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.980			0.981			0.998	
Flt Protected		0.986			0.968		0.950			0.950		
Satd. Flow (prot)	0	1870	0	0	1785	0	1787	1845	0	1770	1859	0
Flt Permitted		0.881			0.621		0.043			0.046		
Satd. Flow (perm)	0	1671	0	0	1145	0	81	1845	0	86	1859	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					6			14			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		466			386			454			1270	
Travel Time (s)		10.6			8.8			10.3			28.9	
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
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Adj. Flow (vph)	42	107	2	246	68	56	10	1068	159	92	1747	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	151	0	0	370	0	10	1227	0	92	1767	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		

2035 Volumes-SR410-Main and Park Ave 11/17/2035 2035 Projection

Synchro 8 Light Report
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Lanes, Volumes, Timings
3: SR410 & W Main St/E Main St

2035 Projection
12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	33.0	33.0		33.0	33.0		97.0	97.0		97.0	97.0	
Total Split (%)	25.4%	25.4%		25.4%	25.4%		74.6%	74.6%		74.6%	74.6%	
Maximum Green (s)	29.0	29.0		29.0	29.0		93.0	93.0		93.0	93.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Efect Green (s)		29.0			29.0		93.0	93.0		93.0	93.0	
Actuated g/C Ratio		0.22			0.22		0.72	0.72		0.72	0.72	
v/c Ratio		0.41			1.42		0.18	0.93		1.51	1.33	
Control Delay		47.0			248.2		14.1	29.1		319.3	174.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		47.0			248.2		14.1	29.1		319.3	174.8	
LOS		D			F		B	C		F	F	
Approach Delay		47.0			248.2			29.0			181.9	
Approach LOS		D			F			C			F	
Intersection Summary												
Area Type:	Other											
Cycle Length: 130												
Actuated Cycle Length: 130												
Natural Cycle: 130												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 1.51												
Intersection Signal Delay: 130.8					Intersection LOS: F							
Intersection Capacity Utilization 122.5%					ICU Level of Service H							
Analysis Period (min) 15												

Splits and Phases: 3: SR410 & W Main St/E Main St

					
97 s			33 s		
					
97 s			33 s		

Queues
3: SR410 & W Main St/E Main St

2035 Projection
12/5/2016



Lane Group	EBT	WBT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	151	370	10	1227	92	1767
v/c Ratio	0.41	1.42	0.18	0.93	1.51	1.33
Control Delay	47.0	248.2	14.1	29.1	319.3	174.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	248.2	14.1	29.1	319.3	174.8
Queue Length 50th (ft)	110	~419	3	779	~55	~1941
Queue Length 95th (ft)	177	#620	12	#1250	#172	#2209
Internal Link Dist (ft)	386	306		374		1190
Turn Bay Length (ft)			100		100	
Base Capacity (vph)	372	260	57	1323	61	1330
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.41	1.42	0.18	0.93	1.51	1.33

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Capacity Analysis

3: SR410 & W Main St/E Main St

2035 Projection
12/5/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	40	103	2	236	65	54	10	1025	153	88	1677	19
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1881	1900	1881	1881	1900	1863	1863	1900
Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Lane Assignment												
Cap, veh/h	120	291	5	229	51	42	55	1145	170	121	1315	15
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
Prop Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.72	0.72	0.72	0.72	0.72	0.72
Ln Grp Delay, s/veh	43.2	0.0	0.0	151.1	0.0	0.0	72.0	0.0	29.0	93.9	0.0	171.7
Ln Grp LOS	D			F			E		C	F		F
Approach Vol, veh/h		151			370			1237			1859	
Approach Delay, s/veh		43.2			151.1			29.4			167.8	
Approach LOS		D			F			C			F	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs			2		4		6		8			
Case No			6.0		8.0		6.0		8.0			
Phs Duration (G+Y+Rc), s			97.0		33.0		97.0		33.0			
Change Period (Y+Rc), s			4.0		4.0		4.0		4.0			
Max Allow Headway (MAH), s			5.2		5.3		5.2		5.3			
Max Green (Gmax), s			93.0		29.0		93.0		29.0			
Max Q Clear (g_c+I1), s			95.0		11.3		95.0		31.0			
Green Ext Time (g_e), s			0.0		3.1		0.0		0.0			
Prob of Phs Call (p_c)			1.00		1.00		1.00		1.00			
Prob of Max Out (p_x)			1.00		0.05		1.00		1.00			
Left-Turn Movement Data												
Assigned Mvmt			5		7		1		3			
Mvmt Sat Flow, veh/h			272		381		453		821			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			1601		1303		1838		227			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			238		23		21		187			
Left Lane Group Data												
Assigned Mvmt		0	5	0	7	0	1	0	3			
Lane Assignment			L		L+T+R		L		L+T+R			
Lanes in Grp		0	1	0	1	0	1	0	1			
Grp Vol (v), veh/h		0	10	0	151	0	92	0	370			
Grp Sat Flow (s), veh/h/ln		0	272	0	1707	0	453	0	1235			
Q Serve Time (g_s), s		0.0	0.0	0.0	0.0	0.0	18.8	0.0	19.7			

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Cycle Q Clear Time (g_c), s	0.0	93.0	0.0	9.3	0.0	93.0	0.0	29.0
Perm LT Sat Flow (s_l), veh/h/ln	0	272	0	1287	0	453	0	1305
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1666	0	0	0	855
Perm LT Eff Green (g_p), s	0.0	93.0	0.0	29.0	0.0	93.0	0.0	29.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	18.8	0.0	19.7
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	18.8	0.0	19.7
Time to First Blk (g_f), s	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.28	0.00	1.00	0.00	0.66
Lane Grp Cap (c), veh/h	0	55	0	416	0	121	0	322
V/C Ratio (X)	0.00	0.18	0.00	0.36	0.00	0.76	0.00	1.15
Avail Cap (c_a), veh/h	0	55	0	416	0	121	0	322
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	65.0	0.0	42.7	0.0	58.3	0.0	53.8
Incr Delay (d2), s/veh	0.0	7.0	0.0	0.5	0.0	35.6	0.0	97.3
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	72.0	0.0	43.2	0.0	93.9	0.0	151.1
1st-Term Q (Q1), veh/ln	0.0	0.3	0.0	4.3	0.0	3.1	0.0	10.9
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.1	0.0	1.2	0.0	8.7
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.4	0.0	4.3	0.0	4.3	0.0	19.6
%ile Storage Ratio (RQ%)	0.00	0.11	0.00	0.27	0.00	1.10	0.00	1.88
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.1
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment								
Lanes in Grp	0	0	0	0	0	0	0	0
Grp Vol (v), veh/h	0	0	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	0	0	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	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
Control Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	T+R				T+R			
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	1227	0	0	0	1767	0	0
Grp Sat Flow (s), veh/h/ln	0	1839	0	0	0	1859	0	0
Q Serve Time (g_s), s	0.0	74.2	0.0	0.0	0.0	93.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	74.2	0.0	0.0	0.0	93.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.13	0.00	0.01	0.00	0.01	0.00	0.15
Lane Grp Cap (c), veh/h	0	1316	0	0	0	1330	0	0
V/C Ratio (X)	0.00	0.93	0.00	0.00	0.00	1.33	0.00	0.00
Avail Cap (c_a), veh/h	0	1316	0	0	0	1330	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	15.8	0.0	0.0	0.0	18.5	0.0	0.0
Incr Delay (d2), s/veh	0.0	13.2	0.0	0.0	0.0	153.2	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
Control Delay (d), s/veh	0.0	29.0	0.0	0.0	0.0	171.7	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	30.7	0.0	0.0	0.0	38.8	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	4.8	0.0	0.0	0.0	56.6	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	35.5	0.0	0.0	0.0	95.4	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	2.27	0.00	0.00	0.00	2.08	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	109.3	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	113.6							
HCM 2010 LOS	F							
Notes								

Two Way Analysis cannot be performed on Signalized Intersection.

Lanes, Volumes, Timings
6: S River Rd/N River Rd & E Main St

2035 Projection

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	34	259	92	46	224	11	77	92	82	8	102	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.968			0.995			0.956			0.961	
Flt Protected		0.996			0.992			0.985			0.997	
Satd. Flow (prot)	0	1832	0	0	1857	0	0	1789	0	0	1820	0
Flt Permitted		0.996			0.992			0.985			0.997	
Satd. Flow (perm)	0	1832	0	0	1857	0	0	1789	0	0	1820	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		386			744			543			1174	
Travel Time (s)		8.8			16.9			12.3			26.7	
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
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	37	278	99	49	241	12	83	99	88	9	110	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	414	0	0	302	0	0	270	0	0	168	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	57.3%											
Analysis Period (min)	15											
	ICU Level of Service B											

Intersection												
Intersection Delay, s/veh	19.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	34	259	92	46	224	11	77	92	82	8	102	46
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	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	37	278	99	49	241	12	83	99	88	9	110	49
Major/Minor	Major1		Major2			Minor1			Minor2			
Conflicting Flow All	253	0	0	377	0	0	826	753	328	841	797	247
Stage 1	-	-	-	-	-	-	401	401	-	346	346	-
Stage 2	-	-	-	-	-	-	425	352	-	495	451	-
Follow-up Headway	2.2	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1324	-	-	1187	-	-	293	341	718	287	322	797
Stage 1	-	-	-	-	-	-	630	604	-	674	639	-
Stage 2	-	-	-	-	-	-	611	635	-	560	574	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1324	-	-	1187	-	-	184	313	718	179	296	797
Mov Capacity-2 Maneuver	-	-	-	-	-	-	184	313	-	179	296	-
Stage 1	-	-	-	-	-	-	607	582	-	650	608	-
Stage 2	-	-	-	-	-	-	447	605	-	393	553	-
Approach	EB		WB			NE			SW			
HCM Control Delay, s	0.7		1.3			64.9			24.5			
HCM LOS						F			C			
Minor Lane / Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1				
Capacity (veh/h)	304	1324	-	-	1187	-	-	349				
HCM Lane V/C Ratio	0.888	0.028	-	-	0.042	-	-	0.481				
HCM Control Delay (s)	64.9	7.796	0	-	8.165	0	-	24.5				
HCM Lane LOS	F	A	A		A	A		C				
HCM 95th %tile Q(veh)	8.152	0.085	-	-	0.13	-	-	2.5				
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

Lanes, Volumes, Timings
10: SR410 & Park Ave

2035 Projection

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	153	27	31	50	33	149	59	987	38	310	1784	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		100	100		0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.913				0.850		0.988	
Flt Protected		0.965			0.989		0.950			0.950		
Satd. Flow (prot)	0	1797	0	0	1716	0	1787	1881	1599	1770	1840	0
Flt Permitted		0.320			0.919		0.043			0.092		
Satd. Flow (perm)	0	596	0	0	1594	0	81	1881	1599	171	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			65				25		11	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		589			200			1270			240	
Travel Time (s)		13.4			4.5			28.9			5.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	2%	2%	2%
Adj. Flow (vph)	191	34	39	62	41	186	74	1234	48	388	2230	196
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	264	0	0	289	0	74	1234	48	388	2426	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		

2035 Volumes-SR410-Main and Park Ave 11/17/2035 2035 Projection

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Lanes, Volumes, Timings
10: SR410 & Park Ave

2035 Projection

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	24.0	24.0		24.0	24.0		96.0	96.0	96.0	96.0	96.0	
Total Split (%)	20.0%	20.0%		20.0%	20.0%		80.0%	80.0%	80.0%	80.0%	80.0%	
Maximum Green (s)	20.0	20.0		20.0	20.0		92.0	92.0	92.0	92.0	92.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5	0.5	0.5	0.5	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)		20.0			20.0		92.0	92.0	92.0	92.0	92.0	
Actuated g/C Ratio		0.17			0.17		0.77	0.77	0.77	0.77	0.77	
v/c Ratio		2.54			0.91		1.19	0.86	0.04	2.96	1.72	
Control Delay		741.4			69.8		199.1	17.3	2.0	918.1	344.9	
Queue Delay		0.0			0.0		0.0	0.1	0.0	0.0	0.0	
Total Delay		741.4			69.8		199.1	17.4	2.0	918.1	344.9	
LOS		F			E		F	B	A	F	F	
Approach Delay		741.4			69.8			26.8			424.0	
Approach LOS		F			E			C			F	
Intersection Summary												
Area Type:	Other											
Cycle Length: 120												
Actuated Cycle Length: 120												
Natural Cycle: 70												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 2.96												
Intersection Signal Delay: 306.0						Intersection LOS: F						
Intersection Capacity Utilization 145.5%						ICU Level of Service H						
Analysis Period (min) 15												

Splits and Phases: 10: SR410 & Park Ave

 02	 04
96 s	24 s
 06	 08
96 s	24 s

Queues
10: SR410 & Park Ave

2035 Projection
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Lane Group	EBT	WBT	NEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	264	289	74	1234	48	388	2426
v/c Ratio	2.54	0.91	1.19	0.86	0.04	2.96	1.72
Control Delay	741.4	69.8	199.1	17.3	2.0	918.1	344.9
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	741.4	69.8	199.1	17.4	2.0	918.1	344.9
Queue Length 50th (ft)	~342	175	~69	549	4	~422	~2797
Queue Length 95th (ft)	#447	#269	#99	558	10	#527	#2584
Internal Link Dist (ft)	509	120		1190			160
Turn Bay Length (ft)			100		100	100	
Base Capacity (vph)	104	319	62	1442	1231	131	1413
Starvation Cap Reductn	0	0	0	9	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	2.54	0.91	1.19	0.86	0.04	2.96	1.72

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Capacity Analysis
10: SR410 & Park Ave

2035 Projection
12/5/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	153	27	31	50	33	149	59	987	38	310	1784	157
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1881	1881	1881	1863	1863	1900
Lanes	0	1	0	0	1	0	1	1	1	1	1	0
Lane Assignment												
Cap, veh/h	253	35	0	208	127	0	60	1442	1226	198	1294	114
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
Prop Arrive On Green	0.17	0.17	0.00	0.17	0.17	0.00	0.77	0.77	0.77	0.77	0.77	0.77
Ln Grp Delay, s/veh	62.9	0.0	0.0	44.7	0.0	0.0	251.8	16.2	3.4	495.4	0.0	342.4
Ln Grp LOS	E			D			F	B	A	F		F
Approach Vol, veh/h		225			103			1356			2814	
Approach Delay, s/veh		62.9			44.7			28.6			363.5	
Approach LOS		E			D			C			F	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs			2		4		6		8			
Case No			5.0		8.0		6.0		8.0			
Phs Duration (G+Y+Rc), s			96.0		24.0		96.0		24.0			
Change Period (Y+Rc), s			4.0		4.0		4.0		4.0			
Max Allow Headway (MAH), s			5.3		5.3		5.3		5.3			
Max Green (Gmax), s			92.0		20.0		92.0		20.0			
Max Q Clear (g_c+I1), s			94.0		21.3		94.0		8.2			
Green Ext Time (g_e), s			0.0		0.0		0.0		1.5			
Prob of Phs Call (p_c)			1.00		1.00		1.00		1.00			
Prob of Max Out (p_x)			1.00		1.00		1.00		0.10			
Left-Turn Movement Data												
Assigned Mvmt			5		7		1		3			
Mvmt Sat Flow, veh/h			142		1185		429		961			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			1881		211		1688		761			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1599		0		148		0			
Left Lane Group Data												
Assigned Mvmt		0	5	0	7	0	1	0	3			
Lane Assignment			L		L+T		L		L+T			
Lanes in Grp		0	1	0	1	0	1	0	1			
Grp Vol (v), veh/h		0	74	0	225	0	388	0	103			
Grp Sat Flow (s), veh/h/ln		0	142	0	1395	0	429	0	1723			
Q Serve Time (g_s), s		0.0	0.0	0.0	13.0	0.0	38.6	0.0	0.0			

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Cycle Q Clear Time (g_c), s	0.0	92.0	0.0	19.3	0.0	92.0	0.0	6.2
Perm LT Sat Flow (s_l), veh/h/ln	0	142	0	1388	0	429	0	1396
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	1282	0	0	0	1716
Perm LT Eff Green (g_p), s	0.0	92.0	0.0	20.0	0.0	92.0	0.0	20.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	13.8	0.0	38.6	0.0	0.7
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	13.0	0.0	38.6	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	0.85	0.00	1.00	0.00	0.60
Lane Grp Cap (c), veh/h	0	60	0	288	0	198	0	335
V/C Ratio (X)	0.00	1.23	0.00	0.78	0.00	1.96	0.00	0.31
Avail Cap (c_a), veh/h	0	60	0	288	0	198	0	335
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	60.0	0.0	49.9	0.0	46.5	0.0	44.2
Incr Delay (d2), s/veh	0.0	191.8	0.0	12.9	0.0	448.9	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
Control Delay (d), s/veh	0.0	251.8	0.0	62.9	0.0	495.4	0.0	44.7
1st-Term Q (Q1), veh/ln	0.0	1.9	0.0	6.9	0.0	6.2	0.0	2.8
2nd-Term Q (Q2), veh/ln	0.0	3.2	0.0	1.0	0.0	24.7	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	5.1	0.0	8.0	0.0	30.9	0.0	2.9
%ile Storage Ratio (RQ%)	0.00	1.28	0.00	0.37	0.00	7.84	0.00	0.56
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	3.5	0.0	0.0	0.0	47.5	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.3	0.0	0.0	0.0	0.5	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T							
Lanes in Grp	0	1	0	0	0	0	0	0
Grp Vol (v), veh/h	0	1234	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	1881	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	53.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	53.4	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	1442	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.86	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	1442	0	0	0	0	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	6.7	0.0	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
Control Delay (d), s/veh	0.0	16.2	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	20.9	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	23.6	0.0	0.0	0.0	0.0	0.0	0.0

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10: SR410 & Park Ave

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%ile Storage Ratio (RQ%)	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	R				T+R			
Lanes in Grp	0	1	0	0	0	1	0	0
Grp Vol (v), veh/h	0	48	0	0	0	2426	0	0
Grp Sat Flow (s), veh/h/ln	0	1599	0	0	0	1837	0	0
Q Serve Time (g_s), s	0.0	0.9	0.0	0.0	0.0	92.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.9	0.0	0.0	0.0	92.0	0.0	0.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	0.00	0.00	0.08	0.00	0.00
Lane Grp Cap (c), veh/h	0	1226	0	0	0	1408	0	0
V/C Ratio (X)	0.00	0.04	0.00	0.00	0.00	1.72	0.00	0.00
Avail Cap (c_a), veh/h	0	1226	0	0	0	1408	0	0
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	3.4	0.0	0.0	0.0	14.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.0	328.4	0.0	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	3.4	0.0	0.0	0.0	342.4	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.3	0.0	0.0	0.0	35.2	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	128.4	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.3	0.0	0.0	0.0	163.6	0.0	0.0
%ile Storage Ratio (RQ%)	0.00	0.08	0.00	0.00	0.00	21.20	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	254.5	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	240.2							
HCM 2010 LOS	F							
Notes								

Two Way Analysis cannot be performed on Signalized Intersection.

