

Alternative Analysis Report West Main Street Study Waterbury, Connecticut

May 26, 2022



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- A Concept Drawings
- B Intersection Capacity Analysis Worksheets – Weekday Morning Peak Hour
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1 Introduction

The West Main Street corridor in Waterbury is a key connection between the West Side neighborhoods and the Downtown, as well a retail corridor and main route for vehicular traffic between Route 8 and Downtown Waterbury. The corridor lacks bicycle, pedestrian, and transit accommodations, and vehicle travel lanes are excessive in width and in number. Following our comprehensive analysis of existing conditions along the corridor and a robust public engagement process that involved stakeholder interviews, public workshops, and interactive surveys, recommendations were identified to create a safer West Main Street for all users. The recommendations of this study seek to build upon the momentum gained from the recently completed TIGER project targeted at the Freight Street area and the multitude of other past and ongoing projects in the area as the City continues to revitalize and redevelop Downtown Waterbury.

This report will serve to summarize the recommendations and conceptual improvement alternatives that have been developed following completion of the public engagement process. These recommendations include high-level, corridor wide improvements that should be considered, as well as a series of concept plan alternatives specific to each section of the corridor. Capacity and queue analyses were performed for the morning and afternoon peak hours to vet each improvement alternative and ensure the revised lane arrangements will not have a significant detrimental effect on the efficiency of vehicular traffic and transit operations.

2 High-Level Recommendations

This section summarizes the general corridor wide recommendations that should be considered in both the short- and long-term timeframes to improve the safety of operations for all modes of travel along the corridor. Intersection and segment specific improvement plans are highlighted in Section 3.

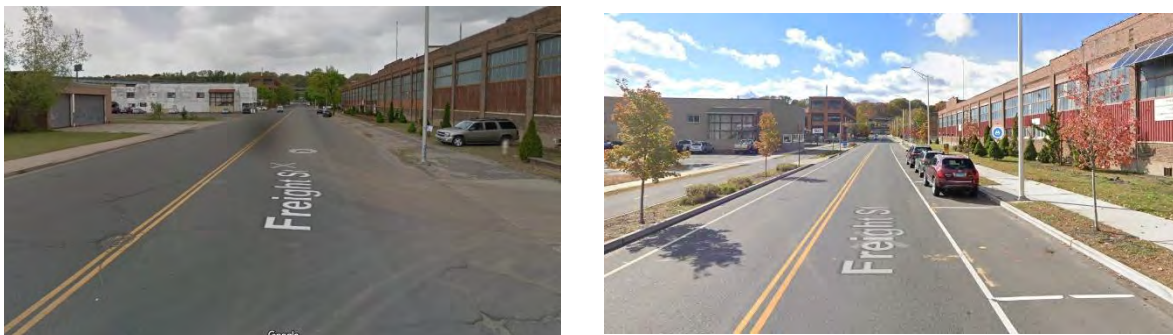
2.1 Road Diet

West Main Street is an exceedingly wide roadway, with many stretches providing two or more travel lanes in each direction, and each intersection providing dedicated turning lanes. Throughout the public outreach process, congestion on West Main Street was not cited as a major problem by stakeholders. In addition, existing conditions analysis revealed that the majority of the intersections along the corridor are operating efficiently and have reserve capacity. For these reasons, the possibility of reducing the number of vehicle travel lanes on West Main Street and reallocating the space to other roadway users was explored.

The preferred alternative proposes to eliminate one eastbound vehicle travel lane on West Main Street between Thomaston Avenue and railroad overpass with further lane reductions proposed east of Willow and Meadow Street. In addition, the westbound vehicle travel lanes are proposed to be reduced between Willow Street/Meadow Street and Church Street.

This space is proposed to be reallocated for a combination of bicycle lanes, bus lanes and pull-offs, on-street parking, a shared use path, and additional landscaped area. Figure 1 below illustrates an example of a road diet recently installed on Freight Street, just south of the West Main Street corridor.

Figure 1 - Road Diet on Freight Street



In order to determine the feasibility of the proposed road diet along the corridor, capacity analyses were performed at each of the impacted study intersections. The road diet, in conjunction with other proposed intersection improvements, is not anticipated to significantly impact traffic operations along the corridor. These findings are consistent with previously conducted corridor studies.

Capacity and queue analysis results are summarized in Section 4, and capacity analysis worksheets have been included in Appendices B and C.

2.2 Pedestrian Improvements

The concept plans propose the addition of midblock crosswalks on West Main Street at locations that have been identified as common crossing locations even though no designated crosswalks exist today. Additionally, curb extensions at existing crossings, and relocation of existing crosswalks, will allow for shorter pedestrian crossing distances and improve overall pedestrian safety along the corridor.

Figure 2 - Curb Extension



Pedestrian actuated crossing devices, such as rectangular rapid flashing beacons, are proposed at several midblock crossings. These beacons aid pedestrians in their ability to cross safely by improving crosswalk visibility and notifying vehicles to stop at crossings when a pedestrian is present.

Figure 3 - Rapid Rectangular Flashing Beacon



In addition, many of the existing pedestrian curb ramps were found to be ADA non-compliant. It is recommended that the existing curb ramps be replaced with ADA compliant ramps in order to make the corridor safe and accessible for all roadway users.

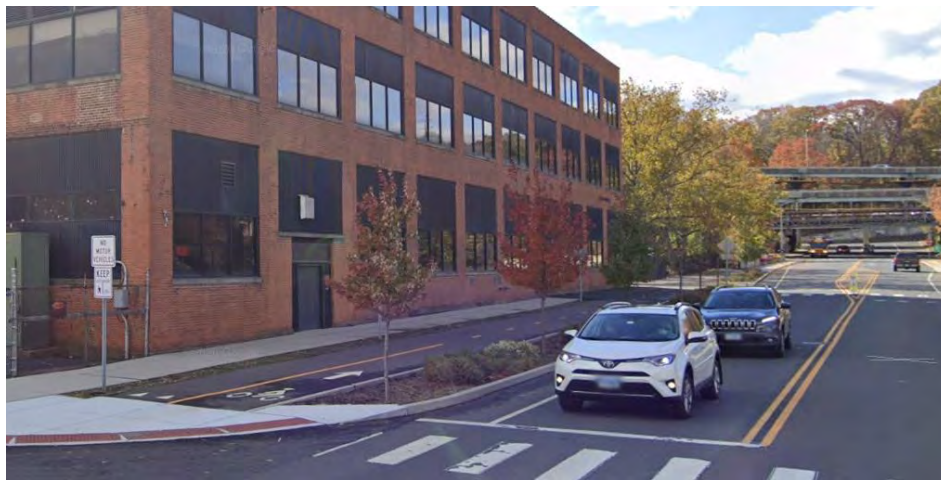
The existing sidewalks should be widened to at least five feet in order to be ADA compliant and to follow PROWAG guidelines. Further sidewalk widening is recommended where right-of-way allows. Wider sidewalks will improve the walkability along the corridor and contribute to creating a sense of place for pedestrians.

2.3 Bicycle Improvements

The existing corridor does not provide any accommodations for cyclists. The implementation of bicycle facilities is strongly recommended, especially considering the nearby shared use path that is planned for construction along the Naugatuck River. Bicycle facilities along West Main Street will also provide connectivity to the recently installed cycle track on Freight Street (see Figure 4 below).

The concept plans prepared depict a combination of on-street dedicated bike lanes, shared bike/bus lanes, and a protected shared use path along a portion of the corridor, similar to the Freight Street application. The addition of these facilities will aid in creating a multimodal corridor that is safe and accessible for vulnerable roadway users.

Figure 4 -- Shared Use Path on Freight Street



Additionally, bicycle parking options, including high quality bike shelters and racks outside of businesses, should be available along the corridor and at centralized locations outside of businesses and on The Green.

2.4 Access Management Improvements

The corridor today has a high number of commercial access driveways that service its many businesses. Each of these driveways adds potential vehicle conflict points to the roadway and increases the potential for vehicle conflict with pedestrians on the sidewalk. It is recommended that some of these driveways be closed with access consolidated to one driveway wherever possible. In addition, left turn restrictions through the installation of physical islands are proposed in some instances. Such potential driveway closures and access restrictions are depicted on the location specific concept plans in Section 3.

These recommendations may be implemented temporarily in the near term by closing the driveways or restricting access with barricades or planters. If successful, these closures may be implemented with the installation of new curbing in the long term.

2.5 Parking Improvements

Vehicles utilize on-street parking in the existing condition, but parking lanes and spaces are not clearly marked. As a result, many vehicles park in lanes designated for travel or at bus stops. It is recommended that on-street parking areas are designated with striping and curb extensions to prevent vehicles from parking where parking is prohibited.

Figure 5 - Striped Parking on Freight Street



In some portions of the corridor between Sperry Street and the Green, on street parking areas were observed to be underutilized and could potentially be eliminated in the interest of reducing the paved road width and providing wider sidewalks.

Additionally, the City currently provides off-street public parking, and has plans to add more on Prospect Street in the future. Wayfinding signage should be installed to direct drivers to available off-street parking.

2.6 Placemaking Recommendations

Creating a sense of place is critical to fostering economic growth and development along a corridor, and benefits all roadway users by encouraging lower vehicle speeds and providing a more inviting pedestrian environment. The recommended streetscape improvements, including textured pavement and hardscape areas, street trees, and landscaped medians will serve as traffic calming measures that increase green space and improve the overall appearance and aesthetics of the corridor. These amenities are illustrated throughout the concept plan alternatives presented in Section 3.

Figure 6 - Place Making Best Practices



It is also recommended that the existing pavement markings be refreshed and are consistent throughout the corridor. Additionally, amenities such as benches and trash receptacles, as well as new landscaping areas should be considered to enhance the appeal of the Green as a public gathering space.

2.7 Transit Recommendations

Bus Operations

West Main Street functions as a funnel for numerous bus routes to and from the system hub downtown. A dedicated eastbound bus lane leading to and exiting the major bus stops on West Main Street south of the Green will improve transit reliability across the entire system, better organize traffic, and reduce conflicts. Strict enforcement of bus facilities (i.e., no-parking regulations and bus lane protection) is critical.

Advancing service recommendations from the Waterbury Area Transit Study (WATS), including those focused on the hours and span of service, will further expand mobility options for area residents and visitors.

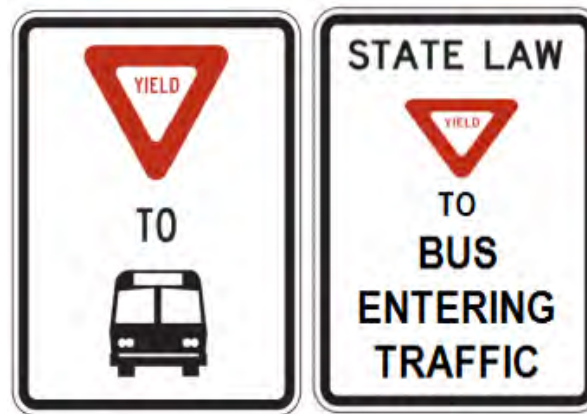
Bus Stops

The customer experience at bus stops often represents a significant portion of a journey. Good sidewalk condition, useful route and schedule information, and basic amenities including seating and shelter are encouraged throughout the corridor. Enhanced and up-to-date customer information on bus services will facilitate the significant timed transfer activity taking place at or near the Waterbury Green.

Specific recommendations related to bus stops include:

- Relocate the eastbound, near-side bus stop on West Main Street at Meadow Street to the east side of the intersection. Include a bus pull-off in conjunction with expanded landscaping and pedestrian/bicycle facilities.
- Where bus pull-offs are installed, provide signage at rear of stop indicating traffic priority to buses re-entering the travel lane.

Figure 7 - Example Yield to Bus Signage



- At major stops such as those at the Waterbury Green, install real-time bus arrival displays clearly aligned with directional travel of buses. Facilitating transfers through clear signage and bus arrival information will reduce confusion and streamline pedestrian movements across East, West, North, and South Main Streets.
- Protection from the weather is important throughout the year, including street tree shade to mitigate sun exposure and heat in summer and bus shelters to block wind, rain, and snow.

3 Proposed Location Specific Improvements

3.1 Watertown Avenue to Jackson Street

West Main Street is a critical corridor in the Waterbury bus route network, and the bus stops located at and J's Ocean Fish Market service a high number of riders. For this reason, bus pull-offs are recommended on the north and south sides of the roadway. Additionally, it is recommended that bus shelters be added to the existing bus stops in order to improve visibility of the bus stop and create a better experience for riders.

Left turns onto West Main Street are prohibited at the intersection of Jackson Street and West Main Street as well as at the intersection of the shared use private driveway on the north side of West Main Street between Jackson Street and Thomaston Ave but these restrictions are often ignored by drivers and are difficult to enforce. Therefore, the installation of an island on Jackson Street and the private shared use driveway to restrict left turning movements out of each side street is recommended.

A marked crosswalk with a pedestrian actuated crossing device such as a HAWK signal is also recommended just east of Jackson Street. This location has been identified through the public outreach process as a common crossing location due to the nearby bus stops, and the addition of a crosswalk will improve visibility for crossing pedestrians.

Figure 9 - Intersection Improvements at Thomaston Avenue



3.3 Intersection of West Main Street and Sperry Street

The existing configuration of the intersection of West Main Street and Sperry Street includes no marked crosswalks and excess pavement width which allows vehicles to turn right onto Sperry Street without slowing down. This layout creates a hazard for pedestrians, long crossing distances, and results in high vehicle speeds entering Sperry Street. A hardscape curb extension is proposed on the east side of Sperry Street to introduce a significant traffic calming measure for vehicles and shorten the pedestrian crossing distance. Crosswalks are proposed on the north and east legs of the intersection with a rectangular rapid flashing beacon (RRFB) pedestrian actuated crossing device also proposed for the West Main Street crossing. This location is well suited for a midblock crossing given the lengthy distance that exists along the corridor with no crosswalk between Thomaston Avenue and Judd Street. In addition, the crossing will support the bus stop pull offs with curb extensions that are proposed immediately to the east on both sides of the roadway.

The eastbound West Main Street approach is also proposed to be restriped to provide an exclusive left turn lane into Sperry Street and provide bypass for through vehicles in a separate eastbound through lane.

Figure 10 - Intersection Improvements at Sperry Street



3.4 Sperry Street to Willow Street

East of Sperry Street, a road diet is proposed to reduce the striped width of the excessively wide travel lanes in each direction and provide striped bicycle lanes in both directions. A combination of parking lanes and bus pull off lanes are proposed on each side of the roadway with curb extensions protecting them.

The existing crosswalk west of Judd Street is proposed to be shifted to the east, and the crossing distance is proposed to be shortened with the curb extensions that have been proposed on both sides of the roadway. A pedestrian actuated RRFB device is recommended at this location to aid pedestrians in crossing and to improve vehicle line of sight to the crosswalk.

Figure 11 - Sperry Street to Willow Street



3.5 West Main Street and Willow Street/Meadow Street

A multitude of safety deficiencies exist at the intersection of West Main Street and Willow Street/Meadow Street. The southeastern curb line is located approximately 20 feet south of the southwestern curb line. Consequently, the eastbound and westbound through movements are offset through the intersection, which is difficult for motorists navigating the intersection. Additionally, because of this poor roadway alignment, the stop bar for northbound vehicles on Meadow Street is located approximately 70 feet south of the eastern curb line, which greatly limits visibility for right turning vehicles.

The recommended improvement alternative proposes a change in lane arrangement that provides one through lane and one receiving lane on each approach. As a result, it is possible to extend the southeastern curb line so that it is in line with the southwestern curb line. This is recommended, as it better aligns the eastbound through movement, and improves visibility for northbound vehicles. These improvements aid pedestrians as well by shortening the crossing distance across Meadow Street and West Main Street.

The intersection realignment and reduction in the number of through vehicle lanes east of the intersection provide ample additional space on the south side of West Main Street east of the intersection for sidewalks, streetscape, a dedicated bicycle facility, and relocation of the bus stop from the southwest to the southeast corner of the intersection. The additional space also allows for a dedicated bus pull off lane.

Additional improvements at this intersection include the proposed closure of commercial access drives on the northeast and southeast corners of the intersection to consolidate curb cuts and relocation of the turning movements into and out of the parcels farther east, away from the intersection.

Figure 12 - Intersection Improvements at Willow and Meadow Street



The realignment of the through movements at this intersection will reduce the offset nature of the approaches and allow the eastbound and southbound left turn restrictions currently in place at this intersection to be lifted. With adjustments to signal timing and phasing, capacity analysis indicated that the intersection can operate sufficiently with the reduced lane capacity and no turning restrictions in place.

3.6 Willow Street to Holmes Avenue

Just east of the intersection of West Main Street and Willow/Meadow Street, a two-way cycle track, dedicated sidewalk, and additional landscape/streetscape space is proposed on the south side of West Main Street. In addition to the bus pull-off proposed immediately east of the intersection of West Main Street and Willow/Meadow Street, on street parking can be provided further east.

The substantial road diet proposed through this stretch of the corridor will reduce the roadway to one through lane in each direction with a textured, flush median and eastbound left turn lane provided at Holmes Street. The reduction in paved roadway cross section will greatly reduce the pedestrian crossing width at the crosswalk on the east leg of the Holmes Street intersection.

Figure 13 - Willow Street to Holmes Avenue



3.7 West Main Street and Church Street/West Main Street Confluence

The confluence of West Main Street north of the Green and West Main Street south of the Green at its intersection with Church Street is geometrically confusing in its existing condition to vehicle drivers and provides an unsafe environment for pedestrians with limited ability for crossings to the western end of the Green. Three design alternatives were explored at this intersection: two signalized intersection realignment alternatives, and one roundabout alternative.

Signalized alternative 1, the preferred alternative, is a T-style intersection that is located just west of the soldiers' monument. West Main Street north of The Green provides the northeast leg, West Main Street south of the Green provides the southeast leg, and West Main Street from the west provides the western leg. One approach lane is proposed on the southbound and westbound approaches, and the eastbound approach provides one through lane and one dedicated left turn lane onto West Main Street north of the Green. A shared use path is proposed on West Main Street on the south side of the intersection, and westbound bicycle lanes are provided north and south of The Green. Marked crossings and pedestrian ramps are provided on each leg of the intersection. Additionally, this alternative allows extension of the Green and sidewalks further west to encompass the soldiers' monument. The reduced width cross section of West Main Street west of the intersection also allows the left turn restriction from Central Avenue to be removed.

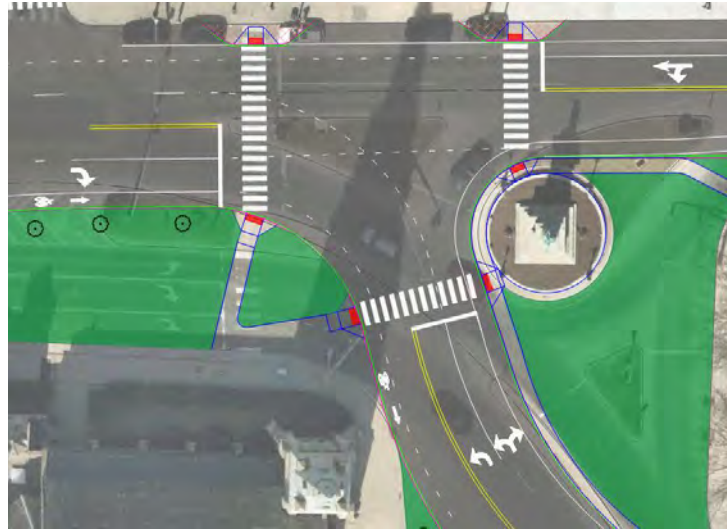
Figure 14 - West Main Street Confluence Alternative 1



This alternative is preferred geometrically because the eastbound and westbound through movements are directed to the south of The Green, allowing for the potential to develop the portion of West Main Street to the north of The Green as a shared use space where vehicles are permitted, but not prioritized.

Signalized alternative 2 is also a T-style intersection located just west of the soldiers' monument however in this alternative, the east/west through movements along the north side of the Green are prioritized. West Main Street north of the Green provides the east leg, West Main Street south of the Green provides the southerly leg, and West Main Street to the west provides the west leg. Eastbound bicycle lanes are provided north and south of the Green, and westbound bicycle lanes are provided on the north side of the Green. Marked crossings and pedestrian ramps are provided on each leg of the intersection. Similar to alternative 1, this alternative proposes to extend the Green to encompass the soldiers' monument.

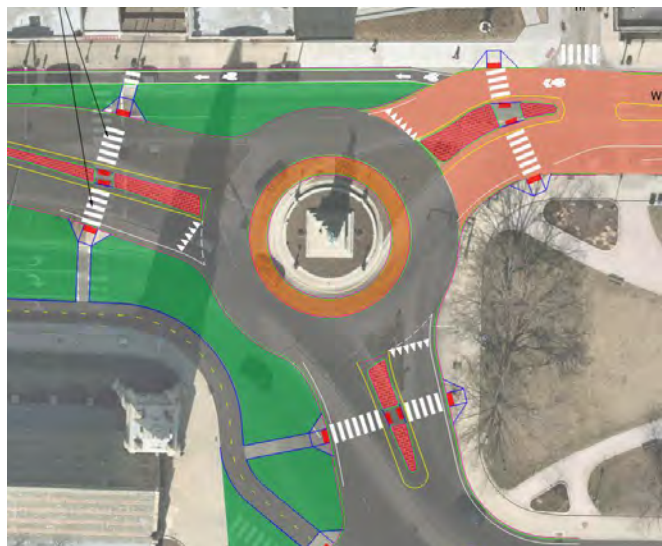
Figure 15 - West Main Street Confluence Alternative 2



This alternative was not favored because eastbound through vehicles are directed north of the Green, making it difficult for that space to be shared and maintaining vehicle priority on all approaches. Additionally, directing through traffic to the north side of the Green results in a less-efficient vehicle travel path for vehicles continuing east onto East Main Street.

Alternative 3 that was explored is a three-legged, single lane roundabout centered around the existing soldiers' monument. A shared use path is provided on the south side of the intersection to provide accommodation for cyclists and pedestrians, and eastbound and westbound bike lanes are provided on West Main Street north of the Green. While roundabouts are excellent traffic calming measures that improve overall intersection safety and reduce vehicle speeds, a roundabout is not the preferred alternative at this intersection as it isolates the monument and the presence of a fixed object in the center of a roundabout may limit visibility for vehicles and create a fixed object crash risk.

Figure 16- West Main Street Confluence, Alternative 3



3.8 South Side of The Green

A road diet is proposed along the segment of West Main Street on the south side of the Green to provide one through lane in each direction and a combination of raised and textured medians. Turn lanes will be provided at the key intersections with Leavenworth Street and at the east end of the Green where West Main Street, East Main Street, South Main Street and North Main Street meet.

Curb extensions are proposed on the east and west sides of Church Street to reclaim excess pavement south of the Green that results from the intersection improvements at the West Main Confluence. These curb extensions shorten the crossing distance across Church Street and enable the introduction of additional green space.

Figure 17- Improvements to the Southwest Corner of The Green



A shared bus/bike lane is proposed immediately east of Church Street to Leavenworth Street on the south side of West Main Street south of the Green as shown in Figure 17 and 18. The lane terminates at a proposed bus pull off east of Leavenworth Street. An eastbound bike lane is proposed on the north side of the roadway beginning at North Main Street.

Leavenworth Street is also proposed to be narrowed with one shared northbound approach lane provided as shown in Figure 18.

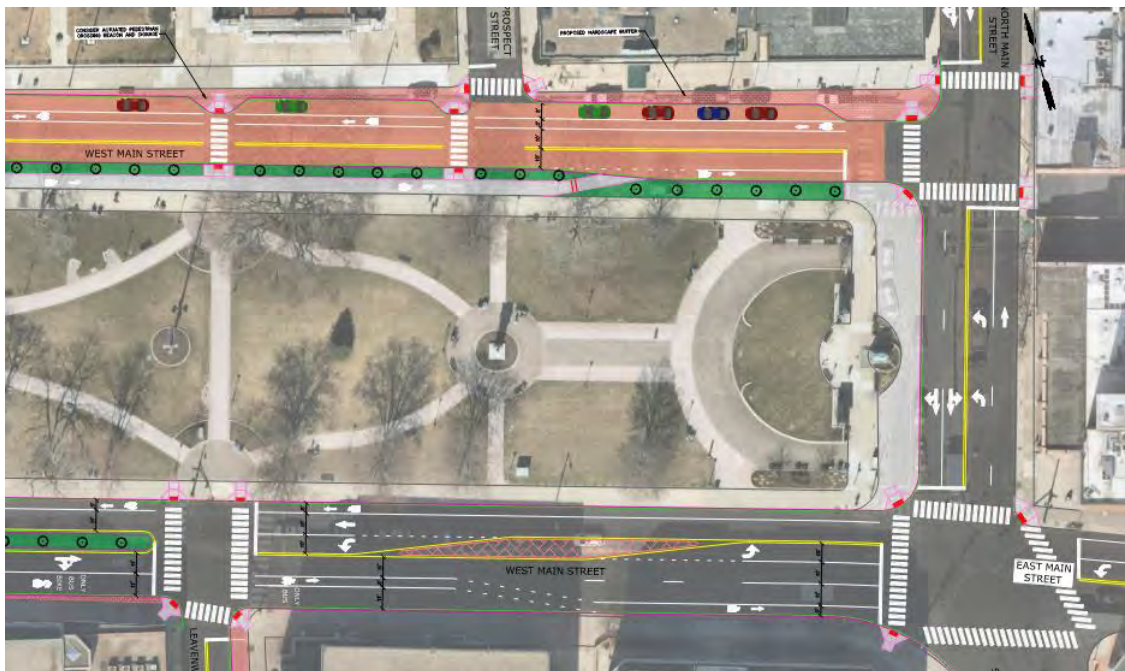
3.9 North Side of The Green

The roadway along the north side of the Green is proposed to be paved with textured pavement in an effort to distinguish this portion of the roadway as a secondary vehicle travel route and promote lower vehicle speeds. Additionally, a landscape buffer and shared use path is proposed on the south side of the roadway adjacent to the north side of the Green. Curb bump outs are proposed at existing midblock crossings and an RRFB pedestrian actuated crossing beacon is proposed at the crosswalk in front of the Basilica. In the westbound direction, a striped bike lane is proposed and on street parking is proposed to be retained.

At the intersection with North Main Street, curb extensions are proposed on the northwest and southwest corners to reduce pedestrian crossing distances. The curb extension on the southwest corner is proposed to continue south along the west side of the Green, eliminating the existing paved area and effectively extending the Green further east.

The improvements to West Main along the north side of the Green would make this roadway ideal for temporary vehicle closures, allowing pedestrian space for street festivals, vendors, or outdoor concerts.

Figure 18 - Improvements at The Green



3.10 West Main Street, East Main Street, North Main Street and South Main Street

This intersection of West Main Street, East Main Street, North Main Street and South Main Street currently prohibits most turning movements. The only turn movement that is permitted is the eastbound right turn. The existing turn restrictions are confusing for drivers, greatly limit driver route choice, and result in vehicles needlessly circulating the downtown street network.

Re-assigning the existing lanes on the eastbound and westbound approaches to provide an exclusive left turn lane in each direction allows the intersection to operate sufficiently with the removal of the turn restrictions, therefore it is recommended that all turning restrictions be eliminated.

4 Capacity and Queue Analysis

A capacity analysis was performed at each intersection for the 2035 future year background condition (without the recommended improvements) and the 2035 future year build condition (with the recommended improvements). The build condition results include the proposed changes in intersection lane configurations described in Section 3 as well as optimized signal timings.

Capacity analyses for both signalized and unsignalized intersections were conducted using Synchro Professional Software, version 10.0.

In discussing intersection capacity analyses results, two terms are used to describe the operating condition of the road or intersection. These two terms are volume-to-capacity ratio (v/c) and level of service (LOS).

The v/c ratio is a ratio of the volume of traffic using an intersection to the total capacity of the intersection (the maximum number of vehicles that can utilize the intersection during an hour). The v/c ratio can be used to describe the percentage of capacity utilized by a single intersection movement, a combination of movements, an entire intersection approach, or the intersection as a whole.

LOS is a measure of the delay experienced by vehicles passing through an intersection. It is rated on a scale from A-to-F, with A describing a condition of very low vehicle delay (less than 10 seconds per vehicle), and F describing a condition where delays will exceed 50 seconds per vehicle for unsignalized intersections and 80 seconds per vehicle for signalized intersections. Delay is described as a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Therefore, intersections with longer delay times are less acceptable to most drivers.

LOS is generally used to describe the operation (based on delay time) of both signalized and unsignalized intersections, while v/c ratio is applied to signalized intersections only. These definitions for v/c ratio and LOS, as well as the methodology for conducting signalized and unsignalized intersection capacity analyses, are taken from the "Highway Capacity Manual 6th Edition" published by the Transportation Research Board.

For intersections where only the minor street approaches are controlled by a stop sign, LOS is used to provide a description of the delay and operational characteristics of vehicles on the minor street (stop sign controlled) and vehicles turning from the major street to the minor street. Through vehicles on the major street are not delayed by the minor street and do not experience delay, therefore these movements are not included in the level of service analysis.

Using the above referenced methodologies, the weekday morning and afternoon peak hour background and build condition capacity analyses were conducted at the following intersections:

- West Main Street at Riverside Street and Watertown Avenue southbound
- West Main Street at Riverside Street and Watertown Avenue northbound
- West Main Street at Thomaston Avenue and Walgreens Driveway

- West Main Street at Sperry Street
- West Main Street at Meadow Street and Willow Street
- West Main Street at Holmes Avenue at State Street
- West Main Street at Central Avenue
- West Main Street at Church Street and West Main Street Confluence
- West Main Street at Leavenworth Street
- West Main Street at South Main Street/Bank Street, East Main Street, and North Main Street
- West Main Street at North Main Street

The Synchro analysis worksheets are attached as *Appendix B* and *C* for the weekday morning and afternoon peak hours, respectively. The tables in each section below provide a summary of the LOS and v/c ratios for the critical lanes at each intersection.

Background and Build condition 95th percentile (design) queue lengths were also reviewed at each intersection in the study area. The 95th percentile (design) vehicle queue lengths represent the maximum queue lengths that can be expected at each of the critical approach lanes of the study area intersections. The queue lengths are provided in the Synchro capacity analysis worksheets, which are located in *Appendices B and C*, for the morning and afternoon peak hours, respectively. The tables in each section below provide a summary of the queue lengths for the critical lanes at each intersection.

For analysis purposes, the West Main Street approaches are referred to as eastbound and westbound and the side street approaches are typically referred to as northbound and southbound approaches. The grown peak hour traffic volumes developed from Streetlight Data and the manual turning movement count data were used in the analyses. The intersection of West Main Street at Jackson Street was not included in the analysis given the intersection was recently constructed, historical count data was not available, and new counts could not be accurately collected due to the ongoing COVID-19 pandemic.

4.1 West Main Street at Watertown Avenue and Riverside Street SB

During the morning peak hour, the intersection of West Main Street, Watertown Avenue and Riverside Street is improved from LOS E in the background condition to LOS D in the Build condition as a result of signal timing improvements. Vehicles experience a reduction in delay of approximately six seconds per vehicle on average.

During the afternoon peak hour, the intersection is improved from LOS F in the background condition to LOS E in the Build condition. Vehicles experience a reduction in delay of approximately 60 seconds per vehicle on average.

The queue analysis revealed generally insignificant queue increases or decreases depending on the approach lane. LOS and 95th Percentile queue results for the intersection of are summarized in Tables 1 and 2 below.

Table 1 - Level of Service Summary, Watertown Avenue/Riverside Street SB

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
Intersection	0.85/LOS E	0.86/LOS D	1.14/LOS F	0.98/LOS E
<i>EB Approach</i>	LOS D	LOS D	LOS F	LOS F
<i>WB Approach</i>	LOS B	LOS C	LOS E	LOS D
<i>SB Approach (Watertown Ave.)</i>	LOS F	LOS E	LOS D	LOS F
<i>SE Approach (Route 8 Off Ramp)</i>	LOS E	LOS E	LOS F	LOS D

Table 2 – 95th Percentile Queue* Summary, Watertown Avenue/Riverside Street SB

Approach Lane	AM Peak Hour		PM Peak Hour		Available Storage
	2035 Background	2035 Build	2035 Background	2035 Build	
EB Through	600 Feet	625 Feet	1020 Feet	895 Feet	350 Feet
EB Right Turn	70 Feet	70 Feet	105 Feet	70 Feet	350 Feet
WB Through	200 Feet	205 Feet	370 Feet	340 Feet	200 Feet
WB Left Turn	45 Feet	40 Feet	35 Feet	25 Feet	200 Feet
SB Left Turn	390 Feet	355 Feet	210 Feet	270 Feet	500 Feet
SB Through/Right Turn	265 Feet	330 Feet	185 Feet	225 Feet	500 Feet
SE Left Turn	400 Feet	375 Feet	540 Feet	400 Feet	300 Feet
SE Through/Right Turn	250 Feet	230 Feet	460 Feet	330 Feet	300 Feet

* Queue lengths have been rounded to the nearest five feet

4.2 West Main Street at Watertown Avenue and Riverside Street NB

During the morning peak hour, the intersection of West Main Street, Watertown Avenue and Riverside Street is improved from LOS F in the background condition to LOS C in the Build condition as a result of signal timing improvements. Vehicles experience a reduction in delay of approximately 52 seconds per vehicle on average.

During the afternoon peak hour, the intersection is improved from LOS F in the background condition to LOS D in the Build condition. Vehicles experience a reduction in delay of approximately 140 seconds per vehicle on average.

The queue analysis revealed that significant reductions in queueing can be provided on the northbound and westbound approaches while some minor increases in queueing occur for other approach movements.

LOS and 95th Percentile queue results for the intersection are summarized in Tables 3 and 4 below.

Table 3 - Level of Service Summary, Watertown Avenue/Riverside Street NB

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
Intersection	0.78/LOS F	0.61/LOS C	1.10/LOS F	0.87/LOS D
<i>EB Approach</i>	LOS A	LOS A	LOS A	LOS A
<i>WB Approach</i>	LOS D	LOS C	LOS E	LOS C
<i>NB Approach</i>	LOS F	LOS D	LOS F	LOS F

Table 4 - 95th Percentile Queue Summary, Watertown Avenue/Riverside Street NB

Approach Lane	AM Peak Hour		PM Peak Hour		Available Storage
	2035 Background	2035 Build	2035 Background	2035 Build	
EB Left Turn	30 Feet	65 Feet	10 Feet	45 Feet	200 Feet
EB Through	70 Feet	130 Feet	15 Feet	75 Feet	200 Feet
WB Through	540 Feet	405 Feet	660 Feet	490 Feet	700 Feet
WB Right Turn	185 Feet	210 Feet	690 Feet	700 Feet	700 Feet
NB Left Turn	75 Feet	140 Feet	50 Feet	105 Feet	150 Feet
NB Through	720 Feet	230 Feet	1105 Feet	455 Feet	-
NB Right Turn	80 Feet	60 Feet	120 Feet	60 Feet	150 Feet

4.3 West Main Street at Thomaston Avenue

During the morning peak hour, the intersection of West Main Street and Thomaston Avenue improves from an overall LOS D in the background condition to an overall LOS C in the Build condition as a result of the proposed lane configurations and signal timing modifications. Average delay per vehicle is reduced by approximately 25 seconds.

During the afternoon peak hour, the intersection operates at LOS F in the background condition and LOS D in the Build condition. Delay is reduced by approximately 75 seconds per vehicle.

The improvements result in a significant reduction in queueing on the westbound approach and an increase in queueing on the southbound approach where an additional queue length of approximately ten vehicles is experienced during the afternoon peak hour. Queues are contained within the available storage length with the exception of southbound right turn queue which exceeds the length of the right turn lane during the afternoon peak hour but does not cause any blockages at adjacent intersections.

LOS and 95th Percentile queue results for the intersection of are summarized in Tables 5 and 6 below.

Table 5 - Level of Service Summary, Thomaston Avenue

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
Intersection	1.06/LOS D	0.80/LOS C	1.19/LOS F	1.10/LOS D
<i>EB Approach</i>	LOS F	LOS B	LOS F	LOS D
<i>WB Approach</i>	LOS B	LOS B	LOS F	LOS C
<i>NB Approach</i>	LOS C	LOS C	LOS B	LOS C
<i>SB Approach</i>	LOS C	LOS C	LOS C	LOS E

Table 6 - 95th Percentile Queue Length Summary, Thomaston Avenue

	AM Peak Hour		PM Peak Hour		
Approach Lane	2035 Background	2035 Build	2035 Background	2035 Build	Available Storage
EB Left Turn	-	135 Feet	-	260 Feet	275 Feet
EB Through	490 Feet	585 Feet	660 Feet	610 Feet	700 Feet
WB Approach	665 Feet	370 Feet	1085 Feet	535 Feet	600 Feet
NB Approach	25 Feet	35 Feet	15 Feet	40 Feet	-
SB Through/Left Turn	180 Feet	265 Feet	315 Feet	555 Feet	-
SB Right Turn	55 Feet	160 Feet	55 Feet	250 Feet	185 Feet

4.4 West Main Street at Sperry Street

During the morning peak hour, LOS B is maintained under background and build conditions for eastbound vehicles. Southbound vehicles experience a significant reduction in delay between the background and build conditions as a result of the proposed elimination of left turn restrictions at the Willow/Meadow intersection which in turn is expected to reduce the number of left turns out of Sperry Street.

During the afternoon peak hour, the LOS for eastbound vehicles is improved from LOS D in the background condition to LOS C in the build condition.

Queue lengths at this intersection are reduced on the southbound approach during both peak hours. The eastbound left turn movement also experiences a decrease in queuing with the addition of the dedicated left turn lane.

LOS and 95th Percentile queue results for the are summarized in Tables 7 and 8 below.

Table 7- Level of Service Summary, Sperry Street

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
<i>EB Left Turn</i>	LOS B	LOS B	LOS D	LOS C
<i>SB Approach</i>	LOS F	LOS F	LOS F	LOS F

Table 8- 95th Percentile Queue Summary, Sperry Street

	AM Peak Hour		PM Peak Hour		
Approach Lane	2035 Background	2035 Build	2035 Background	2035 Build	Available Storage
EB Left Turn	30 Feet	30 Feet	95 Feet	65 Feet	250 Feet
EB Through	0 Feet	0 Feet	0 Feet	0 Feet	500 Feet
WB Approach	0 Feet	0 Feet	0 Feet	0 Feet	800 Feet
SB Approach	500'+	105 Feet	500'+	500'+	730 Feet

* Queue lengths have been rounded to the nearest five feet

4.5 West Main Street at Meadow Street and Willow Street

During the morning peak hour, the intersection maintains LOS C between the background and build conditions with the proposed revision to the approach lane configurations and the elimination of left turn restrictions at the intersection. During the afternoon peak hour, the intersection LOS is improved from LOS F in the background condition to LOS C in the build condition

Some increase in queueing (up to seven vehicle lengths) occurs on the westbound approach with the elimination of the second through lane however queues on the other three approaches are significantly reduced during the afternoon peak hour.

