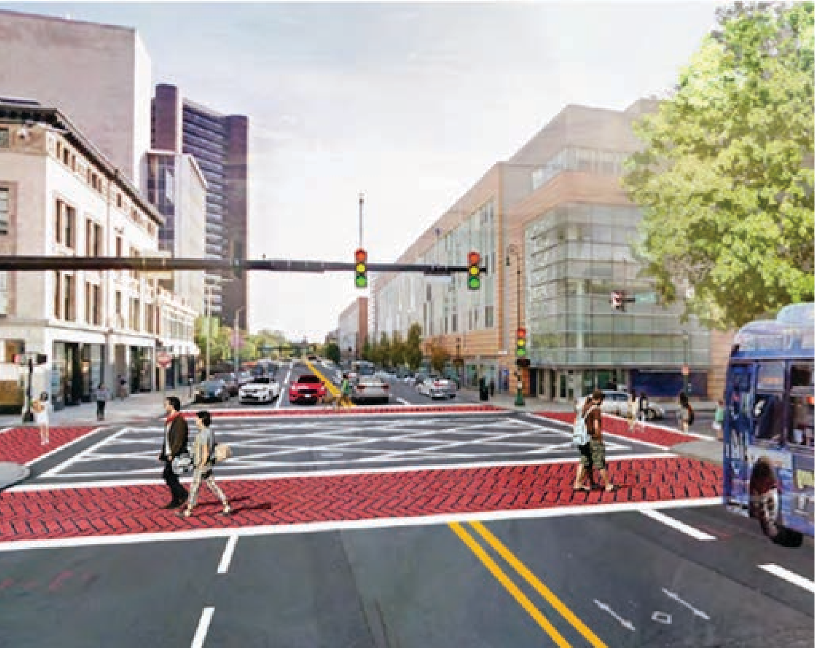

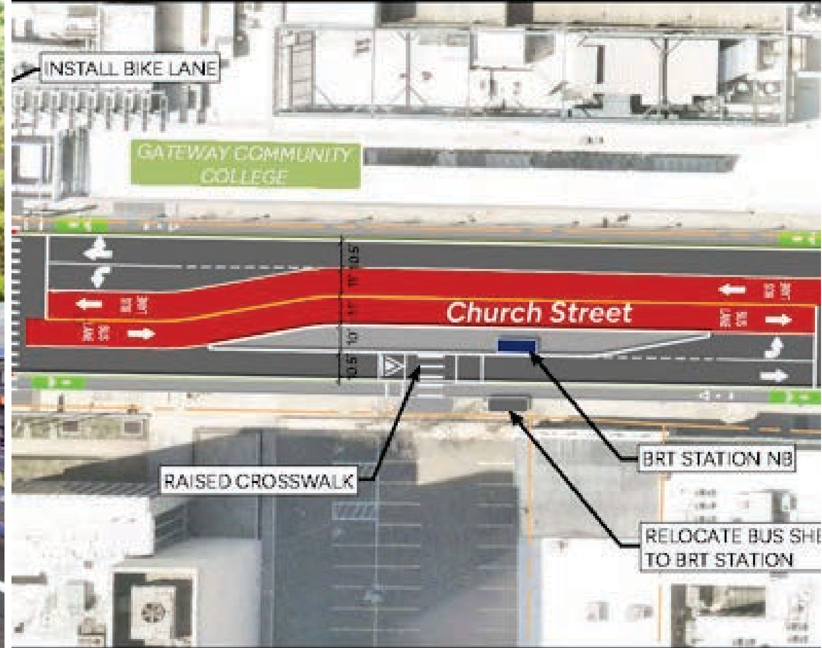

SEPTEMBER 2024

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New Haven One-Way to Two-Way Conversion Study: Final Report

South Central Regional Council of Governments (SCRCOG) and the City of New Haven

Prepared By:
SLR International Corporation
195 Church Street, 7th Floor
New Haven, CT 06510

SLR Project No. 141.20130.00003

In Collaboration with:
Vanasse Hangen Brustlin, Inc. (VHB)
100 Great Meadow Road, Suite 200
Wethersfield, CT 06109

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Making Sustainability Happen

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1.0 Introduction

Many of New Haven's downtown streets were converted from two-way to one-way after World War II to accommodate commuting patterns that resulted from suburbanization. The Covid-19 Pandemic notwithstanding, a resurgence of New Haven's downtown has been actively unfolding over the past 20 plus years. More residential housing is being constructed, and Downtown Crossing is knitting local streets, divided by the former Route 34 Oak Street Connector, back together – necessitating a re-evaluation of the gridded street network. Moreover, there is now a focus on *Vision Zero* as a means to combat traffic safety issues, to better accommodate sustainable modes of transportation, and to address transportation equity. Furthermore, given that fossil-fueled transportation is the largest contributor to greenhouse gas emissions, the opportunity to shift some driving trips to more sustainable non-motorized and/or transit trips, and to reduce circuitous driving distances within downtown, is a main part of this project's imperative.

Two-way streets will allow for more convenient and safer navigation of downtown streets that benefit drivers, cyclists, and transit riders alike. The benefits of converting one-way streets to be two-way outweigh the cons and include the following summarized in **Table 1.1**.

Table 1.1 Pros and Cons of Converting Downtown Streets from One-Way to Two-Way

Pros	Cons
More direct/less circuitous *localized* motorist (and bicyclist) routing.	Travel-time of some automobile traffic going *through*, instead of to, the downtown may be affected.
Slower automobile traffic, resulting in safer streets for everyone including motorists.	Two-way streets may generally move less automobile traffic during a given timeframe on any individual street or intersection.
Reduced potential for multiple-threat pedestrian conflicts when converting same-direction multiple-vehicle-lane streets to be one through-lane each direction.	Pedestrians and other non-motorists will have to check for oncoming vehicles in two directions rather than one.
Simplifies on-street parking by eliminating left-hand side parallel parking	On-street loading, deliveries, and short-term pickup may lose some of the ability to double-park (albeit not legally) in one of two same-direction through lanes.
More comfortable and liveable built environment for non-motorists.	
Potential to convert some signalized intersections to stop-sign control, thus saving on long-term maintenance costs.	
Simplifies transit routing and allows for inbound and outbound bus stops to be on the same street.	
Economic benefits to storefronts by being visible from two approaching directions instead of one.	
Likely less total aggregate travel-time for all street users and less Vehicle-Miles-Traveled (VMT).	

1.1 Study Area

This 2023 *One-Way to Two-Way Study* builds upon the 2014 *One-Way to Two-Way Study* initial planning effort and considers plans and projects proposed over the past decade. This study includes two-way conversion concept-design plans at a preliminary engineering level that brings the actual conversion of the following downtown street segments from one-way to two-way another step closer to implementation:

- Chapel Street from College Street to Park Street
- York Street from Martin Luther King, Jr. (M.L.K. Jr.) Boulevard to Grove Street
- George Street from York Street to Church Street
- Church Street from George Street to Grove Street

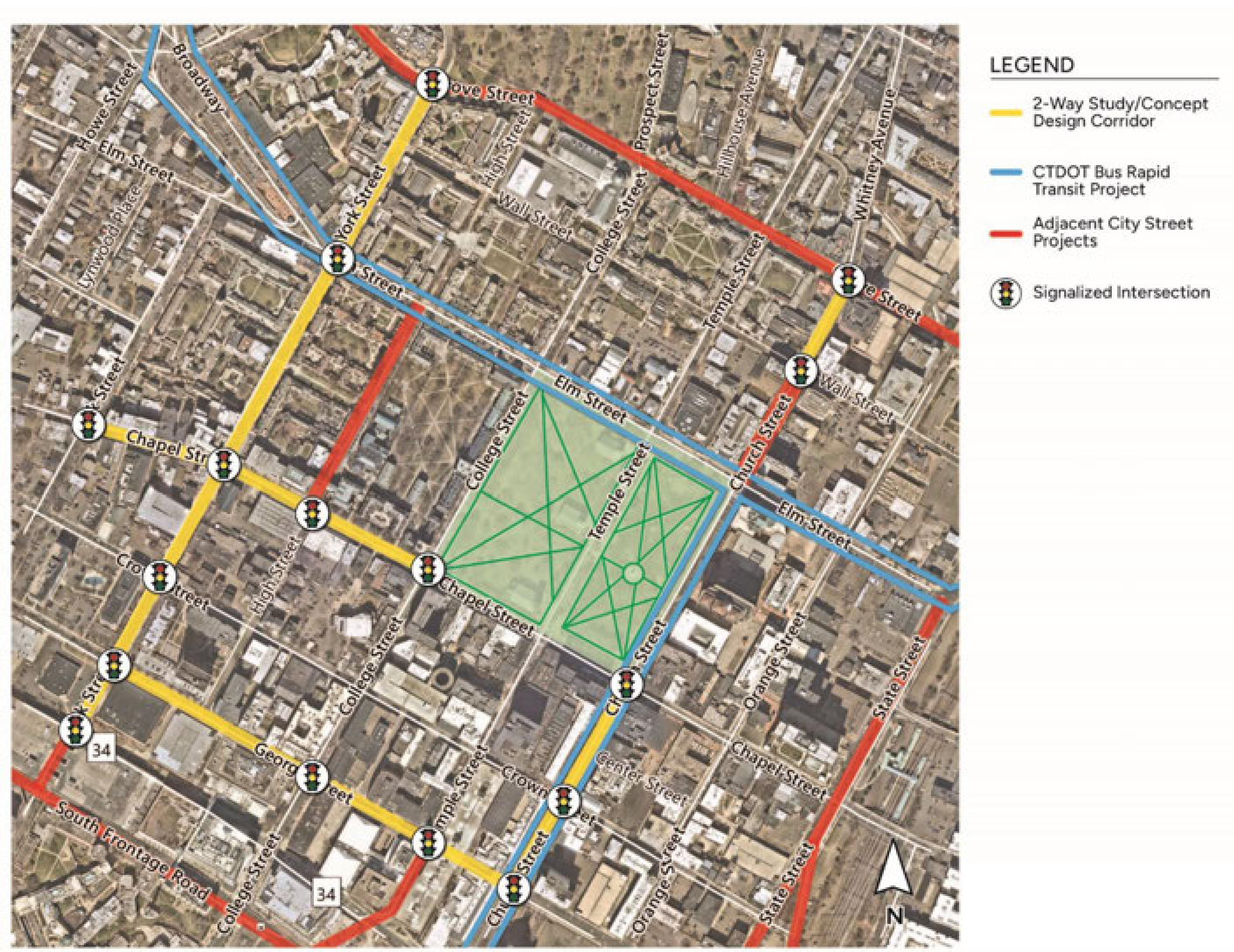
Specifically, the study area includes the following 17 intersections:

- Chapel Street at Park Street
- Chapel Street at York Street
- Chapel Street at High Street
- Chapel Street at College Street
- York Street at Grove Street
- York Street at Elm Street/Broadway
- York Street at Crown Street
- York Street at George Street
- York Street at MLK Jr. Boulevard
- George Street at High Street
- George Street at College Street
- George Street at Temple Street
- George Street at Church Street
- Church Street at Grove Street
- Church Street at Chapel Street
- Church Street at Center Street
- Church Street at Crown Street

It should be noted that Chapel Street east of College Street, George Street east of Church Street, Church Street south of George Street, and Ashmun Street north of York Street are already two-way, meaning that the street segments that are the focus of this concept-design study are linchpin to the downtown as a whole. It should also be noted that the section of Church Street between Chapel Street and Wall Street was not originally part of the study-area scope that was developed with the City of New Haven and the South Central Regional Council of Governments (SCRCOG), and that the intersection of Church Street at Elm Street has not been analyzed in detail herewith. Nonetheless, for continuity of design alignment, the entire stretch of Church Street from George Street to Grove Street is included and shown the concept design plans that have been developed and are shown further below as part of this study.

As is also discussed further below, there are multiple city and Connecticut Department of Transportation (CTDOT) street/intersection redesign projects that are happening in parallel with this effort that intersect and overlap with this study area on some street segments. These include a Bus Rapid Transit (BRT) project that is to route along Elm Street and a portion of Church Street (and which will analyze in detail the intersection of Church Street at Elm Street), the conversion of Grove Street to two-way, the conversion of one block of York Street between South Frontage Road and M.L.K. Jr. Boulevard to two-way, the closure of High Street to automobile traffic between Chapel Street and Elm Street, the conversion to two-way of some of Temple Street as part of Downtown Crossing Phase-4, as well as a major redesign of State Street between Downtown and Wooster Square. **Figure 1.1** shows the study area and extent to which these puzzle pieces fit together.

Figure 1.1 Study Area



1.2 Past Studies and Current Area Projects

This section includes summary of past studies and current projects in and around downtown New Haven that are relevant to this current concept-design study.

1.2.1 City of New Haven Two-Way Conversion Study (2014)

The original *Two-Way Conversion* study was conducted in 2013 to 2014, and had a larger study area than this current study. **Figure 1.2** provides an illustration of the original (2013 to 2014) study area and shows how many of New Haven's downtown streets are one-way. Except for a few blocks of street, all the one-way streets then are still currently one-way. The 2014 two-way conversion study did the yeoman's work of introducing this topic to the public, gaining input/feedback, and producing a number of recommendations in support of two-way conversion. After a multiple-day community design charrette, it was learned that residents support a one-way to two-way street conversion that slows traffic and makes streets easier to navigate.

Figure 1.2 Existing Conditions Map from 2014 Two-Way Conversion Final Report

During the 2013 to 2014 two-way study effort, it was learned that New Haven wanted:

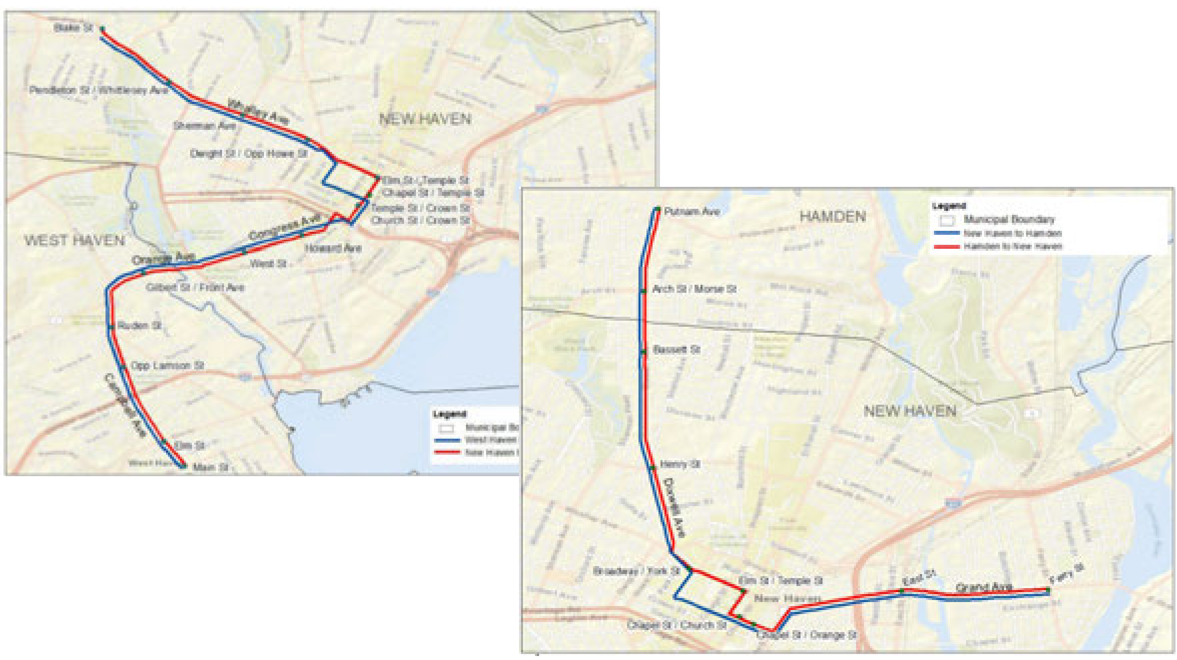
- Improved connectivity of bike and pedestrian facilities between downtown, the train station, and surrounding districts/neighborhoods
- Elimination of pedestrian crashes
- A solution for unsafe mid-block crossings
- Ways to address wrong-way bicycling
- An expanded bicycle network
- Simplified bus routes

Some of the 2014 study's short-term recommendations have since been implemented, including the installation a contra-flow bike lane on Court Street downtown. Unfortunately, however, most of the 2014 study's recommendations have not been implemented due largely to funding issues.

1.2.2 *Move New Haven* Study (2019) and Bus Rapid Transit Design (ongoing)

The *Move New Haven Study* focused on bus transit and made recommendations about how to improve New Haven's bus system to be more convenient and operationally efficient. One of the key recommendations from this study, shown in **Figure 1.3**, is to create two BRT routes that pass through the study area – to and from Hamden, and to and from West Haven via the Grand Avenue and the Whalley Avenue corridors, respectively. To operate most efficiently, these BRT routes would require redesign of Elm Street and Church Street downtown to be two-way at least for bus traffic. CTDOT recently started an effort to facilitate a redesign of Elm Street to accommodate BRT, which is the reason that Elm Street is not a focus of this study.

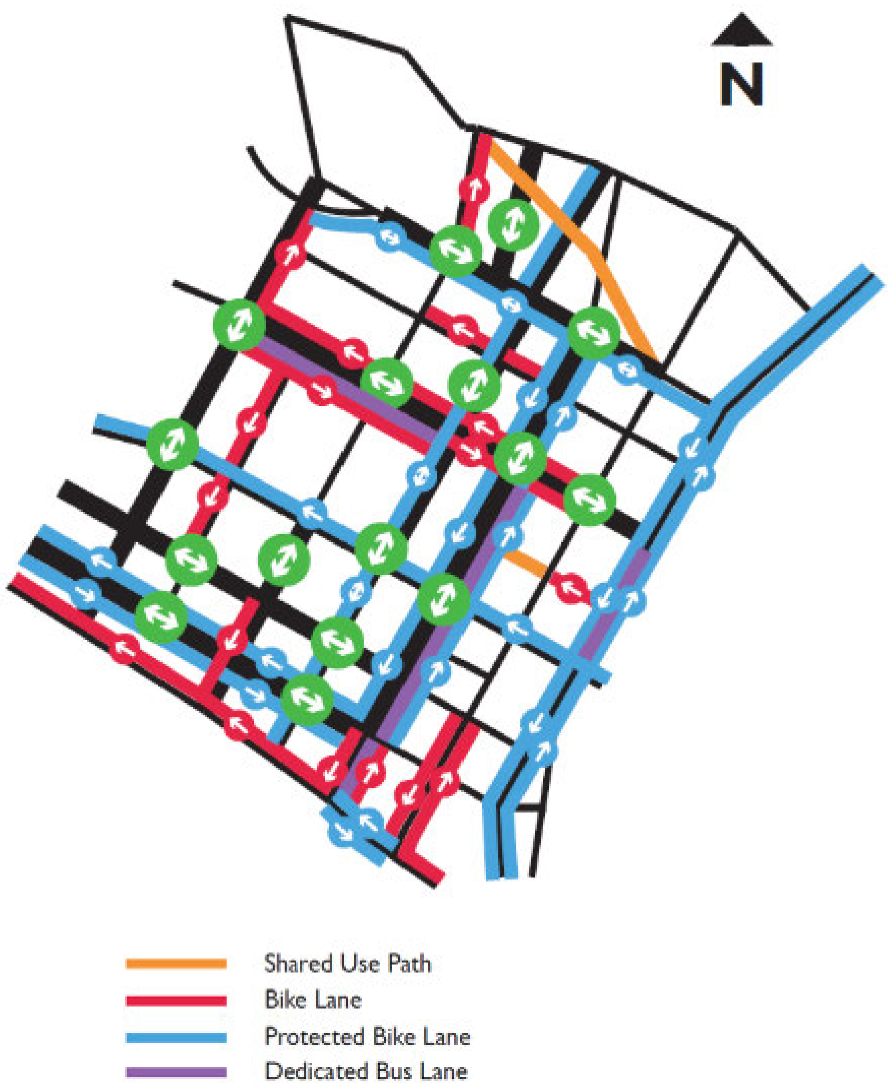
Figure 1.3 Proposed BRT Routes Overlaid on Existing Street Network



1.2.3 Safe Routes for All Active Transportation Plan (2022)

The overarching goal of the *Safe Routes for All (SR4A) Active Transportation Plan* is to increase non-automobile mode share in New Haven over the next ten years by building out a network of safe and comfortable bicycle lanes throughout the city, improving pedestrian and bicyclist safety, and improving bus rider accommodations by adding more bus stop shelters. SR4A Active Transportation Plan also includes a small section about the one-way to two-way conversion with recommendations for many of the streets downtown, as shown on **Figure 1.4**. Included are recommendations for adding protected bike lanes to a future two-way George Street, adding a protected bike lane to Chapel Street, and adding protected bike lanes to a future two-way Church Street, not to mention adding bus-only lane(s) to Church Street. The SR4A plan also calls for adjusting pedestrian signal timings at intersections including adding Leading Pedestrian Intervals (LPI).

Figure 1.4 SR4A Active Transportation Recommendations with Two-Way Conversion



1.2.4 New Haven On-Street Performance-Based Pricing – Monitoring and Evaluation Study

The New Haven On-St Parking Performance-Based Pricing Report (2018) analyzed parking demand by means of parking meter payment data for the entirety of 2018 – morning through evening hours – under typical weekday conditions. After analyzing the year's worth of data, the study recommended increases or decreases to the parking meter price by block, relative to demand. This study recommended an increase to parking meter rates on blocks with high demand, and a decrease to parking meter rates blocks with lower than optimal demand (generally lower than 60 to 80 percent parking occupancy). Some blocks Downtown were recommended for meter rate increases for one part of the day and decreases for another part of the day. It is important to mention this study and the need to appropriately price parking, as research has found that underpriced on-street parking can induce demand for on-street parking relative to nearby off-street parking, induce driving relative to other transportation mode options, and result in motorists circling the block (cruising) for the random underpriced empty on-street spot thus creating unnecessary traffic.

1.2.5 City of New Haven Street Projects

New Haven's Transportation, Traffic & Parking Department and Engineering Department currently have multiple roadway/street projects that are in planning/design that will connect with this two-way conversion effort or are nearby and thus necessitate some degree of cross-project coordination. **Figure 1.1** shows the extent to which many of the streets downtown may see changes in the coming years.

There are planned roadway and intersection upgrades along South Frontage Road in the area of Yale New Haven Hospital (YNHH) and the Air Rights Parking Garage. A block of York Street in this area, between M.L.K. Jr. Boulevard and South Frontage Road, is planned to be converted to two-way to better connect with York Street between South Frontage Road and Howard Avenue that was converted to two-way around 2020/2021. There is a quick-build plan to add a bike lane to George Street in this area. As part of the ongoing Downtown Crossing development (Phase 4), Temple Street is to be extended to the south to connect with South Frontage Road at Congress Avenue and be converted to two-way between M.L.K. Jr. Boulevard and George Street.

There is a city project to give Whitney Avenue a road-diet and bike lanes between Trumbull Street and the Hamden town line, which along with converting Church Street to two-way, and when including Church Street South, will make most, if not all, of this corridor two-way from Long Wharf through Hamden and points north.

The city is engineering a redesign of lower State Street to reallocate and convert some vehicle lanes to become a cycle-track that will become part of the Farmington Canal Trail and to facilitate the construction of new buildings within the several parking lots that dot the east side of lower State Street.

As mentioned earlier, Elm Street and portions of Church Street are expected to be modified to accommodate the state's BTR project, and Grove Street may be converted to two-way to allow for another eastbound traffic route north of the Green should Elm Street become two-way.

1.2.6 Downtown Development

There are also numerous developments in New Haven that are currently either under construction or approved to be built. Within Downtown, these developments include buildings being constructed near the study area at George Street and Orange Street, on Chapel Street between Church Street and Orange Street, on Orange Street between Elm Street and Wall Street, and as part of Downtown Crossing between M.L.K. Jr. Boulevard and South Frontage Road. All these developments are generating more need for the streets downtown to become more multimodal. Most of these developments are mixed-use to some extent, but overall include much residential, and as such are oriented toward living, working, shopping, and recreation as part of a walkable downtown lifestyle. The current building boom in the center of New Haven points to a yet unmet market demand for downtown/urban living and therefore a greater need for safer and more comfortable streets that better accommodate walking, bicycling/ micromobility, and transit. To the extent possible, the opportunity to address multimodal needs and safety can and must take place as streets are redesigned, such as in this case with this effort to convert from one-way to two-way.

2.0 Existing Conditions

As a starting point for this one-way to two-way study, the project team assimilated information on existing study-area street infrastructure and street usage, previous studies, and planned projects in and around the study area, as well as compiled recent public input regarding the proposed two-way conversion.

2.1 Multimodal Infrastructure

This section includes an overview of automobile, walking, bicycling, and transit infrastructure in the study area. **Table 2.1**, and **Figure 2.1** through **Figure 2.4**, summarize this information.

2.1.1 Vehicular Infrastructure

In terms of infrastructure devoted to the movement of motor vehicles, each study-area street currently has at least two same-direction vehicle lanes. Church Street and George Street have upwards of four vehicle lanes headed in the same direction at certain locations in the study area. While multiple lanes per direction can efficiently move automobile traffic on any single street, they can likely result in speeding, and for some motorists to unsafely weave between lanes jockeying for position, particularly during off-peak times.

The majority of the study intersections are signalized, with the exception of the unsignalized intersections of Church Street at Center Street, and George Street at High Street. A number of the signalized intersections downtown are noted to contain old signal equipment. Conversion to two-way will likely necessitate signal equipment upgrades to bring old signal equipment to current standards, and to importantly install signal heads (green-yellow-red lights) that face newly two-way approaches to the intersections. Conversion to two-way may also present the opportunity to unsignalize some intersections where signalization will no longer be warranted; to change some intersections from signal-control to instead operate with only stop-sign(s).

Table 2.1 Existing Characteristics of Streets winthin Study Area

	Church Street	Chapel Street	York Street	George Street
	Between George Street and Grove Street	Between College Street and Park Street	Between M.L.K. Jr. Boulevard and Grove Street	Between York Street and Church Street
Number of Vehicle Traffic Lanes	3 Lanes northbound and 4th (turn) lane at approach to Chapel Street	2 Lanes westbound	2 Lanes northbound and 3rd (turn) lane at approaches to George Street and Elm Street Only 1 lane northbound from Elm Street to Grove Street	2 Lanes eastbound from York Street to College Street 3 Lanes eastbound from College Street to Temple Street 4 Lanes (2 are turn lanes) eastbound from Temple Street to Chapel Street
Bike Facilities	Painted bike lane northbound from George Street to Chapel Street Faded sharrows from Chapel Street to Elm Street	Faded Sharrows	Painted bike lane northbound from York Street to Grove Street	Faded Sharrows
Bus Stops	7 Bus Stops, 3 of which have no shelter (North of Chapel Street, south of Wall Street, and south of Grove Street)	1 Bus Stop	4 Bus Stops, 3 of which have no shelter (south of George Street, north of Chapel Street, south of Elm Street).	2 Bus Stops, 1 of which has no shelter (West of Temple Street)
Bus Routes	18 different CTtransit routes go on at least a portion of Chapel Street in the study area 2 Yale Shuttle routes	7 CTtransit routes	5 CTtransit routes 2 Yale Shuttle routes	6 CTtransit routes 2 Yale Shuttle routes
On-Street Parking	130 Parking Spaces (Portions both sides)	78 Parking Spaces (Portions both sides)	147 Parking Spaces (Portions both sides)	24 Parking Spaces (south side only)
Traffic Calming	None	Curb extensions between College Street and High Street	2 raised midblock crosswalks. ½ corner curb-extension southwest of Elm Street	None
Number of Street Intersections	6 Signalized Intersections 1 Pedestrian Signal (Midblock at Green) 1 Unsignalized (At Center Street)	4 Signalized Intersections	6 Signalized Intersections	4 Signalized Intersections 1 Unsignalized (At High Street)

Figure 2.1 Church Street Corridor – Existing Characteristics

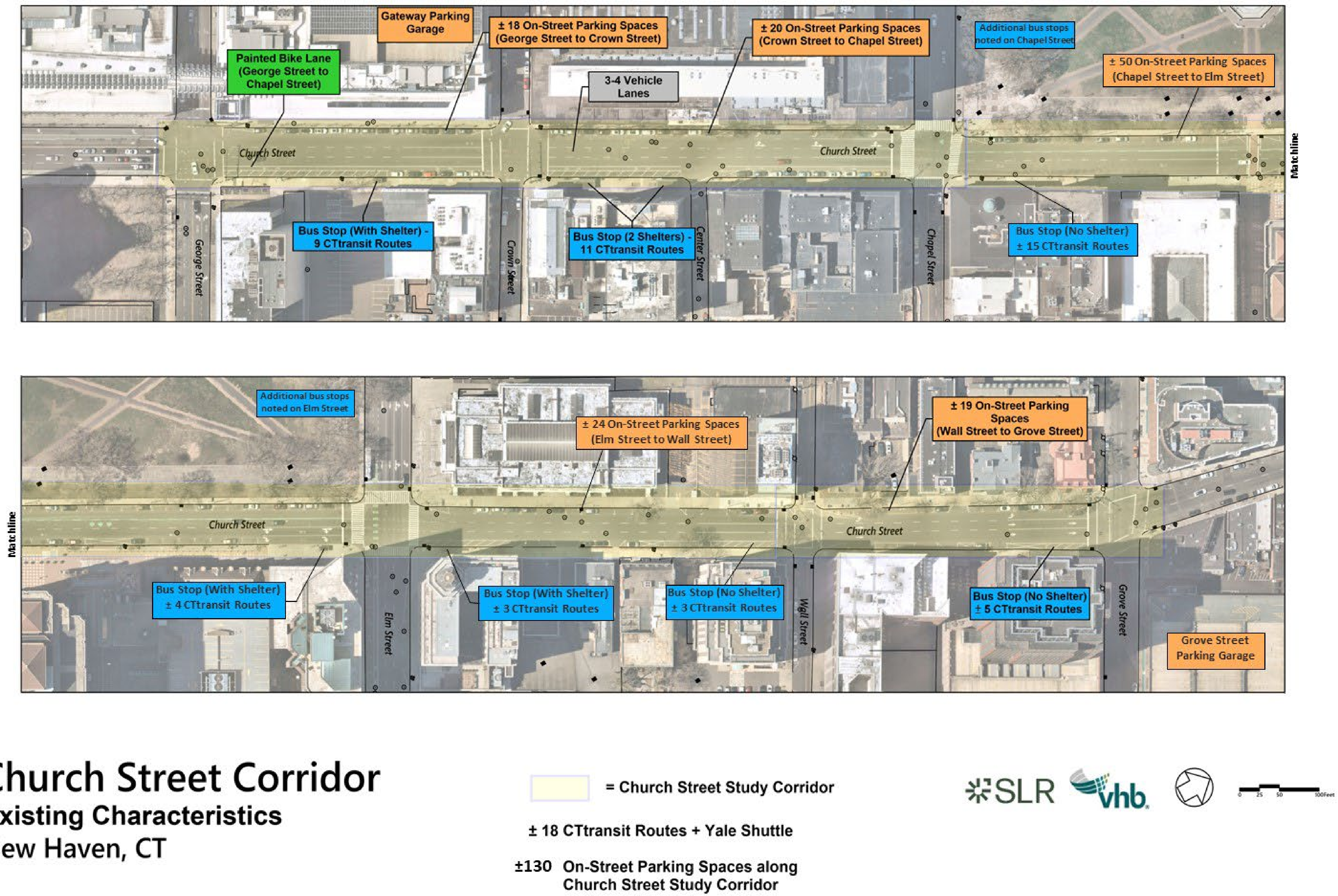
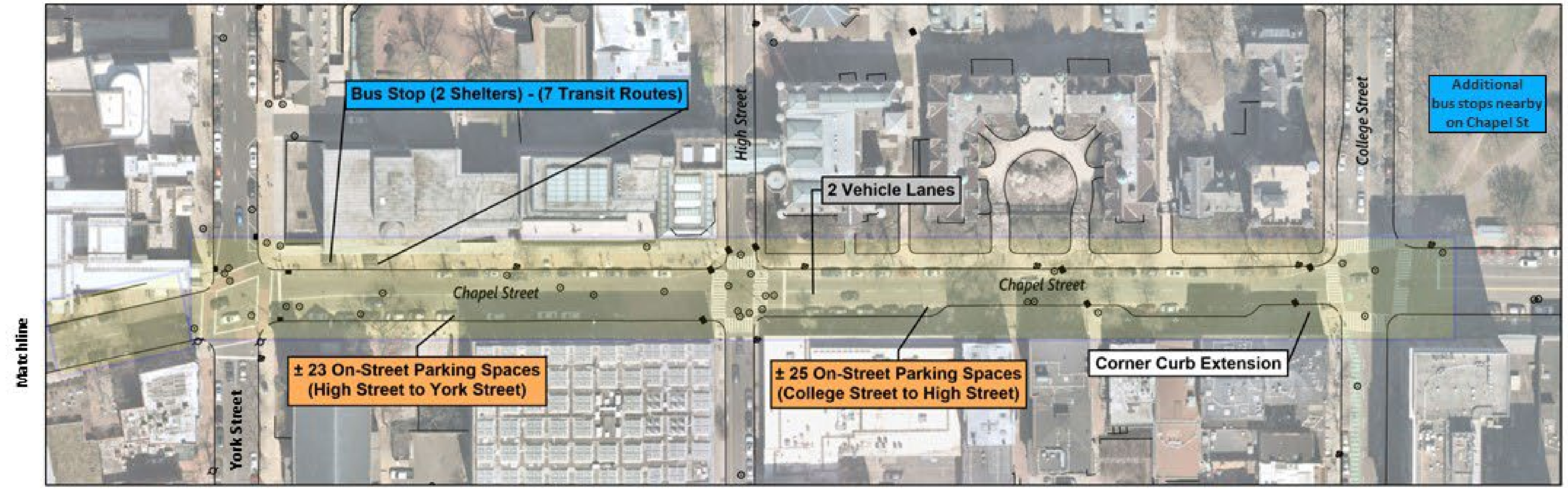


Figure 2.2 Chapel Street Corridor – Existing Characteristics



Chapel Street Corridor
Existing Characteristics
New Haven, CT

= Chapel Street Study Corridor

± 7 CTtransit Routes

± 78 On-Street Parking Spaces along Chapel Street Study Corridor

Figure 2.3 York Street Corridor – Existing Characteristics

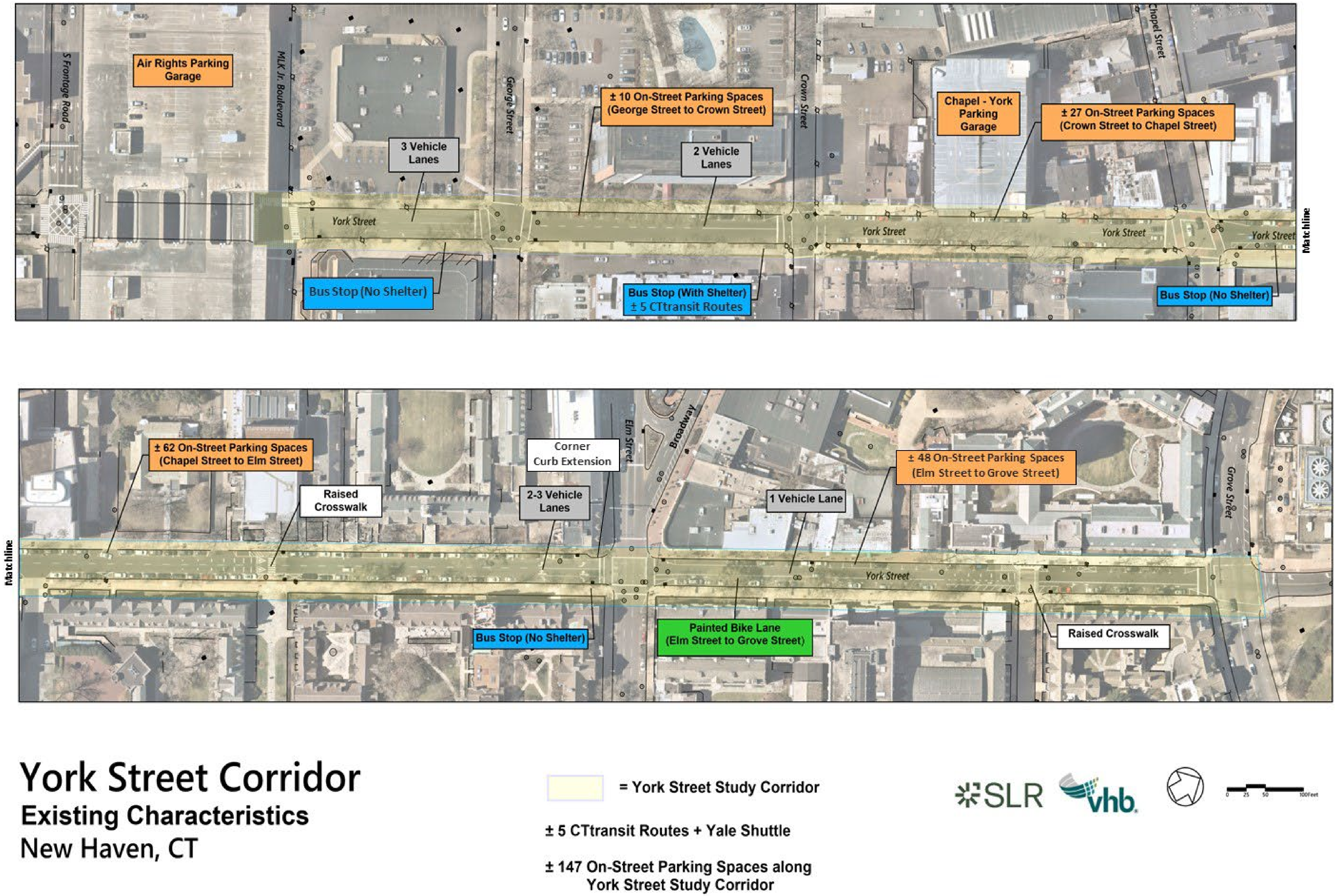
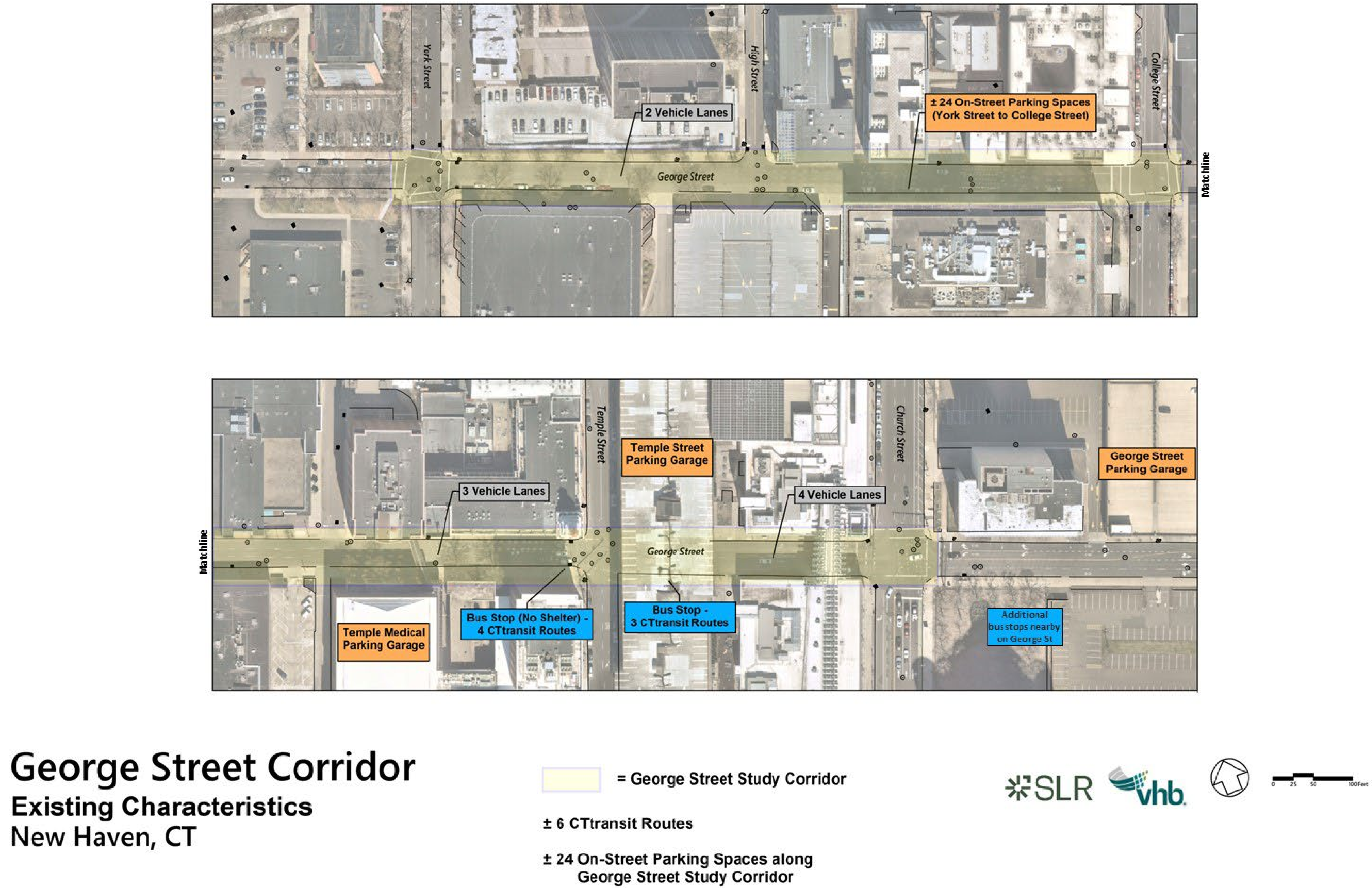


Figure 2.4 George Street Corridor – Existing Characteristics

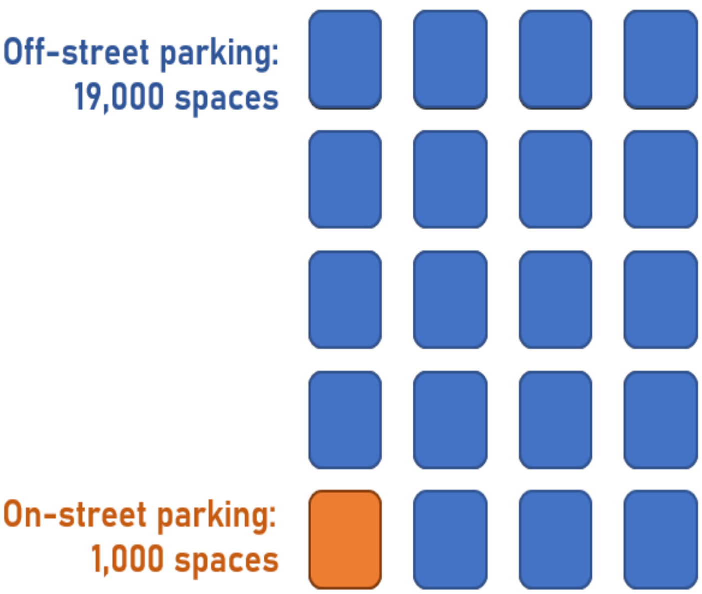


2.1.2 Parking

While motor vehicle movement is often a focus of roadways and streets, automobile parking is Is a large part of the picture. With the exception of three blocks (George Street between College Street and Church Street, and York Street between M.L.K. Jr. Boulevard and George Street), there is on-street parking on at least a portion of the block-to-block street segments within the study area. There is a total of approximately 380 on-street parking spaces along the study-area lengths of street, with York Street having the most on-street parking, and George Street having the least on-street parking in the study area.

It must also be noted that the vast majority of parking in downtown New Haven is not what is visible on-street but is in off-street parking facilities, in large parking garages and lots. As illustrated in **Figure 2.5**, from the 2021 *Downtown Parking in New Haven* report, around 95 percent of all the parking is off-street. Not only that, but the approximately 380 on-street parking spaces along this study's street segments are only a fraction of all the on-street parking downtown when taking into account all of the downtown streets.

Figure 2.5 On-Street Parking in Downtown



Source: Downtown Parking in New Haven (2021)

There are large off-street parking facilities generally within a 1 to 2 block walk throughout the study area, which are operated either by the city parking authority (Park New Haven), Yale, and/or the private sector. Review of real-time parking usage data from the Park New Haven website finds that downtown's large public parking garages have only been around half to two-thirds full during the middle of the day on weekdays. This is important to note, in that there are more empty off-street parking spaces than there are total on-street parking spaces in the study area. For instance, the Crown Street Garage and the Temple Street Garage alone combined have had at least 300 empty parking spaces during the middle of the weekday. When including all the other garages nearby, there are typically two to three times as many empty off-street parking spaces at any given time. In other words, hypothetically all the approximately 380 on-street parking spaces along the study area street segments, even if full, could fit within the empty parking supply in the garages nearby.

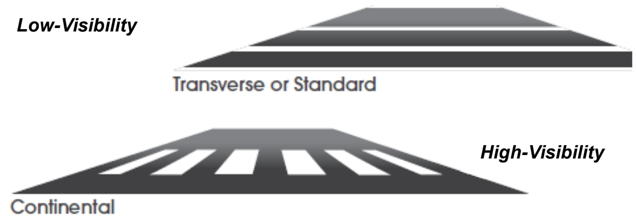
2.1.3 Pedestrian Infrastructure/Traffic Calming

While sidewalks, crosswalks, and pedestrian signals are plentiful downtown, opportunities remain for improvement to the pedestrian realm. The main goals when it comes to pedestrian mobility and safety on downtown streets are to reduce pedestrian crossing distances and vehicle traffic speeds as much as feasible, enhance the conspicuity of crosswalks, and increase pedestrian signal walk times and/or frequencies.

While almost all the intersections downtown have crosswalks, most are low-visibility transverse-line crosswalks and not high-visibility longitudinal bar (continental) crosswalks. **Figure 2.6** shows the difference between these two crosswalk types.

Most of the signals downtown do have pedestrian WALK/DON'T WALK countdown indications; although, some do not – including the intersection of Church Street at Wall Street in the study area.

Figure 2.6 Low-Visibility versus High-Visibility Crosswalks



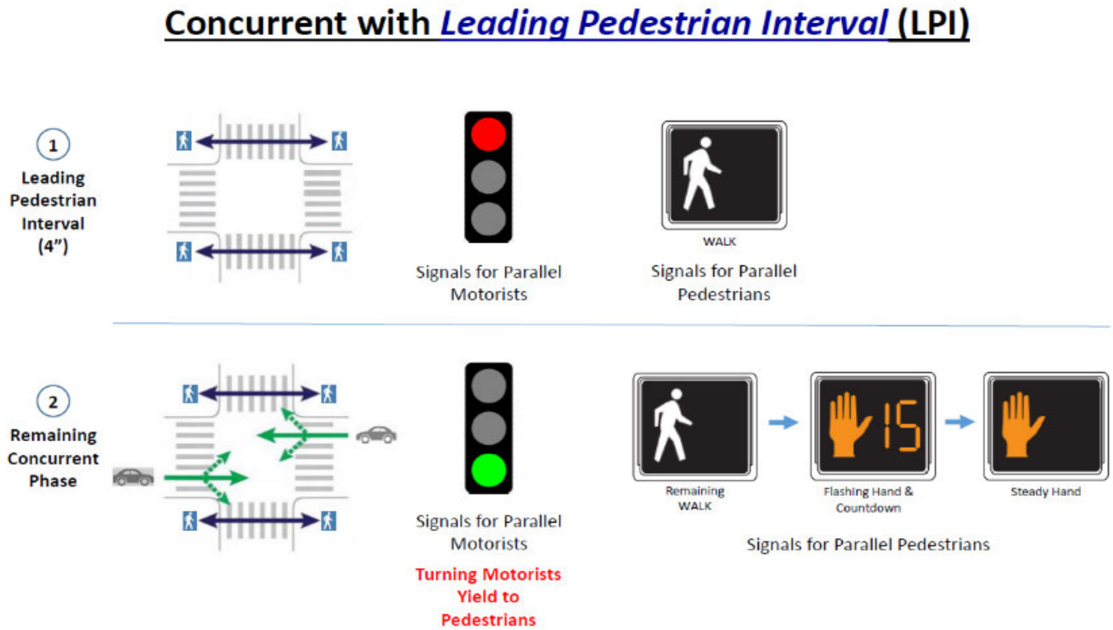
Source: STEP Studio – Tools for selecting and implementing countermeasures for improving pedestrian crossing safety. (Federal Highway Administration (FHWA))

The pedestrian signals, at many of the signalized intersections that have them, operate with what are known as an exclusive pedestrian phase, where all vehicle traffic gets a red light when the pedestrian walk light turns on for every crosswalk. A number of these intersections, because of the one-way streets, additionally have concurrent pedestrian phases where some of the crosswalks get a walk signal when parallel, and in this case non-conflicting, automobile traffic gets a green light. An example of this is Church Street at Grove Street, where the eastern-leg crosswalk at the intersection gets a walk signal while northbound Church Street automobile traffic gets a green light, the southern-leg crosswalk gets a walk signal while westbound Grove Street has a green light, and there is an exclusive pedestrian phase that occurs between when Church Street and Grove Street separately get green lights.

Exclusive pedestrian signal phases are a hallmark of large intersections with multiple through-lanes per direction in Connecticut, such as in downtown New Haven and on suburban arterials. A downside, however, that often comes with large intersections and the exclusive pedestrian phase, is that such intersections often get programmed to have long signal cycle-lengths (the total green-yellow-red time to service all street approaches and pedestrian walk/don't walk signals once) which can result in long wait times for pedestrians. With human behavior being what it is, some pedestrians who experience a long wait for the walk light end up deciding to cross without it when they perceive enough of a gap in traffic – particularly in downtown areas. This decision can be catastrophic, should the pedestrian misjudge a gap in traffic, the speed of traffic and/or the direction of approaching traffic at an intersection, and because drivers in this case may not be expecting a pedestrian to cross at that time.

Some cities, including New Haven, have begun to incorporate what is known as a Leading Pedestrian Interval (LPI), also known as a pedestrian head-start, instead of the exclusive pedestrian phase. An example of such installation in New Haven is at the intersection of Chapel Street and High Street. LPI is a hybrid of the concurrent pedestrian signal phase and the exclusive pedestrian signal phase whereby the pedestrian walk signal starts exclusively for 3 to 7 seconds for half of the crosswalks before the parallel flow of vehicle traffic gets a green light, during which time the remainder of the pedestrian walk phase runs concurrent with the parallel flow of traffic. LPI is especially feasible on streets with fewer lanes per direction and importantly can sometimes reduce wait times for both pedestrians and motorists compared to the exclusive pedestrian signal phase configuration, reducing the likelihood of some pedestrians to cross without the walk signal that was mentioned above. **Figure 2.7** illustrates how LPI works.

Figure 2.7 Leading Pedestrian Interval



Source: CTDOT

Figure 2.8 The Multiple-Threat Collision

Source: City of Haven Two-Way Conversion Study (of 2014)

In downtown settings, some pedestrians also have a tendency to cross midblock not at a crosswalk or pedestrian signal. Again, human behavior is at play here. It should be noted that mid-block crossing activity is less worrisome the fewer lanes of vehicle traffic per direction there are however, such midblock crossings, at or not at a crosswalk, can be especially worrisome when there are multiple vehicle lanes in the same direction due to the multiple-threat concern that is illustrated in **Figure 2.8**. The multiple-threat collision occurs when a vehicle in one lane stops or yields for a pedestrian and in doing so temporarily blocks view of the pedestrian to another same-direction approaching motorist who doesn't see the pedestrian until it's too late.

All the one-way streets that are the focus of this concept-design study unfortunately have the potential for the multiple-threat collision today, but this situation could be reduced or eliminated if same-direction multiple-lane streets are changed to instead generally be one lane each direction. As traffic is likely to at least be somewhat slower through one-way to two-way conversion, all travelers will be less at risk for serious injury on account of reduced vehicle speeds, including motorists and even pedestrians who cross mid-block.

The prior (2014) two-way planning study identified mid-block pedestrian activity throughout downtown. Since that time, to address pedestrian behavior and demand for mid-block crossings at some locations, particularly at long stretches between signals, the City of New Haven, in partnership with Yale University, installed raised mid-block crosswalks at two locations on York Street. Raised-crosswalks, and similar raised-intersections, provide both traffic calming and Americans with Disabilities Act (ADA) improvements in that they physically slow traffic and allow for the crosswalk itself to remain generally level with the sidewalk (eliminating the need for pedestrian curb ramps), respectively. These two mid-block crosswalks also contain Rectangular Rapid-Flashing Beacons (RRFB), which are flashing lights typically on a crosswalk sign that are push-button activated. **Figure 2.9** shows the midblock raised crosswalk on York Street between Chapel Street and Elm Street.

Figure 2.9 Mid-Block Raised Crosswalk on York Street

Source: Google maps

Raised intersections are not (yet) prominent in downtown but exist in some other parts of New Haven and are proposed to be installed nearby on South Frontage Road by York Street in the vicinity of YNHH. Another type of pedestrian safety infrastructure at intersections that is largely lacking in downtown New Haven are corner curb-extensions. Also know as bump-outs, this street design component reduces the curb-to-curb crossing walk distance and amount of time that a pedestrian is exposed in moving traffic lanes. There are curb-extensions in the study area only on Chapel Street between College Street and High Street, and at the southwest corner of York Street at Elm Street. Finally, No-Turn-on-Red signs are present at many, but not all, the study-area intersections. No-Turn-on-Red signs are often installed signs when sight distances are restricted and/or in locations with large amounts of pedestrian activity.

2.1.4 Bicyclist Infrastructure

Bicycle infrastructure within the study corridors consist of basic painted bike lanes on three blocks of Church Street between George Street and Chapel Street, and on two blocks of York Street from Elm Street to Grove Street. Sharrows (shared-lane pavement markings placed in the vehicle traffic lane) are also present, although are faded, on other parts of Church Street and on George Street and Chapel Street.

It should be noted that sharrows are generally not considered acceptable unless paired with traffic calming and/or unless they are located on low-speed, low-volume, space-constrained streets such as single-lane one-direction streets. The faded sharrow markings that exist downtown today were installed during a different era some 10 to 15 years ago. The basic painted bike lane, while acceptable, is also not currently considered best-practice due to its placement on the city streets often directly between moving traffic and the driver's side of on-street parking.

Protected/separated bike lanes, such as those that are placed away from moving traffic between the sidewalk and typically the passenger-side of on-street parking, and/or those that may be curb-separated at the same level as the sidewalk (with or without the presence of on-street parking), are generally considered now to be better bicycle facility design options – especially if proper attention is given to their design at intersections. The city recently installed a parking-protected bike lane on Chapel Street east of College Street, as show in **Figure 2.10**, indicating a step in the right direction.

Figure 2.10 Parking-Protected Bike Lane on Chapel Street between Temple Street and College Street

Image Source: Engineering

Sidewalk-level bike lanes also now exist nearby the study area on segments of South Frontage Road and M.L.K. Jr. Boulevard that were installed as part of the ongoing Downtown Crossing project, as shown on **Figure 2.11**.

Figure 2.11 Sidewalk-level Bike Lane South Frontage Road Downtown Crossing

Source: Google Maps

Contra-flow bike lanes also exist in the study area on High Street at Chapel Street and on Wall Street at Church Street. Shown on **Figure 2.12**, the contra-flow bike lane can be appropriate on single-direction one-lane streets.

Figure 2.12 Contra-Flow Bike Lane – High Street at Chapel Street

Source: Google Maps

Bicycle traffic signals are also present at these two intersections of High Street at Chapel Street and on Wall Street at Church Street. **Figure 2.13** shows the bicycle traffic signal on Wall Street at Church Street.

Bike parking is additionally an important part of bicycle infrastructure. Public bike racks are provided on Church Street next to City Hall and near the New Haven County Courthouse, and on Chapel Street at The Shops at Yale.

Figure 2.13 Bicycle Traffic Signal Wall Street at Church

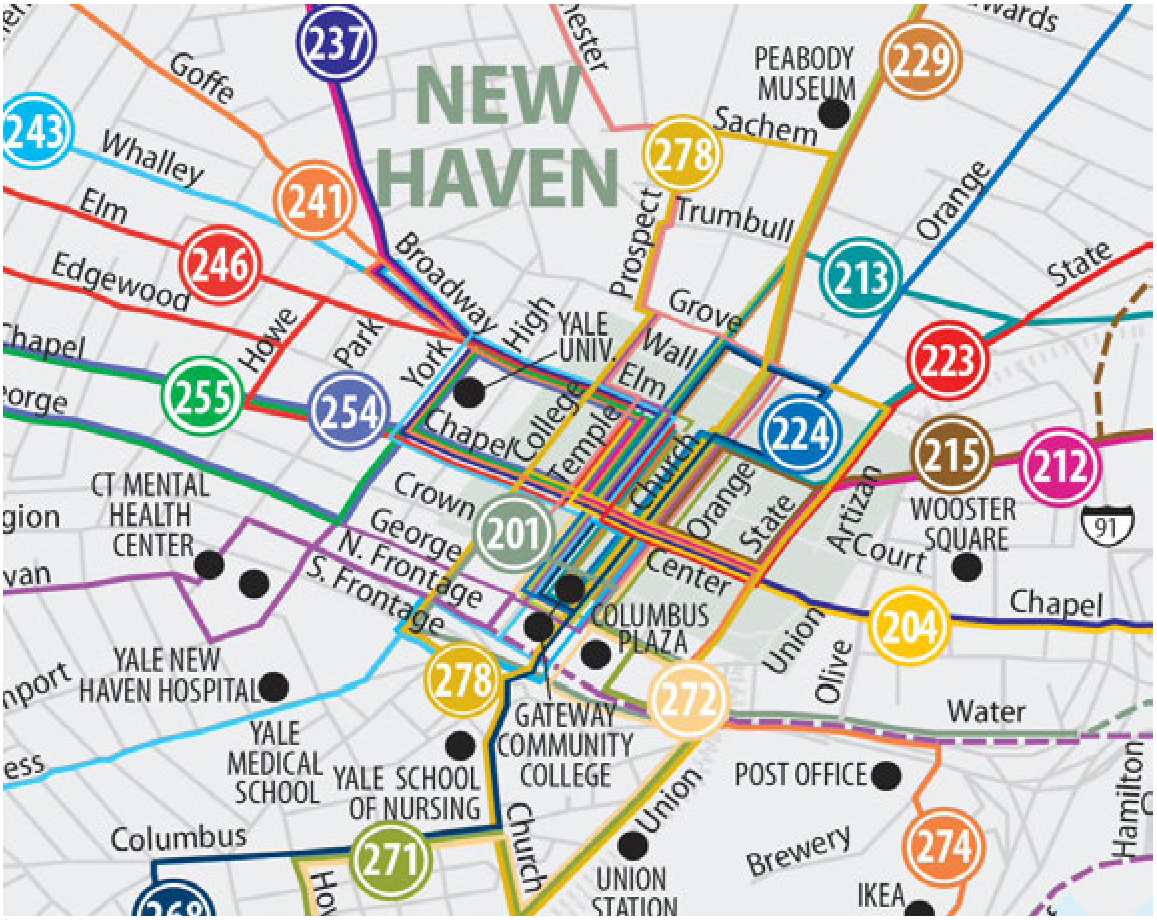
Image Source: Engineering

2.1.5 Transit Infrastructure

Transit in this study area is robust, with over 20 CTtransit, Yale Shuttle, and YNHH Shuttle routes traversing the study area – and most making stops on the streets in the study area, given that the New Haven Green, bounded by the street segments in the study area, is the Hub of the CTtransit system, as well as is directly adjacent to the center of Yale. **Figure 2.14** shows the extent of the CTtransit bus system in downtown New Haven, with bus frequencies running generally around every half hour or better during the day depending on the specific bus route. According to the *Move New Haven* study, discussed further below, the average number of weekday boardings pre-pandemic on CTtransit in New Haven was around 34,300. Round-trip, and assuming some riders take more than a couple one-way trips by bus daily, this equates to some 15,000 people taking the bus on weekdays in New Haven, many of which flow to or through downtown.

Due to the one-way streets, as noted on Figure 2.14, buses on many of the CTtransit routes somewhat confusingly travel on one street into the downtown and on a different street out of the downtown. An example of this is the CTtransit Route 237, which travels along Elm Street and Temple Street inbound, and along Chapel Street and York Street outbound between Dixwell/Newhallville/Hamden and downtown.

Figure 2.14 Map of New Haven Public Bus System



Source: CTtransit

Despite the high bus ridership, not all bus stops are sheltered. Within the study area that is the focus of this one-way to two-way study, there are currently just over a dozen bus stops but about half of them contain only bus stop signs with no bus shelters to shield waiting bus riders from rain, or to provide shade. These include three unsheltered bus stops on Church Street, three on York Street, and one on George Street. The bus stop shelters that do exist within the study area downtown are mostly basic style bus shelters, such as the left-most picture in **Figure 2.15**. Aesthetic bus shelters exist at some downtowns locations nearby the study area including on Chapel Street and Temple Street by the Green, and on Broadway (middle and right-most pictures in Figure 2.15).

Figure 2.15 Bus Shelters Downtown

Source; Google Maps

2.2 Crash Data

A detailed crash analysis was conducted to identify potential vehicle crash trends and/or roadway deficiencies in the study area. The most current vehicle crash data for the traffic study area intersections for the latest two years were obtained from CTDOT via the Connecticut Crash Data Repository (CTCDR) for the two-year period of 2021 to 2022. Readers should note that the CTCDR database may not fully account for all crashes reported to the Department of Public Safety (DPS) or CTDOT.

The data was summarized by level of severity and crash type. It should be noted that the totals reflect the number of crashes, not the total number of people involved in each crash. A summary of this crash history is presented in **Table 2.2** and **Table 2.3**, and a heatmap of this crash data is shown on **Figure 2.16**.

2.2.1 Overall Crash Severities

In total, 438 crashes were reported in the study area during the two-year review period. Of these reported crashes, 386 (88%) occurred at intersections, while the remaining 52 (12%) occurred at midblock locations. Of the 438 crashes, 20% resulted in injuries, and the remaining 80% consisted of property damage only. There were no fatal crashes reported directly within the study area.

2.2.2 Overall Predominant Crash Types

The predominant crash types at the intersections were identified as “Sideswipe” (40%), “Rear-end” (30%), and “Angle” crashes (22%). At the midblock locations, the predominant crash types were “Sideswipe” (52%) and “Rear-end” crashes (33%). Most of the crashes occurred during lighted conditions, and during dry weather (no rain, snow, or ice). In urban areas, sideswipes crashes commonly involve vehicles changing lanes or attempting to enter a travel lane from an adjacent parking lane and colliding with a traveling vehicle. Rear-end crashes typically occur due to driver inattentiveness and/or tailgating. Rear-ends may also indicate that a motorist did not see the signal heads, were not expecting intersection traffic control, or was speeding. Angle type crashes may indicate motorists running a red light and colliding with traffic from another approach.

2.2.3 Serious Injury Crashes

A serious or incapacitating injury was reported in five crashes at the study intersections, and in one crash on midblock segment. Out of these five incidents at intersection locations, three involved motorists colliding with pedestrians who were attempting to cross the street at intersections when the crashes occurred. The remaining two serious injury intersection crashes were vehicle-on-vehicle collisions, with one involving a motorcycle. There is a possibility that this crash might have occurred due to running a red light. All five of these crashes occurred during clear and dry weather conditions. The one serious injury crash that occurred at a midblock crash happened when a parked motorist attempted to enter the travel lane and struck the rear of a vehicle passing by during dry nighttime but lighted conditions.

Table 2.2 Crash Data Summary (2021 to 2022) - Intersections

Location	Crash Severity			Type Of Collision									
	Property Damage Only	Injury	Total	Rear End	Angle	Sideswipe (Same Direction)	Sideswipe (Opposite Direction)	Head -On	Hit Roadside Fixed Object/ Object In Roadway	Other/Unknown	Total	*Hit Pedestrian*	*Hit Bicyclist*
Intersections													
York Street at Grove Street	6	1	7	3	1	2	0	1	0	0	7	*0*	*0*
York Street at Elm Street/ Broadway	45	6	51	11	7	27	1	0	4	1	51	*0*	*1*
York Street at Chapel Street	14	3	17	5	3	8	0	0	1	0	17	*0*	*0*
York Street at Crown Street	6	1	7	0	5	2	0	0	0	0	7	*0*	*0*
York Street at George Street	9	3	12	5	3	4	0	0	0	0	12	*0*	*0*
York Street at MLK Jr Boulevard	17	8	25	12	1	8	1	0	1	2	25	*0*	*0*
Church Street at Grove Street	17	5	22	7	6	5	0	1	3	0	22	*2*	*0*
Church Street at Wall Street	2	0	2	0	2	0	0	0	0	0	2	*0*	*0*
Church Street at Elm Street	12	20	32	6	15	10	0	0	0	1	32	*0*	*0*
Church Street at Chapel Street	24	6	30	12	7	8	1	0	1	1	30	*1*	*1*
Church Street at Crown Street	28	4	32	6	7	17	0	0	2	0	32	*1*	*0*
Church Street at George Street	29	2	31	8	2	21	0	0	0	0	31	*0*	*0*
George Street at High Street	9	1	10	1	7	2	0	0	0	0	10	*0*	*0*
George Street at College Street	15	4	19	8	2	6	0	0	3	0	19	*1*	*1*
George Street at Temple Street	12	1	13	1	3	7	0	0	2	0	13	*1*	*0*
Chapel Street at Park Street	13	4	17	5	5	6	0	0	0	1	17	*0*	*1*
Chapel Street at High Street	16	2	18	8	1	6	0	0	3	0	18	*1*	*0*
Chapel Street at College Street	35	6	41	16	7	15	0	0	2	1	41	*1*	*1*
Intersection Total	**309**	**77**	**386**	**114**	**84**	**154**	**3**	**2**	**22**	**7**	**386**	**8**	**5**

Table 2.3 Crash Data Summary (2021 – 2022) – Midblock Locations

Location	Crash Severity			Type Of Collision									
	Property Damage Only	Injury	Total	Rear End	Angle	Sideswipe (Same Direction)	Sideswipe (Opposite Direction)	Head -On	Hit Roadside Fixed Object/ Object In Roadway	Other/Unknown	Total	*Hit Pedestrian*	*Hit Bicyclist*
Midblock Segments													
York Street, Grove Street to Elm Street	3	1	4	2	0	1	0	0	1	1	4	0	0
York Street, Elm Street to Chapel Street	8	3	11	3	1	6	0	0	0	1	11	1	0
York Street, Chapel Street to Crown Street	3	0	3	1	0	2	0	0	0	0	3	0	0
York Street, Crown Street to George Street	0	1	1	0	0	0	0	0	0	1	1	1	0
York Street, George Street to MLK Boulevard	0	0	0	0	0	0	0	0	0	0	0	0	0
Church Street, Grove Street to Wall Street	1	0	1	0	0	1	0	0	0	0	1	0	0
Church Street, Wall Street to Elm Street	1	0	1	0	0	1	0	0	0	0	1	0	0
Church Street, Elm Street to Chapel Street	7	2	9	5	0	4	0	0	0	0	9	0	0
Church Street, Chapel to Crown Street	4	1	5	2	1	2	0	0	0	0	5	0	0
Church Street, Crown to George Street	1	1	2	0	0	1	0	0	0	1	2	1	0
George Street, York Street to High Street	0	0	0	0	0	0	0	0	0	0	0	0	0
George Street, High Street to College Street	5	1	6	2	2	2	0	0	0	0	6	0	0
George Street, College to Temple Street	0	0	0	0	0	0	0	0	0	0	0	0	0
George Street, Temple to Church Street	3	0	3	0	0	3	0	0	0	0	3	0	0
Chapel Street, Park Street to York Street	4	0	4	2	0	2	0	0	2	0	4	0	0
Chapel Street, York Street to High Street	0	0	0	0	0	0	0	0	0	0	0	0	0
Chapel Street, High Street to College Street	2	0	2	0	0	2	0	0	0	0	2	0	0
Midblock Segments Total	**42**	**10**	**52**	**17**	**4**	**27**	**0**	**0**	**3**	**4**	**52**	**3**	**0**

2.2.4 Crashes Involving Non-Motorists

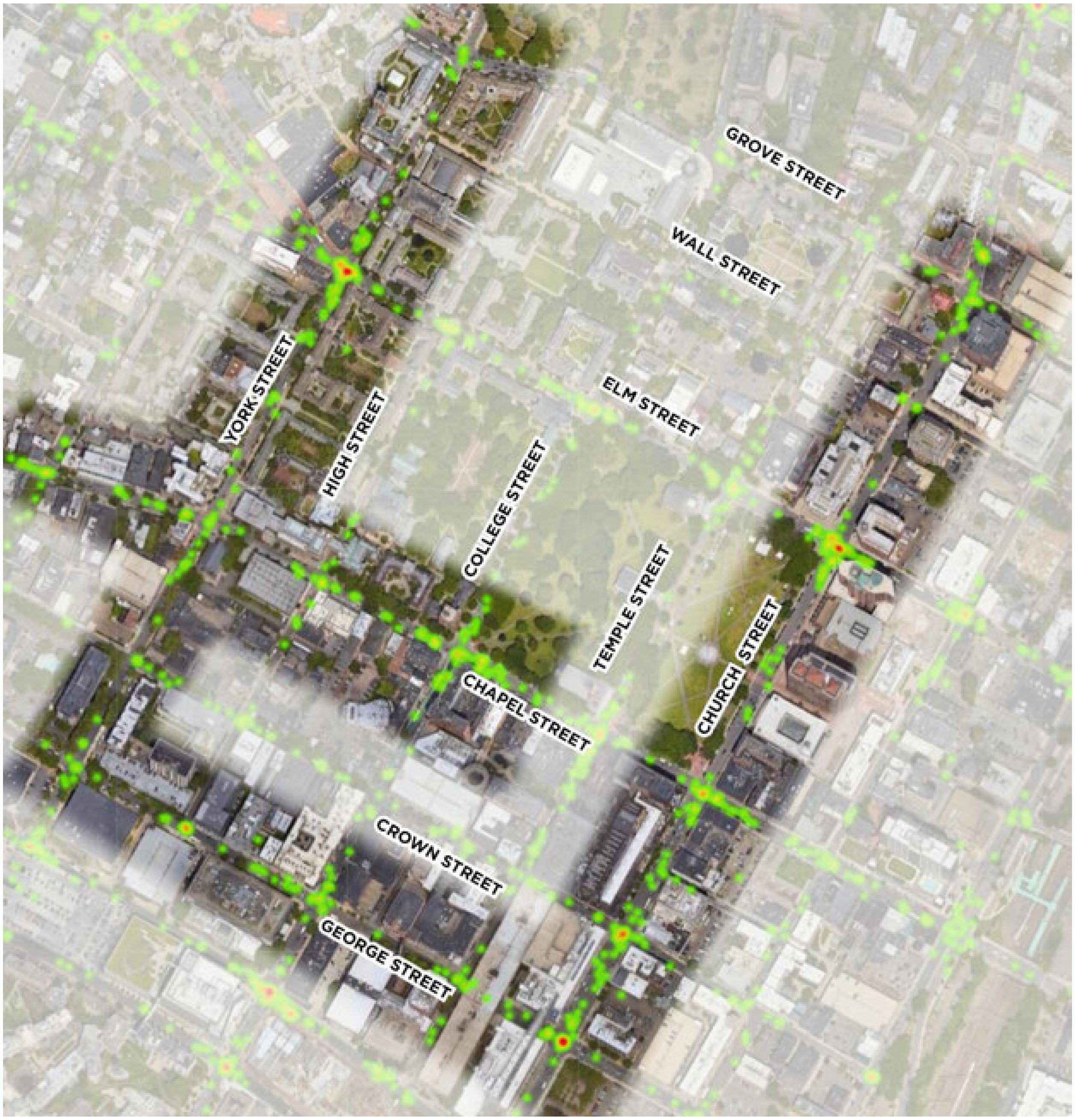
There were 13 crashes involving non-motorized persons that occurred at intersections. As mentioned above, three of these crashes were serious-injury crashes that involved vehicles colliding with pedestrians who were attempting to cross the street at intersections. Five were crashes that reportedly resulted in less-serious injuries, and it is unknown if crosswalk signals were being observed at the time of these crashes. There were five crashes involving cyclists traveling on the street at intersection locations. Out of these, two cyclist collisions occurred with motorists traveling in the same direction (referred to as sideswipes), one occurred with parked vehicles, and two were angle crashes at signalized intersections, with a potential involvement of running a red light.

Furthermore, there were three vehicle-pedestrian collisions that occurred at midblock locations, all of which reportedly resulted in minor injuries. Among these incidents, two crashes involved pedestrians attempting to cross the road, with one collision occurring at a marked crosswalk. The remaining crash occurred when a vehicle collided with a pedestrian pushing a cart within the vehicular travel lane. One of these crashes one occurred during snowy conditions, and one happened during rainy weather.

2.2.5 Nearby Fatal Crashes Involving Non-Motorists

Finally, it is also sadly noted that three traffic crashes involving non-motorists occurred downtown nearby but just outside of the study area in 2021 that resulted in fatalities. These resulted in a bicyclist's fatality at the intersection of Grove Street and College Street (hit and run), pedestrian's fatality at the intersection of Chapel Street and Temple Street (hit and run), and a pedestrian's fatality on Chapel Street east of Church Street.

Figure 2.16 Crash Heatmap (2021 to 2022)



2.3 Existing Traffic Volume, Speed, and Travel Demand Data

This section includes a summary of traffic counts that were collected for this study, as well as a review of other travel demands.

2.3.1 Peak Hour Intersection Turning Movement Traffic Counts

Turning movement traffic counts were conducted at 30 intersections within and adjacent to the project study area to quantify numbers of vehicles and pedestrians. The traffic counts are also used to evaluate existing traffic flow operating conditions (described further below). The traffic counts were collected on a typical weekday in early December 2022, during the morning and afternoon periods of 7:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 pm, respectively. The peak-hour vehicular traffic volumes were then extracted from the counts and are shown on **Figure 2.17** and **Figure 2.18**. The pedestrian crossing volumes from these counts are shown on **Figure 2.19** and **Figure 2.20**.