Lanes, Volumes, Timings
11: N River Rd & N A St & Park Ave

2035 Projection

12/5/2016

												
Lane Group	EBL	EBR	EBR2	NBL2	NBL	NBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	109	211	92	2	113	13	54	31	2	11	36	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	25	0			0	0	0		0	0		0
Storage Lanes	1	1			1	0	0		0	0		0
Taper Length (ft)	25				25		25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.986			0.997			0.914	
Flt Protected	0.950				0.957			0.970			0.996	
Satd. Flow (prot)	1787	1599	0	0	1793	0	0	1801	0	0	1696	0
Flt Permitted	0.950				0.957			0.970			0.996	
Satd. Flow (perm)	1787	1599	0	0	1793	0	0	1801	0	0	1696	0
Link Speed (mph)	30				30			30			30	
Link Distance (ft)	157				926			1174			283	
Travel Time (s)	3.6				21.0			26.7			6.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	115	222	97	2	119	14	59	34	2	12	39	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	115	319	0	0	135	0	0	95	0	0	140	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				12			0			0	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15	15	9	15		9	15		9
Sign Control	Free				Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 36.8% ICU Level of Service A

Analysis Period (min) 15

Intersection										
Intersection Delay, s/veh	6									
Movement	EBL	EBR	NBL	NBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	109	211	113	13	54	31	2	11	36	82
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None
Storage Length	25	0	0	-	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0	-	-	0	-
Grade, %	0	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	1	1	0	0	2	2	2	2	2	2
Mvmt Flow	115	222	119	14	59	34	2	12	39	89
Major/Minor	Major1		Major2		Minor1			Minor2		
Conflicting Flow All	133	0	319	0	694	637	271	648	678	126
Stage 1	-	-	-	-	500	500	-	130	130	-
Stage 2	-	-	-	-	194	137	-	518	548	-
Follow-up Headway	2.209	-	2.2	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Capacity-1 Maneuver	1458	-	1252	-	357	395	768	383	374	924
Stage 1	-	-	-	-	553	543	-	874	789	-
Stage 2	-	-	-	-	808	783	-	541	517	-
Time blocked-Platoon, %		-		-						
Mov Capacity-1 Maneuver	1458	-	1252	-	277	363	768	333	344	924
Mov Capacity-2 Maneuver	-	-	-	-	277	363	-	333	344	-
Stage 1	-	-	-	-	509	500	-	805	787	-
Stage 2	-	-	-	-	692	781	-	463	476	-
Approach	EB		NB		NE			SW		
HCM Control Delay, s	2		0.1		21.9			13.4		
HCM LOS					C			B		
Minor Lane / Major Mvmt	NELn1	NBL2	NBL	NBR	EBL	EBR	EBR2	SWLn1		
Capacity (veh/h)	307	1252	-	-	1458	-	-	570		
HCM Lane V/C Ratio	0.308	0.002	-	-	0.079	-	-	0.246		
HCM Control Delay (s)	21.9	7.88	0	-	7.68	-	-	13.4		
HCM Lane LOS	C	A	A		A			B		
HCM 95th %tile Q(veh)	1.274	0.005	-	-	0.256	-	-	0.962		
Notes										
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined										

Lanes, Volumes, Timings
12: S A St/N A St & E Main St

2035 Projection

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	255	29	10	228	75	19	36	17	136	79	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.968			0.968			0.992	
Flt Protected		0.997			0.998			0.987			0.971	
Satd. Flow (prot)	0	1851	0	0	1836	0	0	1815	0	0	1830	0
Flt Permitted		0.997			0.998			0.987			0.971	
Satd. Flow (perm)	0	1851	0	0	1836	0	0	1815	0	0	1830	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		744			302			501			926	
Travel Time (s)		16.9			6.9			11.4			21.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	24	297	34	12	265	87	22	42	20	158	92	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	355	0	0	364	0	0	84	0	0	265	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	50.2%											
Analysis Period (min)	15											
	ICU Level of Service A											

Intersection												
Intersection Delay, s/veh	14.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	21	255	29	10	228	75	19	36	17	136	79	13
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	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	24	297	34	12	265	87	22	42	20	158	92	15
Major/Minor	Major1		Major2			Minor1			Minor2			
Conflicting Flow All	352	0	0	330	0	0	747	738	313	725	711	309
Stage 1	-	-	-	-	-	-	362	362	-	332	332	-
Stage 2	-	-	-	-	-	-	385	376	-	393	379	-
Follow-up Headway	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1212	-	-	1241	-	-	332	348	732	343	361	736
Stage 1	-	-	-	-	-	-	661	629	-	686	648	-
Stage 2	-	-	-	-	-	-	642	620	-	636	618	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1212	-	-	1241	-	-	252	336	732	294	348	736
Mov Capacity-2 Maneuver	-	-	-	-	-	-	252	336	-	294	348	-
Stage 1	-	-	-	-	-	-	645	614	-	670	640	-
Stage 2	-	-	-	-	-	-	532	613	-	563	603	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0.6		0.3			18.5			52.1			
HCM LOS						C			F			
Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	350	1212	-	-	1241	-	-	322				
HCM Lane V/C Ratio	0.239	0.02	-	-	0.009	-	-	0.823				
HCM Control Delay (s)	18.5	8.031	0	-	7.928	0	-	52.1				
HCM Lane LOS	C	A	A		A	A		F				
HCM 95th %tile Q(veh)	0.918	0.062	-	-	0.028	-	-	7.031				
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

Lanes, Volumes, Timings
3: SR165(River Rd)/SR165 & 112th St E/Ryan Rd

2035 Projection

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	33	8	65	102	10	15	255	23	44	506	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.971			0.986			0.988			0.983	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1845	0	1787	1853	0	1770	1840	0	1770	1831	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1845	0	1787	1853	0	1770	1840	0	1770	1831	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		745			456			374			611	
Travel Time (s)		16.9			10.4			8.5			13.9	
Peak Hour Factor	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	1%	1%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	39	34	8	66	104	11	15	277	23	48	550	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	42	0	66	115	0	15	300	0	48	618	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane								Yes			Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 53.5% ICU Level of Service A

Analysis Period (min) 15

Intersection												
Intersection Delay, s/veh	36.9											
Intersection LOS	E											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	36	33	8	65	102	10	15	255	23	44	506	63
Peak Hour Factor	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	1	1	2	2	2	2	2	2	2
Mvmt Flow	39	34	8	66	104	11	15	277	23	48	550	68
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	11.3	12.1	15.7	56.8
HCM LOS	B	B	C	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	92%	0%	80%	0%	91%	0%	89%
Vol Right, %	0%	8%	0%	20%	0%	9%	0%	11%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	15	278	36	41	65	112	44	569
LT Vol	0	255	0	33	0	102	0	506
Through Vol	0	23	0	8	0	10	0	63
RT Vol	15	0	36	0	65	0	44	0
Lane Flow Rate	15	301	39	42	66	115	48	618
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.029	0.531	0.09	0.088	0.146	0.235	0.086	1
Departure Headway (Hd)	6.93	6.362	8.245	7.555	7.927	7.35	6.469	5.884
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	521	571	441	480	458	494	551	612
Service Time	4.609	4.052	5.881	5.212	5.567	5.007	4.235	3.65
HCM Lane V/C Ratio	0.029	0.527	0.088	0.087	0.144	0.233	0.087	1.01
HCM Control Delay	9.8	16	11.7	10.9	11.9	12.2	9.8	60.4
HCM Lane LOS	A	C	B	B	B	B	A	F
HCM 95th-tile Q	0.1	3.1	0.3	0.3	0.5	0.9	0.3	15.1

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Two Way Analysis cannot be performed on an All Way Stop Intersection.

Lanes, Volumes, Timings
3: S Naches St & E Mason St

2035 Volumes-Mitigated Intersections

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	221	41	20	10	74	10	12	88	8	0	30	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.986			0.990			0.890	
Flt Protected		0.962			0.995			0.994				
Satd. Flow (prot)	0	1774	0	0	1759	0	0	1833	0	0	1691	0
Flt Permitted		0.962			0.995			0.994				
Satd. Flow (perm)	0	1774	0	0	1759	0	0	1833	0	0	1691	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		185			139			294			225	
Travel Time (s)		4.2			3.2			6.7			5.1	
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
Heavy Vehicles (%)	2%	2%	2%	6%	6%	6%	2%	2%	2%	0%	0%	0%
Adj. Flow (vph)	273	51	25	12	91	12	15	109	10	0	37	165
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	349	0	0	115	0	0	134	0	0	202	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	44.2%											
Analysis Period (min)	15											
ICU Level of Service A												

Intersection												
Intersection Delay, s/veh	11											
Intersection LOS	B											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	221	41	20	10	74	10	12	88	8	0	30	134
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
Heavy Vehicles, %	2	2	2	6	6	6	2	2	2	0	0	0
Mvmt Flow	273	51	25	12	91	12	15	109	10	0	37	165
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	12.8	9.5	9.8	9.7
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	11%	78%	11%	0%
Vol Thru, %	81%	15%	79%	18%
Vol Right, %	7%	7%	11%	82%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	108	282	94	164
LT Vol	88	41	74	30
Through Vol	8	20	10	134
RT Vol	12	221	10	0
Lane Flow Rate	133	348	116	202
Geometry Grp	1	1	1	1
Degree of Util (X)	0.202	0.485	0.173	0.268
Departure Headway (Hd)	5.458	5.122	5.364	4.877
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	661	707	672	741
Service Time	3.465	3.122	3.373	2.877
HCM Lane V/C Ratio	0.201	0.492	0.173	0.273
HCM Control Delay	9.8	12.8	9.5	9.7
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.8	2.7	0.6	1.1

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Lanes, Volumes, Timings
8: SR 410 & Wheeler Ave

2035 Volumes-Mitigated Intersections

12/5/2016

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	7	17	2	33	5	1030	55	51	1583	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865			0.914			0.992				
Flt Protected					0.984		0.950			0.950		
Satd. Flow (prot)	0	1644	0	0	1709	0	1770	1848	0	1770	1863	0
Flt Permitted					0.888		0.032			0.202		
Satd. Flow (perm)	0	1644	0	0	1542	0	60	1848	0	376	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		71			35			8				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		101			244			206			335	
Travel Time (s)		2.3			5.5			4.7			7.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	7	18	2	35	5	1120	60	55	1721	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	7	0	0	55	0	5	1180	0	55	1724	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		

2035 Volumes-Naches-Mason and SR410-Wheeler 2/7/2035 2035 Volumes-Mitigated Intersections

Synchro 8 Light Report
Page 3

Lanes, Volumes, Timings
8: SR 410 & Wheeler Ave

2035 Volumes-Mitigated Intersections

12/5/2016

												
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0		130.0	130.0		130.0	130.0	
Total Split (%)	13.3%	13.3%		13.3%	13.3%		86.7%	86.7%		86.7%	86.7%	
Maximum Green (s)	16.0	16.0		16.0	16.0		126.0	126.0		126.0	126.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		7.7			7.7		126.1	126.1		126.1	126.1	
Actuated g/C Ratio		0.05			0.05		0.89	0.89		0.89	0.89	
v/c Ratio		0.04			0.47		0.09	0.72		0.16	1.04	
Control Delay		0.6			43.0		5.2	5.6		2.4	44.0	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		0.6			43.0		5.2	5.6		2.4	44.0	
LOS		A			D		A	A		A	D	
Approach Delay		0.6			43.0			5.6			42.7	
Approach LOS		A			D			A			D	
Queue Length 50th (ft)		0			18		0	207		4	~1702	
Queue Length 95th (ft)		0			64		3	429		14	#2070	
Internal Link Dist (ft)		21			164			126			255	
Turn Bay Length (ft)							100			100		
Base Capacity (vph)		248			204		53	1643		334	1656	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.03			0.27		0.09	0.72		0.16	1.04	
Intersection Summary												
Area Type:	Other											
Cycle Length: 150												
Actuated Cycle Length: 141.8												
Natural Cycle: 150												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 1.04												
Intersection Signal Delay: 28.1					Intersection LOS: C							
Intersection Capacity Utilization 99.9%					ICU Level of Service F							
Analysis Period (min) 15												
~ Volume exceeds capacity, queue is theoretically infinite.												
Queue shown is maximum after two cycles.												