LOS and 95th Percentile queue results for the are summarized in Tables 9 and 10 below.

Table 9 - Level of Service Summary, Willow Street and Meadow Street

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
Intersection	0.82/LOS C	0.64/LOS C	3.63/LOS F	0.85/LOS C
<i>EB Approach</i>	LOS C	LOS B	LOS F	LOS C
<i>WB Approach</i>	LOS B	LOS B	LOS B	LOS C
<i>NB Approach</i>	LOS D	LOS C	LOS F	LOS D
<i>SB Approach</i>	LOS C	LOS C	LOS F	LOS D

Table 10- Level of Service Summary, Willow Street and Meadow Street

	AM Peak Hour		PM Peak Hour		
Approach Lane	2035 Background	2035 Build	2035 Background	2035 Build	Available Storage
EB Left Turn	-	25 Feet	-	25 Feet	150 Feet
EB Through	215 Feet	255 Feet	575 Feet	440 Feet	825 Feet
EB Right Turn	-	60 Feet	-	70 Feet	175 Feet
WB Left Turn	45 Feet	35 Feet	70 Feet	60 Feet	135 Feet
WB Through/Right Turn	70 Feet	185 Feet	160 Feet	335 Feet	375 Feet
NB Left Turn	-	115 Feet	-	145 Feet	145 Feet
NB Through	335 Feet	250 Feet	855 Feet	260 Feet	395 Feet
NB Right Turn	30 Feet	50 Feet	45 Feet	55 Feet	395 Feet
SB Left Turn	-	45 Feet	-	185 Feet	75 Feet
SB Through	175 Feet	180 Feet	555 Feet	150 Feet	400 Feet
SB Right Turn	55 Feet	55 Feet	-	55 Feet	150 Feet

* Queue lengths have been rounded to the nearest five feet

4.6 West Main Street at Holmes Avenue and State Street

The intersection of West Main Street and Holmes Avenue operates efficiently at LOS A under the background condition of both the morning and afternoon peak hours, and the build condition of the morning peak hour. During the afternoon peak hour, the intersection continues to perform efficiently at LOS B under the Build condition, and vehicles experience an increase in average delay of approximately three seconds.

As a result of the elimination of the additional through lanes at this intersection, an increase in queueing occurs during the peak hours on the eastbound and westbound approaches however all queues are contained within the available storage and do not back up to adjacent intersections.

LOS and 95th Percentile queue results for the intersection are summarized in Tables 11 and 12 below.

Table 11 - Level of Service Summary, Holmes Avenue

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
Intersection	0.33/LOS A	0.48/LOS A	0.44/LOS A	0.64/LOS B
<i>EB Approach</i>	LOS A	LOS A	LOS A	LOS A
<i>WB Approach</i>	LOS A	LOS A	LOS B	LOS A
<i>NB Approach</i>	LOS B	LOS C	LOS C	LOS D
<i>SB Approach</i>	LOS B	LOS C	LOS C	LOS D

Table 12 - 95th Percentile Queue Summary, Holmes Avenue

Approach Lane	AM Peak Hour		PM Peak Hour		Available Storage
	2035 Background	2035 Build	2035 Background	2035 Build	
EB Left Turn	15 Feet	20 Feet	20 Feet	30 Feet	75 Feet
EB Through	60 Feet	160 Feet	85 Feet	280 Feet	375 Feet
WB Through/Right Turn	60 Feet	135 Feet	90 Feet	240 Feet	275 Feet
NB Approach	55 Feet	100 Feet	70 Feet	130 Feet	730 Feet
SB Left/Right Turn	14 Feet	40 Feet	55 Feet	130 Feet	700 Feet

*Queue lengths have been rounded to the nearest five feet

4.7 West Main Street at Central Avenue

During the morning peak hour, LOS A is maintained under background and build conditions for eastbound vehicles, and LOS C is maintained for southbound vehicles. During the afternoon peak hour, the eastbound left turn operation drops from LOS A under background conditions to LOS B under build conditions, and the southbound approach drops from LOS D under background conditions to LOS E under build conditions. The most significant change in delay is experienced on the southbound approach, where vehicles experience an increase in delay of approximately 23 seconds.

The most significant increase in queue length occurs on the southbound approach during the afternoon peak hour, where vehicles experience an increase in queue length of approximately five vehicles. The

moderate increase in delay and queueing at this intersection is the result of the proposed road diet and reduction in the number of travel lanes on West Main Street.

LOS and 95th Percentile queue results for the intersection of are summarized in Tables 13 and 14 below.

Table 13 - Level of Service Summary, Central Avenue

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
<i>EB Left Turn</i>	LOS A	LOS A	LOS A	LOS B
<i>SB Approach</i>	LOS C	LOS C	LOS D	LOS E

Table 14 - 95th Percentile Queue Length Summary, Central Avenue

	AM Peak Hour		PM Peak Hour		
Approach Lane	2035 Background	2035 Build	2035 Background	2035 Build	Available Storage
EB Left Turn	0 Feet	5 Feet	5 Feet	5 Feet	150 Feet
SB Approach	15 Feet	20 Feet	40 Feet	155 Feet	875 Feet

*Queue lengths have been rounded to the nearest five feet

4.8 West Main Street at Church Street and West Main Street Confluence

The West Main Street Confluence operates at LOS A under the background condition of both the morning and afternoon peak hours, and the build condition of the morning peak hour with the proposed intersection reconfiguration. During the afternoon peak hour, the intersection performs at LOS B under the build condition, and vehicles experience an increase in average delay of approximately six seconds.

Queues at this intersection are contained within the available storage, with the exception of the eastbound through movement. The eastbound 95th percentile queues may exceed available storage by up to one vehicle length and back up to the vicinity of the Holmes Avenue intersection during the afternoon peak hour build condition. These queues are anticipated to be infrequent and confined to the afternoon peak hour.

LOS and 95th Percentile queue results for the intersection are summarized in Tables 15 and 16 below.

Table 15 - Level of Service Summary, West Main Street Confluence

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
Intersection	0.25/LOS A	0.62/LOS A	0.39/LOS A	0.74/LOS B
<i>WB Approach</i>	LOS A	LOS A	LOS B	LOS B
<i>SE Approach</i>	LOS B	LOS A	LOS C	LOS A
<i>NW Approach</i>	LOS A	LOS B	LOS A	LOS C

Table 16 - 95th Percentile Queue Summary, West Main Street Confluence

	AM Peak Hour		PM Peak Hour		
Approach Lane	2035 Background	2035 Build	2035 Background	2035 Build	Available Storage
EB Left Turn	-	40 Feet	-	95 Feet	250 Feet
EB Through	-	180 Feet	-	300 Feet	275 Feet
WB Approach	-	155 Feet	-	245 Feet	450 Feet
WB Left Turn	85 Feet	-	75 Feet	-	-
SB Approach	-	140 Feet	-	195 Feet	770 Feet
SE Left Turn	105 Feet	-	165 Feet	-	-
SE Through	95 Feet	-	145 Feet	-	-
NW Through	115 Feet	-	175 Feet	-	-
NW Right Turn	10 Feet	-	10 Feet	-	-

*Queue lengths have been rounded to the nearest five feet

4.9 West Main Street at Leavenworth Street

During the morning peak hour, the intersection of West Main Street and Leavenworth Street operates at LOS A under the background condition and continues to operate at LOS B under the Build condition with the proposed lane configurations. Vehicles experience an increase in delay of approximately six seconds per vehicle on average.

During the afternoon peak hour, the intersection operates at LOS B under background and build conditions. Vehicles experience an increase in delay of approximately nine seconds per vehicle on average.

The most significant increase in queue length at this intersection occurs on the eastbound approach, where queue lengths are expected to increase by up to nine vehicles during the morning peak hour and up to ten vehicles during the afternoon peak hour with the elimination of the second through vehicle lane. Queues are contained within the available storage.

LOS and 95th Percentile queue results for the intersection of are summarized in Tables 17 and 18 below.

Table 17 - Level of Service Summary, Leavenworth Street

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
Intersection	0.47/LOS A	0.72/LOS B	0.59/LOS B	0.88/LOS B
<i>EB Approach</i>	LOS A	LOS B	LOS B	LOS C
<i>WB Approach</i>	LOS A	LOS A	LOS A	LOS A
<i>NB Approach</i>	LOS B	LOS C	LOS B	LOS E

Table 18 - 95th Percentile Queue Length Summary, Leavenworth Street

Approach Lane	AM Peak Hour		PM Peak Hour		Available Storage
	2035 Background	2035 Build	2035 Background	2035 Build	
EB Through/Right Turn	120 Feet	345 Feet	170 Feet	415 Feet	405 Feet
WB Left Turn	15 Feet	15 Feet	25 Feet	20 Feet	50 Feet
WB Through	50 Feet	130 Feet	75 Feet	170 Feet	300 Feet
NB Approach	60 Feet	155 Feet	75 Feet	240 Feet	685 Feet

* Queue lengths have been rounded to the nearest five feet

4.10 West Main Street at South Main Street, East Main Street and North Main Street

The intersection of West Main Street, East Main Street, North Main Street and South Main Street maintains efficient LOS B operations under the background and build condition during both peak hours. The most significant increase in queue length of 11 vehicles occurs on the westbound approach during the afternoon peak hour. The average queue length remains within available storage, but the 95th percentile queue length exceeds available storage. The increase in queue length is the result of the elimination of the second westbound lane through the intersection. LOS and 95th Percentile queue results for the intersection are summarized in Tables 19 and 20 below.

Table 19 - Level of Service Summary, South Main Street/East Main Street/North Main Street

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
Intersection	0.42/LOS B	0.56/LOS B	0.55/LOS B	0.71/LOS B
<i>EB Approach</i>	LOS A	LOS A	LOS A	LOS A
<i>WB Approach</i>	LOS A	LOS A	LOS A	LOS B
<i>NB Approach</i>	LOS B	LOS C	LOS C	LOS C
<i>SB Approach</i>	LOS C	LOS C	LOS C	LOS C

Table 20 - 95th Percentile Queue Summary, South Main Street/East Main Street/North Main Street

Approach Lane	AM Peak Hour		PM Peak Hour		Available Storage
	2035 Background	2035 Build	2035 Background	2035 Build	
EB Left Turn	-	25 Feet	-	45 Feet	120 Feet
EB Through/Right Turn	110 Feet	100 Feet	175 Feet	175 Feet	300 Feet
WB Left Turn	-	25 Feet	-	75 Feet	100 Feet
WB Through	100 Feet	220 Feet	165 Feet	455 Feet	200 Feet
NB Approach	80 Feet	80 Feet	140 Feet	145 Feet	170 Feet
SB Approach	110 Feet	110 Feet	130 Feet	130 Feet	135 Feet

* Queue lengths have been rounded to the nearest five feet

4.11 West Main Street at North Main Street

The intersection of West Main Street and North Main Street operates at LOS B during both peak hours under the background condition with no overall reduction in LOS under the build condition. No significant changes in queue length are experienced at this intersection during the peak hours.

LOS and 95th Percentile queue results for the intersection are summarized in Tables 21 and 22 below.

Table 21 - Level of Service Summary, North Main Street

	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Background	Build	Background	Build
Intersection	0.39/LOS B	0.41/LOS B	0.49/LOS B	0.54/ LOS B
<i>EB Approach</i>	LOS C	LOS C	LOS C	LOS C
<i>NB Approach</i>	LOS A	LOS A	LOS A	LOS B
<i>SB Approach</i>	LOS B	LOS B	LOS B	LOS C

Table 22 - 95th Percentile Queue Length, North Main Street

Approach Lane	AM Peak Hour		PM Peak Hour		Available Storage
	2035 Background	2035 Build	2035 Background	2035 Build	
EB Approach	90 Feet	115 Feet	115 Feet	170 Feet	770 Feet
NB Left Turn	80 Feet	90 Feet	150 Feet	165 Feet	140 Feet
NB Through	50 Feet	60 Feet	90 Feet	115 Feet	140 Feet
SB Approach	125 Feet	130 Feet	140 Feet	155 Feet	375 Feet

* Queue lengths have been rounded to the nearest five feet

5 Conclusion

The West Main Street corridor is exceedingly wide and has significant pavement area that can be reallocated to other modes of transportation or as streetscape space to help create a safer and more accessible corridor that is pleasant for all roadway users. While the proposed elimination of travel lanes may reduce lane capacity, increase queuing and deteriorate operations on some intersection approaches, the tradeoff is the reduction of vehicle travel speeds, safer accommodations for pedestrians and bicyclists, and a roadway character more consistent with a vibrant, downtown center. While a deterioration in operations is expected, any reduction in level of service is estimated to be minor and the Build LOS remains at an acceptable level. In addition to road dieting, geometric approach reconfigurations and lane restriping at several key intersections can improve the safety and capacity of vehicular operations.

Several improvements outlined in this report are quick hit, low cost alternatives that can be implemented in the near term such as:

- Upgrading existing pedestrian facilities to ensure ADA compliance
- The addition of pedestrian actuated crossing beacons at existing crosswalks
- Installation of additional midblock crosswalks and pedestrian actuated crossing beacons
- Refreshed pavement markings
- Curb extensions at key locations that shorten crossing distances and slow traffic
- Upgrades to existing bus stops including more prominent signage, bus shelters, and benches
- Temporary closure of several access driveways with barricades or planters

Longer term recommendations identified that will require more significant design and construction cost include:

- Road diet on West Main Street between Thomaston Avenue and the Green
- Significant geometric improvements to the intersection of West Main Street and Willow Street/Meadow Street
- Redesign of the West Main Street confluence intersection at the Green
- The addition of a shared use path on the south side of West Main Street
- Redesign of West Main Street north of the Green into a lower speed, lower volume multi-modal street that can be periodically closed to vehicular traffic for events
- Permanent closure of several access driveways with new curbing

Several of the above alternatives could be broken out into separate standalone projects that would make excellent funding applications for a variety of State and Federal grant sources that currently exist.

Implementation of the above recommendations will improve safety along the corridor, and aid in creating a space that is accessible and enjoyable for all roadway users. Such improvements will also promote further economic development along the corridor, which will benefit existing businesses and the City of Waterbury in the long term.

Appendix A

Concept Plans

Appendix B

Intersection Capacity Analysis Worksheets Weekday Morning Peak Hour

Lanes, Volumes, Timings

2035 Background Condition

1: Riverside Street/Rotue 8 Off Ramp & West Main Street & Watertown Avenue

AM Peak Hour

												
Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	530	120	237	400	247	131	101	275	122	120		
Future Volume (vph)	530	120	237	400	247	131	101	275	122	120		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Storage Length (ft)		40	0		0		0	230	0			
Storage Lanes		1	1		1		0	1	1			
Taper Length (ft)			25		25			25				
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00		
Frt		0.850				0.935			0.850			
Flt Protected			0.950		0.950			0.950				
Satd. Flow (prot)	1863	1583	1770	3539	1770	1742	0	1770	1583	0		
Flt Permitted			0.124		0.950			0.950				
Satd. Flow (perm)	1863	1583	231	3539	1770	1742	0	1770	1583	0		
Right Turn on Red		Yes								Yes		
Satd. Flow (RTOR)		82							82			
Link Speed (mph)	30			30		30		30				
Link Distance (ft)	314			357		308		436				
Travel Time (s)	7.1			8.1		7.0		9.9				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	576	130	258	435	268	142	110	299	133	130		
Shared Lane Traffic (%)												
Lane Group Flow (vph)	576	130	258	435	268	252	0	299	263	0		
Turn Type	NA	Perm	D.P+P	NA	Split	NA		Prot	Prot			
Protected Phases	1		2	1 2	3	3		4	4		5	6
Permitted Phases		1	1									
Minimum Split (s)	14.0	14.0	7.0		12.0	12.0		12.0	12.0		22.5	22.5
Total Split (s)	48.0	48.0	24.0		22.0	22.0		26.0	26.0		48.0	24.0
Total Split (%)	40.0%	40.0%	20.0%		18.3%	18.3%		21.7%	21.7%		40%	20%
Maximum Green (s)	44.0	44.0	20.0		18.0	18.0		22.0	22.0		44.0	20.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0
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	Lead	Lag		Lead	Lead		Lag	Lag		Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes
Act Effct Green (s)	44.0	44.0	64.0	68.0	18.0	18.0		22.0	22.0			
Actuated g/C Ratio	0.37	0.37	0.53	0.57	0.15	0.15		0.18	0.18			
v/c Ratio	0.84	0.21	0.68	0.22	1.01	0.97		0.92	0.74			
Control Delay	47.8	11.5	35.6	7.2	109.1	98.7		82.5	44.9			
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0			
Total Delay	47.8	11.5	35.6	7.2	109.1	98.7		82.5	44.9			
LOS	D	B	D	A	F	F		F	D			
Approach Delay	41.1			17.8		104.1		64.9				
Approach LOS	D			B		F		E				
Queue Length 50th (ft)	405	24	144	35	~213	196		230	135			
Queue Length 95th (ft)	#599	68	m201	m43	#389	#363		#399	#250			
Internal Link Dist (ft)	234			277		228		356				
Turn Bay Length (ft)		40						230				
Base Capacity (vph)	683	632	379	2005	265	261		324	357			

Lane Group	Ø7	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	7	8
Permitted Phases		
Minimum Split (s)	10.0	22.5
Total Split (s)	20.0	28.0
Total Split (%)	17%	23%
Maximum Green (s)	16.0	24.0
Yellow Time (s)	3.0	3.0
All-Red Time (s)	1.0	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2	Ø5	Ø6
Starvation Cap Reductn	0	0	0	0	0	0		0	0			
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	0.84	0.21	0.68	0.22	1.01	0.97		0.92	0.74			

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:, Start of Green

Natural Cycle: 110

Control Type: Pretimed

Maximum v/c Ratio: 1.80

Intersection Signal Delay: 53.2

Intersection LOS: D

Intersection Capacity Utilization 83.3%

ICU Level of Service E

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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside Street/Rotue 8 Off Ramp & West Main Street & Watertown Avenue

#1 ← Ø1 48 s	#1 ← Ø2 (R) 24 s	#1 ← Ø3 22 s	#1 ← Ø4 26 s
#2 ← Ø5 48 s	#2 ← Ø6 (R) 24 s	#2 ← Ø7 20 s	#2 ← Ø8 28 s

Lane Group	Ø7	Ø8
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

2035 Background Condition

1: Riverside Street/Rotue 8 Off Ramp & West Main Street & Watertown Avenue

AM Peak Hour

	→	↘	↙	←	↘	↓	↙	↘	↘	↙
Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2
Lane Configurations	↑	↗	↖	↑↑	↖	↗		↖	↗	
Traffic Volume (vph)	530	120	237	400	247	131	101	275	122	120
Future Volume (vph)	530	120	237	400	247	131	101	275	122	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00		1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.93		1.00	0.85	
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1863	1583	1770	3539	1770	1741		1770	1583	
Flt Permitted	1.00	1.00	0.12	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1863	1583	232	3539	1770	1741		1770	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	576	130	258	435	268	142	110	299	133	130
RTOR Reduction (vph)	0	52	0	0	0	0	0	0	67	0
Lane Group Flow (vph)	576	78	258	435	268	252	0	299	196	0
Turn Type	NA	Perm	D,P+P	NA	Split	NA		Prot	Prot	
Protected Phases	1		2	1 2	3	3		4	4	
Permitted Phases		1	1							
Actuated Green, G (s)	44.0	44.0	64.0	68.0	18.0	18.0		22.0	22.0	
Effective Green, g (s)	44.0	44.0	64.0	68.0	18.0	18.0		22.0	22.0	
Actuated g/C Ratio	0.37	0.37	0.53	0.57	0.15	0.15		0.18	0.18	
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	683	580	380	2005	265	261		324	290	
v/s Ratio Prot	c0.31		c0.11	c0.12	c0.15	0.14		c0.17	0.12	
v/s Ratio Perm		0.05	0.25							
v/c Ratio	0.84	0.13	0.68	0.22	1.01	0.97		0.92	0.68	
Uniform Delay, d1	34.8	25.3	39.2	12.8	51.0	50.7		48.2	45.7	
Progression Factor	1.00	1.00	0.79	0.54	1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.1	0.5	6.8	0.2	58.2	47.5		33.7	12.0	
Delay (s)	46.9	25.8	37.7	7.1	109.2	98.2		81.9	57.6	
Level of Service	D	C	D	A	F	F		F	E	
Approach Delay (s)	43.1			18.5		103.9		70.5		
Approach LOS	D			B		F		E		
Intersection Summary										
HCM 2000 Control Delay			55.2	HCM 2000 Level of Service				E		
HCM 2000 Volume to Capacity ratio			0.85							
Actuated Cycle Length (s)			120.0	Sum of lost time (s)				16.0		
Intersection Capacity Utilization			83.3%	ICU Level of Service				E		
Analysis Period (min)			15							
c Critical Lane Group										

Lanes, Volumes, Timings

2035 Background Condition

2: Riverside Street/Watertown Avenue & West Main Street

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 					 					
Traffic Volume (vph)	250	880	0	0	510	530	110	410	140	0	0	0
Future Volume (vph)	250	880	0	0	510	530	110	410	140	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frnt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	1863	1583	3433	1863	1583	0	0	0
Flt Permitted	0.457						0.950					
Satd. Flow (perm)	851	3539	0	0	1863	1583	3433	1863	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						464			130			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		357			839			247			271	
Travel Time (s)		8.1			19.1			5.6			6.2	
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)	272	957	0	0	554	576	120	446	152	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	272	957	0	0	554	576	120	446	152	0	0	0
Turn Type	custom	NA			NA	Perm	Split	NA	Prot			
Protected Phases	6	5 6 8			5		7	7	7			
Permitted Phases	5 8					5						
Minimum Split (s)	22.5				22.5	22.5	10.0	10.0	10.0			
Total Split (s)	24.0				48.0	48.0	20.0	20.0	20.0			
Total Split (%)	20.0%				40.0%	40.0%	16.7%	16.7%	16.7%			
Maximum Green (s)	20.0				44.0	44.0	16.0	16.0	16.0			
Yellow Time (s)	3.0				3.0	3.0	3.0	3.0	3.0			
All-Red Time (s)	1.0				1.0	1.0	1.0	1.0	1.0			
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	Lag				Lead	Lead	Lead	Lead	Lead			
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	Yes	Yes			
Act Effct Green (s)	92.0	96.0			44.0	44.0	16.0	16.0	16.0			
Actuated g/C Ratio	0.77	0.80			0.37	0.37	0.13	0.13	0.13			
v/c Ratio	0.34	0.34			0.81	0.66	0.26	1.80	0.47			
Control Delay	2.8	2.1			45.2	10.2	48.4	405.8	16.7			
Queue Delay	0.1	0.9			0.0	0.0	0.0	0.0	0.0			
Total Delay	2.9	3.0			45.2	10.2	48.4	405.8	16.7			
LOS	A	A			D	B	D	F	B			
Approach Delay		3.0			27.4			263.7				
Approach LOS		A			C			F				
Queue Length 50th (ft)	25	58			383	59	43	~519	15			
Queue Length 95th (ft)	m29	m71			#539	185	73	#722	79			
Internal Link Dist (ft)		277			759			167			191	
Turn Bay Length (ft)												
Base Capacity (vph)	805	2831			683	874	457	248	323			
Starvation Cap Reductn	85	1496			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			

Lanes, Volumes, Timings
2: Riverside Street/Watertown Avenue & West Main Street

2035 Background Condition

AM Peak Hour

Lane Group	Ø1	Ø2	Ø3	Ø4	Ø8
Lane Configurations					
Traffic Volume (vph)					
Future Volume (vph)					
Ideal Flow (vphpl)					
Lane Util. Factor					
Fr t					
Flt Protected					
Satd. Flow (prot)					
Flt Permitted					
Satd. Flow (perm)					
Right Turn on Red					
Satd. Flow (RTOR)					
Link Speed (mph)					
Link Distance (ft)					
Travel Time (s)					
Peak Hour Factor					
Adj. Flow (vph)					
Shared Lane Traffic (%)					
Lane Group Flow (vph)					
Turn Type					
Protected Phases	1	2	3	4	8
Permitted Phases					
Minimum Split (s)	14.0	7.0	12.0	12.0	22.5
Total Split (s)	48.0	24.0	22.0	26.0	28.0
Total Split (%)	40%	20%	18%	22%	23%
Maximum Green (s)	44.0	20.0	18.0	22.0	24.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)					
Total Lost Time (s)					
Lead/Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes
Act Effct Green (s)					
Actuated g/C Ratio					
v/c Ratio					
Control Delay					
Queue Delay					
Total Delay					
LOS					
Approach Delay					
Approach LOS					
Queue Length 50th (ft)					
Queue Length 95th (ft)					
Internal Link Dist (ft)					
Turn Bay Length (ft)					
Base Capacity (vph)					
Starvation Cap Reductn					
Spillback Cap Reductn					
Storage Cap Reductn					

2: Riverside Street/Watertown Avenue & West Main Street

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Reduced v/c Ratio	0.38	0.72			0.81	0.66	0.26	1.80	0.47			

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:, Start of Green

Natural Cycle: 110

Control Type: Pretimed

Maximum v/c Ratio: 1.80

Intersection Signal Delay: 72.8

Intersection LOS: E

Intersection Capacity Utilization 78.2%

ICU Level of Service D

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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside Street/Watertown Avenue & West Main Street

#1  Ø1	#1  Ø2 (R)	#1  Ø3	#1  Ø4
48 s	24 s	22 s	26 s
#2  Ø5	#2  Ø6 (R)	#2  Ø7	#2  Ø8
48 s	24 s	20 s	28 s

Lane Group	Ø1	Ø2	Ø3	Ø4	Ø8
Reduced v/c Ratio					
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

2: Riverside Street/Watertown Avenue & West Main Street

2035 Background Condition

AM Peak Hour

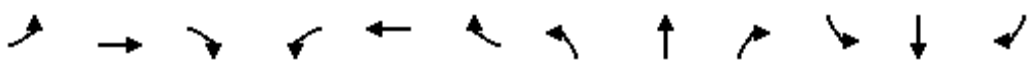
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 					 					
Traffic Volume (vph)	250	880	0	0	510	530	110	410	140	0	0	0
Future Volume (vph)	250	880	0	0	510	530	110	410	140	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			1.00	1.00	0.97	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			1863	1583	3433	1863	1583			
Flt Permitted	0.46	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	851	3539			1863	1583	3433	1863	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	957	0	0	554	576	120	446	152	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	297	0	0	113	0	0	0
Lane Group Flow (vph)	272	957	0	0	554	279	120	446	39	0	0	0
Turn Type	custom	NA			NA	Perm	Split	NA	Prot			
Protected Phases	6	5 6 8			5		7	7	7			
Permitted Phases	5 8					5						
Actuated Green, G (s)	92.0	96.0			43.2	43.2	16.0	16.0	16.0			
Effective Green, g (s)	92.0	96.0			43.2	43.2	16.0	16.0	16.0			
Actuated g/C Ratio	0.77	0.80			0.36	0.36	0.13	0.13	0.13			
Clearance Time (s)	4.0				4.0	4.0	4.0	4.0	4.0			
Lane Grp Cap (vph)	811	2831			670	569	457	248	211			
v/s Ratio Prot	0.06	c0.27			c0.30		0.03	c0.24	0.02			
v/s Ratio Perm	0.20					0.18						
v/c Ratio	0.34	0.34			0.83	0.49	0.26	1.80	0.19			
Uniform Delay, d1	4.8	3.3			35.0	29.8	46.7	52.0	46.2			
Progression Factor	0.58	0.57			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.6	0.2			11.2	3.0	1.4	374.9	1.9			
Delay (s)	3.4	2.0			46.2	32.8	48.1	426.9	48.2			
Level of Service	A	A			D	C	D	F	D			
Approach Delay (s)		2.3			39.4			283.4			0.0	
Approach LOS		A			D			F			A	
Intersection Summary												
HCM 2000 Control Delay			81.5				HCM 2000 Level of Service		F			
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)		16.0			
Intersection Capacity Utilization			78.2%				ICU Level of Service		D			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings

2035 Background Condition

3: Walgreens Driveway/Thomaston Avenue & West Main Street

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔		↔	↔	↔	↔	↔	↔		↔	↔
Traffic Volume (vph)	200	810	10	10	710	270	20	0	0	220	10	350
Future Volume (vph)	200	810	10	10	710	270	20	0	0	220	10	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850						0.850
Flt Protected		0.990		0.950			0.950				0.954	
Satd. Flow (prot)	0	3500	0	1770	1863	1583	1770	1863	1863	0	1777	1583
Flt Permitted		0.521		0.189			0.483				0.735	
Satd. Flow (perm)	0	1842	0	352	1863	1583	900	1863	1863	0	1369	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				173						380
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		839			356			196			228	
Travel Time (s)		19.1			8.1			4.5			5.2	
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)	217	880	11	11	772	293	22	0	0	239	11	380
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1108	0	11	772	293	22	0	0	0	250	380
Turn Type	custom	NA		custom	NA	custom	Perm		Perm	Perm	NA	Perm
Protected Phases	1	1 2		3	2 3			5			5	
Permitted Phases	2			2		2	5		5	5		5
Detector Phase	1	1 2		3	2 3	2	5	5	5	5	5	5
Switch Phase												
Minimum Initial (s)	1.0			1.0		5.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	5.0			5.0		15.0	9.0	9.0	9.0	9.0	9.0	9.0
Total Split (s)	6.0			5.0		40.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	4.9%			4.1%		32.8%	36.9%	36.9%	36.9%	36.9%	36.9%	36.9%
Maximum Green (s)	3.0			1.0		35.0	40.0	40.0	40.0	40.0	40.0	40.0
Yellow Time (s)	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0			1.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)				0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)				4.0		5.0	5.0	5.0	5.0		5.0	5.0
Lead/Lag	Lead			Lead		Lag	Lag	Lag	Lag	Lag	Lag	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		Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		40.2		37.2	35.2	35.2	20.3				20.3	20.3
Actuated g/C Ratio		0.52		0.49	0.46	0.46	0.27				0.27	0.27
v/c Ratio		1.07		0.06	0.90	0.36	0.09				0.69	0.54
Control Delay		70.3		12.2	37.1	7.8	20.9				35.5	5.6
Queue Delay		0.0		0.0	0.0	0.0	0.0				0.0	0.0
Total Delay		70.3		12.2	37.1	7.8	20.9				35.5	5.6
LOS		E		B	D	A	C				D	A
Approach Delay		70.3			28.9			20.9			17.5	
Approach LOS		E			C			C			B	

Lanes, Volumes, Timings
3: Walgreens Driveway/Thomaston Avenue & West Main Street

2035 Background Condition

AM Peak Hour

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	21%
Maximum Green (s)	23.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	16.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Lanes, Volumes, Timings

2035 Background Condition

3: Walgreens Driveway/Thomaston Avenue & West Main Street

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		~195		2	325	32	8				106	0
Queue Length 95th (ft)		#491		12	#666	100	24				180	57
Internal Link Dist (ft)		759			276			116			148	
Turn Bay Length (ft)												
Base Capacity (vph)		1033		189	856	820	472				719	1011
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		1.07		0.06	0.90	0.36	0.05				0.35	0.38

Intersection Summary

Area Type: Other

Cycle Length: 122

Actuated Cycle Length: 76.6

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 42.5

Intersection LOS: D

Intersection Capacity Utilization 96.9%

ICU Level of Service F

Analysis Period (min) 15

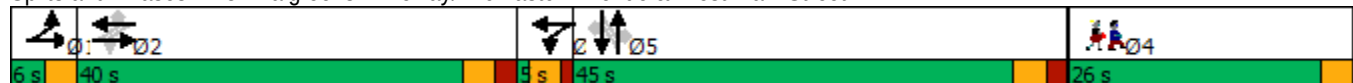
~ Volume exceeds capacity, queue is theoretically infinite.

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: 3: Walgreens Driveway/Thomaston Avenue & West Main Street



Lane Group	Ø4
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

3: Walgreens Driveway/Thomaston Avenue & West Main Street

2035 Background Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	810	10	10	710	270	20	0	0	220	10	350
Future Volume (vph)	200	810	10	10	710	270	20	0	0	220	10	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		4.0	5.0	5.0	5.0				5.0	5.0
Lane Util. Factor		0.95		1.00	1.00	1.00	1.00				1.00	1.00
Frt		1.00		1.00	1.00	0.85	1.00				1.00	0.85
Flt Protected		0.99		0.95	1.00	1.00	0.95				0.95	1.00
Satd. Flow (prot)		3500		1770	1863	1583	1770				1778	1583
Flt Permitted		0.52		0.19	1.00	1.00	0.48				0.74	1.00
Satd. Flow (perm)		1840		352	1863	1583	900				1370	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	880	11	11	772	293	22	0	0	239	11	380
RTOR Reduction (vph)	0	1	0	0	0	93	0	0	0	0	0	279
Lane Group Flow (vph)	0	1107	0	11	772	200	22	0	0	0	250	101
Turn Type	custom	NA		custom	NA	custom	Perm		Perm	Perm	NA	Perm
Protected Phases	1	1 2		3	2 3			5			5	
Permitted Phases	2			2		2	5		5	5		5
Actuated Green, G (s)		38.2		36.2	41.2	35.2	20.3				20.3	20.3
Effective Green, g (s)		38.2		36.2	41.2	35.2	20.3				20.3	20.3
Actuated g/C Ratio		0.50		0.47	0.54	0.46	0.27				0.27	0.27
Clearance Time (s)				4.0		5.0	5.0				5.0	5.0
Vehicle Extension (s)				3.0		3.0	3.0				3.0	3.0
Lane Grp Cap (vph)		983		185	1003	728	238				363	420
v/s Ratio Prot		c0.04		0.00	c0.41							
v/s Ratio Perm		c0.52		0.03		0.13	0.02				c0.18	0.06
v/c Ratio		1.13		0.06	0.77	0.27	0.09				0.69	0.24
Uniform Delay, d1		19.1		16.5	13.9	12.8	21.2				25.3	22.0
Progression Factor		1.00		1.00	1.00	1.00	1.00				1.00	1.00
Incremental Delay, d2		70.2		0.1	3.6	0.9	0.2				5.4	0.3
Delay (s)		89.4		16.6	17.5	13.7	21.3				30.6	22.3
Level of Service		F		B	B	B	C				C	C
Approach Delay (s)		89.4			16.5			21.3			25.6	
Approach LOS		F			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			47.0									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.06									
Actuated Cycle Length (s)			76.5									Sum of lost time (s) 20.0
Intersection Capacity Utilization			96.9%									ICU Level of Service F
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
4: West Main Street & Sperry Street

2035 Background Condition
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	180	820	850	60	100	180
Future Volume (vph)	180	820	850	60	100	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	100	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1846	0	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1846	0	1770	1583
Link Speed (mph)		30	30		30	
Link Distance (ft)		219	398		263	
Travel Time (s)		5.0	9.0		6.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	891	924	65	109	196
Shared Lane Traffic (%)						
Lane Group Flow (vph)	196	891	989	0	109	196
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 73.9% ICU Level of Service D

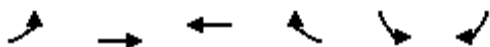
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

4: West Main Street & Sperry Street

2035 Background Condition

AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	180	820	850	60	100	180
Future Volume (Veh/h)	180	820	850	60	100	180
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	196	891	924	65	109	196
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)		722	846			
pX, platoon unblocked	0.91				0.75	0.91
vC, conflicting volume	989				2240	956
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	937				2209	901
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	70				0	36
cM capacity (veh/h)	663				26	306
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	196	891	989	109	196	
Volume Left	196	0	0	109	0	
Volume Right	0	0	65	0	196	
cSH	663	1700	1700	26	306	
Volume to Capacity	0.30	0.52	0.58	4.25	0.64	
Queue Length 95th (ft)	31	0	0	Err	103	
Control Delay (s)	12.7	0.0	0.0	Err	35.7	
Lane LOS	B			F	E	
Approach Delay (s)	2.3		0.0	3596.3		
Approach LOS				F		
Intersection Summary						
Average Delay			461.7			
Intersection Capacity Utilization			73.9%	ICU Level of Service		D
Analysis Period (min)			15			

Lanes, Volumes, Timings
5: Meadow Street/Willow Street & West Main Street

2035 Background Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	438	162	84	304	33	163	252	130	50	163	258
Future Volume (vph)	50	438	162	84	304	33	163	252	130	50	163	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.963			0.985				0.850			0.850
Flt Protected		0.996		0.950				0.981			0.988	
Satd. Flow (prot)	0	3395	0	1770	3486	0	0	1827	1583	0	1840	1583
Flt Permitted		0.886		0.267				0.681			0.751	
Satd. Flow (perm)	0	3020	0	497	3486	0	0	1269	1583	0	1399	1583
Right Turn on Red			No			No			Yes			Yes
Satd. Flow (RTOR)									141			280
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		448			464			449			761	
Travel Time (s)		10.2			10.5			10.2			17.3	
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)	54	476	176	91	330	36	177	274	141	54	177	280
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	706	0	91	366	0	0	451	141	0	231	280
Turn Type	Perm	NA		D.P+P	NA		D.P+P	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	1 2		4	4 5			5	
Permitted Phases	2			2			5		4 5	5		5
Detector Phase	2	2		1	1 2		4	4 5	4 5	5	5	5
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0			1.0			1.0	1.0	1.0
Minimum Split (s)	15.0	15.0		6.0			6.0			8.0	8.0	8.0
Total Split (s)	30.0	30.0		10.0			10.0			25.0	25.0	25.0
Total Split (%)	31.6%	31.6%		10.5%			10.5%			26.3%	26.3%	26.3%
Maximum Green (s)	24.0	24.0		7.0			6.0			19.0	19.0	19.0
Yellow Time (s)	3.0	3.0		3.0			3.0			3.0	3.0	3.0
All-Red Time (s)	3.0	3.0		0.0			1.0			3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0							0.0	0.0
Total Lost Time (s)		6.0		3.0							6.0	6.0
Lead/Lag	Lag	Lag		Lead			Lag					
Lead-Lag Optimize?	Yes	Yes		Yes			Yes					
Vehicle Extension (s)	3.0	3.0		3.0			3.0			3.0	3.0	3.0
Recall Mode	Max	Max		None			None			None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		24.0		34.0	37.0			27.0	31.0		19.0	19.0
Actuated g/C Ratio		0.32		0.45	0.49			0.36	0.41		0.25	0.25
v/c Ratio		0.73		0.26	0.21			0.90	0.19		0.65	0.46
Control Delay		28.0		12.3	11.2			44.9	3.5		35.2	5.9
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay		28.0		12.3	11.2			44.9	3.5		35.2	5.9
LOS		C		B	B			D	A		D	A
Approach Delay		28.0			11.4			35.0			19.2	
Approach LOS		C			B			D			B	

Lanes, Volumes, Timings
5: Meadow Street/Willow Street & West Main Street

2035 Background Condition

AM Peak Hour

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	20.0
Total Split (s)	20.0
Total Split (%)	21%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Lanes, Volumes, Timings
5: Meadow Street/Willow Street & West Main Street

2035 Background Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		151		21	47			158	0		96	0
Queue Length 95th (ft)		213		45	72			#334	30		#177	55
Internal Link Dist (ft)		368			384			369			681	
Turn Bay Length (ft)												
Base Capacity (vph)		966		344	1719			501	737		354	610
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		0.73		0.26	0.21			0.90	0.19		0.65	0.46