Figure 2.17 Existing Vehichle Volumes – Morning Peak Hour

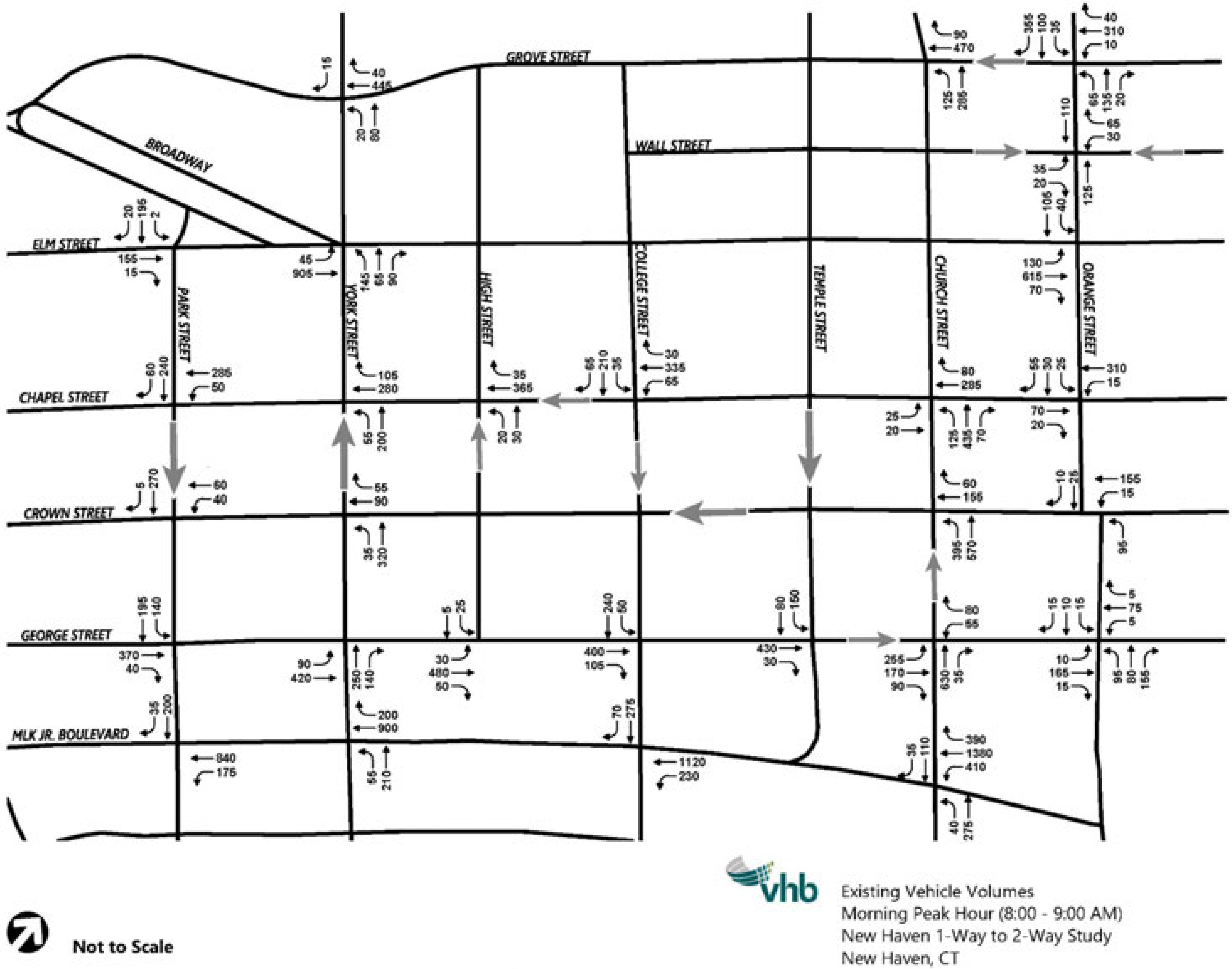


Figure 2.18 Existing Vehichle Volumes – Evening Peak Hour

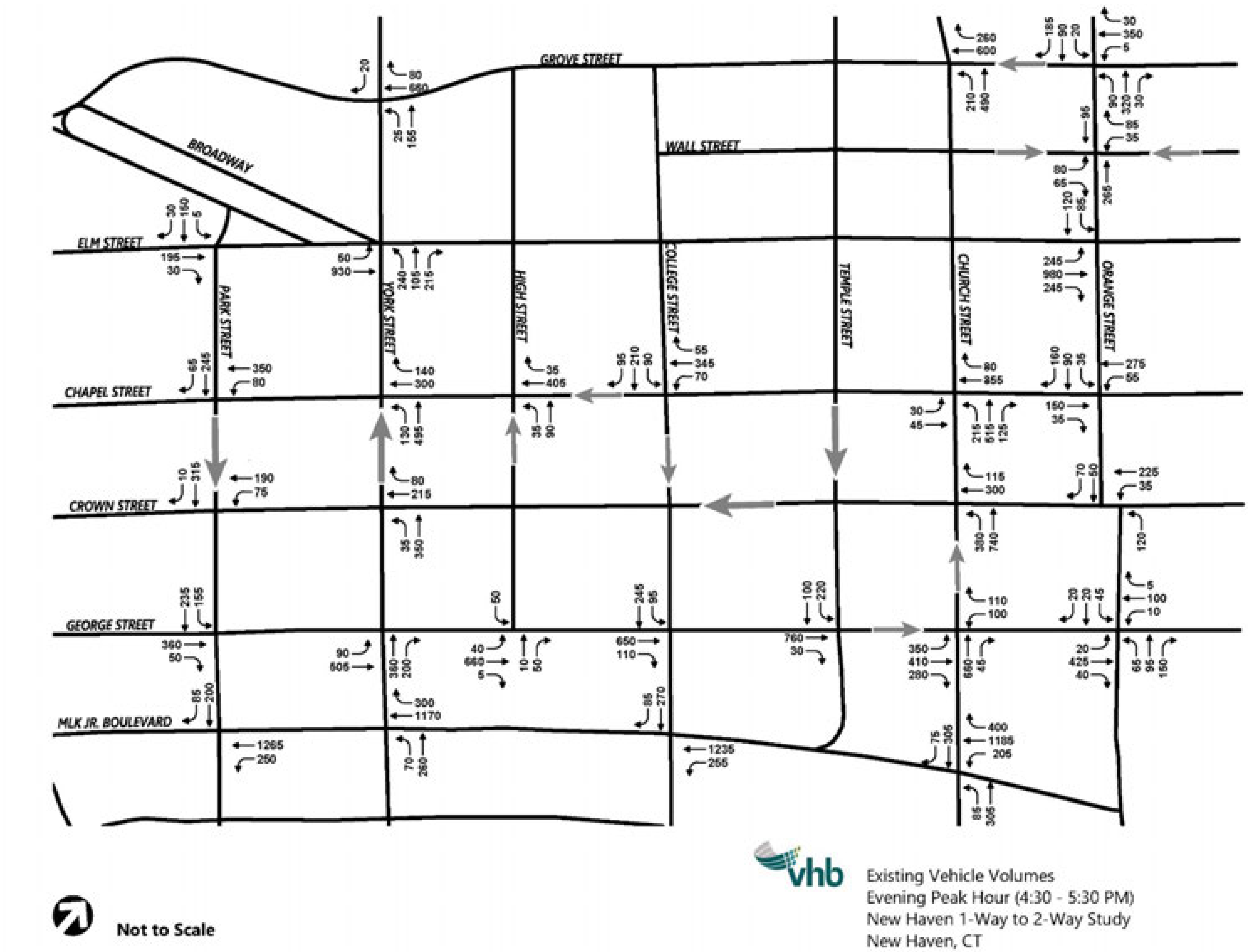


Figure 2.19 Existing Pedestrian Volumes – Morning Peak Hour

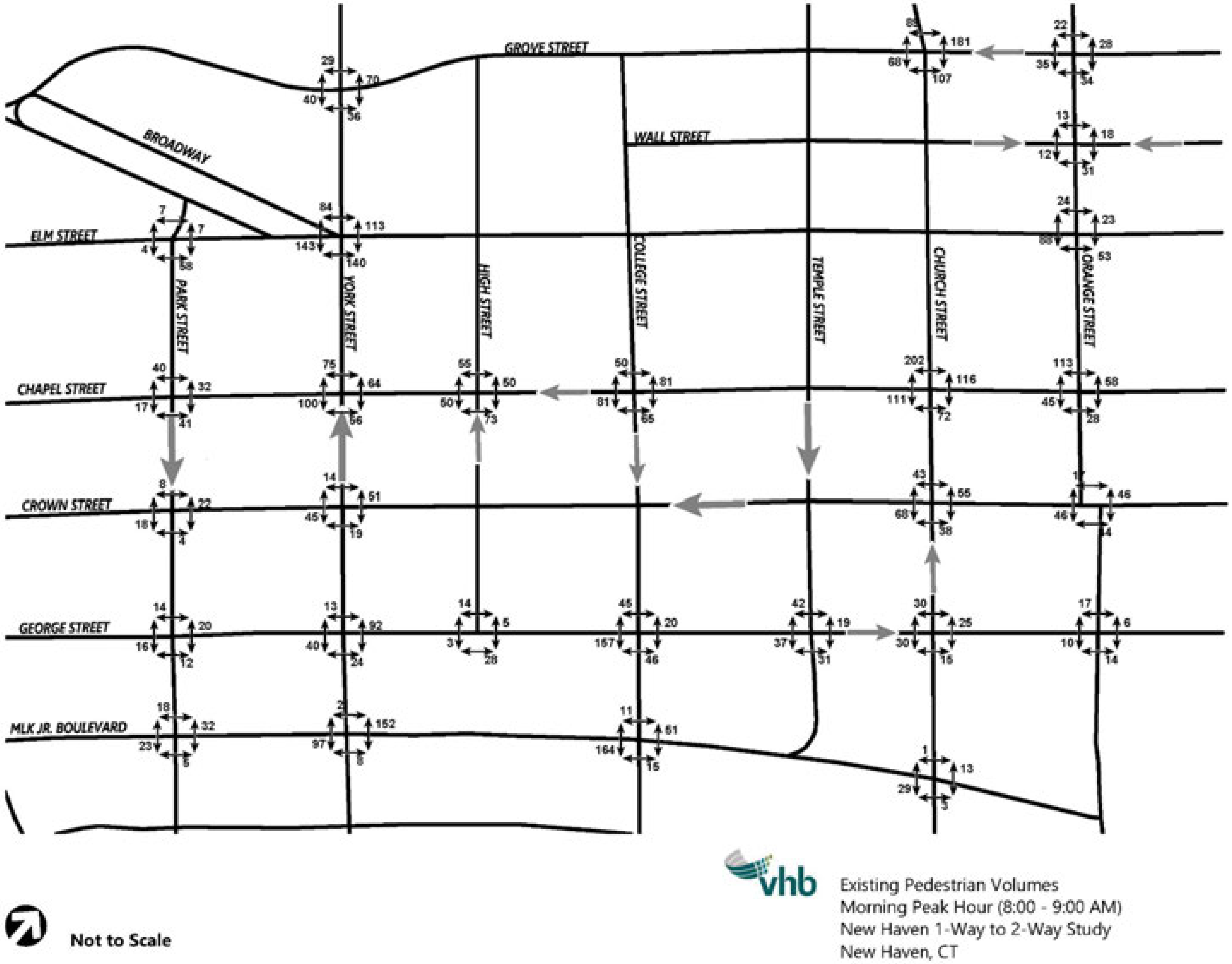
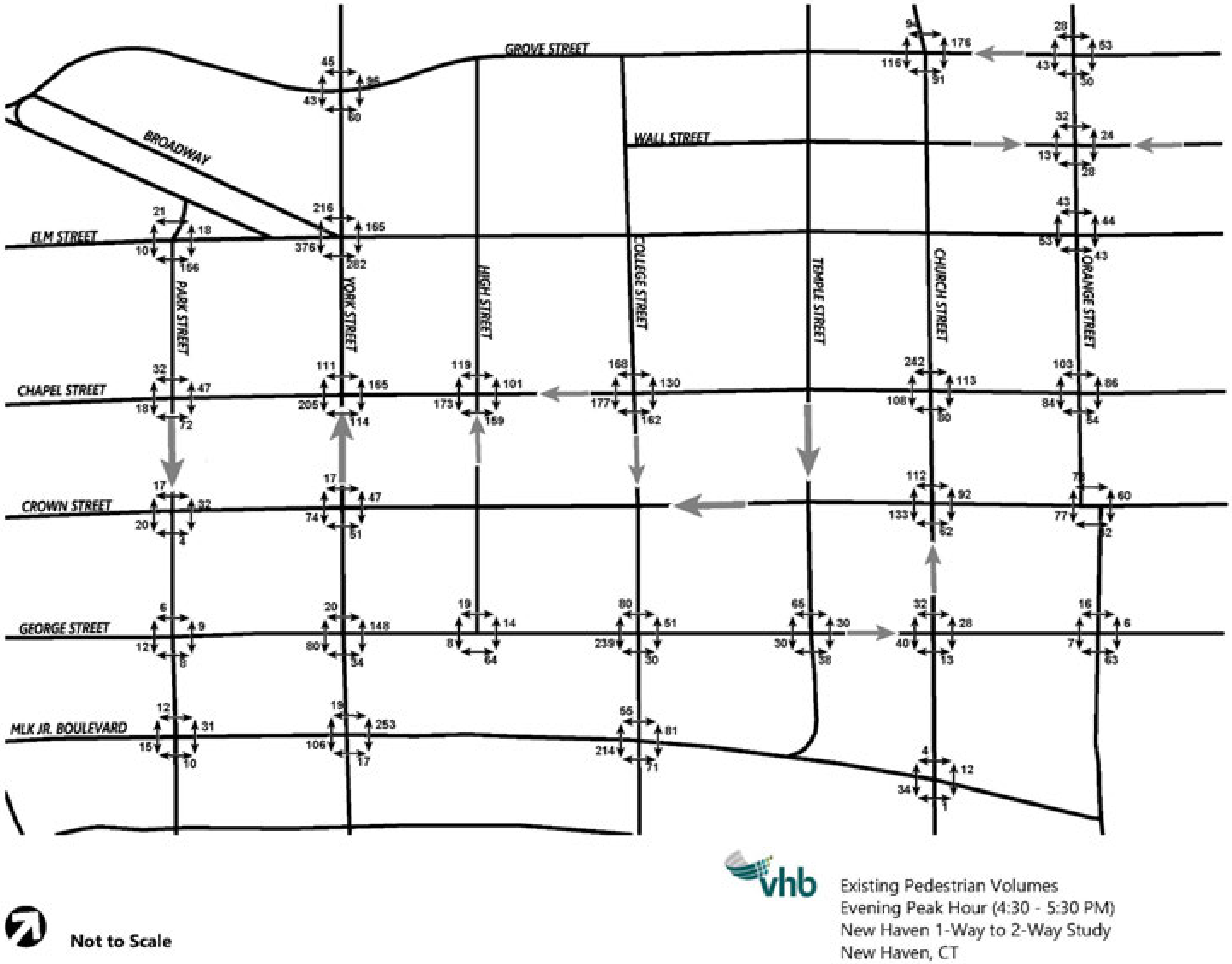


Figure 2.20 Existing Pedestrian Volumes – Evening Peak Hour



2.3.2 Non-Motorist Traffic

It should be noted that the pedestrian counts shown on **Figure 2.19** and **Figure 2.20** only include those pedestrians who crossed the street at intersections and do not include pedestrians who remained on the sidewalk walking the 90-degree corner from one street's sidewalk to another street's sidewalk. The City of New Haven, in partnership with SLR, has for the better part of the past 10 to 15 years conducted an annual Point-In-Time Transportation Survey of non-motorists that does include counts of all pedestrians at intersections, which thus provides a more comprehensive understanding of pedestrian activity at certain locations. The last Point-In-Time that took place in full, and was not done during the pandemic, occurred in October 2019. At the intersection of Church Street at Chapel Street, for example, around 500 pedestrians crossed the street at this intersection during the morning peak hour according to the early December 2022 intersection counts. According to the last Point-In-Time transportation survey another approximately 218 passed immediately by this intersection remaining on the sidewalk (720 total pedestrians). By comparison, 1,040 motor vehicles passed through this intersection during the morning peak hour.

Bicyclists, which were enumerated generally as either vehicle traffic and pedestrian traffic in the early December 2022 intersection traffic counts, are individually counted as a specific part of the Point-In-Time Transportation Survey along with all pedestrian traffic. The 2019 Point-In-Time Transportation Survey found bike traffic at sample intersections downtown to be upwards of almost 100 bicyclists during the morning peak hour. In terms of transit ridership, according to the *Move New Haven* study, thousands of bus riders travel downtown during peak hours.

2.3.3 Travel Demand Mode Comparison

There are seven intersections that are included in both this two-way study and the Point-In-Time Transportation Survey. **Table 2.4** shows a comparison of the motor vehicle, pedestrian, and bicyclist weekday morning peak hour traffic quantities at these intersections. As can be seen, automobile traffic comprises around 65 percent of travel demand at this sample of intersections, while pedestrian traffic comprises 31.5 percent and bicyclist traffic comprises 3.5 percent. Bus riders are mixed within these percentages.

Table 2.4 Modal Traffic Count Comparison at Select Intersections Weekday Morning Peak Hour

Location	Pedestrian Volume	Bicycle Volume	Vehicle Traffic Volume
Chapel Street at Church Street	719	45	1,040
Chapel Street at College Street	411	93	740
Chapel Street at York Street	482	26	640
York Street at Elm Street and Broadway	488	69	1,250
York Street at M.L.K. Jr. Boulevard	355	10	1,365
George Street at High Street	214	15	590
George Street at College Street	402	65	795
Total Percentages	**31.5%**	**3.5%**	**65%**

Review was also made of the latest available Census commuting data of residents who live in the census tracts that contain the study-area streets. This census data finds that only around 25 percent of downtown residents commute by automobile, while 75 percent typically commute by either walking, bicycling, taking transit, or working from home (most walk to work). Census commuting data on the mode-choices of people who travel to work downtown, coming from inside or outside of New Haven, is not readily available. Yet, it is clear that downtown New Haven is truly a multimodal place.

2.3.4 Street Segment All-Day Traffic, Historical Traffic Levels, and Speed Data

Automatic traffic recorder (ATR) counts were also conducted at three street-segment locations in the study area in late November to early December 2022, to get samples of all-day traffic volume and vehicle travel speed data on Church Street south of Wall Street, George Street west of Temple Street, and York Street south of Elm Street. CTDOT additionally maintains ATR traffic monitoring stations at locations downtown, including on Church Street north of Chapel Street and south of Crown Street, George Street east of Temple Street, and York Street south of Chapel Street. The CTDOT ATR data, however, is not as recent as the late November to early December 2022 ATR data that was compiled for this study and hasn't been updated since the pandemic.

Review of the weekday average daily traffic (ADT) volumes from late November to early December 2022 finds that, at these specific locations, around 5,150 vehicles traveled on Church Street south of Wall Street over the course of a day, 5,500 did so on George Street west of Temple Street, and 6,170 did so on York Street south of Elm Street.

It is worth noting that, when comparing the 2022 ADT volume to the nearest historical CTDOT traffic monitoring ADT, daily traffic volumes do not appear to have increased in much of downtown over the past 10 to 15 years. For example, the ADT (from CTDOT) on York Street south of Chapel Street was 6,600 vehicles in 2009 (compared to 6,170 vehicles a block to the north in late 2022). Comparing historical ADT data from only the CTDOT dataset finds the same. Per the CTDOT traffic monitoring data, there was less daily traffic on Church Street north of Chapel Street, for example, in 2018 (8,400 vehicles) than there was in 2006 (8,900 vehicles). This indicates that automobile traffic does not always increase in perpetuity.

The speed data that was collected from the ATR counts in late November to early December 2022 found that that average speeds at the three locations ranged from 19 to 23 mph and that 85th percentile speeds ranged from 24 to 28 miles per hour (mph). However, hundreds of vehicles clocked-in going dangerously over 35 mph, with a handful that went over 45 mph on Church Street and George Street. None went over 45 mph on York Street, perhaps because of its traffic-calming raised crosswalks.

2.4 Traffic Flow Analysis

Based on the existing traffic count data discussed above, intersection capacity analyses were conducted to evaluate traffic flow operations at the study intersections during the weekday morning and afternoon peak-hour traffic periods. The following section summarizes the methods of traffic capacity analyses that are typically used and summarizes the existing conditions traffic flow findings.

2.4.1 Traffic Analysis Measures

Intersection capacity analyses were conducted by means of *Synchro* software (Version 11), which is the industry standard software that uses the methodologies of the *Highway Capacity*

Manual. Capacity analyses results are reported using a variety of performance measures, including “Level of Service” (LOS) and vehicle queuing at intersections.

The LOS designation is based on the average control delay experienced by a motorist traveling through the intersection. Similar to a report card, LOS designations are letter-grade based, ranging from A to F, with LOS A representing the little to no vehicle delays and LOS F representing the long delays and congestion. LOS D or better conditions are widely considered to be acceptable. In downtowns and urban areas, LOS E during peak hours is deemed acceptable and can indicate an efficient trade-off between traffic flow and the amount of land devoted to the movement of motor vehicles. Moreover, in downtown areas, LOS A and LOS B during peak hours can reflect a sense of emptiness and of too much pavement given over to automobiles. A more detailed explanation of LOS can be found in the Appendix. The full detailed capacity analysis intersection worksheets and summary tables can also be found in the Appendix.

2.4.2 Existing Traffic Flow Findings

The existing condition overall intersection LOS findings are summarized in **Table 2.5** and shown on **Figure 2.21** through **Figure 2.22.**

Table 2.5 Existing Traffic Conditions Level of Service Summary

Location	Level Of Service	
	Existing Conditions	
	Weekday Morning Peak Hour	Weekday Evening Peak Hour
York Street at Grove Street/Tower Parkway	B	C
York Street at Elm Street/Broadway	C	C
York Street at Chapel Street	B	C
York Street at Crown Street	A	B
York Street at George Street	C	D
York Street at M.L.K. Jr. Boulevard	A	B
Church Street at Grove Street/Whitney Avenue	C	C
Church Street at Chapel Street	D	C
Church Street at Crown Street	B	B
Church Street at George Street	C	D
George Street at High Street	B	B
George Street at College Street	C	B
George Street at Temple Street	D	C
Chapel Street at Park Street	A	B
Chapel Street at High Street	A	B
Chapel Street at College Street	C	D

As shown above, 11 of the 16 study intersections currently operate at overall LOS C or better, while five operate at an overall LOS D during at least one peak-hour period:

- **Church Street at Chapel Street**: During the morning peak hour, this intersection experiences overall LOS D, with the westbound approach experiencing the longest delays. The longest vehicle queuing occurs at the westbound and northbound approaches, which both experience average queues of around 4 to 5 cars.
- **George Street at Temple Street:** This intersection operates at LOS D during the morning peak hour. The eastbound approach encounters the most significant delays and vehicle queuing, with an average queue length of approximately 5 cars.
- **York Street at George Street:** During the evening peak hour, this intersection functions at overall LOS D. The northbound approach encounters the highest delays and has an approximate queue length of 5 cars on average.

- **Church Street at George Street**: During the evening peak hour, this intersection functions at LOS D. The eastbound through movement encounters the longest delays and queues, with queuing of around 7 to 8 cars on average during the evening peak hour.
- **Chapel Street at College Street**: This intersection operates at overall LOS D during the evening peak hour. The southbound approach experiences the longest delays and queues, with an average queue of approximately 9 cars.

As mentioned earlier, LOS D is acceptable and not uncommon in urban areas but does reflect some noticeable traffic delay conditions. Nonetheless, even peak hour LOS E would be considered acceptable given that this is an urban downtown. In fact, LOS that is high on the A to F scale (LOS A and LOS B) can reflect a sense of emptiness, while traffic conditions in the middle LOS C to LOS E range is often reflective of an economically successful and vibrant place. Importantly, with all the study intersections operating at overall peak-hour LOS D or better, mostly at LOS B or LOS C, this indicates that excess capacity exists on these downtown streets today should there be a desire to repurpose some vehicle lane capacity as part of the two-way conversion.

Figure 2.21 Traffic Operations LOS Map – Church Street

Figure 2.22 Traffic Operations LOS Map – Chapel Street

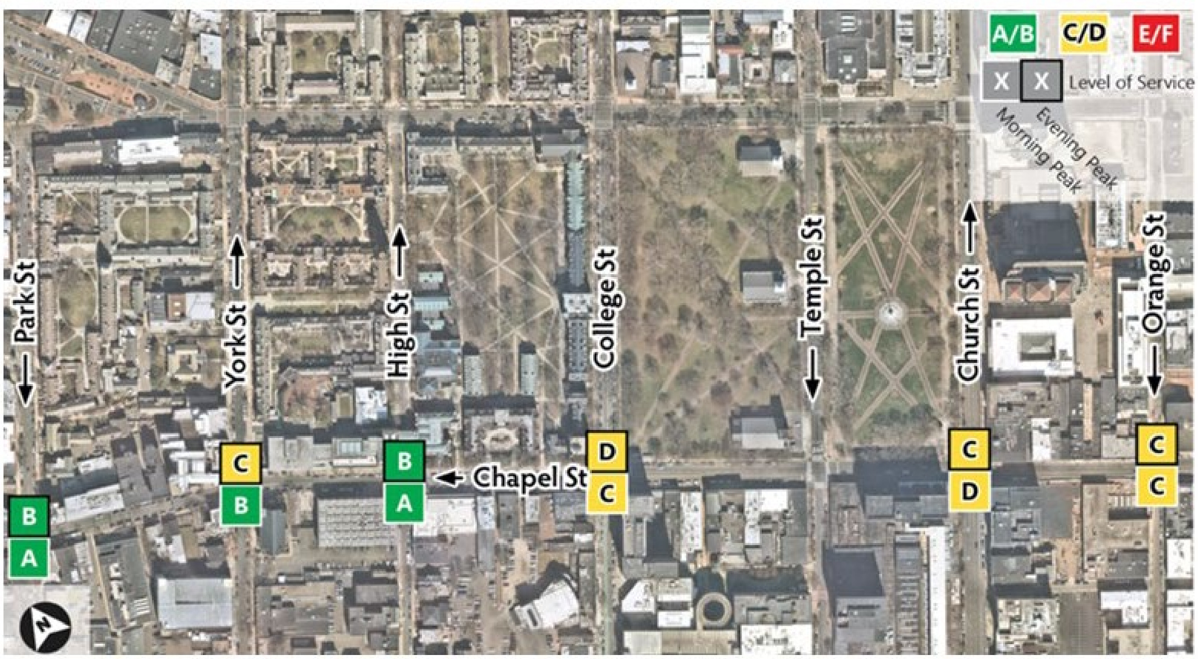
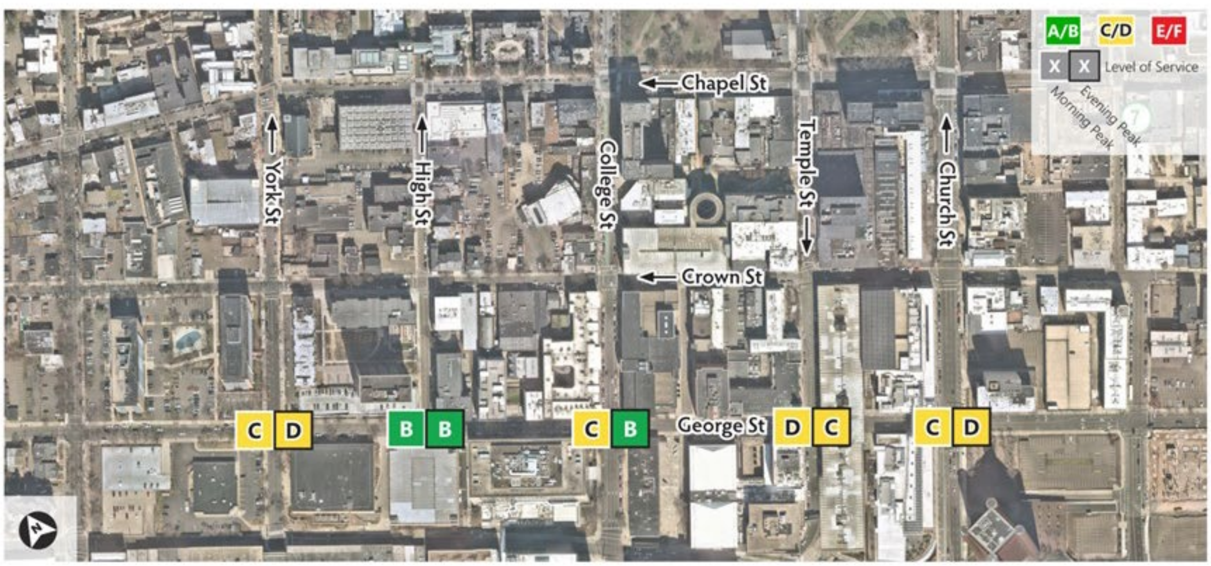


Figure 2.23 Traffic Operations LOS Map – York Street

Figure 2.24 Traffic Operations LOS Map – George Street



2.5 Existing Conditions Public Input

This section includes a summary of public input gained as part of the first public meeting for this study that was held virtually on May 16, 2023. After an introduction of this project and a presentation of the existing conditions by the project team, members of the public shared opinions and questions. A summary of the meeting can be found in the Appendix. Comments and questions from the public that came up during the first public meeting are summarized below.

Q1: Why were these specific corridors selected?

Q2: Will the design for Church Street include protected bike infrastructure?

Q3: The bus stop at the northeast corner of Church Street and Chapel Street should be included in this study, as it is a crew change point and location where lots of bus passengers transfer.

Q4: Could a map be developed which shows all the one to two-way conversions, the State project in front of City Hall, and the “BRT” on Elm Street?

Q5: What is the estimated cost for one-way to two-way conversions?

Q6: One-way streets should be intuitively safer than two-way streets due to reduced conflicts, so wouldn’t converting to two-way streets increase crashes? Will the project consider ADA compliance issues?

Q7: Once a plan is created, how will it be funded? What is the estimated date of completion? When will BRT project have a public info meeting?

Q8: Will there be consideration for removing traffic signals under this project?

Q9: This project should consider all users, not just bicycles.

Q10: There have been studies in the past, but nothing has changed. How will this time be different?

Q11: What has been done to reach out to businesses?

Q12: Can temporary quick fixes (painted bike lanes, etc.) take place on these streets while the study is taking place? If it takes years, do we risk losing the ability to have quick fixes in the interim?

Q13: Will two-way conversions be completed all at once? Or in pieces? What will be the learning process for the public?

Q14: Protected-bike lanes should be installed downtown.

Responses to several of these questions/comments have been incorporated into the earlier parts of this Existing Conditions Chapter. With regard to the study process and additional public meetings, it was noted that additional public meetings will take place as this study and the street redesign concepts advance.

With regard to capital implementation costs, it was noted by the project team that cost estimates will be developed later in the study process after concept design plans have been developed and refined. Specific funding mechanisms to implement the two-way conversion will also be determined later in the process after design plans are developed.

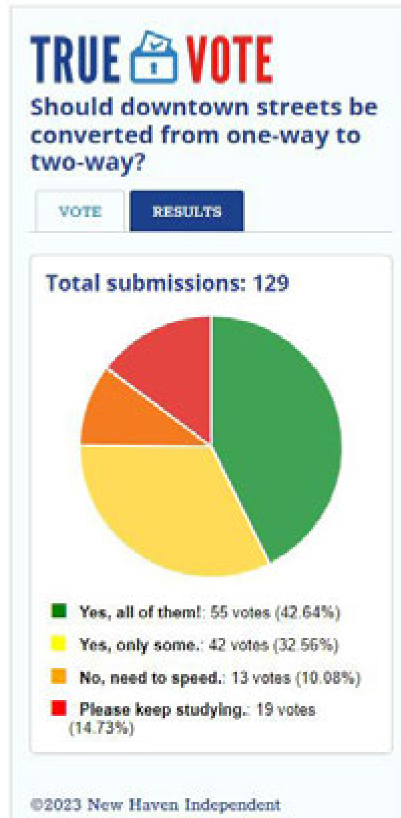
When the two-way conversion will be implemented is also unknown and will be contingent on a number of factors including funding availability. It will likely be possible to implement quick-build solutions that could become permanent, longer-term. In fact, not every improvement needs to happen all at once. The extent to which permanent two-way conversion changes will be implemented in pieces, in large sections, or even all at once will be further evaluated during the full-design/construction phases, and again will be contingent on funding. Public outreach from the city to educate the traveling public about any two-way conversion and possible routing changes and road closures will also take place in the future, prior to actual implementation.

In terms of accessibility, it must be noted that improvements developed under this project will be ADA compliant. To the extent possible, improvement of any current non-compliant ADA facilities within the study area will also be identified for rectification. These streets are for all types of users, including those with disabilities.

With regard to the state's BRT project, as of the time of this writing that state project was in its very early stages and its public information meeting date has not yet been announced. At least some of the concept-design options developed as part of this two-way conversion study will provide accommodation for BRT.

Both the New Haven Register and the New Haven Independent published articles about the project after the initial public information meeting. The [New Haven Independent article] included a live poll that asked the question: "Should downtown streets be converted from one-way to two-way?" The results of this poll, shown in **Figure 2.25**, found that around 3 out of 4 people support the two-way conversion on at least some of downtown's streets.

Figure 2.25 Opinion Poll



3.0 Two-Way Traffic Analysis

To analyze how the study-area streets that are currently one-way would function in terms of traffic flow in the future if they were changed to two-way streets, estimates were first made of the degree of peak-hour traffic volume rerouting that could be reasonably expected to occur. A change to two-way streets would unlock additional, and often more direct, driving routes. In general, each individual motorist starting from an origin and headed to a destination chooses a travel route that they (or their driving directions app) believe is the best for them during that time – usually one that minimizes their travel time when considering all the other motorists, colloquially known as 'traffic', who are also driving through a certain area during a given timeframe. If these streets were to change from one-way to two-way in New Haven, each and every motorist would then decide if any new driving route would be a better option than the route they currently, or otherwise, would take. Some motorists will use a new route to get to their destination and some will not. Ultimately, after an adjustment period of perhaps a few days or more, the general driving patterns to, from, through, or within, downtown New Haven would re-adjust to the new normal.

Next, the estimated two-way scenario traffic flow patterns/volumes were analyzed in the intersection capacity-analysis model (*Synchro* software) that was also modified to reflect how the street lane-striping configurations and signal infrastructure/operations (signal phasings, timings, coordination) would also change if these streets were made two-way. In a somewhat iterative process of fine-tuning the two-way traffic volume rerouting estimates and the potential two-way signal infrastructure modifications, including taking into account intersection capacity changes associated with their redesign, a reasonable picture of future two-way conditions came into focus. This corresponds in general with what is recently known as the Vision & Validate approach to transportation planning/traffic engineering, which aims to match a new vision of how city streets could look and function in a more equitable, sustainable, multimodal, and safer way for all roadway users, with the changes to travel patterns and infrastructure that would be anticipated in making the vision a reality. This is as opposed to the 'predict-and-provide' method that has historically been overfocused on accommodating automobile traffic growth and over-building automobile infrastructure above all else.

3.1 Two-Way Traffic Volumes

Figure 3.1 and **Figure 3.2** respectively show the weekday morning and afternoon peak-hour traffic volume reroutings that are estimated to occur within the study area as part of the one-way to two-way conversion. The afternoon peak-hour traffic volume reroutings were estimated first given that the total traffic volumes are higher in the afternoon than the morning across the board. Those for the morning peak hour where then estimated secondarily in a similar proportional fashion.

Figure 3.1 Two-Way Conversion Traffic Volume Re-Routing Estimates – Morning Peak Hour

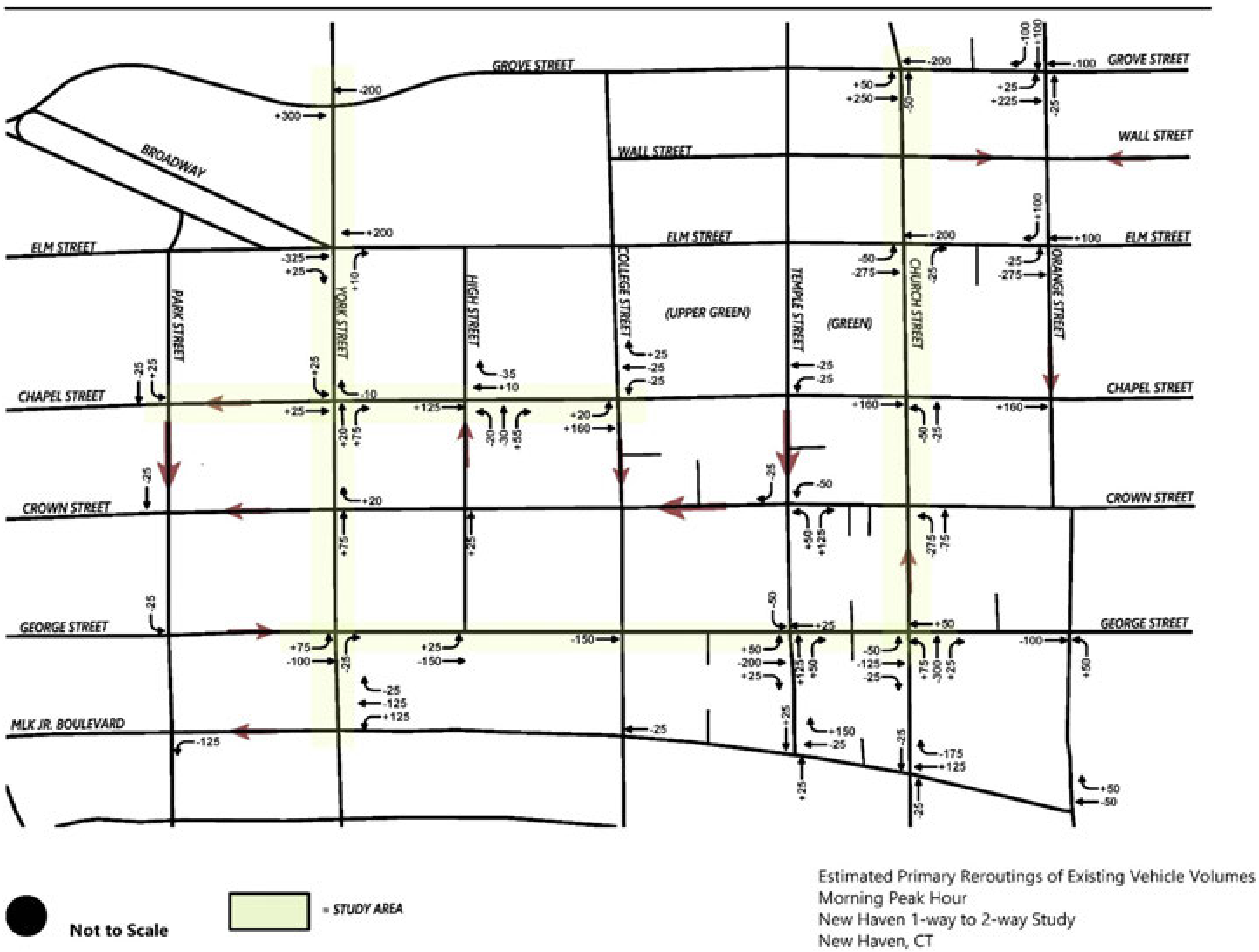
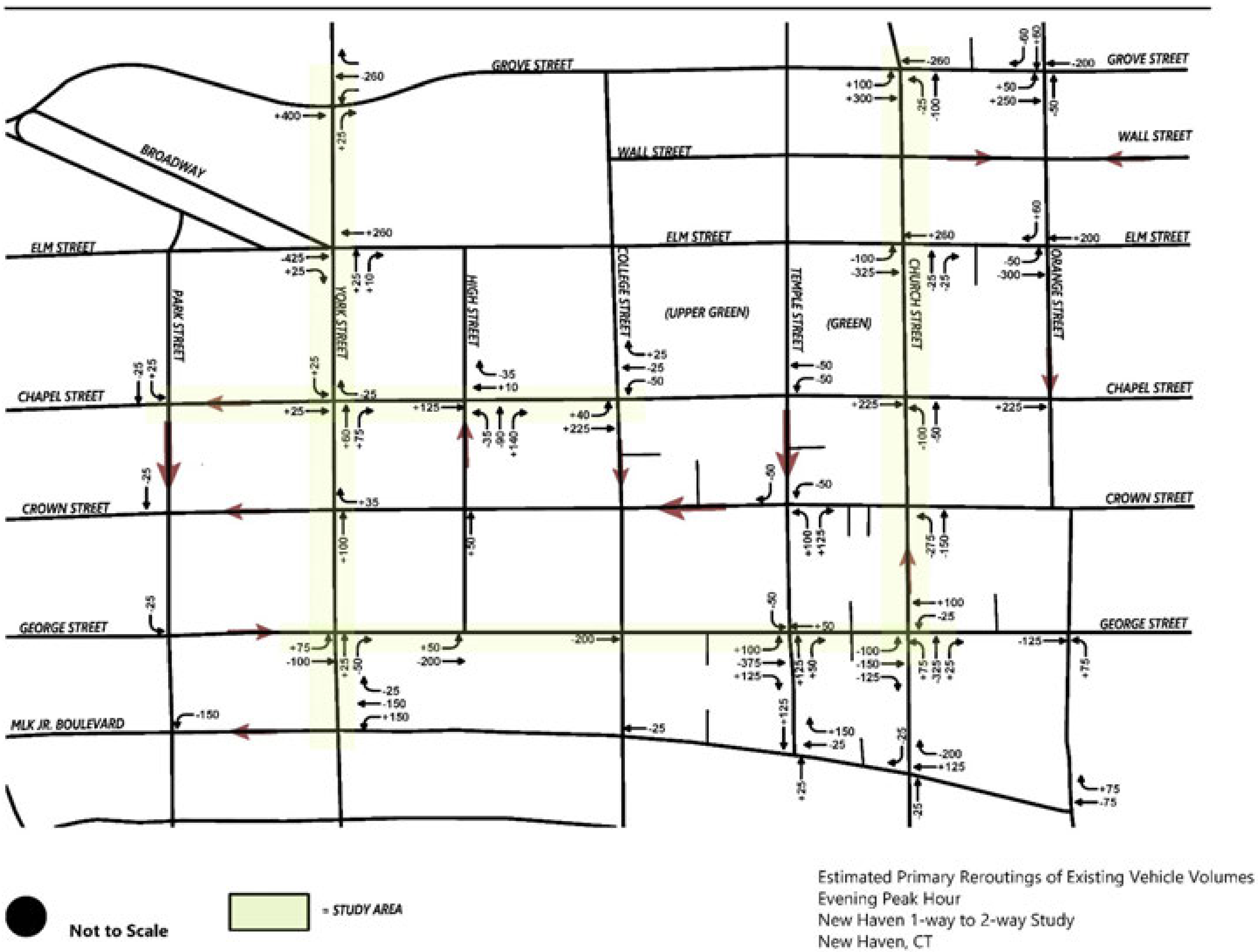


Figure 3.2 Two-Way Conversion Traffic Volume Re-Routing Estimates – Afternoon Peak Hour



Change to two-way on the study area streets will prompt some motorists to seek an alternate parallel route. For instance, making Church Street two-way will necessitate changing some northbound lane(s) to instead allow southbound flow, which will nudge some of the current northbound traffic to instead use other streets to get to their destination. This will include the ability to use Temple Street northbound for some blocks in the future, as that street is to be converted in part to two-way as part of Downtown Crossing Phase 4, as well as the likelihood that some motorists will switch to use York Street and/or other streets to head northbound. Secondary, there will also be some rerouting of traffic based purely out of convenience; such as the ability in the future to drive southbound on Church Street once it becomes two-way even though the demand to go southbound will remain satisfied by multiple other southbound routes that will remain largely unchanged in close proximity.

Two-way conversions also make sense when done in pairs. Another example is that the future two-way George Street and two-way Chapel Street will swap some eastbound and westbound traffic, respectively. Some of the current eastbound George Street traffic will instead use Chapel Street to go eastbound once both are converted to two-way, and similarly some of the current westbound Chapel Street traffic may instead use George Street westbound in the future. Likewise, a two-way Elm Street and two-way Grove Street will swap some eastbound and westbound traffic, respectively.

Note, that not all traffic is expected to reroute as a result of the conversion to two-way streets, as shown in Figure 3.1 and Figure 3.2. When comparing these two-way conversion traffic volume rerouting estimates to the existing traffic volumes shown in Chapter 2, depending on the block, only around one-third of the current northbound traffic on Church Street between George Street and Crown Street during the morning peak hour is estimated to reroute to other blocks as a result of the proposed conversion from one-way to two-way streets. While no one can exactly predict the future, reasonably sound estimates and assumptions were made for the future two-way traffic flow analysis.

Figure 3.3 and **Figure 3.4** show the resultant total two-way peak hour traffic flows that are estimated when applying the estimated two-way-induced traffic volume reroutings to the existing one-way traffic volumes as shown in from Figure 2.17 and Figure 2.18.

Figure 3.3 Two-Way Traffic Volume Scenario at Current Traffic Levels – Morning Peak Hour

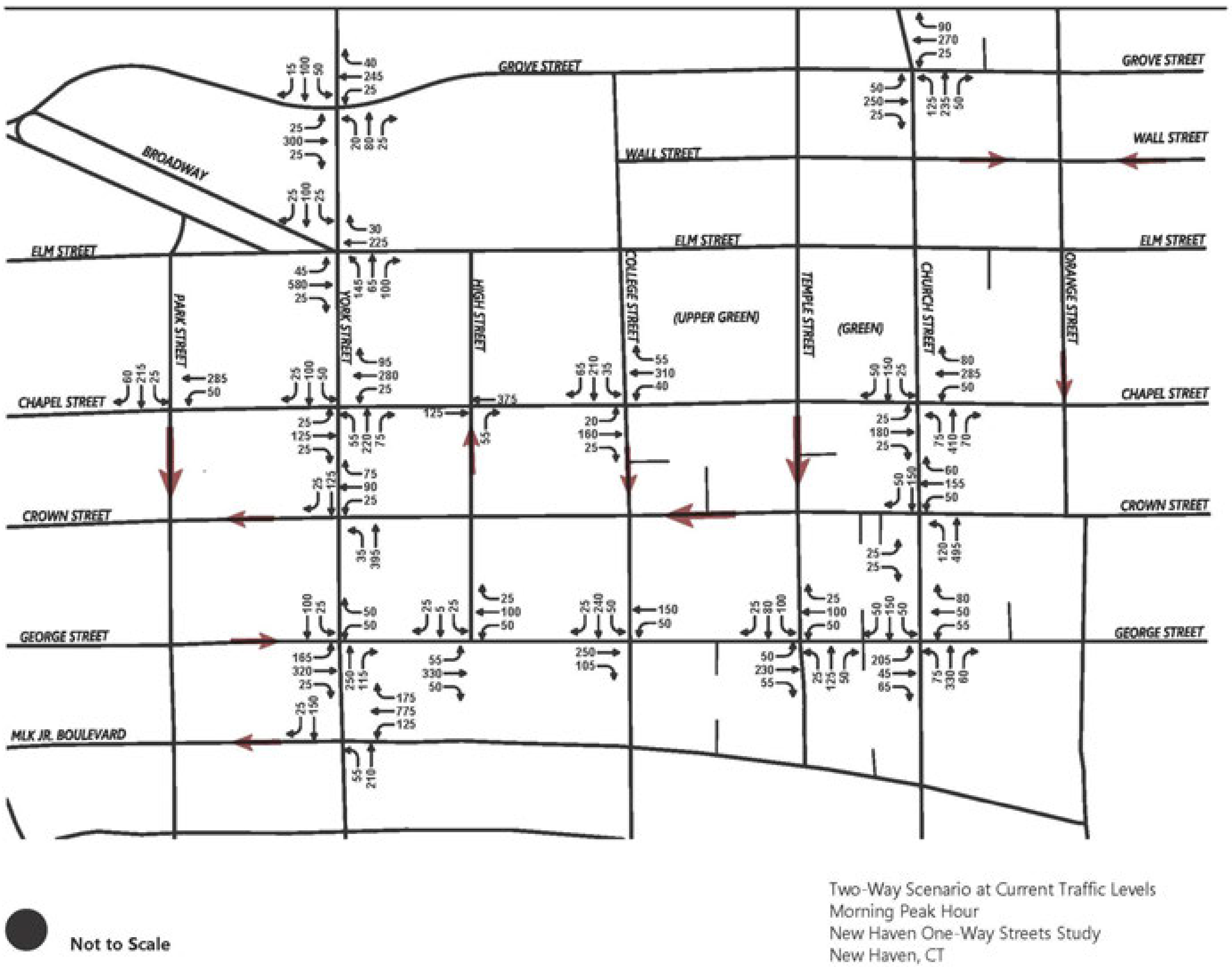
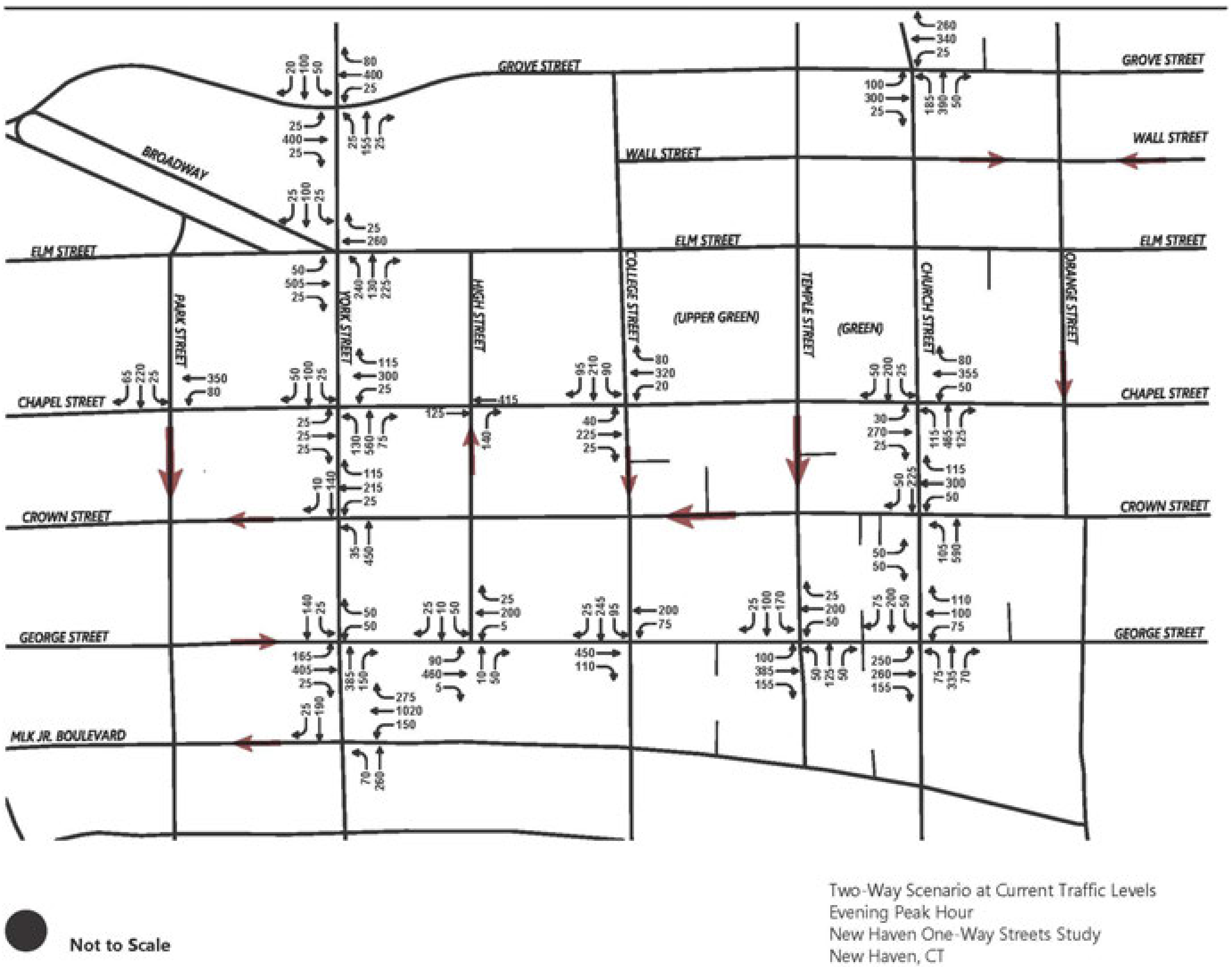


Figure 3.4 Two-Way Traffic Volume Scenario at Current Traffic Levels – Afternoon Peak Hour



3.2 Projected Future 2030 Two-Way Volumes

Lastly, in terms of estimating how the downtown traffic volumes may change with the conversion to two-way streets, the total two-way peak hour traffic flows were projected out to future year 2030. This was done based on correspondence with the City and with CTDOT by applying an ambient growth rate (of 0.4% per year) and adding estimated new traffic from two large developments in the Downtown Crossing to the two-way volumes (Figure 3.3 and Figure 3.4). **Figure 3.5** and **Figure 3.6** show the projected 2030 total two-way peak hour traffic flows downtown.

It is worth noting again that, as mentioned earlier study section 2.3.4, Average Daily Traffic (ADT) volumes did not increase in much of downtown over the past 10 to 15 years. Thus, the estimated future 2030 two-way traffic volumes and Vehicular LOS results, discussed below, may ultimately prove to be inflated should the next 10 to 15 years turn out to be similar.

Figure 3.5 Two-Way Traffic Volume Scenario at Projected 2030 Traffic Levels – Morning Peak Hour

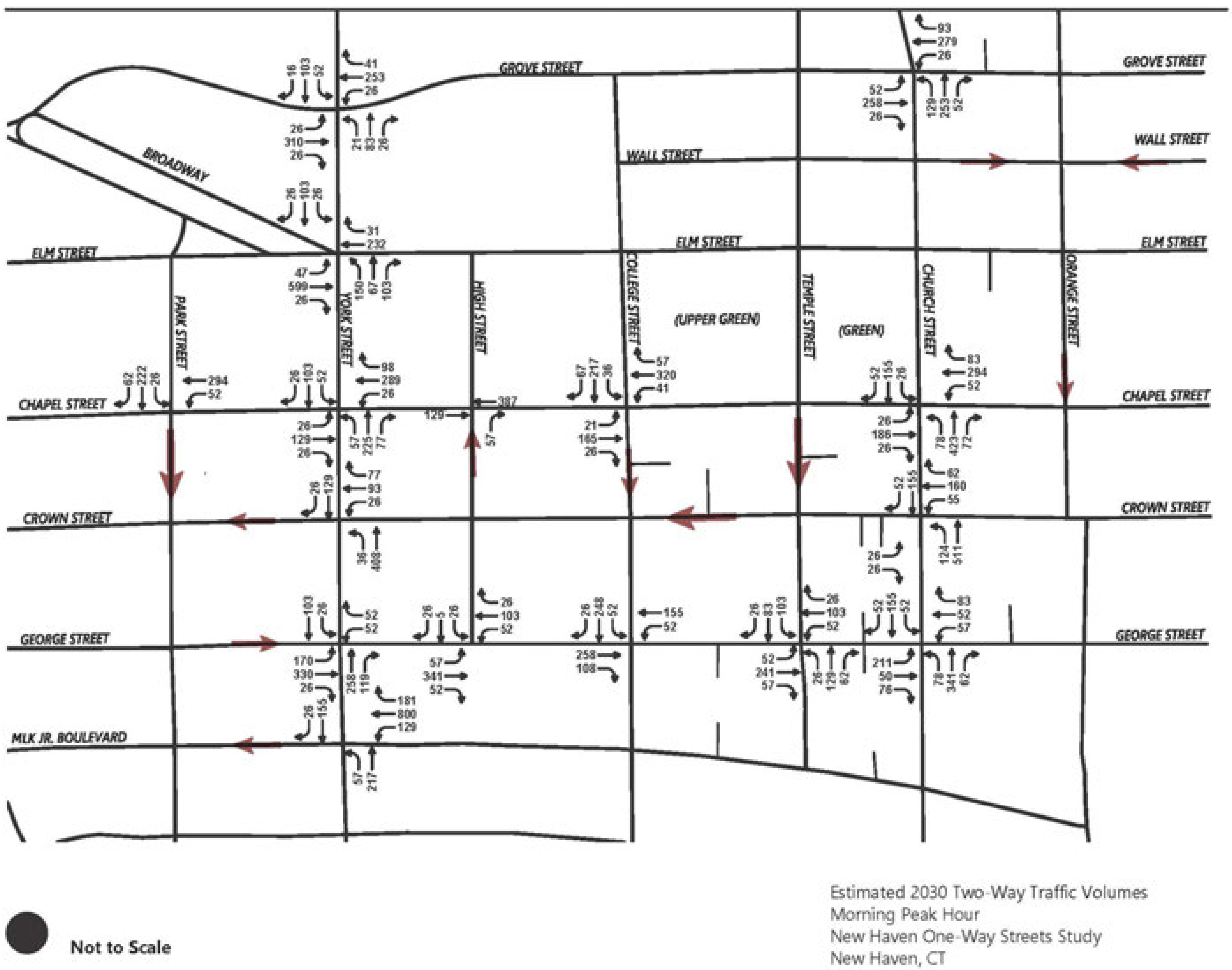
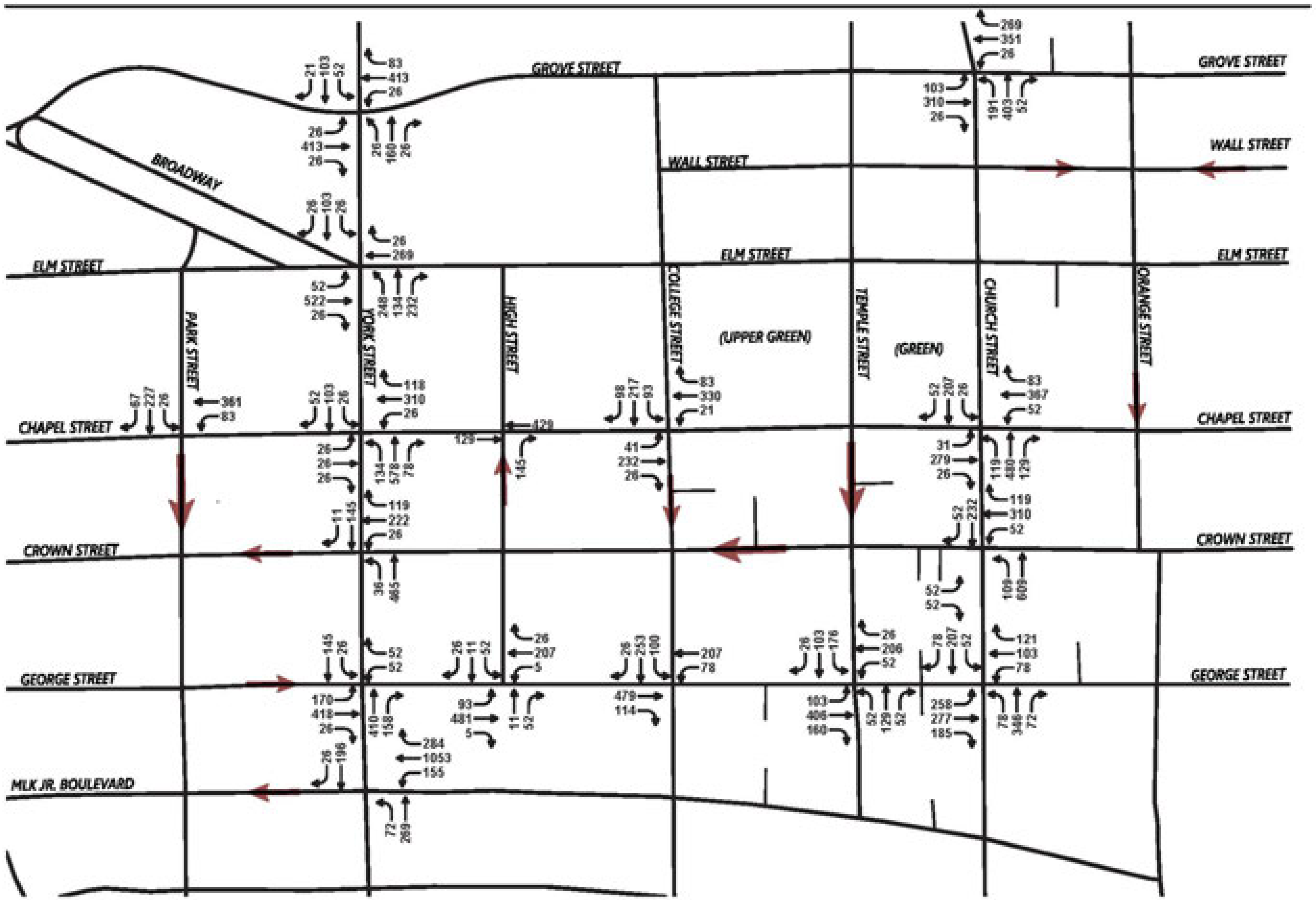


Figure 3.6 Two-Way Traffic Volume Scenario at Projected 2030 Traffic Levels – Afternoon Peak Hour



Not to Scale

Estimated 2030 Two-Way Traffic Volumes
Evening Peak Hour
New Haven One-Way Streets Study
New Haven, CT

3.3 Two-Way Traffic Flow/Intersection Operations Analysis

Based on the estimated two-way traffic volumes, intersection capacity analyses were conducted to evaluate potential future traffic flow operations at the study intersections during the weekday morning and afternoon peak-hours. Changes to signal infrastructure that would be necessary for the two-way conversion, discussed further below in Section 4.1.8, were included in this analysis.

As in the Existing Conditions Chapter, the estimated future two-way intersection capacity analyses were again conducted by means of *Synchro* software (Version 11). Capacity analyses results are reported using a variety of performance measures, including LOS at intersections. LOS designations, ranging from LOS A to LOS F, are based on the average control delay experienced by a motorist traveling through an intersection, with LOS A representing little to no vehicle delays, and LOS F representing the long delays and congestion. LOS D or better conditions are widely considered to be acceptable. In downtowns and urban areas, even LOS E during peak hours is deemed acceptable and can indicate an efficient trade-off between traffic flow and the amount of land devoted to the movement of motor vehicles.

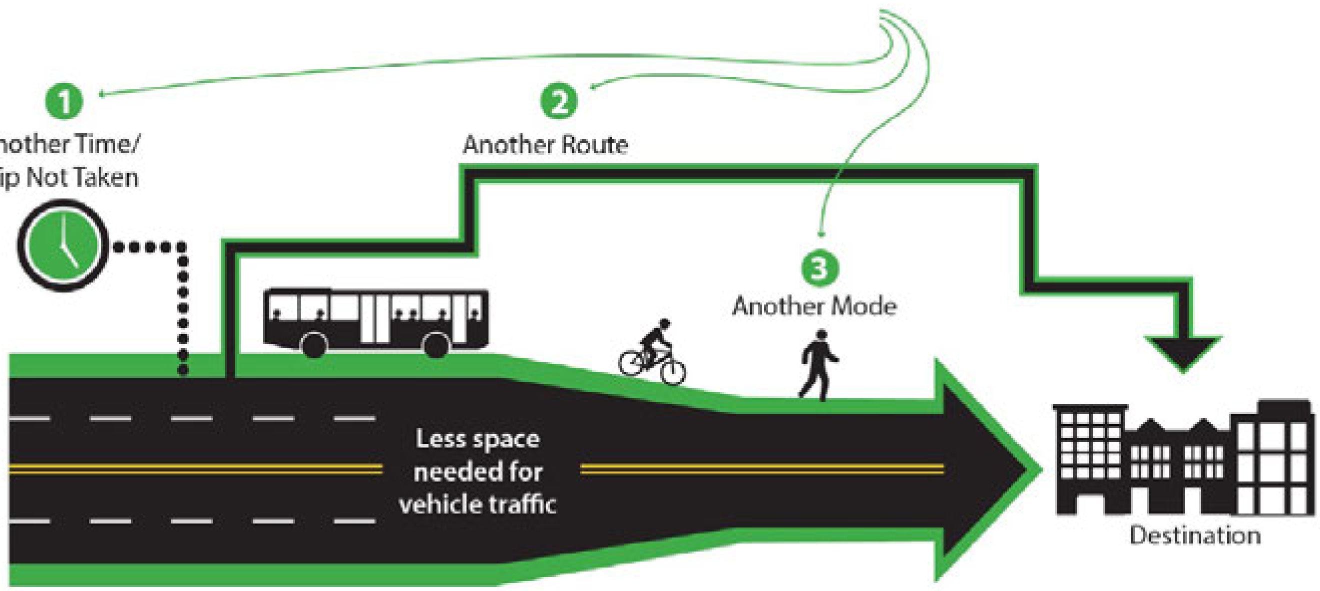
The two-way condition overall intersection LOS findings are summarized in **Table 3.1**. As shown, all of the study intersection can be expected to operate at overall LOS D or better in the future with the two-way conversion during the morning peak hour and overall LOS E or better in during the afternoon peak hour, with the majority of intersections anticipated to operate at Overall LOS B or LOS C during the morning peak hour and LOS D during the afternoon peak hour. As might be expected, should total vehicular traffic levels downtown not substantially increase by 2030 the handful number of intersections with the lowest-grade LOS will be less. With all the potential changes in traffic flow patterns and intersection configurations including to traffic signals that would come with two-way conversion, it should also be noted that while some intersections may see increased motorist delays during peak periods, that some other intersections will see little change to overall LOS and could even see fewer motorist delays overall. Furthermore, conditions for non-motorists and motorists alike in terms of traffic safety will improve on the whole if the streets are redesigned for two-way as shown in the concept plans in this report.

Table 3.1 Two-Way Conversion Traffic-Flow Conditions Level of Service Summary

Location	Vehicle Level of Service					
	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
	Existing One-Way Conditions	Two-Way Conditions		Existing One-Way Conditions	Two-Way Conditions	
		Current Traffic Levels	Estimated Future Growth Year 2030 Traffic Levels		Current Traffic Levels	Estimated Future Growth Year 2030 Traffic Levels
York Street at Grove Street/Tower Parkway	B	B	B	C	B	B
York Street at Elm Street/Broadway	C	D	D	C	D	E
York Street at Chapel Street	B	B	B	C	D	D
York Street at Crown Street	A	B	C	B	D	D
York Street at George Street	C	B	B	D	B	B
York Street at M.L.K. Jr. Boulevard	A	D	D	B	D	D
Church Street at Grove Street/Whitney Avenue	C	C	C	C	D	D
Church Street at Chapel Street	D	C	C	C	D	D
Church Street at Crown Street	B	C	C	B	E	E
Church Street at George Street	C	D	D	D	D	E
George Street at High Street	B	A	A	B	B	C
George Street at College Street	C	C	C	B	D	D
George Street at Temple Street	D	B	B	C	C	D
Chapel Street at Park Street	A	B	B	B	D	D
Chapel Street at High Street	A	B	B	B	B	B
Chapel Street at College Street	C	C	C	D	D	D

Lastly, it must also be noted that this two-way traffic analysis took a conservative approach in that it did not directly take into account that some Vehicle Miles Traveled (VMT) reductions may occur in the future, due to more people potentially deciding to take transit, walk, and/or bike more often instead of drive, or even changing their time of travel to other slightly off-peak times of day. Such changes would also result in some improvements to the Vehicular LOS projections summarized in the table above. Figure 3.7 illustrates just some of the ways that transportation demands can be changed as part of roadway and street reconfigurations to achieve a more sustainable future and still get people where they need to go.

Figure 3.7 Additional Ways That Traffic Can Change When Streets Change



Source: *Implementing Context Sensitive Design on Multimodal Thoroughfares* - A Practitioner's Handbook. Institute of Transportation Engineers, 2017

4.0 Concept Development

Based on the analysis of existing one-way conditions, analysis of estimated future two-way traffic flow conditions, public input received early in study process, and best-practices Complete Streets/safe-streets design principals, multiple concept-design plans were developed for the study corridors. Preliminary concepts were developed with the goal of vetting these concepts with the City, stakeholders and the public, and ultimately refining them into preferred concepts for each corridor.

4.1 Multimodal Safe Streets Two-Way Street Design Concepts

The alternate concept designs for the study-area streets can be seen in **Figure 4.1** through **Figure 4.12**. The following is a summary of the key design modifications, categorized generally by transportation mode, shown in each alternate concept-design plan for each study corridor

4.1.1 Church Street – Alternate 1

The following is proposed under this alternative:

- Bus/Transit Improvements
    - Addition of BRT-style concept-design with center-running bus-only lanes on Church Street south of Elm Street per CTDOT/City's *Move New Haven* BRT plan.
        - BRT station platforms would be right-side-boarding offset platforms on Church Street between George and Chapel Streets in this concept.
        - No BRT/bus-only lanes on Church Street north of Elm Street. BRT route would continue instead on Elm Street via Church Street (Elm Street BRT design not part of this project.)
        - Note that bus-only lanes are able to be used by emergency vehicles.
    - Some relocated and consolidated local-bus stops northbound on Church Street, particularly along the blocks that would overlap with BRT. Note that this concept envisions to ability of some local buses to be able to use BRT stations if desired by the city/state.
    - Conversion from one-way to two-way will allow the ability for southbound bus routing along Church Street, particularly for bus routes that currently route southbound on Temple Street 1 block over. Consolidating both northbound and southbound, or inbound and outbound, bus stops to a single street, instead of a pair of streets block(s) apart, can simplify transit routing and the rider experience. New southbound bus stops are shown on Church Street in Alternate 1. Note that some local buses could/should perhaps remain on Temple Street southbound through some or all of downtown given the abundance of existing bus stops on Temple Street at the Green and due to the lack of right-of-way (ROW) width of Church Street by the Green. Final determination on this to be made by City/State.
    - Addition of bus shelters to all bus stops.

  - BRT-style signal infrastructure including Transit Signal Priority (TSP), transit-only signal heads, and/or transit signal pre-emption.
- Bicycle Infrastructure Accommodations/Improvements:
  - Sidewalk-level one-direction bicycle (and all-purpose personal wheeled mobility device) lanes would be added to the entire study-area stretch of Church Street, including Whiteny Avenue to the north, for each direction northbound and southbound along each side of the street, with the exception of southbound on Church Street between Elm and Chapel Streets. Due to lack of ROW width between Elm and Chapel Streets, southbound bicyclists along this section would be pointed to use the existing shared-use path(s) on the Green.
  - Special attention would be paid to bicycle lane conflicts at local-bus-stop by narrowing the bicycle lane into a yield-area for bicyclists to give way to, and provide sufficient room for, boarding/alighting bus-riders.
  - Protected-intersection bicycle design elements would be added to intersections where width/ROW allows.
- Pedestrian Infrastructure and Traffic Calming Improvements:
  - Raised crosswalks would be added for access to/from BRT station platforms. A raised crosswalk could also be added across the east leg of Wall Street at Church Street.
  - Corner curb-extensions/bump-outs would be added at multiple locations along this corridor, which will reduce pedestrian crossing distances and allow pedestrians to be more visible when standing at those locations.
  - Depending on the final design of the BRT/bus-only lanes, pedestrian refuge median(s) could be added to Church Street at certain location(s).
  - All crosswalks would be restriped as high-visibility crosswalks.
  - Pedestrian signal improvements would be incorporated to signalized intersections where necessary (discussed further below). This would include the addition of Leading Pedestrian Intervals (LPI).
  - Much of the corridor would be reconfigured to remove the multiple all-purpose single-direction automobile through-lanes that exist today. This will reduce incidences of motorist weaving and speeding, reduce the potential for the multiple-threat collision, and make the downtown street look and feel less like a highway. Automobile lane widths would furthermore be narrowed as feasible.
- On-street Parking Accommodations:
  - Approximately a quarter of the current 130 on-street parking spaces would remain under this concept for Church Street between George and Grove Streets. This would include many of the on-street spaces directly next to City Hall. Note that some widening of Church Street in this area would be needed for this. On-street loading and handicap accessible parking space locations within the remaining on-street parking are to be determined during further design stages. It should also be reminded that there are many orders-of-magnitude more parking spaces that are empty

within off-street parking (garages and lots) generally within 1 to 2 blocks nearby (per the City of New Haven Point-in-Time Transportation Survey) that more than offset the on-street parking spaces that would be repurposed under this concept.

- Automobile Infrastructure Modifications:
  - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersections. Where left turn lanes are proposed along Church Street, particularly at intersections that would also have bus-only lanes, those lefts would be allowed only as signal-controlled protected-left-turns for safety purposes.
  - The intersection of Church Street at Wall Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.
  - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).
- Adjacent Non-Study-Corridor Intersecting-Street Modifications:
  - Elm Street, as mentioned above, is to be redesigned for BRT under separate state project.
  - Whitney Avenue north of Church/Grove assumed would remain northbound only but shown with road-diet to one lane to accommodate bicycle lanes.
  - Crown Street west of Church Street (between Church and Temple Streets) is recommended as part of this study to be converted to two-way to allow additional routing options to get to the Temple Street Parking Garage and the Gateway Community College Parking Garage. Crown Street east of Church Street would remain one-way westbound but with a reconfiguration to accommodate bicycle lane.
  - Grove Street it is understood will be converted to two-way under separate City and/or State project.

Figure 4.1 Two-Way Conversion Concept Design – Church Street – Aternate 1

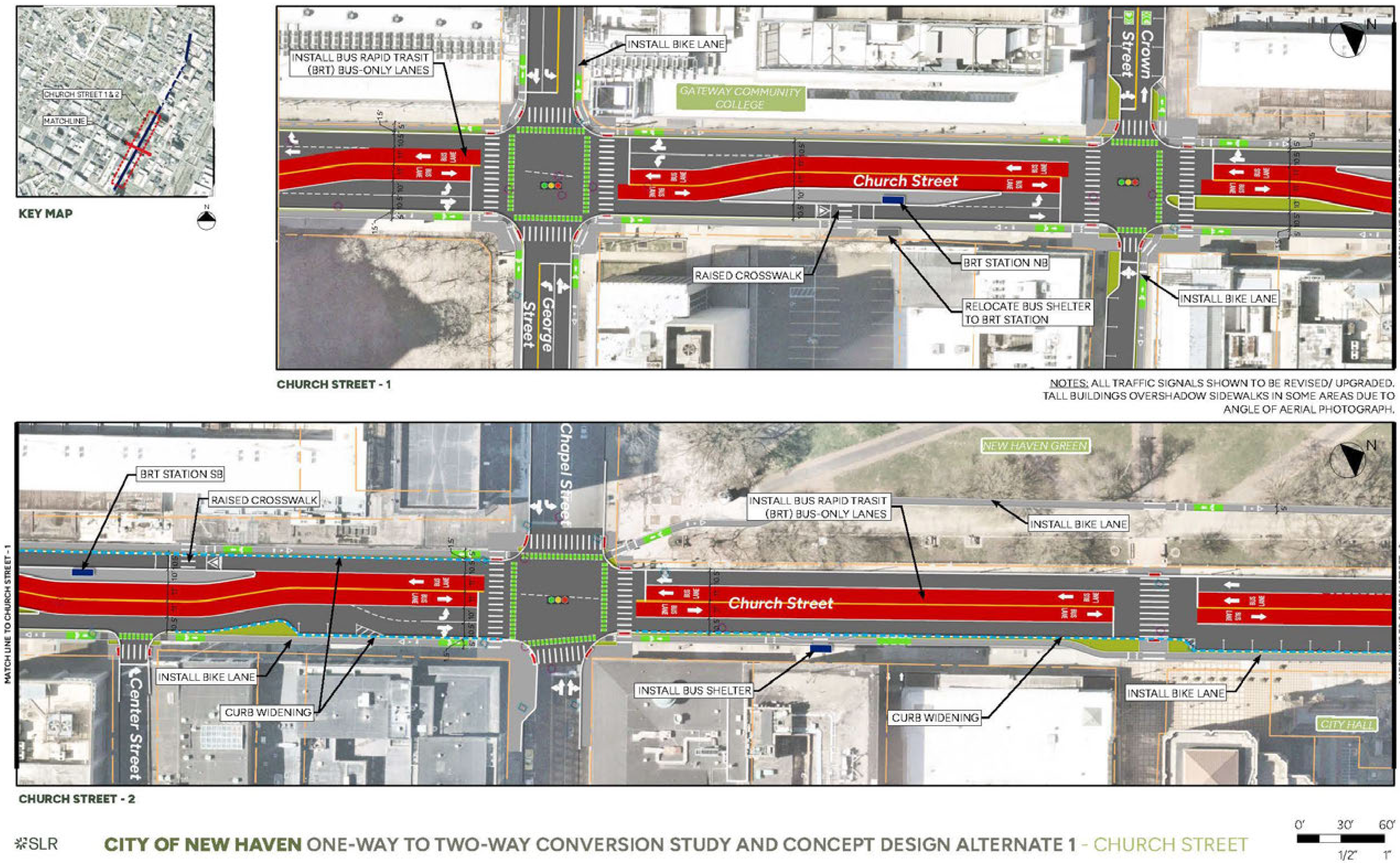
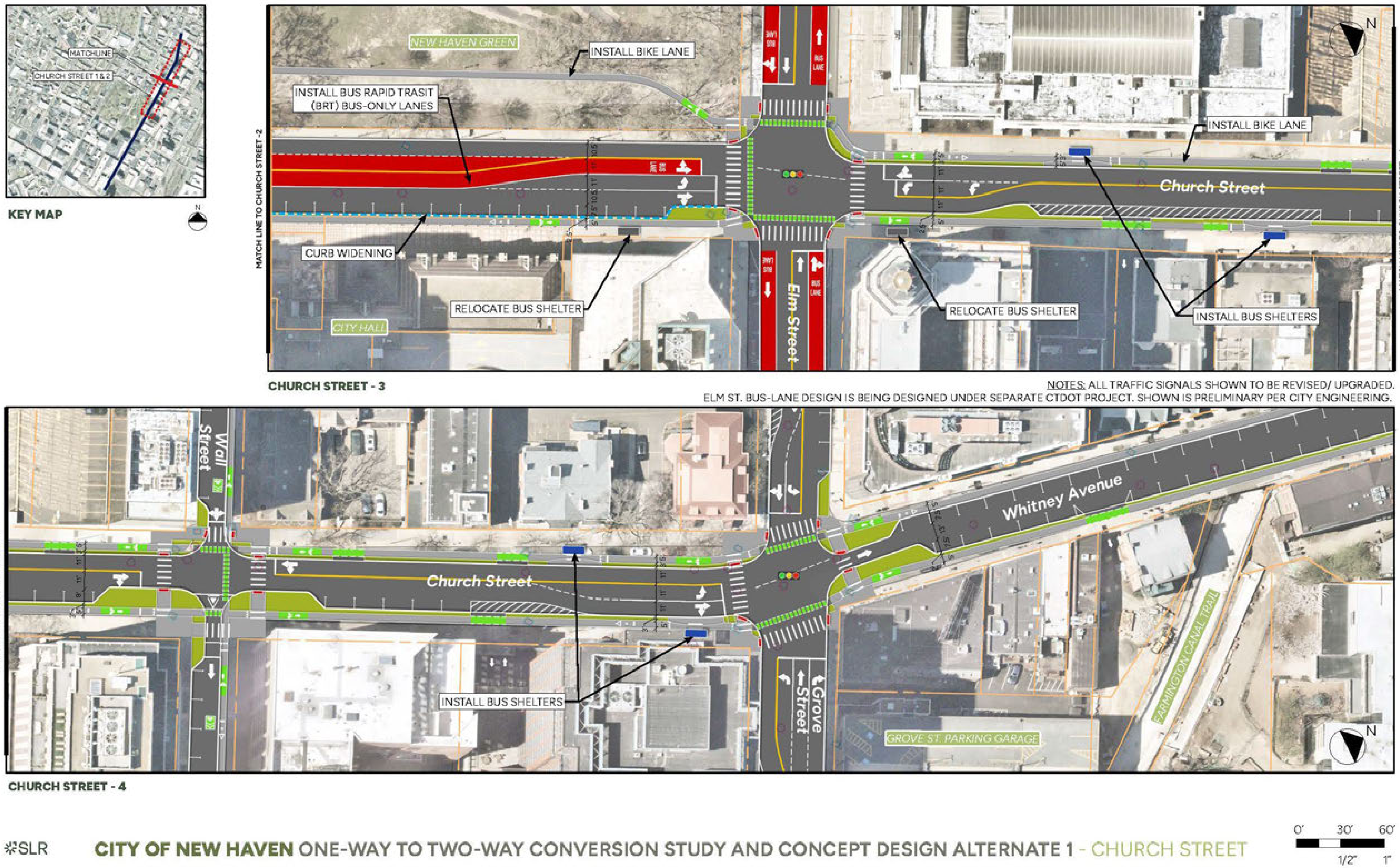


Figure 4.2 Two-Way Conversion Concept Design – Church Street - Alternate 1



4.1.2 Church Street – Alternate 2

The following is proposed under this alternative:

- Bus/Transit Improvements:
  - Some relocated and consolidated bus stops northbound on Church Street.
  - Conversion from one-way to two-way will allow the ability for southbound bus routing along Church Street, particularly for bus routes that currently route southbound on Temple Street 1 block over. Consolidating both northbound and southbound, or inbound and outbound, bus stops to a single street, instead of a pair of streets block(s) apart, can simplify transit routing and the rider experience. New southbound bus stops are shown on Church Street in Alternate 2. Note that some local buses could/should perhaps remain on Temple Street southbound through some or all downtown given the abundance of existing bus stops on Temple Street at the Green and due to the lack of right-of-way (ROW) width of Church Street by the Green. Final determination on this to be made by City/State.
  - Addition of bus shelters to all bus stops.
- Bicycle-lane Accommodations/Improvements:
  - Sidewalk-level one-direction protected bicycle lanes would be added to the entire study-area stretch of Church Street, including Whiteny Avenue to the north, for each direction northbound and southbound along each side of the street.
  - Special attention would be paid to bicycle lane conflicts at local-bus-stop by narrowing the bicycle lane as necessary into a yield-area for bicyclists to give way to, and importantly provide sufficient room for, boarding/alighting bus-riders.
  - Protected-intersection bicycle design elements would be added to intersections where width/ROW allows.
- Pedestrian Infrastructure and Traffic Calming Improvements:
  - A raised crosswalk could be added across the east leg of Wall Street at Church Street.
  - Corner curb-extensions/bump-outs would be added at multiple locations along this corridor, which will reduce pedestrian crossing distances and allow pedestrians to be more visible when standing at those locations.
  - A pedestrian refuge median could be added to portions of Church Street, particularly adjacent to and/or south of the Green.
  - All crosswalks would be restriped as high-visibility crosswalks.
  - Pedestrian signal improvements would be incorporated to signalized intersections where necessary (discussed further below). This would include the addition of Leading Pedestrian Intervals (LPI).
  - Much of the corridor would be reconfigured to remove the multiple all-purpose single-direction automobile through-lanes that exist today. This

will reduce incidences of motorist weaving and speeding, reduce the potential for the multiple-threat collision, and make the downtown street look and feel less like a highway. Automobile lane widths would furthermore be narrowed as feasible.