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: SR 410 & Wheeler Ave

 ø2	 ø4
20 s	130 s
 ø6	 ø8
20 s	130 s

HCM 2010 Signalized Intersection Capacity Analysis

8: SR 410 & Wheeler Ave

2035 Volumes-Mitigated Intersections

12/5/2016

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	0	0	7	17	2	33	5	1030	55	51	1583	3
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1863	1863	1900	1863	1863	1900
Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Lane Assignment												
Cap, veh/h	0	0	79	54	9	50	51	1567	84	386	1662	3
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
Prop Arrive On Green	0.00	0.00	0.05	0.05	0.05	0.05	0.89	0.89	0.89	0.89	0.89	0.89
Ln Grp Delay, s/veh	0.0	0.0	64.5	69.3	0.0	0.0	71.3	0.0	3.7	7.0	0.0	39.2
Ln Grp LOS			E	E			E		A	A		F
Approach Vol, veh/h		7			55			1185			1779	
Approach Delay, s/veh		64.5			69.3			4.0			38.2	
Approach LOS		E			E			A			D	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs			2		4		6		8			
Case No			8.0		6.0		8.0		6.0			
Phs Duration (G+Y+Rc), s			10.9		130.0		10.9		130.0			
Change Period (Y+Rc), s			4.0		4.0		4.0		4.0			
Max Allow Headway (MAH), s			5.5		5.2		5.5		5.2			
Max Green (Gmax), s			16.0		126.0		16.0		126.0			
Max Q Clear (g_c+l1), s			6.8		128.0		2.6		128.0			
Green Ext Time (g_e), s			0.1		0.0		0.2		0.0			
Prob of Phs Call (p_c)			1.00		1.00		1.00		1.00			
Prob of Max Out (p_x)			0.05		1.00		0.00		1.00			
Left-Turn Movement Data												
Assigned Mvmt			5		7		1		3			
Mvmt Sat Flow, veh/h			402		281		0		473			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			176		1752		0		1859			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1012		94		1615		3			
Left Lane Group Data												
Assigned Mvmt		0	5	0	7	0	1	0	3			
Lane Assignment			L+T+R		L				L			
Lanes in Grp		0	1	0	1	0	0	0	1			
Grp Vol (v), veh/h		0	55	0	5	0	0	0	55			
Grp Sat Flow (s), veh/h/ln		0	1590	0	281	0	0	0	473			
Q Serve Time (g_s), s		0.0	3.3	0.0	0.0	0.0	0.0	0.0	5.4			

HCM 2010 Signalized Intersection Capacity Analysis 8: SR 410 & Wheeler Ave

2035 Volumes-Mitigated Intersections

12/5/2016

Cycle Q Clear Time (g_c), s	0.0	4.8	0.0	126.0	0.0	0.0	0.0	31.8
Perm LT Sat Flow (s_l), veh/h/ln	0	1431	0	281	0	0	0	473
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	1900	0	0
Perm LT Eff Green (g_p), s	0.0	6.9	0.0	126.0	0.0	0.0	0.0	126.0
Perm LT Serve Time (g_u), s	0.0	6.3	0.0	0.0	0.0	0.0	0.0	99.6
Perm LT Q Serve Time (g_ps), s	0.0	3.3	0.0	0.0	0.0	0.0	0.0	5.4
Time to First Blk (g_f), s	0.0	1.5	0.0	0.0	0.0	6.9	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.33	0.00	1.00	0.00	0.00	0.00	1.00
Lane Grp Cap (c), veh/h	0	112	0	51	0	0	0	386
V/C Ratio (X)	0.00	0.49	0.00	0.10	0.00	0.00	0.00	0.14
Avail Cap (c_a), veh/h	0	212	0	51	0	0	0	386
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	65.9	0.0	70.4	0.0	0.0	0.0	6.8
Incr Delay (d2), s/veh	0.0	3.3	0.0	0.8	0.0	0.0	0.0	0.2
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	69.3	0.0	71.3	0.0	0.0	0.0	7.0
1st-Term Q (Q1), veh/ln	0.0	2.0	0.0	0.2	0.0	0.0	0.0	0.6
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	2.1	0.0	0.2	0.0	0.0	0.0	0.6
%ile Storage Ratio (RQ%)	0.00	0.25	0.00	0.05	0.00	0.00	0.00	0.16
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment								
Lanes in Grp	0	0	0	0	0	0	0	0
Grp Vol (v), veh/h	0	0	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	0	0	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	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
Control Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

2035 Volumes-Naches-Mason and SR410-Wheeler 2/7/2035 2035 Volumes-Mitigated Intersections

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HCM 2010 Signalized Intersection Capacity Analysis

8: SR 410 & Wheeler Ave

2035 Volumes-Mitigated Intersections

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%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment				T+R	T+R		T+R	
Lanes in Grp	0	0	0	1	0	1	0	1
Grp Vol (v), veh/h	0	0	0	1180	0	7	0	1724
Grp Sat Flow (s), veh/h/ln	0	0	0	1846	0	1615	0	1862
Q Serve Time (g_s), s	0.0	0.0	0.0	26.4	0.0	0.6	0.0	126.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	26.4	0.0	0.6	0.0	126.0
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.64	0.00	0.05	0.00	1.00	0.00	0.00
Lane Grp Cap (c), veh/h	0	0	0	1651	0	79	0	1665
V/C Ratio (X)	0.00	0.00	0.00	0.71	0.00	0.09	0.00	1.04
Avail Cap (c_a), veh/h	0	0	0	1651	0	183	0	1665
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	2.2	0.0	64.0	0.0	7.4
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.5	0.0	0.5	0.0	31.7
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	0.0	0.0	3.7	0.0	64.5	0.0	39.2
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	7.2	0.0	0.2	0.0	34.7
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.7	0.0	0.0	0.0	14.7
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	7.9	0.0	0.3	0.0	49.4
%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.13	0.00	0.17	0.00	4.21
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.7
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Intersection Summary								
HCM 2010 Ctrl Delay	25.4							
HCM 2010 LOS	C							
Notes								

HCM 2010 Signalized Intersection Summary
8: SR 410 & Wheeler Ave

2035 Volumes-Mitigated Intersections

12/5/2016

												
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	0	0	7	17	2	33	5	1030	55	51	1583	3
Number	1	6	16	5	2	12	7	4	14	3	8	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
Adj Sat Flow veh/h/ln	190.0	190.0	190.0	190.0	190.0	190.0	186.3	186.3	190.0	186.3	186.3	190.0
Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Cap, veh/h	0	0	79	54	9	50	51	1567	84	386	1662	3
Arrive On Green	0.00	0.00	0.05	0.05	0.05	0.05	0.89	0.89	0.89	0.89	0.89	0.89
Sat Flow, veh/h	0	0	1615	402	176	1012	281	1752	94	473	1859	3
Grp Volume(v), veh/h	0	0	7	55	0	0	5	0	1180	55	0	1724
Grp Sat Flow(s),veh/h/ln	0	0	1615	1590	0	0	281	0	1846	473	0	1862
Q Serve(g_s), s	0.0	0.0	0.6	3.3	0.0	0.0	0.0	0.0	26.4	5.4	0.0	126.0
Cycle Q Clear(g_c), s	0.0	0.0	0.6	4.8	0.0	0.0	126.0	0.0	26.4	31.8	0.0	126.0
Prop In Lane	0.00		1.00	0.33		0.64	1.00		0.05	1.00		0.00
Lane Grp Cap(c), veh/h	0	0	79	112	0	0	51	0	1651	386	0	1665
V/C Ratio(X)	0.00	0.00	0.09	0.49	0.00	0.00	0.10	0.00	0.71	0.14	0.00	1.04
Avail Cap(c_a), veh/h	0	0	183	212	0	0	51	0	1651	386	0	1665
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	64.0	65.9	0.0	0.0	70.4	0.0	2.2	6.8	0.0	7.4
Incr Delay (d2), s/veh	0.0	0.0	0.5	3.3	0.0	0.0	0.8	0.0	1.5	0.2	0.0	31.7
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 Back of Q (50%), veh/ln	0.0	0.0	0.3	2.1	0.0	0.0	0.2	0.0	7.9	0.6	0.0	49.4
Lane Grp Delay (d), s/veh	0.0	0.0	64.5	69.3	0.0	0.0	71.3	0.0	3.7	7.0	0.0	39.2
Lane Grp LOS			E	E			E		A	A		F
Approach Vol, veh/h		7			55			1185			1779	
Approach Delay, s/veh		64.5			69.3			4.0			38.2	
Approach LOS		E			E			A			D	
Timer												
Assigned Phs		6			2			4			8	
Phs Duration (G+Y+Rc), s		10.9			10.9			130.0			130.0	
Change Period (Y+Rc), s		4.0			4.0			4.0			4.0	
Max Green Setting (Gmax), s		16.0			16.0			126.0			126.0	
Max Q Clear Time (g_c+I1), s		2.6			6.8			128.0			128.0	
Green Ext Time (p_c), s		0.2			0.1			0.0			0.0	
Intersection Summary												
HCM 2010 Ctrl Delay			25.4									
HCM 2010 LOS			C									
Notes												

Lanes, Volumes, Timings
3: Mundy Loss Road & SR 410

2035 volumes-mitigated

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	1035	161	230	1399	48	169	40	165	54	80	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		100	100		0	0		100	0		100
Storage Lanes	1		1	1		0	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.995				0.850			0.850
Flt Protected	0.950			0.950				0.961			0.980	
Satd. Flow (prot)	1770	1863	1583	1787	3556	0	0	1826	1615	0	1862	1615
Flt Permitted	0.950			0.950				0.622			0.692	
Satd. Flow (perm)	1770	1863	1583	1787	3556	0	0	1182	1615	0	1315	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			123		7				168			123
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		680			655			1371			719	
Travel Time (s)		13.2			12.8			31.2			16.3	
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
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	26	1056	164	235	1428	49	172	41	168	55	82	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	1056	164	235	1477	0	0	213	168	0	137	23
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Perm	Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases			4				2		2	6		6

2035 Mundy Loss Road Volumes 11/17/2035 2035 volumes-mitigated
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Lanes, Volumes, Timings
3: Mundy Loss Road & SR 410

2035 volumes-mitigated

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4	4	3	8		2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0		20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	8.0	45.0	45.0	14.0	51.0		21.0	21.0	21.0	21.0	21.0	21.0
Total Split (%)	10.0%	56.3%	56.3%	17.5%	63.8%		26.3%	26.3%	26.3%	26.3%	26.3%	26.3%
Maximum Green (s)	4.0	41.0	41.0	10.0	47.0		17.0	17.0	17.0	17.0	17.0	17.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None		Max	Max	Max	Max	Max	Max
Walk Time (s)		5.0	5.0		5.0		5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0		11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0		0		0	0	0	0	0	0
Act Effect Green (s)	4.0	41.0	41.0	10.0	51.8		17.0	17.0		17.0	17.0	17.0
Actuated g/C Ratio	0.05	0.51	0.51	0.12	0.65		0.21	0.21		0.21	0.21	0.21
v/c Ratio	0.30	1.11	0.19	1.05	0.64		0.85	0.35		0.49	0.05	0.05
Control Delay	45.5	85.0	4.0	112.5	10.8		61.5	7.0		34.7	0.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	45.5	85.0	4.0	112.5	10.8		61.5	7.0		34.7	0.2	0.2
LOS	D	F	A	F	B		E	A		C	A	A
Approach Delay		73.5			24.7		37.5			29.7		
Approach LOS		E			C		D			C		

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 43.7

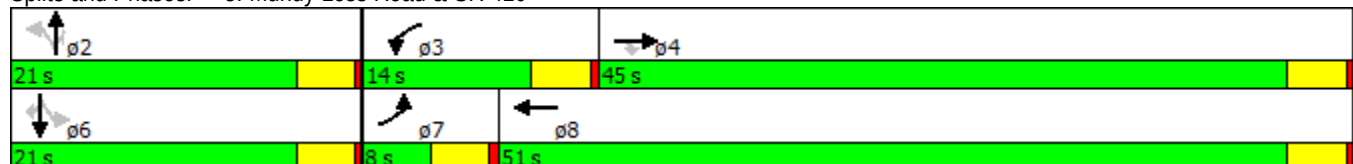
Intersection LOS: D

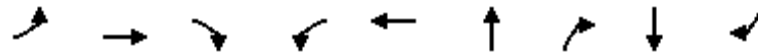
Intersection Capacity Utilization 95.3%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 3: Mundy Loss Road & SR 410





Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	26	1056	164	235	1477	213	168	137	23
v/c Ratio	0.30	1.11	0.19	1.05	0.64	0.85	0.35	0.49	0.05
Control Delay	45.5	85.0	4.0	112.5	10.8	61.5	7.0	34.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.5	85.0	4.0	112.5	10.8	61.5	7.0	34.7	0.2
Queue Length 50th (ft)	13	~611	10	~130	174	103	0	61	0
Queue Length 95th (ft)	38	#841	39	#267	324	#223	48	116	0
Internal Link Dist (ft)		600			575	1291		639	
Turn Bay Length (ft)	100		100	100			100		100
Base Capacity (vph)	88	954	871	223	2304	251	475	279	440
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	1.11	0.19	1.05	0.64	0.85	0.35	0.49	0.05

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Capacity Analysis

3: Mundy Loss Road & SR 410

2035 volumes-mitigated

12/5/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	1035	161	230	1399	48	169	40	165	54	80	23
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1881	1881	1900	1900	1900	1900	1900	1900	1900
Lanes	1	1	1	1	2	0	0	1	1	0	1	1
Lane Assignment												
Cap, veh/h	39	955	811	224	2226	76	81	0	343	63	70	343
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
Prop Arrive On Green	0.02	0.51	0.51	0.13	0.62	0.62	0.21	0.21	0.21	0.21	0.21	0.21
Ln Grp Delay, s/veh	56.8	82.2	10.7	108.7	11.0	11.0	802.6	0.0	32.6	118.1	0.0	25.5
Ln Grp LOS	E	F	B	F	B	B	F		C	F		C
Approach Vol, veh/h		1246			1712			381			160	
Approach Delay, s/veh		72.3			24.4			463.1			104.8	
Approach LOS		E			C			F			F	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs			2	3	4		6	7	8			
Case No			7.0	2.0	3.0		7.0	2.0	4.0			
Phs Duration (G+Y+Rc), s			21.0	14.0	45.0		21.0	5.8	53.2			
Change Period (Y+Rc), s			4.0	4.0	4.0		4.0	4.0	4.0			
Max Allow Headway (MAH), s			4.9	3.8	5.1		4.9	3.8	5.1			
Max Green (Gmax), s			17.0	10.0	41.0		17.0	4.0	47.0			
Max Q Clear (g_c+I1), s			19.0	12.0	43.0		19.0	3.2	22.1			
Green Ext Time (g_e), s			0.0	0.0	0.0		0.0	0.0	20.6			
Prob of Phs Call (p_c)			1.00	0.99	1.00		1.00	0.44	1.00			
Prob of Max Out (p_x)			1.00	1.00	1.00		1.00	1.00	0.83			
Left-Turn Movement Data												
Assigned Mvmt			5	3			1	7				
Mvmt Sat Flow, veh/h			0	1792			0	1774				
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			0		1863		329		3617			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			1615		1583		1615		124			
Left Lane Group Data												
Assigned Mvmt		0	5	3	0	0	1	7	0			
Lane Assignment			L+T	L (Prot)			L+T	L (Prot)				
Lanes in Grp		0	1	1	0	0	1	1	0			
Grp Vol (v), veh/h		0	213	235	0	0	137	26	0			
Grp Sat Flow (s), veh/h/ln		0	0	1792	0	0	329	1774	0			
Q Serve Time (g_s), s		0.0	0.0	10.0	0.0	0.0	0.0	1.2	0.0			

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2035 volumes-mitigated

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Cycle Q Clear Time (g_c), s	0.0	17.0	10.0	0.0	0.0	17.0	1.2	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	1309	0	0	0	1191	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	17.0	0.0	0.0	0.0	17.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	0.81	1.00	0.00	0.00	0.40	1.00	0.00
Lane Grp Cap (c), veh/h	0	81	224	0	0	133	39	0
V/C Ratio (X)	0.00	2.62	1.05	0.00	0.00	1.03	0.67	0.00
Avail Cap (c_a), veh/h	0	81	224	0	0	133	89	0
Upstream Filter (I)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d1), s/veh	0.0	40.0	35.0	0.0	0.0	31.8	38.8	0.0
Incr Delay (d2), s/veh	0.0	762.6	73.7	0.0	0.0	86.3	17.9	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	802.6	108.7	0.0	0.0	118.1	56.8	0.0
1st-Term Q (Q1), veh/ln	0.0	1.6	4.3	0.0	0.0	2.7	0.5	0.0
2nd-Term Q (Q2), veh/ln	0.0	17.2	4.6	0.0	0.0	3.2	0.2	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00
%ile Back of Q (50%), veh/ln	0.0	18.9	8.9	0.0	0.0	5.8	0.7	0.0
%ile Storage Ratio (RQ%)	0.00	0.36	2.24	0.00	0.00	0.22	0.18	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	32.9	2.8	0.0	0.0	1.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.7	0.3	0.0	0.0	0.3	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T				T			
Lanes in Grp	0	0	0	1	0	0	0	1
Grp Vol (v), veh/h	0	0	0	1056	0	0	0	742
Grp Sat Flow (s), veh/h/ln	0	0	0	1863	0	0	0	1881
Q Serve Time (g_s), s	0.0	0.0	0.0	41.0	0.0	0.0	0.0	20.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	41.0	0.0	0.0	0.0	20.0
Lane Grp Cap (c), veh/h	0	0	0	955	0	0	0	1158
V/C Ratio (X)	0.00	0.00	0.00	1.11	0.00	0.00	0.00	0.64
Avail Cap (c_a), veh/h	0	0	0	955	0	0	0	1158
Upstream Filter (I)	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	19.5	0.0	0.0	0.0	9.8
Incr Delay (d2), s/veh	0.0	0.0	0.0	62.7	0.0	0.0	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
Control Delay (d), s/veh	0.0	0.0	0.0	82.2	0.0	0.0	0.0	11.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	16.2	0.0	0.0	0.0	7.4
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	16.6	0.0	0.0	0.0	0.4
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	32.8	0.0	0.0	0.0	7.8

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%ile Storage Ratio (RQ%)	0.00	0.00	0.00	1.32	0.00	0.00	0.00	0.32
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	25.3	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	R		R		R		T+R	
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	168	0	164	0	23	0	735
Grp Sat Flow (s), veh/h/ln	0	1615	0	1583	0	1615	0	1859
Q Serve Time (g_s), s	0.0	7.3	0.0	4.5	0.0	0.9	0.0	20.1
Cycle Q Clear Time (g_c), s	0.0	7.3	0.0	4.5	0.0	0.9	0.0	20.1
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.07
Lane Grp Cap (c), veh/h	0	343	0	811	0	343	0	1145
V/C Ratio (X)	0.00	0.49	0.00	0.20	0.00	0.07	0.00	0.64
Avail Cap (c_a), veh/h	0	343	0	811	0	343	0	1145
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	27.7	0.0	10.6	0.0	25.2	0.0	9.8
Incr Delay (d2), s/veh	0.0	4.9	0.0	0.1	0.0	0.4	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
Control Delay (d), s/veh	0.0	32.6	0.0	10.7	0.0	25.5	0.0	11.0
1st-Term Q (Q1), veh/ln	0.0	2.8	0.0	1.5	0.0	0.3	0.0	7.4
2nd-Term Q (Q2), veh/ln	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.4
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.3	0.0	1.5	0.0	0.4	0.0	7.7
%ile Storage Ratio (RQ%)	0.00	0.82	0.00	0.39	0.00	0.10	0.00	0.32
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	92.9							
HCM 2010 LOS	F							
Notes								

Two Way Analysis cannot be performed on Signalized Intersection.