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 75

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 24.5

Intersection LOS: C

Intersection Capacity Utilization 78.5%

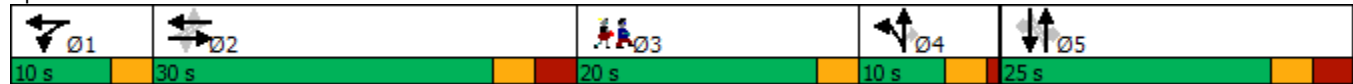
ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: Meadow Street/Willow Street & West Main Street



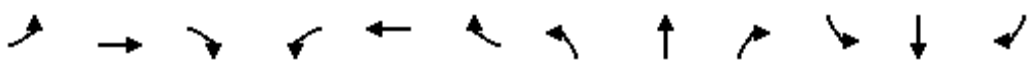
Lane Group	Ø3
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

5: Meadow Street/Willow Street & West Main Street

2035 Background Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑			↑	↑		↑	↑
Traffic Volume (vph)	50	438	162	84	304	33	163	252	130	50	163	258
Future Volume (vph)	50	438	162	84	304	33	163	252	130	50	163	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		3.0	3.0			4.0	4.0		6.0	6.0
Lane Util. Factor		0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt		0.96		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected		1.00		0.95	1.00			0.98	1.00		0.99	1.00
Satd. Flow (prot)		3394		1770	3487			1827	1583		1841	1583
Flt Permitted		0.89		0.27	1.00			0.68	1.00		0.75	1.00
Satd. Flow (perm)		3018		498	3487			1268	1583		1399	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	476	176	91	330	36	177	274	141	54	177	280
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	86	0	0	209
Lane Group Flow (vph)	0	706	0	91	366	0	0	451	55	0	231	71
Turn Type	Perm	NA		D.P+P	NA		D.P+P	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	1 2		4	4 5			5	
Permitted Phases	2			2			5		4 5	5		5
Actuated Green, G (s)		24.0		31.0	34.0			25.0	29.0		19.0	19.0
Effective Green, g (s)		24.0		31.0	34.0			25.0	29.0		19.0	19.0
Actuated g/C Ratio		0.32		0.41	0.45			0.33	0.39		0.25	0.25
Clearance Time (s)		6.0		3.0							6.0	6.0
Vehicle Extension (s)		3.0		3.0							3.0	3.0
Lane Grp Cap (vph)		965		324	1580			467	612		354	401
v/s Ratio Prot				c0.03	0.10			c0.08				
v/s Ratio Perm		c0.23		0.09				c0.24	0.03		0.17	0.04
v/c Ratio		0.73		0.28	0.23			0.97	0.09		0.65	0.18
Uniform Delay, d1		22.6		14.0	12.5			24.6	14.6		25.0	21.9
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		4.9		0.5	0.1			32.6	0.1		4.3	0.2
Delay (s)		27.5		14.5	12.6			57.2	14.7		29.3	22.1
Level of Service		C		B	B			E	B		C	C
Approach Delay (s)		27.5			13.0			47.1			25.4	
Approach LOS		C			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			29.2									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			75.0									Sum of lost time (s) 22.0
Intersection Capacity Utilization			78.5%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
6: State Street/Holmes Avenue & West Main Street

2035 Background Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  						 	
Traffic Volume (vph)	60	600	0	0	500	30	40	40	60	20	0	40
Future Volume (vph)	60	600	0	0	500	30	40	40	60	20	0	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.991				0.850		0.911	
Flt Protected	0.950							0.976			0.983	
Satd. Flow (prot)	1770	3539	0	0	5040	0	0	1818	1583	0	1668	0
Flt Permitted	0.425							0.808			0.853	
Satd. Flow (perm)	792	3539	0	0	5040	0	0	1505	1583	0	1448	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					21				103		103	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		464			269			230			437	
Travel Time (s)		10.5			6.1			5.2			9.9	
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)	65	652	0	0	543	33	43	43	65	22	0	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	652	0	0	576	0	0	86	65	0	65	0
Turn Type	D.P+P	NA			NA		Perm	NA	Perm	Perm	NA	
Protected Phases	1	1 2			2			4			4	
Permitted Phases	2						4		4	4		
Detector Phase	1	1 2			2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	1.0				1.0		1.0	1.0	1.0	1.0	1.0	
Minimum Split (s)	5.0				15.0		8.0	8.0	8.0	8.0	8.0	
Total Split (s)	12.0				25.0		16.0	16.0	16.0	16.0	16.0	
Total Split (%)	22.6%				47.2%		30.2%	30.2%	30.2%	30.2%	30.2%	
Maximum Green (s)	8.0				21.0		11.0	11.0	11.0	11.0	11.0	
Yellow Time (s)	3.0				3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.0				1.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0				0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0				4.0			5.0	5.0		5.0	
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	Min				Max		None	None	None	None	None	
Act Effct Green (s)	29.1	34.3			21.5			8.1	8.1		8.1	
Actuated g/C Ratio	0.61	0.72			0.45			0.17	0.17		0.17	
v/c Ratio	0.10	0.26			0.25			0.34	0.18		0.20	
Control Delay	4.1	3.9			9.4			22.3	3.5		3.7	
Queue Delay	0.0	0.0			0.0			0.0	0.0		0.0	
Total Delay	4.1	3.9			9.4			22.3	3.5		3.7	
LOS	A	A			A			C	A		A	
Approach Delay		3.9			9.4			14.2			3.7	
Approach LOS		A			A			B			A	

Lanes, Volumes, Timings
6: State Street/Holmes Avenue & West Main Street

2035 Background Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	5	32			36			23	0		0	
Queue Length 95th (ft)	17	62			61			55	14		14	
Internal Link Dist (ft)		384			189			150			357	
Turn Bay Length (ft)	125											
Base Capacity (vph)	661	2509			2285			355	452		420	
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	0.10	0.26			0.25			0.24	0.14		0.15	

Intersection Summary

Area Type: Other

Cycle Length: 53

Actuated Cycle Length: 47.6

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.34

Intersection Signal Delay: 7.1

Intersection LOS: A

Intersection Capacity Utilization 35.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: State Street/Holmes Avenue & West Main Street

 Ø1	 Ø2	 Ø4
12 s	25 s	16 s

HCM Signalized Intersection Capacity Analysis

6: State Street/Holmes Avenue & West Main Street

2035 Background Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	600	0	0	500	30	40	40	60	20	0	40
Future Volume (vph)	60	600	0	0	500	30	40	40	60	20	0	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	0.95			0.91			1.00	1.00		1.00	
Frt	1.00	1.00			0.99			1.00	0.85		0.91	
Flt Protected	0.95	1.00			1.00			0.98	1.00		0.98	
Satd. Flow (prot)	1770	3539			5042			1817	1583		1668	
Flt Permitted	0.42	1.00			1.00			0.81	1.00		0.85	
Satd. Flow (perm)	791	3539			5042			1506	1583		1448	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	652	0	0	543	33	43	43	65	22	0	43
RTOR Reduction (vph)	0	0	0	0	12	0	0	0	56	0	56	0
Lane Group Flow (vph)	65	652	0	0	564	0	0	86	9	0	9	0
Turn Type	D.P+P	NA			NA		Perm	NA	Perm	Perm	NA	
Protected Phases	1	1 2			2			4			4	
Permitted Phases	2						4		4	4		
Actuated Green, G (s)	29.1	33.1			21.5			6.6	6.6		6.6	
Effective Green, g (s)	29.1	33.1			21.5			6.6	6.6		6.6	
Actuated g/C Ratio	0.60	0.68			0.44			0.14	0.14		0.14	
Clearance Time (s)	4.0				4.0			5.0	5.0		5.0	
Vehicle Extension (s)	3.0				3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	625	2405			2225			204	214		196	
v/s Ratio Prot	0.02	c0.18			0.11							
v/s Ratio Perm	0.05							c0.06	0.01		0.01	
v/c Ratio	0.10	0.27			0.25			0.42	0.04		0.04	
Uniform Delay, d1	4.1	3.1			8.6			19.3	18.3		18.3	
Progression Factor	1.00	1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	0.1			0.3			1.4	0.1		0.1	
Delay (s)	4.2	3.1			8.8			20.7	18.4		18.4	
Level of Service	A	A			A			C	B		B	
Approach Delay (s)		3.2			8.8			19.7			18.4	
Approach LOS		A			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			7.7									
HCM 2000 Volume to Capacity ratio			0.33									
Actuated Cycle Length (s)			48.7									
Intersection Capacity Utilization			35.5%									
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
7: West Main Street & Central Avenue

2035 Background Condition
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	20	680	500	40	40	10
Future Volume (vph)	20	680	500	40	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt			0.989		0.972	
Flt Protected	0.950				0.962	
Satd. Flow (prot)	1770	5085	3500	0	1742	0
Flt Permitted	0.950				0.962	
Satd. Flow (perm)	1770	5085	3500	0	1742	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		269	98		279	
Travel Time (s)		6.1	2.2		6.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	739	543	43	43	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	739	586	0	54	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 26.6% ICU Level of Service A

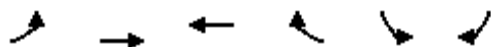
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

7: West Main Street & Central Avenue

2035 Background Condition

AM Peak Hour

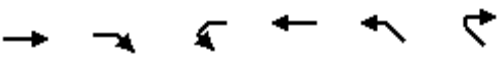


Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	20	680	500	40	40	10	
Future Volume (Veh/h)	20	680	500	40	40	10	
Sign Control		Free	Free		Stop		
Grade		0%	0%		0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	22	739	543	43	43	11	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type		None	None				
Median storage veh							
Upstream signal (ft)		269	98				
pX, platoon unblocked	0.98				0.98	0.98	
vC, conflicting volume	586				855	293	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	547				820	249	
tC, single (s)	4.1				6.8	6.9	
tC, 2 stage (s)							
tF (s)	2.2				3.5	3.3	
p0 queue free %	98				86	99	
cM capacity (veh/h)	1002				301	739	
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	SB 1
Volume Total	22	246	246	246	362	224	54
Volume Left	22	0	0	0	0	0	43
Volume Right	0	0	0	0	0	43	11
cSH	1002	1700	1700	1700	1700	1700	343
Volume to Capacity	0.02	0.14	0.14	0.14	0.21	0.13	0.16
Queue Length 95th (ft)	2	0	0	0	0	0	14
Control Delay (s)	8.7	0.0	0.0	0.0	0.0	0.0	17.5
Lane LOS	A						C
Approach Delay (s)	0.3				0.0		17.5
Approach LOS							C
Intersection Summary							
Average Delay			0.8				
Intersection Capacity Utilization			26.6%		ICU Level of Service		A
Analysis Period (min)			15				

Lanes, Volumes, Timings
8: West Main Street NW of Monument

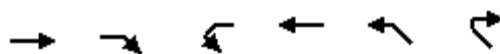
2035 Background Condition

AM Peak Hour

										
Lane Group	EBT	EBR	WBL	WBT	NWL	NWR	Ø1	Ø2	Ø3	Ø4
Lane Configurations		↑↑↑		↑↑	↑↑					
Traffic Volume (vph)	0	680	0	100	440	0				
Future Volume (vph)	0	680	0	100	440	0				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900				
Lane Util. Factor	1.00	0.76	1.00	0.95	0.97	1.00				
Frt		0.850								
Flt Protected					0.950					
Satd. Flow (prot)	0	3610	0	3539	3433	0				
Flt Permitted					0.950					
Satd. Flow (perm)	0	3610	0	3539	3433	0				
Right Turn on Red		Yes				Yes				
Satd. Flow (RTOR)		2487								
Link Speed (mph)	30			30	30					
Link Distance (ft)	98			190	116					
Travel Time (s)	2.2			4.3	2.6					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				
Adj. Flow (vph)	0	739	0	109	478	0				
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	739	0	109	478	0				
Turn Type		pt+ov		NA	Prot					
Protected Phases		1 2		1 4	2 3		1	2	3	4
Permitted Phases										
Detector Phase		1 2		1 4	2 3					
Switch Phase										
Minimum Initial (s)							1.0	1.0	1.0	1.0
Minimum Split (s)							6.0	20.0	5.0	19.0
Total Split (s)							14.0	34.0	6.0	19.0
Total Split (%)							19%	47%	8%	26%
Maximum Green (s)							9.0	30.0	2.0	15.0
Yellow Time (s)							3.0	3.0	3.0	3.0
All-Red Time (s)							2.0	1.0	1.0	1.0
Lost Time Adjust (s)										
Total Lost Time (s)										
Lead/Lag							Lead	Lag	Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes
Vehicle Extension (s)							3.0	3.0	3.0	3.0
Recall Mode							None	Max	None	None
Walk Time (s)								7.0		4.0
Flash Dont Walk (s)								8.0		11.0
Pedestrian Calls (#/hr)								0		0
Act Effct Green (s)		43.1		23.0	36.1					
Actuated g/C Ratio		0.63		0.34	0.53					
v/c Ratio		0.23		0.09	0.26					
Control Delay		0.2		15.3	0.3					
Queue Delay		0.0		0.0	0.3					
Total Delay		0.2		15.3	0.6					
LOS		A		B	A					
Approach Delay	0.2			15.3	0.6					
Approach LOS	A			B	A					

Lanes, Volumes, Timings
8: West Main Street NW of Monument

2035 Background Condition
AM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NWL	NWR	Ø1	Ø2	Ø3	Ø4
Queue Length 50th (ft)		0		15	0					
Queue Length 95th (ft)		0		31	0					
Internal Link Dist (ft)	18			110	36					
Turn Bay Length (ft)										
Base Capacity (vph)		3197		1175	1819					
Starvation Cap Reductn		0		0	723					
Spillback Cap Reductn		495		0	0					
Storage Cap Reductn		0		0	0					
Reduced v/c Ratio		0.27		0.09	0.44					

Intersection Summary

Area Type: Other

Cycle Length: 73

Actuated Cycle Length: 68.1

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 1.6

Intersection LOS: A

Intersection Capacity Utilization 23.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 8: West Main Street

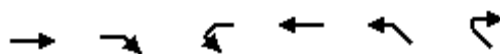


HCM Signalized Intersection Capacity Analysis

8: West Main Street NW of Monument

2035 Background Condition

AM Peak Hour



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations		↑↑↑		↑↑	↑↑	
Traffic Volume (vph)	0	680	0	100	440	0
Future Volume (vph)	0	680	0	100	440	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	4.0	
Lane Util. Factor		0.76		0.95	0.97	
Frt		0.85		1.00	1.00	
Flt Protected		1.00		1.00	0.95	
Satd. Flow (prot)		3610		3539	3433	
Flt Permitted		1.00		1.00	0.95	
Satd. Flow (perm)		3610		3539	3433	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	739	0	109	478	0
RTOR Reduction (vph)	0	260	0	0	0	0
Lane Group Flow (vph)	0	479	0	109	478	0
Turn Type		pt+ov		NA	Prot	
Protected Phases		1 2		1 4	2 3	
Permitted Phases						
Actuated Green, G (s)		44.1		22.9	36.1	
Effective Green, g (s)		44.1		18.9	36.1	
Actuated g/C Ratio		0.65		0.28	0.53	
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)		2341		983	1822	
v/s Ratio Prot		c0.13		c0.03	c0.14	
v/s Ratio Perm						
v/c Ratio		0.20		0.11	0.26	
Uniform Delay, d1		4.8		18.3	8.7	
Progression Factor		1.00		1.00	0.00	
Incremental Delay, d2		0.0		0.1	0.1	
Delay (s)		4.9		18.3	0.1	
Level of Service		A		B	A	
Approach Delay (s)	4.9			18.3	0.1	
Approach LOS	A			B	A	
Intersection Summary						
HCM 2000 Control Delay		4.3		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.25				
Actuated Cycle Length (s)		68.0		Sum of lost time (s)		17.0
Intersection Capacity Utilization		23.4%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings
9: Church Street & West Main Street

2035 Background Condition

AM Peak Hour

												
Lane Group	WBL2	WBL	WBR	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	Ø3
Lane Configurations												
Traffic Volume (vph)	70	30	0	0	0	110	540	70	20	440	140	
Future Volume (vph)	70	30	0	0	0	110	540	70	20	440	140	
Ideal Flow (vphpl)	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	0.95	0.95	0.95	0.95	1.00	
Fr't							0.983					0.850
Flt Protected		0.950				0.950				0.998		
Satd. Flow (prot)	0	1770	0	0	0	1770	3479	0	0	3532	1583	
Flt Permitted		0.950				0.950				0.917		
Satd. Flow (perm)	0	1770	0	0	0	1770	3479	0	0	3245	1583	
Right Turn on Red			Yes					Yes				Yes
Satd. Flow (RTOR)							33					152
Link Speed (mph)		30		30			30			30		
Link Distance (ft)		98		240			116			177		
Travel Time (s)		2.2		5.5			2.6			4.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	76	33	0	0	0	120	587	76	22	478	152	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	109	0	0	0	120	663	0	0	500	152	
Turn Type	Prot	Prot				Prot	NA		Perm	NA	custom	
Protected Phases	4	4				1	1 2			2	3 4	3
Permitted Phases									2		2	
Detector Phase	4	4				1	1 2		2	2	3 4	
Switch Phase												
Minimum Initial (s)	1.0	1.0				1.0			1.0	1.0		1.0
Minimum Split (s)	19.0	19.0				6.0			20.0	20.0		5.0
Total Split (s)	19.0	19.0				14.0			34.0	34.0		6.0
Total Split (%)	26.0%	26.0%				19.2%			46.6%	46.6%		8%
Maximum Green (s)	15.0	15.0				9.0			30.0	30.0		2.0
Yellow Time (s)	3.0	3.0				3.0			3.0	3.0		3.0
All-Red Time (s)	1.0	1.0				2.0			1.0	1.0		1.0
Lost Time Adjust (s)		0.0				0.0				0.0		
Total Lost Time (s)		4.0				5.0				4.0		
Lead/Lag	Lag	Lag				Lead			Lag	Lag		Lead
Lead-Lag Optimize?	Yes	Yes				Yes			Yes	Yes		Yes
Vehicle Extension (s)	3.0	3.0				3.0			3.0	3.0		3.0
Recall Mode	None	None				None			Max	Max		None
Walk Time (s)	4.0	4.0							7.0	7.0		
Flash Dont Walk (s)	11.0	11.0							8.0	8.0		
Pedestrian Calls (#/hr)	0	0							0	0		
Act Effct Green (s)		9.9				9.0	43.1			30.1	50.1	
Actuated g/C Ratio		0.15				0.13	0.63			0.44	0.74	
v/c Ratio		0.42				0.51	0.30			0.35	0.13	
Control Delay		31.3				37.0	6.2			14.0	0.7	
Queue Delay		0.0				80.5	0.9			0.0	0.0	
Total Delay		31.3				117.5	7.0			14.0	0.7	
LOS		C				F	A			B	A	
Approach Delay		31.3					24.0			10.9		
Approach LOS		C					C			B		

Lanes, Volumes, Timings
9: Church Street & West Main Street

2035 Background Condition
AM Peak Hour

												
Lane Group	WBL2	WBL	WBR	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	Ø3
Queue Length 50th (ft)		42				47	51			67	0	
Queue Length 95th (ft)		85				#104	96			116	10	
Internal Link Dist (ft)		18		160			36			97		
Turn Bay Length (ft)												
Base Capacity (vph)		390				234	2214			1433	1310	
Starvation Cap Reductn		0				149	1193			0	0	
Spillback Cap Reductn		0				0	0			0	0	
Storage Cap Reductn		0				0	0			0	0	
Reduced v/c Ratio		0.28				1.41	0.65			0.35	0.12	

Intersection Summary

Area Type: Other

Cycle Length: 73

Actuated Cycle Length: 68.1

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 19.0

Intersection LOS: B

Intersection Capacity Utilization 46.3%

ICU Level of Service A

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 9: Church Street & West Main Street



HCM Signalized Intersection Capacity Analysis

9: Church Street & West Main Street

2035 Background Condition

AM Peak Hour

											
Movement	WBL2	WBL	WBR	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations											
Traffic Volume (vph)	70	30	0	0	0	110	540	70	20	440	140
Future Volume (vph)	70	30	0	0	0	110	540	70	20	440	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0				5.0	5.0			4.0	4.0
Lane Util. Factor		1.00				1.00	0.95			0.95	1.00
Frt		1.00				1.00	0.98			1.00	0.85
Flt Protected		0.95				0.95	1.00			1.00	1.00
Satd. Flow (prot)		1770				1770	3478			3531	1583
Flt Permitted		0.95				0.95	1.00			0.92	1.00
Satd. Flow (perm)		1770				1770	3478			3246	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	33	0	0	0	120	587	76	22	478	152
RTOR Reduction (vph)	0	0	0	0	0	0	12	0	0	0	49
Lane Group Flow (vph)	0	109	0	0	0	120	651	0	0	500	103
Turn Type	Prot	Prot				Prot	NA		Perm	NA	custom
Protected Phases	4	4				1	1 2			2	3 4
Permitted Phases									2		2
Actuated Green, G (s)		9.9				9.0	44.1			30.1	46.0
Effective Green, g (s)		9.9				9.0	44.1			30.1	46.0
Actuated g/C Ratio		0.15				0.13	0.65			0.44	0.68
Clearance Time (s)		4.0				5.0				4.0	
Vehicle Extension (s)		3.0				3.0				3.0	
Lane Grp Cap (vph)		257				234	2255			1436	1163
v/s Ratio Prot		c0.06				c0.07	0.19				c0.02
v/s Ratio Perm										c0.15	0.04
v/c Ratio		0.42				0.51	0.29			0.35	0.09
Uniform Delay, d1		26.5				27.5	5.2			12.5	3.8
Progression Factor		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2		1.1				1.9	0.1			0.7	0.0
Delay (s)		27.6				29.3	5.2			13.2	3.8
Level of Service		C				C	A			B	A
Approach Delay (s)		27.6		0.0			8.9			11.0	
Approach LOS		C		A			A			B	
Intersection Summary											
HCM 2000 Control Delay		11.1				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio		0.39									
Actuated Cycle Length (s)		68.0				Sum of lost time (s)			17.0		
Intersection Capacity Utilization		46.3%				ICU Level of Service			A		
Analysis Period (min)		15									
c Critical Lane Group											

Lanes, Volumes, Timings
10: Leavenworth Street & West Main Street

2035 Background Condition

AM Peak Hour

							
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
Lane Configurations	↑↑		↵	↑↑	↵	↵	
Traffic Volume (vph)	610	60	60	500	100	100	
Future Volume (vph)	610	60	60	500	100	100	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00	
Frt	0.987					0.850	
Flt Protected			0.950		0.950		
Satd. Flow (prot)	3493	0	1770	3539	1770	1583	
Flt Permitted			0.323		0.950		
Satd. Flow (perm)	3493	0	602	3539	1770	1583	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	11					109	
Link Speed (mph)	30			30	30		
Link Distance (ft)	289			389	436		
Travel Time (s)	6.6			8.8	9.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	663	65	65	543	109	109	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	728	0	65	543	109	109	
Turn Type	NA		D.P+P	NA	Prot	Perm	
Protected Phases	1		2	1 2	4		3
Permitted Phases			1			4	
Detector Phase	1		2	1 2	4	4	
Switch Phase							
Minimum Initial (s)	1.0		1.0		1.0	1.0	1.0
Minimum Split (s)	15.0		6.0		8.0	8.0	20.0
Total Split (s)	25.0		10.0		30.0	30.0	20.0
Total Split (%)	29.4%		11.8%		35.3%	35.3%	24%
Maximum Green (s)	21.0		6.0		25.0	25.0	17.0
Yellow Time (s)	3.0		3.0		3.0	3.0	3.0
All-Red Time (s)	1.0		1.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0		4.0		5.0	5.0	
Lead/Lag	Lead		Lag		Lag	Lag	Lead
Lead-Lag Optimize?	Yes		Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0		3.0		3.0	3.0	3.0
Recall Mode	Max		Max		None	None	None
Walk Time (s)							8.0
Flash Dont Walk (s)							9.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)	21.4		27.5	32.6	8.2	8.2	
Actuated g/C Ratio	0.46		0.60	0.71	0.18	0.18	
v/c Ratio	0.45		0.13	0.22	0.34	0.29	
Control Delay	10.5		5.0	3.9	20.8	7.0	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	10.5		5.0	3.9	20.8	7.0	
LOS	B		A	A	C	A	
Approach Delay	10.5			4.0	13.9		
Approach LOS	B			A	B		

Lanes, Volumes, Timings
10: Leavenworth Street & West Main Street

2035 Background Condition

AM Peak Hour

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
Queue Length 50th (ft)	70		5	26	27	0	
Queue Length 95th (ft)	118		17	50	62	31	
Internal Link Dist (ft)	209			309	356		
Turn Bay Length (ft)							
Base Capacity (vph)	1627		513	2505	978	923	
Starvation Cap Reductn	0		0	0	0	0	
Spillback Cap Reductn	0		0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	
Reduced v/c Ratio	0.45		0.13	0.22	0.11	0.12	

Intersection Summary

Area Type: Other

Cycle Length: 85

Actuated Cycle Length: 46.1

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay: 8.4

Intersection LOS: A

Intersection Capacity Utilization 38.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Leavenworth Street & West Main Street

 Ø1	 Ø2	 Ø3	 Ø4
25 s	10 s	20 s	30 s

HCM Signalized Intersection Capacity Analysis

10: Leavenworth Street & West Main Street

2035 Background Condition

AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	610	60	60	500	100	100
Future Volume (vph)	610	60	60	500	100	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	5.0	5.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3492		1770	3539	1770	1583
Flt Permitted	1.00		0.32	1.00	0.95	1.00
Satd. Flow (perm)	3492		601	3539	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	663	65	65	543	109	109
RTOR Reduction (vph)	6	0	0	0	0	94
Lane Group Flow (vph)	722	0	65	543	109	15
Turn Type	NA		D.P+P	NA	Prot	Perm
Protected Phases	1		2	1 2	4	
Permitted Phases			1			4
Actuated Green, G (s)	21.4		27.5	31.5	6.7	6.7
Effective Green, g (s)	21.4		27.5	31.5	6.7	6.7
Actuated g/C Ratio	0.45		0.58	0.67	0.14	0.14
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	1583		501	2361	251	224
v/s Ratio Prot	c0.21		0.02	c0.15	c0.06	
v/s Ratio Perm			0.06			0.01
v/c Ratio	0.46		0.13	0.23	0.43	0.07
Uniform Delay, d1	8.9		6.0	3.1	18.5	17.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9		0.5	0.2	1.2	0.1
Delay (s)	9.8		6.5	3.3	19.7	17.7
Level of Service	A		A	A	B	B
Approach Delay (s)	9.8			3.7	18.7	
Approach LOS	A			A	B	
Intersection Summary						
HCM 2000 Control Delay			8.7		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			47.2		Sum of lost time (s)	16.0
Intersection Capacity Utilization			38.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings

2035 Background Condition

11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑			↑↑			↑↑	
Traffic Volume (vph)	10	650	50	30	550	30	0	290	10	10	390	10
Future Volume (vph)	10	650	50	30	550	30	0	290	10	10	390	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		130	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	0.95	1.00	0.95	0.95	0.95	0.95	0.95
Frt			0.850		0.993			0.995			0.996	
Flt Protected		0.999			0.998						0.999	
Satd. Flow (prot)	0	3536	1583	0	3507	0	0	3522	0	0	3522	0
Flt Permitted		0.945			0.902						0.941	
Satd. Flow (perm)	0	3345	1583	0	3170	0	0	3522	0	0	3317	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			54		9			5			4	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			245			286			217	
Travel Time (s)		8.8			5.6			6.5			4.9	
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)	11	707	54	33	598	33	0	315	11	11	424	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	718	54	0	664	0	0	326	0	0	446	0
Turn Type	Perm	NA	Perm	Perm	NA			NA		Perm	NA	
Protected Phases		2			2			8			4	
Permitted Phases	2		2	2						4		
Detector Phase	2	2	2	2	2			8		4	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0	1.0	1.0	1.0			1.0		1.0	1.0	
Minimum Split (s)	37.0	37.0	37.0	37.0	37.0			35.0		35.0	35.0	
Total Split (s)	40.0	40.0	40.0	40.0	40.0			35.0		35.0	35.0	
Total Split (%)	53.3%	53.3%	53.3%	53.3%	53.3%			46.7%		46.7%	46.7%	
Maximum Green (s)	35.0	35.0	35.0	35.0	35.0			30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0			2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0			0.0			0.0	
Total Lost Time (s)		5.0	5.0		5.0			5.0			5.0	
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	Max	Max	Max	Max	Max			None		None	None	
Walk Time (s)	12.0	12.0	12.0	12.0	12.0			12.0		12.0	12.0	
Flash Dont Walk (s)	20.0	20.0	20.0	20.0	20.0			18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effect Green (s)		35.1	35.1		35.1			13.3			13.3	
Actuated g/C Ratio		0.60	0.60		0.60			0.23			0.23	
v/c Ratio		0.36	0.06		0.35			0.40			0.59	
Control Delay		7.1	2.3		6.9			20.2			23.2	
Queue Delay		0.0	0.0		0.0			0.0			0.0	
Total Delay		7.1	2.3		6.9			20.2			23.2	

Lanes, Volumes, Timings

2035 Background Condition

11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A	A		A			C			C	
Approach Delay		6.7			6.9			20.2			23.2	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)		55	0		50			50			72	
Queue Length 95th (ft)		108	13		100			81			111	
Internal Link Dist (ft)		309			165			206			137	
Turn Bay Length (ft)			130									
Base Capacity (vph)		2009	972		1908			1816			1710	
Starvation Cap Reductn		0	0		0			0			165	
Spillback Cap Reductn		0	0		0			0			0	
Storage Cap Reductn		0	0		0			0			0	
Reduced v/c Ratio		0.36	0.06		0.35			0.18			0.29	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 58.4

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 12.1

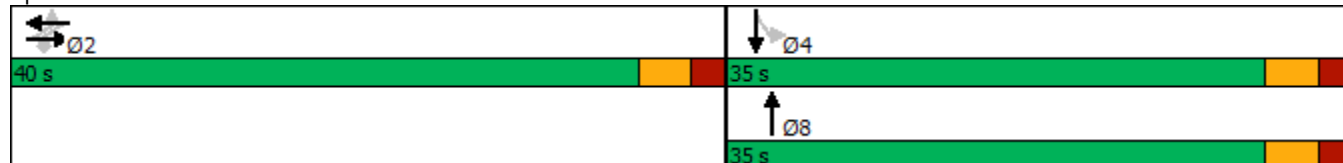
Intersection LOS: B

Intersection Capacity Utilization 65.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street



HCM Signalized Intersection Capacity Analysis

2035 Background Condition

11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑			↑↑			↑↑	
Traffic Volume (vph)	10	650	50	30	550	30	0	290	10	10	390	10
Future Volume (vph)	10	650	50	30	550	30	0	290	10	10	390	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0			5.0			5.0	
Lane Util. Factor		0.95	1.00		0.95			0.95			0.95	
Frt		1.00	0.85		0.99			0.99			1.00	
Flt Protected		1.00	1.00		1.00			1.00			1.00	
Satd. Flow (prot)		3537	1583		3504			3521			3522	
Flt Permitted		0.94	1.00		0.90			1.00			0.94	
Satd. Flow (perm)		3344	1583		3168			3521			3320	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	707	54	33	598	33	0	315	11	11	424	11
RTOR Reduction (vph)	0	0	22	0	4	0	0	4	0	0	3	0
Lane Group Flow (vph)	0	718	32	0	660	0	0	322	0	0	443	0
Turn Type	Perm	NA	Perm	Perm	NA			NA		Perm	NA	
Protected Phases		2			2			8			4	
Permitted Phases	2		2	2						4		
Actuated Green, G (s)		35.1	35.1		35.1			13.3			13.3	
Effective Green, g (s)		35.1	35.1		35.1			13.3			13.3	
Actuated g/C Ratio		0.60	0.60		0.60			0.23			0.23	
Clearance Time (s)		5.0	5.0		5.0			5.0			5.0	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		2009	951		1904			801			756	
v/s Ratio Prot								0.09				
v/s Ratio Perm		c0.21	0.02		0.21						c0.13	
v/c Ratio		0.36	0.03		0.35			0.40			0.59	
Uniform Delay, d1		5.9	4.7		5.9			19.2			20.1	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.5	0.1		0.5			0.3			1.2	
Delay (s)		6.4	4.8		6.4			19.5			21.3	
Level of Service		A	A		A			B			C	
Approach Delay (s)		6.3			6.4			19.5			21.3	
Approach LOS		A			A			B			C	
Intersection Summary												
HCM 2000 Control Delay		11.3										
HCM 2000 Level of Service												
HCM 2000 Volume to Capacity ratio		0.42										
Actuated Cycle Length (s)		58.4										
Sum of lost time (s)												
Intersection Capacity Utilization		65.2%										
ICU Level of Service												
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
12: North Main Street & West Main Street

2035 Background Condition

AM Peak Hour

							Ø3
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	110	50	120	210	360	120	
Future Volume (vph)	110	50	120	210	360	120	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	
Fr't		0.850			0.963		
Flt Protected	0.950		0.950				
Satd. Flow (prot)	1770	1583	1770	1863	3408	0	
Flt Permitted	0.950		0.950				
Satd. Flow (perm)	1770	1583	1770	1863	3408	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)		54			45		
Link Speed (mph)	30			30	30		
Link Distance (ft)	207			217	246		
Travel Time (s)	4.7			4.9	5.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	120	54	130	228	391	130	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	120	54	130	228	521	0	
Turn Type	Prot	Perm	Prot	NA	NA		
Protected Phases	4		2	1 2	1	3	
Permitted Phases		4					
Detector Phase	4	4	2	1 2	1		
Switch Phase							
Minimum Initial (s)	1.0	1.0	1.0		1.0	1.0	
Minimum Split (s)	10.0	10.0	20.0		10.0	18.0	
Total Split (s)	25.0	25.0	25.0		30.0	18.0	
Total Split (%)	25.5%	25.5%	25.5%		30.6%	18%	
Maximum Green (s)	21.0	21.0	21.0		26.0	15.0	
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0		1.0	0.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		
Total Lost Time (s)	4.0	4.0	4.0		4.0		
Lead/Lag	Lag	Lag	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	Max		None	None	
Walk Time (s)						6.0	
Flash Dont Walk (s)						9.0	
Pedestrian Calls (#/hr)						0	
Act Effct Green (s)	9.6	9.6	21.8	42.5	15.3		
Actuated g/C Ratio	0.17	0.17	0.39	0.76	0.27		
v/c Ratio	0.40	0.17	0.19	0.16	0.54		
Control Delay	27.2	9.1	16.2	3.6	18.7		
Queue Delay	0.0	0.0	0.5	0.6	0.0		
Total Delay	27.2	9.1	16.6	4.2	18.7		
LOS	C	A	B	A	B		
Approach Delay	21.6			8.7	18.7		
Approach LOS	C			A	B		

Lanes, Volumes, Timings
12: North Main Street & West Main Street

2035 Background Condition
AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø3
Queue Length 50th (ft)	38	0	30	21	73		
Queue Length 95th (ft)	89	26	81	49	123		
Internal Link Dist (ft)	127			137	166		
Turn Bay Length (ft)							
Base Capacity (vph)	687	647	687	1403	1661		
Starvation Cap Reductn	0	0	284	849	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.17	0.08	0.32	0.41	0.31		

Intersection Summary

Area Type: Other

Cycle Length: 98

Actuated Cycle Length: 56.2

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 15.8

Intersection LOS: B

Intersection Capacity Utilization 36.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 12: North Main Street & West Main Street

 Ø1	 Ø2	 Ø3	 Ø4
30 s	25 s	18 s	25 s

HCM Signalized Intersection Capacity Analysis

12: North Main Street & West Main Street

2035 Background Condition

AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	110	50	120	210	360	120
Future Volume (vph)	110	50	120	210	360	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	1863	3407	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	1770	1863	3407	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	54	130	228	391	130
RTOR Reduction (vph)	0	47	0	0	33	0
Lane Group Flow (vph)	120	7	130	228	488	0
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		2	1 2	1	
Permitted Phases		4				
Actuated Green, G (s)	7.8	7.8	21.8	41.1	15.3	
Effective Green, g (s)	7.8	7.8	21.8	41.1	15.3	
Actuated g/C Ratio	0.14	0.14	0.38	0.72	0.27	
Clearance Time (s)	4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	242	217	678	1345	916	
v/s Ratio Prot	c0.07		c0.07	0.12	c0.14	
v/s Ratio Perm		0.00				
v/c Ratio	0.50	0.03	0.19	0.17	0.53	
Uniform Delay, d1	22.7	21.3	11.7	2.5	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.6	0.1	0.6	0.1	0.6	
Delay (s)	24.3	21.3	12.3	2.6	18.3	
Level of Service	C	C	B	A	B	
Approach Delay (s)	23.4			6.1	18.3	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay			15.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.39			
Actuated Cycle Length (s)			56.9		Sum of lost time (s)	15.0
Intersection Capacity Utilization			36.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
13: Sperry Street/Waterville Street & Johnson Street

2035 Background Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	90	40	70	50	20	10	70	60	20	150	10
Future Volume (vph)	10	90	40	70	50	20	10	70	60	20	150	10
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		0.962			0.980			0.942			0.992	
Flt Protected		0.996			0.976			0.996			0.994	
Satd. Flow (prot)	0	1785	0	0	1782	0	0	1748	0	0	1837	0
Flt Permitted		0.996			0.976			0.996			0.994	
Satd. Flow (perm)	0	1785	0	0	1782	0	0	1748	0	0	1837	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			342			176			213	
Travel Time (s)		5.0			7.8			4.0			4.8	
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)	11	98	43	76	54	22	11	76	65	22	163	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	152	0	0	152	0	0	152	0	0	196	0
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 39.7% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

13: Sperry Street/Waterville Street & Johnson Street

2035 Background Condition

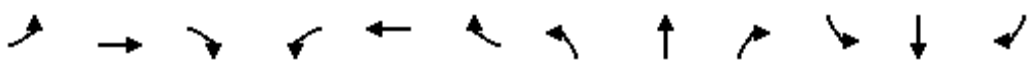
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	90	40	70	50	20	10	70	60	20	150	10
Future Volume (Veh/h)	10	90	40	70	50	20	10	70	60	20	150	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	98	43	76	54	22	11	76	65	22	163	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None								None			
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	392	376	168	435	348	108	174			141		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	392	376	168	435	348	108	174			141		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	82	95	82	90	98	99			98		
cM capacity (veh/h)	505	543	876	428	562	945	1403			1442		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	152	152	152	196								
Volume Left	11	76	11	22								
Volume Right	43	22	65	11								
cSH	605	512	1403	1442								
Volume to Capacity	0.25	0.30	0.01	0.02								
Queue Length 95th (ft)	25	31	1	1								
Control Delay (s)	12.9	15.0	0.6	1.0								
Lane LOS	B	B	A	A								
Approach Delay (s)	12.9	15.0	0.6	1.0								
Approach LOS	B	B										
Intersection Summary												
Average Delay			6.9									
Intersection Capacity Utilization			39.7%	ICU Level of Service					A			
Analysis Period (min)			15									