- On-street Parking Accommodations:
    - At least approximately half of the current 130 on-street parking spaces would remain under this alternate 2 concept for Church Street between George and Grove Streets. This would include many of the on-street spaces directly next to City Hall. Note that some widening of Church Street in this area would be needed for this. On-street loading and handicap accessible parking space locations within the remaining on-street parking are to be determined during further design stages. It should be reminded that there are many orders-of-magnitude more parking spaces that are empty within off-street parking (garages and lots) generally within 1 to 2 blocks nearby (per the City of New Haven Point-in-Time Transportation Survey) that more than offset the on-street parking spaces that would be repurposed under this concept.
- Automobile Infrastructure Modifications:
    - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersections.
    - The intersection of Church Street at Wall Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.
    - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).
- Adjacent Non-Study-Corridor Intersecting-Street Modifications:
    - Elm Street, as mentioned above, is likely to be redesigned for BRT under separate state project.
    - Whitney Avenue north of Church/Grove assumed would remain northbound only but shown with road-diet to one lane to accommodate bicycle lanes.
    - Crown Street west of Church Street (between Church and Temple Streets) is recommended as part of this study to be converted to two-way to allow additional routing options to get to the Temple Street Parking Garage and the Gateway Community College Parking Garage. Crown Street east of Church Street would remain one-way westbound but with a reconfiguration to accommodate a bicycle lane.
    - Grove Street it is understood will be converted to two-way under separate City and/or State project.

Figure 4.3 Two-Way Conversion Concept Design – Church Street - Alternate 2

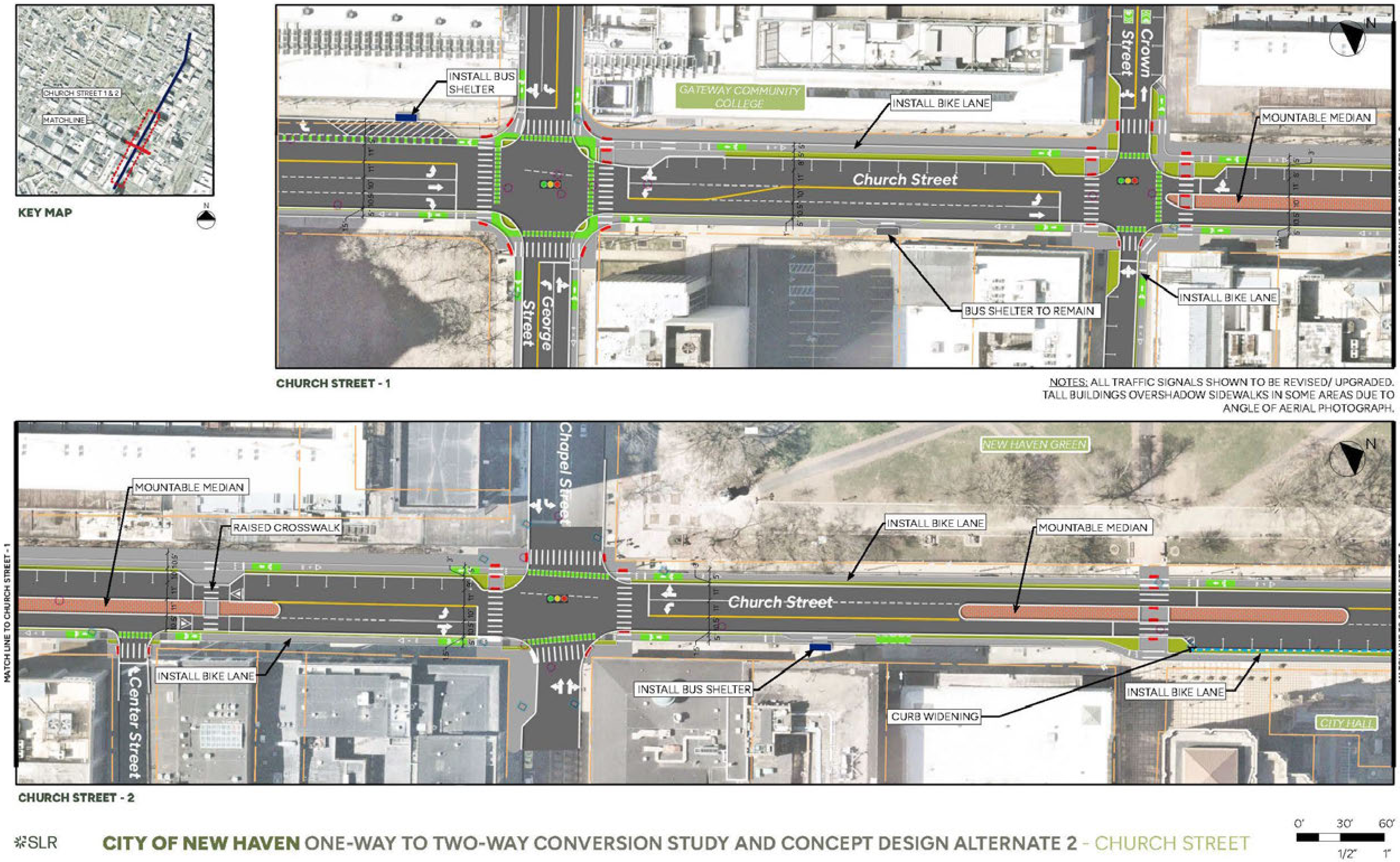
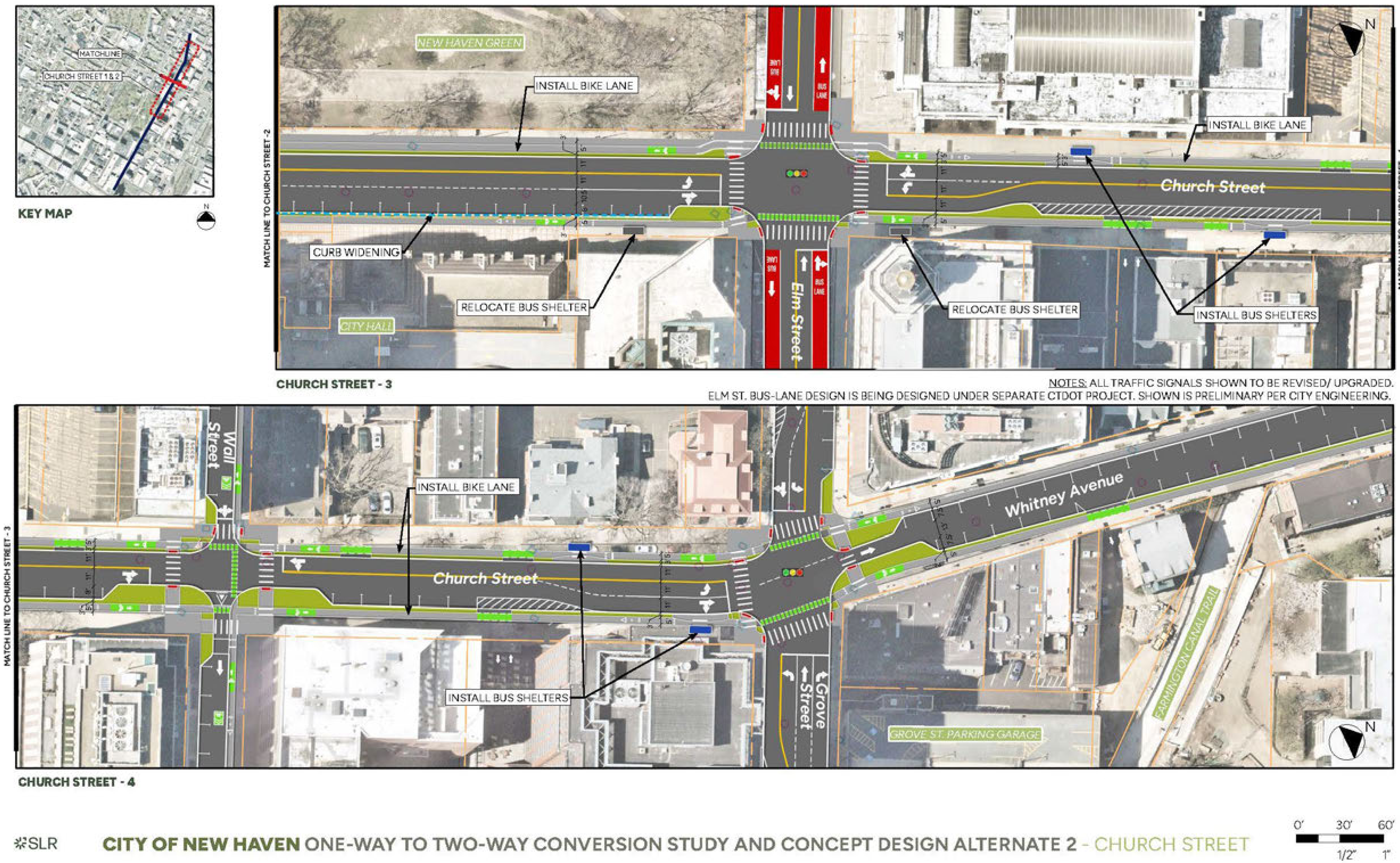


Figure 4.4 Two-Way Conversion Concept Design – Church Street - Alternate 2



4.1.3 York Street – Alternate 1

The following is proposed under this alternative:

- Bus/Transit Improvements:
    - New southbound bus stops are shown on York Street, as conversion from one-way to two-way will allow the ability for southbound bus routing along York Street. Final determination on southbound bus routing to be made by City/State.
    - Addition of bus shelters to all bus stops.
- Bicycle Infrastructure Accommodations/Improvements:
    - Sharrows (shared-lane bicycle pavement markings) would be installed along York Street under Alternate 1 paired with several raised-intersection traffic calming improvements, and two existing raised-crosswalks, aimed at physically precluding automobile speeding and to keep motorist versus bicyclist speed differences somewhat comparable. It is noted that sharrows are only appropriate if motorist travel speeds are kept to 20mph or less.
    - The exception to the above is that a northbound bicycle lane would be installed on York Street from Elm Street to Grove Street in Alternate 1. Shown as well is the potential for protected bicycle lanes to also be installed on Tower Parkway and the western portion of Grove Street as part of those streets becoming two-way (under separate City/State project).
- Pedestrian Infrastructure and Traffic Calming Improvements:
    - As mentioned above, raised-intersection traffic calming improvements are proposed at multiple locations in Alternate 1.
    - Corner curb-extensions/bump-outs would be added where possible to locations along this corridor. Curb-extensions reduce pedestrian crossing distances and allow pedestrians to be more visible when standing at those locations.
    - All crosswalks would be restriped as high-visibility crosswalks.
    - Pedestrian signal improvements would be incorporated to signalized intersections where necessary. This would include the addition of Leading Pedestrian Intervals (LPI).
    - York Street would be reconfigured to remove the multiple one-way northbound automobile through-lanes that exist today, which will reduce incidences of motorist weaving and speeding and reduce the potential of the multiple-threat collisions.
- On-street Parking Accommodations:
    - Approximately 85 percent of the 147 on-street parking spaces would remain under this concept for York Street between MLK Jr. Boulevard and Grove Street. Potential new on-street loading and handicap

accessible parking space locations within the on-street parking are to be determined during further design stages.

- Automobile Infrastructure Modifications:
  - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersection locations.
  - The intersection of York Street at Crown Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.
  - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).
- Adjacent non-study-corridor intersecting street modifications:
  - Elm Street, as mentioned earlier, is expected to be redesigned for BRT under separate state project.
  - York Street south of MLK Jr. Boulevard is expected to be converted to two-way under at separate city project.
  - The MLK Jr. Boulevard approach to York Street should be reconfigured to provide a more user-friendly protected-bicycle lane.
  - George Street west of York Street is understood may be reconfigured to include a bicycle lane and/or become two-way in the future as part of a separate city project.
  - Crown Street is shown to remain one-way westbound but with a potential reconfiguration to accommodate bicycle lane.
  - Grove Street/Tower Parkway it is understood will be converted to two-way under separate City and/or State project.

Figure 4.5 Two-Way Conversion Concept Design – York Street - Alternate 1

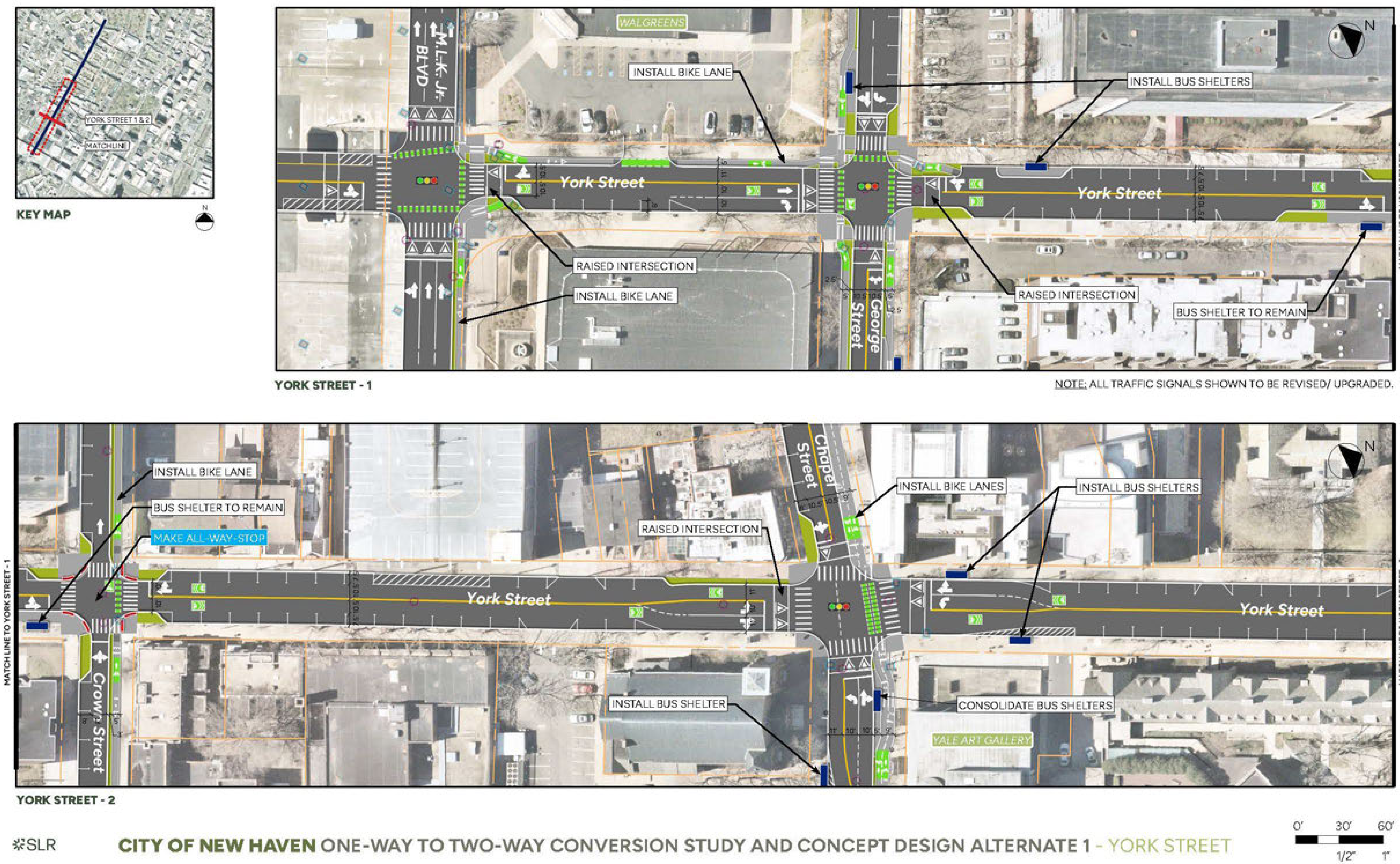
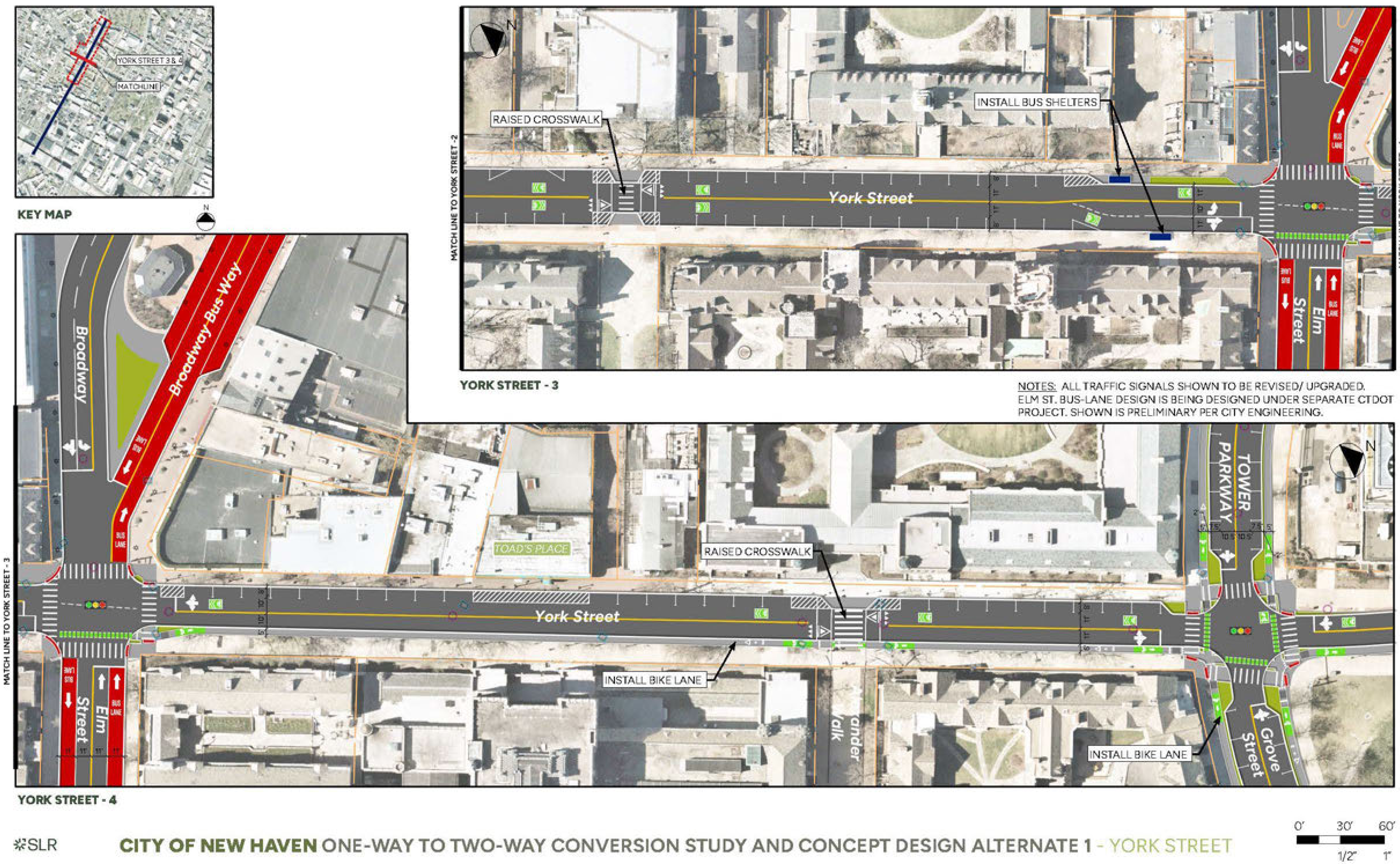


Figure 4.6 Two-Way Conversion Concept Design – York Street - Alternate 1



4.1.4 York Street – Alternate 2

The following is proposed under this alternative:

- Bus/Transit Improvements:
  - New southbound bus stops are shown on York Street, as conversion from one-way to two-way will allow the ability for southbound bus routing along York Street. Final determination on southbound bus routing to be made by City/State.
  - Addition of bus shelters to all bus stops.
- Bicycle Infrastructure Accommodations/Improvements:
  - Sidewalk-level one-direction protected bicycle lanes would be added to the entire study-area stretch of York Street in each direction northbound and southbound on each side of the street in place of most of the on-street parking in Alternate 2.
  - The exception to the above is that a two-way cycle track would be installed on the east side of York Street between Elm and Grove Streets in Alternate 2 to keep some on-street parking along these blocks. Note that this would necessitate some widening into the east sidewalk tree belt.
  - Special attention would be paid to bicycle lane conflicts at local-bus-stop by either narrowing the bicycle lane as necessary into a yield-area for bicyclists to give way to, and importantly provide sufficient room for, boarding/alighting bus-riders, or to weave the bicycle lane behind the bus stop area entirely where ROW would allow.
  - Protected-intersection bicycle design elements would be added to intersections where width/ROW allows.
- Pedestrian Infrastructure and Traffic Calming Improvements:
  - As with Alternate 1 for York Street, raised-intersection traffic calming improvements are proposed at multiple locations in Alternate 2.
  - Corner curb-extensions/bump-outs would be added where possible to locations along this corridor. Curb-extensions reduce pedestrian crossing distances and allow pedestrians to be more visible when standing at those locations.
  - All crosswalks would be restriped as high-visibility crosswalks.
  - Pedestrian signal improvements would be incorporated to signalized intersections where necessary. This would include the addition of Leading Pedestrian Intervals (LPI).
  - York Street would be reconfigured to remove the multiple one-way northbound automobile through-lanes that exist today, which will reduce incidences of motorist weaving and speeding and reduce the potential of the multiple-threat collisions.

- On-street Parking Accommodations:
  - Approximately 17 percent of the 147 on-street parking spaces would remain under this Alternate 2 concept for York Street between MLK Jr. Boulevard and Grove Street. On-street loading and handicap accessible parking space locations within the remaining on-street parking are to be determined during further design stages. Again, it should be reminded that there are many more parking spaces that are empty within off-street parking (garages and lots) generally within 1 to 2 blocks nearby (per the City of New Haven Point-in-Time Transportation Survey) that more than offset the on-street parking spaces that would be repurposed under this concept.
- Automobile Infrastructure Modifications:
  - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersection locations.
  - The intersection of York Street at Crown Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.
  - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).
- Adjacent Non-Study-Corridor Intersecting-Street Modifications:
  - Elm Street, as mentioned earlier, is expected to be redesigned for BRT under separate state project.
  - York Street south of MLK Jr. Boulevard is expected to be converted to two-way under at separate city project.
  - The MLK Jr. Boulevard approach to York Street should be reconfigured to provide a more user-friendly protected-bicycle lane.
  - George Street west of York Street is understood may be reconfigured to include a bicycle lane and/or become two-way in the future as part of a separate city project.
  - Crown Street is shown to remain one-way westbound but with a potential reconfiguration to accommodate bicycle lane.
  - Grove Street/Tower Parkway it is understood will be converted to two-way under separate City and/or State project.

Figure 4.7 Two-Way Conversion Concept Design – York Street - Alternate 2

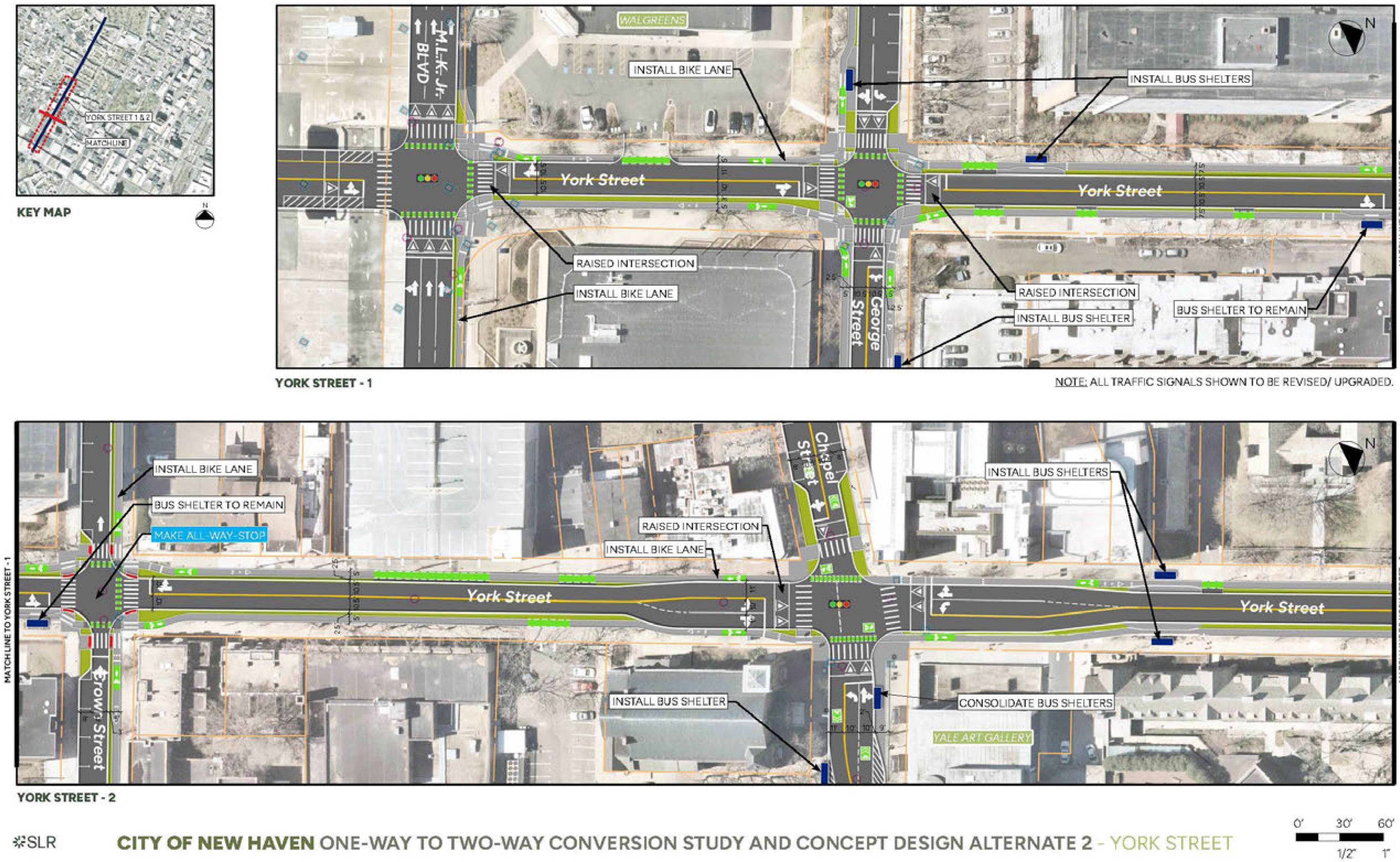
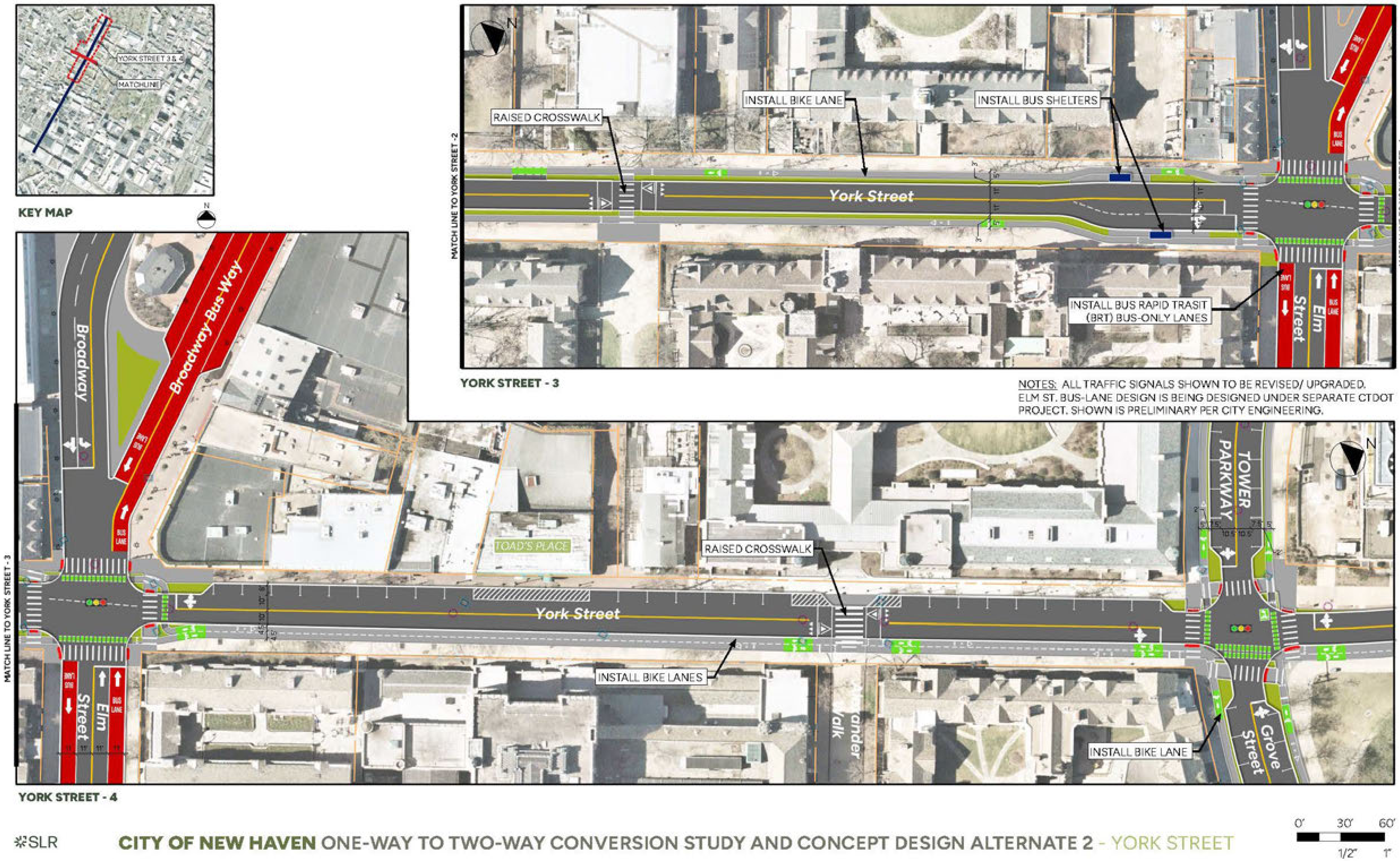


Figure 4.8 Two-Way Conversion Concept Design – York Street - Alternate 2



4.1.5 Chapel Street – Alternate 1

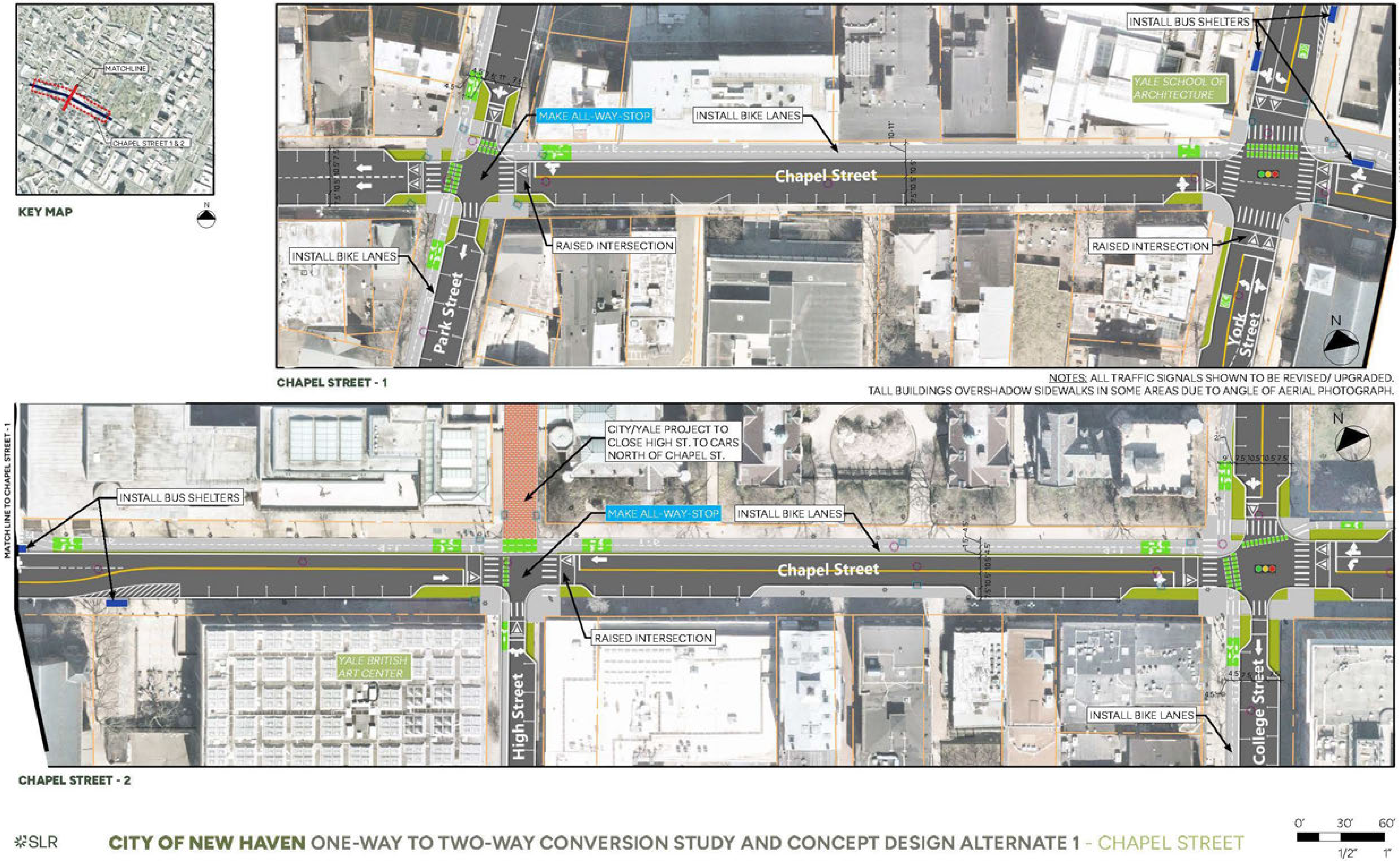
The following is proposed under this alternative:

- Bus/Transit Improvement:
  - A new eastbound sheltered bus stop is shown within the Chapel Street corridor study limits since conversion from one-way to two-way will allow the ability for eastbound bus routing along Chapel Street. Final determination on such to be made by City/State.
- Bicycle Infrastructure Accommodations/Improvements:
  - A sidewalk-level two-way cycle-track would be added to Chapel Street between Park Street and the Green/College Street in place of the north side on-street parking in Alternate 1. Note that this would necessitate some minor widening into the north sidewalk tree-belt.
  - Special attention would be paid to cycle-track conflict with the bus-stop on Chapel Street next to the Yale University Art Gallery by weaving the cycle-track behind the bus stop.
  - Protected-intersection bicycle design elements would be added to intersections where width/ROW allows.
- Pedestrian Infrastructure and Traffic Calming Improvements:
  - Raised-intersection traffic calming improvements are proposed at multiple locations in Alternate 1.
  - Corner curb-extensions/bump-outs would be added where possible to locations along this corridor. Curb-extensions reduce pedestrian crossing distances and allow pedestrians to be more visible when standing at those locations.
  - All crosswalks would be restriped as high-visibility crosswalks.
  - Pedestrian signal improvements would be incorporated to signalized intersections where necessary. This would include the addition of Leading Pedestrian Intervals (LPI).
  - Chapel Street would be reconfigured to remove the multiple one-way westbound automobile through-lanes that exist today, which will reduce incidences of motorist weaving and speeding and reduce the potential of the multiple-threat collisions.
- On-street Parking Accommodations:
  - Approximately half of the 78 on-street parking spaces would remain under this Alternate 1 concept for Chapel Street between Park Street and College Street. On-street loading and handicap accessible parking space locations within the remaining on-street parking are to be determined during further design stages. Note that this could include the addition of accessible parking spaces on the north side of Chapel Street near High Street under Alternate 1 given the available width there. Again, it should be reminded that there are many more parking spaces that are empty within off-street parking (garages and lots) generally within 1 to 2 blocks nearby (per the City of New Haven Point-in-Time Transportation Survey)

that more than offset the on-street parking spaces that would be repurposed under this concept.

- Automobile Infrastructure Modifications:
    - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersection locations.
    - The intersection of Chapel Street at Park Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.
    - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).
- Adjacent Non-Study-Corridor Intersecting-Street Modifications:
    - Park Street, particularly north of Chapel Street, should be considered for reconfiguration to add bicycle lanes or a two-way cycle-track to connect this Alternate 1 proposed Chapel Street cycle-track with the forthcoming Edgewood Avenue cycle-track to provide a seamless bicycle route connecting the Green/Downtown with the neighborhoods to the west.
    - High Street north of Chapel Street is understood will be converted to a pedestrian/non-motorist street by Yale through its campus.
    - College Street south of Chapel Street (to Crown Street) has recently had an on-street painted (southbound) bicycle lane that was a quick-build installation as part of outdoor parklet dinning. This bicycle lane could be converted to a two-way cycle-track that could be extended further north/south on College Street. It is understood that the City may separately be considering other potential alterations to College Street.
    - Chapel Street east of College Street currently has a parking-protected street-level westbound bicycle lane that could be reconfigured somewhat at this intersection to become more user-friendly.

Figure 4.9 Two-Way Conversion Concept Design – Chapel Street - Alternate 1



4.1.6 Chapel Street – Alternate 2

The following is proposed under this alternative:

- Bus/Transit Improvement:
  - A new eastbound sheltered bus stop is shown within the Chapel Street corridor study limits since conversion from one-way to two-way will allow the ability for eastbound bus routing along Chapel Street. Final determination on such to be made by City/State.
- Bicycle Infrastructure Accommodations/Improvements:
  - Sharrows (shared-lane bicycle pavement markings) would be installed along Chapel Street under Alternate 2 paired with several raised-intersection traffic calming improvements aimed at physically precluding automobile speeding and to keep motorist versus bicyclist speed differences somewhat comparable. It is noted that sharrows are only appropriate if motorist travel speeds are kept to 20mph or less.
- Pedestrian Infrastructure and Traffic Calming Improvements:
  - As mentioned above, raised-intersection traffic calming improvements are proposed at multiple locations in Alternate 2.
  - Corner curb-extensions/bump-outs would be added where possible to locations along this corridor. Curb-extensions reduce pedestrian crossing distances and allow pedestrians to be more visible when standing at those locations.
  - All crosswalks would be restriped as high-visibility crosswalks.
  - Pedestrian signal improvements would be incorporated to signalized intersections where necessary. This would include the addition of Leading Pedestrian Intervals (LPI).
  - Chapel Street would be reconfigured to remove the multiple one-way westbound automobile through-lanes that exist today, which will reduce incidences of motorist weaving and speeding and reduce the potential of the multiple-threat collisions.
- On-street Parking Accommodations:
  - Approximately all of the on-street parking spaces on Chapel Street between Park Street and College Street would remain under this Alternate 2 concept. Potential new on-street loading and handicap accessible parking space locations within the remaining on-street parking are to be determined during further design stages.
- Automobile Infrastructure Modifications:
  - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersection locations.
  - The intersection of Chapel Street at Park Street has the potential to be unsignalized and instead function under stop-sign-control, since

continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.

- Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).

- Adjacent Non-Study-Corridor Intersecting-Street Modifications:
  - Park Street, particularly north of Chapel Street, should be considered for reconfiguration to add bicycle lanes or a two-way cycle-track.
  - High Street north of Chapel Street is understood will be converted to a pedestrian/non-motorist street by Yale through its campus.
  - College Street south of Chapel Street (to Crown Street) has recently had an on-street painted (southbound) bicycle lane that was a quick-build installation as part of outdoor parklet dinning. This bicycle lane could be converted to a two-way cycle-track that could be extended further north/south on College Street. It is understood that the City may separately be considering other potential alterations to College Street.
  - Chapel Street east of College Street currently has a parking-protected street-level westbound bicycle lane that could be reconfigured somewhat to become more user-friendly at this intersection.

Figure 4.10 Two-Way Conversion Concept Design – Chapel Street - Alternate 2

4.1.7 George Street

The following is proposed under this alternative:

- Bus/Transit Improvement:
    - New westbound bus stops are shown on George Street since conversion from one-way to two-way will allow the ability for westbound bus routing along George Street. Final determination of such to be made by City/State.
    - Addition of bus shelters to all bus stops.
- Bicycle Infrastructure Accommodations/Improvements:
    - Sidewalk-level one-direction protected bicycle lanes would be added to the entire study-area stretch of George Street in each direction eastbound and westbound on each side of the street in place of the limited amount of existing on-street parking in this concept.
    - Special attention would be paid to bicycle lane conflicts at local-bus-stop by either narrowing the bicycle lane as necessary into a yield-area for bicyclists to give way to, and importantly provide sufficient room for, boarding/alighting bus-riders, or to weave the bicycle lane behind the bus stop area entirely if ROW would allow.
    - Protected-intersection bicycle design elements would be added to intersections where width/ROW allows.
- Pedestrian Infrastructure and Traffic Calming Improvements:
    - Raised-intersection traffic calming improvements are proposed at multiple locations along George Street.
    - Corner curb-extensions/bump-outs would be added where possible. Curb-extensions reduce pedestrian crossing distances and allow pedestrians to be more visible when standing on them.
    - All crosswalks would be restriped as high-visibility crosswalks.
    - Pedestrian signal improvements would be incorporated to signalized intersections where necessary. This would include the addition of Leading Pedestrian Intervals (LPI).
    - George Street would be reconfigured to remove the multiple one-way eastbound automobile through-lanes that exist today, which will reduce incidences of motorist weaving and speeding and reduce the potential of the multiple-threat collisions.
- On-street Parking Accommodations:
    - The 24 on-street parking spaces on the south side of George Street between York and College Streets would be removed under this concept. It should be noted that on-street loading and handicap accessible parking spaces exist or could be added nearby to other streets generally within 1 block. Again, it should be reminded that there are many more parking spaces that are empty within off-street parking (garages and lots) generally within 1 to 2 blocks nearby (per the City of New Haven Point-in-

Time Transportation Survey) that more than offset the on-street parking spaces that would be repurposed under this concept.

- Automobile Infrastructure Modifications:
    - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersection locations.
    - The intersection of George Street at High Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.
    - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).
- Adjacent Non-Study-Corridor Intersecting-Street Modifications:
    - George Street west of York Street is understood may be reconfigured to include a bicycle lane and/or become two-way in the future as part of a separate city project.
    - George Street east of Church Street has the potential to be reconfigured to add bicycle lanes.
    - College Street north and south of George Street has the potential to be reconfigured to install a north/south two-way cycle-track. It is noted that the City may separately be considering other potential alterations to College Street including possibly making it two-way.
    - Temple Street south of George Street is to be converted to two-way as part of the Downtown Crossing Project - Phase 4. Temple Street north of George Street is recommended as part of this study to also be converted to two-way to allow additional routing options to get to the Temple Street Parking Garage and the Gateway Community College Parking Garage, as well as to other nearby parking options including the Crown Street Garage.

Figure 4.11 Two-Way Conversion Concept Design – George Street

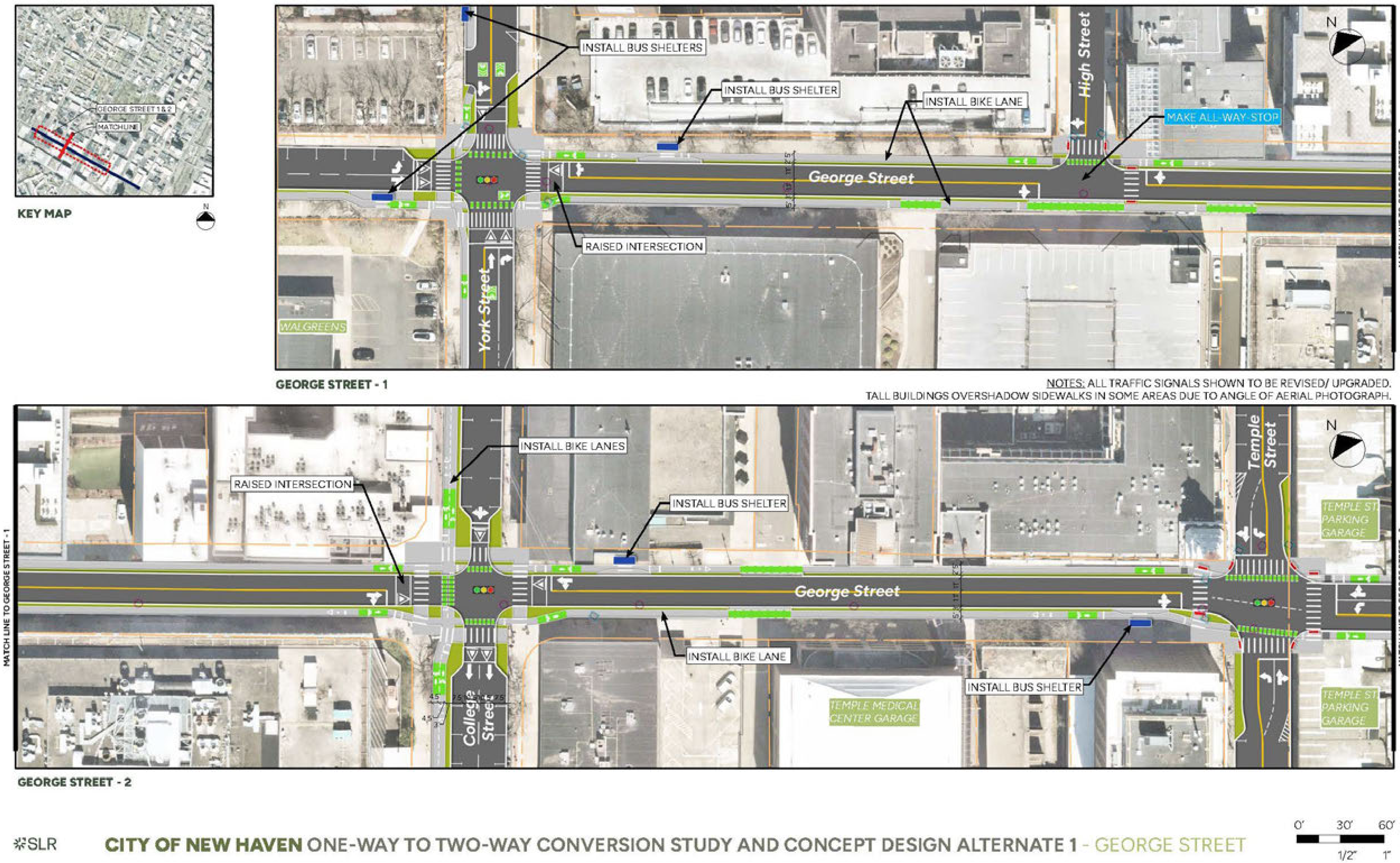
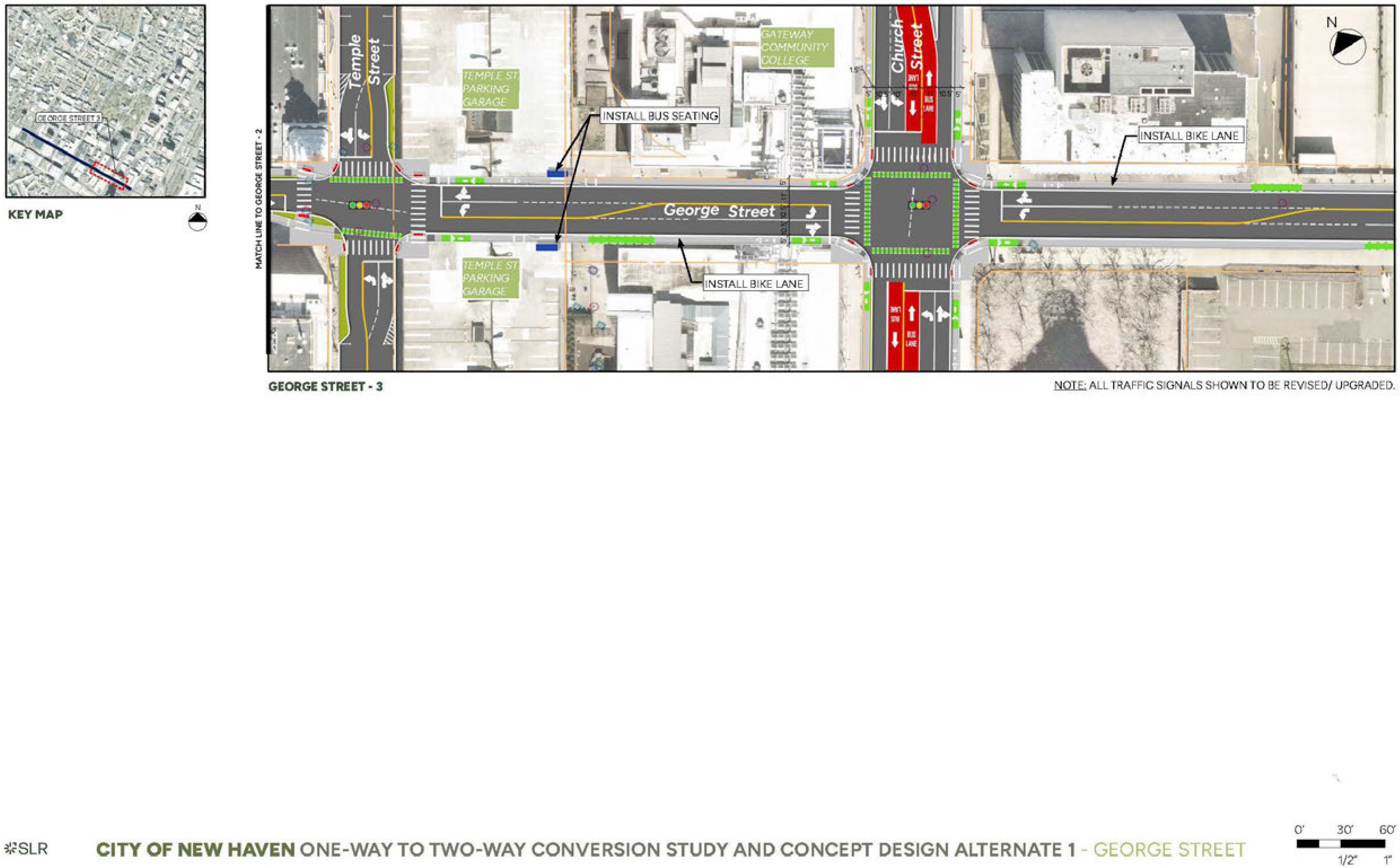


Figure 4.12 Two-Way Conversion Concept Design – George Street



4.1.8 Study Area Signal Upgrades

- The concepts assume traffic signals within each corridor will be upgraded as follows:
  - New signal infrastructure including new signal heads, mast arms, vehicle detection, etc. Many of the study intersections have sub-standard equipment and some intersections currently operate inefficiently as pretimed signals.
  - WALK/DON'T WALK countdown pedestrian signal indications, as well as Audible Pedestrian Signal (APS) elements.
  - Leading Pedestrian Interval (LPI), also known as a pedestrian head-start. LPI is especially feasible on streets with fewer lanes per direction and importantly can sometimes reduce wait times for both pedestrians and motorists compared to exclusive pedestrian signal phase configuration, reducing the likelihood of some pedestrians crossing without the walk signal.
  - No Turn-On-Red across the study intersections.
  - Optimized signal phasing, timing, and coordination/synchronization, including the likely reduction of signal cycle-lengths which could further help to reduce pedestrian and motorist wait times particularly during off-peak times of day.

4.2 Case-Study Examples

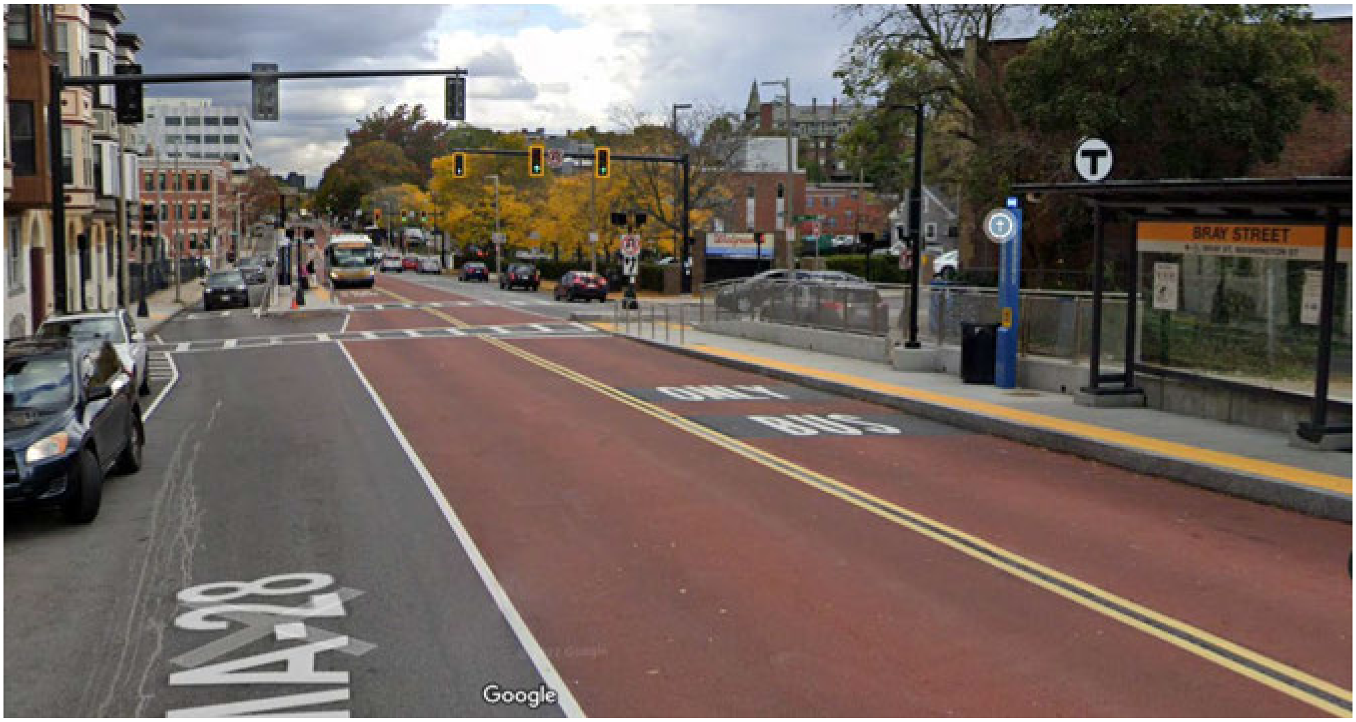
It is worth noting and seeing that there are real-world examples of the types of street design elements shown in this study's concept plans that exist today in the United States, elsewhere in Connecticut, and in some places in New Haven. This section discusses some examples of such applications.

4.2.1 Bus Rapid Transit Infrastructure

Existing places that have BRT or transit facilities with BRT-style elements such as bus-only-lanes include Boston, New York City, Richmond, Cleveland, Indianapolis, San Francisco, Seattle, and Albuquerque, just to name some cities across the country. Right here in Connecticut there is the New Britain-Hartford busway, which is an award-winning example of dedicated bus transit infrastructure in the United States.

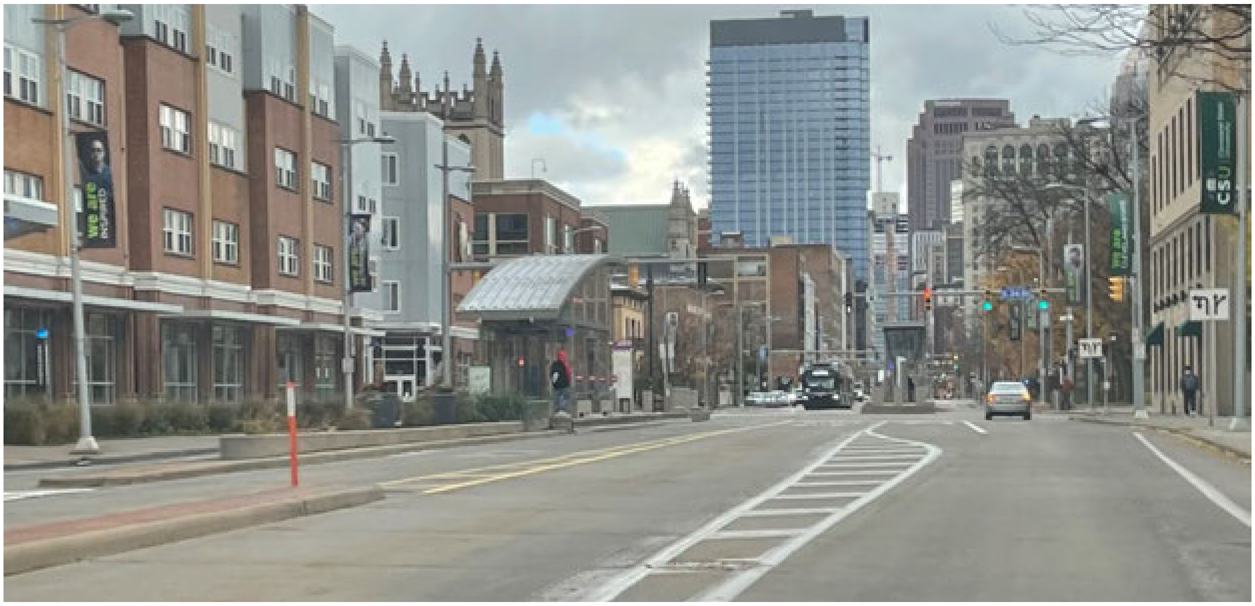
BRT infrastructure is increasingly being recognized as a good option for cities and regions to provide better transit service at a lower cost than streetcar/rail while helping to achieve climate/sustainability goals and helping to give people a more reliable transit option to avoid automobile congestion, avoid driving/parking their own automobile, etc.

Figure 4.13 Center Running BRT with Right-Side Boarding – Boston, MA



Source: Google Maps

Figure 4.14 Center-Running BRT with Right-Side Boarding – Cleveland, OH



Source: NCO

Figure 4.15 Center-Running BRT with Left-Side Boarding – Albuquerque, NM

Source: Google Maps

Figure 4.16 Curbside-Running Bus-Only Lane – New York, NY

Source: Google Maps

4.2.2 Safety Through Design

Raised-intersections and similar features such as raised-crosswalks, where the crosswalk or the whole intersection is raised to the level of the sidewalk, exist in some locations in New Haven and in some of the most walkable places elsewhere. Raised-intersections achieve multiple goals at once: they can improve ADA accessibility and calm traffic/reduce automobile speeding (which improves safety for everyone), reduce necessary driver-stopping-sight-distance lengths, and reduce the speed differential between automobiles and bicyclists in shared-lane/sharrow setting.

Figure 4.17 Raised-Intersection – New Haven, CT

Source: Google Maps

Pedestrian Refuge Islands and medians can allow for a pedestrian crossing to be made in two separate stages; where someone crossing the street can cross one direction (ideally one lane) of traffic at a time and is provided a physical area in the middle where they can pause if needed to assess to their ability at that moment to cross the second half of the street. Pedestrian islands, particularly where the number of traffic lanes are also minimized and lane widths are reasonably narrow, can also help calm traffic and prompt increased driver awareness.

Figure 4.18 Pedestrian Refuge Island – Nashville, TN

Source: Google Maps (under construction)

Lane Reductions, in terms of reducing the number of automobile through-lanes, as mentioned above and also known as a roadway reconfiguration or road-diet, are also important parts of many urban street redesign projects to increase safety. As discussed in the existing conditions chapter, it bears reiterating that reducing the number of vehicle lanes, particularly through-lanes, in areas where pedestrians and other non-motorists are present reduces the potential of the multiple-threat collision. The multiple-threat collision occurs when a vehicle in one lane stops or yields for a pedestrian and in doing so temporarily blocks view of the pedestrian to another same-direction approaching motorist who doesn't see the pedestrian until it's too late.

Curb-Extensions, also known as Bump-outs, are often located at intersection corners and can improve pedestrian safety by shortening the distance that someone on foot needs to walk to cross from one side of the street to the other. Curb-extensions can improve visibility between motorists and pedestrians who are on the sidewalk waiting to cross, particularly if there is the presence of on-street parking. Moreover, curb-extensions can physically preclude the ability for motorists to park on-street too closely to an intersection and/or a crosswalk. Curb-extensions can provide additional room for streetscape elements to be added including street furniture, appropriate vegetation, not to mention things like bioswales.

Figure 4.19 Curb Extensions/Corner Bump-outs – West Hartford, CT

Source: Google Maps

Best-Practices Bicycle Infrastructure

Protected bicycle lanes, such as those that are placed away from moving traffic between the sidewalk and typically the passenger-side of on-street parking, and/or those that may be curb-separated at the same elevated-level as the sidewalk (with or without the presence of on-street parking), are generally considered now to be the ideal bicycle facility design option – especially if proper attention is given to their design at intersections, known as the Protected Intersection. The reason for this is that bicyclists contend with fewer potential conflicts if the bike lane is located between the sidewalk and passenger-side of on-street parked vehicles instead of between moving automobiles and driver-side of parked vehicles. Protected bicycle lanes and the Protected-Intersection are also generally more comfortable/less stressful for bicyclist to use which encourages more people to ride bikes which can be a great sustainable-travel choice for short and moderate-length trips.

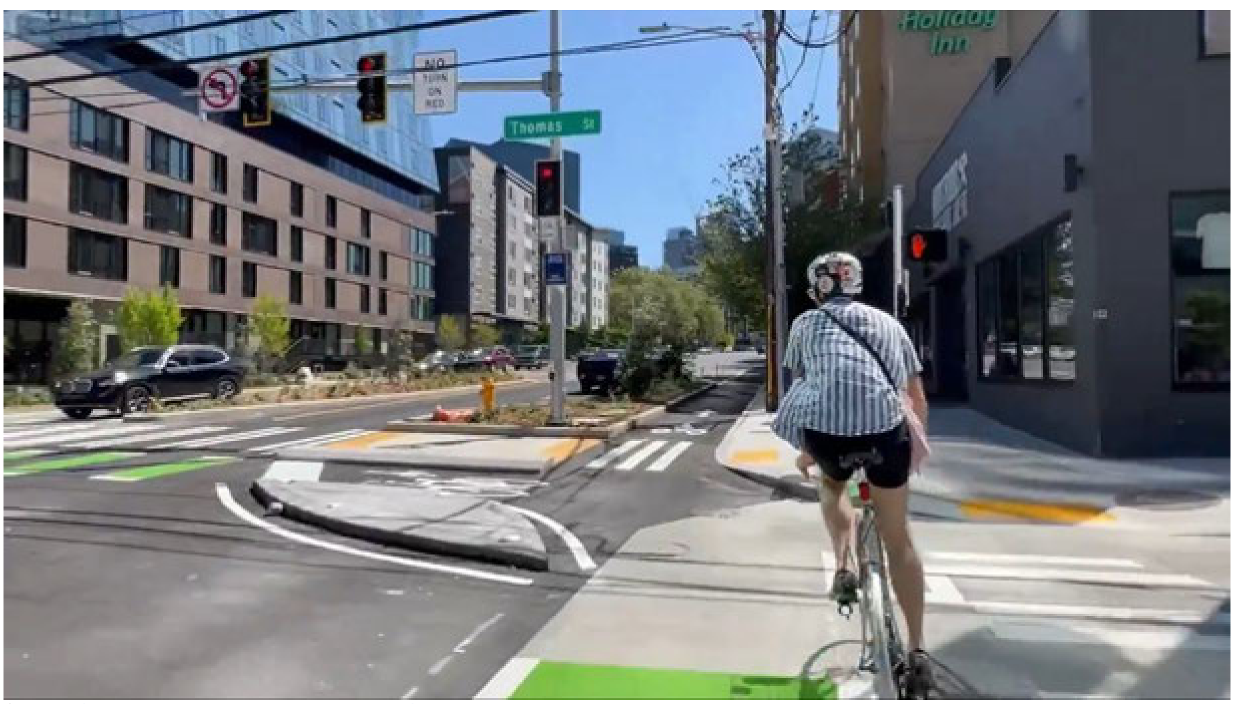
Source: Boston.gov

Source: NCO

Figure 4.20 Parking-Protected Sidewalk-Level Bike Lane – Cambridge, MA

Source: Google Maps

Figure 4.21 Protected Intersection – Seattle, WA



Source: [Seattle's First Protected Intersection Opens at Dexter and Thomas - The Urbanist]

4.3 Safety Benefits of Potential Street Redesign Modifications

It is important to consider how modifying aspects of these streets could improve safety. Statistical data from the Federal Highway Administration (FHWA)[1] [2] indicates that certain street/roadway changes and improvements, referred to as countermeasures, can improve safety. The following is a summary of several of the recommended street redesign elements and the degree of corresponding safety benefit, as reported by the FHWA, that could generally be anticipated.

Table 4.1 Street Redesign Safety Benefits

Proposed Improvement	FHWA Countermeasure	FHWA Safety Benefits
Reduction in Number of Vehicle Lanes per Directions	Road Diets (Roadway Reconfigurations)	Up to 47% reduction in total crashes
High-Visibility Crosswalks	Crosswalk Visibility Enhancements	Up to 40% reduction in crashes involving pedestrians
Raised Crosswalk(s) or Raised Intersection	Install Raised Pedestrian Crosswalk or Speed Humps	Up to 50% reduction in injury crashes
Install Raised Medians/ Pedestrian Crossing Islands	Raised Medians/ Pedestrian Crossing Islands	Up to 56% reduction in crashes involving pedestrians
Install Pedestrian Countdown Signal Heads	Install Pedestrian Countdown Timer	Up to 70% reduction in crashes involving pedestrians
Incorporate Leading Pedestrian Interval (LPI) to Traffic Signals	Leading Pedestrian Interval	Up to 13% reduction in crashes involving pedestrians
Improved Overhead Lighting	Lighting	Up to 38% reduction in nighttime crashes and 42% reduction in nighttime crashes involving pedestrians
Separated and/or Protected-Bicycle Lanes	Bicycle Lanes	Up to 30% reduction in total crashes and 53% reduction in crashes involving bicyclists

[1] https://safety.fhwa.dot.gov/provencountermeasures/

[2] http://www.cmfclearinghouse.org/

4.4 Two-Way Concepts Public Input

The alternate concept plans were presented to the public at an in-person public information meeting that was held on October 18, 2023, as well as via a New Haven Independent article on November 9, 2023. Much public input was received on the concepts. The following is a short summary of the meeting (a full meeting summary can be found in the appendix).

Church Street

There was generally more support for the BRT concept (alternate 1), with some people noting that the raised platforms for BRT will add a nice infrastructure enhancement, some noting that bus-only lanes are important to increase the attractiveness and usefulness of transit as an option to a wider variety of income levels, and some asking if additional bus-only lanes could be added elsewhere. There was support to include bike paths, and even to make them wider to encourage social cycling and to increase the separation between bike lanes and automobiles physically as opposed to with flex posts. That said some people suggested that bike lanes not be added to Church Street but to other nearby streets instead. There was some support for removing on-street parking but also concern by others about loss of on-street parking.

York Street

There was mixed support for the two alternate concepts, but overall broad support for reducing speeds on York Street such as by adding raised-raised intersections. In either York Street alternative (1 and 2), on-street parking would remain on nearby cross-streets, as well as at the Chapel/York Garage. Some people commented that all the on-street parking should be removed to enable better bicycle routes, while others commented about the potential loss of all on-street parking and the need for loading/deliveries for shops, restaurants, and the Yale Art Gallery. The need for artwork pickups and deliveries by tractor trailer from the dock located at 201 York Street was raised by the Yale Art Gallery's Director of Facilities. The relocation of bus shelters and handicap parking spaces was also raised as a concern by the Yale Art Gallery's Facilities Director. Regarding Alternative 1, he also questioned whether there would be more traffic bottleneck if traffic needed to be stopped in both directions on York Street during large truck deliveries.

Chapel Street

Like with York Street, there was mixed support for the two alternate concepts but broad support for traffic calming to preclude speeding. There was also a suggestion that all of Chapel Street west of the study area should be converted to two-way. There may have been slightly more support for Chapel Street Alternate 1, which would add a two-way cycle track along the north side of Chapel Street in place of on-street parking. Some commented that it would be good to also add a two-way cycle track on Park Street (as well as other connecting streets) that could connect with the Edgewood cycle track. Other commenters questioned whether one-way bicycle lanes on either side of the street would be better than a two-way cycle track on one side of the street. Concern was raised about the loss of some on-street parking. One person asked about traffic-signal operations for bicyclists and pedestrians.

George Street

There was some concern about loss of on-street parking on George Street, although another commenter mentioned that George Street within the study area only has two-dozen on-street parking spaces today - which is a tiny fraction compared to the amount of garage parking that is adjacent to George Street and on cross streets. Those in support of the proposed bicycle lanes generally suggested that sidewalk-level bicycle lanes are preferrable. Another comment was that bicycle facilities should be added to nearby Crown Street. One comment suggested that one or more intersections should be un-signalized and converted to stop-sign control instead.

General Comments

In general, the majority of comments support making all of these streets two-way, but some comments were received about possibly keeping some streets (such as York Street) one-way to more easily add a bicycle lane and keep all on-street parking such as by converting one of the automobile lanes into a bike lane. There was general support for adding bicycle lanes, reducing speeds downtown, and improving transit accommodations. But there was also some concern about ability of delivery vehicles to park on-street and about loss of at least some on-street parking. To offset loss of some on-street parking, some commenters noted that there is significant surplus capacity of off-street parking in surrounding parking garages and that it may be appropriate as part of the two-way conversion to temporarily lower the cost to park in some downtown garages and to change some remaining on-street parking spaces to ADA accessible parking spaces, 15-minute parking, and loading zones to better accommodate local businesses.

4.5 City TTP and Engineering Input

In the subsequent months, further discussion was had, and feedback was received, on SLR's alternate two-way concepts from the City of New Haven Engineering Department and TTP Department. High-level comments were brought up about how to best coordinate the potential two-way conversion plans for these portions of Church, York, Chapel, and George Streets with other adjacent City and State roadway and intersection projects that are on different timelines, as well as whether it is possible to implement all of the two-way conversion at once. Technical review comments were also provided about intersection geometry and capacity relative to the BRT station locations and design for Church Street, and about potential impact on bioswales, street trees, and utilities in some areas. The TTP Department also directed that the preferred concept plans keep as much on-street parking as possible.

5.0 Preferred Concept & Cost Estimates

The Preferred Two-Way Conversion Concept Plans for the study corridors contain design elements from both of the alternate concepts discussed above and are based on the public input and the input from the City Engineering and TTP departments. The Preferred Concepts, which are shown on Figure 5.1 through Figure 5.7, involved some revisions to the alternate-plan designs including to lane striping and to curb relocations in some areas, for transit bus maneuverability, and based on additional review of potential utility impacts including to bioswales, catch basins and poles.

It is the hope that these Preferred Concept Plans can be used to help secure funding to design and construction of the two-way conversion.

The following is a summary of the key design elements, categorized by transportation mode, shown in the Preferred Concepts Plan for each study corridor:

5.1 Church Street – Preferred Concept

- Bus/Transit Improvements:
    - Addition of BRT design with center-running bus-only lanes on Church Street south of Elm Street in the Preferred Concept.
        - The BRT station in the study area would be a center platform with left-side-boarding on Church Street between Crown and Center Streets. (Other BRT stations nearby would exist likely on Church Street South to the south and on Elm Street to the northwest.)
        - Note that bus-only lanes are able to be used by emergency vehicles.
    - Some relocated and consolidated local-bus/non-BRT stops northbound on Church Street, particularly along the blocks that would overlap with BRT.
    - Conversion from one-way to two-way will allow the ability for southbound bus routing along Church Street, particularly for bus routes that currently route southbound on Temple Street 1 block over. Consolidating both northbound and southbound, or inbound and outbound, bus stops to a single street, instead of a pair of streets block(s) apart, can simplify transit routing and the rider experience. New southbound bus stops are shown on Church Street in the Preferred Concept. Note that some local buses could perhaps remain on Temple Street southbound through some or all of downtown given the abundance of existing bus stops on Temple Street at the Green and due to the lack of right-of-way (ROW) width of Church Street by the Green. Final determination on this to be made by City/State during further development of the design plans.
    - Addition of bus shelters to all bus stops.
    - BRT-style signal infrastructure including Transit Signal Priority (TSP), transit-only signal heads, and/or transit signal pre-emption.
- Bicycle Infrastructure Accommodations/Improvements:
    - Sidewalk-level two-way cycle-track would be added to Church Street between Elm Street and Grove Street, which could connect with a potential bicycle lane on Grove Street.

- Special attention would be paid to cycle-track conflicts at local-bus-stops by narrowing the bicycle lanes into a yield-area for bicyclists to give way to, and provide sufficient room for, boarding/alighting bus-riders, or by placing the cycle-track behind the bus stops.
- Protected-intersection bicycle design elements would be added to intersections where width/ROW allows.

- Pedestrian Infrastructure and Traffic Calming Improvements:
  - The center BRT station on between Crown Street and Center Street would function as pedestrian refuge median for crosswalks the crosswalks at those locations.
  - Corner curb-extensions/bump-outs would be added at multiple locations along this corridor, which will reduce pedestrian crossing distances and allow pedestrians to be more visible when standing at those locations.
  - All crosswalks would be restriped as high-visibility crosswalks.
  - Pedestrian signal improvements would be incorporated to signalized intersections where necessary (discussed further below). This would include the addition of Leading Pedestrian Intervals (LPI).
  - Much of the corridor would be reconfigured to remove the multiple all-purpose single-direction automobile through-lanes that exist today. This will reduce incidences of motorist weaving and speeding, reduce the potential for the multiple-threat collision, and make the downtown street look and feel less like a highway. Automobile lane widths would furthermore be narrowed as feasible.
- On-street Parking Accommodations:
  - Approximately two-thirds of the current 130 on-street parking spaces would remain under this concept for Church Street between George and Grove Streets. Some minor widening of Church Street near City Hall may be needed for this concept. On-street loading and handicap accessible parking space locations within the remaining on-street parking are to be determined during further design stages. It should also be reminded that there are many orders-of-magnitude more parking spaces that are empty within off-street parking (garages and lots) generally within 1 to 2 blocks nearby (per the City of New Haven Point-in-Time Transportation Survey) that more than offset the on-street parking spaces that would be repurposed under this concept.
- Automobile Infrastructure Modifications:
  - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersections. Where left turn lanes are proposed along Church Street, particularly at intersections that would also have bus-only lanes, those lefts would be allowed only as signal-controlled protected-left-turns for safety purposes.
  - The intersection of Church Street at Wall Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.

  - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).
- Adjacent Non-Study-Corridor Intersecting-Street Modifications:
  - Elm Street, as mentioned above, is to be redesigned for BRT under separate state project.
  - Crown Street west of Church Street (between Church and Temple Streets) is recommended as part of this study to be converted to two-way to allow additional routing options to get to the Temple Street Parking Garage and the Gateway Community College Parking Garage.
  - Grove Street it is understood will be converted to two-way under a separate City and/or State project, which may include the addition of a bicycle lane to one side of Grove Street.