Lanes, Volumes, Timings
6: Mundy Loss Road & 112th ST E

2035 volumes-mitigated

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	25	77	46	84	42	59	280	11	13	391	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.936			0.967			0.996			0.976	
Flt Protected		0.982			0.987			0.992			0.999	
Satd. Flow (prot)	0	1729	0	0	1795	0	0	1877	0	0	1834	0
Flt Permitted		0.982			0.987			0.992			0.999	
Satd. Flow (perm)	0	1729	0	0	1795	0	0	1877	0	0	1834	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		647			701			660			1371	
Travel Time (s)		14.7			15.9			15.0			31.2	
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
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Adj. Flow (vph)	66	27	83	49	90	45	63	301	12	14	420	95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	176	0	0	184	0	0	376	0	0	529	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	66.7%											
Analysis Period (min)	15											
	ICU Level of Service C											

Intersection												
Intersection Delay, s/veh	24.3											
Intersection LOS	C											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	61	25	77	46	84	42	59	280	11	13	391	88
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
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	1	1	1
Mvmt Flow	66	27	83	49	90	45	63	301	12	14	420	95
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	13.5	14	20.1	34.5
HCM LOS	B	B	C	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	17%	37%	27%	3%
Vol Thru, %	80%	15%	49%	79%
Vol Right, %	3%	47%	24%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	350	163	172	492
LT Vol	280	25	84	391
Through Vol	11	77	42	88
RT Vol	59	61	46	13
Lane Flow Rate	376	175	185	529
Geometry Grp	1	1	1	1
Degree of Util (X)	0.649	0.337	0.359	0.859
Departure Headway (Hd)	6.205	6.919	6.995	5.848
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	580	517	512	619
Service Time	4.272	5	5.075	3.907
HCM Lane V/C Ratio	0.648	0.338	0.361	0.855
HCM Control Delay	20.1	13.5	14	34.5
HCM Lane LOS	C	B	B	D
HCM 95th-tile Q	4.7	1.5	1.6	9.6

Notes

~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Two Way Analysis cannot be performed on an All Way Stop Intersection.

Lanes, Volumes, Timings
3: SR410 & W Main St/E Main St

2035 Projection-Mitigated intersections

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	40	103	2	236	65	54	10	1025	153	88	1677	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.932			0.981			0.998	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1894	0	1787	1753	0	1787	1845	0	1770	1859	0
Flt Permitted	0.546			0.588			0.040			0.103		
Satd. Flow (perm)	1037	1894	0	1106	1753	0	75	1845	0	192	1859	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			27			18			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		466			386			454			1270	
Travel Time (s)		10.6			8.8			10.3			28.9	
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
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Adj. Flow (vph)	42	107	2	246	68	56	10	1068	159	92	1747	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	42	109	0	246	124	0	10	1227	0	92	1767	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		

Lanes, Volumes, Timings
3: SR410 & W Main St/E Main St

2035 Projection-Mitigated intersections

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	25.0	25.0		25.0	25.0		105.0	105.0		105.0	105.0	
Total Split (%)	19.2%	19.2%		19.2%	19.2%		80.8%	80.8%		80.8%	80.8%	
Maximum Green (s)	21.0	21.0		21.0	21.0		101.0	101.0		101.0	101.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)	21.0	21.0		21.0	21.0		101.0	101.0		101.0	101.0	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.78	0.78		0.78	0.78	
v/c Ratio	0.25	0.36		1.38	0.41		0.17	0.85		0.62	1.22	
Control Delay	52.2	51.8		243.4	42.5		11.2	17.1		27.7	125.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	52.2	51.8		243.4	42.5		11.2	17.1		27.7	125.7	
LOS	D	D		F	D		B	B		C	F	
Approach Delay		51.9			176.1			17.1			120.9	
Approach LOS		D			F			B			F	

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.38

Intersection Signal Delay: 88.1

Intersection LOS: F

Intersection Capacity Utilization 115.8%

ICU Level of Service H

Analysis Period (min) 15

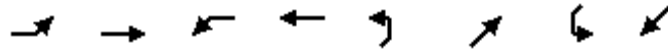
Splits and Phases: 3: SR410 & W Main St/E Main St

 p2	 p4
105 s	25 s
 p6	 p8
105 s	25 s

Queues
3: SR410 & W Main St/E Main St

2035 Projection-Mitigated intersections

12/5/2016



Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	42	109	246	124	10	1227	92	1767
v/c Ratio	0.25	0.36	1.38	0.41	0.17	0.85	0.62	1.22
Control Delay	52.2	51.8	243.4	42.5	11.2	17.1	27.7	125.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.2	51.8	243.4	42.5	11.2	17.1	27.7	125.7
Queue Length 50th (ft)	31	82	~274	74	2	575	28	~1838
Queue Length 95th (ft)	69	141	#446	137	9	854	#146	#2106
Internal Link Dist (ft)		386		306		374		1190
Turn Bay Length (ft)					100		100	
Base Capacity (vph)	167	306	178	305	58	1437	149	1444
Starvation Cap Reductn	0	0	0	0	0	0	0	4
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.36	1.38	0.41	0.17	0.85	0.62	1.23

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Capacity Analysis 2035 Projection-Mitigated intersections

3: SR410 & W Main St/E Main St

12/5/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	40	103	2	236	65	54	10	1025	153	88	1677	19
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1881	1881	1900	1881	1881	1900	1863	1863	1900
Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Lane Assignment												
Cap, veh/h	181	300	6	198	154	127	55	1244	185	205	1428	16
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
Prop Arrive On Green	0.16	0.16	0.16	0.16	0.16	0.16	0.78	0.78	0.78	0.78	0.78	0.78
Ln Grp Delay, s/veh	55.4	0.0	49.2	204.4	0.0	50.3	72.0	0.0	16.6	43.6	0.0	121.4
Ln Grp LOS	E		D	F		D	E		B	D		F
Approach Vol, veh/h		151			370			1237			1859	
Approach Delay, s/veh		50.9			152.7			17.1			117.6	
Approach LOS		D			F			B			F	
Timer:		1	2	3	4	5	6	7	8			
Assigned Phs			2		4		6		8			
Case No			6.0		6.0		6.0		6.0			
Phs Duration (G+Y+Rc), s			105.0		25.0		105.0		25.0			
Change Period (Y+Rc), s			4.0		4.0		4.0		4.0			
Max Allow Headway (MAH), s			5.2		4.5		5.2		4.5			
Max Green (Gmax), s			101.0		21.0		101.0		21.0			
Max Q Clear (g_c+I1), s			103.0		14.3		103.0		23.0			
Green Ext Time (g_e), s			0.0		1.3		0.0		0.0			
Prob of Phs Call (p_c)			1.00		1.00		1.00		1.00			
Prob of Max Out (p_x)			1.00		0.48		1.00		1.00			
Left-Turn Movement Data												
Assigned Mvmt			5		7		1		3			
Mvmt Sat Flow, veh/h			272		1287		453		1292			
Through Movement Data												
Assigned Mvmt			2		4		6		8			
Mvmt Sat Flow, veh/h			1601		1859		1838		955			
Right-Turn Movement Data												
Assigned Mvmt			12		14		16		18			
Mvmt Sat Flow, veh/h			238		35		21		787			
Left Lane Group Data												
Assigned Mvmt		0	5	0	7	0	1	0	3			
Lane Assignment			L		L		L		L			
Lanes in Grp		0	1	0	1	0	1	0	1			
Grp Vol (v), veh/h		0	10	0	42	0	92	0	246			
Grp Sat Flow (s), veh/h/ln		0	272	0	1287	0	453	0	1292			
Q Serve Time (g_s), s		0.0	0.0	0.0	4.0	0.0	22.2	0.0	14.3			

HCM 2010 Signalized Intersection Capacity Analysis 2035 Projection-Mitigated intersections

3: SR410 & W Main St/E Main St

12/5/2016

Cycle Q Clear Time (g_c), s	0.0	101.0	0.0	12.3	0.0	80.4	0.0	21.0
Perm LT Sat Flow (s_l), veh/h/ln	0	272	0	1287	0	453	0	1292
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	101.0	0.0	21.0	0.0	101.0	0.0	21.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	12.6	0.0	42.9	0.0	14.3
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	4.0	0.0	22.2	0.0	14.3
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Lane Grp Cap (c), veh/h	0	55	0	181	0	205	0	198
V/C Ratio (X)	0.00	0.18	0.00	0.23	0.00	0.45	0.00	1.24
Avail Cap (c_a), veh/h	0	55	0	181	0	205	0	198
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	65.0	0.0	54.8	0.0	36.6	0.0	59.8
Incr Delay (d2), s/veh	0.0	7.0	0.0	0.7	0.0	7.0	0.0	144.5
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	72.0	0.0	55.4	0.0	43.6	0.0	204.4
1st-Term Q (Q1), veh/ln	0.0	0.3	0.0	1.3	0.0	2.6	0.0	6.7
2nd-Term Q (Q2), veh/ln	0.0	0.1	0.0	0.0	0.0	0.4	0.0	7.9
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.4	0.0	1.4	0.0	3.0	0.0	14.7
%ile Storage Ratio (RQ%)	0.00	0.11	0.00	0.09	0.00	0.76	0.00	1.51
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment								
Lanes in Grp	0	0	0	0	0	0	0	0
Grp Vol (v), veh/h	0	0	0	0	0	0	0	0
Grp Sat Flow (s), veh/h/ln	0	0	0	0	0	0	0	0
Q Serve Time (g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear Time (g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane Grp Cap (c), veh/h	0	0	0	0	0	0	0	0
V/C Ratio (X)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avail Cap (c_a), veh/h	0	0	0	0	0	0	0	0
Upstream Filter (I)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d1), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	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
Control Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1st-Term Q (Q1), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

2035 Volumes-Mitigated SR410-Main and Park Ave 11/17/2035 2035 Projection-Mitigated intersections

Synchro 8 Light Report
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HCM 2010 Signalized Intersection Capacity Analysis 2035 Projection-Mitigated intersections 3: SR410 & W Main St/E Main St

12/5/2016

%ile Storage Ratio (RQ%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	T+R		T+R		T+R		T+R	
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	1227	0	109	0	1767	0	124
Grp Sat Flow (s), veh/h/ln	0	1839	0	1894	0	1859	0	1742
Q Serve Time (g_s), s	0.0	58.1	0.0	6.7	0.0	101.0	0.0	8.4
Cycle Q Clear Time (g_c), s	0.0	58.1	0.0	6.7	0.0	101.0	0.0	8.4
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.13	0.00	0.02	0.00	0.01	0.00	0.45
Lane Grp Cap (c), veh/h	0	1429	0	306	0	1444	0	281
V/C Ratio (X)	0.00	0.86	0.00	0.36	0.00	1.22	0.00	0.44
Avail Cap (c_a), veh/h	0	1429	0	306	0	1444	0	281
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	9.7	0.0	48.5	0.0	14.5	0.0	49.2
Incr Delay (d2), s/veh	0.0	6.9	0.0	0.7	0.0	106.9	0.0	1.1
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	16.6	0.0	49.2	0.0	121.4	0.0	50.3
1st-Term Q (Q1), veh/ln	0.0	22.5	0.0	3.3	0.0	39.3	0.0	3.8
2nd-Term Q (Q2), veh/ln	0.0	2.7	0.0	0.1	0.0	42.9	0.0	0.1
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	25.2	0.0	3.3	0.0	82.2	0.0	3.8
%ile Storage Ratio (RQ%)	0.00	1.65	0.00	0.21	0.00	1.86	0.00	0.39
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	80.7	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	84.0							
HCM 2010 LOS	F							
Notes								

Two Way Analysis cannot be performed on Signalized Intersection.

Lanes, Volumes, Timings
6: S River Rd/N River Rd & E Main St

2035 Projection-Mitigated intersections

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	34	259	92	46	224	11	77	92	82	8	102	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.968			0.995			0.956			0.961	
Flt Protected		0.996			0.992			0.985			0.997	
Satd. Flow (prot)	0	1832	0	0	1857	0	0	1789	0	0	1820	0
Flt Permitted		0.996			0.992			0.985			0.997	
Satd. Flow (perm)	0	1832	0	0	1857	0	0	1789	0	0	1820	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		386			744			543			1174	
Travel Time (s)		8.8			16.9			12.3			26.7	
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
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	37	278	99	49	241	12	83	99	88	9	110	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	414	0	0	302	0	0	270	0	0	168	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	57.3%						ICU Level of Service B					
Analysis Period (min)	15											

Intersection												
Intersection Delay, s/veh	19.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	34	259	92	46	224	11	77	92	82	8	102	46
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	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	37	278	99	49	241	12	83	99	88	9	110	49
Major/Minor	Major1		Major2			Minor1			Minor2			
Conflicting Flow All	253	0	0	377	0	0	826	753	328	841	797	247
Stage 1	-	-	-	-	-	-	401	401	-	346	346	-
Stage 2	-	-	-	-	-	-	425	352	-	495	451	-
Follow-up Headway	2.2	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1324	-	-	1187	-	-	293	341	718	287	322	797
Stage 1	-	-	-	-	-	-	630	604	-	674	639	-
Stage 2	-	-	-	-	-	-	611	635	-	560	574	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1324	-	-	1187	-	-	184	313	718	179	296	797
Mov Capacity-2 Maneuver	-	-	-	-	-	-	184	313	-	179	296	-
Stage 1	-	-	-	-	-	-	607	582	-	650	608	-
Stage 2	-	-	-	-	-	-	447	605	-	393	553	-
Approach	EB		WB			NE			SW			
HCM Control Delay, s	0.7		1.3			64.9			24.5			
HCM LOS						F			C			
Minor Lane / Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1				
Capacity (veh/h)	304	1324	-	-	1187	-	-	349				
HCM Lane V/C Ratio	0.888	0.028	-	-	0.042	-	-	0.481				
HCM Control Delay (s)	64.9	7.796	0	-	8.165	0	-	24.5				
HCM Lane LOS	F	A	A		A	A		C				
HCM 95th %tile Q(veh)	8.152	0.085	-	-	0.13	-	-	2.5				
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

Lanes, Volumes, Timings
10: SR410 & Park Ave

2035 Projection-Mitigated intersections

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	153	27	31	50	33	149	59	987	38	310	1784	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	50		100	100		100	100		100
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.920				0.850		0.994			0.988	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1748	0	1805	1900	1615	1787	3553	0	1770	3497	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1805	1748	0	1805	1900	1615	1787	3553	0	1770	3497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39				186		4			12	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		589			200			1270			406	
Travel Time (s)		13.4			4.5			28.9			9.2	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	2%	2%	2%
Adj. Flow (vph)	191	34	39	62	41	186	74	1234	48	388	2230	196
Shared Lane Traffic (%)												
Lane Group Flow (vph)	191	73	0	62	41	186	74	1282	0	388	2426	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						

2035 Volumes-Mitigated SR410-Main and Park Ave 11/17/2035 2035 Projection-Mitigated intersections

Synchro 8 Light Report
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Lanes, Volumes, Timings
10: SR410 & Park Ave