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Background Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	130	50	140	50	10	30	260	90	10	260	10
Future Volume (vph)	10	130	50	140	50	10	30	260	90	10	260	10
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		0.965			0.993				0.850		0.995	
Flt Protected		0.997			0.966			0.995			0.998	
Satd. Flow (prot)	0	1792	0	0	1787	0	0	1853	1583	0	1850	0
Flt Permitted		0.977			0.722			0.947			0.985	
Satd. Flow (perm)	0	1756	0	0	1335	0	0	1764	1583	0	1826	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		30			4				98			2
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		273			331			761			180	
Travel Time (s)		6.2			7.5			17.3			4.1	
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)	11	141	54	152	54	11	33	283	98	11	283	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	206	0	0	217	0	0	316	98	0	305	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Detector Phase	2	2		2	2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Minimum Split (s)	10.0	10.0		10.0	10.0		7.0	7.0	7.0	7.0	7.0	
Total Split (s)	35.0	35.0		35.0	35.0		20.0	20.0	20.0	20.0	20.0	
Total Split (%)	47.9%	47.9%		47.9%	47.9%		27.4%	27.4%	27.4%	27.4%	27.4%	
Maximum Green (s)	30.0	30.0		30.0	30.0		16.0	16.0	16.0	16.0	16.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			4.0	4.0		4.0	
Lead/Lag							Lag	Lag	Lag	Lag	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	
Recall Mode	Min	Min		Min	Min		None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		11.8			11.8			14.1	14.1		14.1	
Actuated g/C Ratio		0.34			0.34			0.40	0.40		0.40	
v/c Ratio		0.34			0.48			0.45	0.14		0.42	
Control Delay		9.3			13.4			10.9	3.2		10.4	
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		9.3			13.4			10.9	3.2		10.4	
LOS		A			B			B	A		B	
Approach Delay		9.3			13.4			9.1			10.4	
Approach LOS		A			B			A			B	

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Background Condition
AM Peak Hour

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	25%
Maximum Green (s)	15.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	8.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

14: Willow Street & Johnson Street/Pine Street

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		26			34			38	0		36	
Queue Length 95th (ft)		58			73			109	20		103	
Internal Link Dist (ft)		193			251			681			100	
Turn Bay Length (ft)												
Base Capacity (vph)		1498			1136			824	791		854	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.14			0.19			0.38	0.12		0.36	

Intersection Summary

Area Type: Other

Cycle Length: 73

Actuated Cycle Length: 35.2

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 10.3

Intersection LOS: B

Intersection Capacity Utilization 59.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 14: Willow Street & Johnson Street/Pine Street

 Ø2	 Ø3	 Ø4
35 s	18 s	20 s

Lane Group	Ø3
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

14: Willow Street & Johnson Street/Pine Street

2035 Background Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔	↔		↔	
Traffic Volume (vph)	10	130	50	140	50	10	30	260	90	10	260	10
Future Volume (vph)	10	130	50	140	50	10	30	260	90	10	260	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.0	4.0		4.0	
Lane Util. Factor		1.00			1.00			1.00	1.00		1.00	
Frt		0.96			0.99			1.00	0.85		1.00	
Flt Protected		1.00			0.97			0.99	1.00		1.00	
Satd. Flow (prot)		1792			1787			1853	1583		1850	
Flt Permitted		0.98			0.72			0.95	1.00		0.98	
Satd. Flow (perm)		1756			1337			1763	1583		1826	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	141	54	152	54	11	33	283	98	11	283	11
RTOR Reduction (vph)	0	20	0	0	3	0	0	0	58	0	1	0
Lane Group Flow (vph)	0	186	0	0	214	0	0	316	40	0	304	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Actuated Green, G (s)		11.8			11.8			14.1	14.1		14.1	
Effective Green, g (s)		11.8			11.8			14.1	14.1		14.1	
Actuated g/C Ratio		0.34			0.34			0.40	0.40		0.40	
Clearance Time (s)		5.0			5.0			4.0	4.0		4.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		593			452			712	639		737	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.16			c0.18	0.03		0.17	
v/c Ratio		0.31			0.47			0.44	0.06		0.41	
Uniform Delay, d1		8.6			9.1			7.6	6.4		7.4	
Progression Factor		1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.3			0.8			0.4	0.0		0.4	
Delay (s)		8.9			9.9			8.0	6.4		7.8	
Level of Service		A			A			A	A		A	
Approach Delay (s)		8.9			9.9			7.6			7.8	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.3			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.52										
Actuated Cycle Length (s)		34.9			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		59.5%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
23: West Main Street & Park Place

2035 Background Condition

AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	WBR2	SBL	SBR	SEL	SER
Lane Configurations		↰	↰						
Traffic Volume (vph)	80	180	100	100	30	0	0	0	0
Future Volume (vph)	80	180	100	100	30	0	0	0	0
Ideal Flow (vphpl)	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
Frt			0.924						
Flt Protected		0.985							
Satd. Flow (prot)	0	1835	1721	0	0	0	0	0	0
Flt Permitted		0.985							
Satd. Flow (perm)	0	1835	1721	0	0	0	0	0	0
Link Speed (mph)		30	30			30		30	
Link Distance (ft)		98	502			174		190	
Travel Time (s)		2.2	11.4			4.0		4.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	196	109	109	33	0	0	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	283	251	0	0	0	0	0	0
Sign Control		Free	Free			Stop		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 33.8% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings

2035 Build Condition

1: Riverside Street/Route 8 Off Ramp & West Main Street & Watertown Avenue

AM Peak Hour

												
Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2	Ø5	Ø6
Lane Configurations	↑	↑	↑	↑↑	↑	↑		↑	↑			
Traffic Volume (vph)	530	120	237	400	247	131	101	275	122	120		
Future Volume (vph)	530	120	237	400	247	131	101	275	122	120		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Storage Length (ft)		40	0		0		0	230	0			
Storage Lanes		1	1		1		0	1	1			
Taper Length (ft)			25		25			25				
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00		
Frt		0.850				0.935			0.850			
Flt Protected			0.950		0.950			0.950				
Satd. Flow (prot)	1863	1583	1770	3539	1770	1742	0	1770	1583	0		
Flt Permitted			0.099		0.950			0.950				
Satd. Flow (perm)	1863	1583	184	3539	1770	1742	0	1770	1583	0		
Right Turn on Red		Yes								Yes		
Satd. Flow (RTOR)		82							82			
Link Speed (mph)	30			30		30		30				
Link Distance (ft)	237			379		329		394				
Travel Time (s)	5.4			8.6		7.5		9.0				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	576	130	258	435	268	142	110	299	133	130		
Shared Lane Traffic (%)												
Lane Group Flow (vph)	576	130	258	435	268	252	0	299	263	0		
Turn Type	NA	Perm	pm+pt	NA	Split	NA		Prot	Prot			
Protected Phases	1		2	1 2	3	3		4	4		5	6
Permitted Phases		1	1 2									
Minimum Split (s)	14.0	14.0	7.0		13.0	13.0		13.0	13.0		22.0	6.0
Total Split (s)	46.0	46.0	21.0		25.0	25.0		28.0	28.0		45.0	22.0
Total Split (%)	38.3%	38.3%	17.5%		20.8%	20.8%		23.3%	23.3%		38%	18%
Maximum Green (s)	42.0	42.0	17.0		21.0	21.0		24.0	24.0		41.0	18.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0
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	Lead	Lag		Lead	Lead		Lag	Lag		Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes
Act Effect Green (s)	42.0	42.0	59.0	63.0	21.0	21.0		24.0	24.0			
Actuated g/C Ratio	0.35	0.35	0.49	0.52	0.18	0.18		0.20	0.20			
v/c Ratio	0.88	0.21	0.82	0.23	0.87	0.83		0.84	0.69			
Control Delay	53.5	12.1	45.0	7.6	75.2	70.7		68.1	40.6			
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0			
Total Delay	53.5	12.1	45.0	7.6	75.2	70.7		68.1	40.6			
LOS	D	B	D	A	E	E		E	D			
Approach Delay	45.9			21.6		73.0		55.3				
Approach LOS	D			C		E		E				
Queue Length 50th (ft)	417	25	161	35	204	190		225	132			
Queue Length 95th (ft)	#624	70	m204	m41	#353	#328		#376	228			
Internal Link Dist (ft)	157			299		249		314				
Turn Bay Length (ft)		40						230				
Base Capacity (vph)	652	607	315	1857	309	304		354	382			

Lane Group	Ø7	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	7	8
Permitted Phases		
Minimum Split (s)	18.0	22.5
Total Split (s)	26.0	27.0
Total Split (%)	22%	23%
Maximum Green (s)	22.0	23.0
Yellow Time (s)	3.0	3.0
All-Red Time (s)	1.0	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2	Ø5	Ø6
Starvation Cap Reductn	0	0	0	0	0	0		0	0			
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	0.88	0.21	0.82	0.23	0.87	0.83		0.84	0.69			

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 46.9

Intersection LOS: D

Intersection Capacity Utilization 83.3%

ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside Street/Route 8 Off Ramp & West Main Street & Watertown Avenue

#1 ← Ø1	#1 ← Ø2 (R)	#1 ← Ø3	#1 ← Ø4
46 s	21 s	25 s	28 s
#2 ← Ø5	#2 ← Ø6	#2 ← Ø7	#2 ← Ø8
45 s	22 s	26 s	27 s

Lane Group	Ø7	Ø8
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

2035 Build Condition

1: Riverside Street/Route 8 Off Ramp & West Main Street & Watertown Avenue

AM Peak Hour

										
Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2
Lane Configurations										
Traffic Volume (vph)	530	120	237	400	247	131	101	275	122	120
Future Volume (vph)	530	120	237	400	247	131	101	275	122	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00		1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.93		1.00	0.85	
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1863	1583	1770	3539	1770	1741		1770	1583	
Flt Permitted	1.00	1.00	0.10	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1863	1583	185	3539	1770	1741		1770	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	576	130	258	435	268	142	110	299	133	130
RTOR Reduction (vph)	0	53	0	0	0	0	0	0	66	0
Lane Group Flow (vph)	576	77	258	435	268	252	0	299	197	0
Turn Type	NA	Perm	pm+pt	NA	Split	NA		Prot	Prot	
Protected Phases	1		2	1 2	3	3		4	4	
Permitted Phases		1	1 2							
Actuated Green, G (s)	42.0	42.0	59.0	63.0	21.0	21.0		24.0	24.0	
Effective Green, g (s)	42.0	42.0	59.0	63.0	21.0	21.0		24.0	24.0	
Actuated g/C Ratio	0.35	0.35	0.49	0.52	0.18	0.18		0.20	0.20	
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	652	554	315	1857	309	304		354	316	
v/s Ratio Prot	c0.31		c0.12	c0.12	c0.15	0.14		c0.17	0.12	
v/s Ratio Perm		0.05	0.29							
v/c Ratio	0.88	0.14	0.82	0.23	0.87	0.83		0.84	0.62	
Uniform Delay, d1	36.7	26.6	44.0	15.4	48.1	47.8		46.2	43.9	
Progression Factor	1.00	1.00	0.72	0.48	1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.0	0.5	13.9	0.2	26.4	22.3		21.2	9.0	
Delay (s)	52.7	27.2	45.4	7.6	74.5	70.0		67.4	52.9	
Level of Service	D	C	D	A	E	E		E	D	
Approach Delay (s)	48.0			21.7		72.4		60.6		
Approach LOS	D			C		E		E		
Intersection Summary										
HCM 2000 Control Delay			48.6		HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.86							
Actuated Cycle Length (s)			120.0		Sum of lost time (s)				16.0	
Intersection Capacity Utilization			83.3%		ICU Level of Service				E	
Analysis Period (min)			15							
c Critical Lane Group										

Lanes, Volumes, Timings

2035 Build Condition

2: Riverside Street/Watertown Avenue & West Main Street

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 				
Traffic Volume (vph)	250	880	0	0	510	530	110	410	140	0	0	0
Future Volume (vph)	250	880	0	0	510	530	110	410	140	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frnt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	1863	1583	1770	3539	1583	0	0	0
Flt Permitted	0.457						0.950					
Satd. Flow (perm)	851	3539	0	0	1863	1583	1770	3539	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						424			152			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		379			838			247			271	
Travel Time (s)		8.6			19.0			5.6			6.2	
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)	272	957	0	0	554	576	120	446	152	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	272	957	0	0	554	576	120	446	152	0	0	0
Turn Type	custom	NA			NA	Perm	Split	NA	Prot			
Protected Phases	6	5 6 8			5		7	7	7			
Permitted Phases	5 8					5						
Minimum Split (s)	6.0				22.0	22.0	18.0	18.0	18.0			
Total Split (s)	22.0				45.0	45.0	26.0	26.0	26.0			
Total Split (%)	18.3%				37.5%	37.5%	21.7%	21.7%	21.7%			
Maximum Green (s)	18.0				41.0	41.0	22.0	22.0	22.0			
Yellow Time (s)	3.0				3.0	3.0	3.0	3.0	3.0			
All-Red Time (s)	1.0				1.0	1.0	1.0	1.0	1.0			
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	Lag				Lead	Lead	Lead	Lead	Lead			
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	Yes	Yes			
Act Effct Green (s)	86.0	90.0			41.0	41.0	22.0	22.0	22.0			
Actuated g/C Ratio	0.72	0.75			0.34	0.34	0.18	0.18	0.18			
v/c Ratio	0.36	0.36			0.87	0.70	0.37	0.69	0.37			
Control Delay	4.3	3.3			53.0	13.9	46.8	52.0	9.3			
Queue Delay	0.1	1.0			0.0	0.0	0.0	0.0	0.0			
Total Delay	4.4	4.3			53.0	13.9	46.8	52.0	9.3			
LOS	A	A			D	B	D	D	A			
Approach Delay		4.3			33.0			42.1				
Approach LOS		A			C			D				
Queue Length 50th (ft)	45	97			400	94	82	171	0			
Queue Length 95th (ft)	m46	m108			#598	235	142	229	57			
Internal Link Dist (ft)		299			758			167			191	
Turn Bay Length (ft)												
Base Capacity (vph)	747	2654			636	819	324	648	414			
Starvation Cap Reductn	72	1352			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			

Lanes, Volumes, Timings
2: Riverside Street/Watertown Avenue & West Main Street

2035 Build Condition
AM Peak Hour

Lane Group	Ø1	Ø2	Ø3	Ø4	Ø8
Lane Configurations					
Traffic Volume (vph)					
Future Volume (vph)					
Ideal Flow (vphpl)					
Lane Util. Factor					
Fr t					
Flt Protected					
Satd. Flow (prot)					
Flt Permitted					
Satd. Flow (perm)					
Right Turn on Red					
Satd. Flow (RTOR)					
Link Speed (mph)					
Link Distance (ft)					
Travel Time (s)					
Peak Hour Factor					
Adj. Flow (vph)					
Shared Lane Traffic (%)					
Lane Group Flow (vph)					
Turn Type					
Protected Phases	1	2	3	4	8
Permitted Phases					
Minimum Split (s)	14.0	7.0	13.0	13.0	22.5
Total Split (s)	46.0	21.0	25.0	28.0	27.0
Total Split (%)	38%	18%	21%	23%	23%
Maximum Green (s)	42.0	17.0	21.0	24.0	23.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)					
Total Lost Time (s)					
Lead/Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes
Act Effct Green (s)					
Actuated g/C Ratio					
v/c Ratio					
Control Delay					
Queue Delay					
Total Delay					
LOS					
Approach Delay					
Approach LOS					
Queue Length 50th (ft)					
Queue Length 95th (ft)					
Internal Link Dist (ft)					
Turn Bay Length (ft)					
Base Capacity (vph)					
Starvation Cap Reductn					
Spillback Cap Reductn					
Storage Cap Reductn					

2: Riverside Street/Watertown Avenue & West Main Street

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Reduced v/c Ratio	0.40	0.74			0.87	0.70	0.37	0.69	0.37			

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green

Natural Cycle: 90

Control Type: Pretimed

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 23.7

Intersection LOS: C

Intersection Capacity Utilization 68.0%

ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside Street/Watertown Avenue & West Main Street

#1  Ø1	#1  Ø2 (R)	#1  Ø3	#1  Ø4
46 s	21 s	25 s	28 s
#2  Ø5	#2  Ø6	#2  Ø7	#2  Ø8
45 s	22 s	26 s	27 s

Lane Group	Ø1	Ø2	Ø3	Ø4	Ø8
Reduced v/c Ratio					
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

2: Riverside Street/Watertown Avenue & West Main Street

2035 Build Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 				
Traffic Volume (vph)	250	880	0	0	510	530	110	410	140	0	0	0
Future Volume (vph)	250	880	0	0	510	530	110	410	140	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			1.00	1.00	1.00	0.95	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			1863	1583	1770	3539	1583			
Flt Permitted	0.46	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	851	3539			1863	1583	1770	3539	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	957	0	0	554	576	120	446	152	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	279	0	0	127	0	0	0
Lane Group Flow (vph)	272	957	0	0	554	297	120	446	25	0	0	0
Turn Type	custom	NA			NA	Perm	Split	NA	Prot			
Protected Phases	6	5 6 8			5		7	7	7			
Permitted Phases	5 8					5						
Actuated Green, G (s)	88.1	92.1			41.0	41.0	19.9	19.9	19.9			
Effective Green, g (s)	88.1	92.1			41.0	41.0	19.9	19.9	19.9			
Actuated g/C Ratio	0.73	0.77			0.34	0.34	0.17	0.17	0.17			
Clearance Time (s)	4.0				4.0	4.0	4.0	4.0	4.0			
Lane Grp Cap (vph)	762	2716			636	540	293	586	262			
v/s Ratio Prot	0.05	c0.27			c0.30		0.07	c0.13	0.02			
v/s Ratio Perm	c0.21					0.19						
v/c Ratio	0.36	0.35			0.87	0.55	0.41	0.76	0.10			
Uniform Delay, d1	6.2	4.4			37.0	32.0	44.8	47.8	42.4			
Progression Factor	0.59	0.59			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.7	0.2			15.2	4.0	4.2	9.0	0.7			
Delay (s)	4.4	2.8			52.2	36.0	49.0	56.8	43.2			
Level of Service	A	A			D	D	D	E	D			
Approach Delay (s)		3.2			43.9			52.6			0.0	
Approach LOS		A			D			D			A	
Intersection Summary												
HCM 2000 Control Delay			29.7									
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			120.0									
Intersection Capacity Utilization			68.0%									
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings

3: Walgreens Driveway/Thomaston Avenue & West Main Street

2035 Build Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	810	10	10	710	270	20	0	0	220	10	350
Future Volume (vph)	200	810	10	10	710	270	20	0	0	220	10	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.959							0.850
Flt Protected	0.950				0.999			0.950			0.954	
Satd. Flow (prot)	1770	1859	0	0	3391	0	0	1770	0	0	1777	1583
Flt Permitted	0.127				0.944			0.469			0.719	
Satd. Flow (perm)	237	1859	0	0	3204	0	0	874	0	0	1339	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			65							281
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		838			338			196			228	
Travel Time (s)		19.0			7.7			4.5			5.2	
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)	217	880	11	11	772	293	22	0	0	239	11	380
Shared Lane Traffic (%)												
Lane Group Flow (vph)	217	891	0	0	1076	0	0	22	0	0	250	380
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0		1.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	22.5		5.0	22.5		26.0	26.0		10.0	10.0	10.0
Total Split (s)	18.0	79.0		5.0	66.0		36.0	36.0		36.0	36.0	36.0
Total Split (%)	15.0%	65.8%		4.2%	55.0%		30.0%	30.0%		30.0%	30.0%	30.0%
Maximum Green (s)	13.0	74.0		2.0	61.0		33.0	33.0		31.0	31.0	31.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		0.0	2.0		0.0	0.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	5.0	5.0			5.0			3.0			5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	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	Min		None	Min		None	None		None	None	None
Walk Time (s)							7.0	7.0				
Flash Dont Walk (s)							16.0	16.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)	54.7	54.7			37.7			24.3			22.2	22.2
Actuated g/C Ratio	0.63	0.63			0.43			0.28			0.25	0.25
v/c Ratio	0.61	0.77			0.76			0.09			0.74	0.62
Control Delay	20.1	17.9			23.9			28.4			46.2	14.0
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	20.1	18.0			23.9			28.4			46.2	14.0
LOS	C	B			C			C			D	B
Approach Delay		18.4			23.9			28.4			26.7	
Approach LOS		B			C			C			C	

Lanes, Volumes, Timings
3: Walgreens Driveway/Thomaston Avenue & West Main Street

2035 Build Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	46	316			241			9			125	43
Queue Length 95th (ft)	136	585			368			33			263	159
Internal Link Dist (ft)		758			258			116			148	
Turn Bay Length (ft)												
Base Capacity (vph)	389	1565			2354			349			503	769
Starvation Cap Reductn	0	34			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	0.56	0.58			0.46			0.06			0.50	0.49

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 87.5

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 22.4

Intersection LOS: C

Intersection Capacity Utilization 96.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 3: Walgreens Driveway/Thomaston Avenue & West Main Street



HCM Signalized Intersection Capacity Analysis

3: Walgreens Driveway/Thomaston Avenue & West Main Street

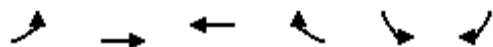
2035 Build Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	810	10	10	710	270	20	0	0	220	10	350
Future Volume (vph)	200	810	10	10	710	270	20	0	0	220	10	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0			3.0			5.0	5.0
Lane Util. Factor	1.00	1.00			0.95			1.00			1.00	1.00
Frt	1.00	1.00			0.96			1.00			1.00	0.85
Flt Protected	0.95	1.00			1.00			0.95			0.95	1.00
Satd. Flow (prot)	1770	1859			3393			1770			1778	1583
Flt Permitted	0.13	1.00			0.94			0.47			0.72	1.00
Satd. Flow (perm)	236	1859			3205			873			1340	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	880	11	11	772	293	22	0	0	239	11	380
RTOR Reduction (vph)	0	0	0	0	37	0	0	0	0	0	0	209
Lane Group Flow (vph)	217	891	0	0	1039	0	0	22	0	0	250	171
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	54.7	54.7			38.0			24.3			22.3	22.3
Effective Green, g (s)	54.7	54.7			38.0			24.3			22.3	22.3
Actuated g/C Ratio	0.63	0.63			0.44			0.28			0.26	0.26
Clearance Time (s)	5.0	5.0			5.0			3.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	354	1168			1399			243			343	405
v/s Ratio Prot	0.08	c0.48										
v/s Ratio Perm	0.30				0.32			0.03			c0.19	0.11
v/c Ratio	0.61	0.76			0.74			0.09			0.73	0.42
Uniform Delay, d1	12.0	11.5			20.4			23.2			29.6	27.0
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	3.1	3.0			2.2			0.2			7.5	0.7
Delay (s)	15.1	14.5			22.6			23.3			37.1	27.7
Level of Service	B	B			C			C			D	C
Approach Delay (s)		14.6			22.6			23.3			31.4	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			21.5			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			87.0			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			96.1%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
4: West Main Street & Sperry Street

2035 Build Condition
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	180	820	850	60	30	180
Future Volume (vph)	180	820	850	60	30	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	100	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1846	0	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1846	0	1770	1583
Link Speed (mph)		30	30		30	
Link Distance (ft)		169	487		207	
Travel Time (s)		3.8	11.1		4.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	891	924	65	33	196
Shared Lane Traffic (%)						
Lane Group Flow (vph)	196	891	989	0	33	196
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 71.7% ICU Level of Service C

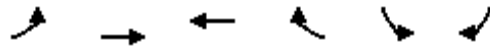
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

4: West Main Street & Sperry Street

2035 Build Condition

AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	180	820	850	60	30	180
Future Volume (Veh/h)	180	820	850	60	30	180
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	196	891	924	65	33	196
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)		650	921			
pX, platoon unblocked	0.87				0.74	0.87
vC, conflicting volume	989				2240	956
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	913				2109	876
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	70				0	35
cM capacity (veh/h)	650				29	303
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	196	891	989	33	196	
Volume Left	196	0	0	33	0	
Volume Right	0	0	65	0	196	
cSH	650	1700	1700	29	303	
Volume to Capacity	0.30	0.52	0.58	1.14	0.65	
Queue Length 95th (ft)	32	0	0	95	105	
Control Delay (s)	12.9	0.0	0.0	417.8	36.2	
Lane LOS	B			F	E	
Approach Delay (s)	2.3		0.0	91.2		
Approach LOS				F		
Intersection Summary						
Average Delay			10.2			
Intersection Capacity Utilization			71.7%	ICU Level of Service		C
Analysis Period (min)			15			

Lanes, Volumes, Timings
5: Meadow Street/Willow Street & West Main Street

2035 Build Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	438	162	84	304	33	163	252	130	120	163	258
Future Volume (vph)	50	438	162	84	304	33	163	252	130	120	163	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		100	100		0	0		50	0		0
Storage Lanes	1		1	1		0	1		1	1		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		0.985				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1835	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.463			0.344			0.462			0.408		
Satd. Flow (perm)	862	1863	1583	641	1835	0	861	1863	1583	760	1863	1583
Right Turn on Red			No			No			Yes			Yes
Satd. Flow (RTOR)									109			280
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		434			464			449			348	
Travel Time (s)		9.9			10.5			10.2			7.9	
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)	54	476	176	91	330	36	177	274	141	130	177	280
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	476	176	91	366	0	177	274	141	130	177	280
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	7	1	6		7	4	1	3	8	5
Permitted Phases	2		2	6			4		4	8		8
Detector Phase	5	2	7	1	6		7	4	1	3	8	5
Switch Phase												
Minimum Initial (s)	5.0	1.0	5.0	5.0	1.0		5.0	1.0	5.0	5.0	1.0	5.0
Minimum Split (s)	9.5	15.0	9.5	9.5	15.0		9.5	6.0	9.5	9.5	8.0	9.5
Total Split (s)	9.8	38.5	11.5	10.0	38.7		11.5	17.0	10.0	9.5	15.0	9.8
Total Split (%)	13.1%	51.3%	15.3%	13.3%	51.6%		15.3%	22.7%	13.3%	12.7%	20.0%	13.1%
Maximum Green (s)	5.3	32.5	7.0	5.5	32.7		7.0	13.0	5.5	5.0	9.0	5.3
Yellow Time (s)	3.5	3.0	3.5	3.5	3.0		3.5	3.0	3.5	3.5	3.0	3.5
All-Red Time (s)	1.0	3.0	1.0	1.0	3.0		1.0	1.0	1.0	1.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	6.0	4.5	4.5	6.0		4.5	4.0	4.5	4.5	6.0	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	None	None	Max		None	None	None	None	None	None
Act Effect Green (s)	39.3	32.5	45.5	39.7	32.7		19.9	14.8	24.3	15.4	8.9	20.2
Actuated g/C Ratio	0.52	0.43	0.61	0.53	0.44		0.27	0.20	0.32	0.21	0.12	0.27
v/c Ratio	0.10	0.59	0.18	0.22	0.46		0.57	0.74	0.24	0.58	0.80	0.44
Control Delay	7.3	19.9	7.1	8.2	17.2		29.2	44.6	7.8	33.2	59.8	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	19.9	7.1	8.2	17.2		29.2	44.6	7.8	33.2	59.8	5.6
LOS	A	B	A	A	B		C	D	A	C	E	A
Approach Delay		15.7			15.4			31.2			28.0	
Approach LOS		B			B			C			C	

Lanes, Volumes, Timings
5: Meadow Street/Willow Street & West Main Street

2035 Build Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	10	162	32	17	115		64	125	11	46	82	0
Queue Length 95th (ft)	23	255	59	35	186		116	#252	49	#93	#182	54
Internal Link Dist (ft)		354			384			369			268	
Turn Bay Length (ft)	50		100	100					50			
Base Capacity (vph)	515	808	961	422	801		313	368	588	224	223	631
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.59	0.18	0.22	0.46		0.57	0.74	0.24	0.58	0.79	0.44

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 74.9

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 22.7

Intersection LOS: C

Intersection Capacity Utilization 63.5%

ICU Level of Service B

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: Meadow Street/Willow Street & West Main Street

 Ø1	 Ø2	 Ø3	 Ø4
10 s	38.5 s	9.5 s	17 s
 Ø5	 Ø6	 Ø7	 Ø8
9.8 s	38.7 s	11.5 s	15 s

HCM Signalized Intersection Capacity Analysis

5: Meadow Street/Willow Street & West Main Street

2035 Build Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	438	162	84	304	33	163	252	130	120	163	258
Future Volume (vph)	50	438	162	84	304	33	163	252	130	120	163	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.0	4.5	4.5	6.0		4.5	4.0	4.5	4.5	6.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1835		1770	1863	1583	1770	1863	1583
Flt Permitted	0.46	1.00	1.00	0.34	1.00		0.46	1.00	1.00	0.41	1.00	1.00
Satd. Flow (perm)	862	1863	1583	641	1835		861	1863	1583	760	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	476	176	91	330	36	177	274	141	130	177	280
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	80	0	0	224
Lane Group Flow (vph)	54	476	176	91	366	0	177	274	61	130	177	56
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	7	1	6		7	4	1	3	8	5
Permitted Phases	2		2	6			4		4	8		8
Actuated Green, G (s)	37.8	32.5	39.5	38.2	32.7		21.8	14.8	20.3	13.8	9.8	15.1
Effective Green, g (s)	37.8	32.5	39.5	38.2	32.7		21.8	14.8	20.3	13.8	9.8	15.1
Actuated g/C Ratio	0.50	0.43	0.52	0.50	0.43		0.29	0.20	0.27	0.18	0.13	0.20
Clearance Time (s)	4.5	6.0	4.5	4.5	6.0		4.5	4.0	4.5	4.5	6.0	4.5
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
Lane Grp Cap (vph)	493	798	824	404	791		331	363	423	191	240	315
v/s Ratio Prot	0.01	c0.26	0.02	c0.02	0.20		c0.05	c0.15	0.01	0.04	0.10	0.01
v/s Ratio Perm	0.05		0.09	0.10			0.10		0.03	0.09		0.02
v/c Ratio	0.11	0.60	0.21	0.23	0.46		0.53	0.75	0.14	0.68	0.74	0.18
Uniform Delay, d1	10.0	16.6	9.8	10.5	15.3		21.5	28.8	21.1	28.2	31.8	25.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	3.3	0.1	0.3	1.9		1.7	8.6	0.2	9.6	11.2	0.3
Delay (s)	10.1	19.9	9.9	10.8	17.3		23.2	37.4	21.3	37.7	43.0	25.5
Level of Service	B	B	A	B	B		C	D	C	D	D	C
Approach Delay (s)		16.7			16.0			29.3			33.5	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			23.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			75.8			Sum of lost time (s)			21.0			
Intersection Capacity Utilization			63.5%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
6: State Street/Holmes Avenue & West Main Street

2035 Build Condition

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	600	0	0	500	30	40	40	60	20	0	40
Future Volume (vph)	60	600	0	0	500	30	40	40	60	20	0	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	0		0	0		0	0		0
Storage Lanes	1		0	0		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					0.992			0.942			0.911	
Flt Protected	0.950							0.986			0.983	
Satd. Flow (prot)	1770	1863	0	0	1848	0	0	1730	0	0	1668	0
Flt Permitted	0.408							0.892			0.825	
Satd. Flow (perm)	760	1863	0	0	1848	0	0	1565	0	0	1400	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					10			43			43	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		464			270			230			199	
Travel Time (s)		10.5			6.1			5.2			4.5	
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)	65	652	0	0	543	33	43	43	65	22	0	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	652	0	0	576	0	0	151	0	0	65	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2						4			8		
Detector Phase	2	2			6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	1.0	1.0			1.0		1.0	1.0		1.0	1.0	
Minimum Split (s)	15.0	15.0			15.0		8.0	8.0		8.0	8.0	
Total Split (s)	58.0	58.0			58.0		17.0	17.0		17.0	17.0	
Total Split (%)	77.3%	77.3%			77.3%		22.7%	22.7%		22.7%	22.7%	
Maximum Green (s)	54.0	54.0			54.0		12.0	12.0		12.0	12.0	
Yellow Time (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0			1.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	4.0	4.0			4.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max			Max		None	None		None	None	
Act Effct Green (s)	54.1	54.1			54.1			9.6			9.6	
Actuated g/C Ratio	0.74	0.74			0.74			0.13			0.13	
v/c Ratio	0.12	0.47			0.42			0.62			0.29	
Control Delay	3.6	5.3			4.8			32.9			17.5	
Queue Delay	0.0	0.7			0.9			0.0			0.0	
Total Delay	3.6	6.0			5.7			32.9			17.5	
LOS	A	A			A			C			B	
Approach Delay		5.8			5.7			32.9			17.5	
Approach LOS		A			A			C			B	

Lanes, Volumes, Timings
6: State Street/Holmes Avenue & West Main Street

2035 Build Condition
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	7	94			76			46			9	
Queue Length 95th (ft)	18	162			134			102			42	
Internal Link Dist (ft)		384			190			150			119	
Turn Bay Length (ft)	50											
Base Capacity (vph)	565	1386			1377			294			267	
Starvation Cap Reductn	0	384			497			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.12	0.65			0.65			0.51			0.24	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 72.7

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 8.9

Intersection LOS: A

Intersection Capacity Utilization 52.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: State Street/Holmes Avenue & West Main Street

 Ø2	 Ø4
58 s	17 s
 Ø6	 Ø8
58 s	17 s

HCM Signalized Intersection Capacity Analysis

6: State Street/Holmes Avenue & West Main Street

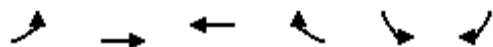
2035 Build Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	600	0	0	500	30	40	40	60	20	0	40
Future Volume (vph)	60	600	0	0	500	30	40	40	60	20	0	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			0.99			0.94			0.91	
Flt Protected	0.95	1.00			1.00			0.99			0.98	
Satd. Flow (prot)	1770	1863			1848			1730			1668	
Flt Permitted	0.41	1.00			1.00			0.89			0.82	
Satd. Flow (perm)	761	1863			1848			1565			1399	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	652	0	0	543	33	43	43	65	22	0	43
RTOR Reduction (vph)	0	0	0	0	3	0	0	37	0	0	37	0
Lane Group Flow (vph)	65	652	0	0	573	0	0	114	0	0	28	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2						4			8		
Actuated Green, G (s)	54.1	54.1			54.1			9.6			9.6	
Effective Green, g (s)	54.1	54.1			54.1			9.6			9.6	
Actuated g/C Ratio	0.74	0.74			0.74			0.13			0.13	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	566	1386			1375			206			184	
v/s Ratio Prot		c0.35			0.31							
v/s Ratio Perm	0.09							c0.07			0.02	
v/c Ratio	0.11	0.47			0.42			0.55			0.15	
Uniform Delay, d1	2.6	3.7			3.5			29.5			27.9	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	0.4	1.1			0.9			3.2			0.4	
Delay (s)	3.0	4.8			4.4			32.7			28.3	
Level of Service	A	A			A			C			C	
Approach Delay (s)		4.6			4.4			32.7			28.3	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			8.4									
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			72.7									
Intersection Capacity Utilization			52.3%									
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
7: West Main Street & Central Avenue

2035 Build Condition
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	20	680	500	40	40	10
Future Volume (vph)	20	680	500	40	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50			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			0.990		0.972	
Flt Protected	0.950				0.962	
Satd. Flow (prot)	1770	1863	1844	0	1742	0
Flt Permitted	0.950				0.962	
Satd. Flow (perm)	1770	1863	1844	0	1742	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		270	124		271	
Travel Time (s)		6.1	2.8		6.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	739	543	43	43	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	739	586	0	54	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

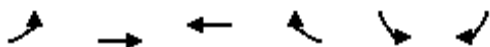
Intersection Capacity Utilization 45.8% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

7: West Main Street & Central Avenue

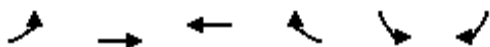
2035 Build Condition
AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	680	500	40	40	10
Future Volume (Veh/h)	20	680	500	40	40	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	739	543	43	43	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		270	124			
pX, platoon unblocked	0.80				0.87	0.80
vC, conflicting volume	586				1348	564
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	352				941	324
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				83	98
cM capacity (veh/h)	961				248	570
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	22	739	586	54		
Volume Left	22	0	0	43		
Volume Right	0	0	43	11		
cSH	961	1700	1700	280		
Volume to Capacity	0.02	0.43	0.34	0.19		
Queue Length 95th (ft)	2	0	0	17		
Control Delay (s)	8.8	0.0	0.0	20.9		
Lane LOS	A			C		
Approach Delay (s)	0.3		0.0	20.9		
Approach LOS				C		
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			45.8%		ICU Level of Service	A
Analysis Period (min)			15			

Lanes, Volumes, Timings
8: West Main Street & Park Place

2035 Build Condition
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	180	200	30	0	0
Future Volume (vph)	80	180	200	30	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.982			
Flt Protected		0.985				
Satd. Flow (prot)	0	1835	1829	0	0	0
Flt Permitted		0.985				
Satd. Flow (perm)	0	1835	1829	0	0	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		206	501		201	
Travel Time (s)		4.7	11.4		4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	196	217	33	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	283	250	0	0	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

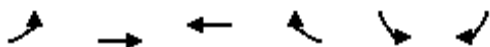
Intersection Capacity Utilization 32.9% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

8: West Main Street & Park Place

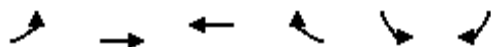
2035 Build Condition
AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩			
Traffic Volume (veh/h)	80	180	200	30	0	0
Future Volume (Veh/h)	80	180	200	30	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	196	217	33	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		206	701			
pX, platoon unblocked						
vC, conflicting volume	250				604	234
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	250				604	234
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				100	100
cM capacity (veh/h)	1316				431	806
Direction, Lane #	EB 1	WB 1				
Volume Total	283	250				
Volume Left	87	0				
Volume Right	0	33				
cSH	1316	1700				
Volume to Capacity	0.07	0.15				
Queue Length 95th (ft)	5	0				
Control Delay (s)	2.8	0.0				
Lane LOS	A					
Approach Delay (s)	2.8	0.0				
Approach LOS						
Intersection Summary						
Average Delay		1.5				
Intersection Capacity Utilization		32.9%		ICU Level of Service		A
Analysis Period (min)		15				