Figure 5.1 Two-Way Conversion Preferred Design – Church Street

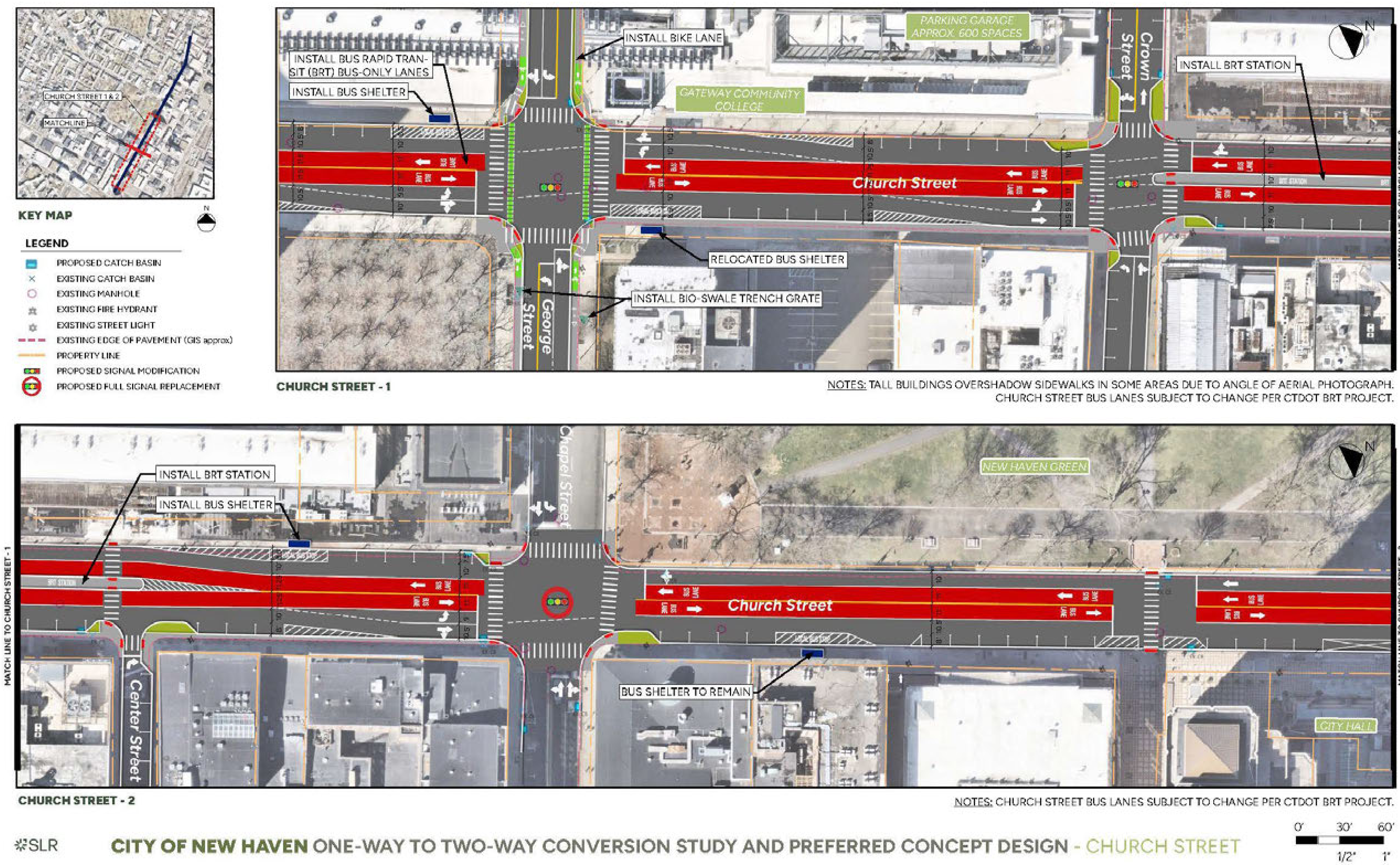
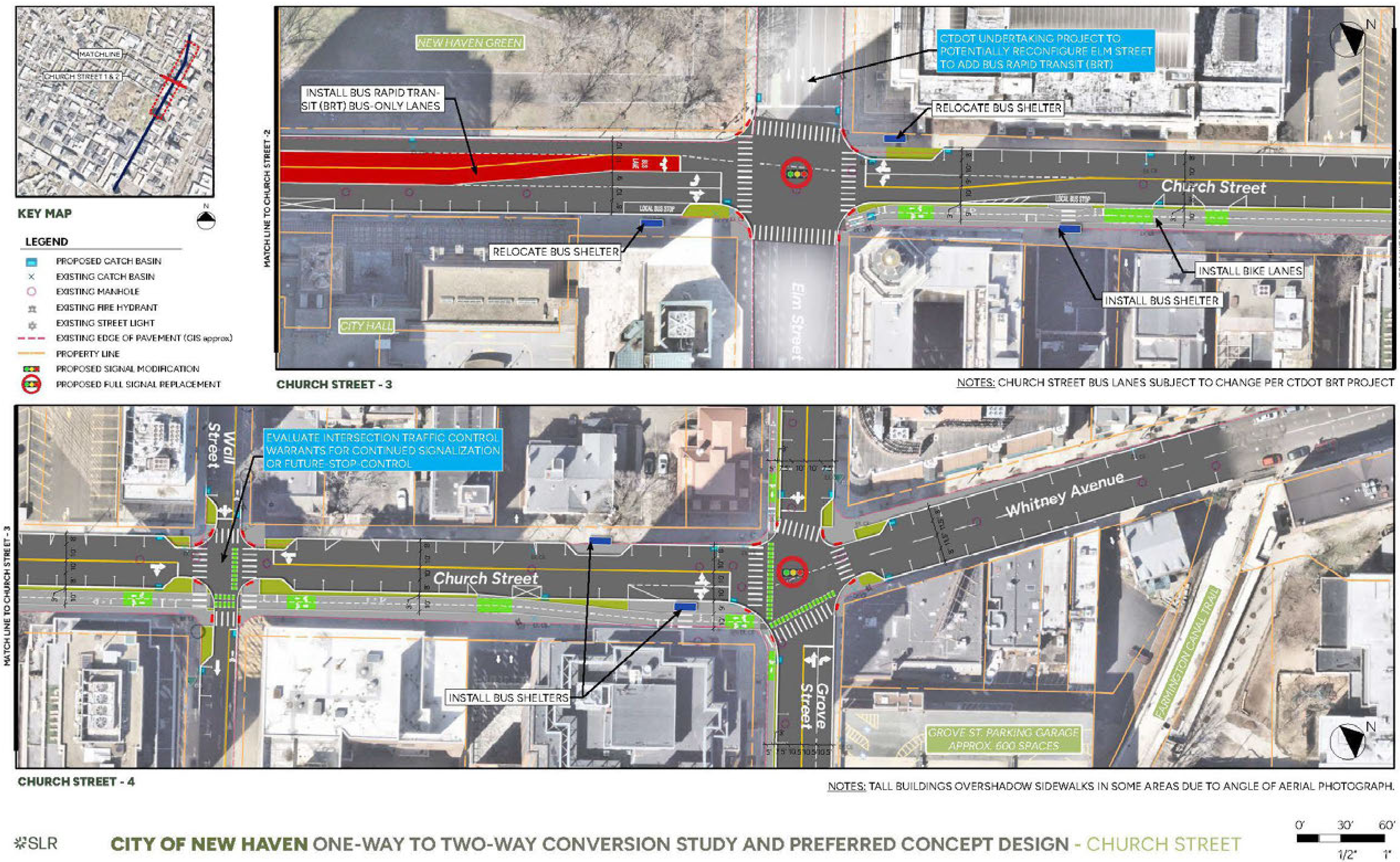


Figure 5.2 Two-Way Conversion Preferred Design – Church Street



5.2 York Street – Preferred Concept

- Bus/Transit Improvements:
  - New southbound bus stops are shown on York Street, as conversion from one-way to two-way will allow the ability for southbound bus routing along York Street. Final determination on southbound bus routing to be made by City/State.
  - Addition of bus shelters to all bus stops.
- Bicycle Infrastructure Accommodations/Improvements:
  - Sharrows (shared-lane bicycle pavement markings) would be installed along York Street, paired with several raised-intersection traffic calming improvements, and two existing raised-crosswalks, aimed at physically precluding automobile speeding and to keep motorist versus bicyclist speed differences somewhat comparable. It is noted that sharrows are only appropriate if motorist travel speeds are kept to 20 mph or less.
  - The exception to the above is that bicycle lanes would be installed on York Street between George Street and MLK Jr. Boulevard. Shown as well is the potential for protected bicycle lanes to also be installed on Tower Parkway and the western portion of Grove Street as part of those streets becoming two-way (under separate City/State project).
- Pedestrian Infrastructure and Traffic Calming Improvements:
  - As mentioned above, raised-intersection traffic calming improvements are proposed at multiple locations in the Preferred Concept.
  - Corner curb-extensions/bump-outs would be added where possible to locations along this corridor. Curb-extensions reduce pedestrian crossing distances and allow pedestrians to be more visible when standing at those locations.
  - All crosswalks would be restriped as high-visibility crosswalks.
  - Pedestrian signal improvements would be incorporated to signalized intersections where necessary. This would include the addition of Leading Pedestrian Intervals (LPI).
  - York Street would be reconfigured to remove the multiple one-way northbound automobile through-lanes that exist today, which will reduce incidences of motorist weaving and speeding and reduce the potential of the multiple-threat collisions.
- On-street Parking Accommodations:
  - Almost all the on-street parking spaces would remain under this concept for York Street between MLK Jr. Boulevard and Grove Street. Potential new on-street loading and handicap accessible parking space locations within the on-street parking are to be determined during further design stages.
- Automobile Infrastructure Modifications:
  - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersection locations.

    - The intersection of York Street at Crown Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.
    - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).
- Adjacent non-study-corridor intersecting street modifications:
    - Elm Street, as mentioned earlier, is expected to be redesigned for BRT under separate state project.
    - York Street south of MLK Jr. Boulevard is expected to be converted to two-way under at separate city project.
    - The MLK Jr. Boulevard approach to York Street should be reconfigured to provide a more user-friendly protected-bicycle lane.
    - George Street west of York Street is understood may be reconfigured to include a bicycle lane and/or become two-way in the future as part of a separate city project.
    - Grove Street/Tower Parkway it is understood will be converted to two-way under separate City and/or State project.

Figure 5.3 Two-Way Conversion Preferred Design – York Street

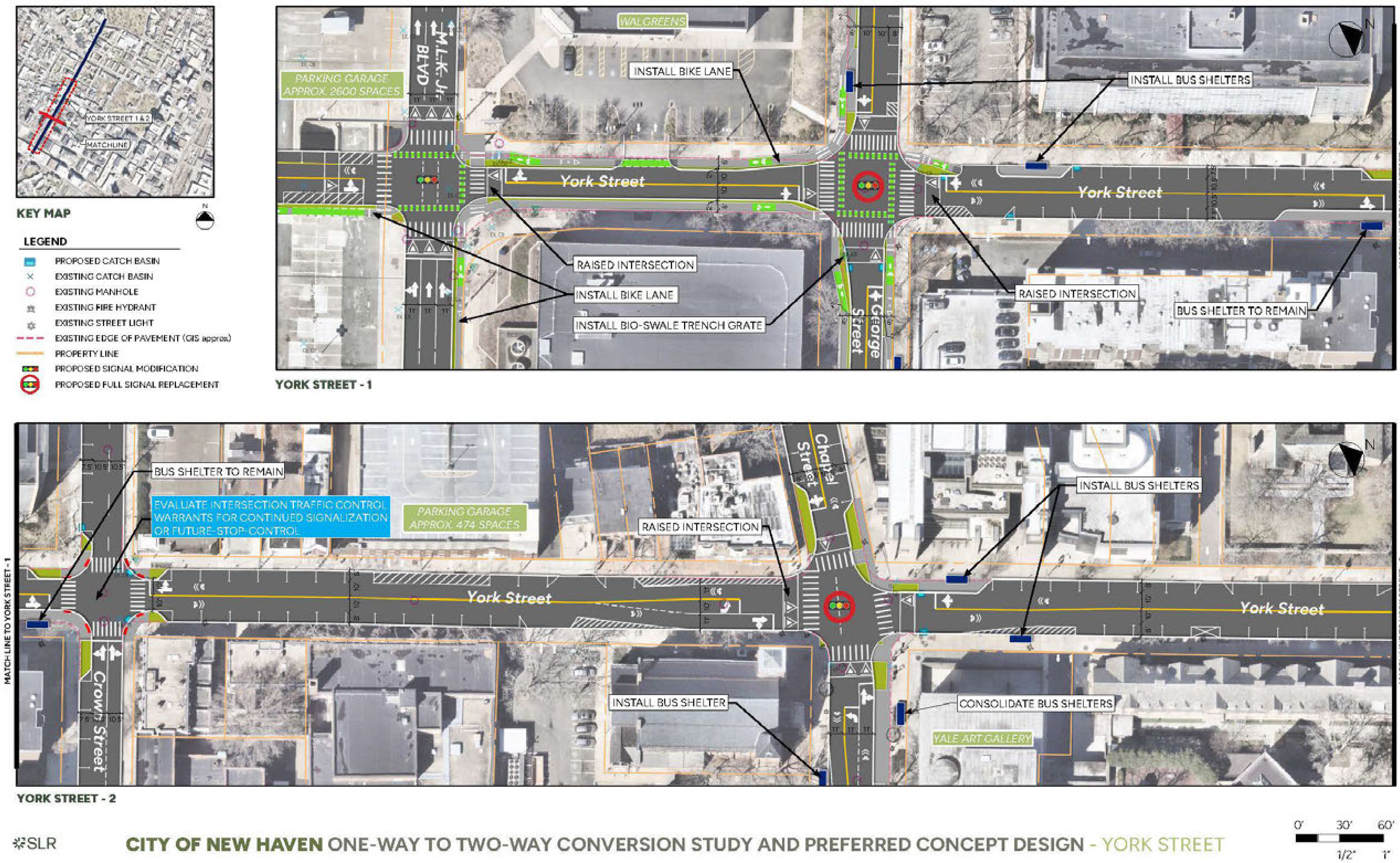
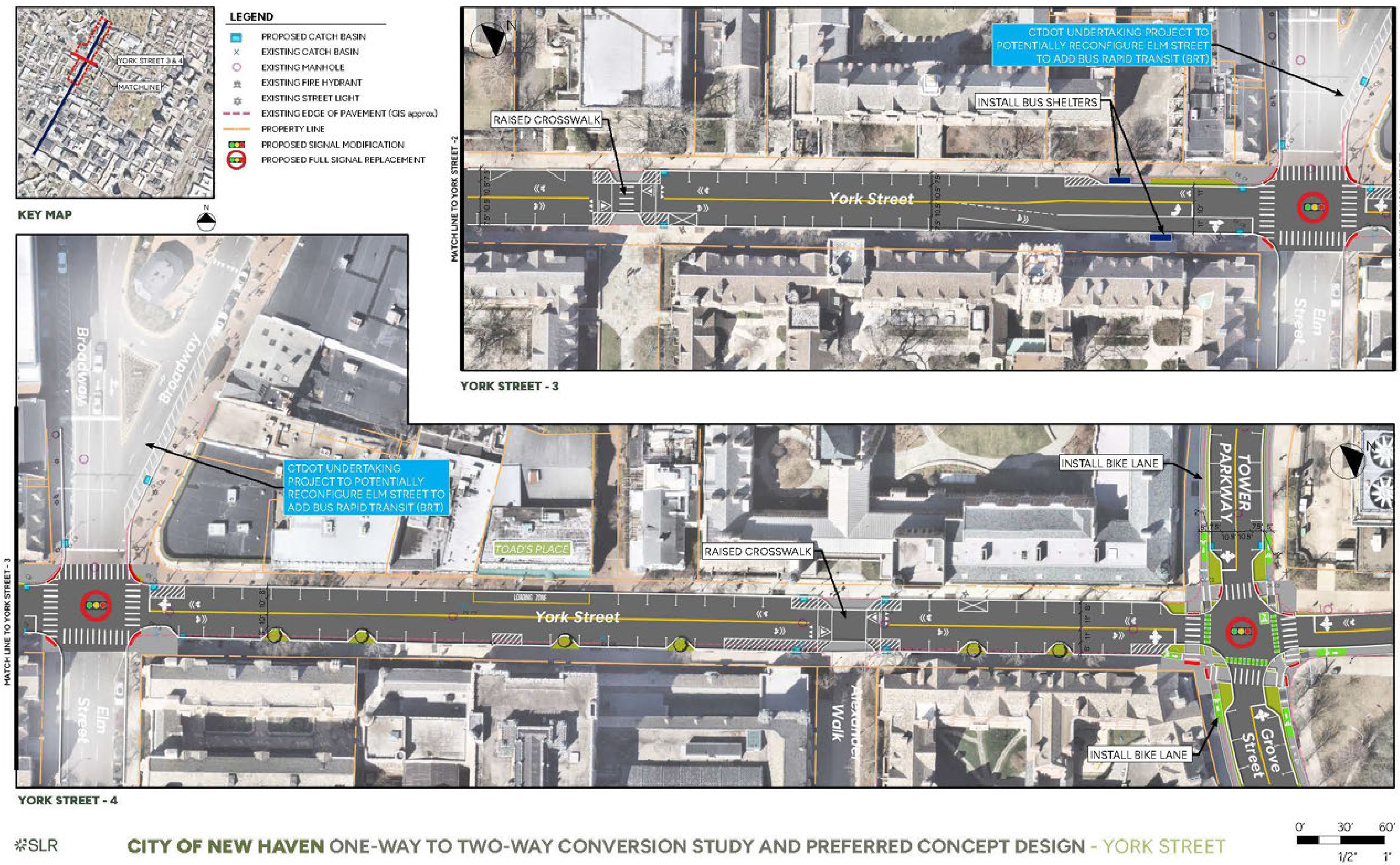


Figure 5.4 Two-Way Conversion Preferred Design – York Street

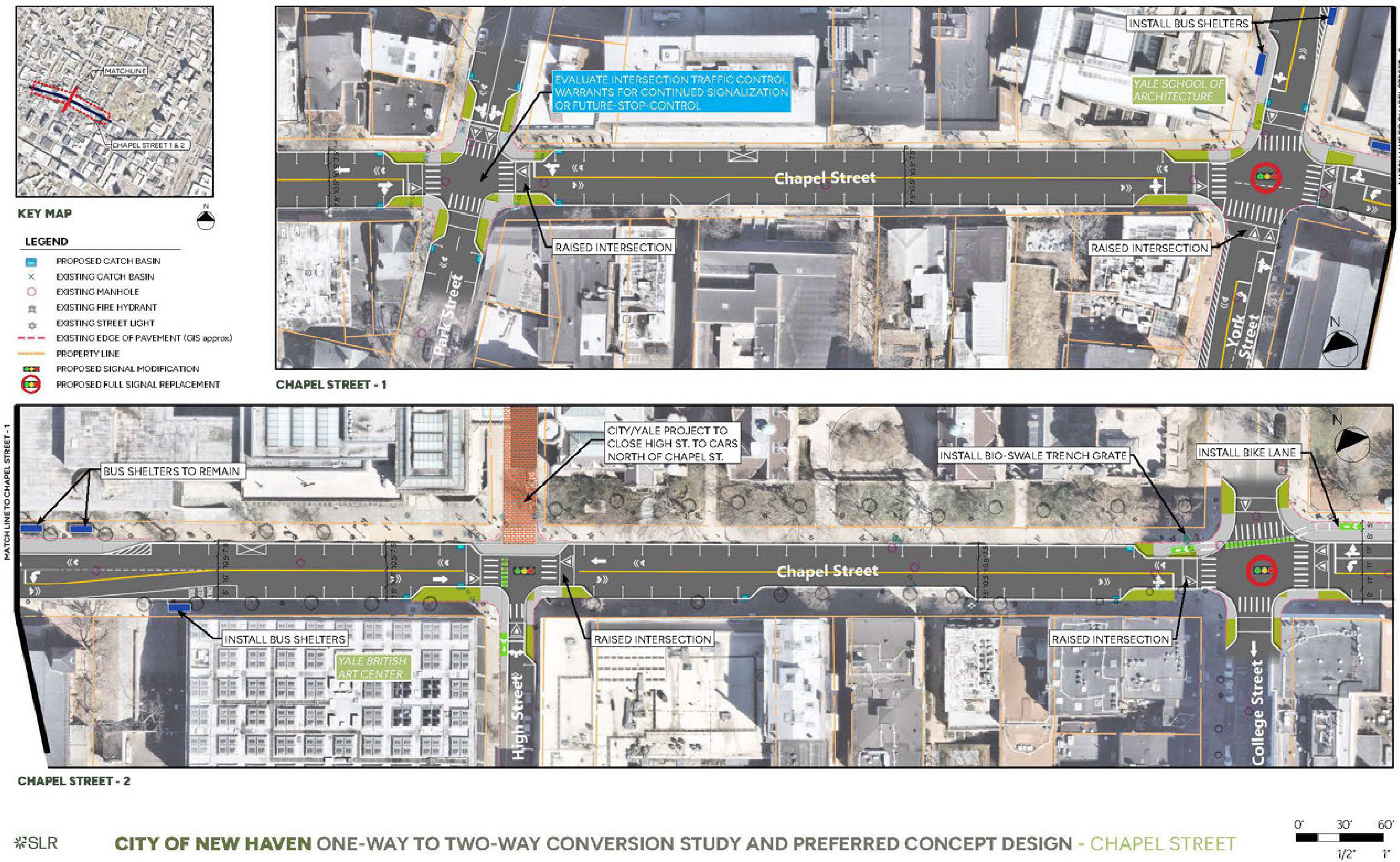


5.3 Chapel Street – Preferred Concept

- Bus/Transit Improvement:
    - A new eastbound sheltered bus stop is shown within the Chapel Street corridor study limits since conversion from one-way to two-way will allow the ability for eastbound bus routing along Chapel Street. Final determination on such to be made by City/State.
- Bicycle Infrastructure Accommodations/Improvements:
    - Sharrows (shared-lane bicycle pavement markings) would be installed along Chapel Street, paired with several raised-intersection traffic calming improvements aimed at physically precluding automobile speeding and to keep motorist versus bicyclist speed differences somewhat comparable. It is noted that sharrows are only appropriate if motorist travel speeds are kept to 20mph or less.
- Pedestrian Infrastructure and Traffic Calming Improvements:
    - As mentioned above, raised-intersection traffic calming improvements are proposed at multiple locations in the Preferred Concept.
    - Corner curb-extensions/bump-outs would be added where possible to locations along this corridor. Curb-extensions reduce pedestrian crossing distances and allow pedestrians to be more visible when standing at those locations.
    - All crosswalks would be restriped as high-visibility crosswalks.
    - Pedestrian signal improvements would be incorporated to signalized intersections where necessary. This would include the addition of Leading Pedestrian Intervals (LPI).
    - Chapel Street would be reconfigured to remove the multiple one-way westbound automobile through-lanes that exist today, which will reduce incidences of motorist weaving and speeding and reduce the potential of the multiple-threat collisions.
- On-street Parking Accommodations:
    - Approximately all of the on-street parking spaces on Chapel Street between Park Street and College Street would remain under this Alternate 2 concept. Potential new on-street loading and handicap accessible parking space locations within the remaining on-street parking are to be determined during further design stages.
- Automobile Infrastructure Modifications:
    - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersection locations.
    - The intersection of Chapel Street at Park Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.
    - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).

- Adjacent Non-Study-Corridor Intersecting-Street Modifications:
    - Park Street, particularly north of Chapel Street, should be considered for reconfiguration to add bicycle lanes or a two-way cycle-track.
    - High Street north of Chapel Street is understood will be converted to a pedestrian/non-motorist street by Yale through its campus.
    - College Street south of Chapel Street (to Crown Street) has recently had an on-street painted (southbound) bicycle lane that was a quick-build installation as part of outdoor parklet dinning. This bicycle lane could be converted to a two-way cycle-track that could be extended further north/south on College Street. It is understood that the City may separately be considering other potential alterations to College Street.
    - Chapel Street east of College Street currently has a parking-protected street-level westbound bicycle lane that could be reconfigured somewhat to become more user-friendly at this intersection.

Figure 5.5 Two-Way Conversion Preferred Design – Chapel Street



5.4 George Street – Preferred Concept

- Bus/Transit Improvement:
  - New westbound bus stops are shown on George Street since conversion from one-way to two-way will allow the ability for westbound bus routing along George Street. Final determination of such to be made by City/State.
  - Addition of bus shelters to all bus stops.
- Bicycle Infrastructure Accommodations/Improvements:
  - Sidewalk-level one-direction protected bicycle lanes would be added to the entire study-area stretch of George Street in each direction eastbound and westbound on each side of the street in place of the limited amount of existing on-street parking in this concept.
  - Special attention would be paid to bicycle lane conflicts at local-bus-stop by either narrowing the bicycle lane as necessary into a yield-area for bicyclists to give way to, and importantly provide sufficient room for, boarding/alighting bus-riders, or to weave the bicycle lane behind the bus stop area entirely if ROW would allow.
  - Protected-intersection bicycle design elements would be added to intersections where width/ROW allows.
- Pedestrian Infrastructure and Traffic Calming Improvements:
  - Raised-intersection traffic calming improvements are proposed at multiple intersections with George Street.
  - Corner curb-extensions/bump-outs would be added where possible. Curb-extensions reduce pedestrian crossing distances and allow pedestrians to be more visible when standing on them.
  - All crosswalks would be restriped as high-visibility crosswalks.
  - Pedestrian signal improvements would be incorporated to signalized intersections where necessary. This would include the addition of Leading Pedestrian Intervals (LPI).
  - George Street would be reconfigured to remove the multiple one-way eastbound automobile through-lanes that exist today, which will reduce incidences of motorist weaving and speeding and reduce the potential of the multiple-threat collisions.
- On-street Parking Accommodations:
  - The 24 on-street parking spaces on the south side of George Street between York and College Streets would be removed under this concept. It should be noted that on-street loading and handicap accessible parking spaces exist or could be added nearby to other streets generally within 1 block. Again, it should be reminded that there are many more parking spaces that are empty within off-street parking (garages and lots) generally within 1 to 2 blocks nearby (per the City of New Haven Point-in-Time Transportation Survey) that more than offset the on-street parking spaces that would be repurposed under this concept.
- Automobile Infrastructure Modifications:

  - The street layout would be reconfigured to more efficiently and safely, for a downtown built-environment, contain one all-purpose automobile through-lane per direction plus turn lane(s) at key intersection locations.
  - The intersection of George Street at High Street has the potential to be unsignalized and instead function under stop-sign-control, since continued signalization of this intersection may not fully satisfy federal signal-warrant criteria. City may wish to study this further.
  - Traffic signal phasing and timings to be modified and optimized at the signalized intersections along this corridor (discussed further below).
- Adjacent Non-Study-Corridor Intersecting-Street Modifications:
  - George Street west of York Street is understood may be reconfigured to include a bicycle lane and/or become two-way in the future as part of a separate city project.
  - George Street east of Church Street has the potential to be reconfigured to add bicycle lanes.
  - College Street north and south of George Street has the potential to be reconfigured to install a north/south two-way cycle-track. It is noted that the City may separately be considering other potential alterations to College Street including to possibly make it two-way.
  - Temple Street south of George Street is to be converted to two-way as part of the Downtown Crossing Project - Phase 4. Temple Street north of George Street is recommended as part of this study to also be converted to two-way to allow additional routing options to get to the Temple Street Parking Garage and the Gateway Community College Parking Garage, as well as to other nearby parking options including the Crown Street Garage.

Figure 5.6 Two-Way Conversion Preferred Design – George Street

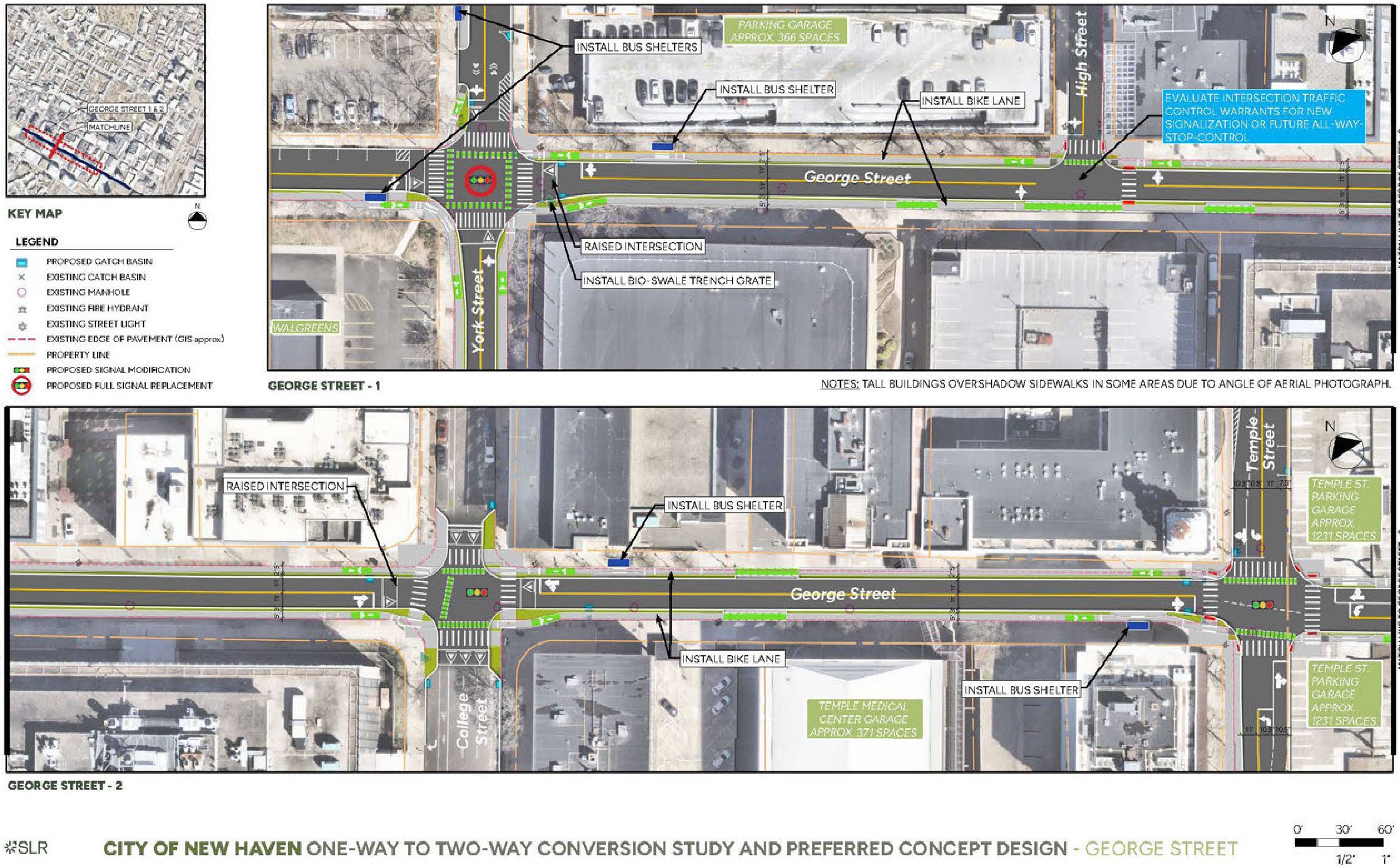
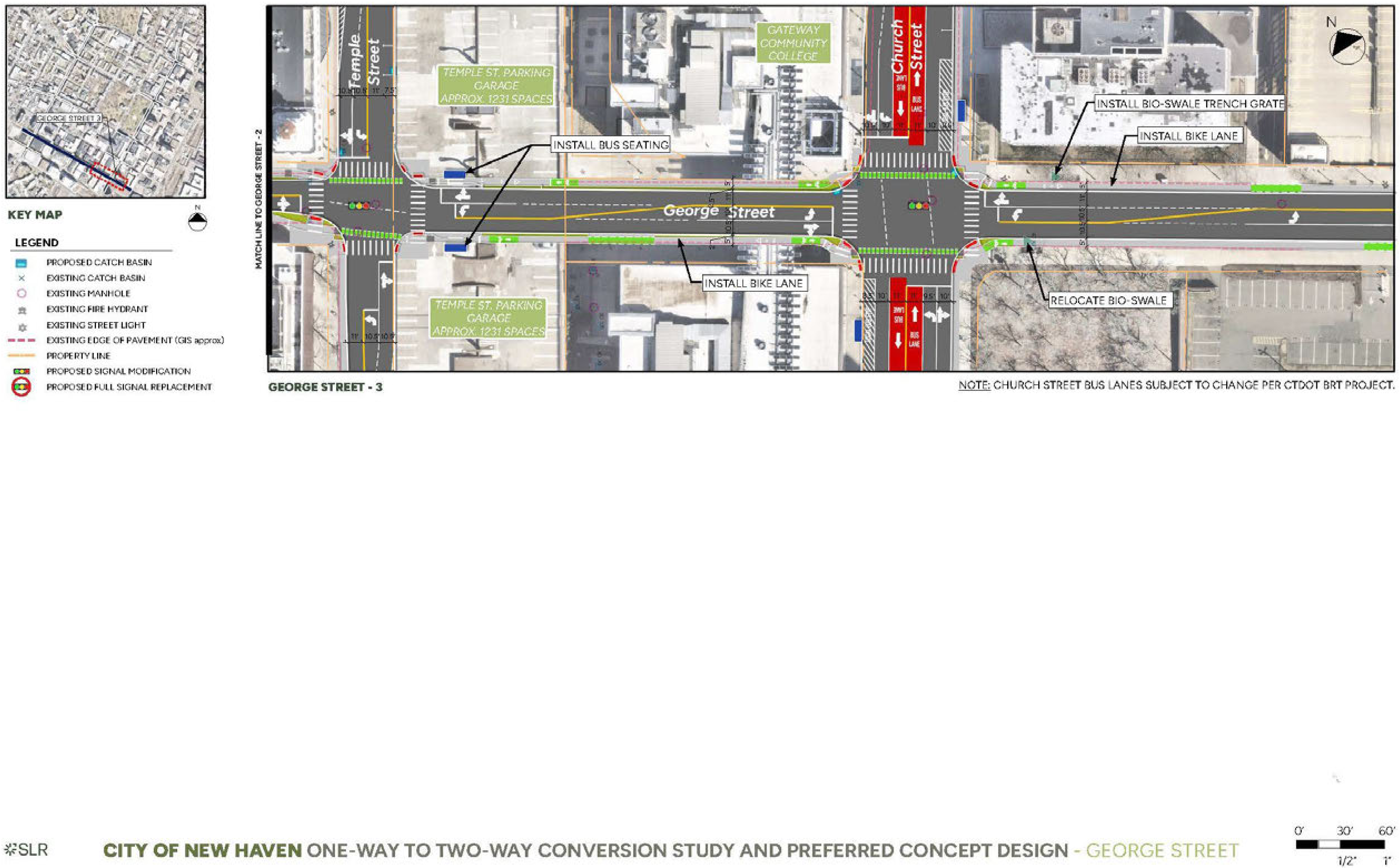


Figure 5.7 Two-Way Conversion Preferred Design – George Street



5.5 Study Area Traffic Signal Upgrades

- The concepts assume traffic signals within each corridor will be upgraded as follows:
  - New signal infrastructure including new signal heads, mast arms, vehicle detection, etc. Many of the study intersections have sub-standard equipment and some intersections currently operate inefficiently as pretimed signals.
  - WALK/DON'T WALK countdown pedestrian signal indications, as well as Audible Pedestrian Signal (APS) elements.
  - Leading Pedestrian Interval (LPI), also known as a pedestrian head-start. LPI is especially feasible on streets with fewer lanes per direction and importantly can sometimes reduce wait times for both pedestrians and motorists compared to exclusive pedestrian signal phase configuration, reducing the likelihood of some pedestrians crossing without the walk signal.
  - No Turn-On-Red across the study intersections.
  - Optimized signal timing, phasing, and coordination/synchronization, including the likely reduction of signal cycle-lengths which could further help to reduce pedestrian and motorist wait times particularly during off-peak times of day.

5.6 Preliminary Cost Estimates

Preliminary/Planning-level construction cost estimate totals for the preferred concept plans are as follows. Note that more detailed itemized preliminary cost estimates can be found in the Appendix.

Church Street.. $7,306,800

York Street.. $7,824,000

Chapel Street.. $3,981,600

George Street.. $8,443,200

Total.. $27,555,600

Appendix A Level of Service Definitions

New Haven One-Way to Two-Way Conversion Study: Final Report

South Central Regional Council of Governments (SCRCOG)/City of New Haven

SLR Project No.: 141.20130.00003

LEVEL OF SERVICE

FOR

SIGNALIZED INTERSECTIONS

(MOTORIZED VEHICLE MODE)

Level of service for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions: in the absence of traffic control, geometric delay, any incidents, and any other vehicles. Specifically, LOS criteria for traffic signals are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. Delay is a complex measure and depends on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group. The criteria are given below.

LEVEL-OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS
MOTORIZED VEHICLE MODE

LOS By Volume-to-Capacity Ratio[1]		**CONTROL DELAY (s/veh)**
v/c ≤ 1.0	**v/c > 1.0**	
A	**F**	**≤ 10**
B	**F**	**> 10 AND ≤ 20**
C	**F**	**> 20 AND ≤ 35**
D	**F**	**> 35 AND ≤ 55**
E	**F**	**> 55 AND ≤ 80**
F	**F**	**> 80**

[1] For approach-based and intersection-wide assessments, LOS is defined solely by control delay.

Specific descriptions of each LOS for signalized intersections are provided below:

Level of Service A describes operations with a control delay of 10 s/veh and 20 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If LOS A is the result of favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.

Level of Service B describes operations with control delay between 10 and 20 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

Level of Service C describes operations with control delay between 20 and 35 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.

Level of Service D describes operations with control delay between 35 and 55 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

Level of Service E describes operations with control delay between 55 and 80 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

Level of Service F describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Reference: Highway Capacity Manual 6, Transportation Research Board, 2016.

LEVEL OF SERVICE
FOR
UNSIGNALIZED INTERSECTIONS
ALL-WAY STOP-CONTROL (AWSC)

The criteria for AWSC intersections have different threshold values than do those for signalized intersections primarily because drivers expect different levels of performance from distinct types of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an AWSC intersection. Thus a higher level of control delay is acceptable at a signalized intersection for the same LOS. The level-of-service criteria are given below.

LEVEL-OF SERVICE CRITERIA FOR AWSC INTERSECTIONS

LOS[1]	CONTROL DELAY (s/veh)
A	≤ 10
B	> 10 AND ≤ 15
C	> 15 AND ≤ 25
D	> 25 AND ≤ 35
E	> 35 AND ≤ 50
F	> 50

[1] For approaches and intersection-wide assessment, LOS is defined solely by control delay.

Note: LOS F is assigned to a movement if the volume-to-capacity ratio exceeds 1.0, regardless of the control delay.

Reference: Highway Capacity Manual Version 6.0, Transportation Research Board, 2016.

LEVEL OF SERVICE
FOR TWO-WAY
STOP SIGN CONTROLLED INTERSECTIONS

The level of service for a TWSC (two-way stop controlled) intersection is determined by the computed or measured control delay and is defined for each minor movement. Level of service is not defined for the intersection as a whole. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS criteria are given in the Table**.** LOS criteria are given below:

LEVEL-OF SERVICE CRITERIA FOR TWSC INTERSECTIONS	
LOS[1]	**CONTROL DELAY (s/veh)**
A	**≤ 10**
B	**> 10 AND ≤ 15**
C	**> 15 AND ≤ 25**
D	**> 25 AND ≤ 35**
E	**> 35 AND ≤ 50**
F	**> 50**

Note: LOS criteria apply to each lane on a given approach and to each approach on the minor street.
LOS is not calculated for major-street approaches or for the intersection as a whole.
LOS F is assigned to a movement if the volume-to-capacity ratio exceeds 1.0, regardless of the control delay

Reference: Highway Capacity Manual Version 6.0, Transportation Research Board, 2016.

Appendix B Traffic Capacity Analyses *Synchro* Printouts

New Haven One-Way to Two-Way Conversion Study: Final Report

South Central Regional Council of Governments (SCRCOG)/City of New Haven

SLR Project No.: 141.20130.00003

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	180	25	50	285	80	75	410	70	25	150	50
Future Volume (vph)	25	180	25	50	285	80	75	410	70	25	150	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			-3%			-6%			-2%	
Storage Length (ft)	50		0	0		0	75		0	0		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	25			0			25			25		
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
Ped Bike Factor	0.78	0.93			0.84			0.91			0.92	
Frt		0.982			0.971			0.978			0.970	
Flt Protected	0.950				0.994		0.950				0.994	
Satd. Flow (prot)	1578	1395	0	0	2417	0	1394	1366	0	0	1449	0
Flt Permitted	0.363				0.826		0.950				0.920	
Satd. Flow (perm)	468	1395	0	0	1932	0	1394	1366	0	0	1341	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		413			476			522			476	
Travel Time (s)		11.3			13.0			14.2			13.0	
Confl. Peds. (#/hr)	218		218	291		291			229	229		229
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.79	0.79	0.79	0.90	0.90	0.90	0.88	0.88	0.88	0.92	0.92	0.92
Heavy Vehicles (%)	0%	9%	2%	2%	14%	5%	16%	10%	16%	2%	2%	2%
Adj. Flow (vph)	32	228	32	56	317	89	85	466	80	27	163	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	260	0	0	462	0	85	546	0	0	244	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		6			2		7	4			8	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2		7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		3.0	7.0		7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		7.0	17.0		17.0	17.0	
Total Split (s)	32.0	32.0		32.0	32.0		15.0	47.0		32.0	32.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		16.7%	52.2%		35.6%	35.6%	
Yellow Time (s)	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	
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-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)	24.6	24.6			24.6		8.0	52.2			41.7	
Actuated g/C Ratio	0.27	0.27			0.27		0.09	0.58			0.46	
v/c Ratio	0.25	0.68			0.88		0.69	0.69			0.39	
Control Delay	29.6	38.5			49.5		54.5	16.1			22.6	
Queue Delay	0.0	0.0			0.0		0.0	0.1			0.0	
Total Delay	29.6	38.5			49.5		54.5	16.2			22.6	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	D			D		D	B			C	
Approach Delay		37.6			49.5			21.4			22.6	
Approach LOS		D			D			C			C	
Stops (vph)	21	178			379		74	372			160	
Fuel Used(gal)	0	3			7		1	5			3	
CO Emissions (g/hr)	22	211			513		101	359			178	
NOx Emissions (g/hr)	4	41			100		20	70			35	
VOC Emissions (g/hr)	5	49			119		23	83			41	
Dilemma Vehicles (#)	0	0			0		0	0			0	
Queue Length 50th (ft)	14	129			128		52	317			102	
Queue Length 95th (ft)	33	174			#198		m68	#420			188	
Internal Link Dist (ft)		333			396			442			396	
Turn Bay Length (ft)	50						75					
Base Capacity (vph)	145	434			601		170	792			620	
Starvation Cap Reductn	0	0			0		0	17			0	
Spillback Cap Reductn	0	0			0		0	0			0	
Storage Cap Reductn	0	0			0		0	0			0	
Reduced v/c Ratio	0.22	0.60			0.77		0.50	0.70			0.39	

Intersection Summary

Area Type: CBD

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 4 (4%), Referenced to phase 4:NBT and 8:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 32.4 Intersection LOS: C

Intersection Capacity Utilization 76.0% ICU Level of Service D

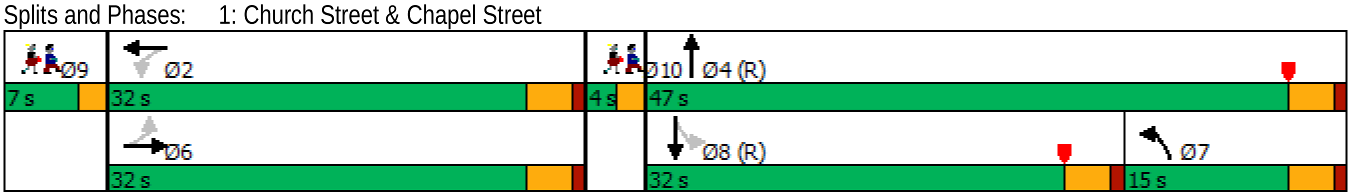
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 1: Church Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	160	25	40	310	55	0	0	0	35	210	65
Future Volume (vph)	20	160	25	40	310	55	0	0	0	35	210	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			5%			-8%			4%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.95		0.83	0.96						0.91	
Frt		0.984			0.977						0.972	
Flt Protected		0.995		0.950							0.994	
Satd. Flow (prot)	0	1561	0	1458	1352	0	0	0	0	0	1425	0
Flt Permitted		0.949		0.621							0.994	
Satd. Flow (perm)	0	1473	0	794	1352	0	0	0	0	0	1382	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		502			519			547			897	
Travel Time (s)		13.7			14.2			14.9			24.5	
Confl. Peds. (#/hr)	118		118	118		118				118		121
Confl. Bikes (#/hr)			10			10						10
Peak Hour Factor	0.92	0.92	0.92	0.88	0.88	0.88	0.92	0.92	0.92	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	5%	11%	13%	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	22	174	27	45	352	63	0	0	0	37	223	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	223	0	45	415	0	0	0	0	0	329	0
Turn Type	Perm	NA		Perm	NA					Perm	NA	
Protected Phases		6			2						8	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2					8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0					7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0					17.0	17.0	
Total Split (s)	26.0	26.0		26.0	26.0					26.0	26.0	
Total Split (%)	43.3%	43.3%		43.3%	43.3%					43.3%	43.3%	
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	
Total Lost Time (s)		4.0		4.0	4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min					None	None	
Act Effct Green (s)		27.3		27.3	27.3						18.3	
Actuated g/C Ratio		0.46		0.46	0.46						0.30	
v/c Ratio		0.33		0.12	0.67						0.78	
Control Delay		14.7		13.6	23.8						32.2	
Queue Delay		0.0		0.0	0.0						0.0	
Total Delay		14.7		13.6	23.8						32.2	
LOS		B		B	C						C	
Approach Delay		14.7			22.8						32.2	
Approach LOS		B			C						C	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		145		28	270						267	
Fuel Used(gal)		2		0	4						5	
CO Emissions (g/hr)		143		28	309						378	
NOx Emissions (g/hr)		28		5	60						74	
VOC Emissions (g/hr)		33		6	72						88	
Dilemma Vehicles (#)		0		0	0						0	
Queue Length 50th (ft)		49		10	122						104	
Queue Length 95th (ft)		122		30	#269						177	
Internal Link Dist (ft)		422			439			467			817	
Turn Bay Length (ft)												
Base Capacity (vph)		670		361	615						506	
Starvation Cap Reductn		0		0	0						0	
Spillback Cap Reductn		0		0	0						0	
Storage Cap Reductn		0		0	0						0	
Reduced v/c Ratio		0.33		0.12	0.67						0.65	

Intersection Summary

Area Type: CBD

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

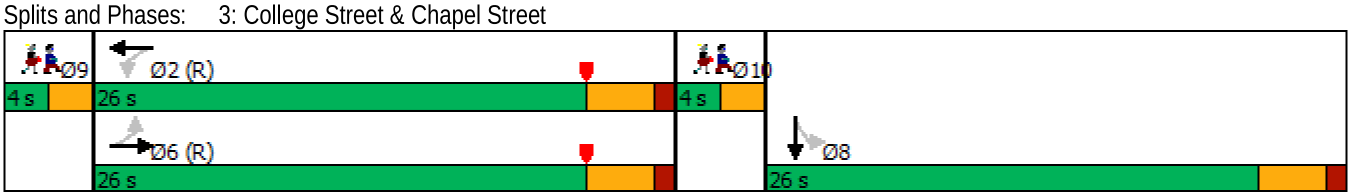
Intersection Signal Delay: 24.0 Intersection LOS: C

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: 3: College Street & Chapel Street



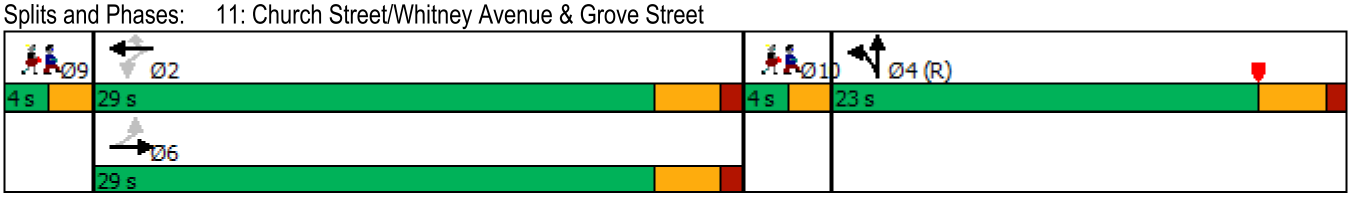
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	250	25	25	270	90	125	235	50	0	0	0
Future Volume (vph)	50	250	25	25	270	90	125	235	50	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-5%			-4%			-10%			5%	
Storage Length (ft)	50		0	50		100	125		0	0		0
Storage Lanes	0		0	0		1	1		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	0.95	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor		0.97			0.98	0.75		0.90				
Frt		0.990				0.850		0.982				
Flt Protected		0.992			0.996			0.985				
Satd. Flow (prot)	0	1599	0	0	1589	1352	0	2846	0	0	0	0
Flt Permitted		0.869			0.959			0.985				
Satd. Flow (perm)	0	1384	0	0	1507	1020	0	2638	0	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		413			498			404			482	
Travel Time (s)		11.3			13.6			11.0			13.1	
Confl. Peds. (#/hr)	112		112	183		183	112		112			
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.87	0.87	0.87	0.90	0.90	0.90	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	6%	6%	10%	9%	2%	2%	2%	2%
Adj. Flow (vph)	54	272	27	29	310	103	139	261	56	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	353	0	0	339	103	0	456	0	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm	Split	NA				
Protected Phases		6			2		4	4				
Permitted Phases	6			2		2						
Detector Phase	6	6		2	2	2	4	4				
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0				
Minimum Split (s)	18.0	18.0		18.0	18.0	18.0	18.0	18.0				
Total Split (s)	29.0	29.0		29.0	29.0	29.0	23.0	23.0				
Total Split (%)	48.3%	48.3%		48.3%	48.3%	48.3%	38.3%	38.3%				
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	1.0	1.0	1.0	1.0				
Lost Time Adjust (s)		0.0			0.0	0.0		0.0				
Total Lost Time (s)		4.0			4.0	4.0		4.0				
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min				
Act Effct Green (s)		19.4			19.4	19.4		29.4				
Actuated g/C Ratio		0.32			0.32	0.32		0.49				
v/c Ratio		0.79			0.70	0.31		0.33				
Control Delay		31.2			25.0	16.3		12.6				
Queue Delay		0.0			0.0	0.0		0.0				
Total Delay		31.2			25.0	16.3		12.6				

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			C	B		B				
Approach Delay		31.2			23.0			12.6				
Approach LOS		C			C			B				
Stops (vph)		279			239	60		254				
Fuel Used(gal)		4			4	1		3				
CO Emissions (g/hr)		299			257	64		240				
NOx Emissions (g/hr)		58			50	12		47				
VOC Emissions (g/hr)		69			59	15		56				
Dilemma Vehicles (#)		0			0	0		0				
Queue Length 50th (ft)		112			103	27		43				
Queue Length 95th (ft)		175			151	51		108				
Internal Link Dist (ft)		333			418			324			402	
Turn Bay Length (ft)						100						
Base Capacity (vph)		576			627	425		1395				
Starvation Cap Reductn		0			0	0		0				
Spillback Cap Reductn		0			0	0		0				
Storage Cap Reductn		0			0	0		0				
Reduced v/c Ratio		0.61			0.54	0.24		0.33				

Intersection Summary	
Area Type: CBD	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 50 (83%), Referenced to phase 4:NBTL, Start of Yellow	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 21.5	Intersection LOS: C
Intersection Capacity Utilization 61.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 11: Church Street/Whitney Avenue & Grove Street



Lane Group	Ø9	Ø10
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		
Fuel Used(gal)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	50	285	0	0	0	0	25	215	60
Future Volume (vph)	0	0	0	50	285	0	0	0	0	25	215	60
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
Ped Bike Factor												
Frt											0.973	
Flt Protected					0.993						0.996	
Satd. Flow (prot)	0	0	0	0	1744	0	0	0	0	0	1738	0
Flt Permitted					0.993						0.996	
Satd. Flow (perm)	0	0	0	0	1744	0	0	0	0	0	1738	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		552			511			389			432	
Travel Time (s)		15.1			13.9			10.6			11.8	
Confl. Peds. (#/hr)				41						18		18
Confl. Bikes (#/hr)						10						10
Peak Hour Factor	0.92	0.92	0.92	0.85	0.85	0.85	0.92	0.92	0.92	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	2%	2%	5%	0%	2%	2%	2%	2%	2%	4%
Adj. Flow (vph)	0	0	0	59	335	0	0	0	0	28	239	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	394	0	0	0	0	0	334	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 41.1% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	12.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	50	285	0	0	0	0	25	215	60
Future Vol, veh/h	0	0	0	50	285	0	0	0	0	25	215	60
Peak Hour Factor	0.92	0.92	0.92	0.85	0.85	0.85	0.92	0.92	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	5	0	2	2	2	2	2	4
Mvmt Flow	0	0	0	59	335	0	0	0	0	28	239	67
Number of Lanes	0	0	0	0	1	0	0	0	0	0	1	0

Approach	WB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left		WB
Conflicting Lanes Left	0	1
Conflicting Approach Right	SB	
Conflicting Lanes Right	1	0
HCM Control Delay	13	11.7
HCM LOS	B	B

Lane	WBLn1	SBLn1
Vol Left, %	15%	8%
Vol Thru, %	85%	72%
Vol Right, %	0%	20%
Sign Control	Stop	Stop
Traffic Vol by Lane	335	300
LT Vol	50	25
Through Vol	285	215
RT Vol	0	60
Lane Flow Rate	394	333
Geometry Grp	1	1
Degree of Util (X)	0.524	0.445
Departure Headway (Hd)	4.786	4.809
Convergence, Y/N	Yes	Yes
Cap	749	747
Service Time	2.839	2.86
HCM Lane V/C Ratio	0.526	0.446
HCM Control Delay	13	11.7
HCM Lane LOS	B	B
HCM 95th-tile Q	3.1	2.3

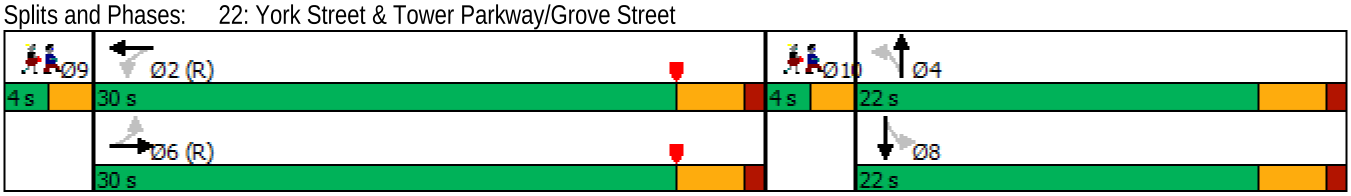
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	300	25	25	245	40	20	80	25	50	100	15
Future Volume (vph)	25	300	25	25	245	40	20	80	25	50	100	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98			0.98			0.93			0.97	
Frt		0.990			0.983			0.973			0.988	
Flt Protected		0.996			0.996			0.992			0.985	
Satd. Flow (prot)	0	1743	0	0	1721	0	0	1617	0	0	1740	0
Flt Permitted		0.966			0.959			0.938			0.882	
Satd. Flow (perm)	0	1686	0	0	1644	0	0	1501	0	0	1526	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		685			397			298			207	
Travel Time (s)		18.7			10.8			8.1			5.6	
Confl. Peds. (#/hr)	39		101	101		39	101		101	39		39
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.57	0.57	0.57
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%	14%	2%	2%	2%	0%	11%
Adj. Flow (vph)	27	326	27	27	266	43	22	86	27	88	175	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	380	0	0	336	0	0	135	0	0	289	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Total Split (s)	30.0	30.0		30.0	30.0		22.0	22.0		22.0	22.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		36.7%	36.7%		36.7%	36.7%	
Yellow Time (s)	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	
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												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		33.5			33.5			15.3			15.3	
Actuated g/C Ratio		0.56			0.56			0.26			0.26	
v/c Ratio		0.40			0.37			0.35			0.74	
Control Delay		11.3			10.9			20.1			32.5	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		11.3			10.9			20.1			32.5	
LOS		B			B			C			C	
Approach Delay		11.3			10.9			20.1			32.5	
Approach LOS		B			B			C			C	
Stops (vph)		206			178			95			145	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Fuel Used(gal)		4			4			2			2	
CO Emissions (g/hr)		304			271			122			136	
NOx Emissions (g/hr)		59			53			24			26	
VOC Emissions (g/hr)		71			63			28			31	
Dilemma Vehicles (#)		0			0			0			0	
Queue Length 50th (ft)		63			54			39			93	
Queue Length 95th (ft)		165			145			77			89	
Internal Link Dist (ft)		605			317			218			127	
Turn Bay Length (ft)												
Base Capacity (vph)		941			917			450			457	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.40			0.37			0.30			0.63	

Intersection Summary	
Area Type: Other	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 17.6	Intersection LOS: B
Intersection Capacity Utilization 46.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 22: York Street & Tower Parkway/Grove Street



Lane Group	EBL	EBT	EBR	WBT	WBR	NBL2	NBT	NBR	SBL	SBT	SBR	SEL
Lane Configurations												
Traffic Volume (vph)	45	580	25	225	30	145	65	100	25	100	25	30
Future Volume (vph)	45	580	25	225	30	145	65	100	25	100	25	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0		0			0	0		0	0
Storage Lanes	1		0		1			0	0		0	1
Taper Length (ft)	0								0			0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98					0.80			0.84		
Frt		0.994			0.850		0.909			0.978		
Flt Protected	0.950					0.950				0.992		0.950
Satd. Flow (prot)	1601	1644	0	1801	1531	1504	1141	0	0	1557	0	1711
Flt Permitted	0.950					0.542				0.919		0.950
Satd. Flow (perm)	1601	1644	0	1801	1531	858	1141	0	0	1356	0	1711
Right Turn on Red			No					No				
Satd. Flow (RTOR)												
Link Speed (mph)		25		25			25			25		25
Link Distance (ft)		309		401			898			511		228
Travel Time (s)		8.4		10.9			24.5			13.9		6.2
Confl. Peds. (#/hr)			282					165	165		376	
Confl. Bikes (#/hr)			15		15			15			15	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.84	0.84	0.84	0.92	0.92	0.92	0.94
Heavy Vehicles (%)	9%	9%	2%	2%	2%	16%	12%	21%	2%	2%	2%	2%
Adj. Flow (vph)	48	624	27	242	32	173	77	119	27	109	27	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	651	0	242	32	173	196	0	0	163	0	32
Turn Type	Prot	NA		NA	Over	D.P+P	NA		Perm	NA		Prot
Protected Phases	1	1 2		2	9	3	3 4			4		9
Permitted Phases						4			4			
Detector Phase	1	1 2		2	9	3	3 4		4	4		9
Switch Phase												
Minimum Initial (s)	4.0			12.0	2.0	4.0			12.0	12.0		2.0
Minimum Split (s)	10.0			18.0	10.0	10.0			19.0	19.0		10.0
Total Split (s)	12.0			25.0	13.0	11.0			25.0	25.0		13.0
Total Split (%)	13.3%			27.8%	14.4%	12.2%			27.8%	27.8%		14.4%
Yellow Time (s)	4.0			4.0	4.0	4.0			4.0	4.0		4.0
All-Red Time (s)	2.0			1.0	2.0	2.0			1.0	1.0		2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0				0.0		0.0
Total Lost Time (s)	6.0			5.0	6.0	6.0				5.0		6.0
Lead/Lag	Lag			Lead		Lag			Lead	Lead		
Lead-Lag Optimize?												
Recall Mode	None			C-Min	None	None			None	None		None
Act Effct Green (s)	6.0	38.5		27.5	6.5	20.8	26.8			16.8		6.5
Actuated g/C Ratio	0.07	0.43		0.31	0.07	0.23	0.30			0.19		0.07
v/c Ratio	0.45	0.93		0.44	0.29	0.74	0.58			0.64		0.26
Control Delay	54.5	49.4		31.3	46.2	47.8	33.7			45.5		44.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0			0.0		0.0
Total Delay	54.5	49.4		31.3	46.2	47.8	33.7			45.5		44.6
LOS	D	D		C	D	D	C			D		D

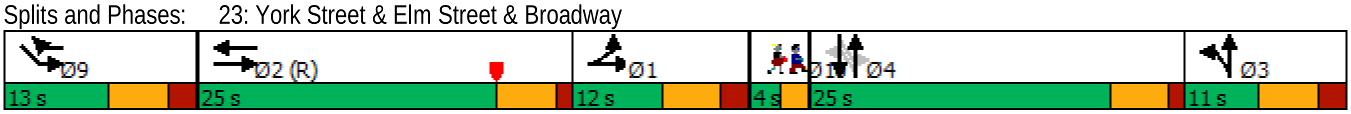
Lane Group	Ø10
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	10
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	2.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	4%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL2	NBT	NBR	SBL	SBT	SBR	SEL
Approach Delay		49.8		33.0			40.3			45.5		44.6
Approach LOS		D		C			D			D		D
Stops (vph)	44	435		186	30	122	136			135		30
Fuel Used(gal)	1	9		3	0	3	3			3		1
CO Emissions (g/hr)	55	654		204	35	209	204			206		46
NOx Emissions (g/hr)	11	127		40	7	41	40			40		9
VOC Emissions (g/hr)	13	151		47	8	48	47			48		11
Dilemma Vehicles (#)	0	0		0	0	0	0			0		0
Queue Length 50th (ft)	27	~412		119	18	77	93			86		17
Queue Length 95th (ft)	#64	#646		203	46	118	144			147		46
Internal Link Dist (ft)		229		321			818			431		148
Turn Bay Length (ft)						150						
Base Capacity (vph)	106	703		551	119	234	329			301		133
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	0.45	0.93		0.44	0.27	0.74	0.60			0.54		0.24

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 44.0 Intersection LOS: D
Intersection Capacity Utilization 80.5% 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.

Splits and Phases: 23: York Street & Elm Street & Broadway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	125	25	25	280	95	55	220	75	50	100	25
Future Volume (vph)	25	125	25	25	280	95	55	220	75	50	100	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	11	11	10	11	11
Storage Length (ft)	50		0	50		0	50		0	50		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.97		0.91	0.96		0.89	0.96		0.93	0.97	
Frt		0.981			0.962			0.962			0.970	
Flt Protected		0.993		0.950			0.950			0.950		
Satd. Flow (prot)	0	1713	0	1745	1555	0	1636	1625	0	1652	1690	0
Flt Permitted		0.926		0.663			0.670			0.377		
Satd. Flow (perm)	0	1585	0	1109	1555	0	1021	1625	0	607	1690	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		511			419			515			898	
Travel Time (s)		13.9			11.4			14.0			24.5	
Confl. Peds. (#/hr)	60		60	60		60	60		60	60		60
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.87	0.87	0.87	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	4%	23%	3%	5%	2%	2%	2%	2%
Adj. Flow (vph)	27	136	27	27	304	103	63	253	86	54	109	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	190	0	27	407	0	63	339	0	54	136	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Total Split (s)	22.0	22.0		22.0	22.0		30.0	30.0		30.0	30.0	
Total Split (%)	36.7%	36.7%		36.7%	36.7%		50.0%	50.0%		50.0%	50.0%	
Yellow Time (s)	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	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		30.9		30.9	30.9		17.9	17.9		17.9	17.9	
Actuated g/C Ratio		0.52		0.52	0.52		0.30	0.30		0.30	0.30	
v/c Ratio		0.23		0.05	0.51		0.21	0.70		0.30	0.27	
Control Delay		12.3		20.8	25.2		15.3	25.9		18.7	15.8	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		12.3		20.8	25.2		15.3	25.9		18.7	15.8	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B		C	C		B	C		B	B	
Approach Delay		12.3			24.9			24.3			16.6	
Approach LOS		B			C			C			B	
Stops (vph)		106		25	299		38	242		37	85	
Fuel Used(gal)		2		0	4		1	4		1	2	
CO Emissions (g/hr)		112		20	308		39	264		50	118	
NOx Emissions (g/hr)		22		4	60		8	51		10	23	
VOC Emissions (g/hr)		26		5	71		9	61		12	27	
Dilemma Vehicles (#)		0		0	0		0	0		0	0	
Queue Length 50th (ft)		30		9	141		17	107		15	37	
Queue Length 95th (ft)		100		m15	#291		34	146		35	61	
Internal Link Dist (ft)		431			339			435			818	
Turn Bay Length (ft)				50			50			50		
Base Capacity (vph)		815		570	800		442	704		263	732	
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		0.23		0.05	0.51		0.14	0.48		0.21	0.19	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 21.4 Intersection LOS: C

Intersection Capacity Utilization 63.5% ICU Level of Service B

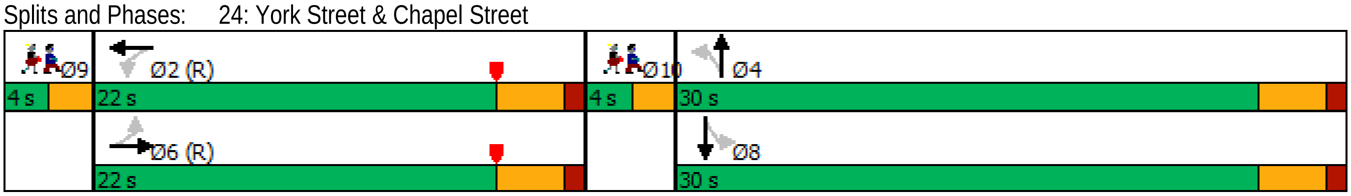
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 24: York Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	25	90	75	35	395	0	0	125	25
Future Volume (vph)	0	0	0	25	90	75	35	395	0	0	125	25
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
Ped Bike Factor												
Frt					0.947						0.978	
Flt Protected					0.994			0.996				
Satd. Flow (prot)	0	0	0	0	1681	0	0	1773	0	0	1761	0
Flt Permitted					0.994			0.996				
Satd. Flow (perm)	0	0	0	0	1681	0	0	1773	0	0	1761	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		502			419			405			515	
Travel Time (s)		13.7			11.4			11.0			14.0	
Confl. Peds. (#/hr)				14		14	45					45
Confl. Bikes (#/hr)						10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%	5%	3%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	38	138	115	38	434	0	0	136	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	291	0	0	472	0	0	163	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 57.1% ICU Level of Service B

Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	14.8
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	25	90	75	35	395	0	0	125	25
Future Vol, veh/h	0	0	0	25	90	75	35	395	0	0	125	25
Peak Hour Factor	0.92	0.92	0.92	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	3	3	5	3	2	2	2	2
Mvmt Flow	0	0	0	38	138	115	38	434	0	0	136	27
Number of Lanes	0	0	0	0	1	0	0	1	0	0	1	0

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	12.5	17.8	10.1
HCM LOS	B	C	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	8%	13%	0%
Vol Thru, %	92%	47%	83%
Vol Right, %	0%	39%	17%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	430	190	150
LT Vol	35	25	0
Through Vol	395	90	125
RT Vol	0	75	25
Lane Flow Rate	473	292	163
Geometry Grp	1	1	1
Degree of Util (X)	0.67	0.435	0.242
Departure Headway (Hd)	5.107	5.354	5.337
Convergence, Y/N	Yes	Yes	Yes
Cap	714	672	672
Service Time	3.107	3.391	3.373
HCM Lane V/C Ratio	0.662	0.435	0.243
HCM Control Delay	17.8	12.5	10.1
HCM Lane LOS	C	B	B
HCM 95th-tile Q	5.2	2.2	0.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	320	25	50	0	50	0	250	115	25	100	0
Future Volume (vph)	165	320	25	50	0	50	0	250	115	25	100	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		100	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	0			0			0			0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.94	0.99			0.93				0.86		0.99	
Frt		0.989			0.932				0.850			
Flt Protected	0.950				0.976						0.990	
Satd. Flow (prot)	1646	1738	0	0	1551	0	0	1783	1487	0	1783	0
Flt Permitted	0.687				0.769						0.903	
Satd. Flow (perm)	1116	1738	0	0	1203	0	0	1783	1284	0	1603	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		504			403			370			405	
Travel Time (s)		13.7			11.0			10.1			11.0	
Confl. Peds. (#/hr)	33		33	33		33	48		48	48		48
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.90	0.90	0.90	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	0%	2%	2%	2%	2%	3%	5%	2%	2%	2%
Adj. Flow (vph)	183	356	28	54	0	54	0	260	120	27	109	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	183	384	0	0	108	0	0	260	120	0	136	0
Turn Type	Perm	NA		Perm	NA			NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6					4	8		
Detector Phase	2	2		6	6			4	4	8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0	7.0	7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0			17.0	17.0	17.0	17.0	
Total Split (s)	22.0	22.0		22.0	22.0			30.0	30.0	30.0	30.0	
Total Split (%)	36.7%	36.7%		36.7%	36.7%			50.0%	50.0%	50.0%	50.0%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0			4.0			4.0	4.0		4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min			None	None	None	None	
Act Effct Green (s)	37.1	37.1			37.1			13.3	13.3		13.3	
Actuated g/C Ratio	0.62	0.62			0.62			0.22	0.22		0.22	
v/c Ratio	0.27	0.36			0.15			0.66	0.42		0.38	
Control Delay	8.9	8.8			4.2			28.8	23.4		21.7	
Queue Delay	0.0	0.0			0.0			0.0	0.0		0.0	
Total Delay	8.9	8.8			4.2			28.8	23.4		21.7	
LOS	A	A			A			C	C		C	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		8.8			4.2			27.1			21.7	
Approach LOS		A			A			C			C	
Stops (vph)	82	177			28			213	90		97	
Fuel Used(gal)	1	3			1			3	1		1	
CO Emissions (g/hr)	92	195			37			215	88		95	
NOx Emissions (g/hr)	18	38			7			42	17		18	
VOC Emissions (g/hr)	21	45			9			50	20		22	
Dilemma Vehicles (#)	0	0			0			0	0		0	
Queue Length 50th (ft)	23	52			7			86	38		42	
Queue Length 95th (ft)	90	171			m25			134	70		75	
Internal Link Dist (ft)		424			323			290			325	
Turn Bay Length (ft)									100			
Base Capacity (vph)	689	1074			743			772	556		694	
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	0.27	0.36			0.15			0.34	0.22		0.20	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 9 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 45

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

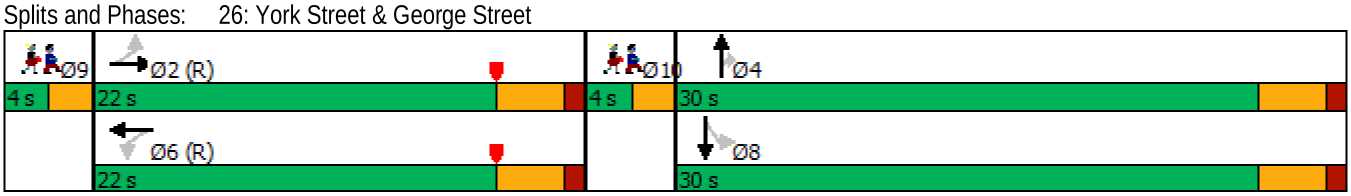
Intersection Signal Delay: 15.7 Intersection LOS: B

Intersection Capacity Utilization 65.9% ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 26: York Street & George Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	125	0	0	375	0	55
Future Volume (vph)	125	0	0	375	0	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	1801	0	0	1670	1558	0
Flt Permitted						
Satd. Flow (perm)	1801	0	0	1670	1558	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	419			502	522	
Travel Time (s)	11.4			13.7	14.2	
Confl. Peds. (#/hr)					75	75
Confl. Bikes (#/hr)		15				15
Peak Hour Factor	0.92	0.92	0.88	0.88	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	10%	3%	2%
Adj. Flow (vph)	136	0	0	426	0	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	136	0	0	426	60	0
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 39.3% ICU Level of Service A

Analysis Period (min) 15

Intersection						
Int Delay, s/veh	1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	Y	
Traffic Vol, veh/h	125	0	0	375	0	55
Future Vol, veh/h	125	0	0	375	0	55
Conflicting Peds, #/hr	0	0	0	0	75	75
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	88	88	91	91
Heavy Vehicles, %	2	2	2	10	3	2
Mvmt Flow	136	0	0	426	0	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	637	211
Stage 1	-	-	-	-	136	-
Stage 2	-	-	-	-	501	-
Critical Hdwy	-	-	-	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	-	-	3.527	3.318
Pot Cap-1 Maneuver	-	0	0	-	440	829
Stage 1	-	0	0	-	888	-
Stage 2	-	0	0	-	607	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	415	782
Mov Cap-2 Maneuver	-	-	-	-	415	-
Stage 1	-	-	-	-	888	-
Stage 2	-	-	-	-	572	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	782	-	-
HCM Lane V/C Ratio	0.077	-	-
HCM Control Delay (s)	10	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.3	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	330	50	50	100	25	10	5	10	25	5	25
Future Volume (vph)	55	330	50	50	100	25	10	5	10	25	5	25
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
Ped Bike Factor												
Frt		0.985			0.981			0.945			0.939	
Flt Protected		0.994			0.987			0.980			0.978	
Satd. Flow (prot)	0	1735	0	0	1743	0	0	1668	0	0	1657	0
Flt Permitted		0.994			0.987			0.980			0.978	
Satd. Flow (perm)	0	1735	0	0	1743	0	0	1668	0	0	1657	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		403			487			120			398	
Travel Time (s)		11.0			13.3			3.3			10.9	
Confl. Peds. (#/hr)	25		28	28		25	5		5	5		5
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.71	0.71	0.71	0.95	0.88	0.88	0.95	0.95	0.95	0.52	0.52	0.52
Heavy Vehicles (%)	5%	4%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Adj. Flow (vph)	77	465	70	53	114	28	11	5	11	48	10	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	612	0	0	195	0	0	27	0	0	106	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 38.8% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	55	330	50	50	100	25	10	5	10	25	5	25
Future Vol, veh/h	55	330	50	50	100	25	10	5	10	25	5	25
Conflicting Peds, #/hr	25	0	28	28	0	25	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	71	71	95	88	88	95	95	95	52	52	52
Heavy Vehicles, %	5	4	0	2	2	2	2	2	2	2	0	2
Mvmt Flow	77	465	70	53	114	28	11	5	11	48	10	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	167	0	0	563	0	0	950	955	533	926	976	158
Stage 1	-	-	-	-	-	-	682	682	-	259	259	-
Stage 2	-	-	-	-	-	-	268	273	-	667	717	-
Critical Hdwy	4.15	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.5	-
Follow-up Hdwy	2.245	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4	3.318
Pot Cap-1 Maneuver	1393	-	-	1008	-	-	240	258	547	249	253	887
Stage 1	-	-	-	-	-	-	440	450	-	746	697	-
Stage 2	-	-	-	-	-	-	738	684	-	448	437	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1366	-	-	986	-	-	191	214	533	210	210	867
Mov Cap-2 Maneuver	-	-	-	-	-	-	191	214	-	210	210	-
Stage 1	-	-	-	-	-	-	396	405	-	672	643	-
Stage 2	-	-	-	-	-	-	644	631	-	397	393	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	2.4	20.1	21.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	265	1366	-	-	986	-	-	320
HCM Lane V/C Ratio	0.099	0.057	-	-	0.053	-	-	0.331
HCM Control Delay (s)	20.1	7.8	0	-	8.9	0	-	21.7
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.3	0.2	-	-	0.2	-	-	1.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	125	775	175	55	210	0	0	150	25
Future Volume (vph)	0	0	0	125	775	175	55	210	0	0	150	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99						1.00	
Frt					0.976						0.981	
Flt Protected					0.994			0.990				
Satd. Flow (prot)	0	0	0	0	4669	0	0	1752	0	0	1760	0
Flt Permitted					0.994			0.903				
Satd. Flow (perm)	0	0	0	0	4669	0	0	1598	0	0	1760	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		495			928			252			370	
Travel Time (s)		13.5			25.3			6.9			10.1	
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.83	0.83	0.83	0.79	0.79	0.79	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	4%	3%	3%	4%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	151	934	211	70	266	0	0	163	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1296	0	0	336	0	0	190	0
Turn Type				Perm	NA		D.P+P	NA			NA	
Protected Phases					6		7	7 8			8	
Permitted Phases				6			8					
Detector Phase				6	6		7 8	7 8			8	
Switch Phase												
Minimum Initial (s)				12.0	12.0		7.0				12.0	
Minimum Split (s)				18.0	18.0		10.0				16.0	
Total Split (s)				30.0	30.0		16.0				20.0	
Total Split (%)				33.3%	33.3%		17.8%				22.2%	
Yellow Time (s)				4.0	4.0		3.0				3.0	
All-Red Time (s)				2.0	2.0		0.0				1.0	
Lost Time Adjust (s)					0.0						0.0	
Total Lost Time (s)					6.0						4.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes					
Recall Mode				C-Max	C-Max		None				None	
Act Effct Green (s)					31.4			27.4			13.4	
Actuated g/C Ratio					0.35			0.30			0.15	
v/c Ratio					0.80			0.66			0.73	
Control Delay					33.9			31.9			52.8	
Queue Delay					0.0			0.3			0.0	
Total Delay					33.9			32.1			52.8	
LOS					C			C			D	
Approach Delay					33.9			32.1			52.8	
Approach LOS					C			C			D	
Stops (vph)					860			227			165	
Fuel Used(gal)					19			3			3	