2035 Projection-Mitigated intersections

12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Detector Phase	7	4		3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0	20.0	8.0	20.0		8.0	20.0	
Total Split (s)	20.0	20.0		20.0	20.0	20.0	9.0	49.0		31.0	71.0	
Total Split (%)	16.7%	16.7%		16.7%	16.7%	16.7%	7.5%	40.8%		25.8%	59.2%	
Maximum Green (s)	16.0	16.0		16.0	16.0	16.0	5.0	45.0		27.0	67.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5		0.5	0.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max		None	Max	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0		0			0	
Act Effect Green (s)	14.9	16.2		9.2	8.3	8.3	5.0	45.2		26.9	67.1	
Actuated g/C Ratio	0.13	0.15		0.08	0.07	0.07	0.04	0.41		0.24	0.60	
v/c Ratio	0.79	0.25		0.42	0.29	0.64	0.93	0.89		0.91	1.15	
Control Delay	70.4	26.5		57.4	54.0	17.5	136.4	40.3		68.0	97.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	70.4	26.5		57.4	54.0	17.5	136.4	40.3		68.0	97.0	
LOS	E	C		E	D	B	F	D		E	F	
Approach Delay		58.3			31.2			45.5			93.0	
Approach LOS		E			C			D			F	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 111.4

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.15

Intersection Signal Delay: 73.6

Intersection LOS: E

Intersection Capacity Utilization 82.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 10: SR410 & Park Ave

			
31 s	49 s	20 s	20 s
			
9 s	71 s	20 s	20 s

Queues
10: SR410 & Park Ave

2035 Projection-Mitigated intersections

12/5/2016



Lane Group	EBL	EBT	WBL	WBT	WBR	NEL	NET	SWL	SWT
Lane Group Flow (vph)	191	73	62	41	186	74	1282	388	2426
v/c Ratio	0.79	0.25	0.42	0.29	0.64	0.93	0.89	0.91	1.15
Control Delay	70.4	26.5	57.4	54.0	17.5	136.4	40.3	68.0	97.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.4	26.5	57.4	54.0	17.5	136.4	40.3	68.0	97.0
Queue Length 50th (ft)	133	22	43	29	0	54	444	272	~1087
Queue Length 95th (ft)	#205	57	78	56	44	#132	485	#393	#1074
Internal Link Dist (ft)		509		120			1190		326
Turn Bay Length (ft)			50		100	100		100	
Base Capacity (vph)	259	302	259	273	391	80	1442	429	2110
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.24	0.24	0.15	0.48	0.93	0.89	0.90	1.15

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Capacity Analysis 2035 Projection-Mitigated intersections

10: SR410 & Park Ave

12/5/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	153	27	31	50	33	149	59	987	38	310	1784	157
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1881	1881	1900	1863	1863	1900
Lanes	1	1	0	1	1	1	1	2	0	1	2	0
Lane Assignment												
Cap, veh/h	220	162	186	93	248	211	76	1376	53	407	1925	167
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
Prop Arrive On Green	0.12	0.20	0.20	0.05	0.13	0.13	0.04	0.38	0.38	0.23	0.57	0.57
Ln Grp Delay, s/veh	75.6	0.0	39.5	62.9	45.7	80.8	149.6	50.2	50.6	77.4	101.5	115.0
Ln Grp LOS	E		D	E	D	F	F	D	D	E	F	F
Approach Vol, veh/h		264			289			1356			2814	
Approach Delay, s/veh		65.6			72.0			55.8			104.0	
Approach LOS		E			E			E			F	
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Case No	2.0	4.0	2.0	4.0	2.0	4.0	2.0	3.0				
Phs Duration (G+Y+Rc), s	31.0	49.0	10.0	27.6	9.0	71.0	18.3	19.4				
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				
Max Allow Headway (MAH), s	3.8	5.3	3.8	4.5	3.8	5.3	3.8	4.5				
Max Green (Gmax), s	27.0	45.0	16.0	16.0	5.0	67.0	16.0	16.0				
Max Q Clear (g_c+I1), s	27.4	40.0	6.0	6.1	6.9	69.0	14.2	15.3				
Green Ext Time (g_e), s	0.0	5.0	0.1	0.9	0.0	0.0	0.1	0.1				
Prob of Phs Call (p_c)	1.00	1.00	1.00	1.00	0.91	1.00	1.00	1.00				
Prob of Max Out (p_x)	1.00	1.00	0.00	0.07	1.00	1.00	1.00	1.00				
Left-Turn Movement Data												
Assigned Mvmt	1		3		5		7					
Mvmt Sat Flow, veh/h	1774		1810		1792		1810					
Through Movement Data												
Assigned Mvmt		2		4		6		8				
Mvmt Sat Flow, veh/h		3598		809		3381		1900				
Right-Turn Movement Data												
Assigned Mvmt		12		14		16		18				
Mvmt Sat Flow, veh/h		140		928		293		1615				
Left Lane Group Data												
Assigned Mvmt	1	0	3	0	5	0	7	0				
Lane Assignment	L (Prot)		L (Prot)		L (Prot)		L (Prot)					
Lanes in Grp	1	0	1	0	1	0	1	0				
Grp Vol (v), veh/h	388	0	62	0	74	0	191	0				
Grp Sat Flow (s), veh/h/ln	1774	0	1810	0	1792	0	1810	0				
Q Serve Time (g_s), s	25.4	0.0	4.0	0.0	4.9	0.0	12.2	0.0				

2035 Volumes-Mitigated SR410-Main and Park Ave 11/17/2035 2035 Projection-Mitigated intersections

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HCM 2010 Signalized Intersection Capacity Analysis 2035 Projection-Mitigated intersections

10: SR410 & Park Ave

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Cycle Q Clear Time (g_c), s	25.4	0.0	4.0	0.0	4.9	0.0	12.2	0.0
Perm LT Sat Flow (s_l), veh/h/ln	0	0	0	0	0	0	0	0
Shared LT Sat Flow (s_sh), veh/h/ln	0	0	0	0	0	0	0	0
Perm LT Eff Green (g_p), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Serve Time (g_u), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perm LT Q Serve Time (g_ps), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time to First Blk (g_f), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Serve Time pre Blk (g_fs), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop LT Inside Lane (P_L)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Lane Grp Cap (c), veh/h	407	0	93	0	76	0	220	0
V/C Ratio (X)	0.95	0.00	0.67	0.00	0.97	0.00	0.87	0.00
Avail Cap (c_a), veh/h	407	0	246	0	76	0	246	0
Upstream Filter (I)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d1), s/veh	44.7	0.0	54.8	0.0	56.3	0.0	50.8	0.0
Incr Delay (d2), s/veh	32.7	0.0	8.0	0.0	93.4	0.0	24.8	0.0
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	77.4	0.0	62.9	0.0	149.6	0.0	75.6	0.0
1st-Term Q (Q1), veh/ln	11.5	0.0	1.9	0.0	2.2	0.0	5.7	0.0
2nd-Term Q (Q2), veh/ln	3.7	0.0	0.2	0.0	2.0	0.0	1.5	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
%ile Back of Q (50%), veh/ln	15.2	0.0	2.1	0.0	4.2	0.0	7.2	0.0
%ile Storage Ratio (RQ%)	3.87	0.00	1.03	0.00	1.06	0.00	0.35	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Middle Lane Group Data								
Assigned Mvmt	0	2	0	4	0	6	0	8
Lane Assignment	T				T		T	
Lanes in Grp	0	1	0	0	0	1	0	1
Grp Vol (v), veh/h	0	645	0	0	0	1213	0	41
Grp Sat Flow (s), veh/h/ln	0	1881	0	0	0	1863	0	1900
Q Serve Time (g_s), s	0.0	37.9	0.0	0.0	0.0	67.0	0.0	2.3
Cycle Q Clear Time (g_c), s	0.0	37.9	0.0	0.0	0.0	67.0	0.0	2.3
Lane Grp Cap (c), veh/h	0	719	0	0	0	1061	0	248
V/C Ratio (X)	0.00	0.90	0.00	0.00	0.00	1.14	0.00	0.17
Avail Cap (c_a), veh/h	0	719	0	0	0	1061	0	258
Upstream Filter (I)	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	34.1	0.0	0.0	0.0	25.3	0.0	45.4
Incr Delay (d2), s/veh	0.0	16.1	0.0	0.0	0.0	76.2	0.0	0.3
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	50.2	0.0	0.0	0.0	101.5	0.0	45.7
1st-Term Q (Q1), veh/ln	0.0	17.9	0.0	0.0	0.0	30.0	0.0	1.1
2nd-Term Q (Q2), veh/ln	0.0	3.2	0.0	0.0	0.0	22.4	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	21.1	0.0	0.0	0.0	52.5	0.0	1.1

2035 Volumes-Mitigated SR410-Main and Park Ave 11/17/2035 2035 Projection-Mitigated intersections

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HCM 2010 Signalized Intersection Capacity Analysis 2035 Projection-Mitigated intersections

10: SR410 & Park Ave

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%ile Storage Ratio (RQ%)	0.00	0.47	0.00	0.00	0.00	4.08	0.00	0.31
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	38.1	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment	T+R		T+R		T+R		R	
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	637	0	73	0	1213	0	186
Grp Sat Flow (s), veh/h/ln	0	1857	0	1736	0	1811	0	1615
Q Serve Time (g_s), s	0.0	38.0	0.0	4.1	0.0	67.0	0.0	13.3
Cycle Q Clear Time (g_c), s	0.0	38.0	0.0	4.1	0.0	67.0	0.0	13.3
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	0.08	0.00	0.53	0.00	0.16	0.00	1.00
Lane Grp Cap (c), veh/h	0	710	0	349	0	1031	0	211
V/C Ratio (X)	0.00	0.90	0.00	0.21	0.00	1.18	0.00	0.88
Avail Cap (c_a), veh/h	0	710	0	349	0	1031	0	220
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	34.2	0.0	39.2	0.0	25.3	0.0	50.2
Incr Delay (d2), s/veh	0.0	16.4	0.0	0.3	0.0	89.7	0.0	30.5
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	50.6	0.0	39.5	0.0	115.0	0.0	80.8
1st-Term Q (Q1), veh/ln	0.0	17.7	0.0	1.8	0.0	29.2	0.0	5.5
2nd-Term Q (Q2), veh/ln	0.0	3.2	0.0	0.0	0.0	25.7	0.0	1.8
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	20.9	0.0	1.9	0.0	54.9	0.0	7.3
%ile Storage Ratio (RQ%)	0.00	0.47	0.00	0.09	0.00	4.26	0.00	1.83
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	45.5	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay	86.1							
HCM 2010 LOS	F							
Notes								

Two Way Analysis cannot be performed on Signalized Intersection.

Lanes, Volumes, Timings
11: N River Rd & N A St & Park Ave

2035 Projection-Mitigated intersections

12/5/2016

												
Lane Group	EBL	EBR	EBR2	NBL2	NBL	NBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	109	211	92	2	113	13	54	31	2	11	36	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	25	0			0	0	0		0	0		0
Storage Lanes	1	1			1	0	0		0	0		0
Taper Length (ft)	25				25		25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.986			0.997			0.914	
Flt Protected	0.950				0.957			0.970			0.996	
Satd. Flow (prot)	1787	1599	0	0	1793	0	0	1801	0	0	1696	0
Flt Permitted	0.950				0.957			0.970			0.996	
Satd. Flow (perm)	1787	1599	0	0	1793	0	0	1801	0	0	1696	0
Link Speed (mph)	30				30			30			30	
Link Distance (ft)	157				926			1174			283	
Travel Time (s)	3.6				21.0			26.7			6.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	115	222	97	2	119	14	59	34	2	12	39	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	115	319	0	0	135	0	0	95	0	0	140	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				12			0			0	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15	15	9	15		9	15		9
Sign Control	Free				Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 36.8% ICU Level of Service A

Analysis Period (min) 15

Intersection										
Intersection Delay, s/veh	6									
Movement	EBL	EBR	NBL	NBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	109	211	113	13	54	31	2	11	36	82
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	None	-	-	None
Storage Length	25	0	0	-	-	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0	-	-	0	-
Grade, %	0	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	1	1	0	0	2	2	2	2	2	2
Mvmt Flow	115	222	119	14	59	34	2	12	39	89
Major/Minor	Major1	Major2	Minor1	Minor2						
Conflicting Flow All	133	0	319	0	694	637	271	648	678	126
Stage 1	-	-	-	-	500	500	-	130	130	-
Stage 2	-	-	-	-	194	137	-	518	548	-
Follow-up Headway	2.209	-	2.2	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Capacity-1 Maneuver	1458	-	1252	-	357	395	768	383	374	924
Stage 1	-	-	-	-	553	543	-	874	789	-
Stage 2	-	-	-	-	808	783	-	541	517	-
Time blocked-Platoon, %		-		-						
Mov Capacity-1 Maneuver	1458	-	1252	-	277	363	768	333	344	924
Mov Capacity-2 Maneuver	-	-	-	-	277	363	-	333	344	-
Stage 1	-	-	-	-	509	500	-	805	787	-
Stage 2	-	-	-	-	692	781	-	463	476	-
Approach	EB	NB	NE	SW						
HCM Control Delay, s	2	0.1	21.9	13.4						
HCM LOS			C	B						
Minor Lane / Major Mvmt	NELn1	NBL2	NBL	NBR	EBL	EBR	EBR2	SWLn1		
Capacity (veh/h)	307	1252	-	-	1458	-	-	570		
HCM Lane V/C Ratio	0.308	0.002	-	-	0.079	-	-	0.246		
HCM Control Delay (s)	21.9	7.88	0	-	7.68	-	-	13.4		
HCM Lane LOS	C	A	A		A			B		
HCM 95th %tile Q(veh)	1.274	0.005	-	-	0.256	-	-	0.962		
Notes										
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined										

Lanes, Volumes, Timings
12: S A St/N A St & E Main St

2035 Projection-Mitigated intersections

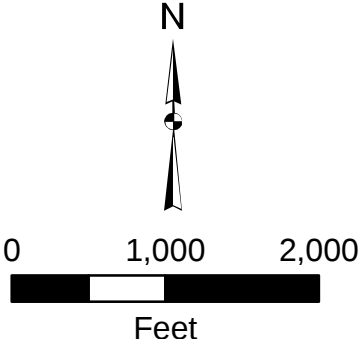
12/5/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	255	29	10	228	75	19	36	17	136	79	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.968			0.968			0.992	
Flt Protected		0.997			0.998			0.987			0.971	
Satd. Flow (prot)	0	1851	0	0	1836	0	0	1815	0	0	1830	0
Flt Permitted		0.997			0.998			0.987			0.971	
Satd. Flow (perm)	0	1851	0	0	1836	0	0	1815	0	0	1830	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		744			302			501			926	
Travel Time (s)		16.9			6.9			11.4			21.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	24	297	34	12	265	87	22	42	20	158	92	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	355	0	0	364	0	0	84	0	0	265	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	50.2%											
Analysis Period (min)	15											
	ICU Level of Service A											

Intersection												
Intersection Delay, s/veh	14.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	21	255	29	10	228	75	19	36	17	136	79	13
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	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	24	297	34	12	265	87	22	42	20	158	92	15
Major/Minor	Major1		Major2			Minor1			Minor2			
Conflicting Flow All	352	0	0	330	0	0	747	738	313	725	711	309
Stage 1	-	-	-	-	-	-	362	362	-	332	332	-
Stage 2	-	-	-	-	-	-	385	376	-	393	379	-
Follow-up Headway	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1212	-	-	1241	-	-	332	348	732	343	361	736
Stage 1	-	-	-	-	-	-	661	629	-	686	648	-
Stage 2	-	-	-	-	-	-	642	620	-	636	618	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1212	-	-	1241	-	-	252	336	732	294	348	736
Mov Capacity-2 Maneuver	-	-	-	-	-	-	252	336	-	294	348	-
Stage 1	-	-	-	-	-	-	645	614	-	670	640	-
Stage 2	-	-	-	-	-	-	532	613	-	563	603	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s	0.6		0.3			18.5			52.1			
HCM LOS						C			F			
Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	350	1212	-	-	1241	-	-	322				
HCM Lane V/C Ratio	0.239	0.02	-	-	0.009	-	-	0.823				
HCM Control Delay (s)	18.5	8.031	0	-	7.928	0	-	52.1				
HCM Lane LOS	C	A	A		A	A		F				
HCM 95th %tile Q(veh)	0.918	0.062	-	-	0.028	-	-	7.031				
Notes												
~ : Volume Exceeds Capacity; \$: Delay Exceeds 300 Seconds; Error : Computation Not Defined												

APPENDIX C

COLLISION MAP



Legend

Traffic Collisions Count

- 1 - 2
- 3 - 5
- 7 - 9
- 11 - 13
- 29 - 44
- Bicycle Collisions
- Pedestrian Collisions
- State Highway
- Roads
- City Limits

CITY OF BUCKLEY
MOTOR VEHICLE COLLISIONS
(2006 - 2011)