Lanes, Volumes, Timings
9: West Main Street Confluence

2035 Build Condition
AM Peak Hour

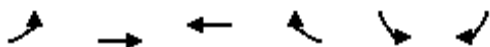


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	110	610	440	140	90	190
Future Volume (vph)	110	610	440	140	90	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.967		0.908	
Flt Protected	0.950				0.984	
Satd. Flow (prot)	1770	1863	1801	0	1664	0
Flt Permitted	0.309				0.984	
Satd. Flow (perm)	576	1863	1801	0	1664	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			56		130	
Link Speed (mph)		30	30		30	
Link Distance (ft)		124	105		206	
Travel Time (s)		2.8	2.4		4.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	663	478	152	98	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	120	663	630	0	305	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Detector Phase	4	4	8		6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	
Minimum Split (s)	22.5	22.5	22.5		16.0	
Total Split (s)	54.0	54.0	54.0		16.0	
Total Split (%)	77.1%	77.1%	77.1%		22.9%	
Maximum Green (s)	49.5	49.5	49.5		11.5	
Yellow Time (s)	3.5	3.5	3.5		3.5	
All-Red Time (s)	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	
Total Lost Time (s)	4.5	4.5	4.5		4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Recall Mode	None	None	None		None	
Walk Time (s)	7.0	7.0	7.0			
Flash Dont Walk (s)	11.0	11.0	11.0			
Pedestrian Calls (#/hr)	0	0	0			
Act Effct Green (s)	21.0	21.0	21.0		10.0	
Actuated g/C Ratio	0.52	0.52	0.52		0.25	
v/c Ratio	0.40	0.69	0.66		0.60	
Control Delay	10.3	11.3	9.9		15.7	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	10.3	11.3	9.9		15.7	
LOS	B	B	A		B	
Approach Delay		11.2	9.9		15.7	
Approach LOS		B	A		B	

Lanes, Volumes, Timings

9: West Main Street Confluence

2035 Build Condition
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)	15	99	82		33	
Queue Length 95th (ft)	42	179	155		#139	
Internal Link Dist (ft)		44	25		126	
Turn Bay Length (ft)						
Base Capacity (vph)	567	1836	1775		590	
Starvation Cap Reductn	0	56	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.21	0.37	0.35		0.52	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 40.5

Natural Cycle: 45

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 11.5

Intersection LOS: B

Intersection Capacity Utilization 65.7%

ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 9: West Main Street

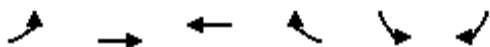


HCM Signalized Intersection Capacity Analysis

9: West Main Street Confluence

2035 Build Condition

AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	110	610	440	140	90	190
Future Volume (vph)	110	610	440	140	90	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.97		0.91	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1770	1863	1802		1665	
Flt Permitted	0.31	1.00	1.00		0.98	
Satd. Flow (perm)	576	1863	1802		1665	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	663	478	152	98	207
RTOR Reduction (vph)	0	0	27	0	97	0
Lane Group Flow (vph)	120	663	603	0	208	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	20.9	20.9	20.9		10.0	
Effective Green, g (s)	20.9	20.9	20.9		10.0	
Actuated g/C Ratio	0.52	0.52	0.52		0.25	
Clearance Time (s)	4.5	4.5	4.5		4.5	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	301	975	943		417	
v/s Ratio Prot		c0.36	0.33		c0.12	
v/s Ratio Perm	0.21					
v/c Ratio	0.40	0.68	0.64		0.50	
Uniform Delay, d1	5.7	7.0	6.8		12.8	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.9	2.0	1.4		0.9	
Delay (s)	6.6	9.0	8.2		13.7	
Level of Service	A	A	A		B	
Approach Delay (s)		8.6	8.2		13.7	
Approach LOS		A	A		B	

Intersection Summary

HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	39.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Leavenworth Street & West Main Street

2035 Build Condition
AM Peak Hour

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
Lane Configurations	↗		↖	↗	↖		
Traffic Volume (vph)	610	60	60	500	100	100	
Future Volume (vph)	610	60	60	500	100	100	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	100		0	0	
Storage Lanes		0	1		1	0	
Taper Length (ft)			25		25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	0.988				0.932		
Flt Protected			0.950		0.976		
Satd. Flow (prot)	1840	0	1770	1863	1694	0	
Flt Permitted			0.212		0.976		
Satd. Flow (perm)	1840	0	395	1863	1694	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	7				46		
Link Speed (mph)	30			30	30		
Link Distance (ft)	421			389	436		
Travel Time (s)	9.6			8.8	9.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	663	65	65	543	109	109	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	728	0	65	543	218	0	
Turn Type	NA		D.P+P	NA	Prot		
Protected Phases	1		2	1 2	4		3
Permitted Phases			1				
Detector Phase	1		2	1 2	4		
Switch Phase							
Minimum Initial (s)	1.0		1.0		1.0		1.0
Minimum Split (s)	15.0		6.0		8.0		20.0
Total Split (s)	42.0		11.0		17.0		20.0
Total Split (%)	46.7%		12.2%		18.9%		22%
Maximum Green (s)	38.0		7.0		12.0		17.0
Yellow Time (s)	3.0		3.0		3.0		3.0
All-Red Time (s)	1.0		1.0		2.0		0.0
Lost Time Adjust (s)	0.0		0.0		0.0		
Total Lost Time (s)	4.0		4.0		5.0		
Lead/Lag	Lead		Lag		Lag		Lead
Lead-Lag Optimize?	Yes		Yes		Yes		Yes
Vehicle Extension (s)	3.0		3.0		3.0		3.0
Recall Mode	Max		Max		None		None
Walk Time (s)							8.0
Flash Dont Walk (s)							9.0
Pedestrian Calls (#/hr)							0
Act Effect Green (s)	38.0		45.0	49.0	11.3		
Actuated g/C Ratio	0.55		0.65	0.71	0.16		
v/c Ratio	0.72		0.16	0.41	0.69		
Control Delay	16.9		5.3	5.5	34.5		
Queue Delay	0.5		0.0	0.8	0.0		
Total Delay	17.4		5.3	6.3	34.5		

Lanes, Volumes, Timings
10: Leavenworth Street & West Main Street

2035 Build Condition
AM Peak Hour

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
LOS	B		A	A	C		
Approach Delay	17.4			6.2	34.5		
Approach LOS	B			A	C		
Queue Length 50th (ft)	215		7	80	69		
Queue Length 95th (ft)	345		16	127	#155		
Internal Link Dist (ft)	341			309	356		
Turn Bay Length (ft)			100				
Base Capacity (vph)	1012		395	1317	331		
Starvation Cap Reductn	68		0	459	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.77		0.16	0.63	0.66		

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 69.3

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 15.4

Intersection LOS: B

Intersection Capacity Utilization 61.6%

ICU Level of Service B

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 10: Leavenworth Street & West Main Street

← Ø1	↖ Ø2	↗ Ø3	↘ Ø4
42 s	11 s	20 s	17 s

HCM Signalized Intersection Capacity Analysis

10: Leavenworth Street & West Main Street

2035 Build Condition
AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	610	60	60	500	100	100
Future Volume (vph)	610	60	60	500	100	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.99		1.00	1.00	0.93	
Flt Protected	1.00		0.95	1.00	0.98	
Satd. Flow (prot)	1840		1770	1863	1695	
Flt Permitted	1.00		0.21	1.00	0.98	
Satd. Flow (perm)	1840		395	1863	1695	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	663	65	65	543	109	109
RTOR Reduction (vph)	3	0	0	0	38	0
Lane Group Flow (vph)	725	0	65	543	180	0
Turn Type	NA		D.P+P	NA	Prot	
Protected Phases	1		2	1 2	4	
Permitted Phases			1			
Actuated Green, G (s)	38.0		45.0	49.0	11.3	
Effective Green, g (s)	38.0		45.0	49.0	11.3	
Actuated g/C Ratio	0.55		0.65	0.71	0.16	
Clearance Time (s)	4.0		4.0		5.0	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	1008		395	1317	276	
v/s Ratio Prot	c0.39		0.02	c0.29	c0.11	
v/s Ratio Perm			0.09			
v/c Ratio	0.72		0.16	0.41	0.65	
Uniform Delay, d1	11.7		13.7	4.2	27.2	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	4.4		0.9	1.0	5.4	
Delay (s)	16.1		14.6	5.2	32.5	
Level of Service	B		B	A	C	
Approach Delay (s)	16.1			6.2	32.5	
Approach LOS	B			A	C	
Intersection Summary						
HCM 2000 Control Delay			14.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			69.3		Sum of lost time (s)	16.0
Intersection Capacity Utilization			61.6%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings

2035 Build Condition

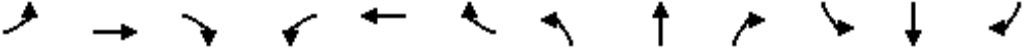
11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	600	50	50	500	50	50	200	50	50	300	50
Future Volume (vph)	50	600	50	50	500	50	50	200	50	50	300	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		130	0		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.989			0.986			0.975			0.981	
Flt Protected	0.950			0.950				0.992			0.994	
Satd. Flow (prot)	1770	3500	0	1770	1837	0	0	3423	0	0	3451	0
Flt Permitted	0.356			0.371				0.797			0.860	
Satd. Flow (perm)	663	3500	0	691	1837	0	0	2750	0	0	2986	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			9			37			25	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			245			286			217	
Travel Time (s)		8.8			5.6			6.5			4.9	
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)	54	652	54	54	543	54	54	217	54	54	326	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	706	0	54	597	0	0	325	0	0	434	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			8			4	
Permitted Phases	2			2			8			4		
Detector Phase	2	2		2	2		8	8		4	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Minimum Split (s)	37.0	37.0		37.0	37.0		35.0	35.0		35.0	35.0	
Total Split (s)	40.0	40.0		40.0	40.0		35.0	35.0		35.0	35.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Maximum Green (s)	35.0	35.0		35.0	35.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
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	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)	35.1	35.1		35.1	35.1			13.4			13.4	
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.23			0.23	
v/c Ratio	0.14	0.34		0.13	0.54			0.49			0.62	
Control Delay	7.2	6.7		7.1	9.8			19.8			23.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	7.2	6.7		7.1	9.8			19.8			23.0	

Lanes, Volumes, Timings

2035 Build Condition

11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	A	A		A	A			B			C	
Approach Delay		6.8			9.6			19.8			23.0	
Approach LOS		A			A			B			C	
Queue Length 50th (ft)	7	53		7	102			45			67	
Queue Length 95th (ft)	25	101		25	220			78			107	
Internal Link Dist (ft)		309			165			206			137	
Turn Bay Length (ft)	100											
Base Capacity (vph)	397	2105		414	1105			1432			1547	
Starvation Cap Reductn	0	0		0	0			0			101	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.14	0.34		0.13	0.54			0.23			0.30	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 58.5

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 12.8

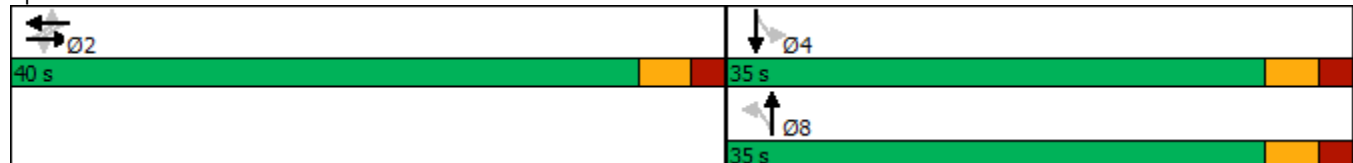
Intersection LOS: B

Intersection Capacity Utilization 69.3%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street



HCM Signalized Intersection Capacity Analysis

2035 Build Condition

11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	600	50	50	500	50	50	200	50	50	300	50
Future Volume (vph)	50	600	50	50	500	50	50	200	50	50	300	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	1.00			0.95			0.95	
Frt	1.00	0.99		1.00	0.99			0.98			0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1770	3499		1770	1837			3423			3452	
Flt Permitted	0.36	1.00		0.37	1.00			0.80			0.86	
Satd. Flow (perm)	664	3499		692	1837			2750			2986	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	652	54	54	543	54	54	217	54	54	326	54
RTOR Reduction (vph)	0	6	0	0	4	0	0	29	0	0	19	0
Lane Group Flow (vph)	54	700	0	54	593	0	0	296	0	0	415	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			8			4	
Permitted Phases	2			2			8			4		
Actuated Green, G (s)	35.1	35.1		35.1	35.1			13.4			13.4	
Effective Green, g (s)	35.1	35.1		35.1	35.1			13.4			13.4	
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.23			0.23	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	398	2099		415	1102			629			683	
v/s Ratio Prot		0.20			c0.32							
v/s Ratio Perm	0.08			0.08				0.11			c0.14	
v/c Ratio	0.14	0.33		0.13	0.54			0.47			0.61	
Uniform Delay, d1	5.1	5.9		5.1	6.9			19.5			20.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.7	0.4		0.6	1.9			0.6			1.5	
Delay (s)	5.8	6.3		5.7	8.8			20.0			21.7	
Level of Service	A	A		A	A			C			C	
Approach Delay (s)		6.2			8.5			20.0			21.7	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM 2000 Control Delay		12.1			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.56										
Actuated Cycle Length (s)		58.5			Sum of lost time (s)			10.0				
Intersection Capacity Utilization		69.3%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
12: North Main Street & West Main Street

2035 Build Condition
AM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	110	50	120	210	360	120	
Future Volume (vph)	110	50	120	210	360	120	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	
Frt	0.958				0.963		
Flt Protected	0.967		0.950				
Satd. Flow (prot)	1726	0	1770	1863	3408	0	
Flt Permitted	0.967		0.950				
Satd. Flow (perm)	1726	0	1770	1863	3408	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	21				46		
Link Speed (mph)	30			30	30		
Link Distance (ft)	200			217	246		
Travel Time (s)	4.5			4.9	5.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	120	54	130	228	391	130	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	174	0	130	228	521	0	
Turn Type	Prot		Prot	NA	NA		
Protected Phases	4		2	1 2	1		3
Permitted Phases							
Detector Phase	4		2	1 2	1		
Switch Phase							
Minimum Initial (s)	1.0		1.0		1.0		1.0
Minimum Split (s)	10.0		20.0		10.0		18.0
Total Split (s)	25.0		25.0		31.0		17.0
Total Split (%)	25.5%		25.5%		31.6%		17%
Maximum Green (s)	21.0		21.0		27.0		14.0
Yellow Time (s)	3.0		3.0		3.0		3.0
All-Red Time (s)	1.0		1.0		1.0		0.0
Lost Time Adjust (s)	0.0		0.0		0.0		
Total Lost Time (s)	4.0		4.0		4.0		
Lead/Lag	Lag		Lag		Lead		Lead
Lead-Lag Optimize?	Yes		Yes		Yes		Yes
Vehicle Extension (s)	3.0		3.0		3.0		3.0
Recall Mode	None		Max		None		None
Walk Time (s)							6.0
Flash Dont Walk (s)							9.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)	11.0		21.4	41.1	15.7		
Actuated g/C Ratio	0.18		0.35	0.68	0.26		
v/c Ratio	0.52		0.21	0.18	0.57		
Control Delay	26.4		17.5	4.3	20.2		
Queue Delay	0.0		0.7	1.3	0.0		
Total Delay	26.4		18.2	5.5	20.2		
LOS	C		B	A	C		
Approach Delay	26.4			10.1	20.2		
Approach LOS	C			B	C		

Lanes, Volumes, Timings
12: North Main Street & West Main Street

2035 Build Condition
AM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø3
Queue Length 50th (ft)	50		32	23	76		
Queue Length 95th (ft)	114		87	57	131		
Internal Link Dist (ft)	120			137	166		
Turn Bay Length (ft)							
Base Capacity (vph)	625		627	1267	1578		
Starvation Cap Reductn	0		274	831	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.28		0.37	0.52	0.33		

Intersection Summary

Area Type: Other

Cycle Length: 98

Actuated Cycle Length: 60.3

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 17.8

Intersection LOS: B

Intersection Capacity Utilization 39.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 12: North Main Street & West Main Street

31 s	25 s	17 s	25 s

HCM Signalized Intersection Capacity Analysis

12: North Main Street & West Main Street

2035 Build Condition
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	110	50	120	210	360	120
Future Volume (vph)	110	50	120	210	360	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frt	0.96		1.00	1.00	0.96	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	1725		1770	1863	3407	
Flt Permitted	0.97		0.95	1.00	1.00	
Satd. Flow (perm)	1725		1770	1863	3407	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	120	54	130	228	391	130
RTOR Reduction (vph)	17	0	0	0	34	0
Lane Group Flow (vph)	157	0	130	228	487	0
Turn Type	Prot		Prot	NA	NA	
Protected Phases	4		2	1 2	1	
Permitted Phases						
Actuated Green, G (s)	11.0		21.4	41.1	15.7	
Effective Green, g (s)	11.0		21.4	41.1	15.7	
Actuated g/C Ratio	0.18		0.36	0.68	0.26	
Clearance Time (s)	4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	315		630	1274	890	
v/s Ratio Prot	c0.09		c0.07	0.12	c0.14	
v/s Ratio Perm						
v/c Ratio	0.50		0.21	0.18	0.55	
Uniform Delay, d1	22.1		13.4	3.4	19.1	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.2		0.7	0.1	0.7	
Delay (s)	23.3		14.2	3.5	19.8	
Level of Service	C		B	A	B	
Approach Delay (s)	23.3			7.4	19.8	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay			16.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.41			
Actuated Cycle Length (s)			60.1		Sum of lost time (s)	15.0
Intersection Capacity Utilization			39.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
13: Sperry Street/Waterville Street & Johnson Street

2035 Build Condition
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	90	40	70	50	20	10	70	60	20	150	10
Future Volume (vph)	10	90	40	70	50	20	10	70	60	20	150	10
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		0.962			0.980			0.942			0.992	
Flt Protected		0.996			0.976			0.996			0.994	
Satd. Flow (prot)	0	1785	0	0	1782	0	0	1748	0	0	1837	0
Flt Permitted		0.996			0.976			0.996			0.994	
Satd. Flow (perm)	0	1785	0	0	1782	0	0	1748	0	0	1837	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			342			241			213	
Travel Time (s)		5.0			7.8			5.5			4.8	
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)	11	98	43	76	54	22	11	76	65	22	163	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	152	0	0	152	0	0	152	0	0	196	0
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	39.7%											
Analysis Period (min)	15											
ICU Level of Service A												

HCM Unsignalized Intersection Capacity Analysis

13: Sperry Street/Waterville Street & Johnson Street

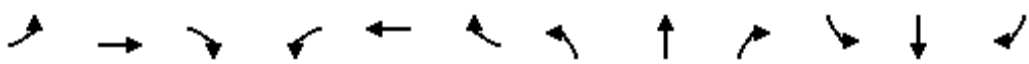
2035 Build Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	90	40	70	50	20	10	70	60	20	150	10
Future Volume (Veh/h)	10	90	40	70	50	20	10	70	60	20	150	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	98	43	76	54	22	11	76	65	22	163	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None								None			
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	392	376	168	435	348	108	174	141				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	392	376	168	435	348	108	174	141				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1				
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2				
p0 queue free %	98	82	95	82	90	98	99	98				
cM capacity (veh/h)	505	543	876	428	562	945	1403	1442				
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	152	152	152	196								
Volume Left	11	76	11	22								
Volume Right	43	22	65	11								
cSH	605	512	1403	1442								
Volume to Capacity	0.25	0.30	0.01	0.02								
Queue Length 95th (ft)	25	31	1	1								
Control Delay (s)	12.9	15.0	0.6	1.0								
Lane LOS	B	B	A	A								
Approach Delay (s)	12.9	15.0	0.6	1.0								
Approach LOS	B	B										
Intersection Summary												
Average Delay	6.9											
Intersection Capacity Utilization	39.7%			ICU Level of Service					A			
Analysis Period (min)	15											

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Build Condition
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	130	50	140	50	10	30	260	90	10	260	10
Future Volume (vph)	10	130	50	140	50	10	30	260	90	10	260	10
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		0.965			0.993				0.850		0.995	
Flt Protected		0.997			0.966			0.995			0.998	
Satd. Flow (prot)	0	1792	0	0	1787	0	0	1853	1583	0	1850	0
Flt Permitted		0.978			0.717			0.946			0.985	
Satd. Flow (perm)	0	1758	0	0	1326	0	0	1762	1583	0	1826	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			4				98			2
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		273			331			413			180	
Travel Time (s)		6.2			7.5			9.4			4.1	
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)	11	141	54	152	54	11	33	283	98	11	283	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	206	0	0	217	0	0	316	98	0	305	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Detector Phase	2	2		2	2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Minimum Split (s)	10.0	10.0		10.0	10.0		7.0	7.0	7.0	7.0	7.0	
Total Split (s)	40.0	40.0		40.0	40.0		25.0	25.0	25.0	25.0	25.0	
Total Split (%)	48.2%	48.2%		48.2%	48.2%		30.1%	30.1%	30.1%	30.1%	30.1%	
Maximum Green (s)	35.0	35.0		35.0	35.0		21.0	21.0	21.0	21.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			4.0	4.0		4.0	
Lead/Lag							Lag	Lag	Lag	Lag	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	
Recall Mode	Min	Min		Min	Min		None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		12.7			12.7			14.2	14.2		14.2	
Actuated g/C Ratio		0.35			0.35			0.39	0.39		0.39	
v/c Ratio		0.33			0.47			0.46	0.14		0.43	
Control Delay		9.9			13.7			11.4	3.1		10.8	
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		9.9			13.7			11.4	3.1		10.8	
LOS		A			B			B	A		B	
Approach Delay		9.9			13.7			9.4			10.8	
Approach LOS		A			B			A			B	

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Build Condition
AM Peak Hour

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	22%
Maximum Green (s)	15.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	8.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Build Condition
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		24			30			41	0		39	
Queue Length 95th (ft)		70			88			113	20		107	
Internal Link Dist (ft)		193			251			333			100	
Turn Bay Length (ft)												
Base Capacity (vph)		1591			1198			1079	1007		1119	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.13			0.18			0.29	0.10		0.27	

Intersection Summary

Area Type: Other

Cycle Length: 83

Actuated Cycle Length: 36.4

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 10.7

Intersection LOS: B

Intersection Capacity Utilization 59.5%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 14: Willow Street & Johnson Street/Pine Street

 Ø2	 Ø3	 Ø4
40 s	18 s	25 s

Lane Group	Ø3
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

14: Willow Street & Johnson Street/Pine Street

2035 Build Condition

AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔	↔		↔	
Traffic Volume (vph)	10	130	50	140	50	10	30	260	90	10	260	10
Future Volume (vph)	10	130	50	140	50	10	30	260	90	10	260	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.0	4.0		4.0	
Lane Util. Factor		1.00			1.00			1.00	1.00		1.00	
Frt		0.96			0.99			1.00	0.85		1.00	
Flt Protected		1.00			0.97			0.99	1.00		1.00	
Satd. Flow (prot)		1792			1787			1853	1583		1850	
Flt Permitted		0.98			0.72			0.95	1.00		0.98	
Satd. Flow (perm)		1757			1327			1763	1583		1826	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	141	54	152	54	11	33	283	98	11	283	11
RTOR Reduction (vph)	0	17	0	0	3	0	0	0	59	0	1	0
Lane Group Flow (vph)	0	189	0	0	214	0	0	316	39	0	304	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Actuated Green, G (s)		12.7			12.7			14.2	14.2		14.2	
Effective Green, g (s)		12.7			12.7			14.2	14.2		14.2	
Actuated g/C Ratio		0.35			0.35			0.40	0.40		0.40	
Clearance Time (s)		5.0			5.0			4.0	4.0		4.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		621			469			697	626		722	
v/s Ratio Prot												
v/s Ratio Perm		0.11			0.16			0.18	0.02		0.17	
v/c Ratio		0.30			0.46			0.45	0.06		0.42	
Uniform Delay, d1		8.4			8.9			8.0	6.7		7.9	
Progression Factor		1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.3			0.7			0.5	0.0		0.4	
Delay (s)		8.7			9.7			8.5	6.8		8.3	
Level of Service		A			A			A	A		A	
Approach Delay (s)		8.7			9.7			8.1			8.3	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay		8.5			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.51										
Actuated Cycle Length (s)		35.9			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		59.5%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
34: Church Street & West Main Street

2035 Build Condition
AM Peak Hour

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	540	70	20	580	0	0
Future Volume (vph)	540	70	20	580	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.985					
Flt Protected				0.998		
Satd. Flow (prot)	1835	0	0	1859	0	0
Flt Permitted				0.998		
Satd. Flow (perm)	1835	0	0	1859	0	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	105			421	220	
Travel Time (s)	2.4			9.6	5.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	587	76	22	630	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	663	0	0	652	0	0
Sign Control	Free			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	50.0%			ICU Level of Service A		
Analysis Period (min)	15					

Appendix C

Intersection Capacity Analysis Worksheets Weekday Afternoon Peak Hour



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2	Ø5	Ø6
Lane Configurations	↑	↑	↑	↑↑	↑	↑		↑	↑			
Traffic Volume (vph)	792	172	368	416	177	89	64	367	231	136		
Future Volume (vph)	792	172	368	416	177	89	64	367	231	136		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Storage Length (ft)		40	0		0		0	230	0			
Storage Lanes		1	1		1		0	1	1			
Taper Length (ft)			25		25			25				
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00		
Frt		0.850				0.937			0.850			
Flt Protected			0.950		0.950			0.950				
Satd. Flow (prot)	1863	1583	1770	3539	1770	1745	0	1770	1583	0		
Flt Permitted			0.103		0.950			0.950				
Satd. Flow (perm)	1863	1583	192	3539	1770	1745	0	1770	1583	0		
Right Turn on Red		Yes								Yes		
Satd. Flow (RTOR)		89							89			
Link Speed (mph)	30			30		30		30				
Link Distance (ft)	237			379		329		394				
Travel Time (s)	5.4			8.6		7.5		9.0				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	861	187	400	452	192	97	70	399	251	148		
Shared Lane Traffic (%)												
Lane Group Flow (vph)	861	187	400	452	192	167	0	399	399	0		
Turn Type	NA	Perm	pm+pt	NA	Split	NA		Prot	Prot			
Protected Phases	1		2	1 2	3	3		4	4		5	6
Permitted Phases		1	1 2									
Minimum Split (s)	14.0	14.0	7.0		13.0	13.0		13.0	13.0		22.0	6.0
Total Split (s)	43.0	43.0	21.0		22.0	22.0		24.0	24.0		43.0	21.0
Total Split (%)	39.1%	39.1%	19.1%		20.0%	20.0%		21.8%	21.8%		39%	19%
Maximum Green (s)	39.0	39.0	17.0		18.0	18.0		20.0	20.0		39.0	17.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0
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	Lead	Lag		Lead	Lead		Lag	Lag		Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes
Act Effect Green (s)	39.0	39.0	56.0	60.0	18.0	18.0		20.0	20.0			
Actuated g/C Ratio	0.35	0.35	0.51	0.55	0.16	0.16		0.18	0.18			
v/c Ratio	1.30	0.30	1.17	0.23	0.66	0.59		1.24	1.11			
Control Delay	179.5	14.6	126.1	5.8	55.4	51.8		171.7	113.3			
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0			
Total Delay	179.5	14.6	126.1	5.8	55.4	51.8		171.7	113.3			
LOS	F	B	F	A	E	D		F	F			
Approach Delay	150.0			62.3		53.7		142.5				
Approach LOS	F			E		D		F				
Queue Length 50th (ft)	~782	47	~296	31	129	110		~351	~268			
Queue Length 95th (ft)	#1020	103	m#370	m34	#208	183		#541	#461			
Internal Link Dist (ft)	157			299		249		314				
Turn Bay Length (ft)		40						230				
Base Capacity (vph)	660	618	341	1930	289	285		321	360			

Lane Group	Ø7	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	7	8
Permitted Phases		
Minimum Split (s)	18.0	22.5
Total Split (s)	20.0	26.0
Total Split (%)	18%	24%
Maximum Green (s)	16.0	22.0
Yellow Time (s)	3.0	3.0
All-Red Time (s)	1.0	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2	Ø5	Ø6
Starvation Cap Reductn	0	0	0	0	0	0		0	0			
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	1.30	0.30	1.17	0.23	0.66	0.59		1.24	1.11			

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green

Natural Cycle: 150

Control Type: Pretimed

Maximum v/c Ratio: 2.70

Intersection Signal Delay: 112.3

Intersection LOS: F

Intersection Capacity Utilization 106.7%

ICU Level of Service G

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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside Street/Route 8 Off Ramp & West Main Street & Watertown Avenue

#1 ← Ø1 43 s	#1 ← Ø2 (R) 21 s	#1 ← Ø3 22 s	#1 ← Ø4 24 s
#2 ← Ø5 43 s	#2 ← Ø6 21 s	#2 ← Ø7 20 s	#2 ← Ø8 26 s

Lane Group	Ø7	Ø8
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

2035 Background

1: Riverside Street/Route 8 Off Ramp & West Main Street & Watertown Avenue

PM Peak Hour

										
Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2
Lane Configurations										
Traffic Volume (vph)	792	172	368	416	177	89	64	367	231	136
Future Volume (vph)	792	172	368	416	177	89	64	367	231	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00		1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.94		1.00	0.85	
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1863	1583	1770	3539	1770	1746		1770	1583	
Flt Permitted	1.00	1.00	0.10	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1863	1583	191	3539	1770	1746		1770	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	861	187	400	452	192	97	70	399	251	148
RTOR Reduction (vph)	0	57	0	0	0	0	0	0	73	0
Lane Group Flow (vph)	861	130	400	452	192	167	0	399	326	0
Turn Type	NA	Perm	pm+pt	NA	Split	NA		Prot	Prot	
Protected Phases	1		2	1 2	3	3		4	4	
Permitted Phases		1	1 2							
Actuated Green, G (s)	39.0	39.0	56.0	60.0	18.0	18.0		20.0	20.0	
Effective Green, g (s)	39.0	39.0	56.0	60.0	18.0	18.0		20.0	20.0	
Actuated g/C Ratio	0.35	0.35	0.51	0.55	0.16	0.16		0.18	0.18	
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	660	561	341	1930	289	285		321	287	
v/s Ratio Prot	c0.46		c0.18	0.13	c0.11	0.10		c0.23	0.21	
v/s Ratio Perm		0.08	0.42							
v/c Ratio	1.30	0.23	1.17	0.23	0.66	0.59		1.24	1.14	
Uniform Delay, d1	35.5	25.0	43.1	13.0	43.2	42.6		45.0	45.0	
Progression Factor	1.00	1.00	0.70	0.43	1.00	1.00		1.00	1.00	
Incremental Delay, d2	147.9	1.0	97.2	0.2	11.5	8.5		132.9	95.1	
Delay (s)	183.4	25.9	127.6	5.8	54.6	51.1		177.9	140.1	
Level of Service	F	C	F	A	D	D		F	F	
Approach Delay (s)	155.3			63.0		53.0		159.0		
Approach LOS	F			E		D		F		
Intersection Summary										
HCM 2000 Control Delay			118.5							F
HCM 2000 Volume to Capacity ratio			1.14							
Actuated Cycle Length (s)			110.0							16.0
Intersection Capacity Utilization			106.7%							G
ICU Level of Service										
Analysis Period (min)			15							
c Critical Lane Group										

2: Riverside Street/Watertown Avenue & West Main Street

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 					 					
Traffic Volume (vph)	330	950	0	0	580	760	80	670	160	0	0	0
Future Volume (vph)	330	950	0	0	580	760	80	670	160	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frnt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	1863	1583	3433	1863	1583	0	0	0
Flt Permitted	0.426						0.950					
Satd. Flow (perm)	794	3539	0	0	1863	1583	3433	1863	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						368			101			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		379			839			247			271	
Travel Time (s)		8.6			19.1			5.6			6.2	
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)	359	1033	0	0	630	826	87	728	174	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	359	1033	0	0	630	826	87	728	174	0	0	0
Turn Type	custom	NA			NA	Perm	Split	NA	Prot			
Protected Phases	6	5 6 8			5		7	7	7			
Permitted Phases	5 8					5						
Minimum Split (s)	6.0				22.0	22.0	18.0	18.0	18.0			
Total Split (s)	21.0				43.0	43.0	20.0	20.0	20.0			
Total Split (%)	19.1%				39.1%	39.1%	18.2%	18.2%	18.2%			
Maximum Green (s)	17.0				39.0	39.0	16.0	16.0	16.0			
Yellow Time (s)	3.0				3.0	3.0	3.0	3.0	3.0			
All-Red Time (s)	1.0				1.0	1.0	1.0	1.0	1.0			
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	Lag				Lead	Lead	Lead	Lead	Lead			
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	Yes	Yes			
Act Effct Green (s)	82.0	86.0			39.0	39.0	16.0	16.0	16.0			
Actuated g/C Ratio	0.75	0.78			0.35	0.35	0.15	0.15	0.15			
v/c Ratio	0.48	0.37			0.95	1.04	0.17	2.70	0.55			
Control Delay	1.6	1.0			61.1	61.8	42.3	794.2	26.4			
Queue Delay	0.1	1.6			4.1	0.0	0.0	0.0	0.0			
Total Delay	1.8	2.6			65.2	61.8	42.3	794.2	26.4			
LOS	A	A			E	E	D	F	C			
Approach Delay		2.4			63.3			593.0				
Approach LOS		A			E			F				
Queue Length 50th (ft)	22	39			430	~448	28	~873	47			
Queue Length 95th (ft)	m11	m17			#661	#688	52	#1103	118			
Internal Link Dist (ft)		299			759			167			191	
Turn Bay Length (ft)												
Base Capacity (vph)	742	2766			660	798	499	270	316			
Starvation Cap Reductn	42	1488			0	0	0	0	0			
Spillback Cap Reductn	0	0			17	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			

Lanes, Volumes, Timings
2: Riverside Street/Watertown Avenue & West Main Street

2035 Background
PM Peak Hour

Lane Group	Ø1	Ø2	Ø3	Ø4	Ø8
Lane Configurations					
Traffic Volume (vph)					
Future Volume (vph)					
Ideal Flow (vphpl)					
Lane Util. Factor					
Fr t					
Flt Protected					
Satd. Flow (prot)					
Flt Permitted					
Satd. Flow (perm)					
Right Turn on Red					
Satd. Flow (RTOR)					
Link Speed (mph)					
Link Distance (ft)					
Travel Time (s)					
Peak Hour Factor					
Adj. Flow (vph)					
Shared Lane Traffic (%)					
Lane Group Flow (vph)					
Turn Type					
Protected Phases	1	2	3	4	8
Permitted Phases					
Minimum Split (s)	14.0	7.0	13.0	13.0	22.5
Total Split (s)	43.0	21.0	22.0	24.0	26.0
Total Split (%)	39%	19%	20%	22%	24%
Maximum Green (s)	39.0	17.0	18.0	20.0	22.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)					
Total Lost Time (s)					
Lead/Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes
Act Effct Green (s)					
Actuated g/C Ratio					
v/c Ratio					
Control Delay					
Queue Delay					
Total Delay					
LOS					
Approach Delay					
Approach LOS					
Queue Length 50th (ft)					
Queue Length 95th (ft)					
Internal Link Dist (ft)					
Turn Bay Length (ft)					
Base Capacity (vph)					
Starvation Cap Reductn					
Spillback Cap Reductn					
Storage Cap Reductn					

2: Riverside Street/Watertown Avenue & West Main Street

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Reduced v/c Ratio	0.51	0.81			0.98	1.04	0.17	2.70	0.55			

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green

Natural Cycle: 150

Control Type: Pretimed

Maximum v/c Ratio: 2.70

Intersection Signal Delay: 177.7

Intersection LOS: F

Intersection Capacity Utilization 110.6%

ICU Level of Service H

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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside Street/Watertown Avenue & West Main Street

#1 	#1 	#1 	#1 
Ø1	Ø2 (R)	Ø3	Ø4
43 s	21 s	22 s	24 s
#2 	#2 	#2 	#2 
Ø5	Ø6	Ø7	Ø8
43 s	21 s	20 s	26 s

Lane Group	Ø1	Ø2	Ø3	Ø4	Ø8
Reduced v/c Ratio					
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

2: Riverside Street/Watertown Avenue & West Main Street

2035 Background

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 					 					
Traffic Volume (vph)	330	950	0	0	580	760	80	670	160	0	0	0
Future Volume (vph)	330	950	0	0	580	760	80	670	160	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			1.00	1.00	0.97	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			1863	1583	3433	1863	1583			
Flt Permitted	0.43	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	793	3539			1863	1583	3433	1863	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	359	1033	0	0	630	826	87	728	174	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	238	0	0	86	0	0	0
Lane Group Flow (vph)	359	1033	0	0	630	588	87	728	88	0	0	0
Turn Type	custom	NA			NA	Perm	Split	NA	Prot			
Protected Phases	6	5 6 8			5		7	7	7			
Permitted Phases	5 8					5						
Actuated Green, G (s)	82.0	86.0			39.0	39.0	16.0	16.0	16.0			
Effective Green, g (s)	82.0	86.0			39.0	39.0	16.0	16.0	16.0			
Actuated g/C Ratio	0.75	0.78			0.35	0.35	0.15	0.15	0.15			
Clearance Time (s)	4.0				4.0	4.0	4.0	4.0	4.0			
Lane Grp Cap (vph)	742	2766			660	561	499	270	230			
v/s Ratio Prot	c0.07	0.29			0.34		0.03	c0.39	0.06			
v/s Ratio Perm	c0.29					c0.37						
v/c Ratio	0.48	0.37			0.95	1.05	0.17	2.70	0.38			
Uniform Delay, d1	6.5	3.7			34.6	35.5	41.2	47.0	42.5			
Progression Factor	0.26	0.25			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.2	0.0			25.5	51.5	0.8	773.8	4.7			
Delay (s)	1.9	1.0			60.1	87.0	42.0	820.8	47.3			
Level of Service	A	A			E	F	D	F	D			
Approach Delay (s)		1.2			75.4			616.2			0.0	
Approach LOS		A			E			F			A	
Intersection Summary												
HCM 2000 Control Delay		187.9			HCM 2000 Level of Service			F				
HCM 2000 Volume to Capacity ratio		1.10										
Actuated Cycle Length (s)		110.0			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		110.6%			ICU Level of Service			H				
Analysis Period (min)		15										
c Critical Lane Group												

3: Walgreens Driveway/Thomaston Avenue & West Main Street

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	820	20	10	920	320	10	10	10	360	10	370
Future Volume (vph)	270	820	20	10	920	320	10	10	10	360	10	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	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		0.988		0.950			0.950				0.954	
Satd. Flow (prot)	0	3486	0	1770	1863	1583	1770	1863	1583	0	1777	1583
Flt Permitted		0.548		0.114			0.357				0.724	
Satd. Flow (perm)	0	1934	0	212	1863	1583	665	1863	1583	0	1349	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				158			107			402
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		839			338			196			228	
Travel Time (s)		19.1			7.7			4.5			5.2	
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)	293	891	22	11	1000	348	11	11	11	391	11	402
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1206	0	11	1000	348	11	11	11	0	402	402
Turn Type	custom	NA		custom	NA	custom	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	1 2		3	2 3			5			5	
Permitted Phases	2			2		2	5		5	5		5
Detector Phase	1	1 2		3	2 3	2	5	5	5	5	5	5
Switch Phase												
Minimum Initial (s)	1.0			1.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	5.0			5.0		22.5	10.0	10.0	10.0	10.0	10.0	10.0
Total Split (s)	6.0			5.0		40.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	4.9%			4.1%		32.8%	36.9%	36.9%	36.9%	36.9%	36.9%	36.9%
Maximum Green (s)	3.0			1.0		35.0	40.0	40.0	40.0	40.0	40.0	40.0
Yellow Time (s)	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	0.0			1.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)				0.0		0.0	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)				4.0		5.0	5.0	5.0	5.0		5.0	5.0
Lead/Lag	Lead			Lead		Lag	Lag	Lag	Lag	Lag	Lag	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		Min	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		40.2		37.2	35.2	35.2	34.9	34.9	34.9		34.9	34.9
Actuated g/C Ratio		0.44		0.41	0.39	0.39	0.38	0.38	0.38		0.38	0.38
v/c Ratio		2.01dl		0.11	1.39	0.49	0.04	0.02	0.02		0.78	0.47
Control Delay		182.4		20.3	211.5	14.7	17.4	16.7	0.0		36.2	3.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay		182.4		20.3	211.5	14.7	17.4	16.7	0.0		36.2	3.9
LOS		F		C	F	B	B	B	A		D	A
Approach Delay		182.4			159.6			11.4			20.0	
Approach LOS		F			F			B			C	