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike 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)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
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)	24.0
Total Split (s)	24.0
Total Split (%)	27%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Stops (vph)	
Fuel Used(gal)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
CO Emissions (g/hr)					1344			221			214	
NOx Emissions (g/hr)					262			43			42	
VOC Emissions (g/hr)					312			51			50	
Dilemma Vehicles (#)					0			0			0	
Queue Length 50th (ft)					257			158			106	
Queue Length 95th (ft)					#334			193			171	
Internal Link Dist (ft)		415			848			172			290	
Turn Bay Length (ft)												
Base Capacity (vph)					1627			554			312	
Starvation Cap Reductn					0			25			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.80			0.64			0.61	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 16 (18%), Referenced to phase 6:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 35.5 Intersection LOS: D
Intersection Capacity Utilization 57.2% 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: 71: York Street & North Frontage Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	250	105	50	150	0	0	0	0	50	240	25
Future Volume (vph)	0	250	105	50	150	0	0	0	0	50	240	25
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
Ped Bike Factor		0.97			0.99						0.97	
Frt		0.960									0.989	
Flt Protected					0.988						0.992	
Satd. Flow (prot)	0	1435	0	0	1601	0	0	0	0	0	1475	0
Flt Permitted					0.855						0.992	
Satd. Flow (perm)	0	1435	0	0	1373	0	0	0	0	0	1445	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		487			542			382			372	
Travel Time (s)		13.3			14.8			10.4			10.1	
Confl. Peds. (#/hr)	60		60	60		60	60		60	60		60
Confl. Bikes (#/hr)			10			10						10
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.83	0.83	0.83
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%	2%	2%	2%	5%	10%	2%
Adj. Flow (vph)	0	275	115	54	163	0	0	0	0	60	289	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	390	0	0	217	0	0	0	0	0	379	0
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Detector Phase		2		6	6					4	4	
Switch Phase												
Minimum Initial (s)		7.0		7.0	7.0					7.0	7.0	
Minimum Split (s)		18.0		18.0	18.0					18.0	18.0	
Total Split (s)		30.0		30.0	30.0					22.0	22.0	
Total Split (%)		50.0%		50.0%	50.0%					36.7%	36.7%	
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)		0.0			0.0						0.0	
Total Lost Time (s)		4.0			4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min		C-Min	C-Min					None	None	
Act Effct Green (s)		29.8			29.8						17.4	
Actuated g/C Ratio		0.50			0.50						0.29	
v/c Ratio		0.55			0.32						0.90	
Control Delay		15.3			13.7						49.1	
Queue Delay		0.0			0.0						0.0	
Total Delay		15.3			13.7						49.1	
LOS		B			B						D	
Approach Delay		15.3			13.7						49.1	
Approach LOS		B			B						D	
Stops (vph)		249			127						262	

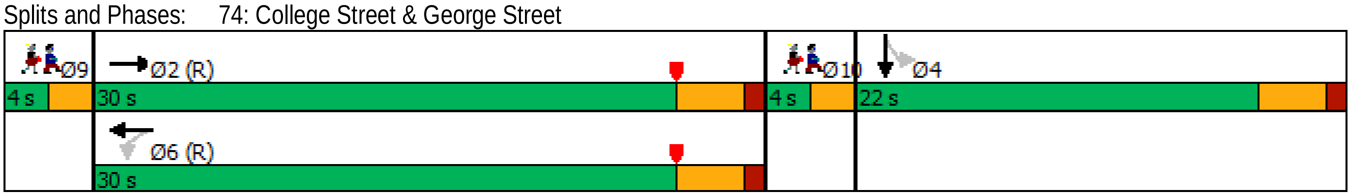
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Fuel Used(gal)		4			2						5	
CO Emissions (g/hr)		247			137						360	
NOx Emissions (g/hr)		48			27						70	
VOC Emissions (g/hr)		57			32						83	
Dilemma Vehicles (#)		0			0						0	
Queue Length 50th (ft)		101			33						129	
Queue Length 95th (ft)		211			112						#236	
Internal Link Dist (ft)		407			462			302			292	
Turn Bay Length (ft)												
Base Capacity (vph)		712			681						433	
Starvation Cap Reductn		0			0						0	
Spillback Cap Reductn		0			0						0	
Storage Cap Reductn		0			0						0	
Reduced v/c Ratio		0.55			0.32						0.88	

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 45 (75%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 27.9 Intersection LOS: C
Intersection Capacity Utilization 70.7% 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: 74: College Street & George Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	230	55	50	100	25	25	125	50	100	80	25
Future Volume (vph)	50	230	55	50	100	25	25	125	50	100	80	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		1
Taper Length (ft)	0			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98		0.98	0.98		0.95	0.98		0.96	0.98	
Frt		0.978			0.970			0.957			0.965	
Flt Protected		0.993		0.950			0.950			0.950		
Satd. Flow (prot)	0	1488	0	1540	1546	0	1540	1513	0	1342	1426	0
Flt Permitted		0.943		0.503			0.673			0.573		
Satd. Flow (perm)	0	1403	0	797	1546	0	1040	1513	0	776	1426	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		542			404			250			403	
Travel Time (s)		14.8			11.0			6.8			11.0	
Confl. Peds. (#/hr)	26		26	26		26	26		26	26		26
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.81	0.81	0.81	0.92	0.92	0.92	0.92	0.92	0.92	0.80	0.80	0.80
Heavy Vehicles (%)	2%	7%	8%	2%	2%	2%	2%	2%	2%	17%	12%	2%
Adj. Flow (vph)	62	284	68	54	109	27	27	136	54	125	100	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	414	0	54	136	0	27	190	0	125	131	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Total Split (s)	28.0	28.0		28.0	28.0		24.0	24.0		24.0	24.0	
Total Split (%)	46.7%	46.7%		46.7%	46.7%		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	
All-Red Time (s)	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-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		34.8		34.8	34.8		14.0	14.0		14.0	14.0	
Actuated g/C Ratio		0.58		0.58	0.58		0.23	0.23		0.23	0.23	
v/c Ratio		0.51		0.12	0.15		0.11	0.54		0.69	0.39	
Control Delay		9.2		10.2	9.3		16.6	24.7		39.7	21.4	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		9.2		10.2	9.3		16.6	24.7		39.7	21.4	
LOS		A		B	A		B	C		D	C	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		9.2			9.6			23.7			30.3	
Approach LOS		A			A			C			C	
Stops (vph)		168		30	64		21	143		88	82	
Fuel Used(gal)		3		0	1		0	2		1	1	
CO Emissions (g/hr)		197		27	64		17	142		104	79	
NOx Emissions (g/hr)		38		5	12		3	28		20	15	
VOC Emissions (g/hr)		46		6	15		4	33		24	18	
Dilemma Vehicles (#)		0		0	0		0	0		0	0	
Queue Length 50th (ft)		28		7	17		8	60		41	40	
Queue Length 95th (ft)		m101		33	64		22	99		70	62	
Internal Link Dist (ft)		462			324			170			323	
Turn Bay Length (ft)				150			75			75		
Base Capacity (vph)		813		462	896		346	504		258	475	
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		0.51		0.12	0.15		0.08	0.38		0.48	0.28	

Intersection Summary

Area Type: CBD

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

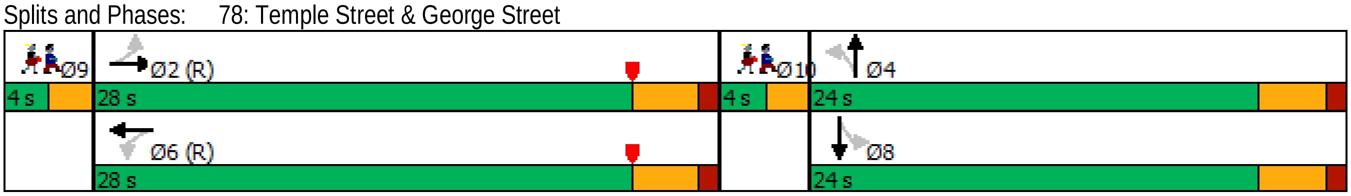
Intersection Signal Delay: 17.2 Intersection LOS: B

Intersection Capacity Utilization 63.3% ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 78: Temple Street & George Street



Lane Group	Ø9	Ø10
Approach Delay		
Approach LOS		
Stops (vph)		
Fuel Used(gal)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	0	25	50	155	60	120	495	0	0	150	50
Future Volume (vph)	25	0	25	50	155	60	120	495	0	0	150	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	50		0	75		0	0		0
Storage Lanes	0		0	1		0	1		0	0		0
Taper Length (ft)	0			15			15			0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.89		0.89	0.96						0.96	
Frt		0.932			0.958						0.966	
Flt Protected		0.976		0.950			0.950					
Satd. Flow (prot)	0	1363	0	1540	1172	0	1510	1301	0	0	1506	0
Flt Permitted		0.519		0.773			0.950					
Satd. Flow (perm)	0	701	0	1114	1172	0	1510	1301	0	0	1506	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		412			510			415			522	
Travel Time (s)		11.2			13.9			11.3			14.2	
Confl. Peds. (#/hr)	35		35	35		35			35			35
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.80	0.80	0.80	0.88	0.88	0.88	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	4%	26%	4%	8%	2%	2%	2%	2%
Parking (#/hr)					10			10				
Adj. Flow (vph)	27	0	27	63	194	75	136	563	0	0	163	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	54	0	63	269	0	136	563	0	0	217	0
Turn Type	Perm	NA		pm+pt	NA		Prot	NA			NA	
Protected Phases		6		5	2		7	4			8	
Permitted Phases	6			2								
Detector Phase	6	6		5	2		7	4			8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		3.0	7.0		3.0	7.0			7.0	
Minimum Split (s)	17.0	17.0		7.0	17.0		7.0	17.0			17.0	
Total Split (s)	29.0	29.0		10.0	39.0		13.0	40.0			27.0	
Total Split (%)	32.2%	32.2%		11.1%	43.3%		14.4%	44.4%			30.0%	
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	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	Lead	Lead		Lag			Lag				Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min			C-Min	
Act Effct Green (s)		12.9		25.9	25.9		16.4	50.9			30.5	
Actuated g/C Ratio		0.14		0.29	0.29		0.18	0.57			0.34	
v/c Ratio		0.54		0.17	0.80		0.50	0.77			0.43	
Control Delay		56.9		22.5	46.2		38.2	21.9			30.0	
Queue Delay		0.4		0.0	0.6		0.0	0.6			0.0	
Total Delay		57.2		22.5	46.8		38.2	22.5			30.0	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Parking (#/hr)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E		C	D		D	C			C	
Approach Delay		57.2			42.2			25.5			30.0	
Approach LOS		E			D			C			C	
Stops (vph)		49		33	190		95	358			142	
Fuel Used(gal)		1		1	4		2	5			3	
CO Emissions (g/hr)		66		40	258		120	373			186	
NOx Emissions (g/hr)		13		8	50		23	73			36	
VOC Emissions (g/hr)		15		9	60		28	86			43	
Dilemma Vehicles (#)		0		0	0		0	0			0	
Queue Length 50th (ft)		29		26	140		78	255			91	
Queue Length 95th (ft)		#70		43	171		m#151	#506			m159	
Internal Link Dist (ft)		332			430			335			442	
Turn Bay Length (ft)				50			75					
Base Capacity (vph)		194		373	455		274	735			510	
Starvation Cap Reductn		0		0	0		0	29			0	
Spillback Cap Reductn		22		0	37		0	4			0	
Storage Cap Reductn		0		0	0		0	0			0	
Reduced v/c Ratio		0.31		0.17	0.64		0.50	0.80			0.43	

Intersection Summary

Area Type: CBD

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 64 (71%), Referenced to phase 4:NBT and 8:SBT, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 31.9 Intersection LOS: C

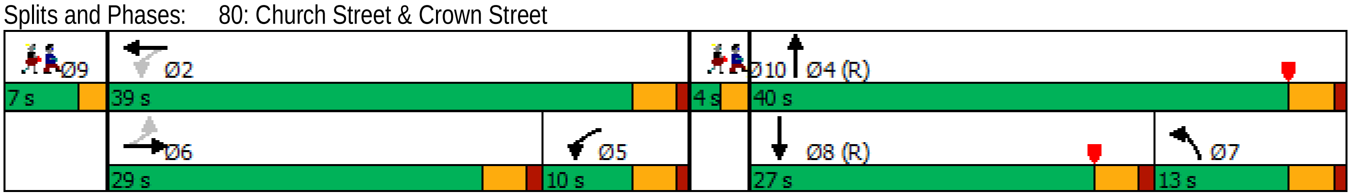
Intersection Capacity Utilization 62.2% ICU Level of Service B

Analysis Period (min) 15

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

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

Splits and Phases: 80: Church Street & Crown Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	45	65	55	50	80	75	330	60	50	150	50
Future Volume (vph)	205	45	65	55	50	80	75	330	60	50	150	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	0		0	75		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			0			15		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.95	0.97		0.97	0.94		0.95	0.98		0.96	0.97	
Frt		0.912			0.907			0.977			0.963	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1441	1210	0	1525	1344	0	1540	1501	0	1540	1520	0
Flt Permitted	0.483			0.606			0.950			0.950		
Satd. Flow (perm)	699	1210	0	939	1344	0	1461	1501	0	1482	1520	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		404			524			453			415	
Travel Time (s)		11.0			14.3			12.4			11.3	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.85	0.85	0.85	0.72	0.72	0.72	0.88	0.88	0.88	0.92	0.92	0.92
Heavy Vehicles (%)	9%	12%	26%	3%	2%	6%	2%	5%	11%	2%	2%	2%
Adj. Flow (vph)	241	53	76	76	69	111	85	375	68	54	163	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	241	129	0	76	180	0	85	443	0	54	217	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2								
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0		3.0	7.0		3.0	7.0	
Minimum Split (s)	7.0	17.0		7.0	17.0		7.0	17.0		7.0	17.0	
Total Split (s)	18.0	35.0		7.0	24.0		14.0	24.0		13.0	23.0	
Total Split (%)	20.0%	38.9%		7.8%	26.7%		15.6%	26.7%		14.4%	25.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lead		Lag	Lead		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	26.2	16.8		27.3	16.3		9.3	39.5		6.1	36.3	
Actuated g/C Ratio	0.29	0.19		0.30	0.18		0.10	0.44		0.07	0.40	
v/c Ratio	0.85	0.57		0.21	0.74		0.53	0.67		0.52	0.35	
Control Delay	54.7	43.6		20.4	52.6		50.5	33.7		53.7	15.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	1.5		0.0	0.0	
Total Delay	54.7	43.6		20.4	52.6		50.5	35.2		53.7	15.8	
LOS	D	D		C	D		D	D		D	B	

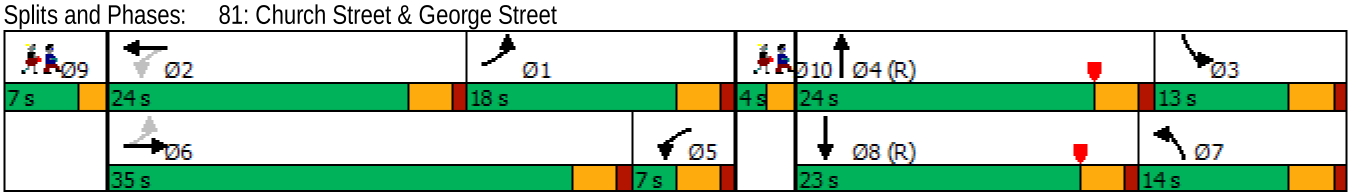
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		50.8			43.1			37.7			23.3	
Approach LOS		D			D			D			C	
Stops (vph)	192	98		35	120		71	239		52	117	
Fuel Used(gal)	4	2		1	2		1	5		1	2	
CO Emissions (g/hr)	260	121		43	170		93	356		64	126	
NOx Emissions (g/hr)	51	24		8	33		18	69		13	24	
VOC Emissions (g/hr)	60	28		10	39		22	83		15	29	
Dilemma Vehicles (#)	0	0		0	0		0	0		0	0	
Queue Length 50th (ft)	104	69		29	96		45	192		34	53	
Queue Length 95th (ft)	144	110		42	123		91	#475		73	97	
Internal Link Dist (ft)		324			444			373			335	
Turn Bay Length (ft)	150			150						75		
Base Capacity (vph)	349	416		356	298		185	658		154	613	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	88		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.69	0.31		0.21	0.60		0.46	0.78		0.35	0.35	

Intersection Summary

Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 69 (77%), Referenced to phase 4:NBT and 8:SBT, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 39.3 Intersection LOS: D
Intersection Capacity Utilization 63.1% 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: 81: Church Street & George Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	270	25	50	355	80	115	465	125	25	200	50
Future Volume (vph)	30	270	25	50	355	80	115	465	125	25	200	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			-3%			-6%			-2%	
Storage Length (ft)	50		0	0		0	75		0	0		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	25			0			25			25		
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
Ped Bike Factor	0.83	0.95			0.89			0.87			0.93	
Frt		0.987			0.975			0.968			0.976	
Flt Protected	0.950				0.995		0.950				0.995	
Satd. Flow (prot)	1547	1526	0	0	2558	0	1498	1354	0	0	1483	0
Flt Permitted	0.311				0.774		0.950				0.705	
Satd. Flow (perm)	422	1526	0	0	1990	0	1498	1354	0	0	1050	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		413			476			522			476	
Travel Time (s)		11.3			13.0			14.2			13.0	
Confl. Peds. (#/hr)	218		218	291		291			229	229		229
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.85	0.85	0.85	0.88	0.88	0.88	0.87	0.87	0.87	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	9%	4%	8%	6%	5%	2%	2%	2%
Adj. Flow (vph)	35	318	29	57	403	91	132	534	144	27	217	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	347	0	0	551	0	132	678	0	0	298	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		6			2		7	4			8	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2		7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		3.0	7.0		7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		7.0	17.0		17.0	17.0	
Total Split (s)	32.0	32.0		32.0	32.0		15.0	47.0		32.0	32.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		16.7%	52.2%		35.6%	35.6%	
Yellow Time (s)	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	
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-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)	26.9	26.9			26.9		11.0	49.9			34.9	
Actuated g/C Ratio	0.30	0.30			0.30		0.12	0.55			0.39	
v/c Ratio	0.28	0.76			0.93		0.72	0.90			0.73	
Control Delay	30.5	40.8			54.5		43.1	23.9			38.7	
Queue Delay	0.0	0.0			0.0		0.0	0.1			0.0	
Total Delay	30.5	40.8			54.5		43.1	23.9			38.7	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	D			D		D	C			D	
Approach Delay		39.9			54.5			27.0			38.7	
Approach LOS		D			D			C			D	
Stops (vph)	25	257			429		104	497			220	
Fuel Used(gal)	0	4			9		2	7			4	
CO Emissions (g/hr)	27	313			628		134	517			287	
NOx Emissions (g/hr)	5	61			122		26	101			56	
VOC Emissions (g/hr)	6	73			146		31	120			67	
Dilemma Vehicles (#)	0	0			0		0	0			0	
Queue Length 50th (ft)	15	175			155		78	399			155	
Queue Length 95th (ft)	40	256			#245		m83	m#417			#303	
Internal Link Dist (ft)		333			396			442			396	
Turn Bay Length (ft)	50						75					
Base Capacity (vph)	131	474			619		183	750			407	
Starvation Cap Reductn	0	0			0		0	1			0	
Spillback Cap Reductn	0	0			0		0	0			0	
Storage Cap Reductn	0	0			0		0	0			0	
Reduced v/c Ratio	0.27	0.73			0.89		0.72	0.91			0.73	

Intersection Summary

Area Type: CBD

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 4 (4%), Referenced to phase 4:NBT and 8:SBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 38.5 Intersection LOS: D

Intersection Capacity Utilization 89.8% ICU Level of Service E

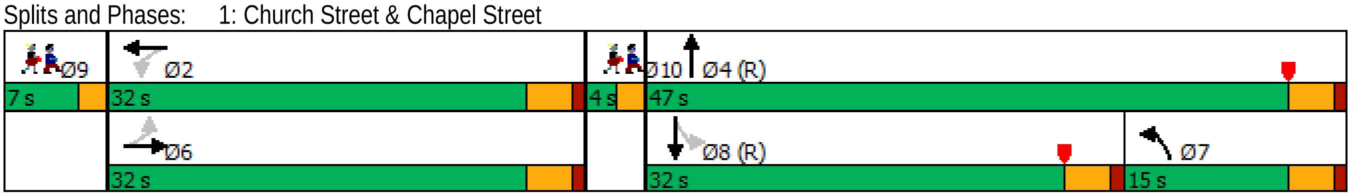
Analysis Period (min) 15

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: Church Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	225	25	20	320	80	0	0	0	90	210	95
Future Volume (vph)	40	225	25	20	320	80	0	0	0	90	210	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			5%			-8%			4%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.96		0.87	0.94						0.87	
Frt		0.988			0.970						0.968	
Flt Protected		0.993		0.950							0.989	
Satd. Flow (prot)	0	1610	0	1501	1383	0	0	0	0	0	1356	0
Flt Permitted		0.788		0.509							0.989	
Satd. Flow (perm)	0	1263	0	700	1383	0	0	0	0	0	1272	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		502			519			547			897	
Travel Time (s)		13.7			14.2			14.9			24.5	
Confl. Peds. (#/hr)	118		118	118		118				118		121
Confl. Bikes (#/hr)			10			10						10
Peak Hour Factor	0.92	0.92	0.92	0.80	0.80	0.80	0.25	0.25	0.25	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	2%	2%	7%	4%	2%	2%	0%	22%	2%	0%
Adj. Flow (vph)	43	245	27	25	400	100	0	0	0	102	239	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	315	0	25	500	0	0	0	0	0	449	0
Turn Type	Perm	NA		Perm	NA					Perm	NA	
Protected Phases		6			2						8	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2					8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0					7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0					17.0	17.0	
Total Split (s)	26.0	26.0		26.0	26.0					26.0	26.0	
Total Split (%)	43.3%	43.3%		43.3%	43.3%					43.3%	43.3%	
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	
Total Lost Time (s)		4.0		4.0	4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min					None	None	
Act Effct Green (s)		23.6		23.6	23.6						22.0	
Actuated g/C Ratio		0.39		0.39	0.39						0.37	
v/c Ratio		0.63		0.09	0.92						0.96	
Control Delay		23.2		13.7	45.6						56.4	
Queue Delay		0.0		0.0	0.0						0.0	
Total Delay		23.2		13.7	45.6						56.4	
LOS		C		B	D						E	
Approach Delay		23.2			44.0						56.4	
Approach LOS		C			D						E	

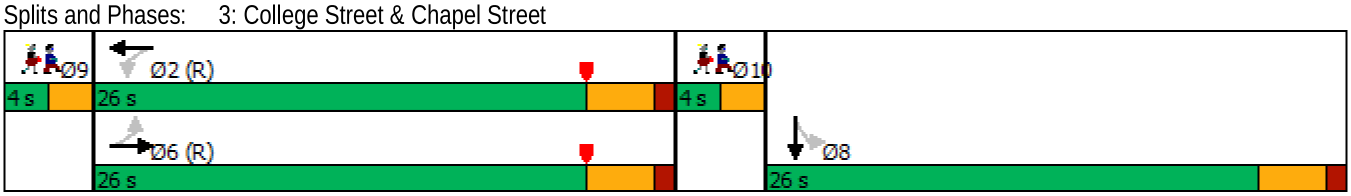
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		230		16	310						315	
Fuel Used(gal)		3		0	7						9	
CO Emissions (g/hr)		244		14	466						613	
NOx Emissions (g/hr)		48		3	91						119	
VOC Emissions (g/hr)		57		3	108						142	
Dilemma Vehicles (#)		0		0	0						0	
Queue Length 50th (ft)		93		6	174						154	
Queue Length 95th (ft)		#199		18	#292						#311	
Internal Link Dist (ft)		422			439			467			817	
Turn Bay Length (ft)												
Base Capacity (vph)		497		275	544						466	
Starvation Cap Reductn		0		0	0						0	
Spillback Cap Reductn		0		0	0						0	
Storage Cap Reductn		0		0	0						0	
Reduced v/c Ratio		0.63		0.09	0.92						0.96	

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 43.3 Intersection LOS: D
Intersection Capacity Utilization 79.1% 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: 3: College Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	300	25	25	340	260	185	390	50	0	0	0
Future Volume (vph)	100	300	25	25	340	260	185	390	50	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-5%			-4%			-10%			5%	
Storage Length (ft)	50		0	50		100	125		0	0		0
Storage Lanes	0		0	0		1	1		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	0.95	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor		0.97			0.99	0.75		0.91				
Frt		0.992				0.850		0.988				
Flt Protected		0.988			0.997			0.985				
Satd. Flow (prot)	0	1603	0	0	1618	1419	0	3016	0	0	0	0
Flt Permitted		0.723			0.955			0.985				
Satd. Flow (perm)	0	1155	0	0	1534	1071	0	2802	0	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		413			498			404			482	
Travel Time (s)		11.3			13.6			11.0			13.1	
Confl. Peds. (#/hr)	112		112	183		183	112		112			
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.87	0.87	0.87	0.87	0.87	0.87	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	4%	1%	5%	4%	2%	2%	2%	2%
Adj. Flow (vph)	109	326	27	29	391	299	213	448	57	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	462	0	0	420	299	0	718	0	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm	Split	NA				
Protected Phases		6			2		4	4				
Permitted Phases	6			2		2						
Detector Phase	6	6		2	2	2	4	4				
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0				
Minimum Split (s)	18.0	18.0		18.0	18.0	18.0	18.0	18.0				
Total Split (s)	34.0	34.0		34.0	34.0	34.0	18.0	18.0				
Total Split (%)	56.7%	56.7%		56.7%	56.7%	56.7%	30.0%	30.0%				
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	1.0	1.0	1.0	1.0				
Lost Time Adjust (s)		0.0			0.0	0.0		0.0				
Total Lost Time (s)		4.0			4.0	4.0		4.0				
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min				
Act Effct Green (s)		25.7			25.7	25.7		23.1				
Actuated g/C Ratio		0.43			0.43	0.43		0.38				
v/c Ratio		0.93			0.64	0.65		0.62				
Control Delay		44.2			17.6	20.1		23.6				
Queue Delay		0.0			0.0	0.0		0.0				
Total Delay		44.2			17.6	20.1		23.6				

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D			B	C		C				
Approach Delay		44.2			18.6			23.6				
Approach LOS		D			B			C				
Stops (vph)		356			262	192		418				
Fuel Used(gal)		7			4	3		7				
CO Emissions (g/hr)		467			270	203		472				
NOx Emissions (g/hr)		91			53	39		92				
VOC Emissions (g/hr)		108			63	47		109				
Dilemma Vehicles (#)		0			0	0		0				
Queue Length 50th (ft)		143			107	77		101				
Queue Length 95th (ft)		#291			161	131		#233				
Internal Link Dist (ft)		333			418			324			402	
Turn Bay Length (ft)						100						
Base Capacity (vph)		577			767	535		1159				
Starvation Cap Reductn		0			0	0		0				
Spillback Cap Reductn		0			0	0		0				
Storage Cap Reductn		0			0	0		0				
Reduced v/c Ratio		0.80			0.55	0.56		0.62				

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 50 (83%), Referenced to phase 4:NBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 26.7 Intersection LOS: C
Intersection Capacity Utilization 81.4% 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: 11: Church Street/Whitney Avenue & Grove Street

Lane Group	Ø9	Ø10
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		
Fuel Used(gal)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	80	350	0	0	0	0	25	220	65
Future Volume (vph)	0	0	0	80	350	0	0	0	0	25	220	65
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
Ped Bike Factor												
Frt											0.972	
Flt Protected					0.991						0.996	
Satd. Flow (prot)	0	0	0	0	1774	0	0	0	0	0	1759	0
Flt Permitted					0.991						0.996	
Satd. Flow (perm)	0	0	0	0	1774	0	0	0	0	0	1759	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		552			511			389			432	
Travel Time (s)		15.1			13.9			10.6			11.8	
Confl. Peds. (#/hr)				72						18		18
Confl. Bikes (#/hr)						10						10
Peak Hour Factor	0.92	0.92	0.92	0.72	0.72	0.72	0.92	0.92	0.92	0.71	0.71	0.71
Heavy Vehicles (%)	2%	0%	2%	1%	3%	50%	2%	0%	0%	2%	1%	1%
Adj. Flow (vph)	0	0	0	111	486	0	0	0	0	35	310	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	597	0	0	0	0	0	437	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 46.8%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	26.9
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	80	350	0	0	0	0	25	220	65
Future Vol, veh/h	0	0	0	80	350	0	0	0	0	25	220	65
Peak Hour Factor	0.92	0.92	0.92	0.72	0.72	0.72	0.92	0.92	0.92	0.71	0.71	0.71
Heavy Vehicles, %	2	0	2	1	3	50	2	0	0	2	1	1
Mvmt Flow	0	0	0	111	486	0	0	0	0	35	310	92
Number of Lanes	0	0	0	0	1	0	0	0	0	0	1	0

Approach	WB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left		WB
Conflicting Lanes Left	0	1
Conflicting Approach Right	SB	
Conflicting Lanes Right	1	0
HCM Control Delay	32.8	18.8
HCM LOS	D	C

Lane	WBLn1	SBLn1
Vol Left, %	19%	8%
Vol Thru, %	81%	71%
Vol Right, %	0%	21%
Sign Control	Stop	Stop
Traffic Vol by Lane	430	310
LT Vol	80	25
Through Vol	350	220
RT Vol	0	65
Lane Flow Rate	597	437
Geometry Grp	1	1
Degree of Util (X)	0.868	0.666
Departure Headway (Hd)	5.232	5.49
Convergence, Y/N	Yes	Yes
Cap	693	659
Service Time	3.264	3.529
HCM Lane V/C Ratio	0.861	0.663
HCM Control Delay	32.8	18.8
HCM Lane LOS	D	C
HCM 95th-tile Q	10.3	5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	400	25	25	400	80	25	155	25	50	100	20
Future Volume (vph)	25	400	25	25	400	80	25	155	25	50	100	20
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
Ped Bike Factor		0.98			0.98			0.95			0.97	
Frt		0.993			0.979			0.984			0.984	
Flt Protected		0.997			0.998			0.994			0.986	
Satd. Flow (prot)	0	1758	0	0	1745	0	0	1732	0	0	1727	0
Flt Permitted		0.962			0.969			0.951			0.802	
Satd. Flow (perm)	0	1694	0	0	1688	0	0	1630	0	0	1384	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		685			397			298			207	
Travel Time (s)		18.7			10.8			8.1			5.6	
Confl. Peds. (#/hr)	39		101	101		39	101		101	39		39
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.86	0.86	0.71	0.71	0.71
Heavy Vehicles (%)	2%	2%	2%	0%	1%	1%	2%	0%	2%	2%	2%	0%
Adj. Flow (vph)	27	435	27	27	435	87	29	180	29	70	141	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	489	0	0	549	0	0	238	0	0	239	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Total Split (s)	30.0	30.0		30.0	30.0		22.0	22.0		22.0	22.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		36.7%	36.7%		36.7%	36.7%	
Yellow Time (s)	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	
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												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		34.6			34.6			14.2			14.2	
Actuated g/C Ratio		0.58			0.58			0.24			0.24	
v/c Ratio		0.50			0.56			0.62			0.73	
Control Delay		12.1			13.8			27.2			34.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		12.1			13.8			27.2			34.3	
LOS		B			B			C			C	
Approach Delay		12.1			13.8			27.2			34.3	
Approach LOS		B			B			C			C	
Stops (vph)		281			320			171			149	

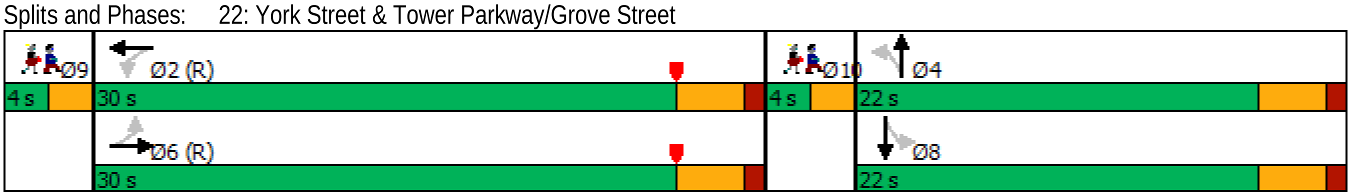
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Fuel Used(gal)		6			7			3			2	
CO Emissions (g/hr)		401			472			224			144	
NOx Emissions (g/hr)		78			92			44			28	
VOC Emissions (g/hr)		93			109			52			33	
Dilemma Vehicles (#)		0			0			0			0	
Queue Length 50th (ft)		80			94			76			79	
Queue Length 95th (ft)		229			#309			121			100	
Internal Link Dist (ft)		605			317			218			127	
Turn Bay Length (ft)												
Base Capacity (vph)		978			974			489			415	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.50			0.56			0.49			0.58	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 18.6 Intersection LOS: B
Intersection Capacity Utilization 59.8% 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: 22: York Street & Tower Parkway/Grove Street



Lane Group	EBL	EBT	EBR	WBT	WBR	NBL2	NBT	NBR	SBL	SBT	SBR	SEL
Lane Configurations												
Traffic Volume (vph)	50	505	25	260	25	240	130	225	25	100	25	30
Future Volume (vph)	50	505	25	260	25	240	130	225	25	100	25	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0		0			0	0		0	0
Storage Lanes	1		0		1			0	0		0	1
Taper Length (ft)	0								0			0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98					0.79			0.87		
Frt		0.993			0.850		0.905			0.978		
Flt Protected	0.950					0.950				0.992		0.950
Satd. Flow (prot)	1586	1683	0	1801	892	1616	1262	0	0	1557	0	997
Flt Permitted	0.950					0.575				0.592		0.950
Satd. Flow (perm)	1586	1683	0	1801	892	978	1262	0	0	904	0	997
Right Turn on Red			No					No				
Satd. Flow (RTOR)												
Link Speed (mph)		25		25			25			25		25
Link Distance (ft)		309		401			898			511		228
Travel Time (s)		8.4		10.9			24.5			13.9		6.2
Confl. Peds. (#/hr)			282					165	165		376	
Confl. Bikes (#/hr)			15		15			15			15	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90	0.92	0.92	0.92	0.94
Heavy Vehicles (%)	10%	6%	2%	2%	75%	8%	2%	6%	2%	2%	2%	75%
Adj. Flow (vph)	54	549	27	283	27	267	144	250	27	109	27	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	576	0	283	27	267	394	0	0	163	0	32
Turn Type	Prot	NA		NA	Over	D.P+P	NA		Perm	NA		Prot
Protected Phases	1	1 2		2	9	3	3 4			4		9
Permitted Phases						4			4			
Detector Phase	1	1 2		2	9	3	3 4		4	4		9
Switch Phase												
Minimum Initial (s)	4.0			12.0	2.0	4.0			12.0	12.0		2.0
Minimum Split (s)	10.0			18.0	10.0	10.0			19.0	19.0		10.0
Total Split (s)	12.0			25.0	13.0	11.0			25.0	25.0		13.0
Total Split (%)	13.3%			27.8%	14.4%	12.2%			27.8%	27.8%		14.4%
Yellow Time (s)	4.0			4.0	4.0	4.0			4.0	4.0		4.0
All-Red Time (s)	2.0			1.0	2.0	2.0			1.0	1.0		2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0				0.0		0.0
Total Lost Time (s)	6.0			5.0	6.0	6.0				5.0		6.0
Lead/Lag	Lag			Lead		Lag			Lead	Lead		
Lead-Lag Optimize?												
Recall Mode	None			C-Min	None	None			None	None		None
Act Effct Green (s)	6.0	35.3		24.3	6.6	24.0	30.0			20.0		6.6
Actuated g/C Ratio	0.07	0.39		0.27	0.07	0.27	0.33			0.22		0.07
v/c Ratio	0.51	0.87		0.58	0.42	0.90	0.94			0.81		0.44
Control Delay	58.7	44.0		36.4	58.8	63.5	62.1			65.2		58.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0			0.0		0.0
Total Delay	58.7	44.0		36.4	58.8	63.5	62.1			65.2		58.8
LOS	E	D		D	E	E	E			E		E

Lane Group	Ø10
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike 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)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	10
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	2.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	4%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL2	NBT	NBR	SBL	SBT	SBR	SEL
Approach Delay		45.3		38.3			62.7			65.2		58.8
Approach LOS		D		D			E			E		E
Stops (vph)	47	421		224	26	194	298			127		31
Fuel Used(gal)	1	8		4	0	6	8			4		1
CO Emissions (g/hr)	64	543		257	34	397	584			245		52
NOx Emissions (g/hr)	12	106		50	7	77	114			48		10
VOC Emissions (g/hr)	15	126		59	8	92	135			57		12
Dilemma Vehicles (#)	0	0		0	0	0	0			0		0
Queue Length 50th (ft)	30	322		149	15	120	215			88		18
Queue Length 95th (ft)	#77	#542		#253	#46	#238	#395			#198		#52
Internal Link Dist (ft)		229		321			818			431		148
Turn Bay Length (ft)						150						
Base Capacity (vph)	105	659		486	69	296	420			200		77
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	0.51	0.87		0.58	0.39	0.90	0.94			0.81		0.42

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 5 (6%), Referenced to phase 2:EBWB, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

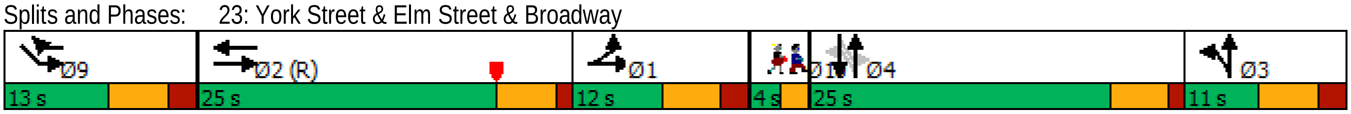
Intersection Signal Delay: 52.5 Intersection LOS: D

Intersection Capacity Utilization 88.0% 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: 23: York Street & Elm Street & Broadway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	25	25	25	300	115	130	560	75	25	100	50
Future Volume (vph)	25	25	25	25	300	115	130	560	75	25	100	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	11	11	10	11	11
Storage Length (ft)	50		0	50		0	50		0	50		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.94		0.88	0.95		0.89	0.98			0.95	
Frt		0.955			0.958			0.982			0.950	
Flt Protected		0.984		0.950			0.950			0.950		
Satd. Flow (prot)	0	1598	0	1711	1610	0	1668	1749	0	1652	1618	0
Flt Permitted		0.577		0.786			0.654			0.148		
Satd. Flow (perm)	0	937	0	1243	1610	0	1021	1749	0	257	1618	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		511			419			515			898	
Travel Time (s)		13.9			11.4			14.0			24.5	
Confl. Peds. (#/hr)	60		60	60		60	60		60	60		60
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.75	0.75	0.75	0.80	0.80	0.80	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	10%	1%	1%	2%	2%	2%	2%
Adj. Flow (vph)	27	27	27	33	400	153	163	700	94	27	109	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	81	0	33	553	0	163	794	0	27	163	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Total Split (s)	21.0	21.0		21.0	21.0		31.0	31.0		31.0	31.0	
Total Split (%)	35.0%	35.0%		35.0%	35.0%		51.7%	51.7%		51.7%	51.7%	
Yellow Time (s)	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	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		21.8		21.8	21.8		27.0	27.0		27.0	27.0	
Actuated g/C Ratio		0.36		0.36	0.36		0.45	0.45		0.45	0.45	
v/c Ratio		0.24		0.07	0.95		0.36	1.01		0.23	0.22	
Control Delay		17.7		15.4	51.5		13.6	54.4		16.6	11.2	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		17.7		15.4	51.5		13.6	54.4		16.6	11.2	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B		B	D		B	D		B	B	
Approach Delay		17.7			49.4			47.4			11.9	
Approach LOS		B			D			D			B	
Stops (vph)		56		20	288		82	508		19	87	
Fuel Used(gal)		1		0	7		1	12		0	2	
CO Emissions (g/hr)		57		17	485		87	822		24	127	
NOx Emissions (g/hr)		11		3	94		17	160		5	25	
VOC Emissions (g/hr)		13		4	112		20	191		6	30	
Dilemma Vehicles (#)		0		0	0		0	0		0	0	
Queue Length 50th (ft)		18		7	170		36	~278		6	34	
Queue Length 95th (ft)		56		22	#321		66	#411		23	67	
Internal Link Dist (ft)		431			339			435			818	
Turn Bay Length (ft)				50			50			50		
Base Capacity (vph)		340		451	584		459	787		115	728	
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		0.24		0.07	0.95		0.36	1.01		0.23	0.22	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 43.0 Intersection LOS: D

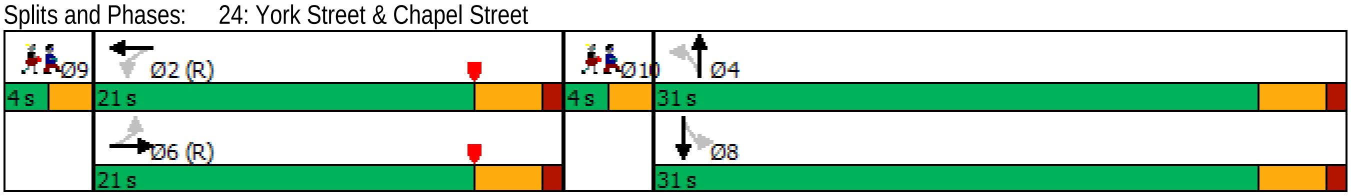
Intersection Capacity Utilization 77.9% ICU Level of Service D

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.

Splits and Phases: 24: York Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	25	215	115	35	450	0	0	140	10
Future Volume (vph)	0	0	0	25	215	115	35	450	0	0	140	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
Ped Bike Factor												
Frt					0.956						0.991	
Flt Protected					0.996			0.996				
Satd. Flow (prot)	0	0	0	0	1730	0	0	1793	0	0	1784	0
Flt Permitted					0.996			0.996				
Satd. Flow (perm)	0	0	0	0	1730	0	0	1793	0	0	1784	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		502			419			405			515	
Travel Time (s)		13.7			11.4			11.0			14.0	
Confl. Peds. (#/hr)				17		17	74					74
Confl. Bikes (#/hr)						10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.86	0.86	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	32	276	147	41	523	0	0	152	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	455	0	0	564	0	0	163	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 68.8% ICU Level of Service C

Analysis Period (min) 15

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	405	25	50	0	50	0	385	150	25	140	0
Future Volume (vph)	165	405	25	50	0	50	0	385	150	25	140	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		100	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	0			0			0			0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.94	0.99			0.94				0.86		0.99	
Frt		0.991			0.932				0.850			
Flt Protected	0.950				0.976						0.993	
Satd. Flow (prot)	1662	1792	0	0	1551	0	0	1818	1516	0	1788	0
Flt Permitted	0.687				0.726						0.828	
Satd. Flow (perm)	1127	1792	0	0	1142	0	0	1818	1309	0	1481	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		504			403			370			405	
Travel Time (s)		13.7			11.0			10.1			11.0	
Confl. Peds. (#/hr)	33		33	33		33	48		48	48		48
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.86	0.86	0.86	0.92	0.92	0.92	0.87	0.87	0.87	0.92	0.92	0.92
Heavy Vehicles (%)	5%	1%	0%	2%	2%	2%	2%	1%	3%	2%	2%	2%
Adj. Flow (vph)	192	471	29	54	0	54	0	443	172	27	152	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	192	500	0	0	108	0	0	443	172	0	179	0
Turn Type	Perm	NA		Perm	NA			NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6					4	8		
Detector Phase	2	2		6	6			4	4	8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0	7.0	7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0			17.0	17.0	17.0	17.0	
Total Split (s)	22.0	22.0		22.0	22.0			30.0	30.0	30.0	30.0	
Total Split (%)	36.7%	36.7%		36.7%	36.7%			50.0%	50.0%	50.0%	50.0%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0			4.0			4.0	4.0		4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min			None	None	None	None	
Act Effct Green (s)	31.1	31.1			31.1			19.3	19.3		19.3	
Actuated g/C Ratio	0.52	0.52			0.52			0.32	0.32		0.32	
v/c Ratio	0.33	0.54			0.18			0.76	0.41		0.38	
Control Delay	13.7	17.1			6.1			26.4	17.5		16.7	
Queue Delay	0.0	0.0			0.0			0.1	0.0		0.0	
Total Delay	13.7	17.1			6.1			26.5	17.5		16.7	
LOS	B	B			A			C	B		B	

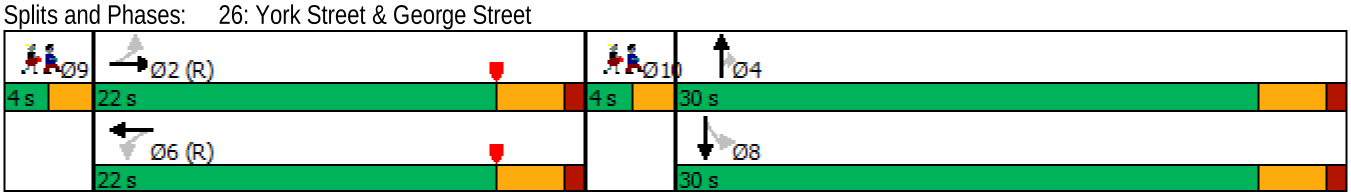
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		16.2			6.1			24.0			16.7	
Approach LOS		B			A			C			B	
Stops (vph)	106	256			35			321	106		115	
Fuel Used(gal)	2	4			1			5	1		2	
CO Emissions (g/hr)	110	303			42			315	99		110	
NOx Emissions (g/hr)	21	59			8			61	19		21	
VOC Emissions (g/hr)	26	70			10			73	23		25	
Dilemma Vehicles (#)	0	0			0			0	0		0	
Queue Length 50th (ft)	34	103			8			141	48		49	
Queue Length 95th (ft)	110	#315			m30			183	75		78	
Internal Link Dist (ft)		424			323			290			325	
Turn Bay Length (ft)									100			
Base Capacity (vph)	583	928			591			787	567		641	
Starvation Cap Reductn	0	0			0			26	0		0	
Spillback Cap Reductn	0	0			0			0	0		0	
Storage Cap Reductn	0	0			0			0	0		0	
Reduced v/c Ratio	0.33	0.54			0.18			0.58	0.30		0.28	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 9 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 18.6 Intersection LOS: B
Intersection Capacity Utilization 72.5% 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: 26: York Street & George Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	125	0	0	415	0	140
Future Volume (vph)	125	0	0	415	0	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	1801	0	0	1717	1589	0
Flt Permitted						
Satd. Flow (perm)	1801	0	0	1717	1589	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	419			502	522	
Travel Time (s)	11.4			13.7	14.2	
Confl. Peds. (#/hr)					173	173
Confl. Bikes (#/hr)		15				15
Peak Hour Factor	0.92	0.92	0.89	0.89	0.62	0.62
Heavy Vehicles (%)	2%	2%	0%	7%	1%	0%
Adj. Flow (vph)	136	0	0	466	0	226
Shared Lane Traffic (%)						
Lane Group Flow (vph)	136	0	0	466	226	0
Sign Control	Stop			Stop	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 44.6% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	Y	
Traffic Vol, veh/h	125	0	0	415	0	140
Future Vol, veh/h	125	0	0	415	0	140
Peak Hour Factor	0.92	0.92	0.89	0.89	0.62	0.62
Heavy Vehicles, %	2	2	0	7	1	0
Mvmt Flow	136	0	0	466	0	226
Number of Lanes	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.3	15	9.8
HCM LOS	A	B	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	0%	0%	0%
Vol Thru, %	0%	100%	100%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	140	125	415
LT Vol	0	0	0
Through Vol	0	125	415
RT Vol	140	0	0
Lane Flow Rate	226	136	466
Geometry Grp	1	1	1
Degree of Util (X)	0.297	0.19	0.612
Departure Headway (Hd)	4.731	5.024	4.723
Convergence, Y/N	Yes	Yes	Yes
Cap	754	707	760
Service Time	2.797	3.107	2.788
HCM Lane V/C Ratio	0.3	0.192	0.613
HCM Control Delay	9.8	9.3	15
HCM Lane LOS	A	A	B
HCM 95th-tile Q	1.2	0.7	4.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	460	5	5	200	25	25	10	50	50	10	25
Future Volume (vph)	90	460	5	5	200	25	25	10	50	50	10	25
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
Ped Bike Factor												
Frt		0.999			0.985			0.921			0.960	
Flt Protected		0.992			0.999			0.986			0.971	
Satd. Flow (prot)	0	1787	0	0	1772	0	0	1635	0	0	1678	0
Flt Permitted		0.992			0.999			0.986			0.971	
Satd. Flow (perm)	0	1787	0	0	1772	0	0	1635	0	0	1678	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		403			487			120			398	
Travel Time (s)		11.0			13.3			3.3			10.9	
Confl. Peds. (#/hr)	25		64	64		25	14		14	14		14
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.81	0.81	0.81	0.95	0.88	0.88	0.64	0.64	0.64	0.76	0.76	0.76
Heavy Vehicles (%)	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	111	568	6	5	227	28	39	16	78	66	13	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	685	0	0	260	0	0	133	0	0	112	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 63.5%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	11

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	460	5	5	200	25	25	10	50	50	10	25
Future Vol, veh/h	90	460	5	5	200	25	25	10	50	50	10	25
Conflicting Peds, #/hr	25	0	64	64	0	25	14	0	14	14	0	14
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	95	88	88	64	64	64	76	76	76
Heavy Vehicles, %	1	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	111	568	6	5	227	28	39	16	78	66	13	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	280	0	0	638	0	0	1145	1147	649	1130	1136	280
Stage 1	-	-	-	-	-	-	857	857	-	276	276	-
Stage 2	-	-	-	-	-	-	288	290	-	854	860	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1288	-	-	946	-	-	177	199	470	181	202	759
Stage 1	-	-	-	-	-	-	352	374	-	730	682	-
Stage 2	-	-	-	-	-	-	720	672	-	353	373	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1263	-	-	900	-	-	134	161	442	120	163	737
Mov Cap-2 Maneuver	-	-	-	-	-	-	134	161	-	120	163	-
Stage 1	-	-	-	-	-	-	291	310	-	623	665	-
Stage 2	-	-	-	-	-	-	663	655	-	238	309	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0.2	38.5	62.7
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	235	1263	-	-	900	-	-	166
HCM Lane V/C Ratio	0.565	0.088	-	-	0.006	-	-	0.674
HCM Control Delay (s)	38.5	8.1	0	-	9	0	-	62.7
HCM Lane LOS	E	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	3.1	0.3	-	-	0	-	-	3.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	150	1020	275	70	260	0	0	190	25
Future Volume (vph)	0	0	0	150	1020	275	70	260	0	0	190	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99						1.00	
Frt					0.971						0.984	
Flt Protected					0.995			0.990				
Satd. Flow (prot)	0	0	0	0	4695	0	0	1716	0	0	1771	0
Flt Permitted					0.995			0.711				
Satd. Flow (perm)	0	0	0	0	4695	0	0	1233	0	0	1771	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		495			928			252			370	
Travel Time (s)		13.5			25.3			6.9			10.1	
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.98	0.98	0.98	0.86	0.86	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	1%	2%	7%	2%	2%	2%	0%
Adj. Flow (vph)	0	0	0	153	1041	281	81	302	0	0	207	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1475	0	0	383	0	0	234	0
Turn Type				Perm	NA		D.P+P	NA			NA	
Protected Phases					6		7	7 8			8	
Permitted Phases				6			8					
Detector Phase				6	6		7 8	7 8			8	
Switch Phase												
Minimum Initial (s)				12.0	12.0		7.0				12.0	
Minimum Split (s)				18.0	18.0		10.0				16.0	
Total Split (s)				30.0	30.0		16.0				20.0	
Total Split (%)				33.3%	33.3%		17.8%				22.2%	
Yellow Time (s)				4.0	4.0		3.0				3.0	
All-Red Time (s)				2.0	2.0		0.0				1.0	
Lost Time Adjust (s)					0.0						0.0	
Total Lost Time (s)					6.0						4.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes					
Recall Mode				C-Max	C-Max		None				None	
Act Effct Green (s)					30.5			28.3			14.3	
Actuated g/C Ratio					0.34			0.31			0.16	
v/c Ratio					0.93			0.84			0.83	
Control Delay					43.7			43.4			61.5	
Queue Delay					0.0			0.3			0.0	
Total Delay					43.7			43.6			61.5	
LOS					D			D			E	
Approach Delay					43.7			43.6			61.5	
Approach LOS					D			D			E	
Stops (vph)					1086			282			197	
Fuel Used(gal)					28			5			4	

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike 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)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
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)	24.0
Total Split (s)	24.0
Total Split (%)	27%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Stops (vph)	
Fuel Used(gal)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
CO Emissions (g/hr)					1990			328			288	
NOx Emissions (g/hr)					387			64			56	
VOC Emissions (g/hr)					461			76			67	
Dilemma Vehicles (#)					0			0			0	
Queue Length 50th (ft)					~361			178			129	
Queue Length 95th (ft)					#464			#273			#235	
Internal Link Dist (ft)		415			848			172			290	
Turn Bay Length (ft)												
Base Capacity (vph)					1590			480			314	
Starvation Cap Reductn					0			5			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.93			0.81			0.75	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 16 (18%), Referenced to phase 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 45.7 Intersection LOS: D
Intersection Capacity Utilization 69.6% ICU Level of Service C
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: 71: York Street & North Frontage Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	450	110	75	200	0	0	0	0	95	245	25
Future Volume (vph)	0	450	110	75	200	0	0	0	0	95	245	25
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
Ped Bike Factor		0.98									0.96	
Frt		0.973									0.991	
Flt Protected					0.986						0.987	
Satd. Flow (prot)	0	1519	0	0	1598	0	0	0	0	0	1484	0
Flt Permitted					0.564						0.987	
Satd. Flow (perm)	0	1519	0	0	914	0	0	0	0	0	1435	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		487			542			382			372	
Travel Time (s)		13.3			14.8			10.4			10.1	
Confl. Peds. (#/hr)	60		60	60		60	60		60	60		60
Confl. Bikes (#/hr)			10			10						10
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.92	0.92	0.92	0.94	0.94	0.94
Heavy Vehicles (%)	2%	4%	4%	2%	2%	2%	2%	2%	2%	6%	9%	2%
Adj. Flow (vph)	0	511	125	82	217	0	0	0	0	101	261	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	636	0	0	299	0	0	0	0	0	389	0
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Detector Phase		2		6	6					4	4	
Switch Phase												
Minimum Initial (s)		7.0		7.0	7.0					7.0	7.0	
Minimum Split (s)		18.0		18.0	18.0					18.0	18.0	
Total Split (s)		30.0		30.0	30.0					22.0	22.0	
Total Split (%)		50.0%		50.0%	50.0%					36.7%	36.7%	
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)		0.0			0.0						0.0	
Total Lost Time (s)		4.0			4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min		C-Min	C-Min					None	None	
Act Effct Green (s)		29.5			29.5						17.7	
Actuated g/C Ratio		0.49			0.49						0.30	
v/c Ratio		0.85			0.67						0.92	
Control Delay		28.2			27.8						51.9	
Queue Delay		0.0			0.0						0.0	
Total Delay		28.2			27.8						51.9	
LOS		C			C						D	
Approach Delay		28.2			27.8						51.9	
Approach LOS		C			C						D	
Stops (vph)		394			211						300	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Fuel Used(gal)		7			4						6	
CO Emissions (g/hr)		493			254						432	
NOx Emissions (g/hr)		96			49						84	
VOC Emissions (g/hr)		114			59						100	
Dilemma Vehicles (#)		0			0						0	
Queue Length 50th (ft)		200			92						134	
Queue Length 95th (ft)		#401			#223						#281	
Internal Link Dist (ft)		407			462			302			292	
Turn Bay Length (ft)												
Base Capacity (vph)		747			449						430	
Starvation Cap Reductn		0			0						0	
Spillback Cap Reductn		0			0						0	
Storage Cap Reductn		0			0						0	
Reduced v/c Ratio		0.85			0.67						0.90	

Intersection Summary

Area Type: CBD

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 45 (75%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

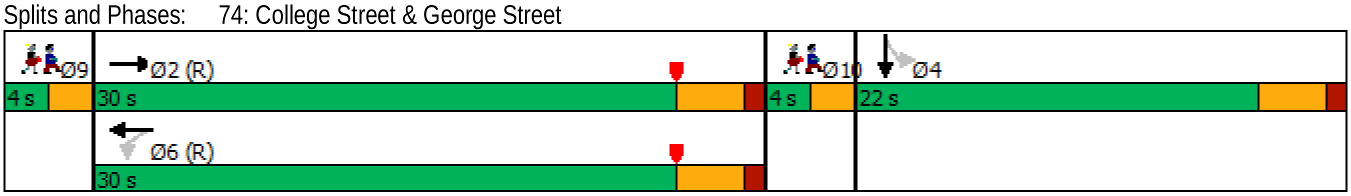
Intersection Signal Delay: 35.1 Intersection LOS: D

Intersection Capacity Utilization 89.8% 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: 74: College Street & George Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	385	155	50	200	25	50	125	50	170	100	25
Future Volume (vph)	100	385	155	50	200	25	50	125	50	170	100	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		1
Taper Length (ft)	0			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.97			0.99		0.95	0.98		0.96	0.98	
Frt		0.967			0.983			0.957			0.970	
Flt Protected		0.992		0.950			0.950			0.950		
Satd. Flow (prot)	0	1531	0	1540	1578	0	1540	1513	0	1510	1510	0
Flt Permitted		0.906		0.324			0.665			0.593		
Satd. Flow (perm)	0	1390	0	525	1578	0	1029	1513	0	903	1510	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		542			404			250			403	
Travel Time (s)		14.8			11.0			6.8			11.0	
Confl. Peds. (#/hr)	26		26	26		26	26		26	26		26
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.85	0.85	0.85	0.92	0.92	0.92	0.92	0.92	0.92	0.87	0.87	0.87
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	2%	2%	2%	4%	5%	2%
Adj. Flow (vph)	118	453	182	54	217	27	54	136	54	195	115	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	753	0	54	244	0	54	190	0	195	144	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Total Split (s)	28.0	28.0		28.0	28.0		24.0	24.0		24.0	24.0	
Total Split (%)	46.7%	46.7%		46.7%	46.7%		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	
All-Red Time (s)	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-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		32.5		32.5	32.5		16.3	16.3		16.3	16.3	
Actuated g/C Ratio		0.54		0.54	0.54		0.27	0.27		0.27	0.27	
v/c Ratio		1.00		0.19	0.29		0.19	0.46		0.80	0.35	
Control Delay		44.1		13.0	11.1		16.8	21.0		44.0	18.8	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		44.1		13.0	11.1		16.8	21.0		44.0	18.8	
LOS		D		B	B		B	C		D	B	

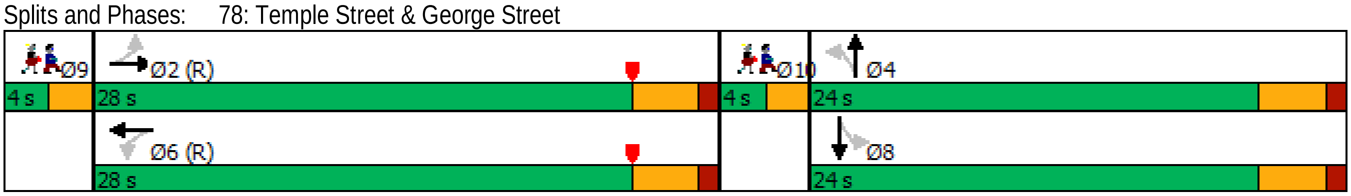
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		44.1			11.5			20.1			33.3	
Approach LOS		D			B			C			C	
Stops (vph)		252		33	129		36	135		146	91	
Fuel Used(gal)		10		0	2		0	2		3	1	
CO Emissions (g/hr)		676		30	124		34	130		186	88	
NOx Emissions (g/hr)		131		6	24		7	25		36	17	
VOC Emissions (g/hr)		157		7	29		8	30		43	20	
Dilemma Vehicles (#)		0		0	0		0	0		0	0	
Queue Length 50th (ft)		68		8	40		14	55		63	40	
Queue Length 95th (ft)		m#468		37	111		36	99		#136	74	
Internal Link Dist (ft)		462			324			170			323	
Turn Bay Length (ft)				150			75			75		
Base Capacity (vph)		753		284	854		343	504		301	503	
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		1.00		0.19	0.29		0.16	0.38		0.65	0.29	

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 32.3 Intersection LOS: C
Intersection Capacity Utilization 88.7% 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: 78: Temple Street & George Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	0	50	50	300	115	105	590	0	0	225	50
Future Volume (vph)	50	0	50	50	300	115	105	590	0	0	225	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	50		0	75		0	0		0
Storage Lanes	0		0	1		0	1		0	0		0
Taper Length (ft)	0			15			15			0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.92		0.91	0.96						0.97	
Frt		0.932			0.958						0.976	
Flt Protected		0.976		0.950			0.950					
Satd. Flow (prot)	0	1391	0	1540	1216	0	1540	1338	0	0	1538	0
Flt Permitted		0.516		0.694			0.950					
Satd. Flow (perm)	0	735	0	1023	1216	0	1540	1338	0	0	1538	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		412			510			415			522	
Travel Time (s)		11.2			13.9			11.3			14.2	
Confl. Peds. (#/hr)	35		35	35		35			35			35
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	2%	4%	12%	2%	5%	2%	2%	2%	2%
Parking (#/hr)					10			10				
Adj. Flow (vph)	54	0	54	54	326	125	113	634	0	0	245	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	108	0	54	451	0	113	634	0	0	299	0
Turn Type	Perm	NA		pm+pt	NA		Prot	NA			NA	
Protected Phases		6		5	2		7	4			8	
Permitted Phases	6			2								
Detector Phase	6	6		5	2		7	4			8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		3.0	7.0		3.0	7.0			7.0	
Minimum Split (s)	17.0	17.0		7.0	17.0		7.0	17.0			17.0	
Total Split (s)	29.0	29.0		10.0	39.0		13.0	40.0			27.0	
Total Split (%)	32.2%	32.2%		11.1%	43.3%		14.4%	44.4%			30.0%	
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	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	Lead	Lead		Lag			Lag				Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min			C-Min	
Act Effct Green (s)		27.5		34.5	34.5		12.0	42.3			26.3	
Actuated g/C Ratio		0.31		0.38	0.38		0.13	0.47			0.29	
v/c Ratio		0.48		0.13	0.97		0.55	1.01			0.67	
Control Delay		36.0		18.9	64.2		42.5	56.0			41.4	
Queue Delay		0.5		0.0	12.4		0.0	27.1			0.0	
Total Delay		36.4		18.9	76.7		42.5	83.0			41.4	

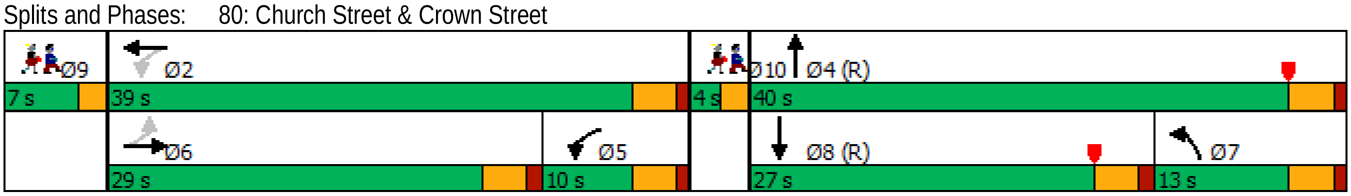
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Parking (#/hr)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D		B	E		D	F			D	
Approach Delay		36.4			70.5			76.9			41.4	
Approach LOS		D			E			E			D	
Stops (vph)		84		31	348		91	441			247	
Fuel Used(gal)		1		1	9		2	11			4	
CO Emissions (g/hr)		97		37	599		114	734			314	
NOx Emissions (g/hr)		19		7	116		22	143			61	
VOC Emissions (g/hr)		23		9	139		26	170			73	
Dilemma Vehicles (#)		0		0	0		0	0			0	
Queue Length 50th (ft)		56		19	244		61	~423			155	
Queue Length 95th (ft)		108		43	#440		m#84	#614			m220	
Internal Link Dist (ft)		332			430			335			442	
Turn Bay Length (ft)				50			75					
Base Capacity (vph)		232		431	472		205	629			449	
Starvation Cap Reductn		0		0	0		0	12			0	
Spillback Cap Reductn		16		0	27		0	46			0	
Storage Cap Reductn		0		0	0		0	0			0	
Reduced v/c Ratio		0.50		0.13	1.01		0.55	1.09			0.67	

Intersection Summary

Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 67 (74%), Referenced to phase 4:NBT and 8:SBT, Start of Yellow
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 65.9 Intersection LOS: E
Intersection Capacity Utilization 80.6% 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: 80: Church Street & Crown Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	260	155	75	100	110	75	335	70	50	200	75
Future Volume (vph)	250	260	155	75	100	110	75	335	70	50	200	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	0		0	75		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			0			15		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.98			0.95			0.98			0.97	
Frt		0.944			0.922			0.974			0.959	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1510	1466	0	1481	1374	0	1540	1518	0	1540	1518	0
Flt Permitted	0.430			0.196			0.950			0.950		
Satd. Flow (perm)	658	1466	0	306	1374	0	1540	1518	0	1540	1518	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		404			524			453			415	
Travel Time (s)		11.0			14.3			12.4			11.3	
Confl. Peds. (#/hr)	20		20	20		20			20			20
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.85	0.85	0.85	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	6%	6%	2%	8%	2%	4%	5%	2%	2%	0%
Adj. Flow (vph)	272	283	168	88	118	129	82	368	77	54	217	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	272	451	0	88	247	0	82	445	0	54	299	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2								
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0		3.0	7.0		3.0	7.0	
Minimum Split (s)	7.0	17.0		7.0	17.0		7.0	17.0		7.0	17.0	
Total Split (s)	13.0	35.0		7.0	29.0		14.0	26.0		11.0	23.0	
Total Split (%)	14.4%	38.9%		7.8%	32.2%		15.6%	28.9%		12.2%	25.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lead		Lag	Lead		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	35.3	29.7		23.4	20.4		7.9	35.1		5.4	32.7	
Actuated g/C Ratio	0.39	0.33		0.26	0.23		0.09	0.39		0.06	0.36	
v/c Ratio	0.75	0.93		0.75	0.79		0.61	0.75		0.58	0.54	
Control Delay	41.5	57.6		61.7	51.0		57.9	38.5		55.0	19.3	
Queue Delay	1.5	2.5		0.0	0.0		0.0	35.4		0.0	0.0	
Total Delay	43.0	60.1		61.7	51.0		57.9	73.9		55.0	19.3	
LOS	D	E		E	D		E	E		D	B	

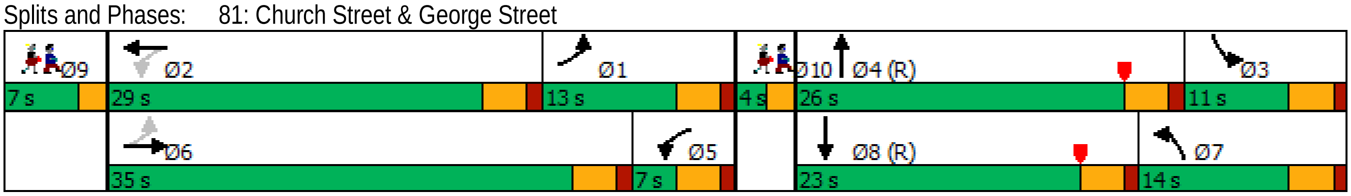
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		53.7			53.8			71.4			24.8	
Approach LOS		D			D			E			C	
Stops (vph)	170	360		56	193		72	284		53	160	
Fuel Used(gal)	4	8		1	4		1	6		1	3	
CO Emissions (g/hr)	253	537		104	270		101	407		66	186	
NOx Emissions (g/hr)	49	104		20	52		20	79		13	36	
VOC Emissions (g/hr)	59	124		24	63		23	94		15	43	
Dilemma Vehicles (#)	0	0		0	0		0	0		0	0	
Queue Length 50th (ft)	106	240		30	131		45	218		34	60	
Queue Length 95th (ft)	#202	#421		#71	192		90	#470		m57	#286	
Internal Link Dist (ft)		324			444			373			335	
Turn Bay Length (ft)	150			150						75		
Base Capacity (vph)	366	504		118	381		171	592		119	552	
Starvation Cap Reductn	0	16		0	0		0	0		0	0	
Spillback Cap Reductn	22	0		0	0		0	168		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.79	0.92		0.75	0.65		0.48	1.05		0.45	0.54	

Intersection Summary

Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 74 (82%), Referenced to phase 4:NBT and 8:SBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 53.3 Intersection LOS: D
Intersection Capacity Utilization 72.4% 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: 81: Church Street & George Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	186	26	52	294	83	78	423	72	26	155	52
Future Volume (vph)	26	186	26	52	294	83	78	423	72	26	155	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			-3%			-6%			-2%	
Storage Length (ft)	50		0	0		0	75		0	0		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	25			0			25			25		
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
Ped Bike Factor	0.79	0.93			0.84			0.91			0.92	
Frt		0.982			0.971			0.978			0.970	
Flt Protected	0.950				0.994		0.950				0.994	
Satd. Flow (prot)	1578	1395	0	0	2416	0	1394	1367	0	0	1446	0
Flt Permitted	0.356				0.820		0.950				0.917	
Satd. Flow (perm)	465	1395	0	0	1921	0	1394	1367	0	0	1334	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		413			476			522			476	
Travel Time (s)		11.3			13.0			14.2			13.0	
Confl. Peds. (#/hr)	218		218	291		291			229	229		229
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.79	0.79	0.79	0.90	0.90	0.90	0.88	0.88	0.88	0.92	0.92	0.92
Heavy Vehicles (%)	0%	9%	2%	2%	14%	5%	16%	10%	16%	2%	2%	2%
Adj. Flow (vph)	33	235	33	58	327	92	89	481	82	28	168	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	268	0	0	477	0	89	563	0	0	253	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		6			2		7	4			8	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2		7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		3.0	7.0		7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		7.0	17.0		17.0	17.0	
Total Split (s)	32.0	32.0		32.0	32.0		15.0	47.0		32.0	32.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		16.7%	52.2%		35.6%	35.6%	
Yellow Time (s)	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	
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-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)	25.2	25.2			25.2		8.1	51.6			40.9	
Actuated g/C Ratio	0.28	0.28			0.28		0.09	0.57			0.45	
v/c Ratio	0.25	0.69			0.89		0.71	0.72			0.42	
Control Delay	29.5	38.2			50.4		55.2	17.5			23.3	
Queue Delay	0.0	0.0			0.0		0.0	0.1			0.0	
Total Delay	29.5	38.2			50.4		55.2	17.6			23.3	

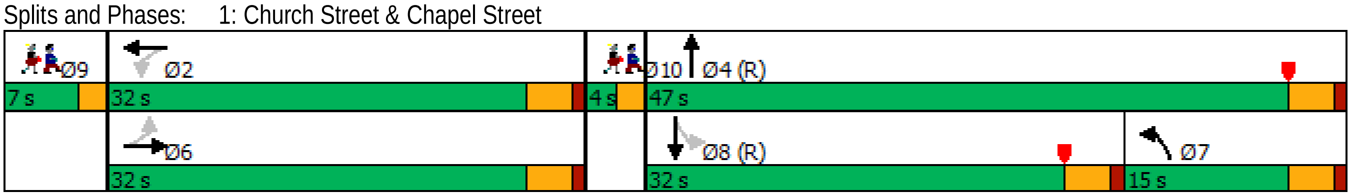
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	D			D		E	B			C	
Approach Delay		37.3			50.4			22.7			23.3	
Approach LOS		D			D			C			C	
Stops (vph)	22	184			388		77	393			169	
Fuel Used(gal)	0	3			8		2	5			3	
CO Emissions (g/hr)	23	217			533		106	382			189	
NOx Emissions (g/hr)	5	42			104		21	74			37	
VOC Emissions (g/hr)	5	50			124		25	89			44	
Dilemma Vehicles (#)	0	0			0		0	0			0	
Queue Length 50th (ft)	14	132			132		52	321			109	
Queue Length 95th (ft)	34	179			#211		m70	m#443			195	
Internal Link Dist (ft)		333			396			442			396	
Turn Bay Length (ft)	50						75					
Base Capacity (vph)	144	434			597		170	783			607	
Starvation Cap Reductn	0	0			0		0	11			0	
Spillback Cap Reductn	0	0			0		0	0			0	
Storage Cap Reductn	0	0			0		0	0			0	
Reduced v/c Ratio	0.23	0.62			0.80		0.52	0.73			0.42	

Intersection Summary

Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 4 (4%), Referenced to phase 4:NBT and 8:SBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 33.3 Intersection LOS: C
Intersection Capacity Utilization 78.3% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Church Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	165	26	41	320	57	0	0	0	36	217	67
Future Volume (vph)	21	165	26	41	320	57	0	0	0	36	217	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			5%			-8%			4%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.95		0.84	0.96						0.91	
Frt		0.984			0.977						0.972	
Flt Protected		0.995		0.950							0.994	
Satd. Flow (prot)	0	1560	0	1458	1352	0	0	0	0	0	1426	0
Flt Permitted		0.946		0.613							0.994	
Satd. Flow (perm)	0	1468	0	787	1352	0	0	0	0	0	1382	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		502			519			547			897	
Travel Time (s)		13.7			14.2			14.9			24.5	
Confl. Peds. (#/hr)	118		118	118		118				118		121
Confl. Bikes (#/hr)			10			10						10
Peak Hour Factor	0.92	0.92	0.92	0.88	0.88	0.88	0.92	0.92	0.92	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	5%	11%	13%	2%	2%	2%	2%	3%	3%
Adj. Flow (vph)	23	179	28	47	364	65	0	0	0	38	231	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	230	0	47	429	0	0	0	0	0	340	0
Turn Type	Perm	NA		Perm	NA					Perm	NA	
Protected Phases		6			2						8	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2					8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0					7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0					17.0	17.0	
Total Split (s)	26.0	26.0		26.0	26.0					26.0	26.0	
Total Split (%)	43.3%	43.3%		43.3%	43.3%					43.3%	43.3%	
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	
Total Lost Time (s)		4.0		4.0	4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min					None	None	
Act Effct Green (s)		27.0		27.0	27.0						18.6	
Actuated g/C Ratio		0.45		0.45	0.45						0.31	
v/c Ratio		0.35		0.13	0.71						0.79	
Control Delay		14.9		13.8	25.5						33.0	
Queue Delay		0.0		0.0	0.0						0.0	
Total Delay		14.9		13.8	25.5						33.0	
LOS		B		B	C						C	
Approach Delay		14.9			24.3						33.0	
Approach LOS		B			C						C	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		145		29	278						275	
Fuel Used(gal)		2		0	5						6	
CO Emissions (g/hr)		147		28	328						395	
NOx Emissions (g/hr)		29		6	64						77	
VOC Emissions (g/hr)		34		7	76						92	
Dilemma Vehicles (#)		0		0	0						0	
Queue Length 50th (ft)		57		10	130						107	
Queue Length 95th (ft)		114		31	#282						#191	
Internal Link Dist (ft)		422			439			467			817	
Turn Bay Length (ft)												
Base Capacity (vph)		660		353	607						506	
Starvation Cap Reductn		0		0	0						0	
Spillback Cap Reductn		0		0	0						0	
Storage Cap Reductn		0		0	0						0	
Reduced v/c Ratio		0.35		0.13	0.71						0.67	

Intersection Summary

Area Type: CBD

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

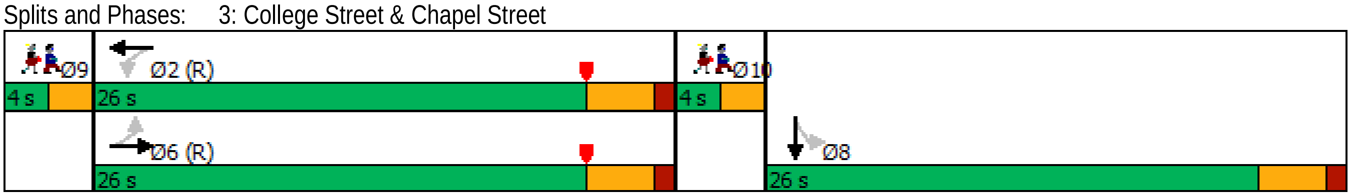
Intersection Signal Delay: 25.1 — Intersection LOS: C

Intersection Capacity Utilization 59.5% — 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: 3: College Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	258	26	26	279	93	129	253	52	0	0	0
Future Volume (vph)	52	258	26	26	279	93	129	253	52	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-5%			-4%			-10%			5%	
Storage Length (ft)	50		0	50		100	125		0	0		0
Storage Lanes	0		0	0		1	1		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	0.95	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor		0.97			0.98	0.75		0.90				
Frt		0.990				0.850		0.982				
Flt Protected		0.992			0.996			0.985				
Satd. Flow (prot)	0	1599	0	0	1589	1352	0	2848	0	0	0	0
Flt Permitted		0.849			0.958			0.985				
Satd. Flow (perm)	0	1352	0	0	1506	1020	0	2645	0	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		413			498			404			482	
Travel Time (s)		11.3			13.6			11.0			13.1	
Confl. Peds. (#/hr)	112		112	183		183	112		112			
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.87	0.87	0.87	0.90	0.90	0.90	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	6%	6%	10%	9%	2%	2%	2%	2%
Adj. Flow (vph)	57	280	28	30	321	107	143	281	58	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	365	0	0	351	107	0	482	0	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm	Split	NA				
Protected Phases		6			2		4	4				
Permitted Phases	6			2		2						
Detector Phase	6	6		2	2	2	4	4				
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0				
Minimum Split (s)	18.0	18.0		18.0	18.0	18.0	18.0	18.0				
Total Split (s)	29.0	29.0		29.0	29.0	29.0	23.0	23.0				
Total Split (%)	48.3%	48.3%		48.3%	48.3%	48.3%	38.3%	38.3%				
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	1.0	1.0	1.0	1.0				
Lost Time Adjust (s)		0.0			0.0	0.0		0.0				
Total Lost Time (s)		4.0			4.0	4.0		4.0				
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min				
Act Effct Green (s)		19.8			19.8	19.8		29.0				
Actuated g/C Ratio		0.33			0.33	0.33		0.48				
v/c Ratio		0.82			0.71	0.32		0.35				
Control Delay		33.5			25.2	16.2		13.0				
Queue Delay		0.0			0.0	0.0		0.0				
Total Delay		33.5			25.2	16.2		13.0				