APPENDIX D

COST ESTIMATES

CITY OF BUCKLEY
SR410 AND MUNDY LOSS RD INTERSECTION IMPROVEMENTS
ENGINEER'S PLANNING LEVEL COST ESTIMATE
August 28, 2014

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT</u>	<u>PRICE</u>	<u>AMOUNT</u>
1.	Mobilization (10%)	1	LS	\$22,000	\$22,000.00
2.	Locate Existing Utilities	1	LS	\$2,000	\$2,000.00
3.	Removal of Structure and Obstruction	1	LS	\$2,000	\$2,000.00
4.	Clearing and Grubbing	1	LS	\$6,000	\$6,000.00
5.	Excavation, Backfill, and Compaction for Roadway	760	CY	\$20	\$15,200.00
6.	Gravel Borrow Incl. Haul	0	TN	\$20	\$0.00
7.	Catch Basin Type 1	0	EA	\$1,500	\$0.00
8.	Storm Sewer Pipe 12 In. Diam. (Incl. Bedding)	0	LF	\$35	\$0.00
9.	Storm Detention Facilities	1	LS	\$0	\$0.00
10.	Trench Excavation Safety Systems	0	LS	\$5,000	\$0.00
11.	Crushed Surfacing Top Course	430	TN	\$26	\$11,180.00
12.	Crushed Surfacing Base Course	650	TN	\$26	\$16,900.00
13.	HMA	1,430	TN	\$100	\$143,000.00
14.	Fire Hydrant Assembly	0	EA	\$3,000	\$0.00
15.	Landscaping	1	LS	\$0	\$0.00
16.	Temporary Water Pollution/Erosion Control (5%)	1	LS	\$11,000	\$11,000.00
17.	Cement Conc. Sidewalk Ramp	0	EA	\$2,000	\$0.00
18.	Cement Conc. Traffic Curb & Gutter	0	LF	\$15	\$0.00
19.	Cement Conc. Sidewalk	0	SY	\$45	\$0.00
20.	Permanent Signing	1	LS	\$5,000	\$5,000.00
21.	Traffic Signal System	1	LS	\$300,000	\$300,000.00
22.	Illumination System	1	LS	\$26,000	\$26,000.00
23.	Temporary Traffic Control (5%)	1	LS	\$11,000	\$11,000.00
24.	Paint Line	4,590	LF	\$2	\$9,180.00
Subtotal Base Bid					\$580,460.00
Sales Tax at 0% per W.S. Revenue Rule No. 171					\$0.00
Construction Contingencies(20%)					\$116,100.00
TOTAL CONSTRUCTION COST					\$696,560.00
Construction Management(15%)					\$104,500.00
Estimated Design, Environmental Engineering Cost(15%)					\$104,500.00
TOTAL PROJECT COST					\$906,000.00

Assumptions:

*Length of Project is Approx. 1530 LF

*Existing: Road width varies

*Proposed: Install Traffic Signal

*Full Depth Pavement Section - 3" HMA, 4" CSTC, 6" CSBC

*Rebuild Curb Ramps

Prepared by: Rory Cameron

Checked by:

Approved by:

CITY OF BUCKLEY
MUNDY LOSS AND 112TH AVE EAST INTERSECTION IMPROVEMENTS
ENGINEER'S PLANNING LEVEL COST ESTIMATE
August 28, 2014

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT</u>	<u>PRICE</u>	<u>AMOUNT</u>
1.	Mobilization (10%)	1	LS	\$46,000	\$46,000.00
2.	Locate Existing Utilities	1	LS	\$5,000	\$5,000.00
3.	Removal of Structure and Obstruction	1	LS	\$25,000	\$25,000.00
4.	Clearing and Grubbing	1	LS	\$21,000	\$21,000.00
5.	Excavation, Backfill, and Compaction for Roadway	1,820	CY	\$20	\$36,400.00
6.	Gravel Borrow Incl. Haul	620	TN	\$20	\$12,400.00
7.	Catch Basin Type 1	11	EA	\$1,500	\$16,500.00
8.	Storm Sewer Pipe 12 In. Diam. (Incl. Bedding)	1,615	LF	\$35	\$56,525.00
9.	Storm Detention Facilities	1	LS	\$45,100	\$45,100.00
10.	Trench Excavation Safety Systems	1	LS	\$5,000	\$5,000.00
11.	Crushed Surfacing Top Course	1,020	TN	\$26	\$26,520.00
12.	Crushed Surfacing Base Course	1,530	TN	\$26	\$39,780.00
13.	HMA	1,190	TN	\$100	\$119,000.00
14.	Fire Hydrant Assembly	1	EA	\$3,000	\$3,000.00
15.	Landscaping	1	LS	\$0	\$0.00
16.	Temporary Water Pollution/Erosion Control (5%)	1	LS	\$23,000	\$23,000.00
17.	Cement Conc. Sidewalk Ramp	8	EA	\$2,000	\$16,000.00
18.	Cement Conc. Traffic Curb & Gutter	370	LF	\$15	\$5,550.00
19.	Cement Conc. Sidewalk	206	SY	\$45	\$9,250.00
20.	Permanent Signing	1	LS	\$5,000	\$5,000.00
21.	Traffic Signal Systemt	1	LS	\$300,000	\$300,000.00
22.	Illumination System	1	LS	\$26,000	\$26,000.00
23.	Temporary Traffic Control (5%)	1	LS	\$23,000	\$23,000.00
24.	Paint Line	4,470	LF	\$2	\$8,940.00
Subtotal Base Bid					\$873,965.00
Sales Tax at 0% per W.S. Revenue Rule No. 171					\$0.00
Construction Contingencies(20%)					\$174,800.00
TOTAL CONSTRUCTION COST					\$1,048,765.00
Construction Management(15%)					\$157,400.00
Estimated Design, Environmental Engineering Cost(15%)					\$157,400.00
TOTAL PROJECT COST					\$1,364,000.00

Assumptions:

*Length of Project is Approx. 1490 LF

*Existing: Road width varies

*Proposed: Widen Existing Road and for turn lanes, overlay, add curb, gutter, and sidewalk, add traffic signal

*Full Depth Pavement Section - 3" HMA, 4" CSTC, 6" CSBC

*Overlay 2"

Prepared by: Rory Cameron

Checked by:

Approved by:

CITY OF BUCKLEY
MAIN ST AND A ST INTERSECTION IMPROVEMENTS
ENGINEER'S PLANNING LEVEL COST ESTIMATE
August 28, 2014

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT</u>	<u>PRICE</u>	<u>AMOUNT</u>
1.	Mobilization (10%)	1	LS	\$1,000	\$1,000.00
2.	Locate Existing Utilities	1	LS	\$2,000	\$2,000.00
3.	Removal of Structure and Obstruction	1	LS	\$2,000	\$2,000.00
4.	Clearing and Grubbing	1	LS	\$0	\$0.00
5.	Excavation, Backfill, and Compaction for Roadway	0	CY	\$20	\$0.00
6.	Gravel Borrow Incl. Haul	0	TN	\$20	\$0.00
7.	Catch Basin Type 1	0	EA	\$1,500	\$0.00
8.	Storm Sewer Pipe 12 In. Diam. (Incl. Bedding)	0	LF	\$35	\$0.00
9.	Storm Detention Facilities	1	LS	\$0	\$0.00
10.	Trench Excavation Safety Systems	0	LS	\$5,000	\$0.00
11.	Crushed Surfacing Top Course	0	TN	\$26	\$0.00
12.	Crushed Surfacing Base Course	0	TN	\$26	\$0.00
13.	HMA	0	TN	\$100	\$0.00
14.	Fire Hydrant Assembly	0	EA	\$3,000	\$0.00
15.	Landscaping	1	LS	\$0	\$0.00
16.	Temporary Water Pollution/Erosion Control (5%)	1	LS	\$1,000	\$1,000.00
17.	Cement Conc. Sidewalk Ramp	0	EA	\$2,000	\$0.00
18.	Cement Conc. Traffic Curb & Gutter	0	LF	\$15	\$0.00
19.	Cement Conc. Sidewalk	0	SY	\$45	\$0.00
20.	Permanent Signing	1	LS	\$5,000	\$5,000.00
21.	Traffic Signal System	1	LS	\$300,000	\$300,000.00
22.	Illumination System	1	LS	\$6,500	\$6,500.00
23.	Temporary Traffic Control (5%)	1	LS	\$1,000	\$1,000.00
24.	Paint Line	300	LF	\$2	\$600.00
Subtotal Base Bid					\$319,100.00
Sales Tax at 0% per W.S. Revenue Rule No. 171					\$0.00
Construction Contingencies(20%)					\$63,900.00
TOTAL CONSTRUCTION COST					\$383,000.00
Construction Management(15%)					\$57,500.00
Estimated Design, Environmental Engineering Cost(15%)					\$57,500.00
TOTAL PROJECT COST					\$498,000.00

Assumptions:

*Length of Project is Approx. 100 LF

*Existing: Road width varies

*Proposed: Install Traffic Signal

*Full Depth Pavement Section - 3" HMA, 4" CSTC, 6" CSBC

*Rebuild Curb Ramps

Prepared by: Rory Cameron

Checked by:

Approved by:

CITY OF BUCKLEY
RIVER AVENUE AND A STREET INTERSECTION IMPROVEMENTS
ENGINEER'S PLANNING LEVEL COST ESTIMATE
August 28, 2014

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT</u>	<u>PRICE</u>	<u>AMOUNT</u>
1.	Mobilization (10%)	1	LS	\$14,000	\$14,000.00
2.	Locate Existing Utilities	1	LS	\$5,000	\$5,000.00
3.	Removal of Structure and Obstruction	1	LS	\$25,000	\$25,000.00
4.	Clearing and Grubbing	1	LS	\$0	\$0.00
5.	Excavation, Backfill, and Compaction for Roadway	90	CY	\$20	\$1,800.00
6.	Gravel Borrow Incl. Haul	40	TN	\$20	\$800.00
7.	Catch Basin Type 1	0	EA	\$1,500	\$0.00
8.	Storm Sewer Pipe 12 In. Diam. (Incl. Bedding)	0	LF	\$35	\$0.00
9.	Storm Detention Facilities	1	LS	\$0	\$0.00
10.	Trench Excavation Safety Systems	1	LS	\$5,000	\$5,000.00
11.	Crushed Surfacing Top Course	0	TN	\$26	\$0.00
12.	Crushed Surfacing Base Course	0	TN	\$26	\$0.00
13.	HMA	490	TN	\$100	\$49,000.00
14.	Fire Hydrant Assembly	1	EA	\$3,000	\$3,000.00
15.	Landscaping	1	LS	\$5,000	\$5,000.00
16.	Temporary Water Pollution/Erosion Control (5%)	1	LS	\$7,000	\$7,000.00
17.	Cement Conc. Sidewalk Ramp	8	EA	\$2,000	\$16,000.00
18.	Cement Conc. Traffic Curb & Gutter	370	LF	\$15	\$5,550.00
19.	Cement Conc. Sidewalk	206	SY	\$45	\$9,250.00
20.	Permanent Signing	1	LS	\$5,000	\$5,000.00
21.	Traffic Signal System	1	LS	\$300,000	\$300,000.00
22.	Illumination System	1	LS	\$19,500	\$19,500.00
23.	Temporary Traffic Control (5%)	1	LS	\$7,000	\$7,000.00
24.	Paint Line	2,850	LF	\$2	\$5,700.00
Subtotal Base Bid					\$483,600.00
Sales Tax at 0% per W.S. Revenue Rule No. 171					\$0.00
Construction Contingencies(20%)					\$96,800.00
TOTAL CONSTRUCTION COST					\$580,400.00
Construction Management(15%)					\$87,100.00
Estimated Design, Environmental Engineering Cost(15%)					\$87,100.00
TOTAL PROJECT COST					\$755,000.00

Assumptions:

*Length of Project is Approx. 950 LF

*Existing: Road width varies

*Proposed: Overlay, Restripe for turn lanes, add traffic signal

*Full Depth Pavement Section - 3" HMA, 4" CSTC, 6" CSBC

Prepared by: Rory Cameron

Checked by:

Approved by:

CITY OF BUCKLEY
RIVER AVENUE AND MAIN STREET INTERSECTION IMPROVEMENTS
ENGINEER'S PLANNING LEVEL COST ESTIMATE
August 28, 2014

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT</u>	<u>PRICE</u>	<u>AMOUNT</u>
1.	Mobilization (10%)	1	LS	\$16,000	\$16,000.00
2.	Locate Existing Utilities	1	LS	\$5,000	\$5,000.00
3.	Removal of Structure and Obstruction	1	LS	\$25,000	\$25,000.00
4.	Clearing and Grubbing	1	LS	\$5,000	\$5,000.00
5.	Excavation, Backfill, and Compaction for Roadway	430	CY	\$20	\$8,600.00
6.	Gravel Borrow Incl. Haul	40	TN	\$20	\$800.00
7.	Catch Basin Type 1	0	EA	\$1,500	\$0.00
8.	Storm Sewer Pipe 12 In. Diam. (Incl. Bedding)	0	LF	\$35	\$0.00
9.	Storm Detention Facilities	1	LS	\$0	\$0.00
10.	Trench Excavation Safety Systems	1	LS	\$5,000	\$5,000.00
11.	Crushed Surfacing Top Course	120	TN	\$26	\$3,120.00
12.	Crushed Surfacing Base Course	180	TN	\$26	\$4,680.00
13.	HMA	520	TN	\$100	\$52,000.00
14.	Fire Hydrant Assembly	1	EA	\$3,000	\$3,000.00
15.	Landscaping	1	LS	\$0	\$0.00
16.	Temporary Water Pollution/Erosion Control (5%)	1	LS	\$8,000	\$8,000.00
17.	Cement Conc. Sidewalk Ramp	8	EA	\$2,000	\$16,000.00
18.	Cement Conc. Traffic Curb & Gutter	370	LF	\$15	\$5,550.00
19.	Cement Conc. Sidewalk	206	SY	\$45	\$9,250.00
20.	Permanent Signing	1	LS	\$5,000	\$5,000.00
21.	Traffic Signal System	1	LS	\$300,000	\$300,000.00
22.	Illumination System	1	LS	\$19,500	\$19,500.00
23.	Temporary Traffic Control (5%)	1	LS	\$8,000	\$8,000.00
24.	Paint Line	2,850	LF	\$2	\$5,700.00
Subtotal Base Bid					\$505,200.00
Sales Tax at 0% per W.S. Revenue Rule No. 171					\$0.00
Construction Contingencies(20%)					\$101,100.00
TOTAL CONSTRUCTION COST					\$606,300.00
Construction Management(15%)					\$91,000.00
Estimated Design, Environmental Engineering Cost(15%)					\$91,000.00
TOTAL PROJECT COST					\$789,000.00

Assumptions:

*Length of Project is Approx. 950 LF

*Existing: Road width varies

*Proposed: Overlay, Restripe for turn lanes, add traffic signal

*Full Depth Pavement Section - 3" HMA, 4" CSTC, 6" CSBC

*Rebuild Curb Ramps

Prepared by: Rory Cameron

Checked by:

Approved by:

CITY OF BUCKLEY
MUNDY LOSS ROAD PEDESTRIAN IMPROVEMENTS-SIDEWALK
ENGINEER'S PLANNING LEVEL COST ESTIMATE
August 8, 2014

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT</u>	<u>PRICE</u>	<u>AMOUNT</u>
1.	Mobilization (10%)	1	LS	\$32,000	\$32,000.00
2.	Locate Existing Utilities	1	LS	\$5,000	\$5,000.00
3.	Removal of Structure and Obstruction	1	LS	\$25,000	\$25,000.00
4.	Clearing and Grubbing	1	LS	\$43,000	\$43,000.00
5.	Excavation, Backfill, and Compaction for Roadway	950	CY	\$20	\$19,000.00
6.	Gravel Borrow Incl. Haul	570	TN	\$20	\$11,400.00
7.	Catch Basin Type 1	11	EA	\$1,500	\$16,500.00
8.	Storm Sewer Pipe 12 In. Diam. (Incl. Bedding)	1,600	LF	\$35	\$56,000.00
9.	Storm Detention Facilities	1	LS	\$0	\$0.00
10.	Trench Excavation Safety Systems	1	LS	\$5,000	\$5,000.00
11.	Crushed Surfacing Top Course	340	TN	\$26	\$8,840.00
12.	Crushed Surfacing Base Course	500	TN	\$26	\$13,000.00
13.	HMA	280	TN	\$100	\$28,000.00
14.	Fire Hydrant Assembly	4	EA	\$3,000	\$12,000.00
15.	Landscaping	1	LS	\$0	\$0.00
16.	Temporary Water Pollution/Erosion Control (5%)	1	LS	\$16,000	\$16,000.00
17.	Cement Conc. Sidewalk Ramp	4	EA	\$2,000	\$8,000.00
18.	Cement Conc. Traffic Curb & Gutter	1,370	LF	\$15	\$20,550.00
19.	Cement Conc. Sidewalk	761	SY	\$45	\$34,250.00
20.	Permanent Signing	1	LS	\$5,000	\$5,000.00
21.	Illumination System	1	LS	\$45,500	\$45,500.00
22.	Temporary Traffic Control (5%)	1	LS	\$16,000	\$16,000.00
23.	Paint Line	4,110	LF	\$2	\$8,220.00
Subtotal Base Bid					\$428,260.00
Sales Tax at 0% per W.S. Revenue Rule No. 171					\$0.00
Construction Contingencies(20%)					\$85,700.00
TOTAL CONSTRUCTION COST					\$513,960.00
Construction Management(15%)					\$77,100.00
Estimated Design, Environmental Engineering Cost(15%)					\$77,100.00
TOTAL PROJECT COST					\$669,000.00