Lanes, Volumes, Timings
3: Walgreens Driveway/Thomaston Avenue & West Main Street

2035 Background
PM Peak Hour

Lane Group	Ø4
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	4
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	21%
Maximum Green (s)	23.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	16.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Lanes, Volumes, Timings

3: Walgreens Driveway/Thomaston Avenue & West Main Street

2035 Background

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		~481		4	~821	82	4	4	0		199	0
Queue Length 95th (ft)		#661		14	#1083	169	15	14	0		317	54
Internal Link Dist (ft)		759			258			116			148	
Turn Bay Length (ft)												
Base Capacity (vph)		905		103	718	707	293	821	758		595	922
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		1.33		0.11	1.39	0.49	0.04	0.01	0.01		0.68	0.44

Intersection Summary

Area Type: Other

Cycle Length: 122

Actuated Cycle Length: 91.1

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.39

Intersection Signal Delay: 133.3

Intersection LOS: F

Intersection Capacity Utilization 118.4%

ICU Level of Service H

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

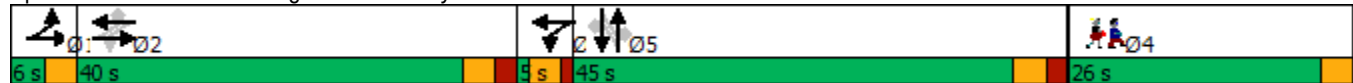
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 3: Walgreens Driveway/Thomaston Avenue & West Main Street



Lane Group	Ø4
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

3: Walgreens Driveway/Thomaston Avenue & West Main Street

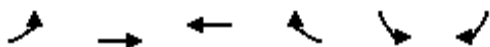
2035 Background

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	820	20	10	920	320	10	10	10	360	10	370
Future Volume (vph)	270	820	20	10	920	320	10	10	10	360	10	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0
Lane Util. Factor		0.95		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00		1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)		3487		1770	1863	1583	1770	1863	1583		1776	1583
Flt Permitted		0.55		0.11	1.00	1.00	0.36	1.00	1.00		0.72	1.00
Satd. Flow (perm)		1933		212	1863	1583	666	1863	1583		1349	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	891	22	11	1000	348	11	11	11	391	11	402
RTOR Reduction (vph)	0	1	0	0	0	97	0	0	7	0	0	248
Lane Group Flow (vph)	0	1205	0	11	1000	251	11	11	4	0	402	154
Turn Type	custom	NA		custom	NA	custom	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	1	1 2		3	2 3			5			5	
Permitted Phases	2			2		2	5		5	5		5
Actuated Green, G (s)		38.2		36.2	41.2	35.2	34.9	34.9	34.9		34.9	34.9
Effective Green, g (s)		38.2		36.2	41.2	35.2	34.9	34.9	34.9		34.9	34.9
Actuated g/C Ratio		0.42		0.40	0.45	0.39	0.38	0.38	0.38		0.38	0.38
Clearance Time (s)				4.0		5.0	5.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)				3.0		3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		861		101	842	611	255	713	606		516	606
v/s Ratio Prot		c0.05		0.00	c0.54			0.01				
v/s Ratio Perm		c0.54		0.04		0.16	0.02		0.00		c0.30	0.10
v/c Ratio		2.01dl		0.11	1.19	0.41	0.04	0.02	0.01		0.78	0.25
Uniform Delay, d1		26.4		31.4	24.9	20.4	17.6	17.4	17.4		24.7	19.2
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		186.8		0.5	96.3	0.5	0.1	0.0	0.0		7.3	0.2
Delay (s)		213.2		31.8	121.3	20.8	17.7	17.4	17.4		32.0	19.4
Level of Service		F		C	F	C	B	B	B		C	B
Approach Delay (s)		213.2			94.8			17.5			25.7	
Approach LOS		F			F			B			C	
Intersection Summary												
HCM 2000 Control Delay	119.7			HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio	1.19											
Actuated Cycle Length (s)	91.1			Sum of lost time (s)					20.0			
Intersection Capacity Utilization	118.4%			ICU Level of Service					H			
Analysis Period (min)	15											
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

Lanes, Volumes, Timings
4: West Main Street & Sperry Street

2035 Background
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	240	1020	1070	120	110	210
Future Volume (vph)	240	1020	1070	120	110	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	100	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.986			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1837	0	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1837	0	1770	1583
Link Speed (mph)		30	30		30	
Link Distance (ft)		169	487		207	
Travel Time (s)		3.8	11.1		4.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	261	1109	1163	130	120	228
Shared Lane Traffic (%)						
Lane Group Flow (vph)	261	1109	1293	0	120	228
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

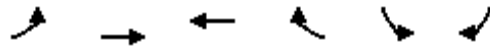
Intersection Capacity Utilization 93.0% ICU Level of Service F

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

4: West Main Street & Sperry Street

2035 Background
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	240	1020	1070	120	110	210
Future Volume (Veh/h)	240	1020	1070	120	110	210
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	261	1109	1163	130	120	228
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (ft)		650	921			
pX, platoon unblocked	0.76				0.76	0.76
vC, conflicting volume	1293				2859	1228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1228				2572	1142
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	40				0	0
cM capacity (veh/h)	432				9	185
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	261	1109	1293	120	228	
Volume Left	261	0	0	120	0	
Volume Right	0	0	130	0	228	
cSH	432	1700	1700	9	185	
Volume to Capacity	0.60	0.65	0.76	13.93	1.23	
Queue Length 95th (ft)	97	0	0	Err	307	
Control Delay (s)	25.3	0.0	0.0	Err	192.0	
Lane LOS	D			F	F	
Approach Delay (s)	4.8		0.0	3573.8		
Approach LOS				F		
Intersection Summary						
Average Delay			415.2			
Intersection Capacity Utilization			93.0%	ICU Level of Service		F
Analysis Period (min)			15			

Lanes, Volumes, Timings
5: Meadow Street/Willow Street & West Main Street

2035 Background
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑			↑	↑		↑	↑
Traffic Volume (vph)	140	670	360	140	560	150	440	320	140	110	290	210
Future Volume (vph)	140	670	360	140	560	150	440	320	140	110	290	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954			0.968				0.850			0.850
Flt Protected		0.994		0.950				0.972			0.986	
Satd. Flow (prot)	0	3356	0	1770	3426	0	0	1811	1583	0	1837	1583
Flt Permitted		0.739		0.167				0.226			0.134	
Satd. Flow (perm)	0	2495	0	311	3426	0	0	421	1583	0	250	1583
Right Turn on Red			No			No			Yes			Yes
Satd. Flow (RTOR)									114			228
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		434			464			449			761	
Travel Time (s)		9.9			10.5			10.2			17.3	
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)	152	728	391	152	609	163	478	348	152	120	315	228
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1271	0	152	772	0	0	826	152	0	435	228
Turn Type	Perm	NA		D.P+P	NA		D.P+P	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	1 2		4	4 5			5	
Permitted Phases	2			2			5		4 5	5		5
Detector Phase	2	2		1	1 2		4	4 5	4 5	5	5	5
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0			1.0			1.0	1.0	1.0
Minimum Split (s)	15.0	15.0		6.0			6.0			8.0	8.0	8.0
Total Split (s)	30.0	30.0		10.0			10.0			25.0	25.0	25.0
Total Split (%)	31.6%	31.6%		10.5%			10.5%			26.3%	26.3%	26.3%
Maximum Green (s)	24.0	24.0		7.0			6.0			19.0	19.0	19.0
Yellow Time (s)	3.0	3.0		3.0			3.0			3.0	3.0	3.0
All-Red Time (s)	3.0	3.0		0.0			1.0			3.0	3.0	3.0
Lost Time Adjust (s)		0.0		0.0							0.0	0.0
Total Lost Time (s)		6.0		3.0							6.0	6.0
Lead/Lag	Lag	Lag		Lead			Lag					
Lead-Lag Optimize?	Yes	Yes		Yes			Yes					
Vehicle Extension (s)	3.0	3.0		3.0			3.0			3.0	3.0	3.0
Recall Mode	Max	Max		None			None			None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		24.0		34.0	37.0			27.0	31.0		19.0	19.0
Actuated g/C Ratio		0.32		0.45	0.49			0.36	0.41		0.25	0.25
v/c Ratio		1.59		0.55	0.46			3.15	0.21		6.90	0.40
Control Delay		296.7		18.6	13.5			993.4	5.6		2698.2	5.9
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay		296.7		18.6	13.5			993.4	5.6		2698.2	5.9
LOS		F		B	B			F	A		F	A
Approach Delay		296.7			14.4			839.9			1772.3	
Approach LOS		F			B			F			F	

Lanes, Volumes, Timings
5: Meadow Street/Willow Street & West Main Street

2035 Background
PM Peak Hour

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	20.0
Total Split (s)	20.0
Total Split (%)	21%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	6.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

5: Meadow Street/Willow Street & West Main Street

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		~452		37	116			~640	10		~382	0
Queue Length 95th (ft)		#576		69	160			#856	44		#556	50
Internal Link Dist (ft)		354			384			369			681	
Turn Bay Length (ft)												
Base Capacity (vph)		798		277	1690			262	721		63	571
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		1.59		0.55	0.46			3.15	0.21		6.90	0.40

Intersection Summary

Area Type: Other

Cycle Length: 95

Actuated Cycle Length: 75

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 6.90

Intersection Signal Delay: 622.2

Intersection LOS: F

Intersection Capacity Utilization 133.6%

ICU Level of Service H

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: 5: Meadow Street/Willow Street & West Main Street

				
Ø1	Ø2	Ø3	Ø4	Ø5
10 s	30 s	20 s	10 s	25 s

Lane Group	Ø3
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

5: Meadow Street/Willow Street & West Main Street

2035 Background

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑			↑	↑		↑	↑
Traffic Volume (vph)	140	670	360	140	560	150	440	320	140	110	290	210
Future Volume (vph)	140	670	360	140	560	150	440	320	140	110	290	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		3.0	3.0			4.0	4.0		6.0	6.0
Lane Util. Factor		0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt		0.95		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected		0.99		0.95	1.00			0.97	1.00		0.99	1.00
Satd. Flow (prot)		3356		1770	3427			1810	1583		1837	1583
Flt Permitted		0.74		0.17	1.00			0.23	1.00		0.13	1.00
Satd. Flow (perm)		2494		310	3427			420	1583		250	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	728	391	152	609	163	478	348	152	120	315	228
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	70	0	0	170
Lane Group Flow (vph)	0	1271	0	152	772	0	0	826	82	0	435	58
Turn Type	Perm	NA		D.P+P	NA		D.P+P	NA	Perm	Perm	NA	Perm
Protected Phases		2		1	1 2		4	4 5			5	
Permitted Phases	2			2			5		4 5	5		5
Actuated Green, G (s)		24.0		31.0	34.0			25.0	29.0		19.0	19.0
Effective Green, g (s)		24.0		31.0	34.0			25.0	29.0		19.0	19.0
Actuated g/C Ratio		0.32		0.41	0.45			0.33	0.39		0.25	0.25
Clearance Time (s)		6.0		3.0							6.0	6.0
Vehicle Extension (s)		3.0		3.0							3.0	3.0
Lane Grp Cap (vph)		798		264	1553			251	612		63	401
v/s Ratio Prot				c0.05	0.23			c0.26				
v/s Ratio Perm		c0.51		0.18				0.83	0.05		c1.74	0.04
v/c Ratio		1.59		0.58	0.50			3.29	0.13		6.90	0.14
Uniform Delay, d1		25.5		17.0	14.5			25.0	14.9		28.0	21.7
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		272.7		3.0	0.3			1041.1	0.1		2690.1	0.2
Delay (s)		298.2		20.0	14.7			1066.1	15.0		2718.1	21.9
Level of Service		F		C	B			F	B		F	C
Approach Delay (s)		298.2			15.6			902.7			1790.9	
Approach LOS		F			B			F			F	
Intersection Summary												
HCM 2000 Control Delay			642.2			HCM 2000 Level of Service			F			
HCM 2000 Volume to Capacity ratio			3.63									
Actuated Cycle Length (s)			75.0			Sum of lost time (s)			22.0			
Intersection Capacity Utilization			133.6%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
6: State Street/Holmes Avenue & West Main Street

2035 Background

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	810	0	0	730	20	50	60	30	80	0	60
Future Volume (vph)	80	810	0	0	730	20	50	60	30	80	0	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.996				0.850		0.942	
Flt Protected	0.950							0.978			0.972	
Satd. Flow (prot)	1770	3539	0	0	5065	0	0	1822	1583	0	1706	0
Flt Permitted	0.307							0.838			0.757	
Satd. Flow (perm)	572	3539	0	0	5065	0	0	1561	1583	0	1328	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9				103		103	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		464			264			230			199	
Travel Time (s)		10.5			6.0			5.2			4.5	
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)	87	880	0	0	793	22	54	65	33	87	0	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	880	0	0	815	0	0	119	33	0	152	0
Turn Type	D.P+P	NA			NA		Perm	NA	Perm	Perm	NA	
Protected Phases	1	1 2			2			4			4	
Permitted Phases	2						4		4	4		
Detector Phase	1	1 2			2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	1.0				1.0		1.0	1.0	1.0	1.0	1.0	
Minimum Split (s)	5.0				15.0		8.0	8.0	8.0	8.0	8.0	
Total Split (s)	12.0				25.0		16.0	16.0	16.0	16.0	16.0	
Total Split (%)	22.6%				47.2%		30.2%	30.2%	30.2%	30.2%	30.2%	
Maximum Green (s)	8.0				21.0		11.0	11.0	11.0	11.0	11.0	
Yellow Time (s)	3.0				3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.0				1.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0				0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0				4.0			5.0	5.0		5.0	
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0				3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	Min				Max		None	None	None	None	None	
Act Effect Green (s)	29.4	34.6			21.5			8.7	8.7		8.7	
Actuated g/C Ratio	0.60	0.71			0.44			0.18	0.18		0.18	
v/c Ratio	0.16	0.35			0.36			0.42	0.09		0.47	
Control Delay	4.7	4.6			10.7			23.7	0.5		13.3	
Queue Delay	0.0	0.0			0.0			0.0	0.0		0.0	
Total Delay	4.7	4.6			10.7			23.7	0.5		13.3	
LOS	A	A			B			C	A		B	
Approach Delay		4.6			10.7			18.6			13.3	
Approach LOS		A			B			B			B	

Lanes, Volumes, Timings
6: State Street/Holmes Avenue & West Main Street

2035 Background
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	8	52			59			32	0		13	
Queue Length 95th (ft)	21	87			90			71	0		53	
Internal Link Dist (ft)		384			184			150			119	
Turn Bay Length (ft)	125											
Base Capacity (vph)	550	2455			2241			361	445		386	
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	0.16	0.36			0.36			0.33	0.07		0.39	

Intersection Summary

Area Type: Other

Cycle Length: 53

Actuated Cycle Length: 48.6

Natural Cycle: 40

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 8.6

Intersection LOS: A

Intersection Capacity Utilization 45.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: State Street/Holmes Avenue & West Main Street

		
Ø1	Ø2	Ø4
12 s	25 s	16 s

HCM Signalized Intersection Capacity Analysis

6: State Street/Holmes Avenue & West Main Street

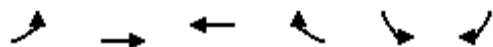
2035 Background

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	810	0	0	730	20	50	60	30	80	0	60
Future Volume (vph)	80	810	0	0	730	20	50	60	30	80	0	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	0.95			0.91			1.00	1.00		1.00	
Frt	1.00	1.00			1.00			1.00	0.85		0.94	
Flt Protected	0.95	1.00			1.00			0.98	1.00		0.97	
Satd. Flow (prot)	1770	3539			5065			1821	1583		1706	
Flt Permitted	0.31	1.00			1.00			0.84	1.00		0.76	
Satd. Flow (perm)	572	3539			5065			1562	1583		1329	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	880	0	0	793	22	54	65	33	87	0	65
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	28	0	88	0
Lane Group Flow (vph)	87	880	0	0	810	0	0	119	5	0	64	0
Turn Type	D.P+P	NA			NA		Perm	NA	Perm	Perm	NA	
Protected Phases	1	1 2			2			4			4	
Permitted Phases	2						4		4	4		
Actuated Green, G (s)	29.4	33.4			21.4			7.2	7.2		7.2	
Effective Green, g (s)	29.4	33.4			21.4			7.2	7.2		7.2	
Actuated g/C Ratio	0.59	0.67			0.43			0.15	0.15		0.15	
Clearance Time (s)	4.0				4.0			5.0	5.0		5.0	
Vehicle Extension (s)	3.0				3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	532	2383			2185			226	229		192	
v/s Ratio Prot	0.03	c0.25			0.16							
v/s Ratio Perm	0.07							c0.08	0.00		0.05	
v/c Ratio	0.16	0.37			0.37			0.53	0.02		0.33	
Uniform Delay, d1	4.4	3.5			9.5			19.6	18.2		19.0	
Progression Factor	1.00	1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.1	0.1			0.5			2.2	0.0		1.0	
Delay (s)	4.5	3.6			10.0			21.8	18.2		20.1	
Level of Service	A	A			B			C	B		C	
Approach Delay (s)		3.7			10.0			21.0			20.1	
Approach LOS		A			B			C			C	
Intersection Summary												
HCM 2000 Control Delay		8.6			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		49.6			Sum of lost time (s)			13.0				
Intersection Capacity Utilization		45.5%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
7: West Main Street & Central Avenue

2035 Background
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	40	930	690	140	60	30
Future Volume (vph)	40	930	690	140	60	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.95	0.95	1.00	1.00
Frt			0.975		0.955	
Flt Protected	0.950				0.968	
Satd. Flow (prot)	1770	5085	3451	0	1722	0
Flt Permitted	0.950				0.968	
Satd. Flow (perm)	1770	5085	3451	0	1722	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		264	120		271	
Travel Time (s)		6.0	2.7		6.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	1011	750	152	65	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	43	1011	902	0	98	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

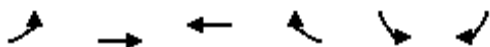
Intersection Capacity Utilization 42.0% ICU Level of Service A

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

7: West Main Street & Central Avenue

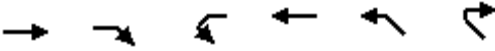
2035 Background
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	40	930	690	140	60	30		
Future Volume (Veh/h)	40	930	690	140	60	30		
Sign Control		Free	Free		Stop			
Grade		0%	0%		0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	43	1011	750	152	65	33		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type		None	None					
Median storage veh								
Upstream signal (ft)		264	120					
pX, platoon unblocked	0.94				0.95	0.94		
vC, conflicting volume	902				1249	451		
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	770				1014	291		
tC, single (s)	4.1				6.8	6.9		
tC, 2 stage (s)								
tF (s)	2.2				3.5	3.3		
p0 queue free %	95				69	95		
cM capacity (veh/h)	790				212	664		
Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	SB 1	
Volume Total	43	337	337	337	500	402	98	
Volume Left	43	0	0	0	0	0	65	
Volume Right	0	0	0	0	0	152	33	
cSH	790	1700	1700	1700	1700	1700	275	
Volume to Capacity	0.05	0.20	0.20	0.20	0.29	0.24	0.36	
Queue Length 95th (ft)	4	0	0	0	0	0	39	
Control Delay (s)	9.8	0.0	0.0	0.0	0.0	0.0	25.2	
Lane LOS	A						D	
Approach Delay (s)	0.4				0.0		25.2	
Approach LOS							D	
Intersection Summary								
Average Delay			1.4					
Intersection Capacity Utilization			42.0%			ICU Level of Service		A
Analysis Period (min)			15					

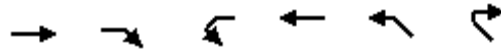
Lanes, Volumes, Timings
8: West Main Street NW of Monument

2035 Background
PM Peak Hour

										
Lane Group	EBT	EBR	WBL	WBT	NWL	NWR	Ø1	Ø2	Ø3	Ø4
Lane Configurations		↑↑↑		↑↑	↑↑					
Traffic Volume (vph)	0	930	0	280	640	0				
Future Volume (vph)	0	930	0	280	640	0				
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900				
Lane Util. Factor	1.00	0.76	1.00	0.95	0.97	1.00				
Frt		0.850								
Flt Protected					0.950					
Satd. Flow (prot)	0	3610	0	3539	3433	0				
Flt Permitted					0.950					
Satd. Flow (perm)	0	3610	0	3539	3433	0				
Right Turn on Red		Yes				Yes				
Satd. Flow (RTOR)		2487								
Link Speed (mph)	30			30	30					
Link Distance (ft)	120			184	92					
Travel Time (s)	2.7			4.2	2.1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				
Adj. Flow (vph)	0	1011	0	304	696	0				
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	1011	0	304	696	0				
Turn Type		pt+ov		NA	Prot					
Protected Phases		1 2		1 4	2 3		1	2	3	4
Permitted Phases										
Detector Phase		1 2		1 4	2 3					
Switch Phase										
Minimum Initial (s)							1.0	1.0	1.0	1.0
Minimum Split (s)							6.0	19.0	5.0	19.0
Total Split (s)							14.0	34.0	6.0	19.0
Total Split (%)							19%	47%	8%	26%
Maximum Green (s)							9.0	30.0	2.0	15.0
Yellow Time (s)							3.0	3.0	3.0	3.0
All-Red Time (s)							2.0	1.0	1.0	1.0
Lost Time Adjust (s)										
Total Lost Time (s)										
Lead/Lag							Lead	Lag	Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes
Vehicle Extension (s)							3.0	3.0	3.0	3.0
Recall Mode							None	Max	None	None
Walk Time (s)								7.0		4.0
Flash Dont Walk (s)								8.0		11.0
Pedestrian Calls (#/hr)								0		0
Act Effct Green (s)		43.1		23.8	36.1					
Actuated g/C Ratio		0.63		0.35	0.52					
v/c Ratio		0.32		0.25	0.39					
Control Delay		0.3		16.5	0.6					
Queue Delay		0.1		0.0	0.0					
Total Delay		0.3		16.5	0.6					
LOS		A		B	A					
Approach Delay	0.3			16.5	0.6					
Approach LOS	A			B	A					

Lanes, Volumes, Timings
8: West Main Street NW of Monument

2035 Background
PM Peak Hour



Lane Group	EBT	EBR	WBL	WBT	NWL	NWR	Ø1	Ø2	Ø3	Ø4
Queue Length 50th (ft)		0		47	0					
Queue Length 95th (ft)		0		74	0					
Internal Link Dist (ft)	40			104	12					
Turn Bay Length (ft)										
Base Capacity (vph)		3188		1189	1796					
Starvation Cap Reductn		0		0	0					
Spillback Cap Reductn		609		0	0					
Storage Cap Reductn		0		0	0					
Reduced v/c Ratio		0.39		0.26	0.39					

Intersection Summary

Area Type: Other

Cycle Length: 73

Actuated Cycle Length: 68.9

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 2.9

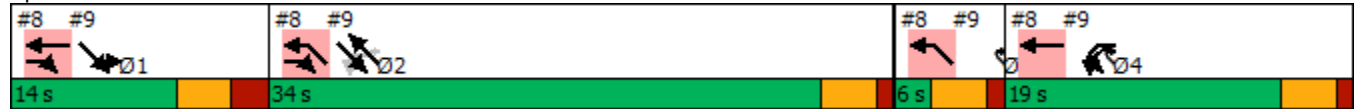
Intersection LOS: A

Intersection Capacity Utilization 33.5%

ICU Level of Service A

Analysis Period (min) 15

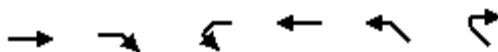
Splits and Phases: 8: West Main Street



HCM Signalized Intersection Capacity Analysis

8: West Main Street NW of Monument

2035 Background
PM Peak Hour



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations		↑↑↑		↑↑	↑↑	
Traffic Volume (vph)	0	930	0	280	640	0
Future Volume (vph)	0	930	0	280	640	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	4.0	
Lane Util. Factor		0.76		0.95	0.97	
Frt		0.85		1.00	1.00	
Flt Protected		1.00		1.00	0.95	
Satd. Flow (prot)		3610		3539	3433	
Flt Permitted		1.00		1.00	0.95	
Satd. Flow (perm)		3610		3539	3433	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1011	0	304	696	0
RTOR Reduction (vph)	0	364	0	0	0	0
Lane Group Flow (vph)	0	647	0	304	696	0
Turn Type		pt+ov		NA	Prot	
Protected Phases		1 2		1 4	2 3	
Permitted Phases						
Actuated Green, G (s)		44.0		23.8	36.0	
Effective Green, g (s)		44.0		19.8	36.0	
Actuated g/C Ratio		0.64		0.29	0.52	
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)		2308		1018	1796	
v/s Ratio Prot		c0.18		c0.09	c0.20	
v/s Ratio Perm						
v/c Ratio		0.28		0.30	0.39	
Uniform Delay, d1		5.4		19.1	9.8	
Progression Factor		1.00		1.00	0.00	
Incremental Delay, d2		0.1		0.2	0.1	
Delay (s)		5.5		19.3	0.1	
Level of Service		A		B	A	
Approach Delay (s)	5.5			19.3	0.1	
Approach LOS	A			B	A	
Intersection Summary						
HCM 2000 Control Delay		5.7		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.39				
Actuated Cycle Length (s)		68.8		Sum of lost time (s)		17.0
Intersection Capacity Utilization		33.5%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings
9: Church Street & West Main Street

2035 Background
PM Peak Hour

												
Lane Group	WBL2	WBL	WBR	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	Ø3
Lane Configurations												
Traffic Volume (vph)	70	20	0	0	0	150	790	50	20	640	130	
Future Volume (vph)	70	20	0	0	0	150	790	50	20	640	130	
Ideal Flow (vphpl)	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	0.95	0.95	0.95	0.95	1.00	
Frnt							0.991					0.850
Flt Protected		0.950				0.950				0.998		
Satd. Flow (prot)	0	1770	0	0	0	1770	3507	0	0	3532	1583	
Flt Permitted		0.950				0.950				0.916		
Satd. Flow (perm)	0	1770	0	0	0	1770	3507	0	0	3242	1583	
Right Turn on Red			Yes					Yes				Yes
Satd. Flow (RTOR)							15					141
Link Speed (mph)		30		30			30			30		
Link Distance (ft)		124		240			92			178		
Travel Time (s)		2.8		5.5			2.1			4.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	76	22	0	0	0	163	859	54	22	696	141	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	98	0	0	0	163	913	0	0	718	141	
Turn Type	Prot	Prot				Prot	NA		Perm	NA	custom	
Protected Phases	4	4				1	1 2			2	3 4	3
Permitted Phases									2		2	
Detector Phase	4	4				1	1 2		2	2	3 4	
Switch Phase												
Minimum Initial (s)	1.0	1.0				1.0			1.0	1.0		1.0
Minimum Split (s)	19.0	19.0				6.0			19.0	19.0		5.0
Total Split (s)	19.0	19.0				14.0			34.0	34.0		6.0
Total Split (%)	26.0%	26.0%				19.2%			46.6%	46.6%		8%
Maximum Green (s)	15.0	15.0				9.0			30.0	30.0		2.0
Yellow Time (s)	3.0	3.0				3.0			3.0	3.0		3.0
All-Red Time (s)	1.0	1.0				2.0			1.0	1.0		1.0
Lost Time Adjust (s)		0.0				0.0				0.0		
Total Lost Time (s)		4.0				5.0				4.0		
Lead/Lag	Lag	Lag				Lead			Lag	Lag		Lead
Lead-Lag Optimize?	Yes	Yes				Yes			Yes	Yes		Yes
Vehicle Extension (s)	3.0	3.0				3.0			3.0	3.0		3.0
Recall Mode	None	None				None			Max	Max		None
Walk Time (s)	4.0	4.0							7.0	7.0		
Flash Dont Walk (s)	11.0	11.0							8.0	8.0		
Pedestrian Calls (#/hr)	0	0							0	0		
Act Effct Green (s)		10.8				9.0	43.1			30.0	50.9	
Actuated g/C Ratio		0.16				0.13	0.63			0.44	0.74	
v/c Ratio		0.35				0.71	0.42			0.51	0.12	
Control Delay		29.3				48.0	7.5			16.1	0.7	
Queue Delay		0.0				0.0	0.0			0.0	0.0	
Total Delay		29.3				48.0	7.5			16.1	0.7	
LOS		C				D	A			B	A	
Approach Delay		29.3					13.6			13.6		
Approach LOS		C					B			B		

Lanes, Volumes, Timings

9: Church Street & West Main Street

2035 Background
PM Peak Hour

												
Lane Group	WBL2	WBL	WBR	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR	Ø3
Queue Length 50th (ft)		37				67	86			110	0	
Queue Length 95th (ft)		77				#163	145			174	10	
Internal Link Dist (ft)		44		160			12			98		
Turn Bay Length (ft)												
Base Capacity (vph)		385				231	2197			1413	1293	
Starvation Cap Reductn		0				0	0			0	0	
Spillback Cap Reductn		0				0	0			0	0	
Storage Cap Reductn		0				0	0			0	0	
Reduced v/c Ratio		0.25				0.71	0.42			0.51	0.11	

Intersection Summary

Area Type: Other

Cycle Length: 73

Actuated Cycle Length: 68.9

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 14.4

Intersection LOS: B

Intersection Capacity Utilization 57.5%

ICU Level of Service B

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 9: Church Street & West Main Street



HCM Signalized Intersection Capacity Analysis

9: Church Street & West Main Street

2035 Background

PM Peak Hour

											
Movement	WBL2	WBL	WBR	NBL	NBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations											
Traffic Volume (vph)	70	20	0	0	0	150	790	50	20	640	130
Future Volume (vph)	70	20	0	0	0	150	790	50	20	640	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0				5.0	5.0			4.0	4.0
Lane Util. Factor		1.00				1.00	0.95			0.95	1.00
Frt		1.00				1.00	0.99			1.00	0.85
Flt Protected		0.95				0.95	1.00			1.00	1.00
Satd. Flow (prot)		1770				1770	3508			3534	1583
Flt Permitted		0.95				0.95	1.00			0.92	1.00
Satd. Flow (perm)		1770				1770	3508			3240	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	22	0	0	0	163	859	54	22	696	141
RTOR Reduction (vph)	0	0	0	0	0	0	5	0	0	0	45
Lane Group Flow (vph)	0	98	0	0	0	163	908	0	0	718	96
Turn Type	Prot	Prot				Prot	NA		Perm	NA	custom
Protected Phases	4	4				1	1 2			2	3 4
Permitted Phases									2		2
Actuated Green, G (s)		10.8				9.0	44.0			30.0	46.8
Effective Green, g (s)		10.8				9.0	44.0			30.0	46.8
Actuated g/C Ratio		0.16				0.13	0.64			0.44	0.68
Clearance Time (s)		4.0				5.0				4.0	
Vehicle Extension (s)		3.0				3.0				3.0	
Lane Grp Cap (vph)		277				231	2243			1412	1168
v/s Ratio Prot		c0.06				c0.09	0.26				c0.02
v/s Ratio Perm										c0.22	0.04
v/c Ratio		0.35				0.71	0.40			0.51	0.08
Uniform Delay, d1		25.9				28.6	6.0			14.1	3.7
Progression Factor		1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2		0.8				9.1	0.1			1.3	0.0
Delay (s)		26.7				37.8	6.1			15.4	3.8
Level of Service		C				D	A			B	A
Approach Delay (s)		26.7		0.0			10.9			13.5	
Approach LOS		C		A			B			B	
Intersection Summary											
HCM 2000 Control Delay		12.8				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio		0.50									
Actuated Cycle Length (s)		68.8				Sum of lost time (s)			17.0		
Intersection Capacity Utilization		57.5%				ICU Level of Service			B		
Analysis Period (min)		15									
c Critical Lane Group											

Lanes, Volumes, Timings
10: Leavenworth Street & West Main Street

2035 Background
PM Peak Hour

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
Lane Configurations	↑↑		↵	↑↑	↵	↵	
Traffic Volume (vph)	820	40	80	660	130	120	
Future Volume (vph)	820	40	80	660	130	120	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00	
Frt	0.993					0.850	
Flt Protected			0.950		0.950		
Satd. Flow (prot)	3514	0	1770	3539	1770	1583	
Flt Permitted			0.210		0.950		
Satd. Flow (perm)	3514	0	391	3539	1770	1583	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	5					130	
Link Speed (mph)	30			30	30		
Link Distance (ft)	289			389	436		
Travel Time (s)	6.6			8.8	9.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	891	43	87	717	141	130	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	934	0	87	717	141	130	
Turn Type	NA		D.P+P	NA	Prot	Perm	
Protected Phases	1		2	1 2	4		3
Permitted Phases			1			4	
Detector Phase	1		2	1 2	4	4	
Switch Phase							
Minimum Initial (s)	1.0		1.0		1.0	1.0	1.0
Minimum Split (s)	15.0		6.0		8.0	8.0	20.0
Total Split (s)	25.0		10.0		30.0	30.0	20.0
Total Split (%)	29.4%		11.8%		35.3%	35.3%	24%
Maximum Green (s)	21.0		6.0		25.0	25.0	17.0
Yellow Time (s)	3.0		3.0		3.0	3.0	3.0
All-Red Time (s)	1.0		1.0		2.0	2.0	0.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	4.0		4.0		5.0	5.0	
Lead/Lag	Lead		Lag		Lag	Lag	Lead
Lead-Lag Optimize?	Yes		Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0		3.0		3.0	3.0	3.0
Recall Mode	Max		Max		None	None	None
Walk Time (s)							8.0
Flash Dont Walk (s)							9.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)	21.0		27.0	31.0	9.1	9.1	
Actuated g/C Ratio	0.43		0.55	0.63	0.18	0.18	
v/c Ratio	0.62		0.23	0.32	0.43	0.33	
Control Delay	13.5		7.7	5.0	21.9	6.6	
Queue Delay	0.0		0.0	0.1	0.0	0.0	
Total Delay	13.5		7.7	5.0	21.9	6.6	
LOS	B		A	A	C	A	
Approach Delay	13.5			5.3	14.6		
Approach LOS	B			A	B		

Lanes, Volumes, Timings
10: Leavenworth Street & West Main Street

2035 Background
PM Peak Hour

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
Queue Length 50th (ft)	102		8	39	36	0	
Queue Length 95th (ft)	170		23	74	76	33	
Internal Link Dist (ft)	209			309	356		
Turn Bay Length (ft)							
Base Capacity (vph)	1504		383	2233	900	869	
Starvation Cap Reductn	0		0	360	0	0	
Spillback Cap Reductn	0		0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	
Reduced v/c Ratio	0.62		0.23	0.38	0.16	0.15	

Intersection Summary

Area Type: Other

Cycle Length: 85

Actuated Cycle Length: 49.2

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 10.4

Intersection LOS: B

Intersection Capacity Utilization 46.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Leavenworth Street & West Main Street

 Ø1	 Ø2	 Ø3	 Ø4
25 s	10 s	20 s	30 s

HCM Signalized Intersection Capacity Analysis

10: Leavenworth Street & West Main Street

2035 Background
PM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	820	40	80	660	130	120
Future Volume (vph)	820	40	80	660	130	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	5.0	5.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3515		1770	3539	1770	1583
Flt Permitted	1.00		0.21	1.00	0.95	1.00
Satd. Flow (perm)	3515		392	3539	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	891	43	87	717	141	130
RTOR Reduction (vph)	3	0	0	0	0	106
Lane Group Flow (vph)	931	0	87	717	141	24
Turn Type	NA		D.P+P	NA	Prot	Perm
Protected Phases	1		2	1 2	4	
Permitted Phases			1			4
Actuated Green, G (s)	21.0		27.0	31.0	9.1	9.1
Effective Green, g (s)	21.0		27.0	31.0	9.1	9.1
Actuated g/C Ratio	0.43		0.55	0.63	0.19	0.19
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	1503		383	2234	328	293
v/s Ratio Prot	c0.26		0.03	c0.20	c0.08	
v/s Ratio Perm			0.10			0.02
v/c Ratio	0.62		0.23	0.32	0.43	0.08
Uniform Delay, d1	10.9		9.9	4.2	17.7	16.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9		1.4	0.4	0.9	0.1
Delay (s)	12.9		11.2	4.6	18.6	16.7
Level of Service	B		B	A	B	B
Approach Delay (s)	12.9			5.3	17.7	
Approach LOS	B			A	B	
Intersection Summary						
HCM 2000 Control Delay			10.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.59			
Actuated Cycle Length (s)			49.1		Sum of lost time (s)	16.0
Intersection Capacity Utilization			46.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings

2035 Background

11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑			↑↑			↑↑	
Traffic Volume (vph)	10	860	70	50	730	20	0	510	10	30	440	10
Future Volume (vph)	10	860	70	50	730	20	0	510	10	30	440	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		130	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	0.95	0.95	0.95	1.00	0.95	0.95	0.95	0.95	0.95
Frt			0.850		0.996			0.997			0.997	
Flt Protected		0.999			0.997						0.997	
Satd. Flow (prot)	0	3536	1583	0	3514	0	0	3529	0	0	3518	0
Flt Permitted		0.944			0.846						0.887	
Satd. Flow (perm)	0	3341	1583	0	2982	0	0	3529	0	0	3130	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			76		5			3			3	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			245			286			217	
Travel Time (s)		8.8			5.6			6.5			4.9	
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)	11	935	76	54	793	22	0	554	11	33	478	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	946	76	0	869	0	0	565	0	0	522	0
Turn Type	Perm	NA	Perm	Perm	NA			NA		Perm	NA	
Protected Phases		2			2			8			4	
Permitted Phases	2		2	2						4		
Detector Phase	2	2	2	2	2			8		4	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0	1.0	1.0	1.0			1.0		1.0	1.0	
Minimum Split (s)	37.0	37.0	37.0	37.0	37.0			35.0		35.0	35.0	
Total Split (s)	40.0	40.0	40.0	40.0	40.0			35.0		35.0	35.0	
Total Split (%)	53.3%	53.3%	53.3%	53.3%	53.3%			46.7%		46.7%	46.7%	
Maximum Green (s)	35.0	35.0	35.0	35.0	35.0			30.0		30.0	30.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0			3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0			2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0			0.0			0.0	
Total Lost Time (s)		5.0	5.0		5.0			5.0			5.0	
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	Max	Max	Max	Max	Max			None		None	None	
Walk Time (s)	12.0	12.0	12.0	12.0	12.0			12.0		12.0	12.0	
Flash Dont Walk (s)	20.0	20.0	20.0	20.0	20.0			18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effect Green (s)		35.2	35.2		35.2			15.9			15.9	
Actuated g/C Ratio		0.58	0.58		0.58			0.26			0.26	
v/c Ratio		0.49	0.08		0.51			0.61			0.64	
Control Delay		9.4	2.5		9.7			22.7			23.6	
Queue Delay		0.2	0.0		0.0			0.0			0.1	
Total Delay		9.7	2.5		9.7			22.7			23.7	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A	A		A			C			C	
Approach Delay		9.1			9.7			22.7			23.7	
Approach LOS		A			A			C			C	
Queue Length 50th (ft)		95	0		88			95			88	
Queue Length 95th (ft)		173	17		164			139			132	
Internal Link Dist (ft)		309			165			206			137	
Turn Bay Length (ft)			130									
Base Capacity (vph)		1922	942		1717			1741			1545	
Starvation Cap Reductn		335	0		0			0			245	
Spillback Cap Reductn		0	0		0			0			0	
Storage Cap Reductn		0	0		0			0			0	
Reduced v/c Ratio		0.60	0.08		0.51			0.32			0.40	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 61.1

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 14.4

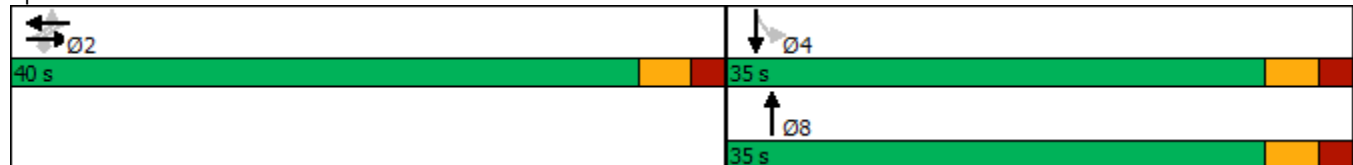
Intersection LOS: B

Intersection Capacity Utilization 90.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street



HCM Signalized Intersection Capacity Analysis

2035 Background

11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑			↑↑			↑↑	
Traffic Volume (vph)	10	860	70	50	730	20	0	510	10	30	440	10
Future Volume (vph)	10	860	70	50	730	20	0	510	10	30	440	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0		5.0			5.0			5.0	
Lane Util. Factor		0.95	1.00		0.95			0.95			0.95	
Frt		1.00	0.85		1.00			1.00			1.00	
Flt Protected		1.00	1.00		1.00			1.00			1.00	
Satd. Flow (prot)		3537	1583		3515			3529			3517	
Flt Permitted		0.94	1.00		0.85			1.00			0.89	
Satd. Flow (perm)		3341	1583		2983			3529			3130	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	935	76	54	793	22	0	554	11	33	478	11
RTOR Reduction (vph)	0	0	32	0	2	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	946	44	0	867	0	0	563	0	0	520	0
Turn Type	Perm	NA	Perm	Perm	NA			NA		Perm	NA	
Protected Phases		2			2			8			4	
Permitted Phases	2		2	2						4		
Actuated Green, G (s)		35.1	35.1		35.1			15.9			15.9	
Effective Green, g (s)		35.1	35.1		35.1			15.9			15.9	
Actuated g/C Ratio		0.58	0.58		0.58			0.26			0.26	
Clearance Time (s)		5.0	5.0		5.0			5.0			5.0	
Vehicle Extension (s)		3.0	3.0		3.0			3.0			3.0	
Lane Grp Cap (vph)		1922	910		1716			919			815	
v/s Ratio Prot								0.16				
v/s Ratio Perm		0.28	0.03		c0.29						c0.17	
v/c Ratio		0.49	0.05		0.51			0.61			0.64	
Uniform Delay, d1		7.7	5.7		7.8			19.8			20.0	
Progression Factor		1.00	1.00		1.00			1.00			1.00	
Incremental Delay, d2		0.9	0.1		1.1			1.2			1.6	
Delay (s)		8.6	5.8		8.8			21.1			21.6	
Level of Service		A	A		A			C			C	
Approach Delay (s)		8.4			8.8			21.1			21.6	
Approach LOS		A			A			C			C	
Intersection Summary												
HCM 2000 Control Delay			13.2									
HCM 2000 Level of Service											B	
HCM 2000 Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			61.0								10.0	
Intersection Capacity Utilization			90.8%								E	
ICU Level of Service												
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
12: North Main Street & West Main Street

2035 Background
PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	140	100	210	330	380	140	
Future Volume (vph)	140	100	210	330	380	140	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	
Frt		0.850			0.960		
Flt Protected	0.950		0.950				
Satd. Flow (prot)	1770	1583	1770	1863	3398	0	
Flt Permitted	0.950		0.950				
Satd. Flow (perm)	1770	1583	1770	1863	3398	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)		109			52		
Link Speed (mph)	30			30	30		
Link Distance (ft)	200			217	246		
Travel Time (s)	4.5			4.9	5.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	152	109	228	359	413	152	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	152	109	228	359	565	0	
Turn Type	Prot	Perm	Prot	NA	NA		
Protected Phases	4		2	1 2	1		3
Permitted Phases		4					
Detector Phase	4	4	2	1 2	1		
Switch Phase							
Minimum Initial (s)	1.0	1.0	1.0		1.0		1.0
Minimum Split (s)	10.0	10.0	20.0		10.0		18.0
Total Split (s)	25.0	25.0	25.0		30.0		18.0
Total Split (%)	25.5%	25.5%	25.5%		30.6%		18%
Maximum Green (s)	21.0	21.0	21.0		26.0		15.0
Yellow Time (s)	3.0	3.0	3.0		3.0		3.0
All-Red Time (s)	1.0	1.0	1.0		1.0		0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0		
Total Lost Time (s)	4.0	4.0	4.0		4.0		
Lead/Lag	Lag	Lag	Lag		Lead		Lead
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0
Recall Mode	None	None	Max		None		None
Walk Time (s)							6.0
Flash Dont Walk (s)							9.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)	10.9	10.9	21.3	43.5	18.1		
Actuated g/C Ratio	0.17	0.17	0.34	0.70	0.29		
v/c Ratio	0.49	0.30	0.38	0.28	0.56		
Control Delay	30.3	8.2	20.3	4.5	19.2		
Queue Delay	0.0	0.0	2.1	2.4	0.0		
Total Delay	30.3	8.2	22.3	6.9	19.2		
LOS	C	A	C	A	B		
Approach Delay	21.0			12.9	19.2		
Approach LOS	C			B	B		

Lanes, Volumes, Timings
12: North Main Street & West Main Street

2035 Background
PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø3
Queue Length 50th (ft)	52	0	64	40	83		
Queue Length 95th (ft)	114	38	150	87	138		
Internal Link Dist (ft)	120			137	166		
Turn Bay Length (ft)							
Base Capacity (vph)	604	612	604	1295	1465		
Starvation Cap Reductn	0	0	246	788	0		
Spillback Cap Reductn	0	0	0	0	0		
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.25	0.18	0.64	0.71	0.39		

Intersection Summary

Area Type: Other

Cycle Length: 98

Actuated Cycle Length: 62.5

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 16.9

Intersection LOS: B

Intersection Capacity Utilization 44.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 12: North Main Street & West Main Street

 Ø1	 Ø2	 Ø3	 Ø4
30 s	25 s	18 s	25 s

HCM Signalized Intersection Capacity Analysis

12: North Main Street & West Main Street

2035 Background
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	140	100	210	330	380	140
Future Volume (vph)	140	100	210	330	380	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	
Frt	1.00	0.85	1.00	1.00	0.96	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1583	1770	1863	3396	
Flt Permitted	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (perm)	1770	1583	1770	1863	3396	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	109	228	359	413	152
RTOR Reduction (vph)	0	90	0	0	37	0
Lane Group Flow (vph)	152	19	228	359	528	0
Turn Type	Prot	Perm	Prot	NA	NA	
Protected Phases	4		2	1 2	1	
Permitted Phases		4				
Actuated Green, G (s)	10.9	10.9	21.3	43.4	18.1	
Effective Green, g (s)	10.9	10.9	21.3	43.4	18.1	
Actuated g/C Ratio	0.17	0.17	0.34	0.70	0.29	
Clearance Time (s)	4.0	4.0	4.0		4.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	309	276	605	1297	986	
v/s Ratio Prot	c0.09		c0.13	0.19	c0.16	
v/s Ratio Perm		0.01				
v/c Ratio	0.49	0.07	0.38	0.28	0.54	
Uniform Delay, d1	23.2	21.5	15.5	3.6	18.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	0.1	1.8	0.1	0.6	
Delay (s)	24.4	21.6	17.3	3.7	19.1	
Level of Service	C	C	B	A	B	
Approach Delay (s)	23.2			9.0	19.1	
Approach LOS	C			A	B	
Intersection Summary						
HCM 2000 Control Delay			15.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			62.3		Sum of lost time (s)	15.0
Intersection Capacity Utilization			44.4%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
13: Sperry Street/Waterville Street & Johnson Street

2035 Background
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	60	20	80	60	40	70	180	120	40	150	0
Future Volume (vph)	10	60	20	80	60	40	70	180	120	40	150	0
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		0.970			0.970			0.956				
Flt Protected		0.994			0.978			0.991			0.990	
Satd. Flow (prot)	0	1796	0	0	1767	0	0	1765	0	0	1844	0
Flt Permitted		0.994			0.978			0.991			0.990	
Satd. Flow (perm)	0	1796	0	0	1767	0	0	1765	0	0	1844	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			342			241			213	
Travel Time (s)		5.0			7.8			5.5			4.8	
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)	11	65	22	87	65	43	76	196	130	43	163	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	98	0	0	195	0	0	402	0	0	206	0
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	50.1%											
Analysis Period (min)	15											
ICU Level of Service A												

HCM Unsignalized Intersection Capacity Analysis

13: Sperry Street/Waterville Street & Johnson Street

2035 Background
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	60	20	80	60	40	70	180	120	40	150	0
Future Volume (Veh/h)	10	60	20	80	60	40	70	180	120	40	150	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	65	22	87	65	43	76	196	130	43	163	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None								None			
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	738	727	163	716	662	261	163	326				
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	738	727	163	716	662	261	163	326				
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1	4.1				
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2	2.2				
p0 queue free %	96	80	98	67	81	94	95	97				
cM capacity (veh/h)	253	320	882	266	349	778	1416	1234				
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	98	195	402	206								
Volume Left	11	87	76	43								
Volume Right	22	43	130	0								
cSH	361	343	1416	1234								
Volume to Capacity	0.27	0.57	0.05	0.03								
Queue Length 95th (ft)	27	84	4	3								
Control Delay (s)	18.6	28.5	1.9	1.9								
Lane LOS	C	D	A	A								
Approach Delay (s)	18.6	28.5	1.9	1.9								
Approach LOS	C	D										
Intersection Summary												
Average Delay			9.5									
Intersection Capacity Utilization			50.1%	ICU Level of Service					A			
Analysis Period (min)			15									

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Background
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	140	100	130	80	10	50	320	160	10	320	10
Future Volume (vph)	40	140	100	130	80	10	50	320	160	10	320	10
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		0.952			0.994				0.850		0.996	
Flt Protected		0.993			0.971			0.993			0.999	
Satd. Flow (prot)	0	1761	0	0	1798	0	0	1850	1583	0	1853	0
Flt Permitted		0.924			0.659			0.918			0.987	
Satd. Flow (perm)	0	1639	0	0	1220	0	0	1710	1583	0	1831	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		42			4				174			2
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		273			331			761			180	
Travel Time (s)		6.2			7.5			17.3			4.1	
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)	43	152	109	141	87	11	54	348	174	11	348	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	304	0	0	239	0	0	402	174	0	370	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Detector Phase	2	2		2	2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Minimum Split (s)	10.0	10.0		10.0	10.0		7.0	7.0	7.0	7.0	7.0	
Total Split (s)	40.0	40.0		40.0	40.0		25.0	25.0	25.0	25.0	25.0	
Total Split (%)	48.2%	48.2%		48.2%	48.2%		30.1%	30.1%	30.1%	30.1%	30.1%	
Maximum Green (s)	35.0	35.0		35.0	35.0		21.0	21.0	21.0	21.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			4.0	4.0		4.0	
Lead/Lag							Lag	Lag	Lag	Lag	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	
Recall Mode	Min	Min		Min	Min		None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		14.8			14.8			21.3	21.3		21.3	
Actuated g/C Ratio		0.33			0.33			0.47	0.47		0.47	
v/c Ratio		0.54			0.59			0.50	0.21		0.43	
Control Delay		13.9			18.6			12.6	2.9		11.4	
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		13.9			18.6			12.6	2.9		11.4	
LOS		B			B			B	A		B	
Approach Delay		13.9			18.6			9.7			11.4	
Approach LOS		B			B			A			B	

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Background
PM Peak Hour

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	22%
Maximum Green (s)	15.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	8.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Background

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		52			49			64	0		56	
Queue Length 95th (ft)		103			99			172	29		150	
Internal Link Dist (ft)		193			251			681			100	
Turn Bay Length (ft)												
Base Capacity (vph)		1294			957			804	837		862	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.23			0.25			0.50	0.21		0.43	

Intersection Summary

Area Type: Other

Cycle Length: 83

Actuated Cycle Length: 45.2

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 12.4

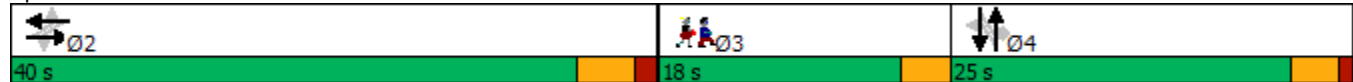
Intersection LOS: B

Intersection Capacity Utilization 80.1%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 14: Willow Street & Johnson Street/Pine Street



Lane Group	Ø3
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

14: Willow Street & Johnson Street/Pine Street

2035 Background
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	140	100	130	80	10	50	320	160	10	320	10
Future Volume (vph)	40	140	100	130	80	10	50	320	160	10	320	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.0	4.0		4.0	
Lane Util. Factor		1.00			1.00			1.00	1.00		1.00	
Frt		0.95			0.99			1.00	0.85		1.00	
Flt Protected		0.99			0.97			0.99	1.00		1.00	
Satd. Flow (prot)		1760			1798			1850	1583		1853	
Flt Permitted		0.92			0.66			0.92	1.00		0.99	
Satd. Flow (perm)		1637			1219			1711	1583		1832	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	152	109	141	87	11	54	348	174	11	348	11
RTOR Reduction (vph)	0	28	0	0	3	0	0	0	92	0	1	0
Lane Group Flow (vph)	0	276	0	0	236	0	0	402	82	0	369	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Actuated Green, G (s)		14.8			14.8			21.3	21.3		21.3	
Effective Green, g (s)		14.8			14.8			21.3	21.3		21.3	
Actuated g/C Ratio		0.33			0.33			0.47	0.47		0.47	
Clearance Time (s)		5.0			5.0			4.0	4.0		4.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		537			400			808	747		865	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.19			c0.23	0.05		0.20	
v/c Ratio		0.51			0.59			0.50	0.11		0.43	
Uniform Delay, d1		12.2			12.6			8.2	6.6		7.9	
Progression Factor		1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.8			2.3			0.5	0.1		0.3	
Delay (s)		13.1			15.0			8.7	6.7		8.2	
Level of Service		B			B			A	A		A	
Approach Delay (s)		13.1			15.0			8.1			8.2	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			10.2									
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			45.1									
Intersection Capacity Utilization			80.1%									
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
23: West Main Street & Park Place

2035 Background
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	WBR2	SBL	SBR	SEL	SER
Lane Configurations		↰	↰						
Traffic Volume (vph)	80	200	90	280	80	0	0	0	0
Future Volume (vph)	80	200	90	280	80	0	0	0	0
Ideal Flow (vphpl)	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
Frt			0.892						
Flt Protected		0.986							
Satd. Flow (prot)	0	1837	1662	0	0	0	0	0	0
Flt Permitted		0.986							
Satd. Flow (perm)	0	1837	1662	0	0	0	0	0	0
Link Speed (mph)		30	30			30		30	
Link Distance (ft)		124	497			185		184	
Travel Time (s)		2.8	11.3			4.2		4.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	217	98	304	87	0	0	0	0
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	304	489	0	0	0	0	0	0
Sign Control		Free	Free			Stop		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 48.5% ICU Level of Service A

Analysis Period (min) 15

Lanes, Volumes, Timings

2035 Build Condition

1: Riverside Street/Route 8 Off Ramp & West Main Street & Watertown Avenue

PM Peak Hour

	→	↘	↙	←	↘	↓	↙	↘	↙	↘		
Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2	Ø5	Ø6
Lane Configurations	↑	↑	↑	↑↑	↑	↑		↑	↑			
Traffic Volume (vph)	689	150	320	362	154	77	56	319	201	118		
Future Volume (vph)	689	150	320	362	154	77	56	319	201	118		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Storage Length (ft)		40	0		0		0	230	0			
Storage Lanes		1	1		1		0	1	1			
Taper Length (ft)			25		25			25				
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00		
Frt		0.850				0.937			0.850			
Flt Protected			0.950		0.950			0.950				
Satd. Flow (prot)	1863	1583	1770	3539	1770	1745	0	1770	1583	0		
Flt Permitted			0.091		0.950			0.950				
Satd. Flow (perm)	1863	1583	170	3539	1770	1745	0	1770	1583	0		
Right Turn on Red		Yes								Yes		
Satd. Flow (RTOR)		118							82			
Link Speed (mph)	30			30		30		30				
Link Distance (ft)	237			379		329		394				
Travel Time (s)	5.4			8.6		7.5		9.0				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	749	163	348	393	167	84	61	347	218	128		
Shared Lane Traffic (%)												
Lane Group Flow (vph)	749	163	348	393	167	145	0	347	346	0		
Turn Type	NA	Perm	pm+pt	NA	Split	NA		Prot	Prot			
Protected Phases	1		2	1 2	3	3		4	4		5	6
Permitted Phases		1	1 2									
Minimum Split (s)	14.0	14.0	7.0		13.0	13.0		13.0	13.0		22.0	6.0
Total Split (s)	48.0	48.0	22.5		16.0	16.0		33.5	33.5		50.0	20.5
Total Split (%)	40.0%	40.0%	18.8%		13.3%	13.3%		27.9%	27.9%		42%	17%
Maximum Green (s)	44.0	44.0	18.5		12.0	12.0		29.5	29.5		46.0	16.5
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0
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	Lead	Lag		Lead	Lead		Lag	Lag		Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes
Act Effect Green (s)	44.0	44.0	62.5	66.5	12.0	12.0		29.5	29.5			
Actuated g/C Ratio	0.37	0.37	0.52	0.55	0.10	0.10		0.25	0.25			
v/c Ratio	1.10	0.25	1.04	0.20	0.94	0.83		0.80	0.77			
Control Delay	100.4	9.5	80.2	5.0	108.4	88.8		57.4	44.4			
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0			
Total Delay	100.4	9.5	80.2	5.0	108.4	88.8		57.4	44.4			
LOS	F	A	F	A	F	F		E	D			
Approach Delay	84.2			40.3		99.3		50.9				
Approach LOS	F			D		F		D				
Queue Length 50th (ft)	~657	23	~249	22	131	112		253	194			
Queue Length 95th (ft)	#894	70	m#342	m26	#268	#227		#397	#332			
Internal Link Dist (ft)	157			299		249		314				
Turn Bay Length (ft)		40						230				
Base Capacity (vph)	683	655	335	1961	177	174		435	450			

Lane Group	Ø7	Ø8
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Peak Hour Factor		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	7	8
Permitted Phases		
Minimum Split (s)	18.0	22.5
Total Split (s)	27.0	22.5
Total Split (%)	23%	19%
Maximum Green (s)	23.0	18.5
Yellow Time (s)	3.0	3.0
All-Red Time (s)	1.0	1.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		



Lane Group	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2	Ø5	Ø6
Starvation Cap Reductn	0	0	0	0	0	0		0	0			
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	1.10	0.25	1.04	0.20	0.94	0.83		0.80	0.77			

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green

Natural Cycle: 140

Control Type: Pretimed

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 65.0

Intersection LOS: E

Intersection Capacity Utilization 94.5%

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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Riverside Street/Route 8 Off Ramp & West Main Street & Watertown Avenue

#1 ← Ø1 48 s	#1 ← Ø2 (R) 22.5 s	#1 ← Ø3 16 s	#1 ← Ø4 33.5 s
#2 ← Ø5 50 s	#2 ← Ø6 20.5 s	#2 ← Ø7 27 s	#2 ← Ø8 22.5 s

Lane Group	Ø7	Ø8
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

HCM Signalized Intersection Capacity Analysis

2035 Build Condition

1: Riverside Street/Route 8 Off Ramp & West Main Street & Watertown Avenue

PM Peak Hour



Movement	EBT	EBR	WBL	WBT	SBL	SBT	SBR	SEL	SER	SER2
Lane Configurations	↑	↑	↑	↑↑	↑	↑		↑	↑	
Traffic Volume (vph)	689	150	320	362	154	77	56	319	201	118
Future Volume (vph)	689	150	320	362	154	77	56	319	201	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00		1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.94		1.00	0.85	
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1863	1583	1770	3539	1770	1745		1770	1583	
Flt Permitted	1.00	1.00	0.09	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1863	1583	169	3539	1770	1745		1770	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	749	163	348	393	167	84	61	347	218	128
RTOR Reduction (vph)	0	75	0	0	0	0	0	0	62	0
Lane Group Flow (vph)	749	88	348	393	167	145	0	347	284	0
Turn Type	NA	Perm	pm+pt	NA	Split	NA		Prot	Prot	
Protected Phases	1		2	1 2	3	3		4	4	
Permitted Phases		1	1 2							
Actuated Green, G (s)	44.0	44.0	62.5	66.5	12.0	12.0		29.5	29.5	
Effective Green, g (s)	44.0	44.0	62.5	66.5	12.0	12.0		29.5	29.5	
Actuated g/C Ratio	0.37	0.37	0.52	0.55	0.10	0.10		0.25	0.25	
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	683	580	334	1961	177	174		435	389	
v/s Ratio Prot	c0.40		c0.16	c0.11	c0.09	0.08		c0.20	0.18	
v/s Ratio Perm		0.06	0.38							
v/c Ratio	1.10	0.15	1.04	0.20	0.94	0.83		0.80	0.73	
Uniform Delay, d1	38.0	25.5	47.3	13.4	53.7	53.0		42.5	41.6	
Progression Factor	1.00	1.00	0.67	0.36	1.00	1.00		1.00	1.00	
Incremental Delay, d2	63.9	0.6	49.5	0.1	54.2	35.2		14.1	11.5	
Delay (s)	101.9	26.0	81.4	4.9	107.9	88.2		56.6	53.1	
Level of Service	F	C	F	A	F	F		E	D	
Approach Delay (s)	88.3			40.8		98.7		54.8		
Approach LOS	F			D		F		D		

Intersection Summary

HCM 2000 Control Delay	67.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

2035 Build Condition

2: Riverside Street/Watertown Avenue & West Main Street

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 				
Traffic Volume (vph)	330	950	0	0	580	760	80	670	160	0	0	0
Future Volume (vph)	330	950	0	0	580	760	80	670	160	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
Frnt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	3539	0	0	1863	1583	1770	3539	1583	0	0	0
Flt Permitted	0.426						0.950					
Satd. Flow (perm)	794	3539	0	0	1863	1583	1770	3539	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						325			174			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		379			838			247			271	
Travel Time (s)		8.6			19.0			5.6			6.2	
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)	359	1033	0	0	630	826	87	728	174	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	359	1033	0	0	630	826	87	728	174	0	0	0
Turn Type	custom	NA			NA	Perm	Split	NA	Prot			
Protected Phases	6	5 6 8			5		7	7	7			
Permitted Phases	5 8					5						
Minimum Split (s)	6.0				22.0	22.0	18.0	18.0	18.0			
Total Split (s)	20.5				50.0	50.0	27.0	27.0	27.0			
Total Split (%)	17.1%				41.7%	41.7%	22.5%	22.5%	22.5%			
Maximum Green (s)	16.5				46.0	46.0	23.0	23.0	23.0			
Yellow Time (s)	3.0				3.0	3.0	3.0	3.0	3.0			
All-Red Time (s)	1.0				1.0	1.0	1.0	1.0	1.0			
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	Lag				Lead	Lead	Lead	Lead	Lead			
Lead-Lag Optimize?	Yes				Yes	Yes	Yes	Yes	Yes			
Act Effct Green (s)	85.0	89.0			46.0	46.0	23.0	23.0	23.0			
Actuated g/C Ratio	0.71	0.74			0.38	0.38	0.19	0.19	0.19			
v/c Ratio	0.52	0.39			0.88	1.02	0.26	1.07	0.39			
Control Delay	5.5	3.1			50.1	60.8	43.6	102.0	8.8			
Queue Delay	0.2	1.7			1.1	0.0	0.0	0.0	0.0			
Total Delay	5.6	4.8			51.2	60.8	43.6	102.0	8.8			
LOS	A	A			D	E	D	F	A			
Approach Delay		5.0			56.6			80.5				
Approach LOS		A			E			F				
Queue Length 50th (ft)	43	76			450	~514	58	~330	0			
Queue Length 95th (ft)	m45	m74			#666	#762	107	#453	60			
Internal Link Dist (ft)		299			758			167			191	
Turn Bay Length (ft)												
Base Capacity (vph)	696	2624			714	807	339	678	444			
Starvation Cap Reductn	41	1356			0	0	0	0	0			
Spillback Cap Reductn	0	0			16	0	0	0	0			
Storage Cap Reductn	0	0			0	0	0	0	0			

Lanes, Volumes, Timings
2: Riverside Street/Watertown Avenue & West Main Street

2035 Build Condition
PM Peak Hour

Lane Group	Ø1	Ø2	Ø3	Ø4	Ø8
Lane Configurations					
Traffic Volume (vph)					
Future Volume (vph)					
Ideal Flow (vphpl)					
Lane Util. Factor					
Fr t					
Flt Protected					
Satd. Flow (prot)					
Flt Permitted					
Satd. Flow (perm)					
Right Turn on Red					
Satd. Flow (RTOR)					
Link Speed (mph)					
Link Distance (ft)					
Travel Time (s)					
Peak Hour Factor					
Adj. Flow (vph)					
Shared Lane Traffic (%)					
Lane Group Flow (vph)					
Turn Type					
Protected Phases	1	2	3	4	8
Permitted Phases					
Minimum Split (s)	14.0	7.0	13.0	13.0	22.5
Total Split (s)	48.0	22.5	16.0	33.5	22.5
Total Split (%)	40%	19%	13%	28%	19%
Maximum Green (s)	44.0	18.5	12.0	29.5	18.5
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)					
Total Lost Time (s)					
Lead/Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes
Act Effct Green (s)					
Actuated g/C Ratio					
v/c Ratio					
Control Delay					
Queue Delay					
Total Delay					
LOS					
Approach Delay					
Approach LOS					
Queue Length 50th (ft)					
Queue Length 95th (ft)					
Internal Link Dist (ft)					
Turn Bay Length (ft)					
Base Capacity (vph)					
Starvation Cap Reductn					
Spillback Cap Reductn					
Storage Cap Reductn					

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Reduced v/c Ratio	0.55	0.81			0.90	1.02	0.26	1.07	0.39			

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green

Natural Cycle: 140

Control Type: Pretimed

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 44.0

Intersection LOS: D

Intersection Capacity Utilization 93.9%

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.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Riverside Street/Watertown Avenue & West Main Street

#1 	#1 	#1 	#1 
Ø1	Ø2 (R)	Ø3	Ø4
48 s	22.5 s	16 s	33.5 s
#2 	#2 	#2 	#2 
Ø5	Ø6	Ø7	Ø8
50 s	20.5 s	27 s	22.5 s

Lane Group	Ø1	Ø2	Ø3	Ø4	Ø8
Reduced v/c Ratio					
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

2: Riverside Street/Watertown Avenue & West Main Street

2035 Build Condition

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 						 				
Traffic Volume (vph)	330	950	0	0	580	760	80	670	160	0	0	0
Future Volume (vph)	330	950	0	0	580	760	80	670	160	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			1.00	1.00	1.00	0.95	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			1863	1583	1770	3539	1583			
Flt Permitted	0.43	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	793	3539			1863	1583	1770	3539	1583			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	359	1033	0	0	630	826	87	728	174	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	200	0	0	141	0	0	0
Lane Group Flow (vph)	359	1033	0	0	630	626	87	728	33	0	0	0
Turn Type	custom	NA			NA	Perm	Split	NA	Prot			
Protected Phases	6	5 6 8			5		7	7	7			
Permitted Phases	5 8					5						
Actuated Green, G (s)	85.0	89.0			46.0	46.0	23.0	23.0	23.0			
Effective Green, g (s)	85.0	89.0			46.0	46.0	23.0	23.0	23.0			
Actuated g/C Ratio	0.71	0.74			0.38	0.38	0.19	0.19	0.19			
Clearance Time (s)	4.0				4.0	4.0	4.0	4.0	4.0			
Lane Grp Cap (vph)	696	2624			714	606	339	678	303			
v/s Ratio Prot	c0.07	c0.29			0.34		0.05	c0.21	0.02			
v/s Ratio Perm	c0.29					c0.40						
v/c Ratio	0.52	0.39			0.88	1.03	0.26	1.07	0.11			
Uniform Delay, d1	9.3	5.7			34.5	37.0	41.2	48.5	40.0			
Progression Factor	0.53	0.50			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	1.1	0.2			14.8	45.1	1.8	56.1	0.7			
Delay (s)	6.1	3.0			49.3	82.1	43.1	104.6	40.8			
Level of Service	A	A			D	F	D	F	D			
Approach Delay (s)		3.8			67.9			87.9			0.0	
Approach LOS		A			E			F			A	
Intersection Summary												
HCM 2000 Control Delay			49.8				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			93.9%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings

3: Walgreens Driveway/Thomaston Avenue & West Main Street

2035 Build Condition

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	820	20	10	920	320	10	10	10	360	10	370
Future Volume (vph)	270	820	20	10	920	320	10	10	10	360	10	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.962			0.955				0.850
Flt Protected	0.950							0.984			0.954	
Satd. Flow (prot)	1770	1855	0	0	3405	0	0	1750	0	0	1777	1583
Flt Permitted	0.072				0.945			0.863			0.748	
Satd. Flow (perm)	134	1855	0	0	3217	0	0	1535	0	0	1393	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			49			11				341
Link Speed (mph)		30			30			30				30
Link Distance (ft)		838			378			196				228
Travel Time (s)		19.0			8.6			4.5				5.2
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)	293	891	22	11	1000	348	11	11	11	391	11	402
Shared Lane Traffic (%)												
Lane Group Flow (vph)	293	913	0	0	1359	0	0	33	0	0	402	402
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Detector Phase	5	2		1	6		4	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0		1.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	22.5		5.0	22.5		26.0	26.0		10.0	10.0	10.0
Total Split (s)	28.0	79.0		5.0	56.0		36.0	36.0		36.0	36.0	36.0
Total Split (%)	23.3%	65.8%		4.2%	46.7%		30.0%	30.0%		30.0%	30.0%	30.0%
Maximum Green (s)	23.0	74.0		2.0	51.0		33.0	33.0		31.0	31.0	31.0
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		0.0	2.0		0.0	0.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	5.0	5.0			5.0			3.0			5.0	5.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	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	Min		None	Min		None	None		None	None	None
Walk Time (s)							7.0	7.0				
Flash Dont Walk (s)							16.0	16.0				
Pedestrian Calls (#/hr)							0	0				
Act Effct Green (s)	73.5	73.5			50.3			33.1			31.1	31.1
Actuated g/C Ratio	0.64	0.64			0.44			0.29			0.27	0.27
v/c Ratio	0.85	0.77			0.94			0.07			1.07	0.59
Control Delay	52.3	19.7			44.1			23.9			106.2	10.9
Queue Delay	0.0	1.1			0.0			0.0			0.0	0.0
Total Delay	52.3	20.8			44.1			23.9			106.2	10.9
LOS	D	C			D			C			F	B
Approach Delay		28.5			44.1			23.9			58.5	
Approach LOS		C			D			C			E	

Lanes, Volumes, Timings
3: Walgreens Driveway/Thomaston Avenue & West Main Street

2035 Build Condition

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	159	437			480			12			~331	34
Queue Length 95th (ft)	#262	610			#688			39			#556	138
Internal Link Dist (ft)		758			298			116			148	
Turn Bay Length (ft)												
Base Capacity (vph)	414	1225			1461			450			377	677
Starvation Cap Reductn	0	129			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	0.71	0.83			0.93			0.07			1.07	0.59

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 114.6

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 41.8

Intersection LOS: D

Intersection Capacity Utilization 120.0%

ICU Level of Service H

Analysis Period (min) 15

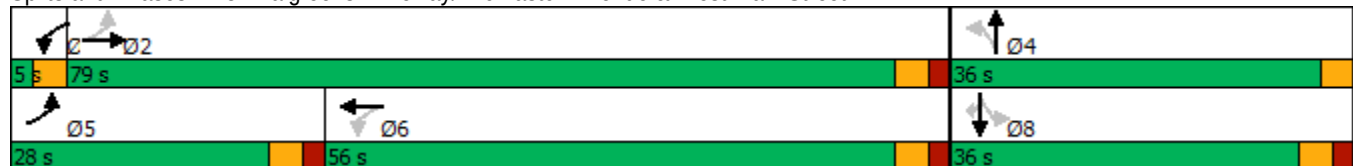
~ Volume exceeds capacity, queue is theoretically infinite.

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: 3: Walgreens Driveway/Thomaston Avenue & West Main Street



HCM Signalized Intersection Capacity Analysis

3: Walgreens Driveway/Thomaston Avenue & West Main Street

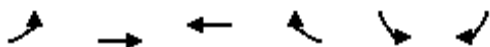
2035 Build Condition

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	820	20	10	920	320	10	10	10	360	10	370
Future Volume (vph)	270	820	20	10	920	320	10	10	10	360	10	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			5.0			3.0			5.0	5.0
Lane Util. Factor	1.00	1.00			0.95			1.00			1.00	1.00
Frt	1.00	1.00			0.96			0.95			1.00	0.85
Flt Protected	0.95	1.00			1.00			0.98			0.95	1.00
Satd. Flow (prot)	1770	1856			3402			1750			1776	1583
Flt Permitted	0.07	1.00			0.95			0.86			0.75	1.00
Satd. Flow (perm)	135	1856			3218			1535			1393	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	891	22	11	1000	348	11	11	11	391	11	402
RTOR Reduction (vph)	0	1	0	0	27	0	0	8	0	0	0	248
Lane Group Flow (vph)	293	912	0	0	1332	0	0	25	0	0	402	154
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2			6			4			8		8
Actuated Green, G (s)	73.5	73.5			50.3			33.1			31.1	31.1
Effective Green, g (s)	73.5	73.5			50.3			33.1			31.1	31.1
Actuated g/C Ratio	0.64	0.64			0.44			0.29			0.27	0.27
Clearance Time (s)	5.0	5.0			5.0			3.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	346	1190			1412			443			378	429
v/s Ratio Prot	0.13	c0.49										
v/s Ratio Perm	0.41				c0.41			0.02			c0.29	0.10
v/c Ratio	0.85	0.77			0.94			0.06			1.06	0.36
Uniform Delay, d1	34.4	14.5			30.8			29.5			41.8	33.7
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	17.1	3.0			12.7			0.1			64.1	0.5
Delay (s)	51.5	17.5			43.5			29.5			105.9	34.2
Level of Service	D	B			D			C			F	C
Approach Delay (s)		25.8			43.5			29.5			70.0	
Approach LOS		C			D			C			E	
Intersection Summary												
HCM 2000 Control Delay	43.4			HCM 2000 Level of Service					D			
HCM 2000 Volume to Capacity ratio	0.97											
Actuated Cycle Length (s)	114.6			Sum of lost time (s)					15.0			
Intersection Capacity Utilization	120.0%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
4: West Main Street & Sperry Street

2035 Build Condition
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	240	1020	1070	120	33	210
Future Volume (vph)	240	1020	1070	120	33	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	100	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.986			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1837	0	1770	1583
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1863	1837	0	1770	1583
Link Speed (mph)		30	30		30	
Link Distance (ft)		141	487		207	
Travel Time (s)		3.2	11.1		4.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	261	1109	1163	130	36	228
Shared Lane Traffic (%)						
Lane Group Flow (vph)	261	1109	1293	0	36	228
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

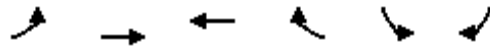
Intersection Capacity Utilization 90.2% ICU Level of Service E

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

4: West Main Street & Sperry Street

2035 Build Condition
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	240	1020	1070	120	33	210
Future Volume (Veh/h)	240	1020	1070	120	33	210
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	261	1109	1163	130	36	228
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		646	921			
pX, platoon unblocked	0.69				0.81	0.69
vC, conflicting volume	1293				2859	1228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1200				2312	1106
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	35				0	0
cM capacity (veh/h)	401				12	177
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	261	1109	1293	36	228	
Volume Left	261	0	0	36	0	
Volume Right	0	0	130	0	228	
cSH	401	1700	1700	12	177	
Volume to Capacity	0.65	0.65	0.76	3.02	1.29	
Queue Length 95th (ft)	111	0	0	Err	325	
Control Delay (s)	29.2	0.0	0.0	Err	217.7	
Lane LOS	D			F	F	
Approach Delay (s)	5.6		0.0	1551.5		
Approach LOS				F		
Intersection Summary						
Average Delay			142.5			
Intersection Capacity Utilization			90.2%		ICU Level of Service	E
Analysis Period (min)			15			

Lanes, Volumes, Timings
5: Meadow Street/Willow Street & West Main Street

2035 Build Condition

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	602	200	155	467	68	198	258	143	187	140	228
Future Volume (vph)	50	602	200	155	467	68	198	258	143	187	140	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		100	100		0	0		50	0		0
Storage Lanes	1		1	1		0	1		1	1		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		0.981				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1827	0	1770	1863	1583	1770	1863	1583
Flt Permitted	0.255			0.183			0.553			0.455		
Satd. Flow (perm)	475	1863	1583	341	1827	0	1030	1863	1583	848	1863	1583
Right Turn on Red			No			No			Yes			Yes
Satd. Flow (RTOR)									114			240
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		434			464			449			348	
Travel Time (s)		9.9			10.5			10.2			7.9	
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)	54	654	217	168	508	74	215	280	155	203	152	248
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	654	217	168	582	0	215	280	155	203	152	248
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	7	1	6		7	4	1	3	8	5
Permitted Phases	2		2	6			4		4	8		8
Detector Phase	5	2	7	1	6		7	4	1	3	8	5
Switch Phase												
Minimum Initial (s)	5.0	1.0	5.0	5.0	1.0		5.0	1.0	5.0	5.0	1.0	5.0
Minimum Split (s)	9.5	15.0	9.5	9.5	15.0		9.5	6.0	9.5	9.5	8.0	9.5
Total Split (s)	9.8	38.5	11.5	10.0	38.7		11.5	17.0	10.0	9.5	15.0	9.8
Total Split (%)	13.1%	51.3%	15.3%	13.3%	51.6%		15.3%	22.7%	13.3%	12.7%	20.0%	13.1%
Maximum Green (s)	5.3	32.5	7.0	5.5	32.7		7.0	13.0	5.5	5.0	9.0	5.3
Yellow Time (s)	3.5	3.0	3.5	3.5	3.0		3.5	3.0	3.5	3.5	3.0	3.5
All-Red Time (s)	1.0	3.0	1.0	1.0	3.0		1.0	1.0	1.0	1.0	3.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	6.0	4.5	4.5	6.0		4.5	4.0	4.5	4.5	6.0	4.5
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Max	None	None	Max		None	None	None	None	None	None
Act Effect Green (s)	39.3	32.5	45.5	39.7	32.7		19.3	12.8	22.3	15.3	8.8	20.1
Actuated g/C Ratio	0.53	0.43	0.61	0.53	0.44		0.26	0.17	0.30	0.20	0.12	0.27
v/c Ratio	0.16	0.81	0.23	0.59	0.73		0.64	0.88	0.28	0.86	0.69	0.41
Control Delay	7.9	28.4	7.4	16.5	24.0		32.3	60.2	8.4	59.8	50.1	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.6		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	28.4	7.4	16.5	24.6		32.3	60.2	8.4	59.8	50.1	6.0
LOS	A	C	A	B	C		C	E	A	E	D	A
Approach Delay		22.3			22.8			38.6			35.2	
Approach LOS		C			C			D			D	

Lanes, Volumes, Timings
5: Meadow Street/Willow Street & West Main Street

2035 Build Condition

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	10	255	41	32	215		80	128	14	75	69	3
Queue Length 95th (ft)	23	#441	72	59	337		#144	#259	55	#184	#150	54
Internal Link Dist (ft)		354			384			369			268	
Turn Bay Length (ft)	50		100	100					50			
Base Capacity (vph)	341	809	962	286	798		334	323	552	235	224	601
Starvation Cap Reductn	0	0	0	0	48		0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.81	0.23	0.59	0.78		0.64	0.87	0.28	0.86	0.68	0.41

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 74.8

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 28.7

Intersection LOS: C

Intersection Capacity Utilization 80.0%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 5: Meadow Street/Willow Street & West Main Street

 Ø1	 Ø2	 Ø3	 Ø4
10 s	38.5 s	9.5 s	17 s
 Ø5	 Ø6	 Ø7	 Ø8
9.8 s	38.7 s	11.5 s	15 s

HCM Signalized Intersection Capacity Analysis

5: Meadow Street/Willow Street & West Main Street

2035 Build Condition

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	602	200	155	467	68	198	258	143	187	140	228
Future Volume (vph)	50	602	200	155	467	68	198	258	143	187	140	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	6.0	4.5	4.5	6.0		4.5	4.0	4.5	4.5	6.0	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1827		1770	1863	1583	1770	1863	1583
Flt Permitted	0.25	1.00	1.00	0.18	1.00		0.55	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)	474	1863	1583	341	1827		1030	1863	1583	847	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	654	217	168	508	74	215	280	155	203	152	248
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	86	0	0	195
Lane Group Flow (vph)	54	654	217	168	582	0	215	280	69	203	152	53
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov
Protected Phases	5	2	7	1	6		7	4	1	3	8	5
Permitted Phases	2		2	6			4		4	8		8
Actuated Green, G (s)	37.8	32.5	39.5	38.2	32.7		19.8	12.8	18.3	13.8	8.8	14.1
Effective Green, g (s)	37.8	32.5	39.5	38.2	32.7		19.8	12.8	18.3	13.8	8.8	14.1
Actuated g/C Ratio	0.51	0.43	0.53	0.51	0.44		0.26	0.17	0.24	0.18	0.12	0.19
Clearance Time (s)	4.5	6.0	4.5	4.5	6.0		4.5	4.0	4.5	4.5	6.0	4.5
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
Lane Grp Cap (vph)	331	809	835	279	798		341	318	387	217	219	298
v/s Ratio Prot	0.01	c0.35	0.02	c0.04	0.32		0.06	c0.15	0.01	c0.06	0.08	0.01
v/s Ratio Perm	0.07		0.11	0.26			0.11		0.03	0.11		0.02
v/c Ratio	0.16	0.81	0.26	0.60	0.73		0.63	0.88	0.18	0.94	0.69	0.18
Uniform Delay, d1	10.8	18.4	9.7	12.8	17.4		23.2	30.3	22.3	29.9	31.7	25.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	8.5	0.2	3.6	5.8		3.8	23.5	0.2	43.0	9.2	0.3
Delay (s)	11.1	27.0	9.8	16.4	23.2		27.0	53.7	22.5	72.9	40.9	25.8
Level of Service	B	C	A	B	C		C	D	C	E	D	C
Approach Delay (s)		22.0			21.7			37.4			45.4	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			30.2			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			74.8			Sum of lost time (s)			21.0			
Intersection Capacity Utilization			80.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
6: State Street/Holmes Avenue & West Main Street

2035 Build Condition

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	810	0	0	730	20	50	60	30	80	0	60
Future Volume (vph)	80	810	0	0	730	20	50	60	30	80	0	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0	0		0	0		0	0		0
Storage Lanes	1		0	0		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					0.996			0.971			0.942	
Flt Protected	0.950							0.983			0.972	
Satd. Flow (prot)	1770	1863	0	0	1855	0	0	1778	0	0	1706	0
Flt Permitted	0.278							0.830			0.706	
Satd. Flow (perm)	518	1863	0	0	1855	0	0	1501	0	0	1239	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5			16			43	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		464			270			230			199	
Travel Time (s)		10.5			6.1			5.2			4.5	
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)	87	880	0	0	793	22	54	65	33	87	0	65
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	880	0	0	815	0	0	152	0	0	152	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2						4			8		
Detector Phase	2	2			6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	1.0	1.0			1.0		1.0	1.0		1.0	1.0	
Minimum Split (s)	15.0	15.0			15.0		8.0	8.0		8.0	8.0	
Total Split (s)	58.0	58.0			58.0		17.0	17.0		17.0	17.0	
Total Split (%)	77.3%	77.3%			77.3%		22.7%	22.7%		22.7%	22.7%	
Maximum Green (s)	54.0	54.0			54.0		12.0	12.0		12.0	12.0	
Yellow Time (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0			1.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	
Total Lost Time (s)	4.0	4.0			4.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max			Max		None	None		None	None	
Act Effct Green (s)	54.0	54.0			54.0			10.5			10.5	
Actuated g/C Ratio	0.73	0.73			0.73			0.14			0.14	
v/c Ratio	0.23	0.64			0.60			0.67			0.71	
Control Delay	5.2	7.9			7.1			42.0			41.5	
Queue Delay	0.0	1.6			2.1			0.0			0.0	
Total Delay	5.2	9.5			9.2			42.0			41.5	
LOS	A	A			A			D			D	
Approach Delay		9.1			9.2			42.0			41.5	
Approach LOS		A			A			D			D	

Lanes, Volumes, Timings
6: State Street/Holmes Avenue & West Main Street

2035 Build Condition
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	11	174			151			59			47	
Queue Length 95th (ft)	27	278			238			#129			#127	
Internal Link Dist (ft)		384			190			150			119	
Turn Bay Length (ft)	50											
Base Capacity (vph)	380	1369			1365			258			238	
Starvation Cap Reductn	0	298			390			0			0	
Spillback Cap Reductn	0	0			0			0			0	
Storage Cap Reductn	0	0			0			0			0	
Reduced v/c Ratio	0.23	0.82			0.84			0.59			0.64	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 73.5

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 13.9

Intersection LOS: B

Intersection Capacity Utilization 68.1%

ICU Level of Service C

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 6: State Street/Holmes Avenue & West Main Street

 Ø2	 Ø4
58 s	17 s
 Ø6	 Ø8
58 s	17 s

HCM Signalized Intersection Capacity Analysis

6: State Street/Holmes Avenue & West Main Street

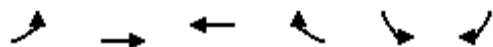
2035 Build Condition

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	810	0	0	730	20	50	60	30	80	0	60
Future Volume (vph)	80	810	0	0	730	20	50	60	30	80	0	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			0.97			0.94	
Flt Protected	0.95	1.00			1.00			0.98			0.97	
Satd. Flow (prot)	1770	1863			1856			1777			1706	
Flt Permitted	0.28	1.00			1.00			0.83			0.71	
Satd. Flow (perm)	517	1863			1856			1501			1240	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	880	0	0	793	22	54	65	33	87	0	65
RTOR Reduction (vph)	0	0	0	0	1	0	0	14	0	0	37	0
Lane Group Flow (vph)	87	880	0	0	814	0	0	138	0	0	115	0
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2						4			8		
Actuated Green, G (s)	54.0	54.0			54.0			10.5			10.5	
Effective Green, g (s)	54.0	54.0			54.0			10.5			10.5	
Actuated g/C Ratio	0.73	0.73			0.73			0.14			0.14	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	379	1368			1363			214			177	
v/s Ratio Prot		c0.47			0.44							
v/s Ratio Perm	0.17							0.09			c0.09	
v/c Ratio	0.23	0.64			0.60			0.65			0.65	
Uniform Delay, d1	3.1	4.9			4.6			29.7			29.8	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	1.4	2.3			1.9			6.6			8.3	
Delay (s)	4.5	7.2			6.5			36.3			38.0	
Level of Service	A	A			A			D			D	
Approach Delay (s)		7.0			6.5			36.3			38.0	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			11.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			73.5			Sum of lost time (s)			9.0			
Intersection Capacity Utilization			68.1%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
7: West Main Street & Central Avenue

2035 Build Condition
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	40	930	690	140	60	30
Future Volume (vph)	40	930	690	140	60	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50			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			0.977		0.955	
Flt Protected	0.950				0.968	
Satd. Flow (prot)	1770	1863	1820	0	1722	0
Flt Permitted	0.950				0.968	
Satd. Flow (perm)	1770	1863	1820	0	1722	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		270	124		271	
Travel Time (s)		6.1	2.8		6.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	1011	750	152	65	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	43	1011	902	0	98	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

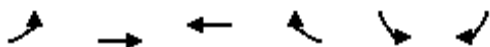
Intersection Capacity Utilization 60.8% ICU Level of Service B

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

7: West Main Street & Central Avenue

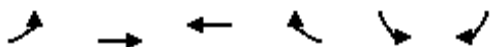
2035 Build Condition
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	40	930	690	140	60	30
Future Volume (Veh/h)	40	930	690	140	60	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	1011	750	152	65	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		270	124			
pX, platoon unblocked	0.68				0.82	0.68
vC, conflicting volume	902				1923	826
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	626				1283	515
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				53	91
cM capacity (veh/h)	654				139	383
Direction, Lane #	EB 1	EB 2	WB 1	SB 1		
Volume Total	43	1011	902	98		
Volume Left	43	0	0	65		
Volume Right	0	0	152	33		
cSH	654	1700	1700	177		
Volume to Capacity	0.07	0.59	0.53	0.55		
Queue Length 95th (ft)	5	0	0	72		
Control Delay (s)	10.9	0.0	0.0	47.9		
Lane LOS	B			E		
Approach Delay (s)	0.4		0.0	47.9		
Approach LOS				E		
Intersection Summary						
Average Delay			2.5			
Intersection Capacity Utilization			60.8%	ICU Level of Service		B
Analysis Period (min)			15			

Lanes, Volumes, Timings
8: West Main Street & Park Place

2035 Build Condition
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	200	280	80	0	0
Future Volume (vph)	80	200	280	80	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.970			
Flt Protected		0.986				
Satd. Flow (prot)	0	1837	1807	0	0	0
Flt Permitted		0.986				
Satd. Flow (perm)	0	1837	1807	0	0	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		247	452		201	
Travel Time (s)		5.6	10.3		4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	217	304	87	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	304	391	0	0	0
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 41.2% ICU Level of Service A

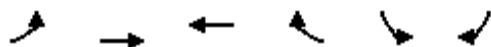
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis

8: West Main Street & Park Place

2035 Build Condition

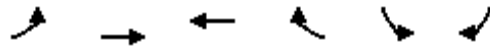
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↩	↩			
Traffic Volume (veh/h)	80	200	280	80	0	0
Future Volume (Veh/h)	80	200	280	80	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	217	304	87	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		247	652			
pX, platoon unblocked						
vC, conflicting volume	391				738	348
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	391				738	348
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				100	100
cM capacity (veh/h)	1168				356	696
Direction, Lane #	EB 1	WB 1				
Volume Total	304	391				
Volume Left	87	0				
Volume Right	0	87				
cSH	1168	1700				
Volume to Capacity	0.07	0.23				
Queue Length 95th (ft)	6	0				
Control Delay (s)	2.9	0.0				
Lane LOS	A					
Approach Delay (s)	2.9	0.0				
Approach LOS						
Intersection Summary						
Average Delay		1.3				
Intersection Capacity Utilization		41.2%		ICU Level of Service		A
Analysis Period (min)		15				

Lanes, Volumes, Timings
9: West Main Street & Park Place

2035 Build Condition
PM Peak Hour

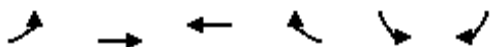


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	150	840	640	130	90	190
Future Volume (vph)	150	840	640	130	90	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.977		0.908	
Flt Protected	0.950				0.984	
Satd. Flow (prot)	1770	1863	1820	0	1664	0
Flt Permitted	0.218				0.984	
Satd. Flow (perm)	406	1863	1820	0	1664	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			36		130	
Link Speed (mph)		30	30		30	
Link Distance (ft)		124	105		247	
Travel Time (s)		2.8	2.4		5.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	913	696	141	98	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	163	913	837	0	305	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Detector Phase	4	4	8		6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	
Minimum Split (s)	22.5	22.5	22.5		16.0	
Total Split (s)	54.0	54.0	54.0		16.0	
Total Split (%)	77.1%	77.1%	77.1%		22.9%	
Maximum Green (s)	49.5	49.5	49.5		11.5	
Yellow Time (s)	3.5	3.5	3.5		3.5	
All-Red Time (s)	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	
Total Lost Time (s)	4.5	4.5	4.5		4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Recall Mode	None	None	None		None	
Walk Time (s)	7.0	7.0	7.0			
Flash Dont Walk (s)	11.0	11.0	11.0			
Pedestrian Calls (#/hr)	0	0	0			
Act Effct Green (s)	32.5	32.5	32.5		10.4	
Actuated g/C Ratio	0.62	0.62	0.62		0.20	
v/c Ratio	0.65	0.79	0.73		0.70	
Control Delay	20.0	13.0	10.7		24.9	
Queue Delay	0.0	0.2	0.0		0.0	
Total Delay	20.0	13.2	10.8		24.9	
LOS	C	B	B		C	
Approach Delay		14.3	10.8		24.9	
Approach LOS		B	B		C	

Lanes, Volumes, Timings

9: West Main Street Confluence

2035 Build Condition
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)	27	181	147		48	
Queue Length 95th (ft)	94	298	245		#196	
Internal Link Dist (ft)		44	25		167	
Turn Bay Length (ft)						
Base Capacity (vph)	361	1657	1623		489	
Starvation Cap Reductn	0	196	54		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.45	0.62	0.53		0.62	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 52.5

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 14.4

Intersection LOS: B

Intersection Capacity Utilization 77.8%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

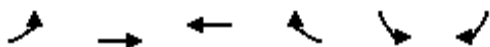
Splits and Phases: 9: West Main Street



HCM Signalized Intersection Capacity Analysis

9: West Main Street Confluence

2035 Build Condition
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	150	840	640	130	90	190
Future Volume (vph)	150	840	640	130	90	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5		4.5	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.91	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1770	1863	1820		1665	
Flt Permitted	0.22	1.00	1.00		0.98	
Satd. Flow (perm)	405	1863	1820		1665	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	913	696	141	98	207
RTOR Reduction (vph)	0	0	13	0	104	0
Lane Group Flow (vph)	163	913	824	0	201	0
Turn Type	Perm	NA	NA		Prot	
Protected Phases		4	8		6	
Permitted Phases	4					
Actuated Green, G (s)	32.5	32.5	32.5		10.4	
Effective Green, g (s)	32.5	32.5	32.5		10.4	
Actuated g/C Ratio	0.63	0.63	0.63		0.20	
Clearance Time (s)	4.5	4.5	4.5		4.5	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	253	1166	1139		333	
v/s Ratio Prot		c0.49	0.45		c0.12	
v/s Ratio Perm	0.40					
v/c Ratio	0.64	0.78	0.72		0.60	
Uniform Delay, d1	6.1	7.1	6.6		18.9	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	5.5	3.5	2.3		3.1	
Delay (s)	11.6	10.6	8.9		22.0	
Level of Service	B	B	A		C	
Approach Delay (s)		10.8	8.9		22.0	
Approach LOS		B	A		C	
Intersection Summary						
HCM 2000 Control Delay			11.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			51.9		Sum of lost time (s)	9.0
Intersection Capacity Utilization			77.8%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
10: Leavenworth Street & West Main Street

2035 Build Condition
PM Peak Hour

							
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
Lane Configurations							
Traffic Volume (vph)	820	40	80	660	130	120	
Future Volume (vph)	820	40	80	660	130	120	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	100		0	0	
Storage Lanes		0	1		1	0	
Taper Length (ft)			25		25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	0.994				0.935		
Flt Protected			0.950		0.975		
Satd. Flow (prot)	1852	0	1770	1863	1698	0	
Flt Permitted			0.153		0.975		
Satd. Flow (perm)	1852	0	285	1863	1698	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	4				41		
Link Speed (mph)	30			30	30		
Link Distance (ft)	421			389	436		
Travel Time (s)	9.6			8.8	9.9		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	891	43	87	717	141	130	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	934	0	87	717	271	0	
Turn Type	NA		D.P+P	NA	Prot		
Protected Phases	1		2	1 2	4		3
Permitted Phases			1				
Detector Phase	1		2	1 2	4		
Switch Phase							
Minimum Initial (s)	1.0		1.0		1.0		1.0
Minimum Split (s)	15.0		6.0		8.0		20.0
Total Split (s)	48.0		6.0		15.0		21.0
Total Split (%)	53.3%		6.7%		16.7%		23%
Maximum Green (s)	44.0		2.0		10.0		18.0
Yellow Time (s)	3.0		3.0		3.0		3.0
All-Red Time (s)	1.0		1.0		2.0		0.0
Lost Time Adjust (s)	0.0		0.0		0.0		
Total Lost Time (s)	4.0		4.0		5.0		
Lead/Lag	Lead		Lag		Lag		Lead
Lead-Lag Optimize?	Yes		Yes		Yes		Yes
Vehicle Extension (s)	3.0		3.0		3.0		3.0
Recall Mode	Max		Max		None		None
Walk Time (s)							8.0
Flash Dont Walk (s)							9.0
Pedestrian Calls (#/hr)							0
Act Effect Green (s)	44.0		46.0	50.0	10.0		
Actuated g/C Ratio	0.64		0.67	0.72	0.14		
v/c Ratio	0.79		0.37	0.53	0.96		
Control Delay	15.5		9.7	6.0	74.3		
Queue Delay	2.1		0.0	1.4	0.0		
Total Delay	17.7		9.7	7.4	74.3		

Lanes, Volumes, Timings
10: Leavenworth Street & West Main Street

2035 Build Condition
PM Peak Hour

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
LOS	B		A	A	E		
Approach Delay	17.7			7.6	74.3		
Approach LOS	B			A	E		
Queue Length 50th (ft)	248		8	105	99		
Queue Length 95th (ft)	415		18	169	#240		
Internal Link Dist (ft)	341			309	356		
Turn Bay Length (ft)			100				
Base Capacity (vph)	1182		233	1350	281		
Starvation Cap Reductn	131		0	413	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.89		0.37	0.77	0.96		

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 69

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 21.3

Intersection LOS: C

Intersection Capacity Utilization 75.4%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 10: Leavenworth Street & West Main Street

 Ø1	 Ø2	 Ø3	 Ø4
48 s	6 s	21 s	15 s

HCM Signalized Intersection Capacity Analysis

10: Leavenworth Street & West Main Street

2035 Build Condition
PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	820	40	80	660	130	120
Future Volume (vph)	820	40	80	660	130	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	1.00	
Frt	0.99		1.00	1.00	0.94	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	1851		1770	1863	1698	
Flt Permitted	1.00		0.15	1.00	0.97	
Satd. Flow (perm)	1851		285	1863	1698	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	891	43	87	717	141	130
RTOR Reduction (vph)	1	0	0	0	35	0
Lane Group Flow (vph)	933	0	87	717	236	0
Turn Type	NA		D.P+P	NA	Prot	
Protected Phases	1		2	1 2	4	
Permitted Phases			1			
Actuated Green, G (s)	44.0		46.0	50.0	10.0	
Effective Green, g (s)	44.0		46.0	50.0	10.0	
Actuated g/C Ratio	0.64		0.67	0.72	0.14	
Clearance Time (s)	4.0		4.0		5.0	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	1180		233	1350	246	
v/s Ratio Prot	c0.50		0.01	c0.38	c0.14	
v/s Ratio Perm			0.24			
v/c Ratio	0.79		0.37	0.53	0.96	
Uniform Delay, d1	9.1		17.9	4.3	29.3	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	5.4		4.5	1.5	45.5	
Delay (s)	14.6		22.5	5.8	74.8	
Level of Service	B		C	A	E	
Approach Delay (s)	14.6			7.6	74.8	
Approach LOS	B			A	E	
Intersection Summary						
HCM 2000 Control Delay			19.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.88			
Actuated Cycle Length (s)			69.0		Sum of lost time (s)	16.0
Intersection Capacity Utilization			75.4%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings

2035 Build Condition

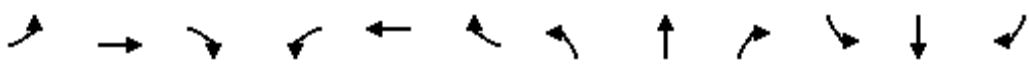
11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	810	70	100	650	50	50	420	50	50	380	50
Future Volume (vph)	60	810	70	100	650	50	50	420	50	50	380	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		130	0		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.988			0.989			0.986			0.984	
Flt Protected	0.950			0.950				0.995			0.995	
Satd. Flow (prot)	1770	3497	0	1770	1842	0	0	3472	0	0	3465	0
Flt Permitted	0.215			0.251				0.838			0.806	
Satd. Flow (perm)	400	3497	0	468	1842	0	0	2924	0	0	2807	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			5			18			20	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		389			245			286			217	
Travel Time (s)		8.8			5.6			6.5			4.9	
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)	65	880	76	109	707	54	54	457	54	54	413	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	956	0	109	761	0	0	565	0	0	521	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			8			4	
Permitted Phases	2			2			8			4		
Detector Phase	2	2		2	2		8	8		4	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Minimum Split (s)	37.0	37.0		37.0	37.0		35.0	35.0		35.0	35.0	
Total Split (s)	40.0	40.0		40.0	40.0		50.0	50.0		50.0	50.0	
Total Split (%)	44.4%	44.4%		44.4%	44.4%		55.6%	55.6%		55.6%	55.6%	
Maximum Green (s)	35.0	35.0		35.0	35.0		45.0	45.0		45.0	45.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
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	Max	Max		Max	Max		None	None		None	None	
Walk Time (s)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)	35.2	35.2		35.2	35.2			17.4			17.4	
Actuated g/C Ratio	0.56	0.56		0.56	0.56			0.28			0.28	
v/c Ratio	0.29	0.49		0.42	0.73			0.68			0.66	
Control Delay	13.1	9.8		15.6	17.0			23.9			23.2	
Queue Delay	0.0	0.3		0.0	0.0			0.0			0.0	
Total Delay	13.1	10.1		15.6	17.0			23.9			23.2	

Lanes, Volumes, Timings

2035 Build Condition

11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	B		B	B			C			C	
Approach Delay		10.3			16.9			23.9			23.2	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	12	100		21	190			96			87	
Queue Length 95th (ft)	43	177		73	#453			143			132	
Internal Link Dist (ft)		309			165			206			137	
Turn Bay Length (ft)	100											
Base Capacity (vph)	224	1969		262	1036			2116			2032	
Starvation Cap Reductn	0	394		0	0			0			213	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.29	0.61		0.42	0.73			0.27			0.29	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 62.6

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 17.1

Intersection LOS: B

Intersection Capacity Utilization 85.4%

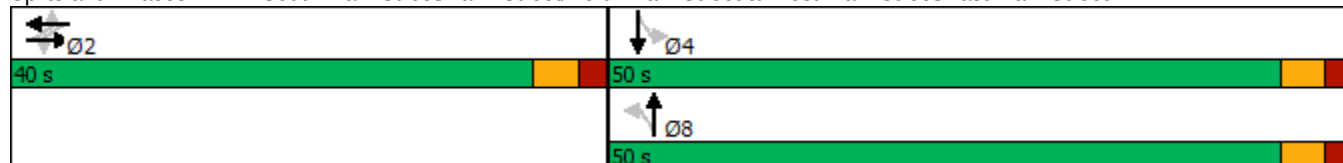
ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street



HCM Signalized Intersection Capacity Analysis

2035 Build Condition

11: South Main Street/Bank Street/North Main Street & West Main Street/East Main Street

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	810	70	100	650	50	50	420	50	50	380	50
Future Volume (vph)	60	810	70	100	650	50	50	420	50	50	380	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	1.00			0.95			0.95	
Frt	1.00	0.99		1.00	0.99			0.99			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	3497		1770	1843			3472			3466	
Flt Permitted	0.22	1.00		0.25	1.00			0.84			0.81	
Satd. Flow (perm)	401	3497		468	1843			2923			2809	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	880	76	109	707	54	54	457	54	54	413	54
RTOR Reduction (vph)	0	5	0	0	2	0	0	13	0	0	14	0
Lane Group Flow (vph)	65	951	0	109	759	0	0	552	0	0	507	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			8			4	
Permitted Phases	2			2			8			4		
Actuated Green, G (s)	35.1	35.1		35.1	35.1			17.4			17.4	
Effective Green, g (s)	35.1	35.1		35.1	35.1			17.4			17.4	
Actuated g/C Ratio	0.56	0.56		0.56	0.56			0.28			0.28	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	225	1963		262	1035			813			782	
v/s Ratio Prot		0.27			c0.41							
v/s Ratio Perm	0.16			0.23				c0.19			0.18	
v/c Ratio	0.29	0.48		0.42	0.73			0.68			0.65	
Uniform Delay, d1	7.2	8.3		7.8	10.2			20.1			19.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	3.2	0.9		4.8	4.6			2.3			1.9	
Delay (s)	10.4	9.1		12.6	14.8			22.3			21.7	
Level of Service	B	A		B	B			C			C	
Approach Delay (s)		9.2			14.5			22.3			21.7	
Approach LOS		A			B			C			C	
Intersection Summary												
HCM 2000 Control Delay			15.4			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			62.5			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			85.4%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
12: North Main Street & West Main Street

2035 Build Condition
PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	140	100	210	330	380	140	
Future Volume (vph)	140	100	210	330	380	140	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	
Frt	0.944				0.960		
Flt Protected	0.972		0.950				
Satd. Flow (prot)	1709	0	1770	1863	3398	0	
Flt Permitted	0.972		0.950				
Satd. Flow (perm)	1709	0	1770	1863	3398	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	34				52		
Link Speed (mph)	30			30	30		
Link Distance (ft)	200			217	246		
Travel Time (s)	4.5			4.9	5.6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	152	109	228	359	413	152	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	261	0	228	359	565	0	
Turn Type	Prot		Prot	NA	NA		
Protected Phases	4		2	1 2	1		3
Permitted Phases							
Detector Phase	4		2	1 2	1		
Switch Phase							
Minimum Initial (s)	1.0		1.0		1.0		1.0
Minimum Split (s)	10.0		20.0		10.0		18.0
Total Split (s)	25.0		25.0		30.0		18.0
Total Split (%)	25.5%		25.5%		30.6%		18%
Maximum Green (s)	21.0		21.0		26.0		15.0
Yellow Time (s)	3.0		3.0		3.0		3.0
All-Red Time (s)	1.0		1.0		1.0		0.0
Lost Time Adjust (s)	0.0		0.0		0.0		
Total Lost Time (s)	4.0		4.0		4.0		
Lead/Lag	Lag		Lag		Lead		Lead
Lead-Lag Optimize?	Yes		Yes		Yes		Yes
Vehicle Extension (s)	3.0		3.0		3.0		3.0
Recall Mode	None		Max		None		None
Walk Time (s)							6.0
Flash Dont Walk (s)							9.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)	14.5		21.4	44.2	18.7		
Actuated g/C Ratio	0.22		0.32	0.66	0.28		
v/c Ratio	0.66		0.40	0.29	0.57		
Control Delay	29.9		23.1	6.0	21.3		
Queue Delay	0.0		2.6	3.0	0.0		
Total Delay	29.9		25.8	9.0	21.3		
LOS	C		C	A	C		
Approach Delay	29.9			15.5	21.3		
Approach LOS	C			B	C		

Lanes, Volumes, Timings
12: North Main Street & West Main Street

2035 Build Condition
PM Peak Hour



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø3
Queue Length 50th (ft)	84		72	51	92		
Queue Length 95th (ft)	171		164	113	153		
Internal Link Dist (ft)	120			137	166		
Turn Bay Length (ft)							
Base Capacity (vph)	571		567	1229	1380		
Starvation Cap Reductn	0		230	747	0		
Spillback Cap Reductn	0		0	0	0		
Storage Cap Reductn	0		0	0	0		
Reduced v/c Ratio	0.46		0.68	0.74	0.41		

Intersection Summary

Area Type: Other

Cycle Length: 98

Actuated Cycle Length: 66.8

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 20.5

Intersection LOS: C

Intersection Capacity Utilization 50.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 12: North Main Street & West Main Street

 Ø1	 Ø2	 Ø3	 Ø4
30 s	25 s	18 s	25 s

HCM Signalized Intersection Capacity Analysis

12: North Main Street & West Main Street

2035 Build Condition
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	140	100	210	330	380	140
Future Volume (vph)	140	100	210	330	380	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frt	0.94		1.00	1.00	0.96	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	1708		1770	1863	3396	
Flt Permitted	0.97		0.95	1.00	1.00	
Satd. Flow (perm)	1708		1770	1863	3396	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	109	228	359	413	152
RTOR Reduction (vph)	27	0	0	0	37	0
Lane Group Flow (vph)	234	0	228	359	528	0
Turn Type	Prot		Prot	NA	NA	
Protected Phases	4		2	1 2	1	
Permitted Phases						
Actuated Green, G (s)	14.5		21.4	44.1	18.7	
Effective Green, g (s)	14.5		21.4	44.1	18.7	
Actuated g/C Ratio	0.22		0.32	0.66	0.28	
Clearance Time (s)	4.0		4.0		4.0	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	371		568	1233	953	
v/s Ratio Prot	c0.14		c0.13	0.19	c0.16	
v/s Ratio Perm						
v/c Ratio	0.63		0.40	0.29	0.55	
Uniform Delay, d1	23.6		17.6	4.7	20.4	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	3.5		2.1	0.1	0.7	
Delay (s)	27.1		19.7	4.8	21.1	
Level of Service	C		B	A	C	
Approach Delay (s)	27.1			10.6	21.1	
Approach LOS	C			B	C	
Intersection Summary						
HCM 2000 Control Delay			17.9		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.54			
Actuated Cycle Length (s)			66.6		Sum of lost time (s)	15.0
Intersection Capacity Utilization			50.5%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
13: Sperry Street/Waterville Street & Johnson Street

2035 Build Condition
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	50	21	71	52	32	66	164	106	35	134	0
Future Volume (vph)	5	50	21	71	52	32	66	164	106	35	134	0
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		0.962			0.972			0.957				
Flt Protected		0.997			0.978			0.990			0.990	
Satd. Flow (prot)	0	1787	0	0	1771	0	0	1765	0	0	1844	0
Flt Permitted		0.997			0.978			0.990			0.990	
Satd. Flow (perm)	0	1787	0	0	1771	0	0	1765	0	0	1844	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		218			342			241			213	
Travel Time (s)		5.0			7.8			5.5			4.8	
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)	5	54	23	77	57	35	72	178	115	38	146	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	0	169	0	0	365	0	0	184	0
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	46.6%											
Analysis Period (min)	15											
ICU Level of Service A												

HCM Unsignalized Intersection Capacity Analysis

13: Sperry Street/Waterville Street & Johnson Street

2035 Build Condition
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	50	21	71	52	32	66	164	106	35	134	0
Future Volume (Veh/h)	5	50	21	71	52	32	66	164	106	35	134	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	54	23	77	57	35	72	178	115	38	146	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	665	659	146	652	602	236	146			293		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	665	659	146	652	602	236	146			293		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	85	97	75	85	96	95			97		
cM capacity (veh/h)	298	353	901	309	381	804	1436			1269		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	82	169	365	184								
Volume Left	5	77	72	38								
Volume Right	23	35	115	0								
cSH	420	382	1436	1269								
Volume to Capacity	0.20	0.44	0.05	0.03								
Queue Length 95th (ft)	18	55	4	2								
Control Delay (s)	15.6	21.7	1.9	1.8								
Lane LOS	C	C	A	A								
Approach Delay (s)	15.6	21.7	1.9	1.8								
Approach LOS	C	C										
Intersection Summary												
Average Delay			7.5									
Intersection Capacity Utilization			46.6%	ICU Level of Service					A			
Analysis Period (min)			15									

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Build Condition
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	123	91	115	73	12	42	275	145	12	287	12
Future Volume (vph)	34	123	91	115	73	12	42	275	145	12	287	12
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		0.950			0.992				0.850		0.995	
Flt Protected		0.993			0.972			0.993			0.998	
Satd. Flow (prot)	0	1757	0	0	1796	0	0	1850	1583	0	1850	0
Flt Permitted		0.929			0.721			0.926			0.984	
Satd. Flow (perm)	0	1644	0	0	1332	0	0	1725	1583	0	1824	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		43			5				158			2
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		273			331			413			180	
Travel Time (s)		6.2			7.5			9.4			4.1	
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)	37	134	99	125	79	13	46	299	158	13	312	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	270	0	0	217	0	0	345	158	0	338	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Detector Phase	2	2		2	2		4	4	4	4	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Minimum Split (s)	10.0	10.0		10.0	10.0		7.0	7.0	7.0	7.0	7.0	
Total Split (s)	40.0	40.0		40.0	40.0		25.0	25.0	25.0	25.0	25.0	
Total Split (%)	48.2%	48.2%		48.2%	48.2%		30.1%	30.1%	30.1%	30.1%	30.1%	
Maximum Green (s)	35.0	35.0		35.0	35.0		21.0	21.0	21.0	21.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.5	1.5		1.5	1.5		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0			5.0			4.0	4.0		4.0	
Lead/Lag							Lag	Lag	Lag	Lag	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	
Recall Mode	Min	Min		Min	Min		None	None	None	None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		12.7			12.7			17.4	17.4		17.4	
Actuated g/C Ratio		0.32			0.32			0.44	0.44		0.44	
v/c Ratio		0.48			0.50			0.45	0.20		0.42	
Control Delay		12.7			15.7			10.8	2.7		10.2	
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		12.7			15.7			10.8	2.7		10.2	
LOS		B			B			B	A		B	
Approach Delay		12.7			15.7			8.2			10.2	
Approach LOS		B			B			A			B	

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Build Condition
PM Peak Hour

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	18.0
Total Split (s)	18.0
Total Split (%)	22%
Maximum Green (s)	15.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	8.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Lanes, Volumes, Timings
14: Willow Street & Johnson Street/Pine Street

2035 Build Condition

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		41			39			48	0		46	
Queue Length 95th (ft)		91			88			124	25		117	
Internal Link Dist (ft)		193			251			333			100	
Turn Bay Length (ft)												
Base Capacity (vph)		1431			1155			956	948		1012	
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.19			0.19			0.36	0.17		0.33	

Intersection Summary

Area Type: Other

Cycle Length: 83

Actuated Cycle Length: 39.5

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 10.8

Intersection LOS: B

Intersection Capacity Utilization 68.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 14: Willow Street & Johnson Street/Pine Street

 Ø2	 Ø3	 Ø4
40 s	18 s	25 s

Lane Group	Ø3
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

14: Willow Street & Johnson Street/Pine Street

2035 Build Condition

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔	↔		↔	
Traffic Volume (vph)	34	123	91	115	73	12	42	275	145	12	287	12
Future Volume (vph)	34	123	91	115	73	12	42	275	145	12	287	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			4.0	4.0		4.0	
Lane Util. Factor		1.00			1.00			1.00	1.00		1.00	
Frt		0.95			0.99			1.00	0.85		0.99	
Flt Protected		0.99			0.97			0.99	1.00		1.00	
Satd. Flow (prot)		1758			1796			1850	1583		1850	
Flt Permitted		0.93			0.72			0.93	1.00		0.98	
Satd. Flow (perm)		1646			1332			1725	1583		1823	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	134	99	125	79	13	46	299	158	13	312	13
RTOR Reduction (vph)	0	29	0	0	3	0	0	0	88	0	1	0
Lane Group Flow (vph)	0	241	0	0	214	0	0	345	70	0	337	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Actuated Green, G (s)		12.7			12.7			17.4	17.4		17.4	
Effective Green, g (s)		12.7			12.7			17.4	17.4		17.4	
Actuated g/C Ratio		0.32			0.32			0.45	0.45		0.45	
Clearance Time (s)		5.0			5.0			4.0	4.0		4.0	
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		534			432			767	704		811	
v/s Ratio Prot												
v/s Ratio Perm		0.15			c0.16			c0.20	0.04		0.18	
v/c Ratio		0.45			0.49			0.45	0.10		0.42	
Uniform Delay, d1		10.4			10.6			7.5	6.3		7.4	
Progression Factor		1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.6			0.9			0.4	0.1		0.3	
Delay (s)		11.1			11.5			7.9	6.4		7.7	
Level of Service		B			B			A	A		A	
Approach Delay (s)		11.1			11.5			7.5			7.7	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay			8.9									
HCM 2000 Level of Service									A			
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			39.1									
Sum of lost time (s)									12.0			
Intersection Capacity Utilization			68.6%									
ICU Level of Service									C			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
34: Church Street & West Main Street

2035 Build Condition
PM Peak Hour

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	790	50	20	770	0	0
Future Volume (vph)	790	50	20	770	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.992					
Flt Protected				0.999		
Satd. Flow (prot)	1848	0	0	1861	0	0
Flt Permitted				0.999		
Satd. Flow (perm)	1848	0	0	1861	0	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	105			421	220	
Travel Time (s)	2.4			9.6	5.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	859	54	22	837	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	913	0	0	859	0	0
Sign Control	Free			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	59.9%			ICU Level of Service B		
Analysis Period (min)	15					