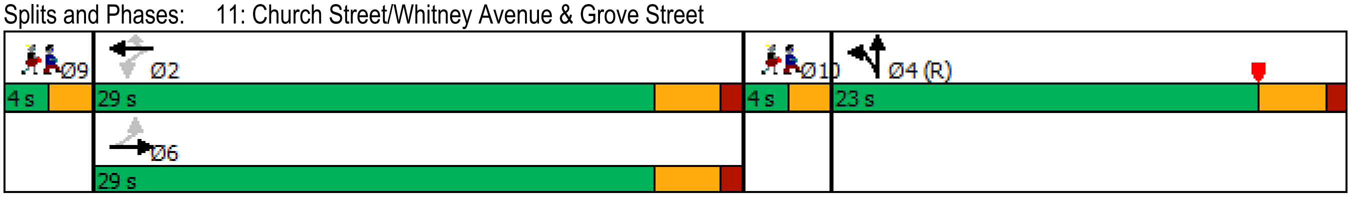
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		C			C	B		B				
Approach Delay		33.5			23.1			13.0				
Approach LOS		C			C			B				
Stops (vph)		293			249	63		276				
Fuel Used(gal)		5			4	1		4				
CO Emissions (g/hr)		321			267	66		259				
NOx Emissions (g/hr)		63			52	13		50				
VOC Emissions (g/hr)		74			62	15		60				
Dilemma Vehicles (#)		0			0	0		0				
Queue Length 50th (ft)		116			107	28		47				
Queue Length 95th (ft)		185			157	53		115				
Internal Link Dist (ft)		333			418			324			402	
Turn Bay Length (ft)						100						
Base Capacity (vph)		563			627	425		1378				
Starvation Cap Reductn		0			0	0		0				
Spillback Cap Reductn		0			0	0		0				
Storage Cap Reductn		0			0	0		0				
Reduced v/c Ratio		0.65			0.56	0.25		0.35				

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 50 (83%), Referenced to phase 4:NBTL, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 22.3 — Intersection LOS: C
Intersection Capacity Utilization 63.0% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 11: Church Street/Whitney Avenue & Grove Street



Lane Group	Ø9	Ø10
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		
Fuel Used(gal)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	52	294	0	0	0	0	26	222	62
Future Volume (vph)	0	0	0	52	294	0	0	0	0	26	222	62
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
Ped Bike Factor												
Frt											0.973	
Flt Protected					0.993						0.996	
Satd. Flow (prot)	0	0	0	0	1744	0	0	0	0	0	1738	0
Flt Permitted					0.993						0.996	
Satd. Flow (perm)	0	0	0	0	1744	0	0	0	0	0	1738	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		552			511			389			432	
Travel Time (s)		15.1			13.9			10.6			11.8	
Confl. Peds. (#/hr)				41						18		18
Confl. Bikes (#/hr)						10						10
Peak Hour Factor	0.92	0.92	0.92	0.85	0.85	0.85	0.92	0.92	0.92	0.90	0.90	0.90
Heavy Vehicles (%)	2%	2%	2%	2%	5%	0%	2%	2%	2%	2%	2%	4%
Adj. Flow (vph)	0	0	0	61	346	0	0	0	0	29	247	69
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	407	0	0	0	0	0	345	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 42.3%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	12.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	52	294	0	0	0	0	26	222	62
Future Vol, veh/h	0	0	0	52	294	0	0	0	0	26	222	62
Peak Hour Factor	0.92	0.92	0.92	0.85	0.85	0.85	0.92	0.92	0.92	0.90	0.90	0.90
Heavy Vehicles, %	2	2	2	2	5	0	2	2	2	2	2	4
Mvmt Flow	0	0	0	61	346	0	0	0	0	29	247	69
Number of Lanes	0	0	0	0	1	0	0	0	0	0	1	0

Approach	WB	SB
Opposing Approach		
Opposing Lanes	0	0
Conflicting Approach Left		WB
Conflicting Lanes Left	0	1
Conflicting Approach Right	SB	
Conflicting Lanes Right	1	0
HCM Control Delay	13.6	12.1
HCM LOS	B	B

Lane	WBLn1	SBLn1
Vol Left, %	15%	8%
Vol Thru, %	85%	72%
Vol Right, %	0%	20%
Sign Control	Stop	Stop
Traffic Vol by Lane	346	310
LT Vol	52	26
Through Vol	294	222
RT Vol	0	62
Lane Flow Rate	407	344
Geometry Grp	1	1
Degree of Util (X)	0.545	0.463
Departure Headway (Hd)	4.82	4.844
Convergence, Y/N	Yes	Yes
Cap	745	741
Service Time	2.875	2.901
HCM Lane V/C Ratio	0.546	0.464
HCM Control Delay	13.6	12.1
HCM Lane LOS	B	B
HCM 95th-tile Q	3.3	2.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	310	26	26	253	41	21	83	26	52	103	16
Future Volume (vph)	26	310	26	26	253	41	21	83	26	52	103	16
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
Ped Bike Factor		0.98			0.98			0.93			0.97	
Frt		0.990			0.983			0.973			0.987	
Flt Protected		0.996			0.996			0.992			0.985	
Satd. Flow (prot)	0	1743	0	0	1721	0	0	1617	0	0	1737	0
Flt Permitted		0.965			0.957			0.935			0.879	
Satd. Flow (perm)	0	1684	0	0	1641	0	0	1497	0	0	1519	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		685			397			298			207	
Travel Time (s)		18.7			10.8			8.1			5.6	
Confl. Peds. (#/hr)	39		101	101		39	101		101	39		39
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.57	0.57	0.57
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%	14%	2%	2%	2%	0%	11%
Adj. Flow (vph)	28	337	28	28	275	45	23	89	28	91	181	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	393	0	0	348	0	0	140	0	0	300	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Total Split (s)	30.0	30.0		30.0	30.0		22.0	22.0		22.0	22.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		36.7%	36.7%		36.7%	36.7%	
Yellow Time (s)	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	
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												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		33.2			33.2			15.6			15.6	
Actuated g/C Ratio		0.55			0.55			0.26			0.26	
v/c Ratio		0.42			0.38			0.36			0.76	
Control Delay		11.6			11.2			20.1			33.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		11.6			11.2			20.1			33.7	
LOS		B			B			C			C	
Approach Delay		11.6			11.2			20.1			33.7	
Approach LOS		B			B			C			C	
Stops (vph)		218			188			99			150	

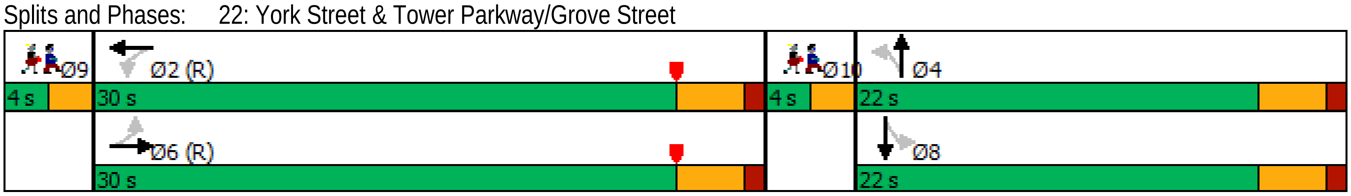
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Fuel Used(gal)		5			4			2			2	
CO Emissions (g/hr)		318			283			126			143	
NOx Emissions (g/hr)		62			55			25			28	
VOC Emissions (g/hr)		74			66			29			33	
Dilemma Vehicles (#)		0			0			0			0	
Queue Length 50th (ft)		68			58			40			96	
Queue Length 95th (ft)		173			151			79			93	
Internal Link Dist (ft)		605			317			218			127	
Turn Bay Length (ft)												
Base Capacity (vph)		932			908			449			455	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.42			0.38			0.31			0.66	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 18.1 Intersection LOS: B
Intersection Capacity Utilization 47.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 22: York Street & Tower Parkway/Grove Street



Lane Group	EBL	EBT	EBR	WBT	WBR	NBL2	NBT	NBR	SBL	SBT	SBR	SEL
Lane Configurations												
Traffic Volume (vph)	47	599	26	232	31	150	67	103	26	103	26	30
Future Volume (vph)	47	599	26	232	31	150	67	103	26	103	26	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0		0			0	0		0	0
Storage Lanes	1		0		1			0	0		0	1
Taper Length (ft)	0								0			0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98					0.80			0.84		
Frt		0.994			0.850		0.909			0.977		
Flt Protected	0.950					0.950				0.992		0.950
Satd. Flow (prot)	1601	1644	0	1801	1531	1504	1141	0	0	1554	0	1711
Flt Permitted	0.950					0.534				0.917		0.950
Satd. Flow (perm)	1601	1644	0	1801	1531	845	1141	0	0	1352	0	1711
Right Turn on Red			No					No				
Satd. Flow (RTOR)												
Link Speed (mph)		25		25			25			25		25
Link Distance (ft)		309		401			898			511		228
Travel Time (s)		8.4		10.9			24.5			13.9		6.2
Confl. Peds. (#/hr)			282					165	165		376	
Confl. Bikes (#/hr)			15		15			15			15	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.84	0.84	0.84	0.92	0.92	0.92	0.94
Heavy Vehicles (%)	9%	9%	2%	2%	2%	16%	12%	21%	2%	2%	2%	2%
Adj. Flow (vph)	51	644	28	249	33	179	80	123	28	112	28	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	51	672	0	249	33	179	203	0	0	168	0	32
Turn Type	Prot	NA		NA	Over	D.P+P	NA		Perm	NA		Prot
Protected Phases	1	1 2		2	9	3	3 4			4		9
Permitted Phases						4			4			
Detector Phase	1	1 2		2	9	3	3 4		4	4		9
Switch Phase												
Minimum Initial (s)	4.0			12.0	2.0	4.0			12.0	12.0		2.0
Minimum Split (s)	10.0			18.0	10.0	10.0			19.0	19.0		10.0
Total Split (s)	12.0			25.0	13.0	11.0			25.0	25.0		13.0
Total Split (%)	13.3%			27.8%	14.4%	12.2%			27.8%	27.8%		14.4%
Yellow Time (s)	4.0			4.0	4.0	4.0			4.0	4.0		4.0
All-Red Time (s)	2.0			1.0	2.0	2.0			1.0	1.0		2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0				0.0		0.0
Total Lost Time (s)	6.0			5.0	6.0	6.0				5.0		6.0
Lead/Lag	Lag			Lead		Lag			Lead	Lead		
Lead-Lag Optimize?												
Recall Mode	None			C-Min	None	None			None	None		None
Act Effct Green (s)	6.0	38.4		27.4	6.5	21.0	27.0			17.0		6.5
Actuated g/C Ratio	0.07	0.43		0.30	0.07	0.23	0.30			0.19		0.07
v/c Ratio	0.48	0.96		0.46	0.30	0.77	0.59			0.66		0.26
Control Delay	56.2	55.7		31.7	46.5	50.6	34.2			46.1		44.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0			0.0		0.0
Total Delay	56.2	55.7		31.7	46.5	50.6	34.2			46.1		44.6
LOS	E	E		C	D	D	C			D		D

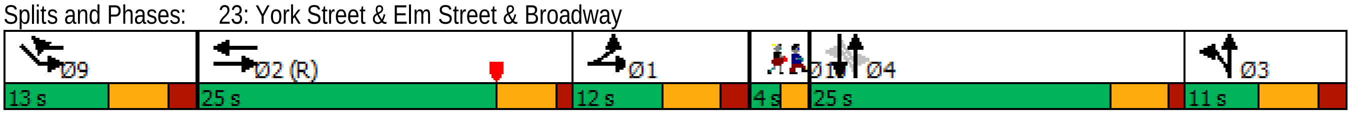
Lane Group	Ø10
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	10
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	2.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	4%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL2	NBT	NBR	SBL	SBT	SBR	SEL
Approach Delay		55.7		33.5			41.9			46.1		44.6
Approach LOS		E		C			D			D		D
Stops (vph)	44	444		193	32	125	142			139		30
Fuel Used(gal)	1	10		3	1	3	3			3		1
CO Emissions (g/hr)	58	729		212	37	222	213			214		46
NOx Emissions (g/hr)	11	142		41	7	43	41			42		9
VOC Emissions (g/hr)	13	169		49	8	51	49			50		11
Dilemma Vehicles (#)	0	0		0	0	0	0			0		0
Queue Length 50th (ft)	29	~443		125	18	79	96			88		17
Queue Length 95th (ft)	#71	#675		208	48	#125	149			152		46
Internal Link Dist (ft)		229		321			818			431		148
Turn Bay Length (ft)						150						
Base Capacity (vph)	106	700		547	119	233	329			300		133
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	0.48	0.96		0.46	0.28	0.77	0.62			0.56		0.24

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBWB, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 47.2 Intersection LOS: D
Intersection Capacity Utilization 81.9% 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.

Splits and Phases: 23: York Street & Elm Street & Broadway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	129	26	26	289	98	57	225	77	52	103	26
Future Volume (vph)	26	129	26	26	289	98	57	225	77	52	103	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	11	11	10	11	11
Storage Length (ft)	50		0	50		0	50		0	50		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.97		0.91	0.96		0.89	0.96		0.93	0.97	
Frt		0.981			0.962			0.962			0.970	
Flt Protected		0.993		0.950			0.950			0.950		
Satd. Flow (prot)	0	1712	0	1745	1555	0	1636	1624	0	1652	1690	0
Flt Permitted		0.923		0.656			0.668			0.371		
Satd. Flow (perm)	0	1580	0	1099	1555	0	1019	1624	0	599	1690	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		511			419			515			898	
Travel Time (s)		13.9			11.4			14.0			24.5	
Confl. Peds. (#/hr)	60		60	60		60	60		60	60		60
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.87	0.87	0.87	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	0%	4%	23%	3%	5%	2%	2%	2%	2%
Adj. Flow (vph)	28	140	28	28	314	107	66	259	89	57	112	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	196	0	28	421	0	66	348	0	57	140	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Total Split (s)	22.0	22.0		22.0	22.0		30.0	30.0		30.0	30.0	
Total Split (%)	36.7%	36.7%		36.7%	36.7%		50.0%	50.0%		50.0%	50.0%	
Yellow Time (s)	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	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		30.5		30.5	30.5		18.3	18.3		18.3	18.3	
Actuated g/C Ratio		0.51		0.51	0.51		0.30	0.30		0.30	0.30	
v/c Ratio		0.24		0.05	0.53		0.21	0.70		0.31	0.27	
Control Delay		12.6		12.4	18.1		15.2	25.8		18.9	15.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		12.6		12.4	18.1		15.2	25.8		18.9	15.6	

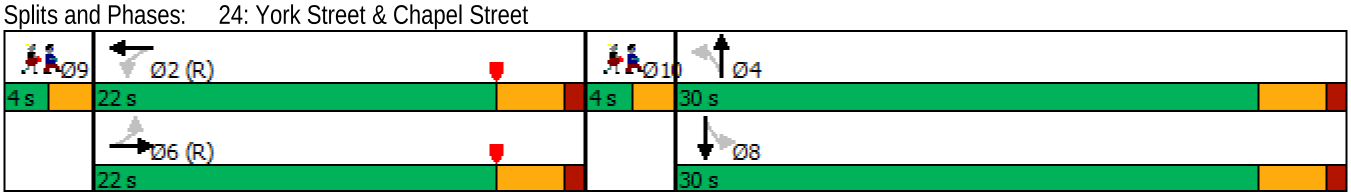
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B		B	B		B	C		B	B	
Approach Delay		12.6			17.8			24.1			16.6	
Approach LOS		B			B			C			B	
Stops (vph)		108		18	244		39	249		38	88	
Fuel Used(gal)		2		0	4		1	4		1	2	
CO Emissions (g/hr)		116		16	262		40	271		52	121	
NOx Emissions (g/hr)		23		3	51		8	53		10	24	
VOC Emissions (g/hr)		27		4	61		9	63		12	28	
Dilemma Vehicles (#)		0		0	0		0	0		0	0	
Queue Length 50th (ft)		32		4	81		18	110		16	38	
Queue Length 95th (ft)		105		23	#287		35	149		36	62	
Internal Link Dist (ft)		431			339			435			818	
Turn Bay Length (ft)				50			50			50		
Base Capacity (vph)		804		559	791		441	703		259	732	
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		0.24		0.05	0.53		0.15	0.50		0.22	0.19	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 18.9 Intersection LOS: B
Intersection Capacity Utilization 65.0% 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.

Splits and Phases: 24: York Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	26	93	77	36	408	0	0	129	26
Future Volume (vph)	0	0	0	26	93	77	36	408	0	0	129	26
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
Ped Bike Factor												
Frt					0.947						0.977	
Flt Protected					0.993			0.996				
Satd. Flow (prot)	0	0	0	0	1679	0	0	1773	0	0	1759	0
Flt Permitted					0.993			0.996				
Satd. Flow (perm)	0	0	0	0	1679	0	0	1773	0	0	1759	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		502			419			405			515	
Travel Time (s)		13.7			11.4			11.0			14.0	
Confl. Peds. (#/hr)				14		14	45					45
Confl. Bikes (#/hr)						10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	3%	5%	3%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	40	143	118	40	448	0	0	140	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	301	0	0	488	0	0	168	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 58.1%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	26	93	77	36	408	0	0	129	26
Future Vol, veh/h	0	0	0	26	93	77	36	408	0	0	129	26
Peak Hour Factor	0.92	0.92	0.92	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	3	3	5	3	2	2	2	2
Mvmt Flow	0	0	0	40	143	118	40	448	0	0	140	28
Number of Lanes	0	0	0	0	1	0	0	1	0	0	1	0

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	12.9	19	10.3
HCM LOS	B	C	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	8%	13%	0%
Vol Thru, %	92%	47%	83%
Vol Right, %	0%	39%	17%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	444	196	155
LT Vol	36	26	0
Through Vol	408	93	129
RT Vol	0	77	26
Lane Flow Rate	488	302	168
Geometry Grp	1	1	1
Degree of Util (X)	0.695	0.454	0.253
Departure Headway (Hd)	5.129	5.418	5.404
Convergence, Y/N	Yes	Yes	Yes
Cap	707	663	664
Service Time	3.157	3.454	3.441
HCM Lane V/C Ratio	0.69	0.456	0.253
HCM Control Delay	19	12.9	10.3
HCM Lane LOS	C	B	B
HCM 95th-tile Q	5.6	2.4	1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	330	26	52	0	52	0	258	119	26	103	0
Future Volume (vph)	170	330	26	52	0	52	0	258	119	26	103	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		100	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	0			0			0			0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.94	0.99			0.93				0.86		0.99	
Frt		0.989			0.932				0.850			
Flt Protected	0.950				0.976						0.990	
Satd. Flow (prot)	1646	1738	0	0	1551	0	0	1783	1487	0	1783	0
Flt Permitted	0.684				0.761						0.890	
Satd. Flow (perm)	1113	1738	0	0	1191	0	0	1783	1284	0	1580	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		504			403			370			405	
Travel Time (s)		13.7			11.0			10.1			11.0	
Confl. Peds. (#/hr)	33		33	33		33	48		48	48		48
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.90	0.90	0.90	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92
Heavy Vehicles (%)	6%	4%	0%	2%	2%	2%	2%	3%	5%	2%	2%	2%
Adj. Flow (vph)	189	367	29	57	0	57	0	269	124	28	112	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	189	396	0	0	114	0	0	269	124	0	140	0
Turn Type	Perm	NA		Perm	NA			NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6					4	8		
Detector Phase	2	2		6	6			4	4	8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0	7.0	7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0			17.0	17.0	17.0	17.0	
Total Split (s)	22.0	22.0		22.0	22.0			30.0	30.0	30.0	30.0	
Total Split (%)	36.7%	36.7%		36.7%	36.7%			50.0%	50.0%	50.0%	50.0%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0			4.0			4.0	4.0		4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min			None	None	None	None	
Act Effct Green (s)	36.8	36.8			36.8			13.6	13.6		13.6	
Actuated g/C Ratio	0.61	0.61			0.61			0.23	0.23		0.23	
v/c Ratio	0.28	0.37			0.16			0.66	0.42		0.39	
Control Delay	9.2	9.2			4.5			28.6	23.1		21.6	
Queue Delay	0.0	0.0			0.0			0.0	0.0		0.0	
Total Delay	9.2	9.2			4.5			28.6	23.1		21.6	
LOS	A	A			A			C	C		C	

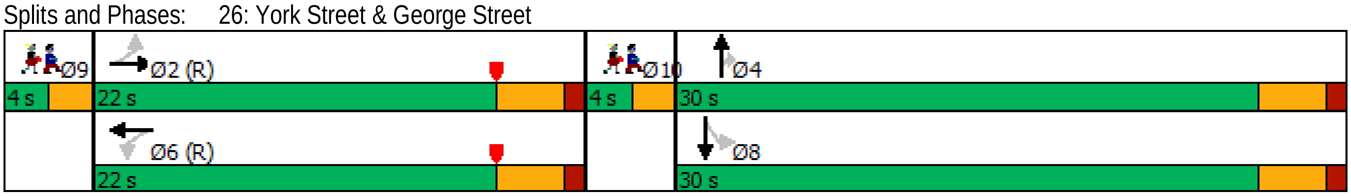
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		9.2			4.5			26.9			21.6	
Approach LOS		A			A			C			C	
Stops (vph)	86	185			30			221	94		100	
Fuel Used(gal)	1	3			1			3	1		1	
CO Emissions (g/hr)	96	203			40			221	91		98	
NOx Emissions (g/hr)	19	39			8			43	18		19	
VOC Emissions (g/hr)	22	47			9			51	21		23	
Dilemma Vehicles (#)	0	0			0			0	0		0	
Queue Length 50th (ft)	25	56			7			89	39		43	
Queue Length 95th (ft)	95	180			m26			137	71		76	
Internal Link Dist (ft)		424			323			290			325	
Turn Bay Length (ft)									100			
Base Capacity (vph)	681	1064			729			772	556		684	
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	0.28	0.37			0.16			0.35	0.22		0.20	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 9 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 15.8 Intersection LOS: B
Intersection Capacity Utilization 66.9% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: York Street & George Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	129	0	0	387	0	57
Future Volume (vph)	129	0	0	387	0	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	1801	0	0	1670	1558	0
Flt Permitted						
Satd. Flow (perm)	1801	0	0	1670	1558	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	419			502	522	
Travel Time (s)	11.4			13.7	14.2	
Confl. Peds. (#/hr)					75	75
Confl. Bikes (#/hr)		15				15
Peak Hour Factor	0.92	0.92	0.88	0.88	0.91	0.91
Heavy Vehicles (%)	2%	2%	2%	10%	3%	2%
Adj. Flow (vph)	140	0	0	440	0	63
Shared Lane Traffic (%)						
Lane Group Flow (vph)	140	0	0	440	63	0
Sign Control	Stop			Stop	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 40.0% ICU Level of Service A
Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	129	0	0	387	0	57
Future Vol, veh/h	129	0	0	387	0	57
Peak Hour Factor	0.92	0.92	0.88	0.88	0.91	0.91
Heavy Vehicles, %	2	2	2	10	3	2
Mvmt Flow	140	0	0	440	0	63
Number of Lanes	1	0	0	1	1	0

Approach	EB			WB	NB	
Opposing Approach	WB			EB		
Opposing Lanes	1			1	0	
Conflicting Approach Left				NB	EB	
Conflicting Lanes Left	0			1	1	
Conflicting Approach Right	NB				WB	
Conflicting Lanes Right	1			0	1	
HCM Control Delay	8.5			12.1	8.1	
HCM LOS	A			B	A	

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	0%	0%	0%
Vol Thru, %	0%	100%	100%
Vol Right, %	100%	0%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	57	129	387
LT Vol	0	0	0
Through Vol	0	129	387
RT Vol	57	0	0
Lane Flow Rate	63	140	440
Geometry Grp	1	1	1
Degree of Util (X)	0.081	0.177	0.524
Departure Headway (Hd)	4.641	4.535	4.288
Convergence, Y/N	Yes	Yes	Yes
Cap	775	794	827
Service Time	2.651	2.548	2.384
HCM Lane V/C Ratio	0.081	0.176	0.532
HCM Control Delay	8.1	8.5	12.1
HCM Lane LOS	A	A	B
HCM 95th-tile Q	0.3	0.6	3.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	57	341	52	52	103	26	11	5	11	26	5	26
Future Volume (vph)	57	341	52	52	103	26	11	5	11	26	5	26
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
Ped Bike Factor												
Frt		0.984			0.980			0.944			0.939	
Flt Protected		0.994			0.987			0.980			0.978	
Satd. Flow (prot)	0	1733	0	0	1742	0	0	1666	0	0	1657	0
Flt Permitted		0.994			0.987			0.980			0.978	
Satd. Flow (perm)	0	1733	0	0	1742	0	0	1666	0	0	1657	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		403			487			120			398	
Travel Time (s)		11.0			13.3			3.3			10.9	
Confl. Peds. (#/hr)	25		28	28		25	5		5	5		5
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.71	0.71	0.71	0.95	0.88	0.88	0.95	0.95	0.95	0.52	0.52	0.52
Heavy Vehicles (%)	5%	4%	0%	2%	2%	2%	2%	2%	2%	2%	0%	2%
Adj. Flow (vph)	80	480	73	55	117	30	12	5	12	50	10	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	633	0	0	202	0	0	29	0	0	110	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 39.8%		ICU Level of Service A
Analysis Period (min) 15		

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	57	341	52	52	103	26	11	5	11	26	5	26
Future Vol, veh/h	57	341	52	52	103	26	11	5	11	26	5	26
Conflicting Peds, #/hr	25	0	28	28	0	25	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	71	71	71	95	88	88	95	95	95	52	52	52
Heavy Vehicles, %	5	4	0	2	2	2	2	2	2	2	0	2
Mvmt Flow	80	480	73	55	117	30	12	5	12	50	10	50

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	172	0	0	581	0	0	982	987	550	957	1008	162
Stage 1	-	-	-	-	-	-	705	705	-	267	267	-
Stage 2	-	-	-	-	-	-	277	282	-	690	741	-
Critical Hdwy	4.15	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.5	-
Follow-up Hdwy	2.245	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4	3.318
Pot Cap-1 Maneuver	1387	-	-	993	-	-	228	247	535	237	242	883
Stage 1	-	-	-	-	-	-	427	439	-	738	692	-
Stage 2	-	-	-	-	-	-	729	678	-	435	426	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1361	-	-	972	-	-	180	203	522	198	199	863
Mov Cap-2 Maneuver	-	-	-	-	-	-	180	203	-	198	199	-
Stage 1	-	-	-	-	-	-	382	393	-	662	637	-
Stage 2	-	-	-	-	-	-	632	624	-	382	381	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	2.4	21	23.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	253	1361	-	-	972	-	-	306
HCM Lane V/C Ratio	0.112	0.059	-	-	0.056	-	-	0.358
HCM Control Delay (s)	21	7.8	0	-	8.9	0	-	23.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.4	0.2	-	-	0.2	-	-	1.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	129	800	181	57	217	0	0	155	26
Future Volume (vph)	0	0	0	129	800	181	57	217	0	0	155	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99						1.00	
Frt					0.976						0.981	
Flt Protected					0.994			0.990				
Satd. Flow (prot)	0	0	0	0	4669	0	0	1752	0	0	1760	0
Flt Permitted					0.994			0.871				
Satd. Flow (perm)	0	0	0	0	4669	0	0	1541	0	0	1760	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		495			928			252			370	
Travel Time (s)		13.5			25.3			6.9			10.1	
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.83	0.83	0.83	0.79	0.79	0.79	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	4%	3%	3%	4%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	155	964	218	72	275	0	0	168	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1337	0	0	347	0	0	196	0
Turn Type				Perm	NA		D.P+P	NA			NA	
Protected Phases					6		7	7 8			8	
Permitted Phases				6			8					
Detector Phase				6	6		7 8	7 8			8	
Switch Phase												
Minimum Initial (s)				12.0	12.0		7.0				12.0	
Minimum Split (s)				18.0	18.0		10.0				16.0	
Total Split (s)				30.0	30.0		16.0				20.0	
Total Split (%)				33.3%	33.3%		17.8%				22.2%	
Yellow Time (s)				4.0	4.0		3.0				3.0	
All-Red Time (s)				2.0	2.0		0.0				1.0	
Lost Time Adjust (s)					0.0						0.0	
Total Lost Time (s)					6.0						4.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes					
Recall Mode				C-Max	C-Max		None				None	
Act Effct Green (s)					31.3			27.5			13.5	
Actuated g/C Ratio					0.35			0.31			0.15	
v/c Ratio					0.82			0.69			0.74	
Control Delay					35.3			33.1			53.8	
Queue Delay					0.0			0.3			0.0	
Total Delay					35.3			33.4			53.8	
LOS					D			C			D	
Approach Delay					35.3			33.4			53.8	
Approach LOS					D			C			D	
Stops (vph)					880			238			168	
Fuel Used(gal)					20			3			3	

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike 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)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
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)	24.0
Total Split (s)	24.0
Total Split (%)	27%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Stops (vph)	
Fuel Used(gal)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
CO Emissions (g/hr)					1406			234			222	
NOx Emissions (g/hr)					274			46			43	
VOC Emissions (g/hr)					326			54			52	
Dilemma Vehicles (#)					0			0			0	
Queue Length 50th (ft)					270			163			109	
Queue Length 95th (ft)					#351			200			176	
Internal Link Dist (ft)		415			848			172			290	
Turn Bay Length (ft)												
Base Capacity (vph)					1621			544			312	
Starvation Cap Reductn					0			22			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.82			0.66			0.63	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 16 (18%), Referenced to phase 6:WBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 36.8 Intersection LOS: D
Intersection Capacity Utilization 58.4% 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: 71: York Street & North Frontage Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	258	108	52	155	0	0	0	0	52	248	26
Future Volume (vph)	0	258	108	52	155	0	0	0	0	52	248	26
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
Ped Bike Factor		0.97			0.99						0.97	
Frt		0.960									0.989	
Flt Protected					0.987						0.992	
Satd. Flow (prot)	0	1435	0	0	1600	0	0	0	0	0	1475	0
Flt Permitted					0.847						0.992	
Satd. Flow (perm)	0	1435	0	0	1360	0	0	0	0	0	1445	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		487			542			382			372	
Travel Time (s)		13.3			14.8			10.4			10.1	
Confl. Peds. (#/hr)	60		60	60		60	60		60	60		60
Confl. Bikes (#/hr)			10			10						10
Peak Hour Factor	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.83	0.83	0.83
Heavy Vehicles (%)	2%	7%	9%	2%	2%	2%	2%	2%	2%	5%	10%	2%
Adj. Flow (vph)	0	284	119	57	168	0	0	0	0	63	299	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	403	0	0	225	0	0	0	0	0	393	0
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Detector Phase		2		6	6					4	4	
Switch Phase												
Minimum Initial (s)		7.0		7.0	7.0					7.0	7.0	
Minimum Split (s)		18.0		18.0	18.0					18.0	18.0	
Total Split (s)		30.0		30.0	30.0					22.0	22.0	
Total Split (%)		50.0%		50.0%	50.0%					36.7%	36.7%	
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)		0.0			0.0						0.0	
Total Lost Time (s)		4.0			4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min		C-Min	C-Min					None	None	
Act Effct Green (s)		29.5			29.5						17.7	
Actuated g/C Ratio		0.49			0.49						0.30	
v/c Ratio		0.57			0.34						0.92	
Control Delay		15.8			13.9						52.1	
Queue Delay		0.0			0.0						0.0	
Total Delay		15.8			13.9						52.1	
LOS		B			B						D	
Approach Delay		15.8			13.9						52.1	
Approach LOS		B			B						D	
Stops (vph)		259			137						268	

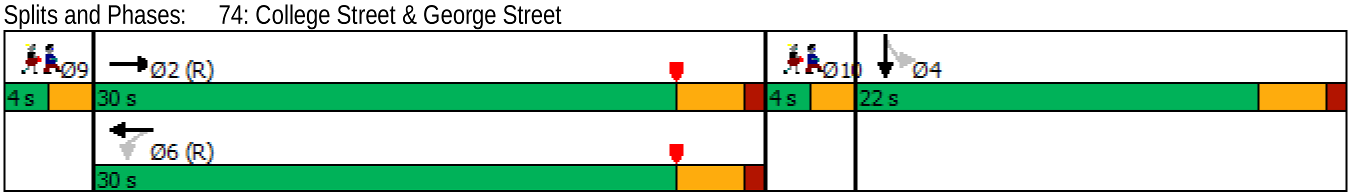
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Fuel Used(gal)		4			2						6	
CO Emissions (g/hr)		258			145						386	
NOx Emissions (g/hr)		50			28						75	
VOC Emissions (g/hr)		60			34						89	
Dilemma Vehicles (#)		0			0						0	
Queue Length 50th (ft)		105			35						135	
Queue Length 95th (ft)		217			125						#249	
Internal Link Dist (ft)		407			462			302			292	
Turn Bay Length (ft)												
Base Capacity (vph)		705			668						433	
Starvation Cap Reductn		0			0						0	
Spillback Cap Reductn		0			0						0	
Storage Cap Reductn		0			0						0	
Reduced v/c Ratio		0.57			0.34						0.91	

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 45 (75%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 29.4 Intersection LOS: C
Intersection Capacity Utilization 72.5% 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: 74: College Street & George Street



Future Volumes under 2-way Scenario
Timing Plan: MORNING PEAK HOUR

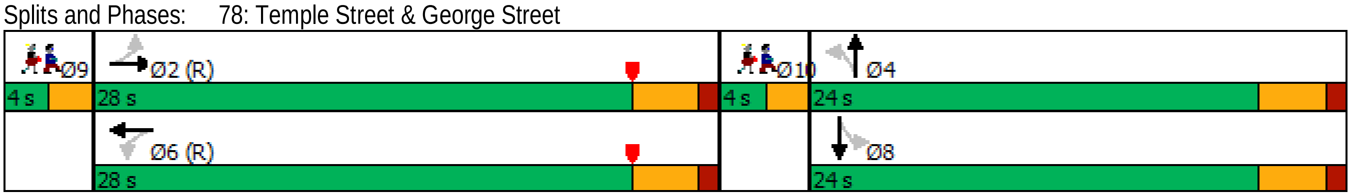
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	241	57	52	103	26	26	129	62	103	83	26
Future Volume (vph)	52	241	57	52	103	26	26	129	62	103	83	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		1
Taper Length (ft)	0			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98		0.98	0.98		0.95	0.97		0.96	0.98	
Frt		0.978			0.970			0.951			0.964	
Flt Protected		0.993		0.950			0.950			0.950		
Satd. Flow (prot)	0	1488	0	1540	1546	0	1540	1499	0	1342	1424	0
Flt Permitted		0.942		0.489			0.669			0.545		
Satd. Flow (perm)	0	1402	0	776	1546	0	1034	1499	0	739	1424	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		542			404			250			403	
Travel Time (s)		14.8			11.0			6.8			11.0	
Confl. Peds. (#/hr)	26		26	26		26	26		26	26		26
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.81	0.81	0.81	0.92	0.92	0.92	0.92	0.92	0.92	0.80	0.80	0.80
Heavy Vehicles (%)	2%	7%	8%	2%	2%	2%	2%	2%	2%	17%	12%	2%
Adj. Flow (vph)	64	298	70	57	112	28	28	140	67	129	104	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	432	0	57	140	0	28	207	0	129	137	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Total Split (s)	28.0	28.0		28.0	28.0		24.0	24.0		24.0	24.0	
Total Split (%)	46.7%	46.7%		46.7%	46.7%		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	
All-Red Time (s)	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-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		34.3		34.3	34.3		14.5	14.5		14.5	14.5	
Actuated g/C Ratio		0.57		0.57	0.57		0.24	0.24		0.24	0.24	
v/c Ratio		0.54		0.13	0.16		0.11	0.57		0.72	0.40	
Control Delay		10.1		10.6	9.6		16.3	25.5		42.9	21.2	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		10.1		10.6	9.6		16.3	25.5		42.9	21.2	
LOS		B		B	A		B	C		D	C	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		10.1			9.8			24.4			31.7	
Approach LOS		B			A			C			C	
Stops (vph)		174		30	66		21	155		92	84	
Fuel Used(gal)		3		0	1		0	2		2	1	
CO Emissions (g/hr)		210		28	66		18	156		112	82	
NOx Emissions (g/hr)		41		6	13		3	30		22	16	
VOC Emissions (g/hr)		49		7	15		4	36		26	19	
Dilemma Vehicles (#)		0		0	0		0	0		0	0	
Queue Length 50th (ft)		31		7	18		8	66		43	41	
Queue Length 95th (ft)		m111		35	66		22	108		74	65	
Internal Link Dist (ft)		462			324			170			323	
Turn Bay Length (ft)				150			75			75		
Base Capacity (vph)		802		444	884		344	499		246	474	
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		0.54		0.13	0.16		0.08	0.41		0.52	0.29	

Intersection Summary
Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 18.1 Intersection LOS: B
Intersection Capacity Utilization 65.4% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 78: Temple Street & George Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	0	26	55	160	62	124	511	0	0	155	52
Future Volume (vph)	26	0	26	55	160	62	124	511	0	0	155	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	50		0	75		0	0		0
Storage Lanes	0		0	1		0	1		0	0		0
Taper Length (ft)	0			15			15			0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.90		0.89	0.96						0.96	
Frt		0.932			0.958						0.966	
Flt Protected		0.976		0.950			0.950					
Satd. Flow (prot)	0	1363	0	1540	1171	0	1510	1301	0	0	1505	0
Flt Permitted		0.501		0.768			0.950					
Satd. Flow (perm)	0	678	0	1108	1171	0	1510	1301	0	0	1505	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		412			510			415			522	
Travel Time (s)		11.2			13.9			11.3			14.2	
Confl. Peds. (#/hr)	35		35	35		35			35			35
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.80	0.80	0.80	0.88	0.88	0.88	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	4%	26%	4%	8%	2%	2%	2%	2%
Parking (#/hr)					10			10				
Adj. Flow (vph)	28	0	28	69	200	78	141	581	0	0	168	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	56	0	69	278	0	141	581	0	0	225	0
Turn Type	Perm	NA		pm+pt	NA		Prot	NA			NA	
Protected Phases		6		5	2		7	4			8	
Permitted Phases	6			2								
Detector Phase	6	6		5	2		7	4			8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		3.0	7.0		3.0	7.0			7.0	
Minimum Split (s)	17.0	17.0		7.0	17.0		7.0	17.0			17.0	
Total Split (s)	29.0	29.0		10.0	39.0		13.0	40.0			27.0	
Total Split (%)	32.2%	32.2%		11.1%	43.3%		14.4%	44.4%			30.0%	
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	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	Lead	Lead		Lag			Lag				Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min			C-Min	
Act Effct Green (s)		13.1		26.4	26.4		16.0	50.3			30.3	
Actuated g/C Ratio		0.15		0.29	0.29		0.18	0.56			0.34	
v/c Ratio		0.57		0.18	0.81		0.52	0.80			0.44	
Control Delay		59.8		22.5	46.8		39.0	23.9			32.0	
Queue Delay		0.4		0.0	0.7		0.0	0.7			0.0	
Total Delay		60.2		22.5	47.4		39.0	24.6			32.0	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Parking (#/hr)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E		C	D		D	C			C	
Approach Delay		60.3			42.5			27.4			32.0	
Approach LOS		E			D			C			C	
Stops (vph)		50		37	199		99	369			154	
Fuel Used(gal)		1		1	4		2	6			3	
CO Emissions (g/hr)		70		44	269		126	399			200	
NOx Emissions (g/hr)		14		9	52		25	78			39	
VOC Emissions (g/hr)		16		10	62		29	92			46	
Dilemma Vehicles (#)		0		0	0		0	0			0	
Queue Length 50th (ft)		30		29	145		80	286			100	
Queue Length 95th (ft)		#78		46	178		m#152	#529			m164	
Internal Link Dist (ft)		332			430			335			442	
Turn Bay Length (ft)				50			75					
Base Capacity (vph)		188		380	455		269	727			506	
Starvation Cap Reductn		0		0	0		0	27			0	
Spillback Cap Reductn		21		0	37		0	9			0	
Storage Cap Reductn		0		0	0		0	0			0	
Reduced v/c Ratio		0.34		0.18	0.67		0.52	0.83			0.44	

Intersection Summary

Area Type: CBD

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 64 (71%), Referenced to phase 4:NBT and 8:SBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 33.4 | Intersection LOS: C

Intersection Capacity Utilization 63.6% | ICU Level of Service B

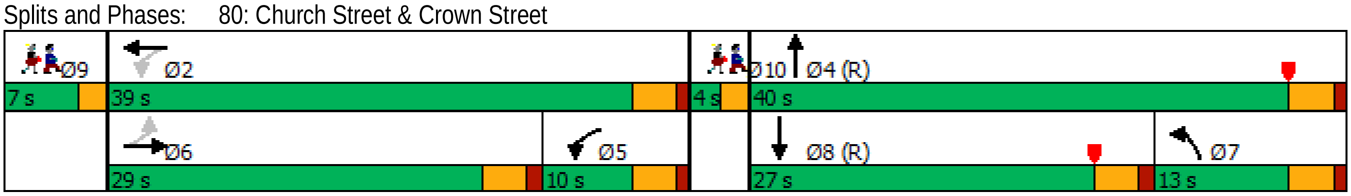
Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

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

Splits and Phases: 80: Church Street & Crown Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	50	76	57	52	83	78	341	62	52	155	52
Future Volume (vph)	211	50	76	57	52	83	78	341	62	52	155	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	0		0	75		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			0			15		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.96		0.97	0.94		0.95	0.98		0.96	0.97	
Frt		0.910			0.908			0.977			0.962	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1441	1205	0	1525	1346	0	1540	1501	0	1540	1518	0
Flt Permitted	0.480			0.565			0.950			0.950		
Satd. Flow (perm)	695	1205	0	878	1346	0	1462	1501	0	1483	1518	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		404			524			453			415	
Travel Time (s)		11.0			14.3			12.4			11.3	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.85	0.85	0.85	0.72	0.72	0.72	0.88	0.88	0.88	0.92	0.92	0.92
Heavy Vehicles (%)	9%	12%	26%	3%	2%	6%	2%	5%	11%	2%	2%	2%
Adj. Flow (vph)	248	59	89	79	72	115	89	388	70	57	168	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	248	148	0	79	187	0	89	458	0	57	225	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2								
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0		3.0	7.0		3.0	7.0	
Minimum Split (s)	7.0	17.0		7.0	17.0		7.0	17.0		7.0	17.0	
Total Split (s)	18.0	35.0		7.0	24.0		14.0	24.0		13.0	23.0	
Total Split (%)	20.0%	38.9%		7.8%	26.7%		15.6%	26.7%		14.4%	25.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lead		Lag	Lead		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	27.4	18.1		26.3	16.5		9.2	39.2		6.2	36.3	
Actuated g/C Ratio	0.30	0.20		0.29	0.18		0.10	0.44		0.07	0.40	
v/c Ratio	0.85	0.61		0.24	0.76		0.57	0.70		0.54	0.37	
Control Delay	54.1	43.8		21.2	53.7		52.5	34.9		54.7	15.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	3.5		0.0	0.0	
Total Delay	54.1	43.8		21.2	53.7		52.5	38.4		54.7	15.9	
LOS	D	D		C	D		D	D		D	B	

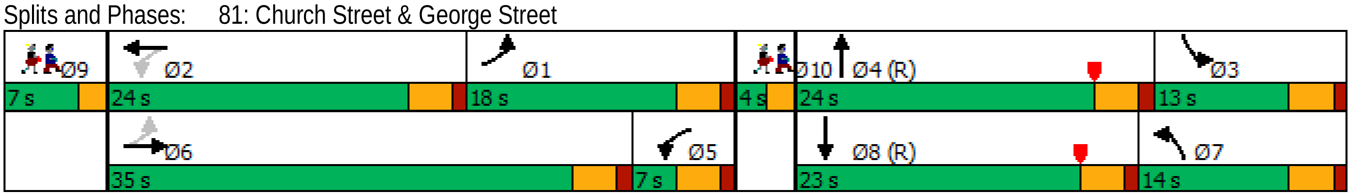
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		50.2			44.1			40.7			23.8	
Approach LOS		D			D			D			C	
Stops (vph)	190	112		37	126		73	247		52	121	
Fuel Used(gal)	4	2		1	3		1	5		1	2	
CO Emissions (g/hr)	264	139		45	179		99	375		67	131	
NOx Emissions (g/hr)	51	27		9	35		19	73		13	25	
VOC Emissions (g/hr)	61	32		10	42		23	87		16	30	
Dilemma Vehicles (#)	0	0		0	0		0	0		0	0	
Queue Length 50th (ft)	108	79		30	100		48	203		35	56	
Queue Length 95th (ft)	148	122		43	128		95	#494		76	108	
Internal Link Dist (ft)		324			444			373			335	
Turn Bay Length (ft)	150			150						75		
Base Capacity (vph)	358	415		327	299		180	653		154	613	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	117		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.69	0.36		0.24	0.63		0.49	0.85		0.37	0.37	

Intersection Summary

Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 69 (77%), Referenced to phase 4:NBT and 8:SBT, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 40.6 Intersection LOS: D
Intersection Capacity Utilization 64.4% 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: 81: Church Street & George Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	279	26	52	367	83	119	480	129	26	207	52
Future Volume (vph)	31	279	26	52	367	83	119	480	129	26	207	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			-3%			-6%			-2%	
Storage Length (ft)	50		0	0		0	75		0	0		0
Storage Lanes	1		0	0		0	1		0	0		0
Taper Length (ft)	25			0			25			25		
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
Ped Bike Factor	0.84	0.95			0.89			0.87			0.93	
Frt		0.987			0.975			0.968			0.975	
Flt Protected	0.950				0.995		0.950				0.996	
Satd. Flow (prot)	1547	1523	0	0	2559	0	1498	1355	0	0	1481	0
Flt Permitted	0.302				0.765		0.950				0.642	
Satd. Flow (perm)	415	1523	0	0	1967	0	1498	1355	0	0	955	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		413			476			522			476	
Travel Time (s)		11.3			13.0			14.2			13.0	
Confl. Peds. (#/hr)	218		218	291		291			229	229		229
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.85	0.85	0.85	0.88	0.88	0.88	0.87	0.87	0.87	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	9%	4%	8%	6%	5%	2%	2%	2%
Adj. Flow (vph)	36	328	31	59	417	94	137	552	148	28	225	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	359	0	0	570	0	137	700	0	0	310	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		6			2		7	4			8	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2		7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		3.0	7.0		7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		7.0	17.0		17.0	17.0	
Total Split (s)	32.0	32.0		32.0	32.0		15.0	47.0		32.0	32.0	
Total Split (%)	35.6%	35.6%		35.6%	35.6%		16.7%	52.2%		35.6%	35.6%	
Yellow Time (s)	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	
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-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		C-Min	C-Min	
Act Effct Green (s)	27.4	27.4			27.4		11.0	49.4			34.4	
Actuated g/C Ratio	0.30	0.30			0.30		0.12	0.55			0.38	
v/c Ratio	0.29	0.78			0.95		0.75	0.94			0.85	
Control Delay	30.8	41.4			58.8		53.6	36.1			51.5	
Queue Delay	0.0	0.0			0.0		0.0	0.1			0.0	
Total Delay	30.8	41.4			58.8		53.6	36.2			51.5	

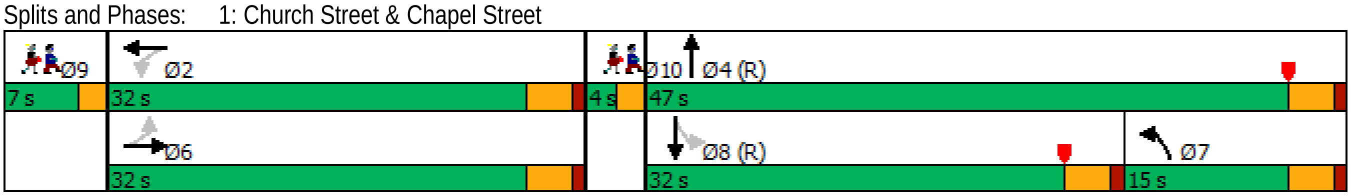
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	D			E		D	D			D	
Approach Delay		40.5			58.8			39.1			51.5	
Approach LOS		D			E			D			D	
Stops (vph)	25	265			437		108	516			221	
Fuel Used(gal)	0	5			10		2	9			5	
CO Emissions (g/hr)	28	326			680		157	640			349	
NOx Emissions (g/hr)	5	63			132		30	125			68	
VOC Emissions (g/hr)	6	76			157		36	148			81	
Dilemma Vehicles (#)	0	0			0		0	0			0	
Queue Length 50th (ft)	15	183			164		84	~449			171	
Queue Length 95th (ft)	40	267			#260		m84	m#423			#339	
Internal Link Dist (ft)		333			396			442			396	
Turn Bay Length (ft)	50						75					
Base Capacity (vph)	129	473			611		183	743			364	
Starvation Cap Reductn	0	0			0		0	1			0	
Spillback Cap Reductn	0	0			0		0	0			0	
Storage Cap Reductn	0	0			0		0	0			0	
Reduced v/c Ratio	0.28	0.76			0.93		0.75	0.94			0.85	

Intersection Summary

Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 4 (4%), Referenced to phase 4:NBT and 8:SBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 46.5 Intersection LOS: D
Intersection Capacity Utilization 92.5% 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: Church Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	232	26	21	330	83	0	0	0	93	217	98
Future Volume (vph)	41	232	26	21	330	83	0	0	0	93	217	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%			5%			-8%			4%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.96		0.87	0.94						0.87	
Frt		0.988			0.970						0.968	
Flt Protected		0.993		0.950							0.989	
Satd. Flow (prot)	0	1609	0	1501	1382	0	0	0	0	0	1357	0
Flt Permitted		0.749		0.500							0.989	
Satd. Flow (perm)	0	1201	0	690	1382	0	0	0	0	0	1272	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		502			519			547			897	
Travel Time (s)		13.7			14.2			14.9			24.5	
Confl. Peds. (#/hr)	118		118	118		118				118		121
Confl. Bikes (#/hr)			10			10						10
Peak Hour Factor	0.92	0.92	0.92	0.80	0.80	0.80	0.25	0.25	0.25	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	2%	2%	7%	4%	2%	2%	0%	22%	2%	0%
Adj. Flow (vph)	45	252	28	26	413	104	0	0	0	106	247	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	325	0	26	517	0	0	0	0	0	464	0
Turn Type	Perm	NA		Perm	NA					Perm	NA	
Protected Phases		6			2						8	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2					8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0					7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0					17.0	17.0	
Total Split (s)	26.0	26.0		26.0	26.0					26.0	26.0	
Total Split (%)	43.3%	43.3%		43.3%	43.3%					43.3%	43.3%	
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	
Total Lost Time (s)		4.0		4.0	4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min					None	None	
Act Effct Green (s)		23.6		23.6	23.6						22.0	
Actuated g/C Ratio		0.39		0.39	0.39						0.37	
v/c Ratio		0.69		0.10	0.95						1.00	
Control Delay		23.4		13.8	51.6						64.1	
Queue Delay		0.0		0.0	0.0						0.0	
Total Delay		23.4		13.8	51.6						64.1	
LOS		C		B	D						E	
Approach Delay		23.4			49.8						64.1	
Approach LOS		C			D						E	

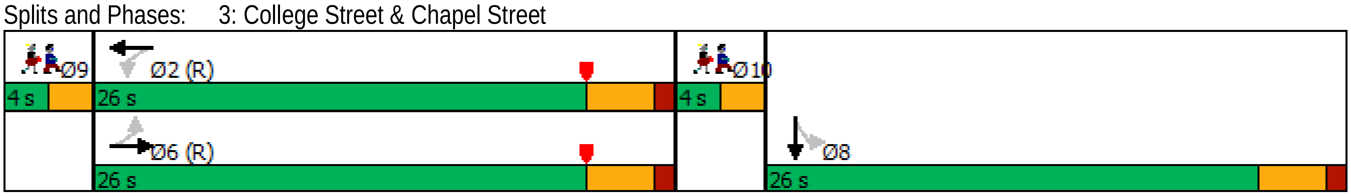
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Stops (vph)		229		16	318						325	
Fuel Used(gal)		4		0	7						10	
CO Emissions (g/hr)		251		15	517						677	
NOx Emissions (g/hr)		49		3	101						132	
VOC Emissions (g/hr)		58		3	120						157	
Dilemma Vehicles (#)		0		0	0						0	
Queue Length 50th (ft)		95		6	~190						163	
Queue Length 95th (ft)		m#164		18	#306						#324	
Internal Link Dist (ft)		422			439			467			817	
Turn Bay Length (ft)												
Base Capacity (vph)		472		271	543						466	
Starvation Cap Reductn		0		0	0						0	
Spillback Cap Reductn		0		0	0						0	
Storage Cap Reductn		0		0	0						0	
Reduced v/c Ratio		0.69		0.10	0.95						1.00	

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 48.4 Intersection LOS: D
Intersection Capacity Utilization 81.2% 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: 3: College Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	310	26	26	351	269	191	403	52	0	0	0
Future Volume (vph)	103	310	26	26	351	269	191	403	52	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-5%			-4%			-10%			5%	
Storage Length (ft)	50		0	50		100	125		0	0		0
Storage Lanes	0		0	0		1	1		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	0.95	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor		0.97			0.99	0.75		0.91				
Frt		0.992				0.850		0.988				
Flt Protected		0.988			0.997			0.985				
Satd. Flow (prot)	0	1603	0	0	1619	1419	0	3015	0	0	0	0
Flt Permitted		0.720			0.954			0.985				
Satd. Flow (perm)	0	1151	0	0	1533	1071	0	2801	0	0	0	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		413			498			404			482	
Travel Time (s)		11.3			13.6			11.0			13.1	
Confl. Peds. (#/hr)	112		112	183		183	112		112			
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.87	0.87	0.87	0.87	0.87	0.87	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	4%	1%	5%	4%	2%	2%	2%	2%
Adj. Flow (vph)	112	337	28	30	403	309	220	463	60	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	477	0	0	433	309	0	743	0	0	0	0
Turn Type	Perm	NA		Perm	NA	Perm	Split	NA				
Protected Phases		6			2		4	4				
Permitted Phases	6			2		2						
Detector Phase	6	6		2	2	2	4	4				
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0				
Minimum Split (s)	18.0	18.0		18.0	18.0	18.0	18.0	18.0				
Total Split (s)	34.0	34.0		34.0	34.0	34.0	18.0	18.0				
Total Split (%)	56.7%	56.7%		56.7%	56.7%	56.7%	30.0%	30.0%				
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	1.0	1.0	1.0	1.0				
Lost Time Adjust (s)		0.0			0.0	0.0		0.0				
Total Lost Time (s)		4.0			4.0	4.0		4.0				
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	C-Min	C-Min				
Act Effct Green (s)		26.5			26.5	26.5		22.3				
Actuated g/C Ratio		0.44			0.44	0.44		0.37				
v/c Ratio		0.94			0.64	0.65		0.66				
Control Delay		44.9			17.3	19.8		25.1				
Queue Delay		0.0			0.0	0.0		0.0				
Total Delay		44.9			17.3	19.8		25.1				

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D			B	B		C				
Approach Delay		44.9			18.3			25.1				
Approach LOS		D			B			C				
Stops (vph)		366			270	199		436				
Fuel Used(gal)		7			4	3		7				
CO Emissions (g/hr)		487			277	209		503				
NOx Emissions (g/hr)		95			54	41		98				
VOC Emissions (g/hr)		113			64	48		116				
Dilemma Vehicles (#)		0			0	0		0				
Queue Length 50th (ft)		144			107	77		110				
Queue Length 95th (ft)		#305			168	137		#244				
Internal Link Dist (ft)		333			418			324			402	
Turn Bay Length (ft)						100						
Base Capacity (vph)		575			766	535		1121				
Starvation Cap Reductn		0			0	0		0				
Spillback Cap Reductn		0			0	0		0				
Storage Cap Reductn		0			0	0		0				
Reduced v/c Ratio		0.83			0.57	0.58		0.66				

Intersection Summary

Area Type: CBD
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 50 (83%), Referenced to phase 4:NBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 27.3 — Intersection LOS: C
Intersection Capacity Utilization 83.6% — 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: Church Street/Whitney Avenue & Grove Street

Lane Group	Ø9	Ø10
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		
Fuel Used(gal)		
CO Emissions (g/hr)		
NOx Emissions (g/hr)		
VOC Emissions (g/hr)		
Dilemma Vehicles (#)		
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

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL2	NBT	NBR	SBL	SBT	SBR	SEL
Lane Configurations												
Traffic Volume (vph)	52	522	26	269	26	248	134	232	26	103	26	30
Future Volume (vph)	52	522	26	269	26	248	134	232	26	103	26	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0		0			0	0		0	0
Storage Lanes	1		0		1			0	0		0	1
Taper Length (ft)	0								0			0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98					0.79			0.87		
Frt		0.993			0.850		0.905			0.977		
Flt Protected	0.950					0.950				0.992		0.950
Satd. Flow (prot)	1586	1682	0	1801	892	1616	1262	0	0	1554	0	997
Flt Permitted	0.950					0.566				0.549		0.950
Satd. Flow (perm)	1586	1682	0	1801	892	963	1262	0	0	838	0	997
Right Turn on Red			No					No				
Satd. Flow (RTOR)												
Link Speed (mph)		25		25			25			25		25
Link Distance (ft)		309		401			898			511		228
Travel Time (s)		8.4		10.9			24.5			13.9		6.2
Confl. Peds. (#/hr)			282					165	165		376	
Confl. Bikes (#/hr)			15		15			15			15	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90	0.92	0.92	0.92	0.94
Heavy Vehicles (%)	10%	6%	2%	2%	75%	8%	2%	6%	2%	2%	2%	75%
Adj. Flow (vph)	57	567	28	292	28	276	149	258	28	112	28	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	595	0	292	28	276	407	0	0	168	0	32
Turn Type	Prot	NA		NA	Over	D.P+P	NA		Perm	NA		Prot
Protected Phases	1	1 2		2	9	3	3 4			4		9
Permitted Phases						4			4			
Detector Phase	1	1 2		2	9	3	3 4		4	4		9
Switch Phase												
Minimum Initial (s)	4.0			12.0	2.0	4.0			12.0	12.0		2.0
Minimum Split (s)	10.0			18.0	10.0	10.0			19.0	19.0		10.0
Total Split (s)	12.0			25.0	13.0	11.0			25.0	25.0		13.0
Total Split (%)	13.3%			27.8%	14.4%	12.2%			27.8%	27.8%		14.4%
Yellow Time (s)	4.0			4.0	4.0	4.0			4.0	4.0		4.0
All-Red Time (s)	2.0			1.0	2.0	2.0			1.0	1.0		2.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0				0.0		0.0
Total Lost Time (s)	6.0			5.0	6.0	6.0				5.0		6.0
Lead/Lag	Lag			Lead		Lag			Lead	Lead		
Lead-Lag Optimize?												
Recall Mode	None			C-Min	None	None			None	None		None
Act Effct Green (s)	6.0	35.3		24.3	6.6	24.0	30.0			20.0		6.6
Actuated g/C Ratio	0.07	0.39		0.27	0.07	0.27	0.33			0.22		0.07
v/c Ratio	0.54	0.90		0.60	0.43	0.94	0.97			0.90		0.44
Control Delay	60.8	47.6		37.1	60.2	71.6	68.7			81.9		58.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0			0.0		0.0
Total Delay	60.8	47.6		37.1	60.2	71.6	68.7			81.9		58.8
LOS	E	D		D	E	E	E			F		E

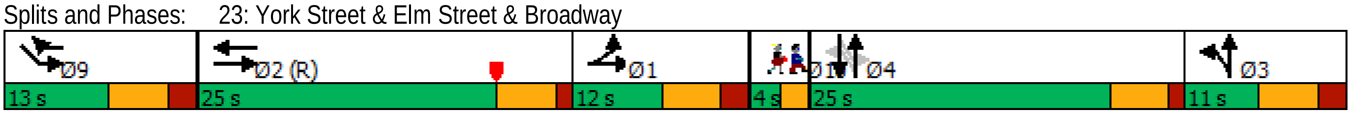
Lane Group	Ø10
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Ped Bike Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	10
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	2.0
Minimum Split (s)	4.0
Total Split (s)	4.0
Total Split (%)	4%
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL2	NBT	NBR	SBL	SBT	SBR	SEL
Approach Delay		48.8		39.1			69.8			81.9		58.8
Approach LOS		D		D			E			F		E
Stops (vph)	49	427		232	27	198	306			128		31
Fuel Used(gal)	1	8		4	1	6	9			4		1
CO Emissions (g/hr)	68	586		268	36	438	635			290		52
NOx Emissions (g/hr)	13	114		52	7	85	124			56		10
VOC Emissions (g/hr)	16	136		62	8	102	147			67		12
Dilemma Vehicles (#)	0	0		0	0	0	0			0		0
Queue Length 50th (ft)	32	~365		155	15	125	225			93		18
Queue Length 95th (ft)	#83	#567		#266	#48	#252	#412			#215		#52
Internal Link Dist (ft)		229		321			818			431		148
Turn Bay Length (ft)						150						
Base Capacity (vph)	105	659		486	69	293	420			186		77
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	0.54	0.90		0.60	0.41	0.94	0.97			0.90		0.42

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 5 (6%), Referenced to phase 2:EBWB, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 58.0 Intersection LOS: E
Intersection Capacity Utilization 89.5% 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.

Splits and Phases: 23: York Street & Elm Street & Broadway



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	26	26	26	310	118	134	578	78	26	103	52
Future Volume (vph)	26	26	26	26	310	118	134	578	78	26	103	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	10	11	11	10	11	11
Storage Length (ft)	50		0	50		0	50		0	50		0
Storage Lanes	0		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.94		0.88	0.95		0.89	0.98			0.95	
Frt		0.955			0.959			0.982			0.949	
Flt Protected		0.984		0.950			0.950			0.950		
Satd. Flow (prot)	0	1598	0	1711	1613	0	1668	1749	0	1652	1615	0
Flt Permitted		0.540		0.781			0.650			0.148		
Satd. Flow (perm)	0	877	0	1236	1613	0	1016	1749	0	257	1615	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		511			419			515			898	
Travel Time (s)		13.9			11.4			14.0			24.5	
Confl. Peds. (#/hr)	60		60	60		60	60		60	60		60
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.75	0.75	0.75	0.80	0.80	0.80	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	10%	1%	1%	2%	2%	2%	2%
Adj. Flow (vph)	28	28	28	35	413	157	168	723	98	28	112	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	84	0	35	570	0	168	821	0	28	169	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0		17.0	17.0		17.0	17.0	
Total Split (s)	21.0	21.0		21.0	21.0		31.0	31.0		31.0	31.0	
Total Split (%)	35.0%	35.0%		35.0%	35.0%		51.7%	51.7%		51.7%	51.7%	
Yellow Time (s)	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	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		21.8		21.8	21.8		27.0	27.0		27.0	27.0	
Actuated g/C Ratio		0.36		0.36	0.36		0.45	0.45		0.45	0.45	
v/c Ratio		0.26		0.08	0.97		0.37	1.04		0.24	0.23	
Control Delay		18.4		22.0	54.7		13.9	64.2		16.9	11.2	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		18.4		22.0	54.7		13.9	64.2		16.9	11.2	

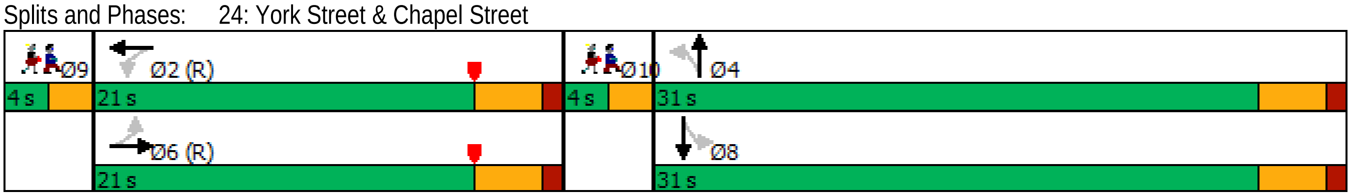
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B		C	D		B	E		B	B	
Approach Delay		18.4			52.8			55.6			12.0	
Approach LOS		B			D			E			B	
Stops (vph)		58		25	326		85	523		20	91	
Fuel Used(gal)		1		0	8		1	13		0	2	
CO Emissions (g/hr)		59		21	528		90	942		26	132	
NOx Emissions (g/hr)		12		4	103		18	183		5	26	
VOC Emissions (g/hr)		14		5	122		21	218		6	31	
Dilemma Vehicles (#)		0		0	0		0	0		0	0	
Queue Length 50th (ft)		19		11	217		38	~333		6	35	
Queue Length 95th (ft)		59		m15	m#313		68	#432		24	70	
Internal Link Dist (ft)		431			339			435			818	
Turn Bay Length (ft)				50			50			50		
Base Capacity (vph)		318		449	586		457	787		115	726	
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		0.26		0.08	0.97		0.37	1.04		0.24	0.23	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.04
Intersection Signal Delay: 48.5 — Intersection LOS: D
Intersection Capacity Utilization 80.1% — 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: 24: York Street & Chapel Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	26	222	119	36	465	0	0	145	11
Future Volume (vph)	0	0	0	26	222	119	36	465	0	0	145	11
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
Ped Bike Factor												
Frt					0.956						0.990	
Flt Protected					0.997			0.996				
Satd. Flow (prot)	0	0	0	0	1732	0	0	1793	0	0	1783	0
Flt Permitted					0.997			0.996				
Satd. Flow (perm)	0	0	0	0	1732	0	0	1793	0	0	1783	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		502			419			405			515	
Travel Time (s)		13.7			11.4			11.0			14.0	
Confl. Peds. (#/hr)				17		17	74					74
Confl. Bikes (#/hr)						10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.86	0.86	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	0	0	0	33	285	153	42	541	0	0	158	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	471	0	0	583	0	0	170	0
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 70.3% ICU Level of Service C

Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	32.9
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					✥			↰			↱	
Traffic Vol, veh/h	0	0	0	26	222	119	36	465	0	0	145	11
Future Vol, veh/h	0	0	0	26	222	119	36	465	0	0	145	11
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.86	0.86	0.86	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	1	1	2	2	2	2	2	2
Mvmt Flow	0	0	0	33	285	153	42	541	0	0	158	12
Number of Lanes	0	0	0	0	1	0	0	1	0	0	1	0

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	25.9	44.5	12.3
HCM LOS	D	E	B

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	7%	7%	0%
Vol Thru, %	93%	60%	93%
Vol Right, %	0%	32%	7%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	501	367	156
LT Vol	36	26	0
Through Vol	465	222	145
RT Vol	0	119	11
Lane Flow Rate	583	471	170
Geometry Grp	1	1	1
Degree of Util (X)	0.928	0.768	0.305
Departure Headway (Hd)	5.735	5.877	6.483
Convergence, Y/N	Yes	Yes	Yes
Cap	629	612	558
Service Time	3.818	3.965	4.483
HCM Lane V/C Ratio	0.927	0.77	0.305
HCM Control Delay	44.5	25.9	12.3
HCM Lane LOS	E	D	B
HCM 95th-tile Q	12.2	7.1	1.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	418	26	52	0	52	0	410	158	26	145	0
Future Volume (vph)	170	418	26	52	0	52	0	410	158	26	145	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		100	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	0			0			0			0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.94	0.99			0.94				0.86		0.99	
Frt		0.991			0.932				0.850			
Flt Protected	0.950				0.976						0.993	
Satd. Flow (prot)	1662	1792	0	0	1551	0	0	1818	1516	0	1788	0
Flt Permitted	0.733				0.685						0.801	
Satd. Flow (perm)	1204	1792	0	0	1078	0	0	1818	1309	0	1434	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		504			403			370			405	
Travel Time (s)		13.7			11.0			10.1			11.0	
Confl. Peds. (#/hr)	33		33	33		33	48		48	48		48
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.86	0.86	0.86	0.92	0.92	0.92	0.87	0.87	0.87	0.92	0.92	0.92
Heavy Vehicles (%)	5%	1%	0%	2%	2%	2%	2%	1%	3%	2%	2%	2%
Adj. Flow (vph)	198	486	30	57	0	57	0	471	182	28	158	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	198	516	0	0	114	0	0	471	182	0	186	0
Turn Type	Perm	NA		Perm	NA			NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6					4	8		
Detector Phase	2	2		6	6			4	4	8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0	7.0	7.0	7.0	
Minimum Split (s)	17.0	17.0		17.0	17.0			17.0	17.0	17.0	17.0	
Total Split (s)	22.0	22.0		22.0	22.0			30.0	30.0	30.0	30.0	
Total Split (%)	36.7%	36.7%		36.7%	36.7%			50.0%	50.0%	50.0%	50.0%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0	4.0			4.0			4.0	4.0		4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min			None	None	None	None	
Act Effct Green (s)	30.4	30.4			30.4			20.0	20.0		20.0	
Actuated g/C Ratio	0.51	0.51			0.51			0.33	0.33		0.33	
v/c Ratio	0.33	0.57			0.21			0.78	0.42		0.39	
Control Delay	13.8	18.2			6.5			26.7	17.2		16.5	
Queue Delay	0.0	0.0			0.0			0.1	0.0		0.0	
Total Delay	13.8	18.2			6.5			26.8	17.2		16.5	
LOS	B	B			A			C	B		B	

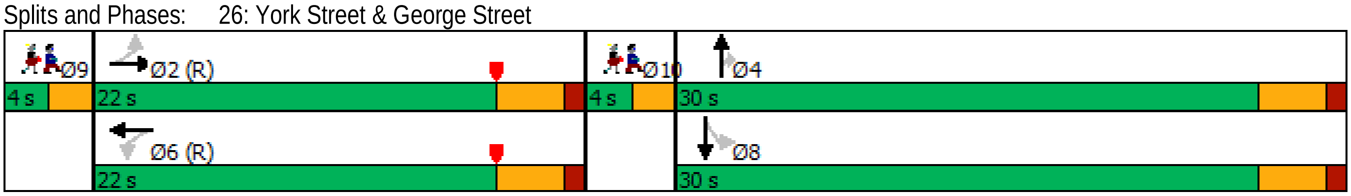
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		17.0			6.5			24.1			16.5	
Approach LOS		B			A			C			B	
Stops (vph)	110	269			39			342	110		118	
Fuel Used(gal)	2	5			1			5	1		2	
CO Emissions (g/hr)	114	320			45			338	103		113	
NOx Emissions (g/hr)	22	62			9			66	20		22	
VOC Emissions (g/hr)	26	74			11			78	24		26	
Dilemma Vehicles (#)	0	0			0			0	0		0	
Queue Length 50th (ft)	37	112			9			149	50		50	
Queue Length 95th (ft)	111	#329			m29			197	78		82	
Internal Link Dist (ft)		424			323			290			325	
Turn Bay Length (ft)									100			
Base Capacity (vph)	609	906			545			787	567		621	
Starvation Cap Reductn	0	0			0			26	0		0	
Spillback Cap Reductn	0	0			0			0	0		0	
Storage Cap Reductn	0	0			0			0	0		0	
Reduced v/c Ratio	0.33	0.57			0.21			0.62	0.32		0.30	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 9 (15%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 19.0 Intersection LOS: B
Intersection Capacity Utilization 74.3% 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.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 26: York Street & George Street



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	129	0	0	429	0	145
Future Volume (vph)	129	0	0	429	0	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	1801	0	0	1717	1589	0
Flt Permitted						
Satd. Flow (perm)	1801	0	0	1717	1589	0
Link Speed (mph)	25			25	25	
Link Distance (ft)	419			502	522	
Travel Time (s)	11.4			13.7	14.2	
Confl. Peds. (#/hr)					173	173
Confl. Bikes (#/hr)		15				15
Peak Hour Factor	0.92	0.92	0.89	0.89	0.62	0.62
Heavy Vehicles (%)	2%	2%	0%	7%	1%	0%
Adj. Flow (vph)	140	0	0	482	0	234
Shared Lane Traffic (%)						
Lane Group Flow (vph)	140	0	0	482	234	0
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 45.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	3.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	129	0	0	429	0	145
Future Vol, veh/h	129	0	0	429	0	145
Conflicting Peds, #/hr	0	0	0	0	173	173
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	89	89	62	62
Heavy Vehicles, %	2	2	0	7	1	0
Mvmt Flow	140	0	0	482	0	234

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	795	313
Stage 1	-	-	-	-	140	-
Stage 2	-	-	-	-	655	-
Critical Hdwy	-	-	-	-	6.41	6.2
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	-	-	3.509	3.3
Pot Cap-1 Maneuver	-	0	0	-	358	732
Stage 1	-	0	0	-	889	-
Stage 2	-	0	0	-	519	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	311	635
Mov Cap-2 Maneuver	-	-	-	-	311	-
Stage 1	-	-	-	-	889	-
Stage 2	-	-	-	-	450	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	635	-	-
HCM Lane V/C Ratio	0.368	-	-
HCM Control Delay (s)	13.9	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1.7	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	481	5	5	207	26	26	11	52	52	11	26
Future Volume (vph)	93	481	5	5	207	26	26	11	52	52	11	26
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
Ped Bike Factor												
Frt		0.999			0.985			0.921			0.960	
Flt Protected		0.992			0.999			0.985			0.972	
Satd. Flow (prot)	0	1787	0	0	1772	0	0	1634	0	0	1680	0
Flt Permitted		0.992			0.999			0.985			0.972	
Satd. Flow (perm)	0	1787	0	0	1772	0	0	1634	0	0	1680	0
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		403			487			120			398	
Travel Time (s)		11.0			13.3			3.3			10.9	
Confl. Peds. (#/hr)	25		64	64		25	14		14	14		14
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.81	0.81	0.81	0.95	0.88	0.88	0.64	0.64	0.64	0.76	0.76	0.76
Heavy Vehicles (%)	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	115	594	6	5	235	30	41	17	81	68	14	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	715	0	0	270	0	0	139	0	0	116	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 65.2% ICU Level of Service C

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	13.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	93	481	5	5	207	26	26	11	52	52	11	26
Future Vol, veh/h	93	481	5	5	207	26	26	11	52	52	11	26
Conflicting Peds, #/hr	25	0	64	64	0	25	14	0	14	14	0	14
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	95	88	88	64	64	64	76	76	76
Heavy Vehicles, %	1	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	115	594	6	5	235	30	41	17	81	68	14	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	290	0	0	664	0	0	1189	1191	675	1175	1179	289
Stage 1	-	-	-	-	-	-	891	891	-	285	285	-
Stage 2	-	-	-	-	-	-	298	300	-	890	894	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1278	-	-	925	-	-	165	187	454	168	190	750
Stage 1	-	-	-	-	-	-	337	361	-	722	676	-
Stage 2	-	-	-	-	-	-	711	666	-	337	360	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1254	-	-	880	-	-	122	149	427	107	152	728
Mov Cap-2 Maneuver	-	-	-	-	-	-	122	149	-	107	152	-
Stage 1	-	-	-	-	-	-	276	296	-	611	658	-
Stage 2	-	-	-	-	-	-	651	649	-	219	295	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0.2	46.7	83.9
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	218	1254	-	-	880	-	-	150
HCM Lane V/C Ratio	0.638	0.092	-	-	0.006	-	-	0.781
HCM Control Delay (s)	46.7	8.2	0	-	9.1	0	-	83.9
HCM Lane LOS	E	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	3.8	0.3	-	-	0	-	-	4.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	155	1053	284	72	269	0	0	196	26
Future Volume (vph)	0	0	0	155	1053	284	72	269	0	0	196	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.91	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					0.99						1.00	
Frt					0.971						0.984	
Flt Protected					0.995			0.990				
Satd. Flow (prot)	0	0	0	0	4695	0	0	1716	0	0	1771	0
Flt Permitted					0.995			0.679				
Satd. Flow (perm)	0	0	0	0	4695	0	0	1177	0	0	1771	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		495			928			252			370	
Travel Time (s)		13.5			25.3			6.9			10.1	
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.98	0.98	0.98	0.86	0.86	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	3%	1%	2%	7%	2%	2%	2%	0%
Adj. Flow (vph)	0	0	0	158	1074	290	84	313	0	0	213	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1522	0	0	397	0	0	241	0
Turn Type				Perm	NA		D.P+P	NA			NA	
Protected Phases					6		7	7 8			8	
Permitted Phases				6			8					
Detector Phase				6	6		7 8	7 8			8	
Switch Phase												
Minimum Initial (s)				12.0	12.0		7.0				12.0	
Minimum Split (s)				18.0	18.0		10.0				16.0	
Total Split (s)				30.0	30.0		16.0				20.0	
Total Split (%)				33.3%	33.3%		17.8%				22.2%	
Yellow Time (s)				4.0	4.0		3.0				3.0	
All-Red Time (s)				2.0	2.0		0.0				1.0	
Lost Time Adjust (s)					0.0						0.0	
Total Lost Time (s)					6.0						4.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes					
Recall Mode				C-Max	C-Max		None				None	
Act Effct Green (s)					30.3			28.5			14.5	
Actuated g/C Ratio					0.34			0.32			0.16	
v/c Ratio					0.96			0.88			0.85	
Control Delay					49.0			48.6			62.8	
Queue Delay					0.0			0.4			0.0	
Total Delay					49.0			49.0			62.8	
LOS					D			D			E	
Approach Delay					49.0			49.0			62.8	
Approach LOS					D			D			E	
Stops (vph)					1105			290			201	
Fuel Used(gal)					31			5			4	

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Ped Bike 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)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
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)	24.0
Total Split (s)	24.0
Total Split (%)	27%
Yellow Time (s)	4.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Stops (vph)	
Fuel Used(gal)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
CO Emissions (g/hr)					2162			365			301	
NOx Emissions (g/hr)					421			71			59	
VOC Emissions (g/hr)					501			85			70	
Dilemma Vehicles (#)					0			0			0	
Queue Length 50th (ft)					~387			185			133	
Queue Length 95th (ft)					#485			#303			#246	
Internal Link Dist (ft)		415			848			172			290	
Turn Bay Length (ft)												
Base Capacity (vph)					1579			470			314	
Starvation Cap Reductn					0			5			0	
Spillback Cap Reductn					0			0			0	
Storage Cap Reductn					0			0			0	
Reduced v/c Ratio					0.96			0.85			0.77	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 6:WBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 50.6 Intersection LOS: D

Intersection Capacity Utilization 71.5% ICU Level of Service C

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: 71: York Street & North Frontage Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	479	114	78	207	0	0	0	0	100	253	26
Future Volume (vph)	0	479	114	78	207	0	0	0	0	100	253	26
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
Ped Bike Factor		0.98									0.96	
Frt		0.974									0.991	
Flt Protected					0.986						0.987	
Satd. Flow (prot)	0	1521	0	0	1598	0	0	0	0	0	1485	0
Flt Permitted					0.498						0.987	
Satd. Flow (perm)	0	1521	0	0	807	0	0	0	0	0	1434	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		487			542			382			372	
Travel Time (s)		13.3			14.8			10.4			10.1	
Confl. Peds. (#/hr)	60		60	60		60	60		60	60		60
Confl. Bikes (#/hr)			10			10						10
Peak Hour Factor	0.88	0.88	0.88	0.92	0.92	0.92	0.92	0.92	0.92	0.94	0.94	0.94
Heavy Vehicles (%)	2%	4%	4%	2%	2%	2%	2%	2%	2%	6%	9%	2%
Adj. Flow (vph)	0	544	130	85	225	0	0	0	0	106	269	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	674	0	0	310	0	0	0	0	0	403	0
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Detector Phase		2		6	6					4	4	
Switch Phase												
Minimum Initial (s)		7.0		7.0	7.0					7.0	7.0	
Minimum Split (s)		18.0		18.0	18.0					18.0	18.0	
Total Split (s)		30.0		30.0	30.0					22.0	22.0	
Total Split (%)		50.0%		50.0%	50.0%					36.7%	36.7%	
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)		0.0			0.0						0.0	
Total Lost Time (s)		4.0			4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		C-Min		C-Min	C-Min					None	None	
Act Effct Green (s)		29.2			29.2						18.0	
Actuated g/C Ratio		0.49			0.49						0.30	
v/c Ratio		0.91			0.79						0.94	
Control Delay		34.6			38.0						55.2	
Queue Delay		0.0			0.0						0.0	
Total Delay		34.6			38.0						55.2	
LOS		C			D						E	
Approach Delay		34.6			38.0						55.2	
Approach LOS		C			D						E	
Stops (vph)		414			204						308	

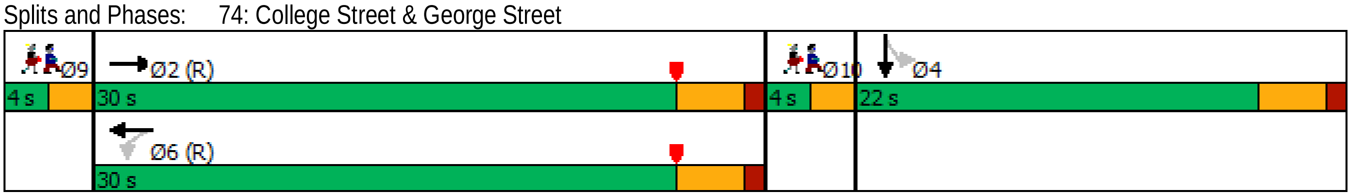
Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Util. Factor		
Ped Bike Factor		
Frt		
Flt Protected		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		
Approach Delay		
Approach LOS		
Stops (vph)		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Fuel Used(gal)		8			4						7	
CO Emissions (g/hr)		575			301						464	
NOx Emissions (g/hr)		112			59						90	
VOC Emissions (g/hr)		133			70						108	
Dilemma Vehicles (#)		0			0						0	
Queue Length 50th (ft)		~224			94						140	
Queue Length 95th (ft)		#435			#254						#294	
Internal Link Dist (ft)		407			462			302			292	
Turn Bay Length (ft)												
Base Capacity (vph)		741			393						430	
Starvation Cap Reductn		0			0						0	
Spillback Cap Reductn		0			0						0	
Storage Cap Reductn		0			0						0	
Reduced v/c Ratio		0.91			0.79						0.94	

Intersection Summary	
Area Type: CBD	
Cycle Length: 60	
Actuated Cycle Length: 60	
Offset: 45 (75%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 41.3	Intersection LOS: D
Intersection Capacity Utilization 93.1%	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: 74: College Street & George Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	406	160	52	206	26	52	129	52	176	103	26
Future Volume (vph)	103	406	160	52	206	26	52	129	52	176	103	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	75		0	75		0
Storage Lanes	0		0	1		0	1		0	1		1
Taper Length (ft)	0			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.97			0.99		0.95	0.98		0.96	0.98	
Frt		0.968			0.983			0.957			0.970	
Flt Protected		0.992		0.950			0.950			0.950		
Satd. Flow (prot)	0	1532	0	1540	1578	0	1540	1513	0	1510	1509	0
Flt Permitted		0.905		0.308			0.663			0.584		
Satd. Flow (perm)	0	1390	0	499	1578	0	1026	1513	0	890	1509	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		542			404			250			403	
Travel Time (s)		14.8			11.0			6.8			11.0	
Confl. Peds. (#/hr)	26		26	26		26	26		26	26		26
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.85	0.85	0.85	0.92	0.92	0.92	0.92	0.92	0.92	0.87	0.87	0.87
Heavy Vehicles (%)	2%	2%	0%	2%	2%	2%	2%	2%	2%	4%	5%	2%
Adj. Flow (vph)	121	478	188	57	224	28	57	140	57	202	118	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	787	0	57	252	0	57	197	0	202	148	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Total Split (s)	28.0	28.0		28.0	28.0		24.0	24.0		24.0	24.0	
Total Split (%)	46.7%	46.7%		46.7%	46.7%		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	
All-Red Time (s)	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-Lag Optimize?												
Recall Mode	C-Min	C-Min		C-Min	C-Min		None	None		None	None	
Act Effct Green (s)		32.1		32.1	32.1		16.7	16.7		16.7	16.7	
Actuated g/C Ratio		0.54		0.54	0.54		0.28	0.28		0.28	0.28	
v/c Ratio		1.06		0.21	0.30		0.20	0.47		0.81	0.35	
Control Delay		60.2		13.7	11.4		16.8	20.8		46.2	18.6	
Queue Delay		0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		60.2		13.7	11.4		16.8	20.8		46.2	18.6	
LOS		E		B	B		B	C		D	B	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	4.0	4.0
Total Split (s)	4.0	4.0
Total Split (%)	7%	7%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		60.2			11.8			19.9			34.5	
Approach LOS		E			B			B			C	
Stops (vph)		286		36	136		39	140		149	94	
Fuel Used(gal)		12		0	2		1	2		3	1	
CO Emissions (g/hr)		866		32	130		35	134		198	90	
NOx Emissions (g/hr)		168		6	25		7	26		38	18	
VOC Emissions (g/hr)		201		7	30		8	31		46	21	
Dilemma Vehicles (#)		0		0	0		0	0		0	0	
Queue Length 50th (ft)		~78		9	43		15	56		64	40	
Queue Length 95th (ft)		m#462		40	115		38	103		#144	76	
Internal Link Dist (ft)		462			324			170			323	
Turn Bay Length (ft)				150			75			75		
Base Capacity (vph)		742		266	843		342	504		296	503	
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		1.06		0.21	0.30		0.17	0.39		0.68	0.29	

Intersection Summary

Area Type: CBD

Cycle Length: 60

Actuated Cycle Length: 60

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 40.1 Intersection LOS: D

Intersection Capacity Utilization 91.5% ICU Level of Service F

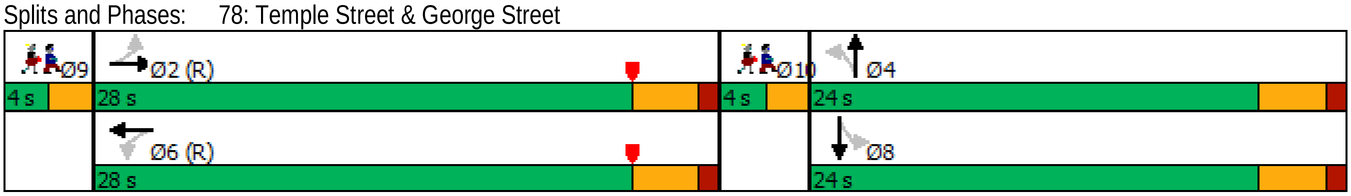
Analysis Period (min) 15

~ 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: 78: Temple Street & George Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	0	52	52	310	119	109	609	0	0	232	52
Future Volume (vph)	52	0	52	52	310	119	109	609	0	0	232	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	50		0	75		0	0		0
Storage Lanes	0		0	1		0	1		0	0		0
Taper Length (ft)	0			15			15			0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.92		0.91	0.96						0.97	
Frt		0.932			0.958						0.975	
Flt Protected		0.976		0.950			0.950					
Satd. Flow (prot)	0	1391	0	1540	1216	0	1540	1338	0	0	1536	0
Flt Permitted		0.506		0.689			0.950					
Satd. Flow (perm)	0	721	0	1018	1216	0	1540	1338	0	0	1536	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		412			510			415			522	
Travel Time (s)		11.2			13.9			11.3			14.2	
Confl. Peds. (#/hr)	35		35	35		35			35			35
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	2%	4%	12%	2%	5%	2%	2%	2%	2%
Parking (#/hr)					10			10				
Adj. Flow (vph)	57	0	57	57	337	129	117	655	0	0	252	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	114	0	57	466	0	117	655	0	0	309	0
Turn Type	Perm	NA		pm+pt	NA		Prot	NA			NA	
Protected Phases		6		5	2		7	4			8	
Permitted Phases	6			2								
Detector Phase	6	6		5	2		7	4			8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		3.0	7.0		3.0	7.0			7.0	
Minimum Split (s)	17.0	17.0		7.0	17.0		7.0	17.0			17.0	
Total Split (s)	29.0	29.0		10.0	39.0		13.0	40.0			27.0	
Total Split (%)	32.2%	32.2%		11.1%	43.3%		14.4%	44.4%			30.0%	
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	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	Lead	Lead		Lag			Lag				Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min			C-Min	
Act Effct Green (s)		28.7		35.0	35.0		11.6	41.8			26.2	
Actuated g/C Ratio		0.32		0.39	0.39		0.13	0.46			0.29	
v/c Ratio		0.50		0.13	0.99		0.59	1.05			0.69	
Control Delay		36.1		19.0	68.0		49.0	71.7			32.7	
Queue Delay		4.6		0.0	42.3		0.0	5.7			0.0	
Total Delay		40.6		19.0	110.3		49.0	77.4			32.7	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Parking (#/hr)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

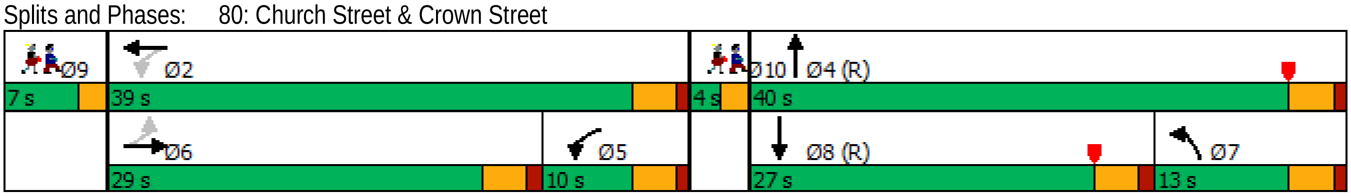
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D		B	F		D	E			C	
Approach Delay		40.6			100.4			73.1			32.7	
Approach LOS		D			F			E			C	
Stops (vph)		88		33	355		94	429			277	
Fuel Used(gal)		1		1	9		2	13			4	
CO Emissions (g/hr)		103		39	640		128	887			295	
NOx Emissions (g/hr)		20		8	125		25	173			57	
VOC Emissions (g/hr)		24		9	148		30	206			68	
Dilemma Vehicles (#)		0		0	0		0	0			0	
Queue Length 50th (ft)		57		20	257		63	~446			193	
Queue Length 95th (ft)		#118		45	#461		m#90	m#625			m227	
Internal Link Dist (ft)		332			430			335			442	
Turn Bay Length (ft)				50			75					
Base Capacity (vph)		232		432	472		198	621			446	
Starvation Cap Reductn		0		0	0		0	9			0	
Spillback Cap Reductn		66		0	222		0	8			0	
Storage Cap Reductn		0		0	0		0	0			0	
Reduced v/c Ratio		0.69		0.13	1.86		0.59	1.07			0.69	

Intersection Summary

Area Type: CBD
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 35 (39%), Referenced to phase 4:NBT and 8:SBT, Start of Yellow
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.05
Intersection Signal Delay: 72.0 Intersection LOS: E
Intersection Capacity Utilization 82.7% 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: 80: Church Street & Crown Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	258	277	185	78	103	121	78	346	72	52	207	78
Future Volume (vph)	258	277	185	78	103	121	78	346	72	52	207	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	150		0	0		0	75		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			0			15		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.96	0.98			0.95			0.98			0.97	
Frt		0.940			0.919			0.974			0.959	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1510	1456	0	1481	1366	0	1540	1518	0	1540	1518	0
Flt Permitted	0.421			0.183			0.950			0.950		
Satd. Flow (perm)	645	1456	0	285	1366	0	1540	1518	0	1540	1518	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		404			524			453			415	
Travel Time (s)		11.0			14.3			12.4			11.3	
Confl. Peds. (#/hr)	20		20	20		20			20			20
Confl. Bikes (#/hr)			10			10			10			10
Peak Hour Factor	0.92	0.92	0.92	0.85	0.85	0.85	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	6%	6%	2%	8%	2%	4%	5%	2%	2%	0%
Adj. Flow (vph)	280	301	201	92	121	142	86	380	79	57	225	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	280	502	0	92	263	0	86	459	0	57	310	0
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2								
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	3.0	7.0		3.0	7.0		3.0	7.0		3.0	7.0	
Minimum Split (s)	7.0	17.0		7.0	17.0		7.0	17.0		7.0	17.0	
Total Split (s)	10.0	35.0		7.0	32.0		14.0	26.0		11.0	23.0	
Total Split (%)	11.1%	38.9%		7.8%	35.6%		15.6%	28.9%		12.2%	25.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lead		Lag	Lead		Lag	Lead		Lag	Lead	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	37.8	31.0		24.9	21.9		8.0	32.4		5.5	30.0	
Actuated g/C Ratio	0.42	0.34		0.28	0.24		0.09	0.36		0.06	0.33	
v/c Ratio	0.72	1.00		0.78	0.79		0.63	0.84		0.61	0.61	
Control Delay	39.5	72.3		66.9	48.7		59.4	45.7		76.8	38.6	
Queue Delay	6.7	7.5		0.0	17.0		0.0	6.7		0.0	0.0	
Total Delay	46.2	79.8		66.9	65.7		59.4	52.4		76.8	38.6	
LOS	D	E		E	E		E	D		E	D	

Lane Group	Ø9	Ø10
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Lane Util. Factor		
Ped Bike 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)		
Confl. Peds. (#/hr)		
Confl. Bikes (#/hr)		
Peak Hour Factor		
Heavy Vehicles (%)		
Adj. Flow (vph)		
Shared Lane Traffic (%)		
Lane Group Flow (vph)		
Turn Type		
Protected Phases	9	10
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	2.0	2.0
Minimum Split (s)	7.0	4.0
Total Split (s)	7.0	4.0
Total Split (%)	8%	4%
Yellow Time (s)	2.0	2.0
All-Red Time (s)	0.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		
LOS		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		67.7			66.0			53.5			44.5	
Approach LOS		E			E			D			D	
Stops (vph)	165	389		59	204		74	302		52	243	
Fuel Used(gal)	4	10		2	4		2	7		1	4	
CO Emissions (g/hr)	251	691		114	280		107	466		84	292	
NOx Emissions (g/hr)	49	134		22	54		21	91		16	57	
VOC Emissions (g/hr)	58	160		27	65		25	108		19	68	
Dilemma Vehicles (#)	0	0		0	0		0	0		0	0	
Queue Length 50th (ft)	110	~283		31	139		48	228		35	139	
Queue Length 95th (ft)	#192	#492		#74	195		94	#489		m58	#323	
Internal Link Dist (ft)		324			444			373			335	
Turn Bay Length (ft)	150			150						75		
Base Capacity (vph)	387	501		118	424		171	546		119	506	
Starvation Cap Reductn	0	13		0	0		0	0		0	0	
Spillback Cap Reductn	68	0		0	146		0	56		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.88	1.03		0.78	0.95		0.50	0.94		0.48	0.61	

Intersection Summary

Area Type: CBD

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:NBT and 8:SBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 59.5 Intersection LOS: E

Intersection Capacity Utilization 76.4% ICU Level of Service D

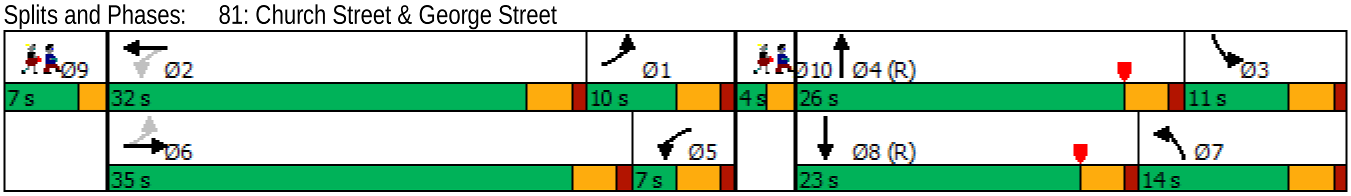
Analysis Period (min) 15

~ 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: 81: Church Street & George Street



Appendix C Public Input Summaries

New Haven One-Way to Two-Way Conversion Study: Final Report

South Central Regional Council of Governments (SCRCOG)/City of New Haven

SLR Project No.: 141.20130.00003

1ST PUBLIC INFORMATION MEETING SUMMARY

A detailed summary of the May 16, 2023 Public Meeting is as follows:

Sandeep Aysola (City of New Haven) welcomed everyone to the meeting and provided a brief summary of the project background and objectives and introduced Mayor Justin Elicker. Mayor Elicker explained the importance of the project within the City. Mr. Aysola then introduced the consultant project team to provide a presentation on the project.

Kwesi Brown (SLR) began the presentation with an introduction to the project area and objectives. Mr. Brown noted the following:

- The Goal of the project is to convert streets from 1-way to 2-way to improve safety and efficiency for all transportation modes. Other objectives include:
    - Align with Vision Zero safety principles & Safe Routes for All (SRFA) Active Transportation Plan
    - Accommodate sustainable modes of transportation
    - Improve traffic circulation, safety, and mobility
- Study timeline:
    - Notice to Proceed in November 2022
    - Winter & Spring 2023: Data collection, existing conditions evaluation, and first public meeting
    - Summer 2023: Future condition traffic analysis, develop concepts, and second public meeting
    - Fall & Winter 2023: Prepare implementation plan and final study report
- The Project will build upon previous studies completed in the downtown area, including:
    - One-Way to Two-way Conversion Study (2013-2014)
    - Move New Haven Study (2019)
    - Safe Routes for All Active Transportation Plan (2022)

Neil Olinski (SLR) presented the project base mapping and provided an overview of existing conditions in the project area, including lane configurations, transit routes, bus stop locations, and parking within the project area.

Charlie Baker (VHB) presented the traffic operations and crash history along each of the project roadways:

- Traffic counts were collected during the weekday morning and evening peak traffic periods at 28 intersections

- 2-years of crash data were reviewed at each of the project intersections using the Connecticut Crash Data Repository. Mr. Baker presented an overview of the crash records at each of the project intersections.
- Capacity analysis was conducted at each of the project intersections using industry standard Synchro software. Capacity analysis indicates that all project intersections are currently operating at an overall level of service (LOS) D or better during the peak traffic periods.

Mr. Brown (SLR) concluded the presentation with a discussion on the next steps on the project. The project team will evaluate future conditions, develop conceptual improvement plans, and a second public information meeting will be held in the Summer of 2023.

Mr. Aysola (New Haven) opened the meeting up to public comment using the chat window within Zoom, and Sandeep read select questions aloud for discussion with the project team. The following presents a summary of the public questions/comments read during the meeting, followed by responses from the project team.

A transcript of the chat window questions/comments from the Zoom meeting is as follows:

Q1:Why were these specific corridors selected?

- *Response 1: It was noted that the corridors were chosen to complement previous studies. The street segments for this study were also chosen so as to not duplicate efforts of other current city and/or state projects.*

Q2: Will the design for Church Street include protected bike infrastructure?

- *Response 2: The prior (2014) two-way design for Church Street only included basic (un-protected) bike lanes. Protected bicycle infrastructure for Church Street will be considered as part of this concept-design study.*

Q3: The bus stop at the northeast corner of Church Street and Chapel should be included in this study and shown on the base mapping. It is a crew change point where lots of bus passengers transfer.

- *Response 3: While not originally in the study area of this current two-way conversion and concept-design study, based on this comment, this bus stop will be included in the concept-designs.*

Q4: Could a map be developed which shows all the one to two-way conversions, the State project in front of City Hall, and the “BRT” on Elm Street?

- *Response 4: Figure 1, included herewith, now includes this information.*

Q5: What is the estimated cost for one-way to two-way conversions?

- *Response 5: It was noted that costs to implement two-way conversion will be estimated later in the study process after conceptual improvement plans have been developed.*

Q6: One-way streets should be intuitively safer than two-way streets due to reduced conflicts, so wouldn't converting to two-way streets increase crashes? Will the project consider ADA compliance issues?

- *Response 6.1: It was noted that there are trade-offs involved in one-way vs. two-way streets. The project team believes that converting to two-way streets will decrease speeds, make the roadways less automobile-centric, reduce multiple threat conflicts, and overall improve safety. (Refer to Table 1 for pros and cons.)*
- *Response 6.2: Conceptual improvements developed under this project will include improvements to ADA compliance.*

Q7: Once a plan is created, how will it be funded? What is the estimated date of completion? When will BRT project have a public info meeting?

- *Response 7.1: It was noted that specific funding mechanisms to implement the two-way conversion have not yet been determined.*
- *Response 7.2: Timing of when the two-way conversion will be implemented is also not known.*
- *Response 7.3: As of May 2023, state's BRT project was in its very early stages and its public information meeting date has not yet been determined.*

Q8: Will there be consideration for removing traffic signals under this project?

- *Response 8: It was noted that one-way to two-way conversion will change traffic patterns. As such, evaluation will be given to whether signals will still be warranted with the new traffic patterns and if some signals could be converted to stop-sign control instead..*

Q9: This project should consider all users, not just bicycles.

- *Response 9: It was agreed that these streets are for all types of users, and this concept-design study will consider vulnerable users, including those with disabilities.*

Q10: There have been studies in the past, but nothing has changed. How will this time be different?

- *Response 10: It was noted that an implementation plan will be developed as part of this concept-design study to ensure that recommended improvements are feasible and constructable. The past two-way conversion effort also stalled due to funding issues.*

Q11: What has been done to reach out to businesses?

- *Response 11: It was noted that this May 2023 public information meeting is the first public meeting of this current two-way conversion concept-design effort so far, and that there will be additional meetings planned as the study advances.*

Q12: Can temporary quick fixes (painted bike lanes, etc.) take place on these streets while the study is taking place? If it takes years, do we risk losing the ability to have quick fixes in the interim?

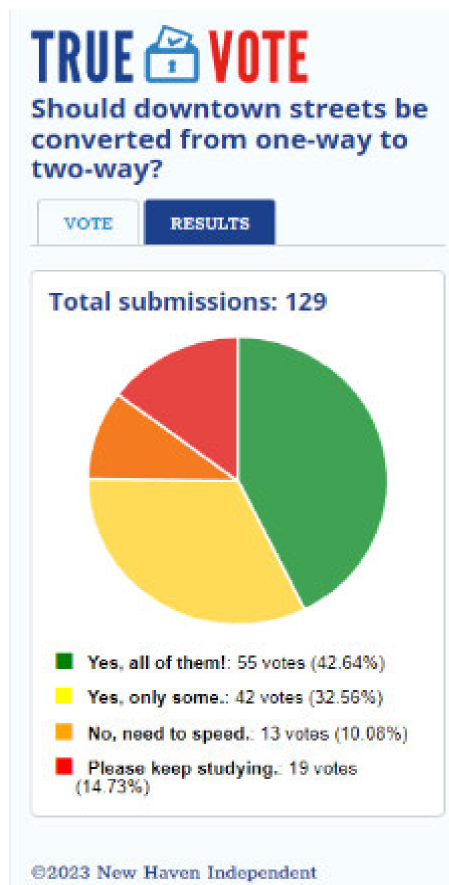
- *Response 12: It was noted that short-term improvements can be completed in the interim and that short-term improvements can be completed based on the forthcoming long-term recommendations from this study. There is no need to wait to make at least some changes.*

Q13: Will two-way conversions be completed all at once? Or in pieces? What will be the learning process for the public?

- *Response 13.1: As mentioned above, not every improvement needs to happen all at once. It was noted that the extent to which the two-way conversion will implemented in pieces, in large sections, or even all at once will be further evaluated during the full-design/construction phases, and will be contingent on funding.*
- *Response 13.2: It was also noted that there will be additional public outreach to educate the public at the appropriate time closer to full-design/construction.*

Mr. Aysola concluded the meeting and provided links to the City website and contact information for additional comments/questions about the project.

Both the New Haven Register and the New Haven Independent published articles about the project after the initial public meeting. The New Haven Independent article included a live poll that asked the question “Should downtown streets be converted from one-way to two-way?”, which found that around 3 out of 4 people support the two-way conversion on at least some of downtown’s streets.



Public Comments from Online Survey Question of May-September ‘23

In response to the question **“What do you consider to be the most important issues to consider in converting parts of York, George, Church and Chapel Streets from one-way to two way?”** the following responses were received:

- Focus on the minimum materials and construction and get it done. New York started putting down planters and boulders and hung up traffic lights in the 2000s. That built momentum for further change. No one wants to deal with complaining entitled drivers, but there's no way around it. There is real backing for a change in allocating street space to modes other than the car. I want to see some urgency, not just a new round of studies. (May 2023)
- It makes no sense at all. (May 2023)
- Protected bike lanes should be included on these routes (except for York it is too narrow most likely) during the conversion. There are no protected bike lanes downtown which is a safety issue and discourages bike mode share. Paint only bike lanes or sharrows are inadequate. Many parking garages nearby - remove on street parking if necessary to install protected bike lane. (September 2023)
- York St - 10' lane in either direction with parking on both sides, traffic calming measures for shared and narrowed street environment for bike/ped safety. George St - 10-11' lane in either direction, 5' separated bike lanes, 2' buffers, many parking garages adjacent so parking not necessary on George itself. Church St - prioritize bus only lanes and separated bike lanes or cycletrack, connect downtown crossing bike lanes all the way to city hall to show city's priority in multimodal access to government center and civic spaces. Chapel St - 10-11' lane in either direction, parking on one side only to make room for protected bike lanes, especially important to include bike lanes all the way to Park St to facilitate Edgewood to Park to Chapel to Downtown bike connection. ALL bike lanes should be fully separated and connected as part of a network with proper protected intersection design, patchwork bike lanes and lack of intersection treatments do not encourage bike mode shift. Thank you! (September 2023)

[Wanted: Public Input On 2-Way Street Conversion Proposals | New Haven Independent]

Yale Art Gallery Comments 11/15/23

Primary concerns:

1) Artwork pickups and deliveries with tractor trailers to our only dock located at 201 York St. are ***exceedingly*** difficult now. How do these York St. alternatives positively or negatively affect our critical transit operations?
2) What are the effects on ease of visitor's accessibility to the Art Gallery with no parking on Chapel St. in front of Art Gallery? Potential conflict for sufficient sidewalk space for any changed location of the extant bus shelters now closer to York (events, crowds, passerby, transit customers, any future HC ramp at main entrance, etc.)?
3) Effects on ease of accessibility to our robust Nolen Education Center programing at Street Hall, 59 High St., if no cars/parking allowed on proposed High St. pedestrian only way.

Specific comments

York Alt 1, #2

- We could still use whole road as we do now with meter bags – we would just need additional people to stop traffic from *both* ways. More of a potential traffic bottleneck?
- Proposed new right-hand turning lane onto Chapel St. removes meters in front of Rudolph Hall: trailers could now approach and cut *"sight side"* (driver's side) into dock if headed South on York. Sight-side backing could be a benefit for 48' trailers which are extremely hard to receive now. We cannot receive 53' trailers. (Q. is there a truck route around to approach the Art Gallery dock at 201 York from Elm St.? – otherwise this is moot). Current blind-side backing is very close to impossible, even with meter bags, as people disregard them and the truck gets jack-knifed: taking more attempts and longer to get into dock and blocking traffic longer, if even successful.
- Proposed bus shelter on East side of York (near current single HC parking spot) may cause issue with trailer cuts when jumping curb?

York Alt 2, #2

- Same as above.
- Bus shelter on East side of York near corner of JE may cause issues with current trailer approaches and jumping curb (now often *needed* due to blind-side backing approach).

Chapel Alt 1, #2

- No more parking along front of YUAG facades – is this a barrier to accessibility for visitors?

Chapel Alt 1, #2

- No more parking along front of YUAG facades – is this a barrier to accessibility for visitors?
- Bus shelter moved close to our main entrance. Sidewalk space for conflicting activities of transit and entering Art Gallery building via our only public entrance. Potential conflict for sidewalk space with any future HC ramps at front of Art Gallery.

George Hagerty
Director of Facilities, Yale University Art Gallery
george.hagerty@yale.edu
Mobile: 781-856-2635

Meeting Notes

Place: 200 Orange Street
Conference Room G2
New Haven, CT

Date: October 18, 2023 | Notes Taken by: Charles Baker

Project #: 43234.00 | Re: New Haven One-way to Two-way Study
Public Information Meeting #2

A public information meeting was held on October 18, 2023 for the above referenced project. The following represents a summary of the meeting.

Sandeep Aysola (City of New Haven) welcomed everyone to the meeting, provided a summary of the project background, and introduced the SLR consultant team, led by Kwesi Brown. The SLR consultant team provided a presentation on the project objectives and progress to date, including an overview of two-way concept plans that have been developed for the Church Street, York Street, Chapel Street, and George Street corridors.

The meeting was then opened up to separate breakout groups for each corridor where attendees could view the concept plans in detail and provide comments. The following presents a summary of the public/comments questions provided by attendees during the meeting:

Chapel Street

1. I think it would be better to have a bike lane on the north side if we're going to remove a lane of parking. Either way I worry about parking here.
2. Where we have two way streets with no bike lanes, can we slow traffic down and block with speed humps in addition to the raised intersections?
3. The cultural center and arts portion of New Haven should not be impacted by removal of parking spots!
4. I strongly support getting rid of parking, so option 2 is less positive to me.
5. Some concepts have one-way bike routes on either side of the street and others have two-way routes on one side. Which is best practice? Isn't it easier to protect a consolidated lane?
6. Keeping Park Street one-way but down to 1 lane with a two-way cycle track is good use of space.
7. Design alternate 1 does not account for the need of bus parking to YCBA. Also for the removal of High Street parking.
8. As a short term installation, a two-way system on ODD side of street makes more sense.
9. Installation of a two-way system on College negates need for two-way buses going from med school to science hall.
10. The backup for drop off and pickup for Shubert and CSMH
11. Did you run Synchro factoring in exclusive phases for bikes and peds?

100 Great Meadow Road
Suite 200
Wethersfield, CT 06109-2377
P 860.807.4300

12. Chapel has businesses of interest points on both sides. Bikes should have access to both side of the street.
13. Speed limit for call (sp?) and no overtaking bikes by design for all shared streets.
14. Why does Chapel turn back into two one-way lanes past Park Street? This is lost opportunity to complete the street.
15. Keep the 2-way going past Park Street to Dwight.
16. Alternate #1 preferred. Important to add two-way flow on York so drivers on Chapel can get to Yale York Street garage to park once there is less on-street parking.
17. Two-way bicycle path on Chapel. Fully support. Please do more of this throughout the City.
18. Make some parking spaces 15 minutes or 30 minutes to prioritize folks stopping off at stores. Longer parkers can use garages.

Church Street

1. Broader bike paths to encourage social cycling.
2. Speed limits for cars 20 mph. Not allowing cars to overtake bikes.
3. I worry about all the lost street parking.
4. The raised platforms for BRT add a nice infrastructure enhancement for the buses and nicely protect the bike lane.
5. Parking is limited. I do not think removing street parking is a viable option.
6. The raised medians in Alternate 2 do not seem as useful as other infrastructure change. While it helps for pedestrian crossing, it seems like it will mostly be empty space and a bit of a waste. The raised BRT platform space seem more useful.
7. The federal RAISE grant for MOVE funds BRT on Church. Don't' we need to choose Alternate 1?
8. Mane of the bicycles lanes only have a 5 foot width between curb and parking. Seems too narrow. Consider removing parking on one side and add 2-3 foot buffers to bicycle lanes.
9. Where would d I bike on the Elm Street here?
10. Why so many stops on a rapid transit route?
11. Why is the bus lane in the middle of the road where it always will be pulling over. Also, do we have enough bus traffic to justify the bus always lane, and will this assume our hub system of buses going to green will continue for a long time.
12. Bus lanes are important to increase transportation options to a wide variety of income levels. I am a biker but support bus lanes.
13. I hope bike lanes have physical separation not just flex posts.
14. We must have a bus lane on Church Street.

15. We don't need a bike lane on Church. Orange and High is bikes.
16. Why not extend bus way to Grove? Connect with Whitney buses.
17. Routing the bike lane through the Green seems like it is worse for the bikers and worse for the Green. The proposal for Alternate 2 on this issue meets the needs of both.
18. BRT project likely to drive this design. I imagine it will be very difficult to accommodate bikes, buses, and traffic. Much better to have two-way bike lanes on Orange Street to connect to East Rock and Farmington Canal Trail at Grove and Orange.

George Street

1. This plan removes storage for High School and YNHH shuttle.
2. Removal of on street parking is not advisable – needed to service 300 George.
3. The bikes should be on Crown Street
4. Remove signal entirely and put ped priority with all-way stop (referring to York Street at George Street signal).
5. Bikes don't belong on Church. They belong on Wall, Crown, Orange, Wall.
6. I worry about the loss of on-street parking.
7. Parking downtown is already really limited. I do not think any plan that removes parking spaces is feasible.
8. If bus shelters are every block, I worry the buses will move very slowly.
9. Raised bike paths wherever it is crossed by cars.
10. Raised/continuous crosswalk for unsignalized intersection. Maybe even some surface materials as crosswalks.
11. I am in favor of taking incremental steps in the right direction. I would love 100% complete streets, but do not let the perfect be the enemy of the good.
12. Okay to remove parking spaces as long as there are many garages in study area.

York Street

1. Speed limit for cars 20 mph and do not overtake bikes policy for all shared roads.
2. Raised bike path wherever cars are allowed to cut through.
3. Might need loading zones for the restaurants.
4. This is too long of a cut for bike paths and footpaths (reference to curb cut on York between Crown and Chapel)
5. Reconsider making York Street two-way.
6. Should we make up for lost on-street parking by making parking garages cheaper?

7. I like the removal of parking for the infrastructure investments, but if all the designs proposed with reduced parking were put forward, I'd be concerned they wouldn't pass because of the aggregate effect. Although would love to see it all pass.
8. Let's reduce all this parking to make better bike routes.
9. The raised intersections are great.

General Comments

After the breakout period, the entire group reconvened to discuss general comments and next steps. The following is a summary of the public comments/questions provided at this time:

1. One attendee opposes the two-way street conversions in general, and he is concerned that delivery trucks will block travel lanes.
2. There was a comment stating a preference to keep York Street one-way but add a bike lane.
3. Are there any studies showing effect of converting streets to two-way incrementally vs. converting an entire area to two-way all at once?
4. Two-way conversions should be synced with the upcoming BRT project or some other major change, creating an "installation" vs creating a street. Design should be intuitive for all users.
5. There was a discussion on the potential changes to on-street parking and whether a reduction in on-street parking could be accommodated by the surrounding parking garages.
    - Data is available on the parking garage capacities and occupancy. In general, there is significant surplus capacity in surrounding parking garages. This occupancy data will be reviewed in detail as part of the Point-in-Time parking study and can be included in the final report for the two-way conversion study.
    - Parking garages may not be a good parking solution for women
    - Consider temporarily lowering the cost of garages
    - Consider changing some on-street parking spaces to 15-minute parking or loading zones to accommodate local businesses
6. There was a suggestion to reduce the speed limit to 20 mph and allow bikes and cars to share the road.

Place: Virtual Zoom Meeting

Date: September 24, 2024 Notes Taken by: Charles Baker

Re: New Haven One-way to Two-way SCRCOG Study
Public Information Meeting #3 – Final Meeting

- Alderman Eli Sabin and Frank Douglass gave opening remarks about the project.
- Alderman Frank Douglass requested that opportunities for public input be extended.
  - Sandeep noted that the study is being concluded due to the need to close out the consultant's contract. However, there will be additional opportunities for public input as any of the projects identified are advanced.
- Sandeep Aysola (New Haven TT&P) provided an introduction to the project and presented a summary of other ongoing projects within the downtown area.
- Kwesi Brown (SLR) presented an overview of the project, including objectives, study scope, consideration of FHWA safety countermeasures, and study outcomes.
- Neil Olinski (SLR) presented the concept plans that were developed for Chapel Street, York Street, George Street, and Church Street. Neil also presented a summary of estimated construction costs for each of the conceptual improvements.
- Sandeep Aysola (New Haven TT&P) discussed the next steps for implementation for each of the concepts. Sandeep then opened up the meeting for questions/comments.
- Alderman Sabin requested an opportunity to review the design plans for the Chapel Street conversion before it is implemented. Sandeep Aysola offered to setup a separate meeting with Alderman Sabin to review.
- Lior Trestman Comment: Expressed disappointment that bike lanes were not provided on all preferred concept plans and expressed desire for traffic calming and better accommodations for active transportation including bike lanes.
  - Sandeep explained some of the challenges involved in providing bike lanes on some corridors, given the public feedback that was provided previously supporting on-street parking.
- Lior Trestman Comment: "Has there been any thought of designalization? That's an easy way to slow cars (so they aren't speeding to get through a light)"
  - Sandeep noted that there are federal requirements outlined in the MUTCD for removal traffic signals. This will be considered as appropriate.
- Sandeep Aysola noted that all materials including the presentation slide deck would be posted on the City's website: www.newhavenct.gov

Appendix D Preliminary Cost Estimates

New Haven One-Way to Two-Way Conversion Study: Final Report

South Central Regional Council of Governments (SCRCOG)/City of New Haven

SLR Project No.: 141.20130.00003

Concept Cost Estimate | Church Street

Major and Minor Contract Items

	Item No.	Item	Unit	Quantity	Unit $	Total Cost
		Full-Depth Pavement Repair	SY	1500	$ 80.00	$ 120,000.00
		2" Fine Milling	SY	17300	$ 6.00	$ 103,800.00
		HMA S0.5	Tons	2000	$ 150.00	$ 300,000.00
		Concrete Sidewalk/Ramps	SF	14600	$ 16.00	$ 233,600.00
		Bituminous Concrete Sidewalk (Bike Lane)	SY	1000	$ 65.00	$ 65,000.00
		Storm Drainage Modifications	LS	1	$ 120,000.00	$ 120,000.00
		Granite Curbing	LF	6600	$ 65.00	$ 429,000.00
		Pavement Markings	LS	1	$ 365,000.00	$ 365,000.00
		Police	LS	1	$ 225,000.00	$ 225,000.00
		Bus shelters	EA	5	$ 20,000.00	$ 100,000.00
		Traffic Signal Improvements	LS	1	$ 2,400,000.00	$ 2,400,000.00
A	**Major Items Subtotal**					**$ 4,461,400**
B	**Minor Items Subtotal**		15	% of Line "A"		**$ 669,210**
C	**Major and Minor Contract Items Subtotal (A + B)**					**$ 5,130,610**

Other Item Allowances

	Item			Total Cost
	Clearing and Grubbing	2	% of Line "C"	$ 102,612
	M & P of Traffic	6	% of Line "C"	$ 307,837
	Mobilization	6	% of Line "C"	$ 307,837
	Construction Staking	1	% of Line "C"	$ 51,306
D	**Other Items Subtotal**			**$ 769,592**
E	**CONTRACT SUBTOTAL (C + D)**			**$ 5,900,202**

Inflation Costs (Simple Method)

	Item			Total Cost
	Date of Estimate	Jun-24		
	Anticipated Bid Date	Apr-25		
	Annual Inflation	4%		
F	**Inflation Subtotal**	3.2%	of Line "E"	**$ 188,806**
G	**TOTAL CONTRACT COST ESTIMATE (E + F)** (Rounded to nearest $1000)			**$ 6,089,000**

LOTCIP Project Costs Summary		
Contract Cost Estimate (Line "G")		$ 6,089,000
Contingencies	10%	$ 608,900
Incidentals	10%	$ 608,900
ROW	LS	N/A
Utilities	LS	N/A
TOTAL PROJECT COST		**$ 7,306,800**

Concept Cost Estimate | York Street

Major and Minor Contract Items

	Item No.	Item	Unit	Quantity	Unit $	Total Cost
		Full-Depth Pavement Repair	SY	3300	$ 80.00	$ 264,000.00
		2" Fine Milling	SY	11700	$ 6.00	$ 70,200.00
		HMA S0.5	Tons	1350	$ 150.00	$ 202,500.00
		Concrete Sidewalk/Ramps	SF	8000	$ 16.00	$ 128,000.00
		Bituminous Concrete Sidewalk (Bike Lane)	SY	700	$ 65.00	$ 45,500.00
		Storm Drainage Modifications	LS	1	$ 100,000.00	$ 100,000.00
		Granite Curbing	LF	5800	$ 65.00	$ 377,000.00
		Bus shelters	EA	5	$ 20,000.00	$ 100,000.00
		Pavement Markings	LS	1	$ 65,000.00	$ 65,000.00
		Police	LS	1	$ 225,000.00	$ 225,000.00
		Traffic Signal Improvements	LS	1	$ 3,200,000.00	$ 3,200,000.00
A	**Major Items Subtotal**					**$ 4,777,200**
B	**Minor Items Subtotal**		15	% of Line "A"		**$ 716,580**
C	**Major and Minor Contract Items Subtotal (A + B)**					**$ 5,493,780**

Other Item Allowances

	Item	%	Basis	Total
	Clearing and Grubbing	2	% of Line "C"	$ 109,876
	M & P of Traffic	6	% of Line "C"	$ 329,627
	Mobilization	6	% of Line "C"	$ 329,627
	Construction Staking	1	% of Line "C"	$ 54,938
D	**Other Items Subtotal**			**$ 824,068**
E	**CONTRACT SUBTOTAL (C + D)**			**$ 6,317,848**

Inflation Costs (Simple Method)

	Item	Value		Total
	Date of Estimate	Jun-24		
	Anticipated Bid Date	Apr-25		
	Annual Inflation	4%		
F	**Inflation Subtotal**	3.2%	of Line "E"	**$ 202,171**
G	**TOTAL CONTRACT COST ESTIMATE (E + F)** (Rounded to nearest $1000)			**$ 6,520,000**

LOTCIP Project Costs Summary		
Contract Cost Estimate (Line "G")		$ 6,520,000
Contingencies	10%	$ 652,000
Incidentals	10%	$ 652,000
ROW	LS	N/A
Utilities	LS	N/A
TOTAL PROJECT COST		**$ 7,824,000**

Concept Cost Estimate | Chapel Street

Major and Minor Contract Items

	Item No.	Item	Unit	Quantity	Unit $	Total Cost
		Full-Depth Pavement Repair	SY	1900	$ 80.00	$ 152,000.00
		2" Fine Milling	SY	5500	$ 6.00	$ 33,000.00
		HMA S0.5	Tons	650	$ 150.00	$ 97,500.00
		Concrete Sidewalk/Ramps	SF	4400	$ 16.00	$ 70,400.00
		Bituminous Concrete Sidewalk (Bike Lane)	SY	100	$ 65.00	$ 6,500.00
		Storm Drainage Modifications	LS	1	$ 60,000.00	$ 60,000.00
		Granite Curbing	LF	3200	$ 65.00	$ 208,000.00
		Pavement Markings	LS	1	$ 20,000.00	$ 20,500.00
		Police	LS	1	$ 170,000.00	$ 163,200.00
		Bus shelters	EA	1	$ 20,000.00	$ 20,000.00
		Traffic Signal Improvements	LS	1	$ 1,600,000.00	$ 1,600,000.00
A	**Major Items Subtotal**					**$ 2,431,100**
B	**Minor Items Subtotal**		15	% of Line "A"		**$ 364,665**
C	**Major and Minor Contract Items Subtotal (A + B)**					**$ 2,795,765**

Other Item Allowances

	Item			Cost
	Clearing and Grubbing	2	% of Line "C"	$ 55,915
	M & P of Traffic	6	% of Line "C"	$ 167,746
	Mobilization	6	% of Line "C"	$ 167,746
	Construction Staking	1	% of Line "C"	$ 27,958
D	**Other Items Subtotal**			**$ 419,365**
E	**CONTRACT SUBTOTAL (C + D)**			**$ 3,215,130**

Inflation Costs (Simple Method)

	Item			Cost
	Date of Estimate	Jun-24		
	Anticipated Bid Date	Apr-25		
	Annual Inflation	4%		
F	**Inflation Subtotal**	3.2%	of Line "E"	**$ 102,884**
G	**TOTAL CONTRACT COST ESTIMATE (E + F)** (Rounded to nearest $1000)			**$ 3,318,000**

LOTCIP Project Costs Summary		
Contract Cost Estimate (Line "G")		$ 3,318,000
Contingencies	10%	$ 331,800
Incidentals	10%	$ 331,800
ROW	LS	N/A
Utilities	LS	N/A
TOTAL PROJECT COST		**$ 3,981,600**

Concept Cost Estimate | George Street

Major and Minor Contract Items

	Item No.	Item	Unit	Quantity	Unit $	Total Cost
		Full-Depth Pavement Repair	SY	1500	$ 80.00	$ 120,000.00
		2" Fine Milling	SY	6600	$ 6.00	$ 39,600.00
		HMA S0.5	Tons	800	$ 150.00	$ 120,000.00
		Concrete Sidewalk/Ramps	SF	5000	$ 16.00	$ 80,000.00
		Bituminous Concrete Sidewalk (Bike Lane)	SY	2200	$ 65.00	$ 143,000.00
		Storm Drainage Modifications	LS	1	$ 50,000.00	$ 50,000.00
		Granite Curbing	LF	4200	$ 65.00	$ 273,000.00
		Pavement Markings	LS	1	$ 40,000.00	$ 40,000.00
		Police	LS	1	$ 170,000.00	$ 170,000.00
		Bus shelters	EA	6	$ 20,000.00	$ 120,000.00
		Traffic Signal Improvements	LS	1	$ 4,000,000.00	$ 4,000,000.00
A	**Major Items Subtotal**					**$ 5,155,600**
B	**Minor Items Subtotal**		15	% of Line "A"		**$ 773,340**
C	**Major and Minor Contract Items Subtotal (A + B)**					**$ 5,928,940**

Other Item Allowances

	Clearing and Grubbing	2	% of Line "C"	$ 118,579
	M & P of Traffic	6	% of Line "C"	$ 355,736
	Mobilization	6	% of Line "C"	$ 355,736
	Construction Staking	1	% of Line "C"	$ 59,289
D	**Other Items Subtotal**			**$ 889,340**
E	**CONTRACT SUBTOTAL (C + D)**			**$ 6,818,280**

Inflation Costs (Simple Method)

	Date of Estimate	Jun-24		
	Anticipated Bid Date	Apr-25		
	Annual Inflation	4%		
F	**Inflation Subtotal**	3.2%	of Line "E"	**$ 218,185**
G	**TOTAL CONTRACT COST ESTIMATE (E + F)** (Rounded to nearest $1000)			**$ 7,036,000**

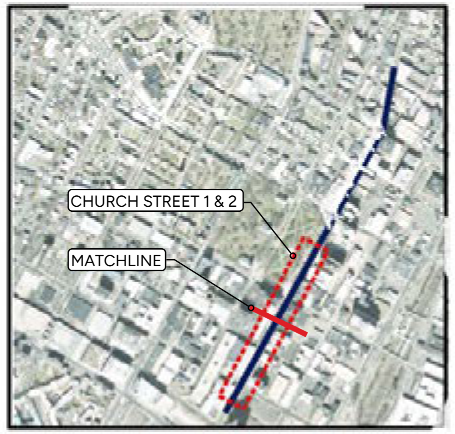
LOTCIP Project Costs Summary		
Contract Cost Estimate (Line "G")		$ 7,036,000
Contingencies	10%	$ 703,600
Incidentals	10%	$ 703,600
ROW	LS	N/A
Utilities	LS	N/A
TOTAL PROJECT COST		**$ 8,443,200**

Appendix E Concepts

New Haven One-Way to Two-Way Conversion Study: Final Report

South Central Regional Council of Governments (SCRCOG)/City of New Haven

SLR Project No.: 141.20130.00003



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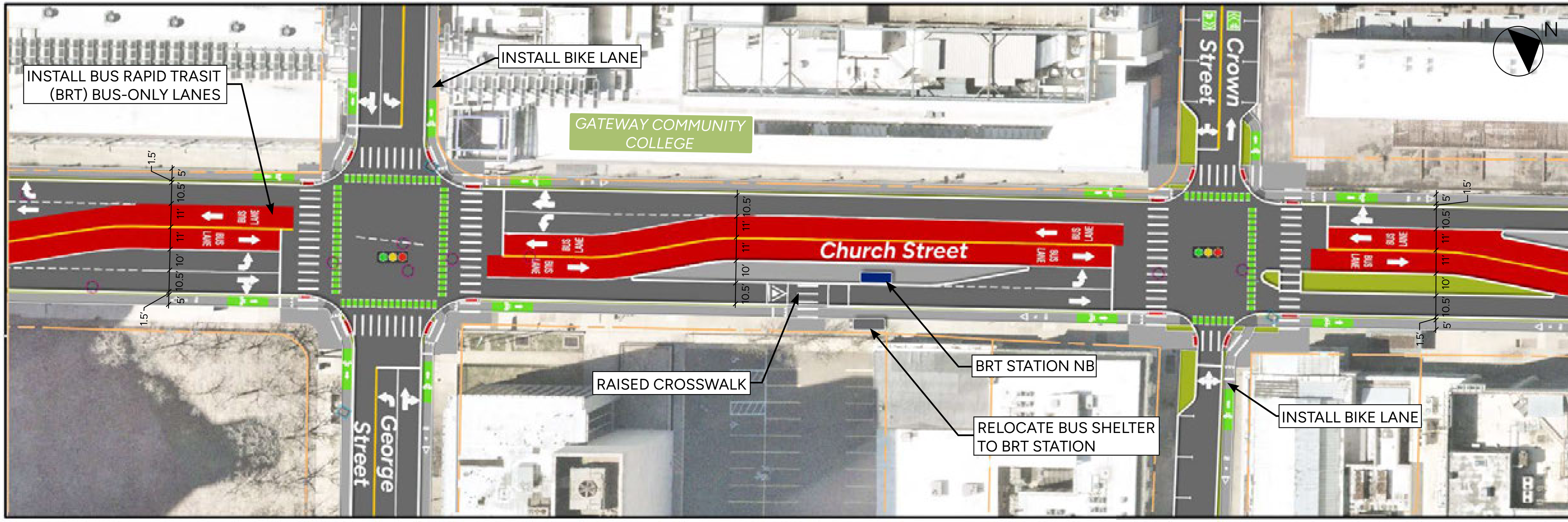
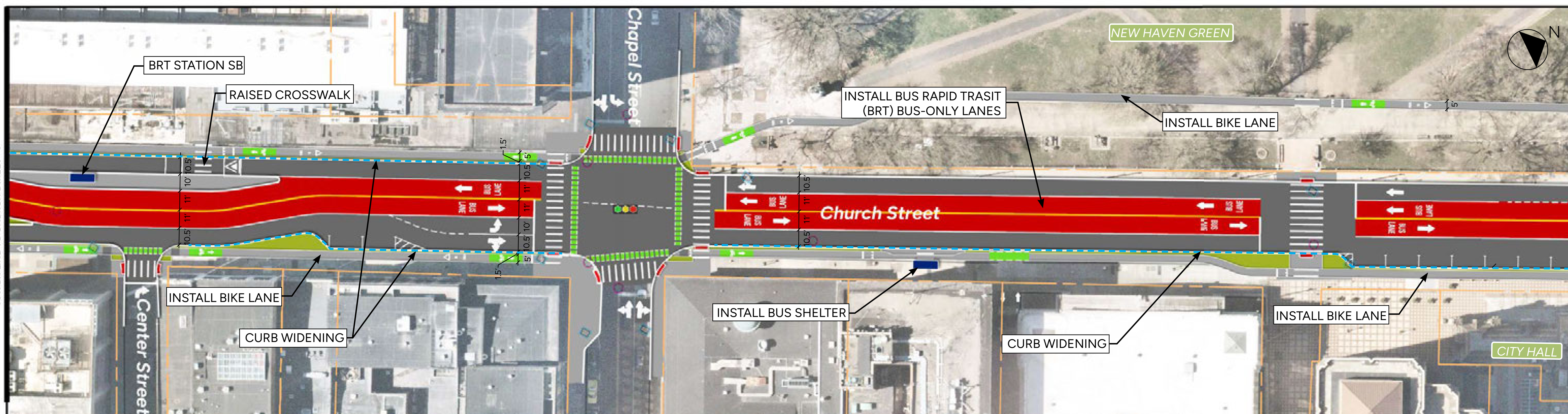


CHURCH STREET - 1

NOTES: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED. TALL BUILDINGS OVERSHADOW SIDEWALKS IN SOME AREAS DUE TO ANGLE OF AERIAL PHOTOGRAPH.



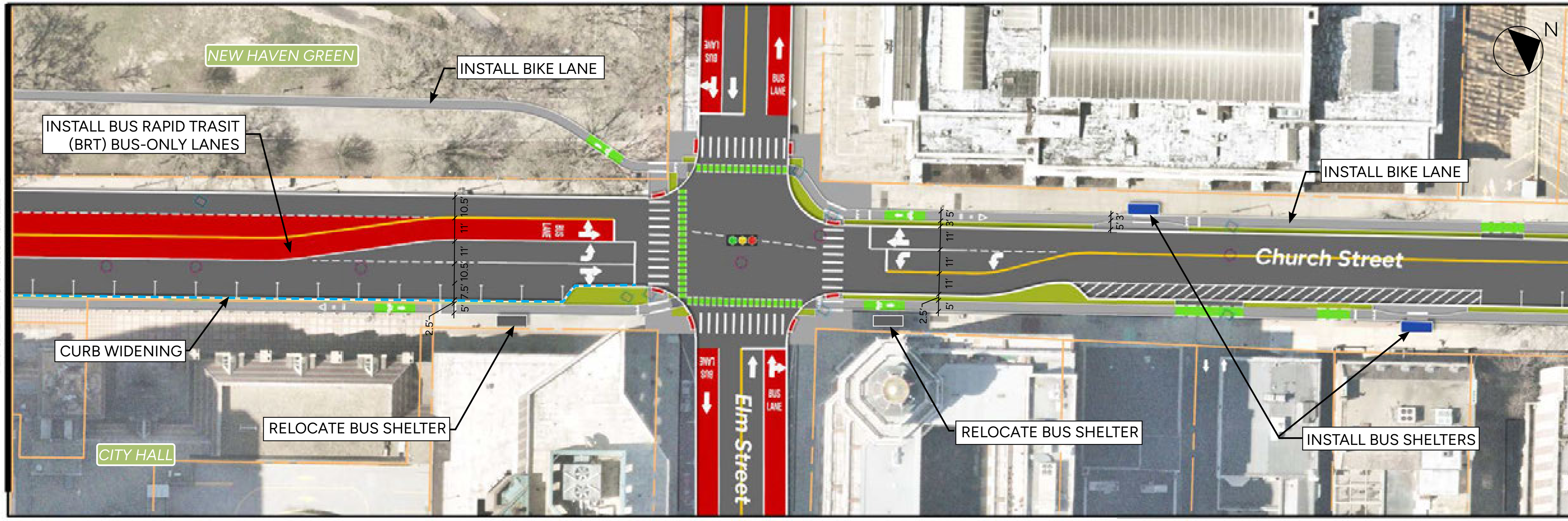
CHURCH STREET - 2

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND CONCEPT DESIGN ALTERNATE 1 - CHURCH STREET

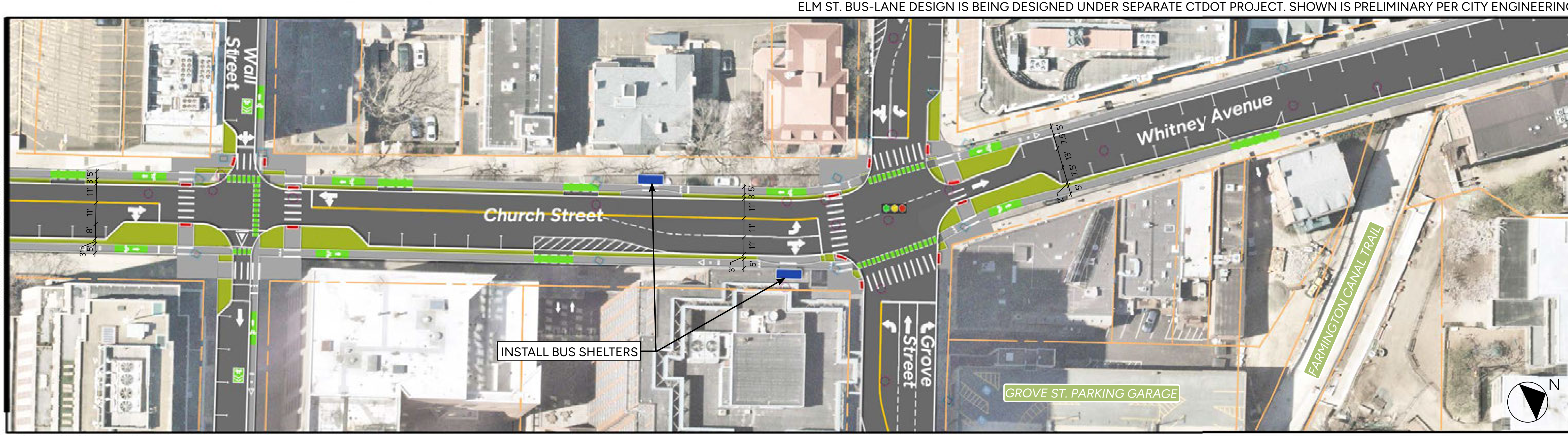
0′ 30′ 60′
1/2″ 1″

KEY MAP



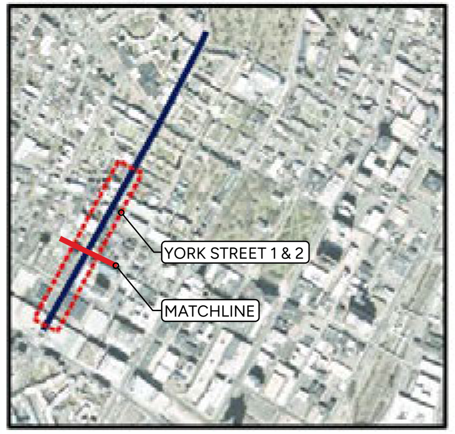
CHURCH STREET - 3

NOTES: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.
ELM ST. BUS-LANE DESIGN IS BEING DESIGNED UNDER SEPARATE CTDOT PROJECT. SHOWN IS PRELIMINARY PER CITY ENGINEERING.



CHURCH STREET - 4

0' 30' 60'
1/2" 1"



KEY MAP

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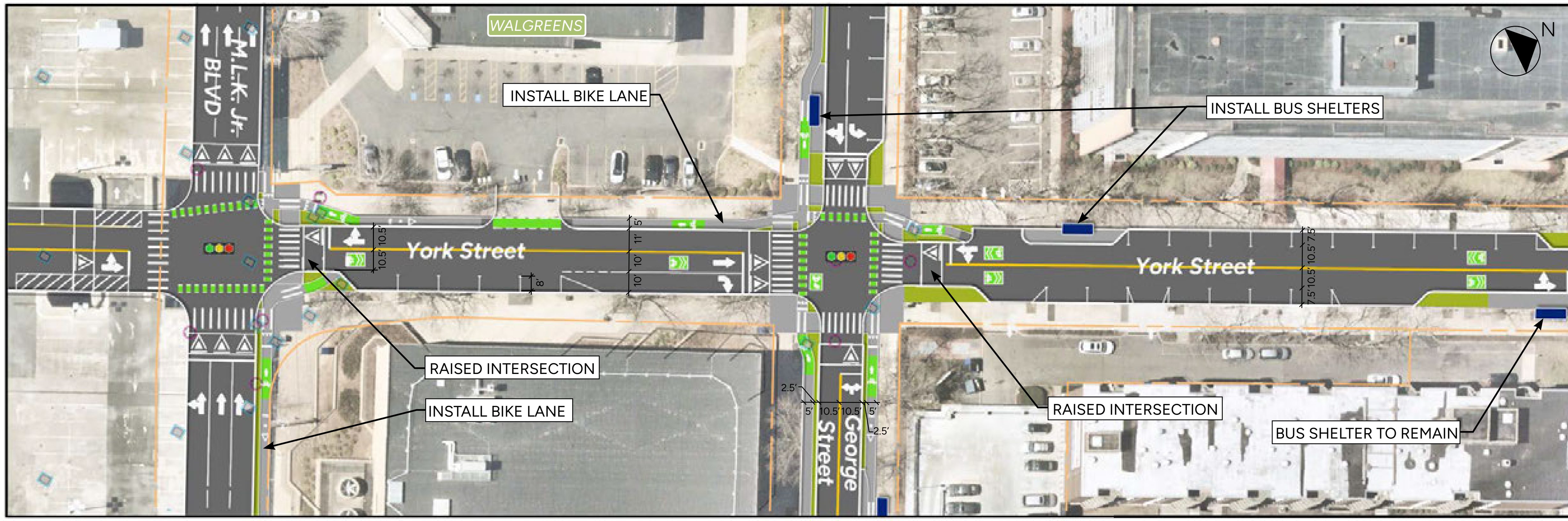
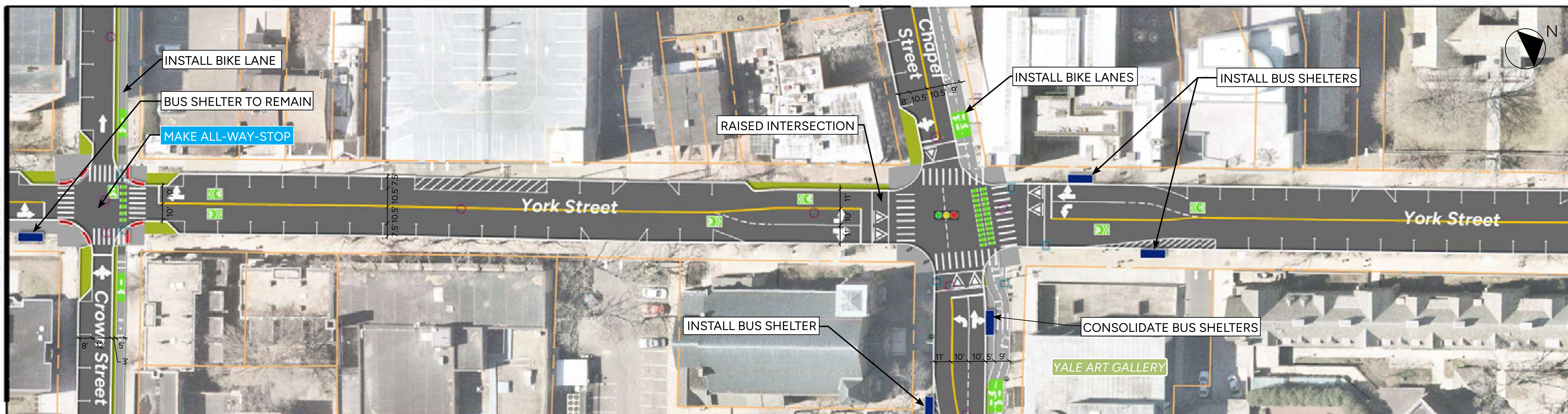


YORK STREET - 1

NOTE: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.

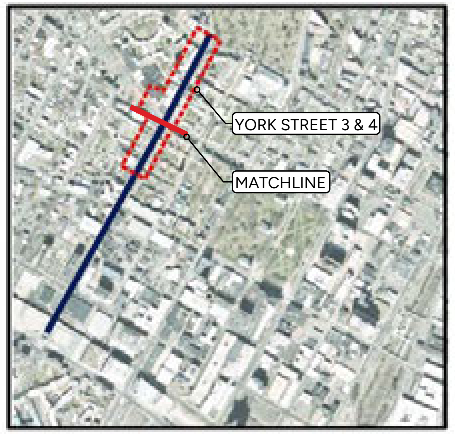


YORK STREET - 2

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND CONCEPT DESIGN ALTERNATE 1 - YORK STREET

0′ 30′ 60′
1/2″ 1″



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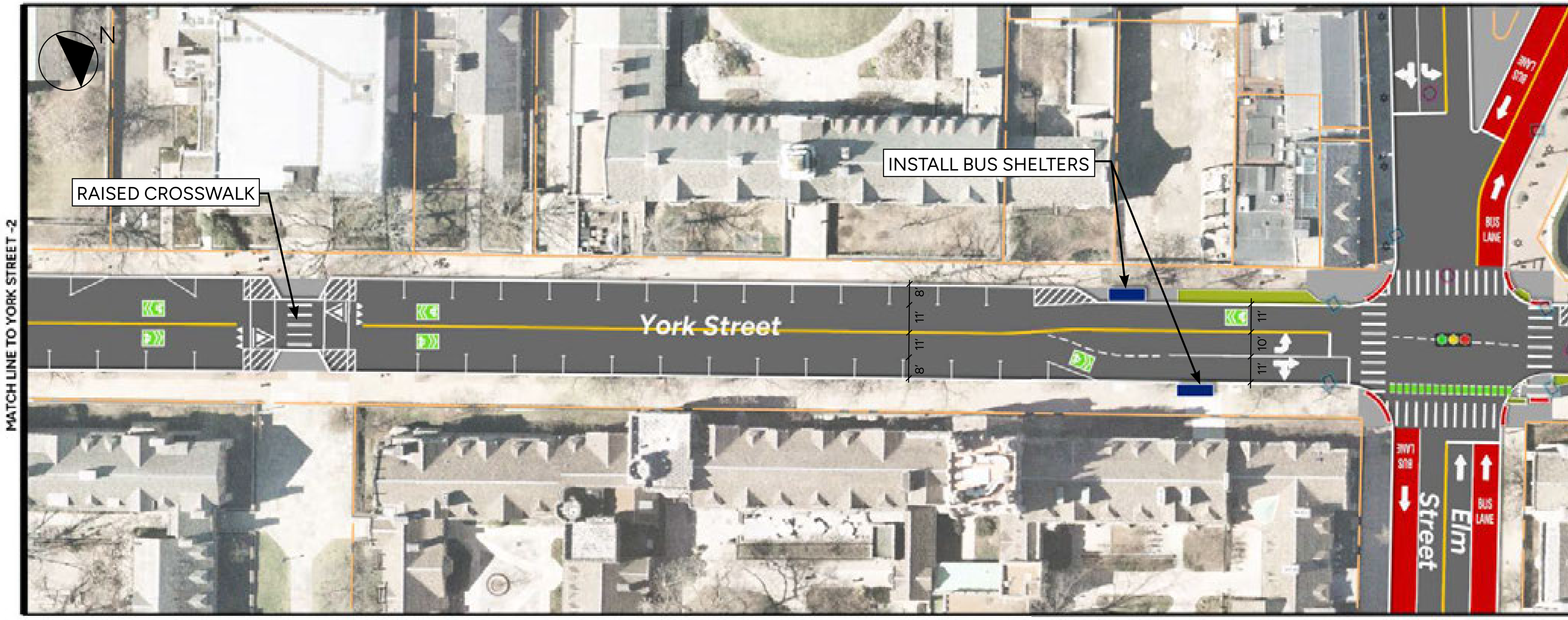

YORK STREET - 3

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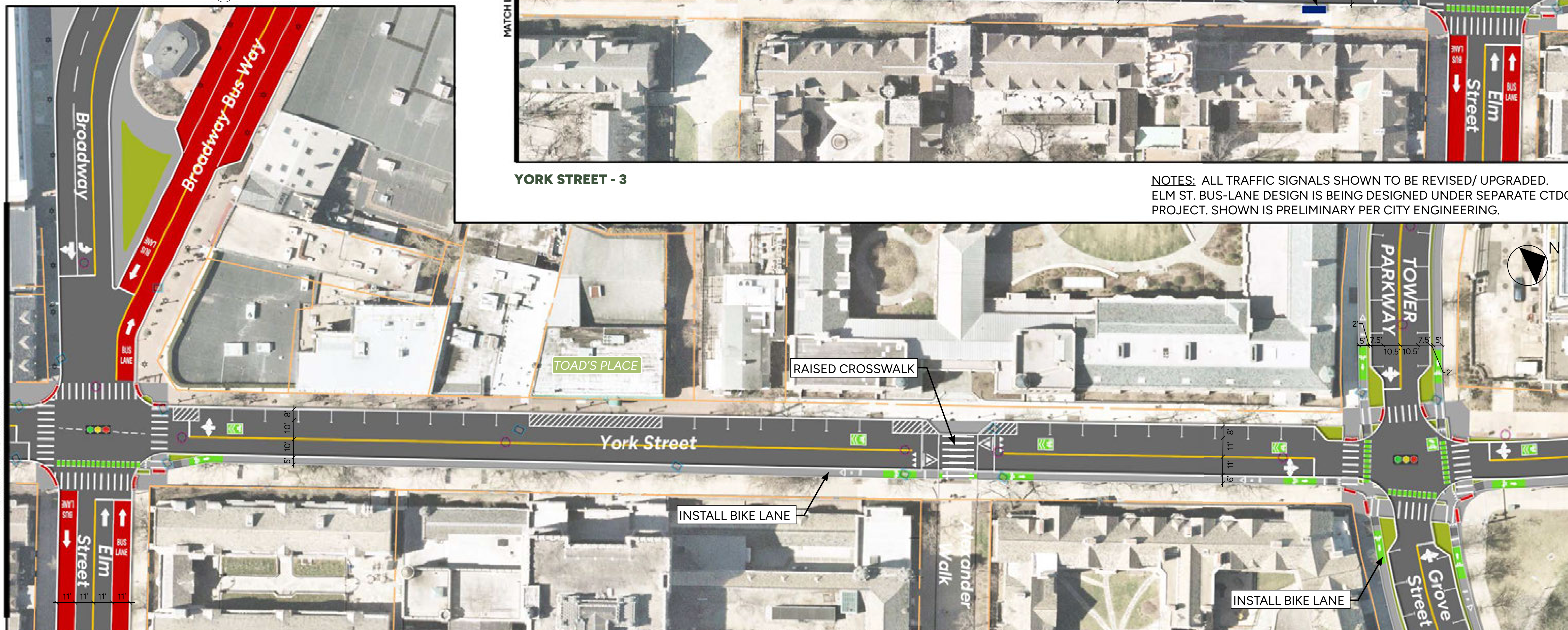
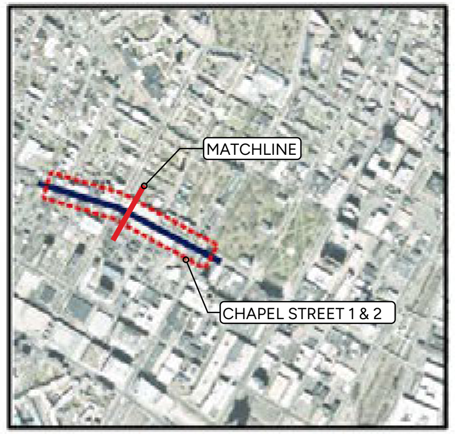


YORK STREET - 4

0' 30' 60'
1/2" 1"



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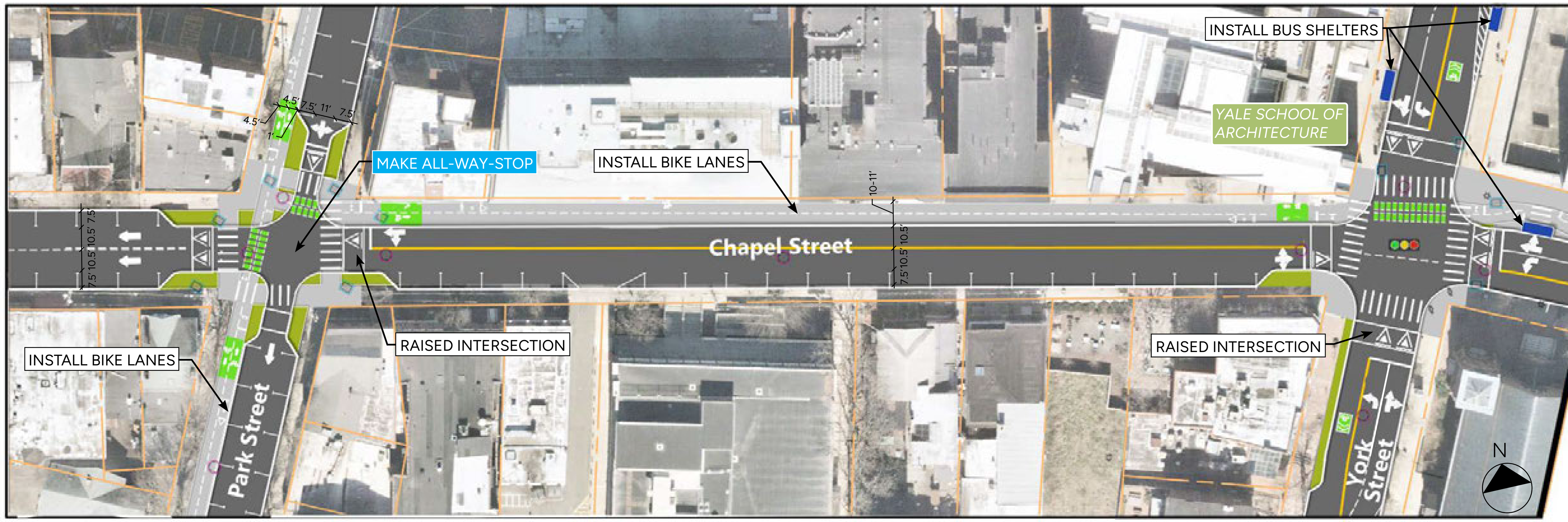
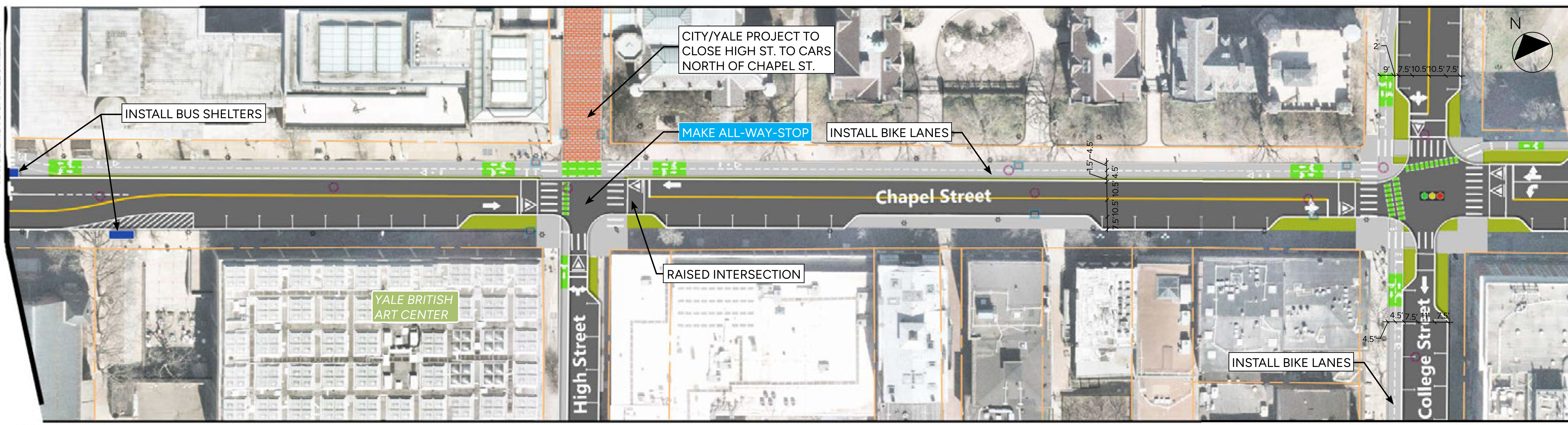


CHAPEL STREET - 1

NOTES: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.
TALL BUILDINGS OVERSHADOW SIDEWALKS IN SOME AREAS DUE TO ANGLE OF AERIAL PHOTOGRAPH.

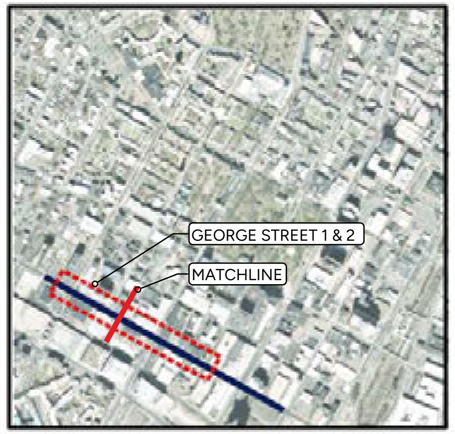


CHAPEL STREET - 2

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND CONCEPT DESIGN ALTERNATE 1 - CHAPEL STREET

0' 30' 60'
1/2" 1"



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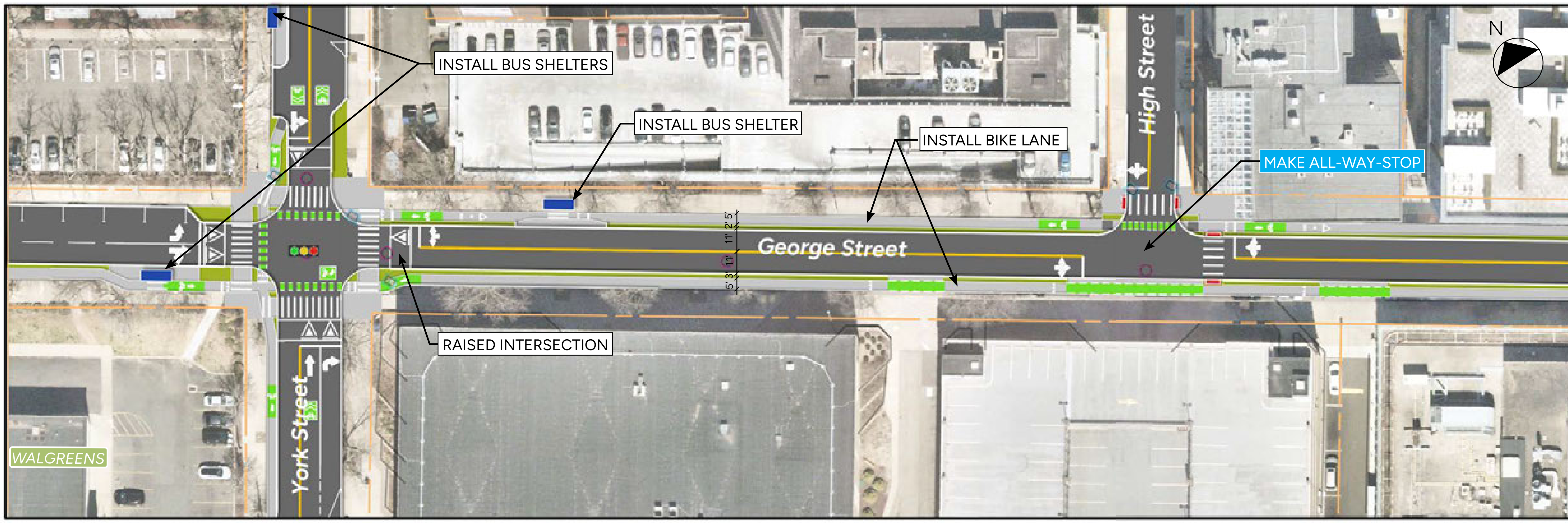
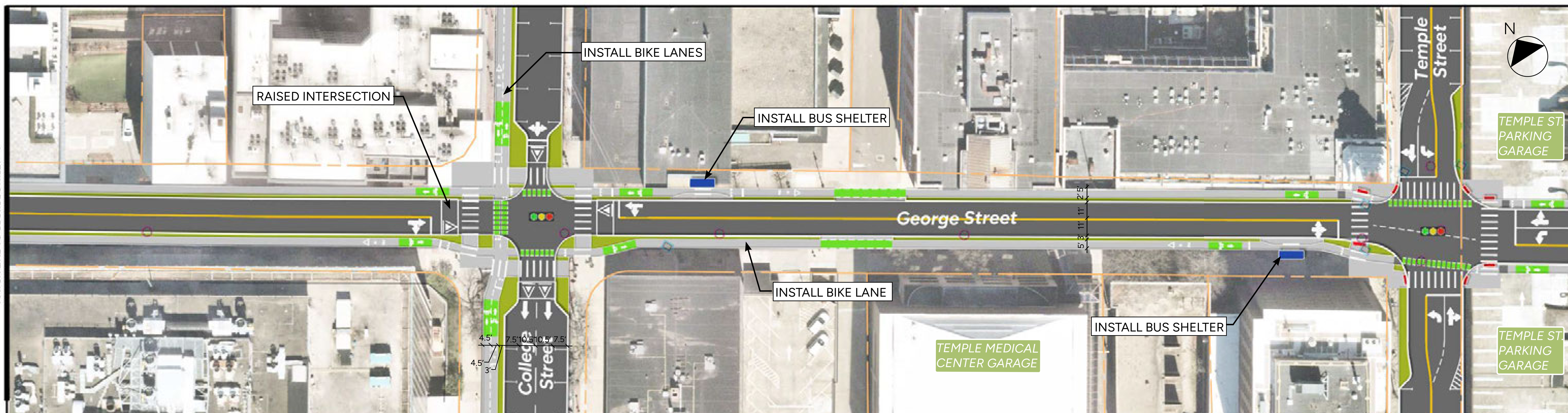


GEORGE STREET - 1

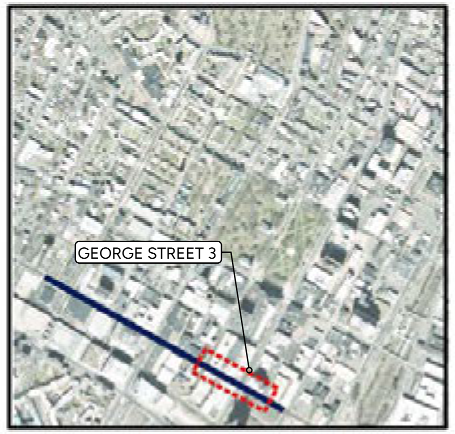
NOTES: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.
TALL BUILDINGS OVERSHADOW SIDEWALKS IN SOME AREAS DUE TO ANGLE OF AERIAL PHOTOGRAPH.



GEORGE STREET - 2

SLR **CITY OF NEW HAVEN** ONE-WAY TO TWO-WAY CONVERSION STUDY AND CONCEPT DESIGN ALTERNATE 1 - GEORGE STREET

0' 30' 60'
1/2" 1"



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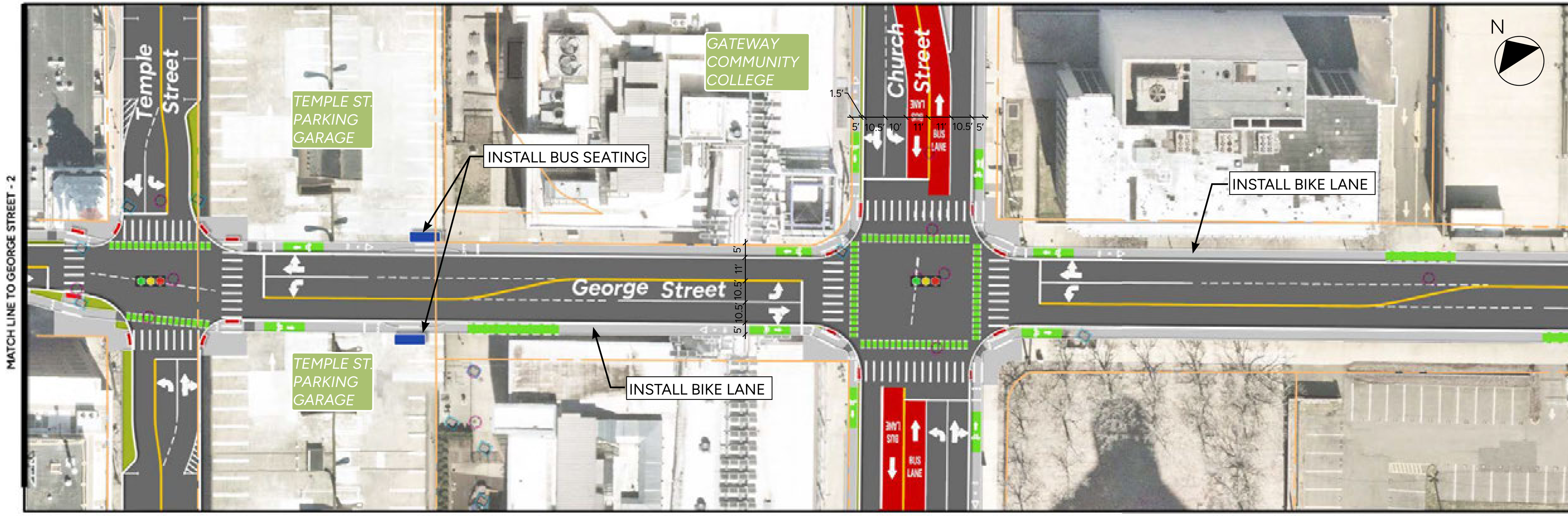
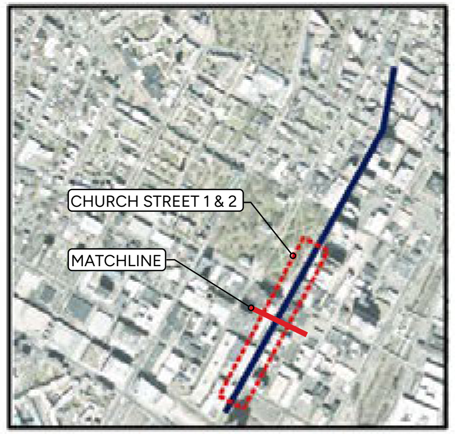


GEORGE STREET - 3

NOTE: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.

0' 30' 60'
1/2" 1"



KEY MAP

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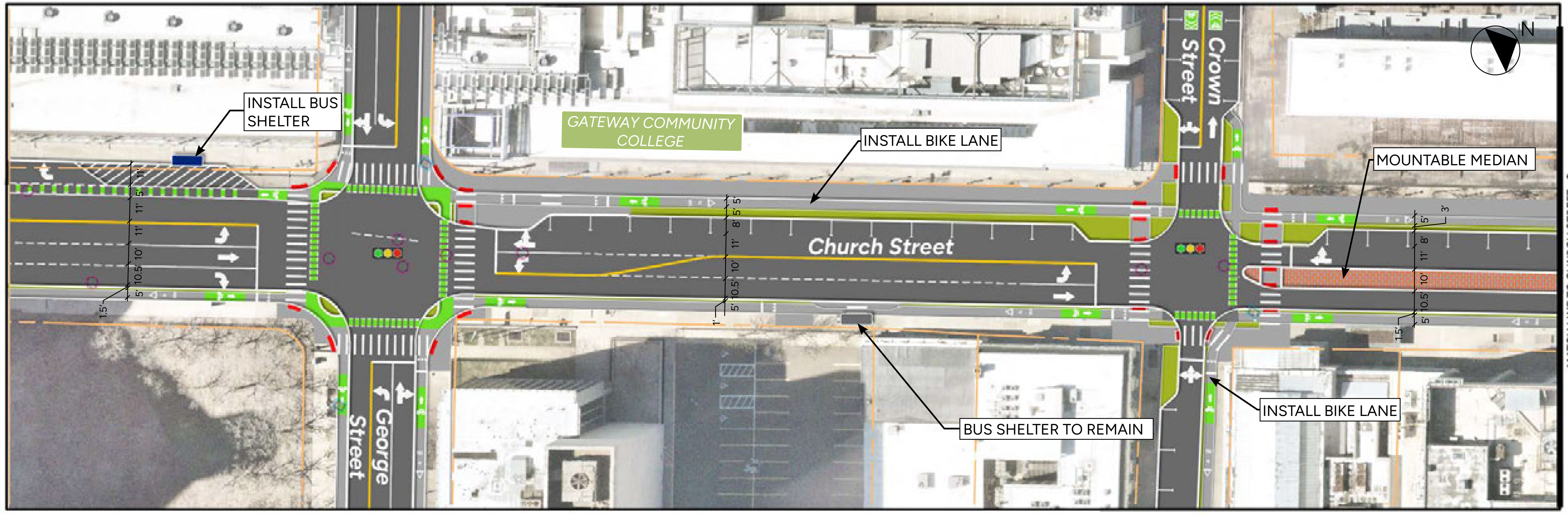
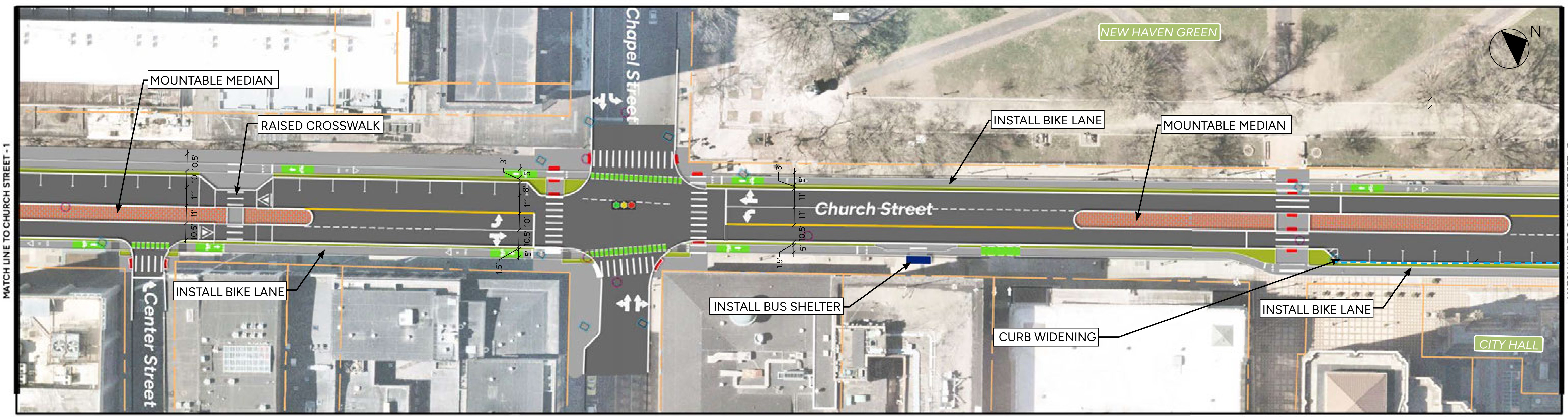


CHURCH STREET - 1

NOTES: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.
TALL BUILDINGS OVERSHADOW SIDEWALKS IN SOME AREAS DUE TO ANGLE OF AERIAL PHOTOGRAPH.



CHURCH STREET - 2

SLR

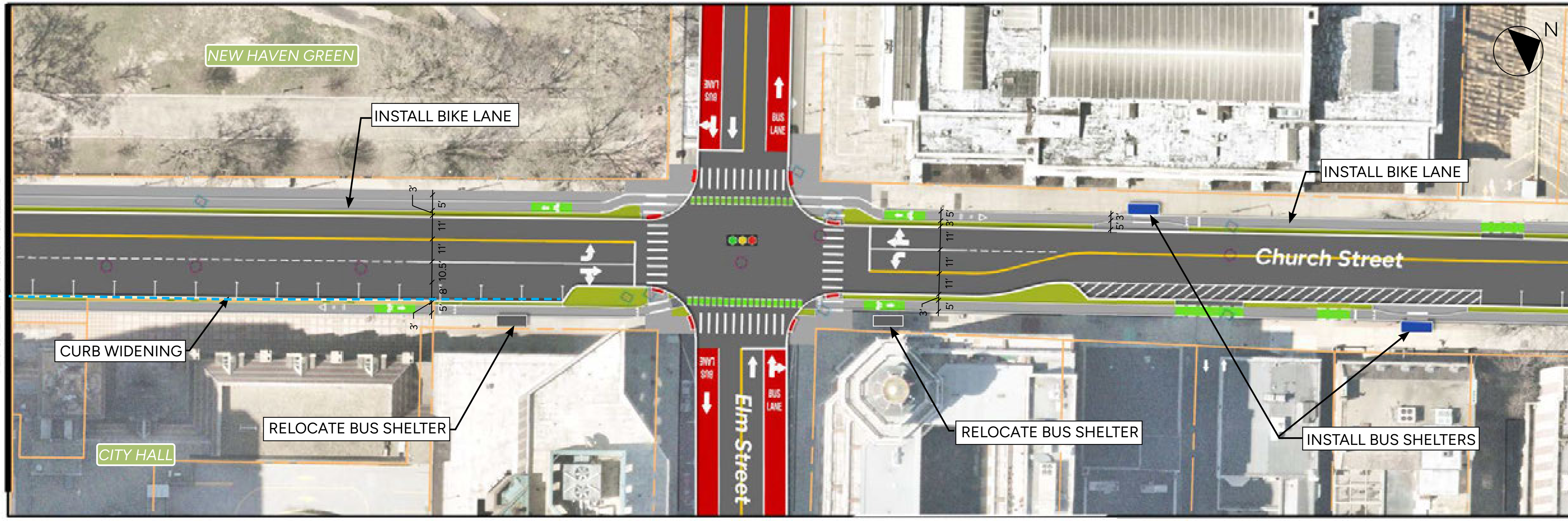
CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND CONCEPT DESIGN ALTERNATE 2 - CHURCH STREET

0' 30' 60'
1/2" 1"

KEY MAP

N

MATCH LINE TO CHURCH STREET -2

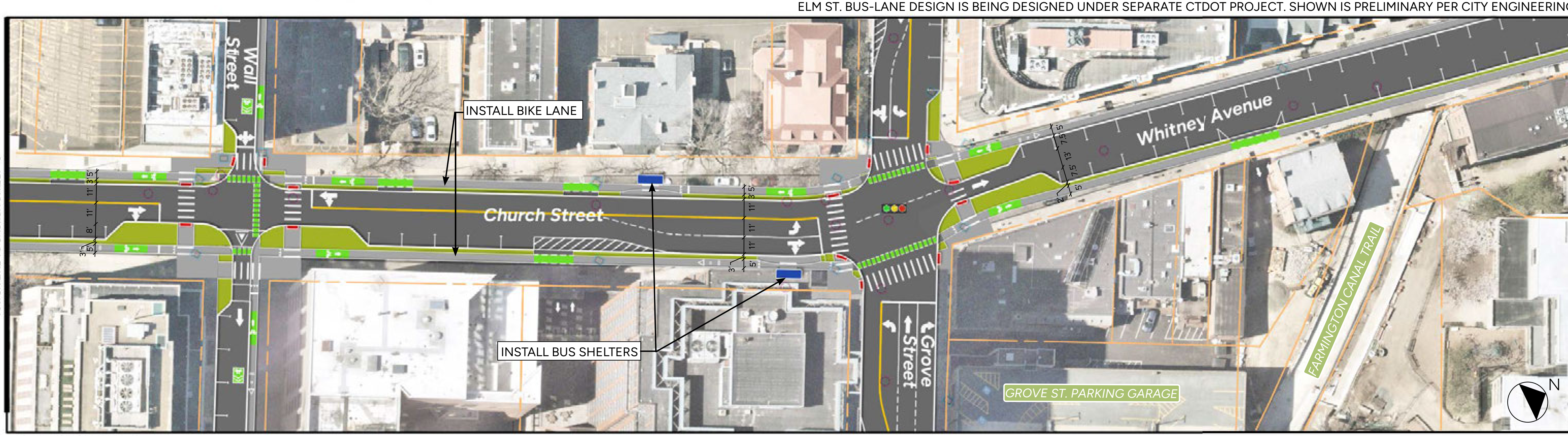


MATCH LINE TO CHURCH STREET - 4

CHURCH STREET - 3

NOTES: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.
ELM ST. BUS-LANE DESIGN IS BEING DESIGNED UNDER SEPARATE CTDOT PROJECT. SHOWN IS PRELIMINARY PER CITY ENGINEERING.

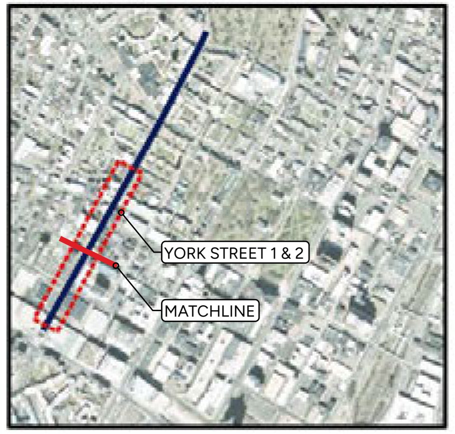
MATCH LINE TO CHURCH STREET - 3



CHURCH STREET - 4

0' 30' 60'
1/2" 1"

SLR **CITY OF NEW HAVEN** ONE-WAY TO TWO-WAY CONVERSION STUDY AND CONCEPT DESIGN ALTERNATE 2 - CHURCH STREET



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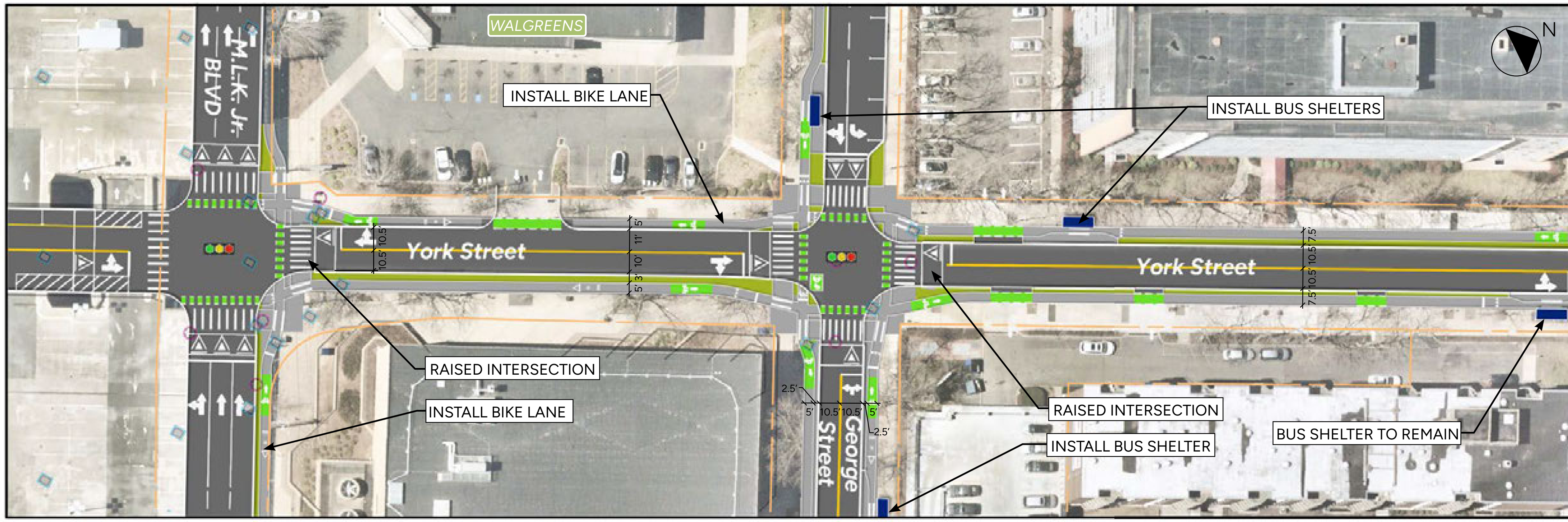


YORK STREET - 1

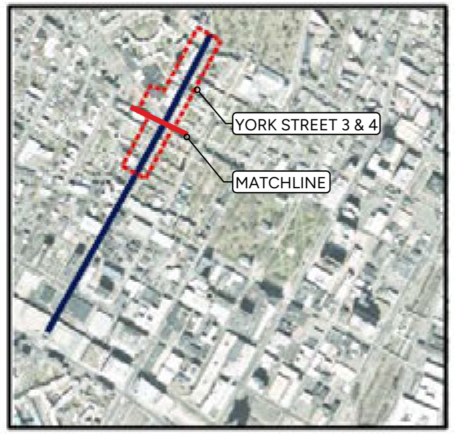
NOTE: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.

YORK STREET - 2

0′ 30′ 60′
1/2″ 1″

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND CONCEPT DESIGN ALTERNATE 2 - YORK STREET



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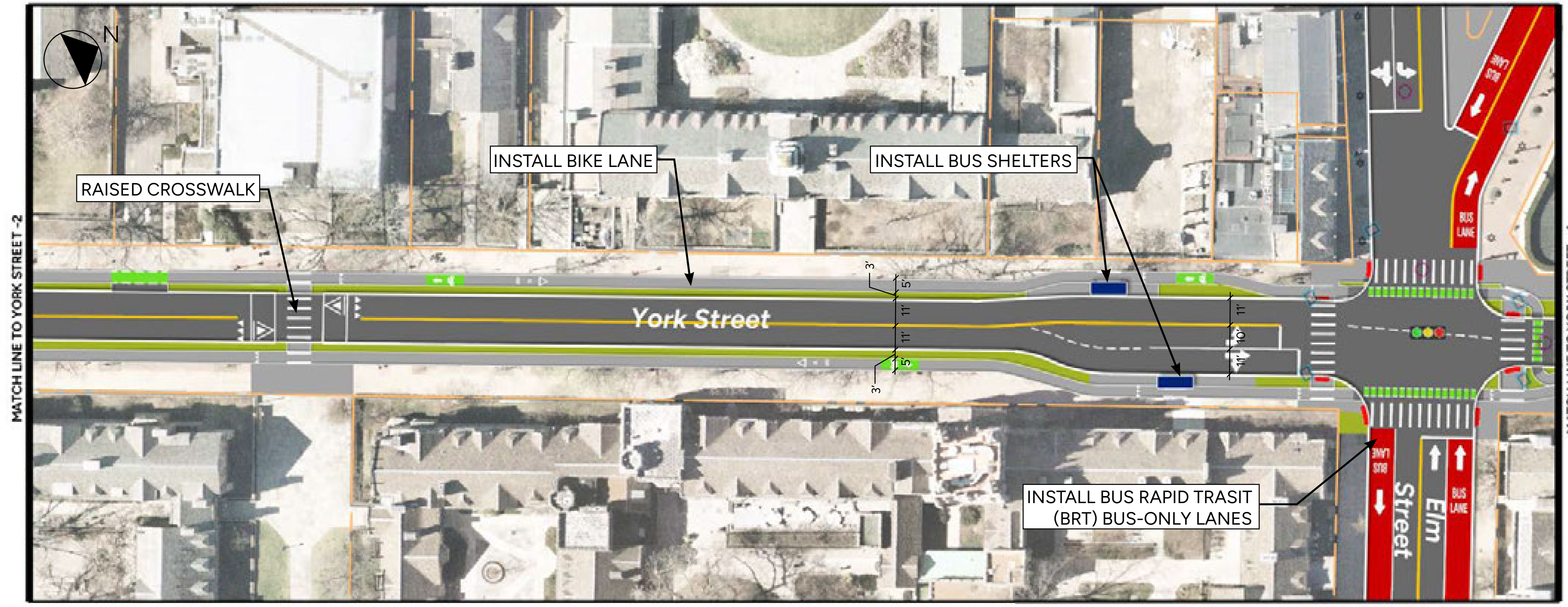
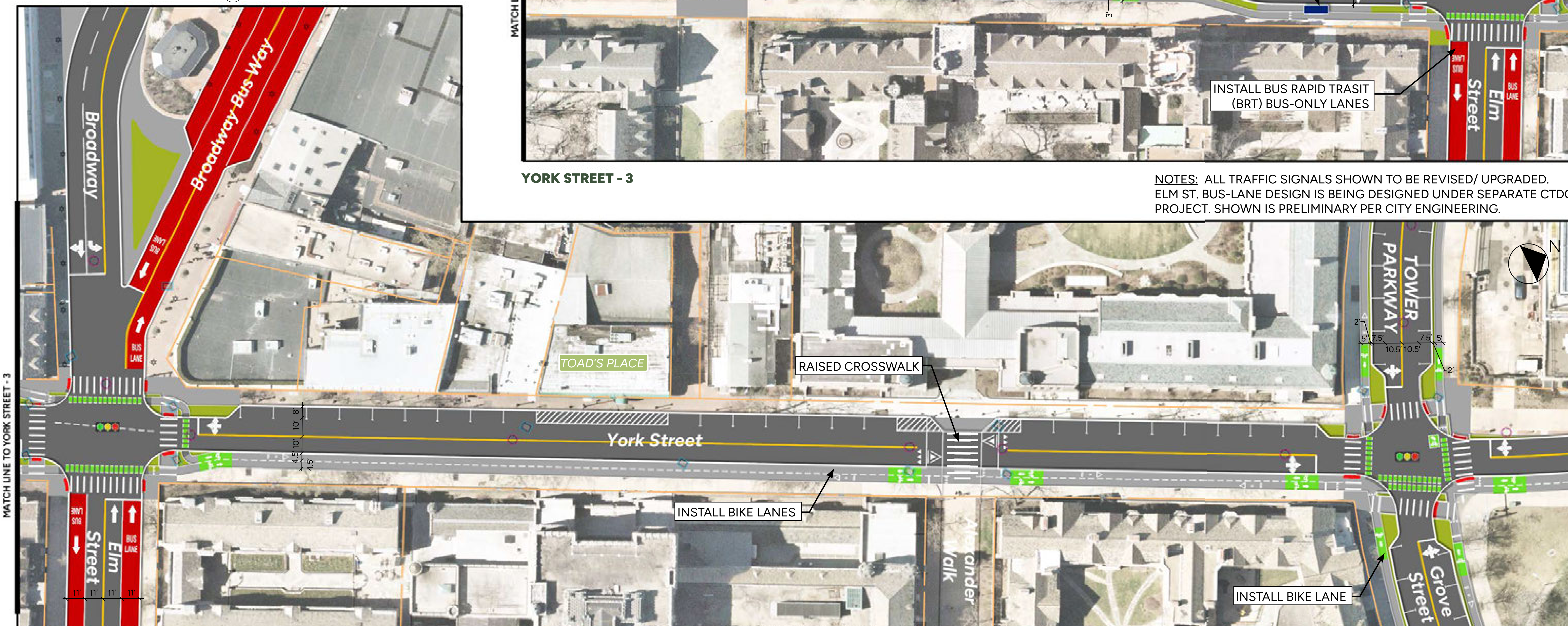


YORK STREET - 3

NOTES: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.
ELM ST. BUS-LANE DESIGN IS BEING DESIGNED UNDER SEPARATE CTDOT PROJECT. SHOWN IS PRELIMINARY PER CITY ENGINEERING.

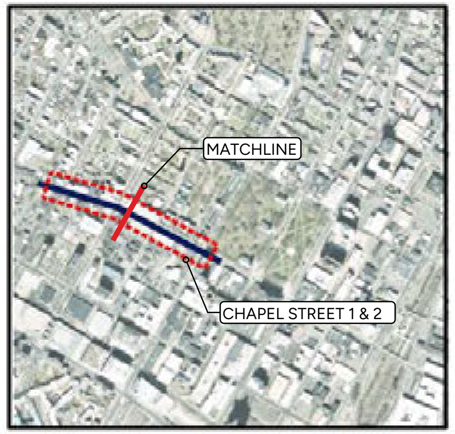


YORK STREET - 4

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND CONCEPT DESIGN ALTERNATE 2 - YORK STREET

0' 30' 60'
1/2" 1"



KEY MAP

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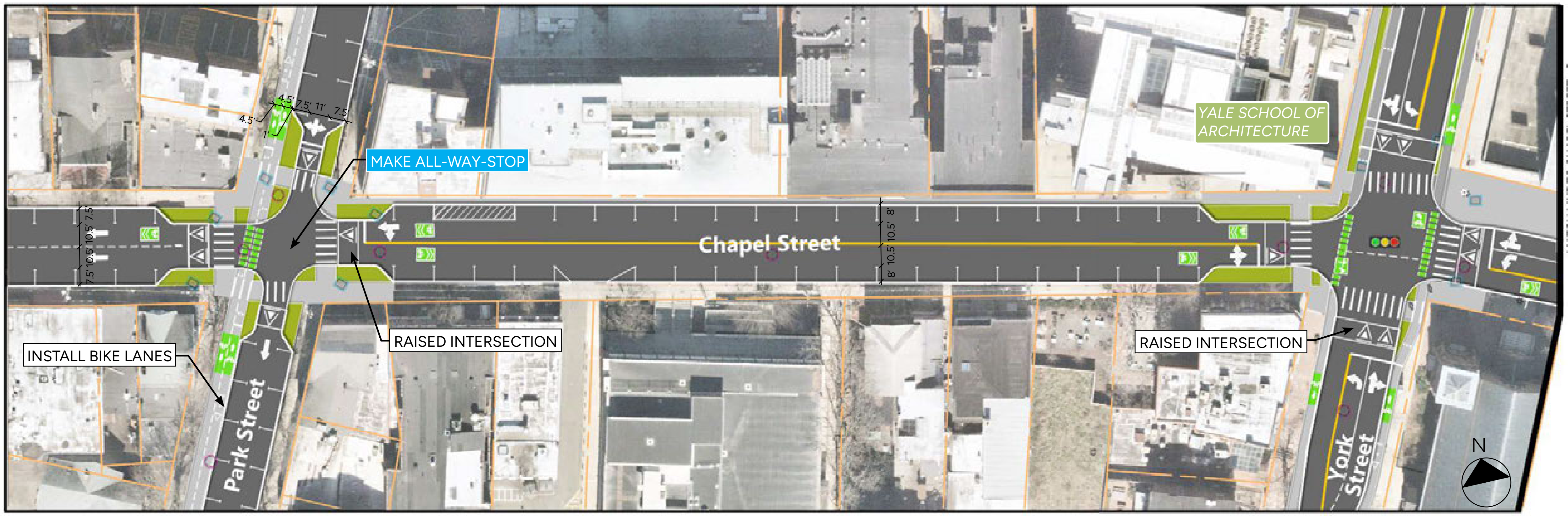
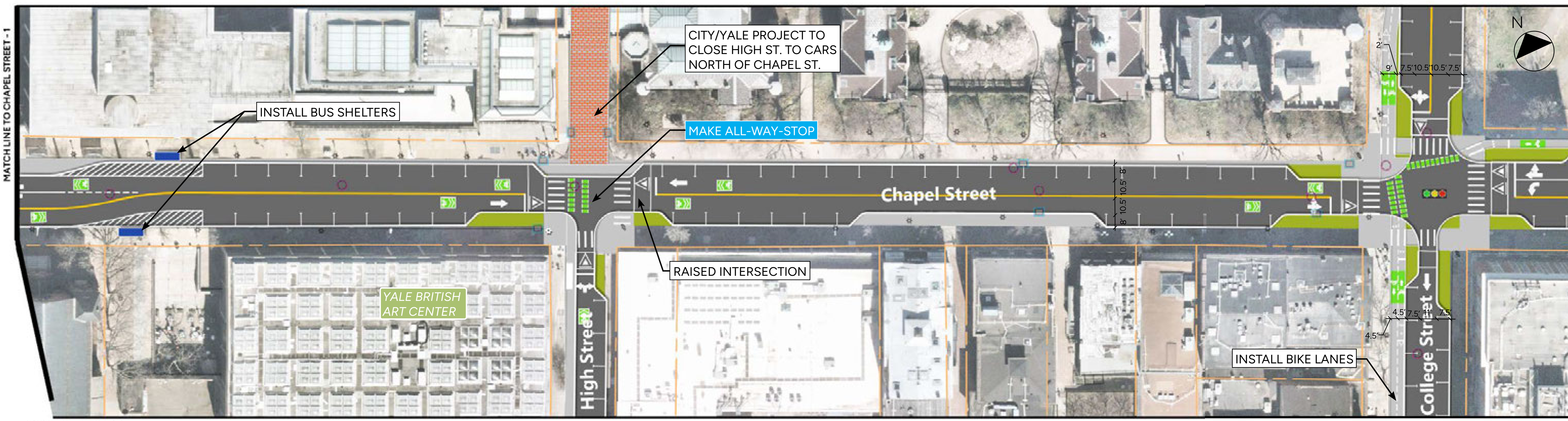


CHAPEL STREET - 1

NOTES: ALL TRAFFIC SIGNALS SHOWN TO BE REVISED/ UPGRADED.
TALL BUILDINGS OVERSHADOW SIDEWALKS IN SOME AREAS DUE TO ANGLE OF AERIAL PHOTOGRAPH.



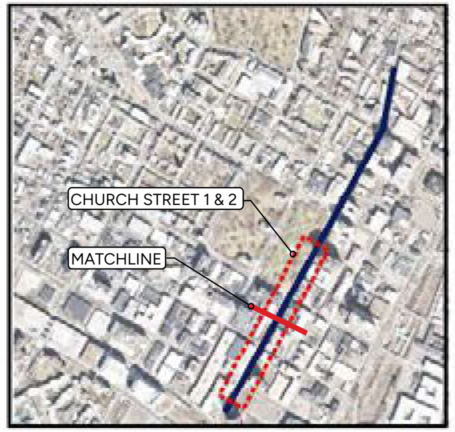
CHAPEL STREET - 2

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND CONCEPT DESIGN ALTERNATE 2 - CHAPEL STREET

0' 30' 60'
1/2" 1"

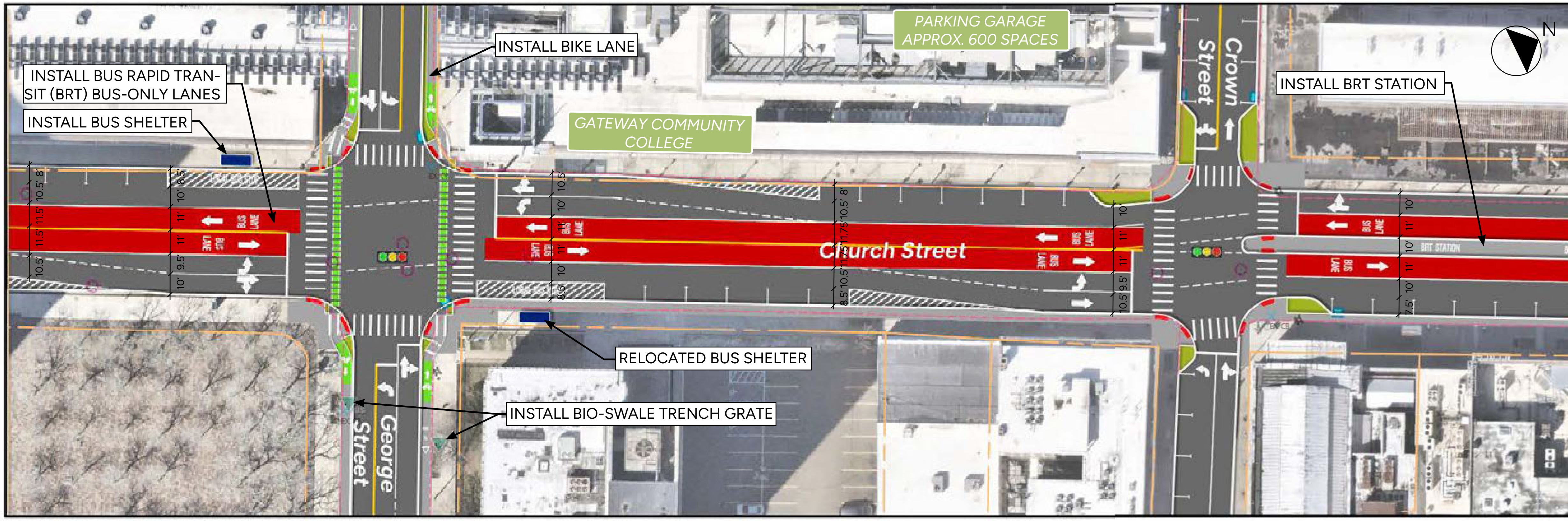
CONCEPT ONLY - NOT FOR CONSTRUCTION



KEY MAP

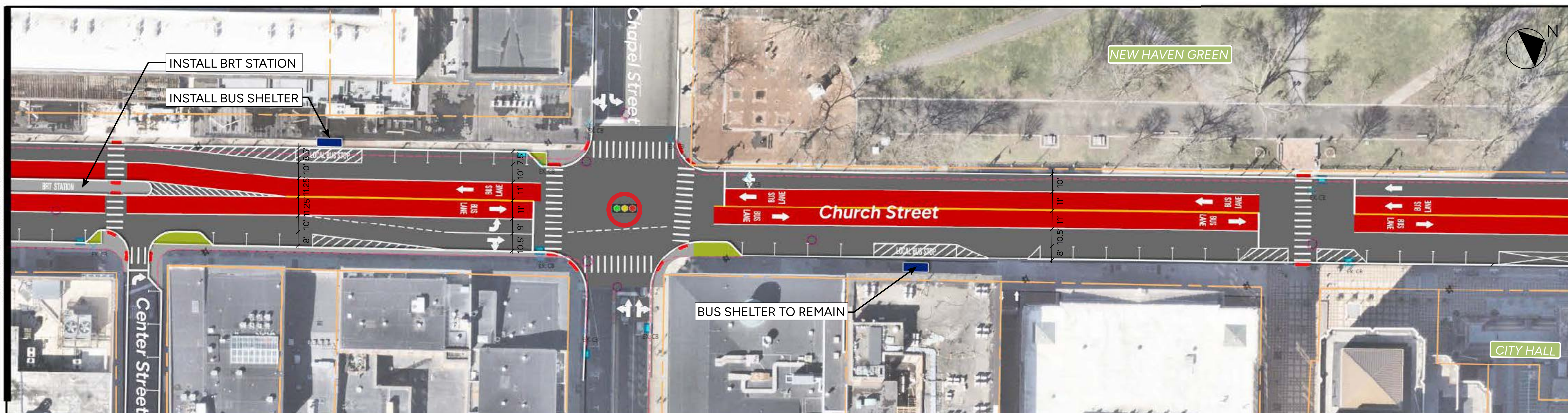
LEGEND

- PROPOSED CATCH BASIN
- EXISTING CATCH BASIN
- EXISTING MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING EDGE OF PAVEMENT (GIS approx)
- PROPERTY LINE
- PROPOSED SIGNAL MODIFICATION
- PROPOSED FULL SIGNAL REPLACEMENT



CHURCH STREET - 1

NOTES: TALL BUILDINGS OVERSHADOW SIDEWALKS IN SOME AREAS DUE TO ANGLE OF AERIAL PHOTOGRAPH.
CHURCH STREET BUS LANES SUBJECT TO CHANGE PER CTDOT BRT PROJECT.



CHURCH STREET - 2

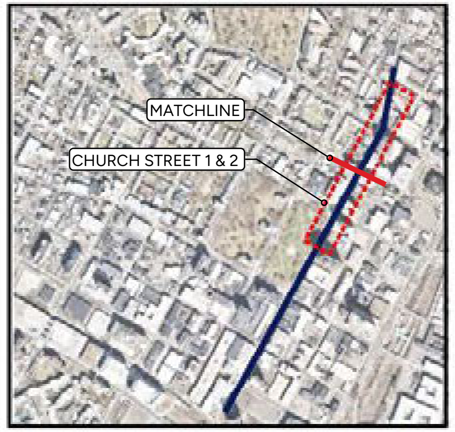
NOTES: CHURCH STREET BUS LANES SUBJECT TO CHANGE PER CTDOT BRT PROJECT.

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND PREFERRED CONCEPT DESIGN - CHURCH STREET

0' 30' 60'
1/2" 1"

CONCEPT ONLY - NOT FOR CONSTRUCTION

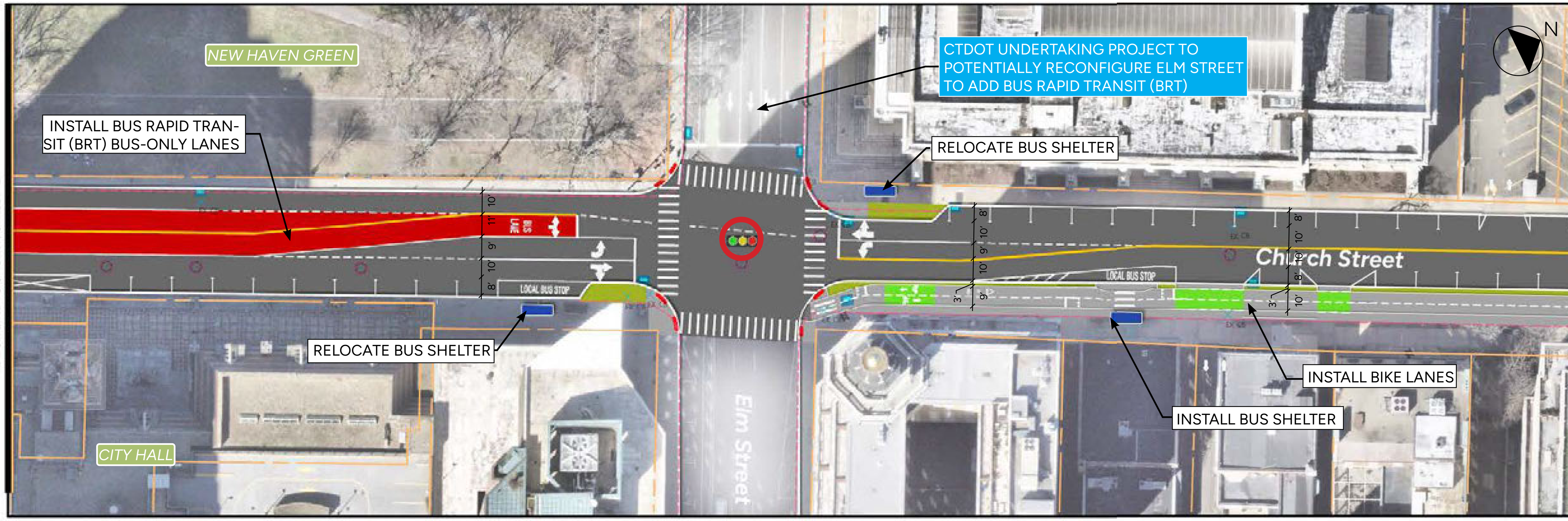


KEY MAP

N

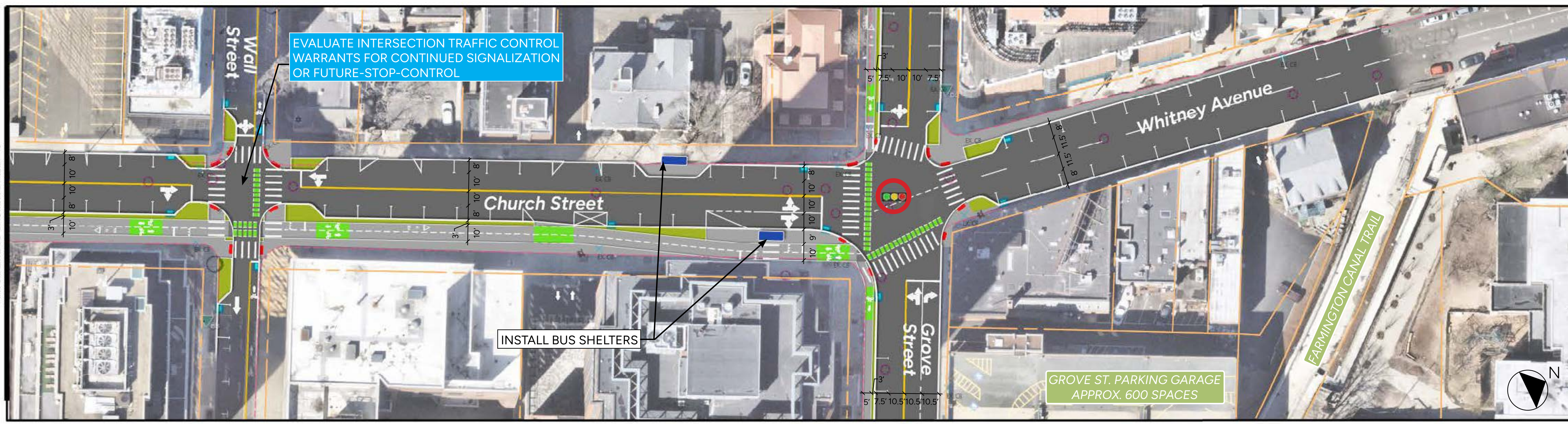
LEGEND

- PROPOSED CATCH BASIN
- EXISTING CATCH BASIN
- EXISTING MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING EDGE OF PAVEMENT (GIS approx)
- PROPERTY LINE
- PROPOSED SIGNAL MODIFICATION
- PROPOSED FULL SIGNAL REPLACEMENT



CHURCH STREET - 3

NOTES: CHURCH STREET BUS LANES SUBJECT TO CHANGE PER CTDOT BRT PROJECT



CHURCH STREET - 4

NOTES: TALL BUILDINGS OVERSHADOW SIDEWALKS IN SOME AREAS DUE TO ANGLE OF AERIAL PHOTOGRAPH.

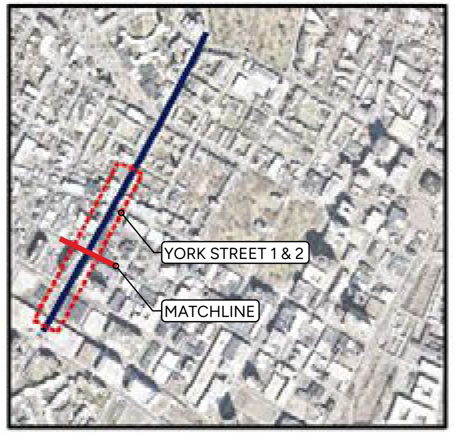
SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND PREFERRED CONCEPT DESIGN - CHURCH STREET

0' 30' 60'

1/2" 1"

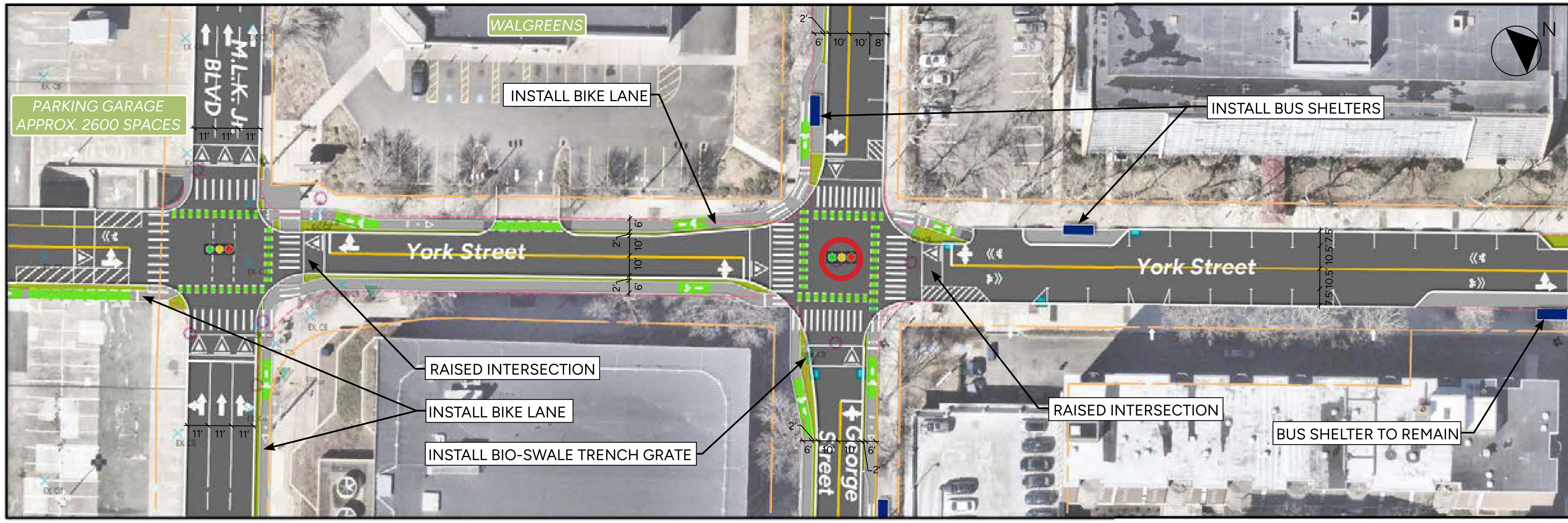
CONCEPT ONLY - NOT FOR CONSTRUCTION



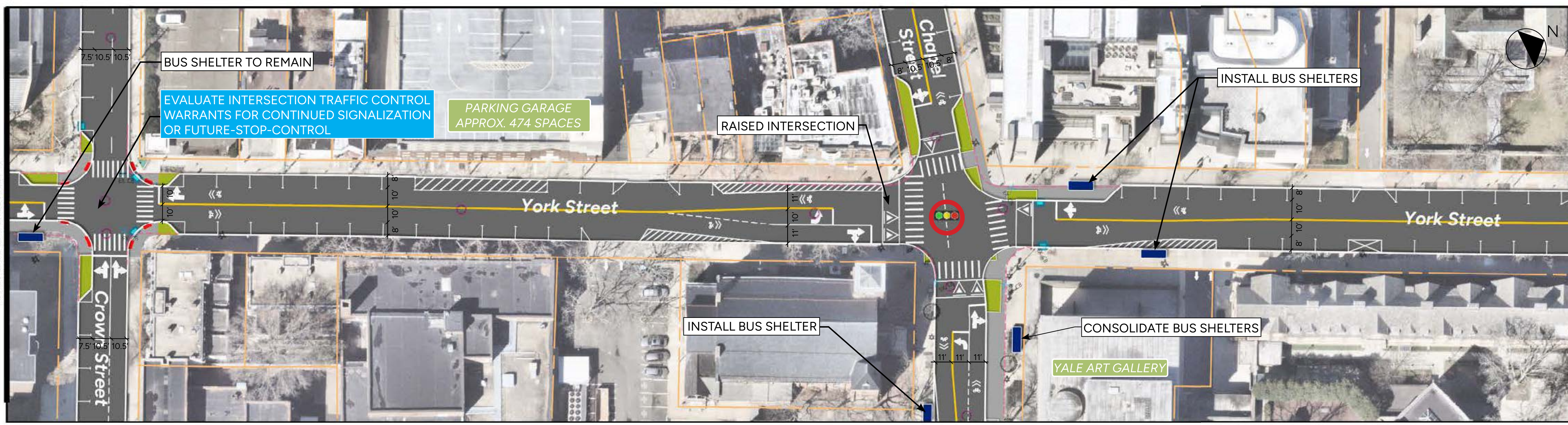
KEY MAP

LEGEND

- PROPOSED CATCH BASIN
- EXISTING CATCH BASIN
- EXISTING MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING EDGE OF PAVEMENT (GIS approx)
- PROPERTY LINE
- PROPOSED SIGNAL MODIFICATION
- PROPOSED FULL SIGNAL REPLACEMENT



YORK STREET - 1



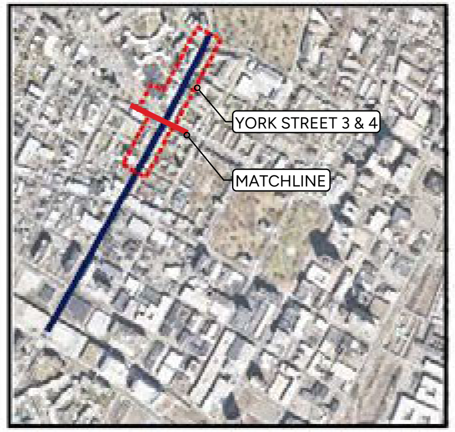
YORK STREET - 2

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND PREFERRED CONCEPT DESIGN - YORK STREET

0' 30' 60'
1/2" 1"

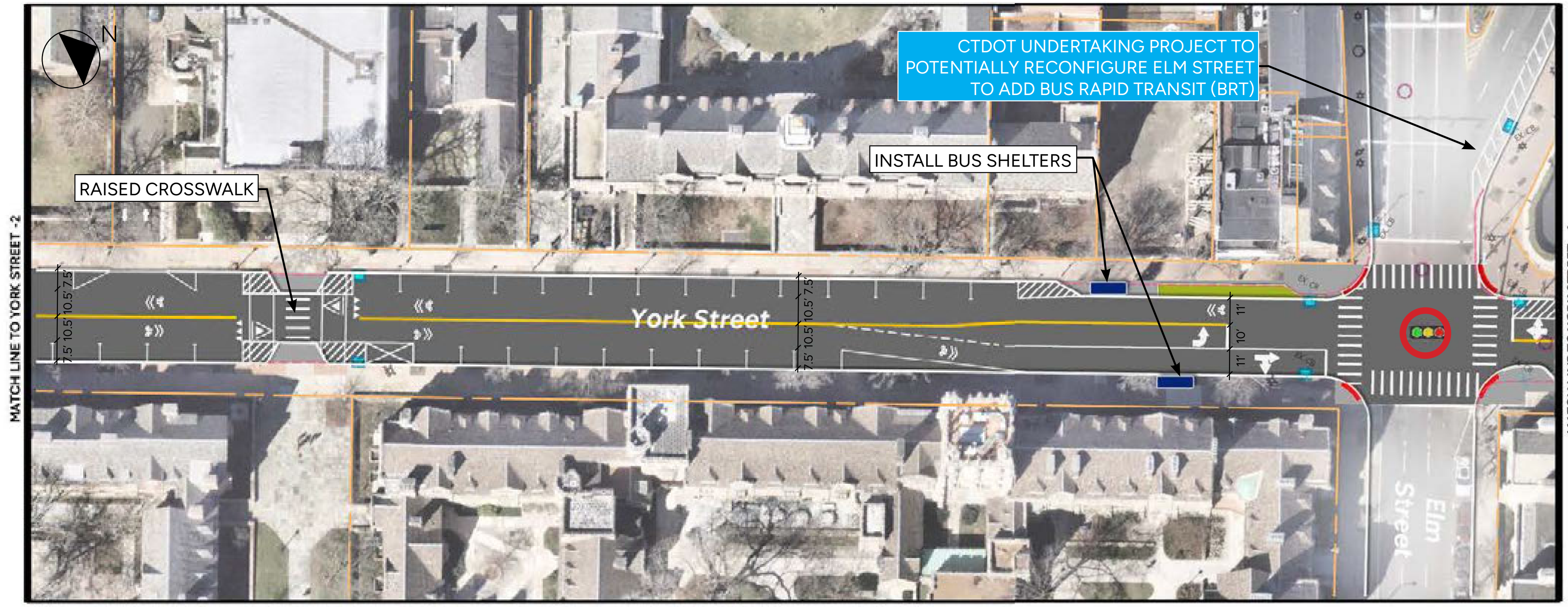
CONCEPT ONLY - NOT FOR CONSTRUCTION



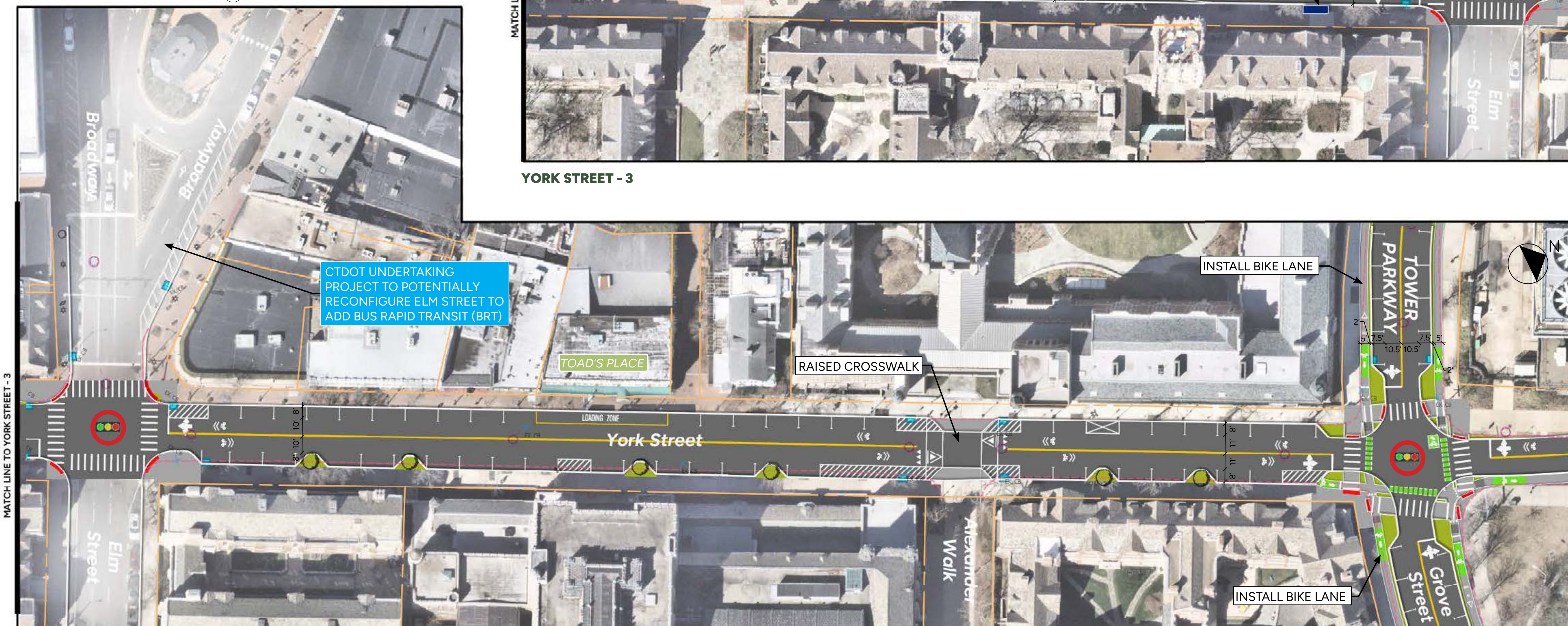
KEY MAP

LEGEND

- PROPOSED CATCH BASIN
- EXISTING CATCH BASIN
- EXISTING MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING EDGE OF PAVEMENT (GIS approx)
- PROPERTY LINE
- PROPOSED SIGNAL MODIFICATION
- PROPOSED FULL SIGNAL REPLACEMENT



YORK STREET - 3



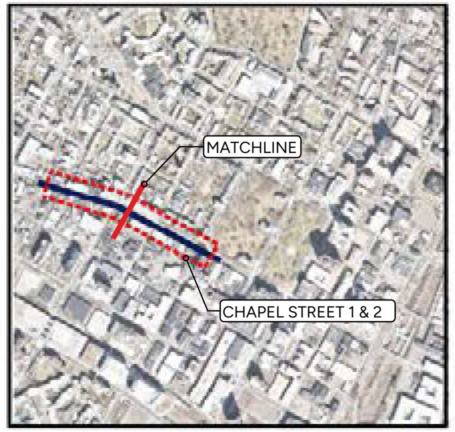
YORK STREET - 4

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND PREFERRED CONCEPT DESIGN - YORK STREET

0' 30' 60'
1/2" 1"

CONCEPT ONLY - NOT FOR CONSTRUCTION

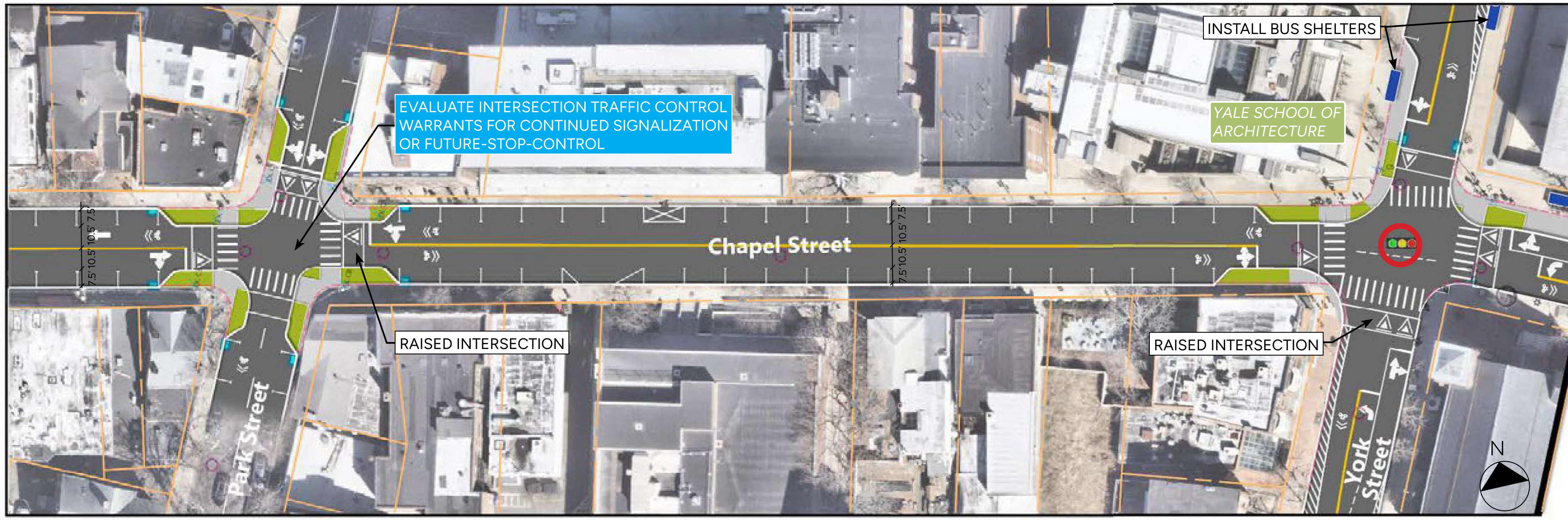


KEY MAP

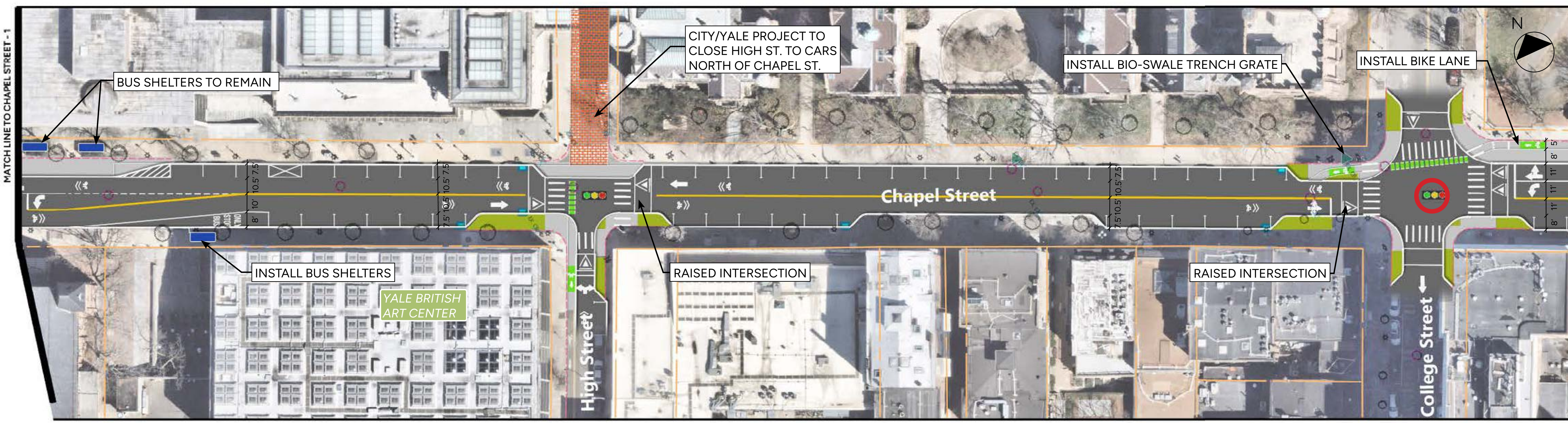
N

LEGEND

- PROPOSED CATCH BASIN
- EXISTING CATCH BASIN
- EXISTING MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING EDGE OF PAVEMENT (GIS approx)
- PROPERTY LINE
- PROPOSED SIGNAL MODIFICATION
- PROPOSED FULL SIGNAL REPLACEMENT



CHAPEL STREET - 1



CHAPEL STREET - 2

0′ 30′ 60′

1/2″ 1″

SLR

CITY OF NEW HAVEN ONE-WAY TO TWO-WAY CONVERSION STUDY AND PREFERRED CONCEPT DESIGN - CHAPEL STREET

CONCEPT ONLY - NOT FOR CONSTRUCTION

KEY MAP

N

LEGEND

- PROPOSED CATCH BASIN
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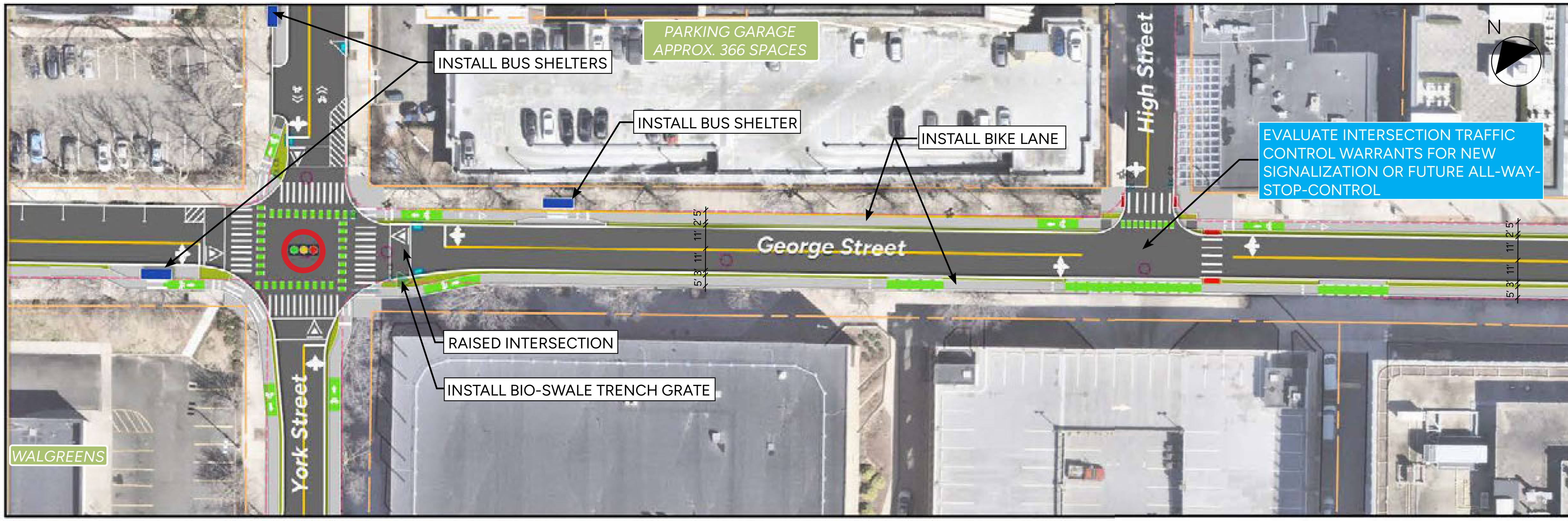
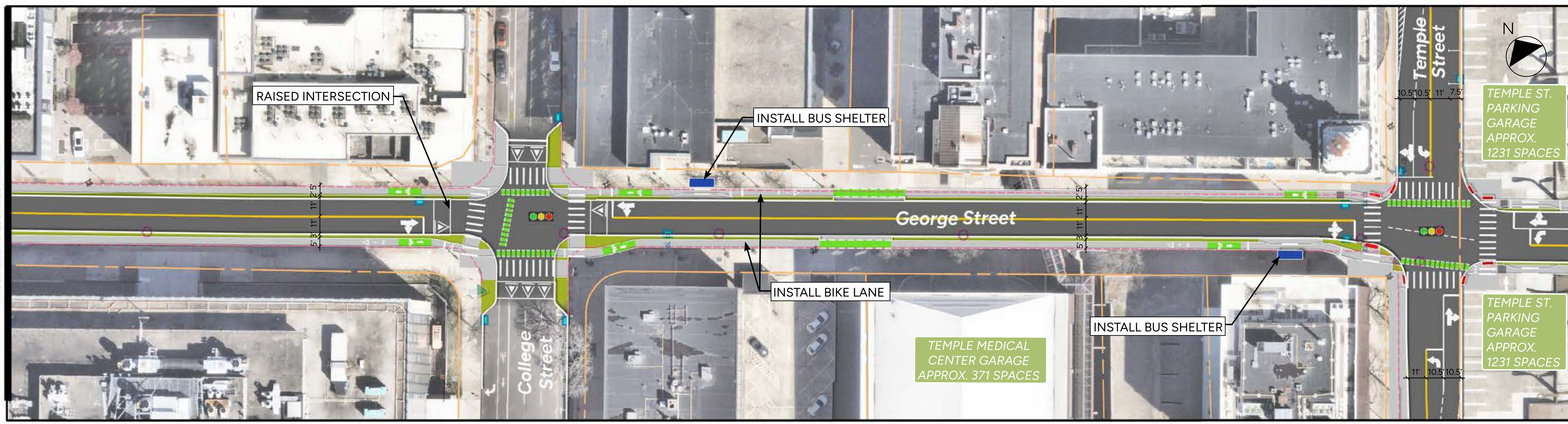
- EXISTING STREET LIGHT
- EXISTING EDGE OF PAVEMENT (GIS approx)
- PROPERTY LINE
- PROPOSED SIGNAL MODIFICATION
- PROPOSED FULL SIGNAL REPLACEMENT



GEORGE STREET - 1

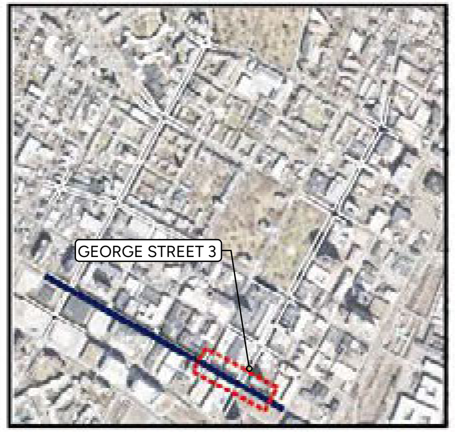
NOTES: TALL BUILDINGS OVERSHADOW SIDEWALKS IN SOME AREAS DUE TO ANGLE OF AERIAL PHOTOGRAPH.



GEORGE STREET - 2

0' 30' 60'
1/2" 1"

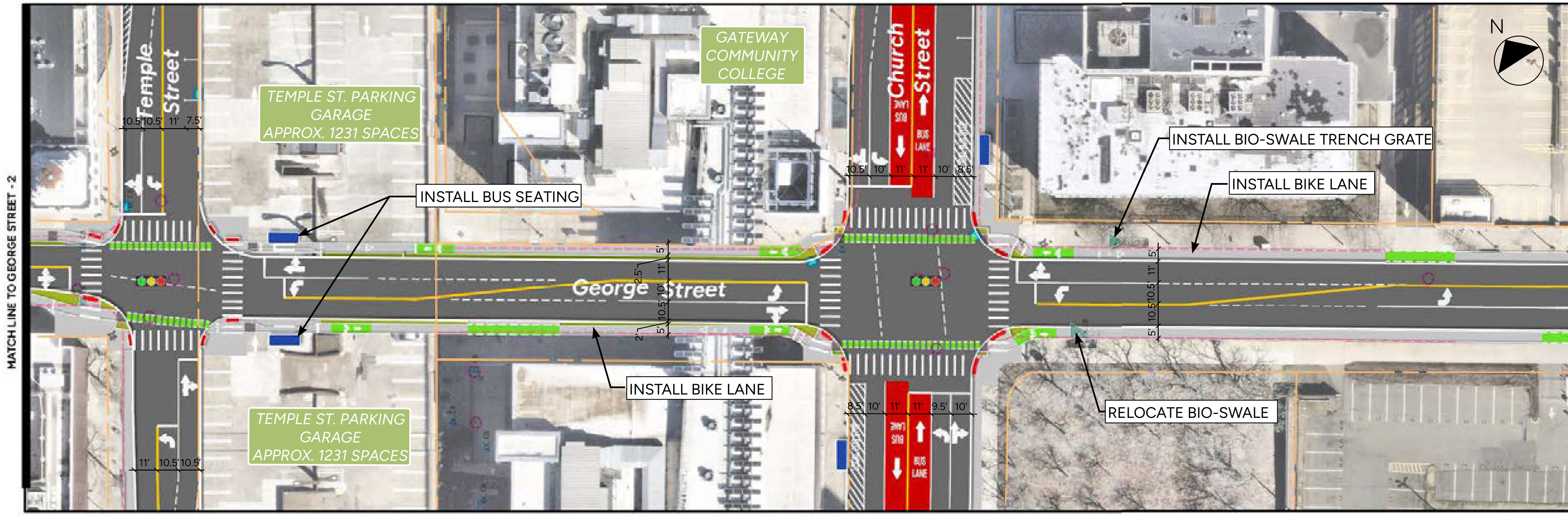
CONCEPT ONLY - NOT FOR CONSTRUCTION



KEY MAP

LEGEND

- PROPOSED CATCH BASIN
- EXISTING CATCH BASIN
- EXISTING MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING STREET LIGHT
- EXISTING EDGE OF PAVEMENT (GIS approx)
- PROPERTY LINE
- PROPOSED SIGNAL MODIFICATION
- PROPOSED FULL SIGNAL REPLACEMENT



GEORGE STREET - 3

NOTE: CHURCH STREET BUS LANES SUBJECT TO CHANGE PER CTDOT BRT PROJECT.

0' 30' 60'
1/2" 1"

Making Sustainability Happen