Assumptions:

*Length of Project is Approx. 3,300 LF

*Existing: 23' wide road

*Proposed: Add median, bike lanes, planter and Sidewalk along project corridor

*Full Depth Pavement Section - 5" HMA, 4" CSTC, 6" CSBC

Wetland work will be included with this construction

Prepared by: Rory Cameron

Checked by:

Approved by:

CITY OF BUCKLEY
 RYAN ROAD PEDESTRIAN IMPROVEMENTS
 ENGINEER'S PRELIMINARY CONTRACT COST ESTIMATE
 UPDATED: 4/28/2014

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT</u>	<u>PRICE</u>	<u>AMOUNT</u>
1.	Minor Changes	1	FA	\$5,000.00	\$5,000.00
2.	Survey	1	LS	\$6,000.00	\$6,000.00
3.	SPCC Plan	1	LS	\$500.00	\$500.00
4.	Mobilization, Cleanup, and Demobilization	1	LS	\$67,000.00	\$67,000.00
5.	Project Temporary Traffic Control	1	LS	\$4,000.00	\$4,000.00
6.	Clearing and Grubbing	1	LS	\$4,000.00	\$4,000.00
7.	Removal of Structure and Obstruction	1	LS	\$2,500.00	\$2,500.00
8.	Unsuitable Excavation Incl. Haul	50	CY	\$50.00	\$2,500.00
9.	Excavation, Backfill, Compaction, and Grading, incl Haul	3,430	CY	\$30.00	\$102,900.00
10.	Gravel Borrow, Incl. Haul	530	TN	\$15.00	\$7,950.00
11.	Locate Existing Utilities	1	LS	\$500.00	\$500.00
12.	Crushed Surfacing Top Course	1,100	TN	\$40.00	\$44,000.00
13.	Crushed Surfacing Base Course	1,100	TN	\$40.00	\$44,000.00
14.	Commercial HMA	610	TN	\$130.00	\$79,300.00
15.	Storm Drainage Pipe, 12"	6,520	LF	\$65.00	\$423,800.00
16.	Catch Basin Type 1	44	EA	\$1,000.00	\$44,000.00
17.	Catch Basin Type 2, 48"	2	EA	\$2,500.00	\$5,000.00
18.	Adjust Valve Box	2	EA	\$250.00	\$500.00
19.	Erosion/Water Pollution Control	1	LS	\$1,500.00	\$1,500.00
20.	Cement Concrete Traffic Curb and Gutter	6,520	LF	\$35.00	\$228,200.00
21.	Cement Concrete Sidewalk	1,070	SY	\$50.00	\$53,500.00
22.	Cement Concrete Driveway	436	SY	\$50.00	\$21,800.00
23.	Cement Concrete Curb Ramp	2	EA	\$2,500.00	\$5,000.00
24.	Plastic Stop Line	0	LF	\$30.00	\$0.00
25.	Edge Line	0	LF	\$1.00	\$0.00
26.	Permanent Signing	1	LS	\$5,000.00	\$5,000.00
27.	Project Documentation	1	LS	\$500.00	\$500.00
Subtotal:					\$1,158,950.00
Sales Tax at 0% per W.S. Revenue Rule No. 171					\$0.00
ESTIMATED CONSTRUCTION COST, SUBTOTAL:					\$1,158,950.00
20% CONTINGENCY					\$231,790.00
TOTAL CONSTRUCTION COST					\$1,390,740.00
Construction Management(15%)					\$208,700.00
Estimated Design, Environmental Engineering Cost(15%)					\$208,700.00
<u>TOTAL PROJECT COST</u>					<u>\$1,808,140.00</u>

Assumptions:

- *Length of Project is Approx. 6,420 LF
- *Existing: 23' wide road
- *Proposed: Add curb gutter and sidewalk to north side of roadway
- *Full Depth Pavement Section - 5" HMA, 4" CSTC, 6" CSBC

Prepared by: Rory Cameron

Checked by:

Approved by:

CITY OF BUCKLEY
SPIKETON AVENUE PEDESTRIAN IMPROVEMENTS-SIDEWALK
ENGINEER'S PLANNING LEVEL COST ESTIMATE
August 8, 2014

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT</u>	<u>PRICE</u>	<u>AMOUNT</u>
1.	Mobilization (10%)	1	LS	\$33,000	\$33,000.00
2.	Locate Existing Utilities	1	LS	\$5,000	\$5,000.00
3.	Removal of Structure and Obstruction	1	LS	\$25,000	\$25,000.00
4.	Clearing and Grubbing	1	LS	\$12,000	\$12,000.00
5.	Excavation, Backfill, and Compaction for Roadway	1,030	CY	\$20	\$20,600.00
6.	Gravel Borrow Incl. Haul	700	TN	\$20	\$14,000.00
7.	Catch Basin Type 1	12	EA	\$1,500	\$18,000.00
8.	Storm Sewer Pipe 12 In. Diam. (Incl. Bedding)	1,700	LF	\$35	\$59,500.00
9.	Storm Detention Facilities	1	LS	\$34,850	\$34,850.00
10.	Trench Excavation Safety Systems	1	LS	\$5,000	\$5,000.00
11.	Crushed Surfacing Top Course	330	TN	\$26	\$8,580.00
12.	Crushed Surfacing Base Course	490	TN	\$26	\$12,740.00
13.	HMA	280	TN	\$100	\$28,000.00
14.	Fire Hydrant Assembly	1	EA	\$3,000	\$3,000.00
15.	Landscaping	1	LS	\$0	\$0.00
16.	Temporary Water Pollution/Erosion Control (2%)	1	LS	\$7,000	\$7,000.00
17.	Cement Conc. Sidewalk Ramp	0	EA	\$2,000	\$0.00
18.	Cement Conc. Traffic Curb & Gutter	1,700	LF	\$15	\$25,500.00
19.	Cement Conc. Sidewalk	944	SY	\$45	\$42,500.00
20.	Permanent Signing	1	LS	\$5,000	\$5,000.00
21.	Illumination System	1	LS	\$0	\$0.00
22.	Temporary Traffic Control (2%)	1	LS	\$7,000	\$7,000.00
23.	Paint Line	5,100	LF	\$2	\$10,200.00
Subtotal Base Bid					\$376,470.00
Sales Tax at 0% per W.S. Revenue Rule No. 171					\$0.00
Construction Contingencies(20%)					\$75,300.00
TOTAL CONSTRUCTION COST					\$451,770.00
Construction Management(15%)					\$67,800.00
Estimated Design, Environmental Engineering Cost(15%)					\$67,800.00
TOTAL PROJECT COST					\$588,000.00

Assumptions:

*Length of Project is Approx. 3,300 LF

*Existing: 23' wide road

*Proposed: Add median, bike lanes, planter and Sidewalk along project corridor

*Full Depth Pavement Section - 5" HMA, 4" CSTC, 6" CSBC

Wetland work will be included with this construction

Prepared by: Rory Cameron

Checked by:

Approved by:

APPENDIX E

TRIP GENERATION & FEE BASE

APPENDIX E
INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)
TRIP GENERATION MANUAL, 9TH EDITION

Code Description	Unit of Measure	Daily Weekday Trips/Unit	\$/Trip	\$/Unit
PORT AND TERMINAL				
30 Truck Terminal	Acres	81.90	\$638	\$52,252
90 Park and Ride Lot with Bus Service	Parking Spaces	4.50	\$638	\$2,871
INDUSTRIAL				
110 General Light Industrial	1,000 SF	6.97	\$638	\$4,447
120 General Heavy Industrial	Acres	6.75	\$638	\$4,307
130 Industrial Park	1,000 SF	6.83	\$638	\$4,358
140 Manufacturing	1,000 SF	3.82	\$638	\$2,437
150 Warehousing	1,000 SF	3.56	\$638	\$2,271
151 Mini-Warehouse	1,000 SF	2.50	\$638	\$1,595
152 High-Cube Warehouse	1,000 SF	1.68	\$638	\$1,072
RESIDENTIAL				
210 Single-Family Detached Housing	Dwelling Units	9.52	\$638	\$6,074
220 Apartment	Dwelling Units	6.65	\$638	\$4,243
221 Low-Rise Apartment	Dwelling Units	6.59	\$638	\$4,204
230 Residential Condominium / Townhouse	Dwelling Units	5.81	\$638	\$3,707
240 Mobile Home Park	Dwelling Units	4.99	\$638	\$3,184
251 Senior Adult Housing -Detached	Dwelling Units	3.68	\$638	\$2,348
252 Senior Adult Housing -Attached	Dwelling Units	3.44	\$638	\$2,195
253 Congregate Care Facility	Dwelling Units	2.02	\$638	\$1,289
254 Assisted Living	Beds	2.74	\$638	\$1,748
255 Continuing Care Retirement Community	Dwelling Units	2.40	\$638	\$1,531
LODGING				
310 Hotel	Rooms	8.17	\$638	\$5,212
320 Motel	Rooms	5.63	\$638	\$3,592
RECREATIONAL				
411 City Park	Acres	1.89	\$638	\$1,206
412 County Park	Acres	2.28	\$638	\$1,455
413 State Park	Acres	0.65	\$638	\$415
415 Beach Park	Acres	29.81	\$638	\$19,019
417 Regional Park	Acres	4.57	\$638	\$2,916
420 Marina	Berths	2.96	\$638	\$1,888
430 Golf Course	Acres	5.04	\$638	\$3,216
432 Golf Driving Range	Positions	13.65	\$638	\$8,709
435 Multi-Purpose Recreational Facility	Acres	90.38	\$638	\$57,662
437 Bowling Alley	1,000 SF	33.33	\$638	\$21,265
443 Movie Theater without Matinee	1,000 SF	78.06	\$638	\$49,802
452 Horse Race Track	Acres	43.00	\$638	\$27,434
460 Arena	Acres	33.33	\$638	\$21,265
480 Amusement Park	Acres	75.76	\$638	\$48,335
488 Soccer Complex	Fields	71.33	\$638	\$45,509
490 Tennis Courts	Courts	31.04	\$638	\$19,804
491 Racquet / Tennis Club	Courts	38.70	\$638	\$24,691
492 Health / Fitness Club	1,000 SF	32.93	\$638	\$21,009

APPENDIX E
INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)
TRIP GENERATION MANUAL, 9TH EDITION

Code Description	Unit of Measure	Daily Weekday Trips/Unit	\$/Trip	\$/Unit
493 Athletic Club	1,000 SF	43.00	\$638	\$27,434
495 Recreational Community Center	1,000 SF	33.82	\$638	\$21,577
INSTITUTIONAL				
520 Elementary School	1,000 SF	15.43	\$638	\$9,844
522 Middle School / Junior High School	1,000 SF	13.78	\$638	\$8,792
530 High School	1,000 SF	12.89	\$638	\$8,224
536 Private School (K-12)	Students	2.48	\$638	\$1,582
540 Junior / Community College	1,000 SF	27.49	\$638	\$17,539
560 Church	1,000 SF	9.11	\$638	\$5,812
565 Daycare Center	1,000 SF	74.06	\$638	\$47,250
566 Cemetery	Acres	4.73	\$638	\$3,018
590 Library	1,000 SF	56.24	\$638	\$35,881
591 Lodge / Fraternal Organization	Members	0.29	\$638	\$185
MEDICAL				
610 Hospital	1,000 SF	6.95	\$638	\$4,434
620 Nursing Home	1,000 SF	7.60	\$638	\$4,849
630 Clinic	1,000 SF	8.01	\$638	\$5,110
OFFICE				
710 General Office Building	1,000 SF	11.03	\$638	\$7,037
714 Corporate Headquarters Building	1,000 SF	7.98	\$638	\$5,091
715 Single Tenant Office Building	1,000 SF	11.65	\$638	\$7,433
720 Medical-Dental Office Building	1,000 SF	36.13	\$638	\$23,051
730 Government Office Building	1,000 SF	68.93	\$638	\$43,977
732 United States Post Office	1,000 SF	108.19	\$638	\$69,025
733 Government Office Complex	1,000 SF	27.92	\$638	\$17,813
750 Office Park	1,000 SF	0.76	\$638	\$485
760 Research and Development Center	1,000 SF	8.11	\$638	\$5,174
770 Business Park	1,000 SF	12.44	\$638	\$7,937
RETAIL				
812 Building Materials and Lumber Store	1,000 SF	45.16	\$638	\$28,812
813 Free-Standing Discount Superstore	1,000 SF	50.75	\$638	\$32,379
814 Variety Store	1,000 SF	64.03	\$638	\$40,851
815 Free Standing Discount Store	1,000 SF	57.24	\$638	\$36,519
816 Hardware / Paint Store	1,000 SF	51.29	\$638	\$32,723
817 Nursery (Garden Center)	1,000 SF	68.10	\$638	\$43,448
818 Nursery (Wholesale)	1,000 SF	39.00	\$638	\$24,882
820 Shopping Center	1,000 SF	42.70	\$638	\$27,243
823 Factory Outlet Center	1,000 SF	26.59	\$638	\$16,964
826 Specialty Retail Center	1,000 SF	44.32	\$638	\$28,276
841 New Car Sales	1,000 SF	32.30	\$638	\$20,607
843 Automobile Parts Sales	1,000 SF	61.91	\$638	\$39,499
848 Tire Store	1,000 SF	24.87	\$638	\$15,867
850 Supermarket	1,000 SF	102.24	\$638	\$65,229
851 Convenience Market (Open 24 Hours)	1,000 SF	737.99	\$638	\$470,838

APPENDIX E
INSTITUTE OF TRANSPORTATION ENGINEERS (ITE)
TRIP GENERATION MANUAL, 9TH EDITION

Code Description	Unit of Measure	Daily Weekday Trips/Unit	\$/Trip	\$/Unit
853 Convenience Market with Gasoline Pumps	1,000 SF	845.60	\$638	\$539,493
854 Discount Supermarket	1,000 SF	90.86	\$638	\$57,969
857 Discount Club	1,000 SF	41.80	\$638	\$26,668
860 Wholesale Market	1,000 SF	6.73	\$638	\$4,294
862 Home Improvement Superstore	1,000 SF	30.74	\$638	\$19,612
863 Electronics Superstore	1,000 SF	45.04	\$638	\$28,736
875 Department Store	1,000 SF	22.88	\$638	\$14,597
876 Apparel Store	1,000 SF	66.40	\$638	\$42,363
879 Arts and Craft Store	1,000 SF	56.55	\$638	\$36,079
880 Pharmacy / Drugstore without Drive-Through Window	1,000 SF	90.06	\$638	\$57,458
881 Pharmacy / Drugstore with Drive-Through Window	1,000 SF	96.91	\$638	\$61,829
890 Furniture Store	1,000 SF	5.06	\$638	\$3,228
SERVICES				
912 Drive-In Bank	1,000 SF	148.15	\$638	\$94,520
931 Quality Restaurant	1,000 SF	89.95	\$638	\$57,388
932 High-Turnover (Sit-Down) Restaurant	1,000 SF	127.15	\$638	\$81,122
933 Fast Food Restaurant without Drive-Through Window	1,000 SF	716.00	\$638	\$456,808
934 Fast Food Restaurant with Drive-Through Window	1,000 SF	496.12	\$638	\$316,525
937 Coffee / Donut Shop with Drive-Through Window	1,000 SF	818.58	\$638	\$522,254
938 Coffee / Donut Shop with Drive-Through Window and No Indoor Seating	1,000 SF	1,800.00	\$638	\$1,148,400
941 Quick Lubrication Vehicle Shop	Service Bays	40.00	\$638	\$25,520
944 Gasoline / Service Station	Fueling Positions	168.56	\$638	\$107,541
945 Gasoline / Service Station with Convenience Market	Fueling Positions	162.78	\$638	\$103,854
946 Gasoline / Service Station with Convenience Market and Car Wash	Fueling Positions	152.84	\$638	\$97,512
947 Self Service Car Wash	Stalls	108.00	\$638	\$68,904

APPENDIX F

FUTURE STREET PLAN

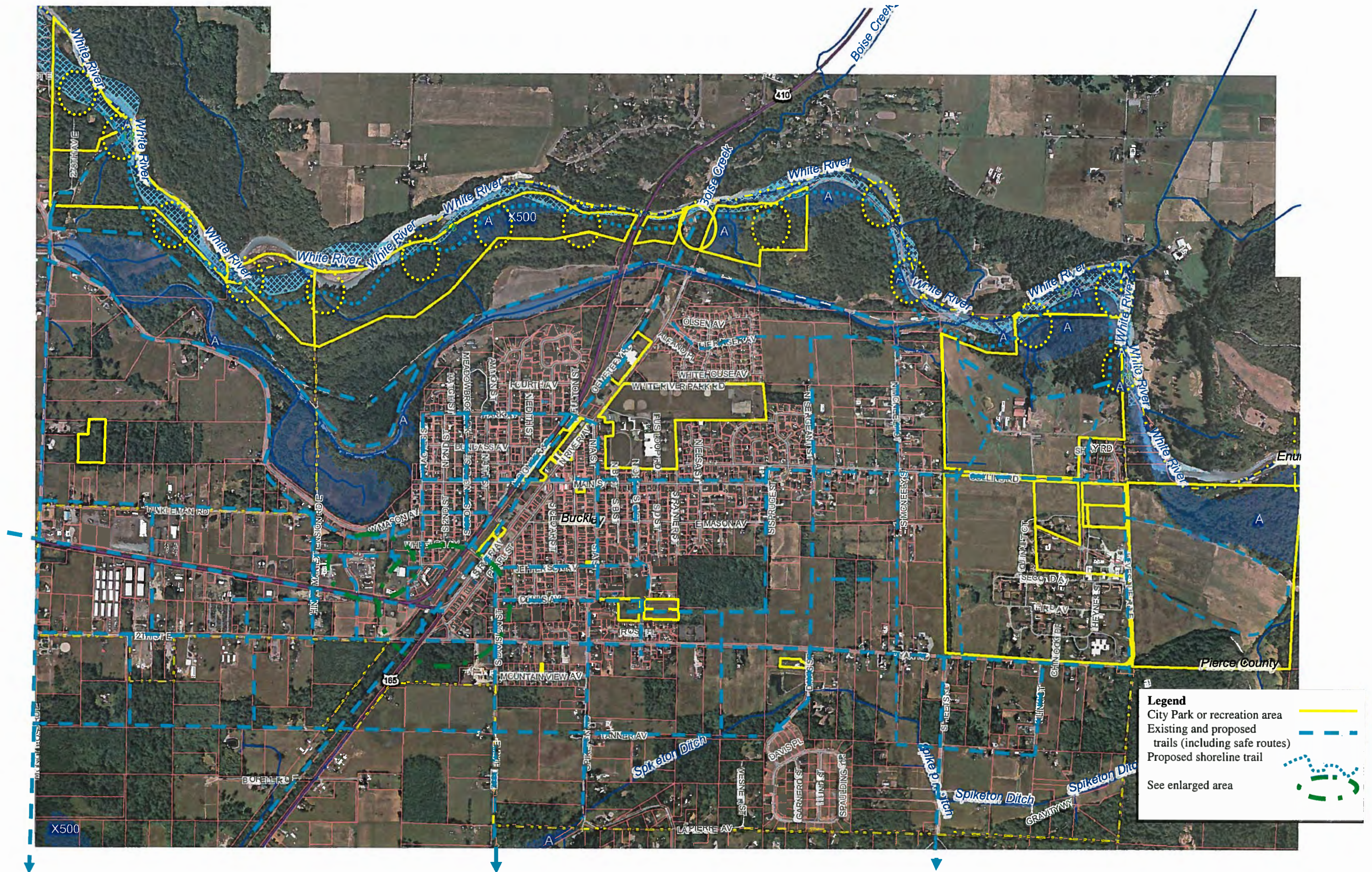


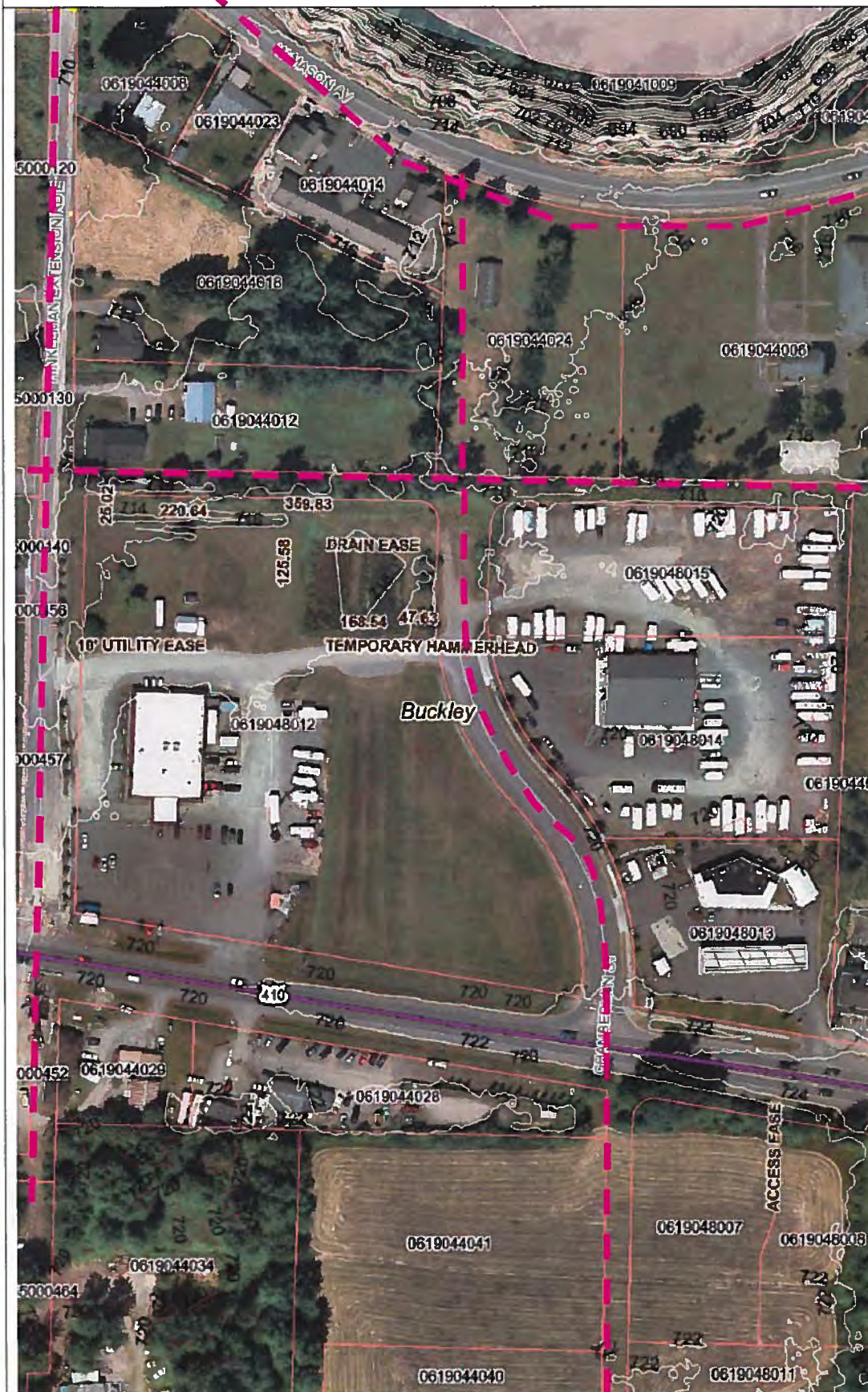
MAJOR (PRINCIPAL) ARTERIALS
MINOR (SECONDARY) ARTERIALS
COLLECTOR STREETS
CITY BOUNDARY LINE
UGA



APPENDIX G

FUTURE WALKWAY PLAN

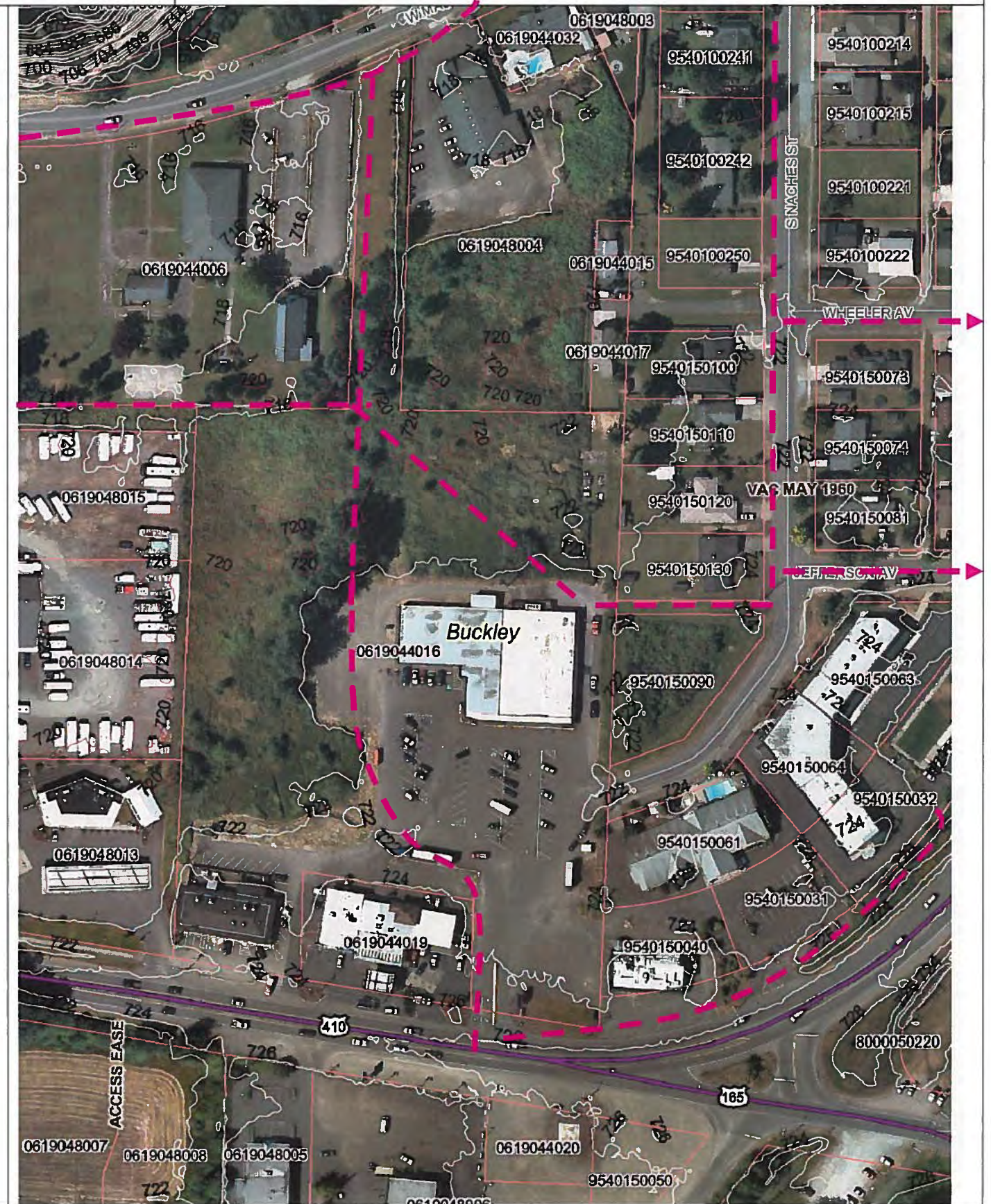


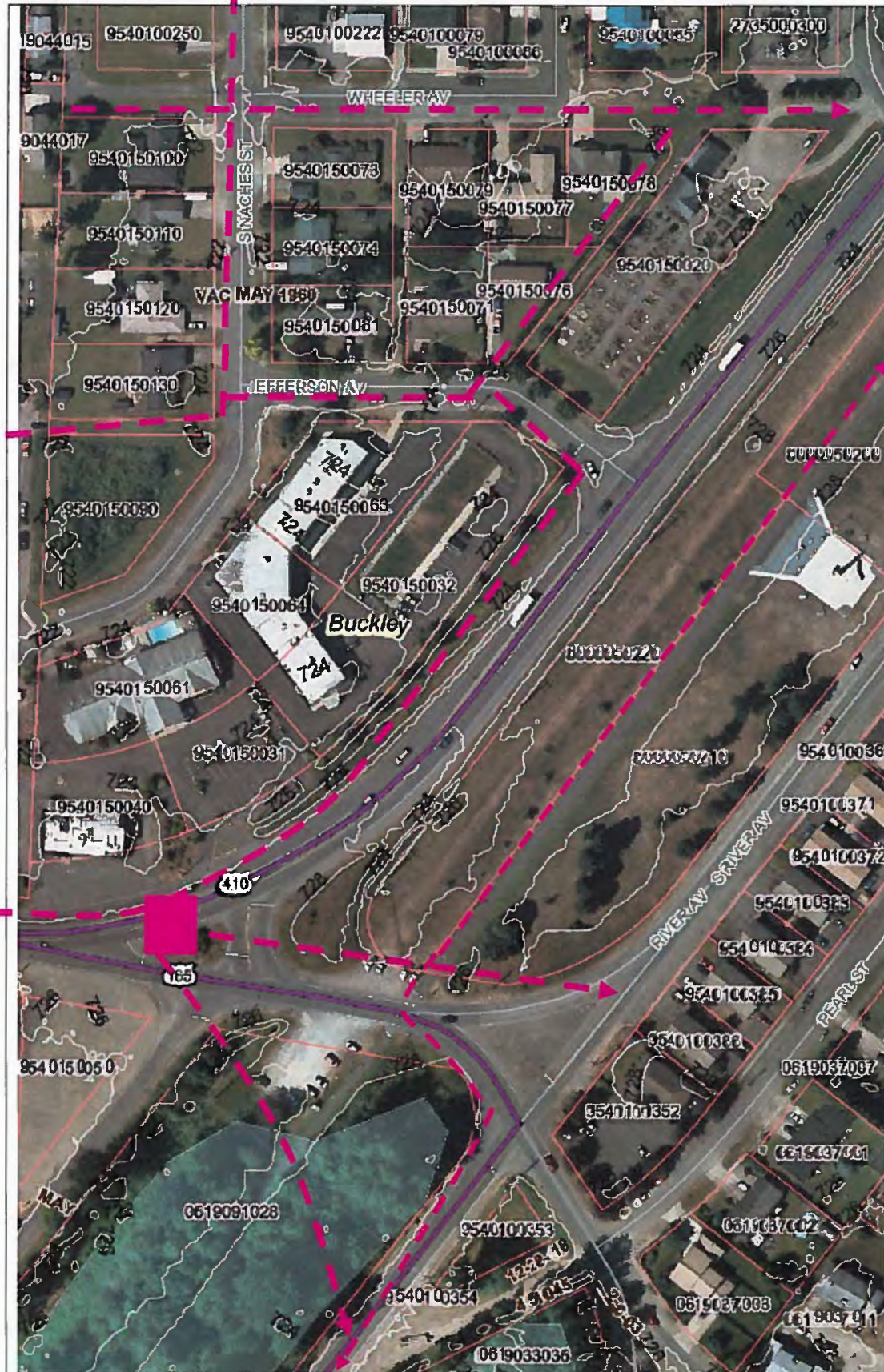


Eagle's area: Use right-of-way to the north to cross to Rose's to the east.

Rose's IGA: continue path from Eagle's area to." flag-pole" of the flag lot. Connect to sidewalk to north and to south. The sidewalk should continue along 410 and Jefferson.

A stretch of land between the north corner of the IGA building and Naches is about 15 feet wide and could be used for a walkway.





The walkway could be on the highway and connect with a swath of land northwest of the nursery to Wheeler Way. From there, pedestrians could use the cross walk to the youth center.

The trail plan should show the walkway and foothills trail as they will be after phase 2, at the light.

Blue: phase 2
Purple: completed phase 1

The whited-out areas are not part of phase 2 at this time:

