City of Thornton Eastlake at 124th Station Area Master Plan Update

steer davies gleave

October 27, 2015

Acknowledgments

The Project Team would like to thank and acknowledge the significant contributions of the members of this plan's Project Management Team and Advisory Committee, who provided valuable guidance and vision throughout the course of the planning process. We would also like to thank attendees who participated in the Developer Forum and community meetings.

Mayor and City Council Members

Mayor	Heidi K. Williams
Ward I	Jenice "JJ" Dove Mack Goodman
Ward II	Erick Montoya Val Vigil, Mayor Pro Tem
Ward III	SomXai Vue Sam Nizam
Ward IV	Eric Tade Janifer Kulmann

City of Thornton Project Management Team

Jack Ethredge	City Manager
Jeff Coder, AICP	Deputy City Manager, City Development
Glenda Lainis, AICP Robert	Policy Planning Manager
Larsen, AICP Diane Van	Senior Planner
Fossen	Capital Projects and Planning Manager

Advisory Committee

Pete Brezall, PE	City of Thornton
Dante Carbone	City of Thornton
Leah Dawson, AICP	City of Thornton
Buz Hedglin	City of Thornton
Julie Jacoby	City of Thornton
Andy Jennings	City of Thornton
Jim Kaiser, PE	City of Thornton
Jan Kiehl	City of Thornton

Mike Mallon, AICP	City of Thornton
Chad McCollum , PE	City of Thornton
Chris Molison	City of Thornton
Kent Moorman, PE	City of Thornton
Jason O'Shea, PE	City of Thornton
Paula Schulte	City of Thornton
Matthew Skogen	City of Thornton
Deb Turner, PE	City of Thornton
Lee Vitgenos	City of Thornton
Travis Reynolds, AICP	City of Northglenn
Becky Smith, AICP	City of Northglenn
Glen and Susan Lambertson	Property Owners
Rob Webber	Adams 12 School District
Matt Schaefer, GISP	Adams 12 School District
Ashland Vaughn, PE	Regional Transportation District
Jeet Desai	Regional Transportation District
Jeff Kay, PE	Regional Transportation District
Patrick McLaughlin	Regional Transportation District
Katrina Rodriguez, PE	Regional Transportation District
Lindsey Smith	Regional Transportation District

Developer Forum Participants

Chris Coble	Black Label Development
Tim Fredregill	Real Capital Solutions
Tim Steinhaus	Former Executive Director, Arvada Urban Renewal Authority

Consultant Team

Tim Baldwin, AICP	Steer Davies Gleave
Jean Sanson, AICP	Steer Davies Gleave
Hannah Polow, AICP	Steer Davies Gleave
Mark Leese, AIA, AICP	Leese & Associates
Bart Przybyl, PE, PTOE	Apex Design

RESO

C. D. No. 2015-189

RESOLUTION

A RESOLUTION ADOPTING THE EASTLAKE AT 124TH STATION AREA MASTER PLAN AS A PART OF THE COMPREHENSIVE PLAN.

WHEREAS, the Eastlake at 124th Station ("Station") located at 124th Avenue and Claude Court has been identified by Regional Transportation District (RTD) as a transit station for the North Metro FasTracks corridor; and

WHEREAS, the Thornton City Council adopted the Eastlake Station Area Master Plan (STAMP) on February 24, 2009; and

WHEREAS, the STAMP was prepared to guide development in the vicinity of the future Eastlake at 124th Station; and

WHEREAS, the conditions and circumstances have changed since the STAMP was adopted now with the North Metro Line scheduled for completion in 2018; and

WHEREAS, in response to the conditions and circumstances changing the STAMP has been updated; and

WHEREAS, the updated STAMP provides guidance related to the types of land uses, transportation infrastructure and amenities desired by the community through specific elements including the Station Area Vision, the Preferred Alternative, Guiding Principles, and Implementation Strategies; and

WHEREAS, the updated STAMP includes a chapter providing guidance on improvements in the City owned Open Lands area alongside the railway tracks including the grain elevator and associated buildings; and

WHEREAS, the Thornton City Council adopted the 2012 update to the Thornton Comprehensive Plan on September 11, 2012; and

WHEREAS, the STAMP furthers the Comprehensive Plan policy to "Facilitate the development of well-designed and integrated mixed-use developments at anticipated future FasTracks stations, and ensure suitable pedestrian connections with surrounding neighborhoods"; and

WHEREAS, the STAMP will be used by City Council, City Boards and Commissions, other City officials, residents, developers and City staff to ensure a well-designed and integrated mixed-use development around the future Station.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF THORNTON, COLORADO, AS FOLLOWS:

The Eastlake at 124th Station Area Master Plan, attached as Attachment A to this Resolution, is hereby adopted as an implementation document of the 2012 Thornton Comprehensive Plan.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Thornton, Colorado, on October 27, 2015.

CITY OF THORNTON, COLORADO

Heidi K. Williams, Mayor

ATTEST:

Nancy A. Vincent, City Clerk

Table of Contents

Figures

Tables

Chapter 1.0 Introduction

1.1 Background

The North Metro commuter rail line is part of the RTD FasTracks regional transit system expansion program to build more than 100 miles of rail transit throughout the Denver region. The 18.5-mile North Metro line is proposed to run from Denver Union Station in downtown Denver, through Commerce City, Thornton, and Northglenn to just north of Highway 7 in north Thornton. Currently, the line is funded to the Eastlake at 124th Station, as shown in Figure 1.1, and is expected to open in 2018. This means that, under current plans, the Eastlake at 124th Station is assumed to be the end-of-line station when the system opens in 2018.

Figure 1.1: RTD FasTracks North Metro Line

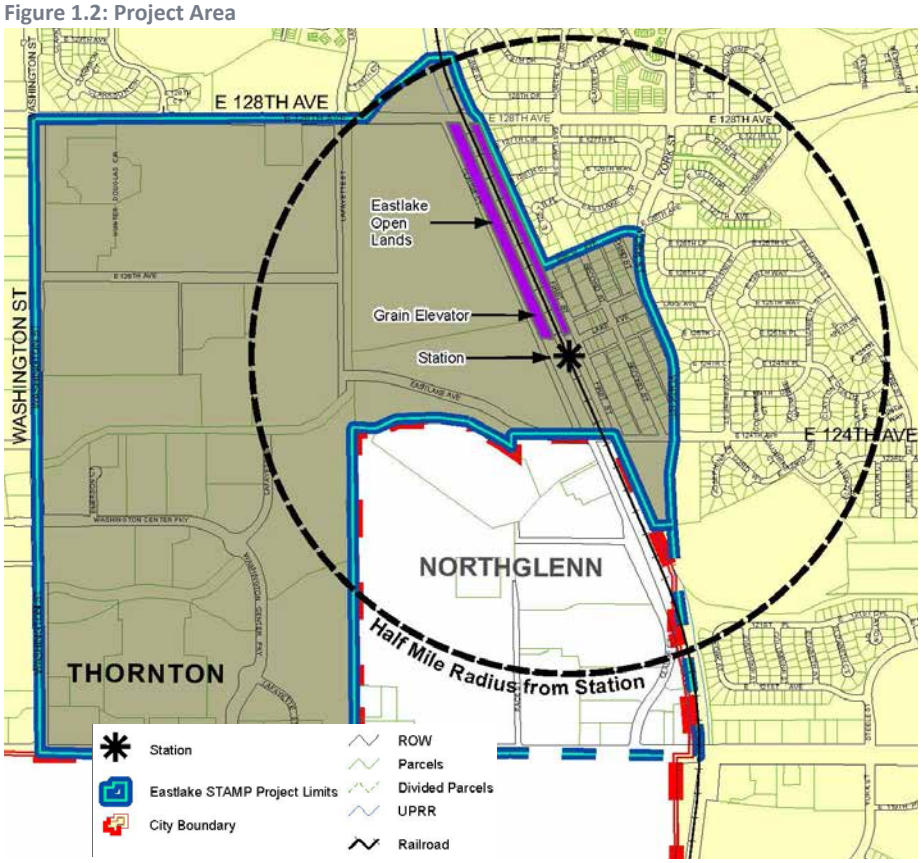
Source: RTD

It is with this backdrop that the City of Thornton initiated development of the Eastlake at 124th Station Area Master Plan (STAMP) as a follow-up to an earlier 2009 plan to capitalize on opportunities that commuter rail service will bring to the community and potentially help to transform the station area into a vibrant, walkable, mixed-use community with convenient train access. The station will open up a new gateway into the city for travelers throughout the Denver region. As such, planning for this station area presents a tremendous opportunity to make a first and lasting impression of Thornton. This impression, and the experience of living and working in the station area, should be one that is distinctive, attractive, and desirable for residents and visitors alike.

1.2 The Project Area

The Eastlake at 124th Station and Park-n-Ride will be located at 124th Avenue and Claude Court, with the bulk of the station located west of the UP railroad tracks, as shown in Figure 1.2. The 600-acre Station Area Master Plan Project Area, highlighted in grey, incorporates the station itself and properties within proximity of the station that are likely to redevelop and/or develop over time. Figure 1.2 also shows a half-mile radius from the station passenger platform; this half-mile radius is generally the distance that people are willing to walk to transit.

Figure 1.2: Project Area



Source: RTD

The Project Area also encompasses a portion of the city of Northglenn to the south of the station; this area is not included in this Station Area Master Plan Update but is the subject of a concurrent study by the city of Northglenn. The project area is also shown to include the original town of Eastlake; however, this STAMP will not include detailed planning proposals for this area. The 2003 Eastlake Subarea Plan is scheduled to be updated and will focus on planning for the original Eastlake area.

Figure 1.3 shows details of the proposed RTD Eastlake at 124th commuter rail station. The project shows the roughly 400 parking spaces planned for the primary Park-n-Ride at the station, with Claude Court relocated to the west of the Park-n-Ride to provide auto and bus access to the station. Additional 'overflow' parking of approximately 130 spaces is tentatively proposed by RTD to be located on the parcel south of 124th Avenue, east of the tracks. RTD has stated that it will re-evaluate the need for this interim overflow parking if the agency is successful in funding and constructing the remainder of the North Metro corridor by 2018; however, the Project Team proceeded under the assumption that this interim overflow parking will be needed at the time of station opening.

Figure 1.3: RTD Eastlake at 124th Station

Source: RTD

1.3 Transit-Oriented Development Defined

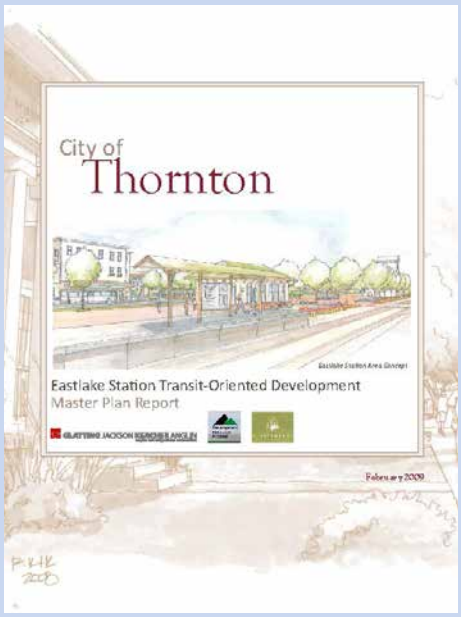
The Eastlake at 124th Station Area presents a unique opportunity for a Transit Oriented Development (TOD) in Thornton. TOD has many definitions, but it generally has three major characteristics:

- **A vibrant mix of land uses for people to comfortably live, work, and enjoy amenities in and around the station area.** Instead of land being designated for just one purpose such as single-family housing, commercial or industrial, TOD allows a mix of uses within a station area. Often this means having retail or office uses on lower floors of buildings, with residential above. Alternatively, it could mean having different uses located within comfortable walking distance of each other. While most transit patrons will use the North Metro line to travel inbound to Denver in the morning and outbound to Thornton during the evening, TOD can help to foster more balanced two-way travel so that riders have a reason to travel to the station area for jobs, school or shopping.

- **A well-connected street network that makes it easy and convenient to get around on foot, by bicycle, car and on transit.** TOD is generally located within walking or biking distance of a transit facility and provides the ability for residents or employees to walk to and from their origins and destinations, reducing the need for driving. For example, local residents might have easy walking access to the transit station, stores, and restaurants, or employees and students who arrive at the station by commuter rail could easily walk or bike to their places of work or school. A key goal of TOD is to reduce the need to drive and encourage the use of alternative travel modes such as rail, bus, bicycle and walking. The idea of TOD fostering travel by means other than private autos goes hand-in-hand with the city of Thornton's Complete Streets Policy which seeks "…to ensure that roadways are designed and operated to be safe, comfortable, accessible, and convenient for drivers, bicyclists, transit vehicles and users, trail users, and pedestrians of all ages and abilities."

- **Includes compact and compatible development.** TOD allows higher density development – or more units and square footage per acre – than other traditional neighborhoods. As mentioned above, it might include both horizontal and vertical mixed uses, meaning that more and different types of development could occupy a smaller 'footprint' of land than traditional development. This type of compact land use pattern promotes easy pedestrian connections and comfortable access to the transit station and surrounding uses. To do so successfully however, and to garner support by the local community, TOD must be designed to complement the existing character of surrounding areas, so that the scale of higher density and compact development is seamlessly integrated into the more single-family, lower density character of the surrounding community.

Summary of the Previous Study



In 2009, the City of Thornton completed the Eastlake Station Transit-Oriented Development Master Plan Report that was intended to create a community-based vision for the station area, document the economic opportunities surrounding the station, guide RTD in its final decisions related to the station's detailed placement and design, and provide the City with specific land use recommendations and infrastructure actions to help ensure the successful integration of the station into surrounding neighborhoods. The plan focused on three primary areas around the station:

- Areas of no change, primarily stable residential neighborhoods to the south and east, that likely will not redevelop (and do not have a need to redevelop) in the foreseeable future.
- Areas of incremental change, primarily the properties currently developed in the station area (including the historic Eastlake community to the east of the station and currently developed public and private properties to the west of the rail tracks) that would likely require buffers or other transitions to vacant parcels that may develop in the station area.
- Areas of probable change, focused on undeveloped vacant parcels throughout the study area that are appropriate for higher-intensity development.

The study resulted in a concept for a "new village development" in the vacant parcels (comprising approximately 40 acres) immediately west of the station platform, as shown in the figure at right. The village was proposed as a "compact walkable neighborhood with supporting small scale retail services and recreational opportunities" and could include a mix of:

- Two- to three-story commercial buildings with residential or office above;
- Multifamily residential developments in the range of 20-30 dwelling units per acre;
- Two-story townhomes or row homes at 9-12 dwelling units per acre; and
- Two- to three-story live-work units combining work units on lower levels and residential above.
- The study also included recommendations on new roadway connections to improve connectivity throughout the study area, new connections to trails and open space facilities, and recommendations on "split" RTD station parking lot locations accommodating approximately 800 autos (as shown in Figure 1-4 above). The study also included specific recommendations on potential actions for implementation, such as creation of a TOD overlay district for undeveloped areas around the station, new financing mechanisms for public improvements (such as a TIF district), and adaptive re-use of the historic grain elevator to the north of the station platform.

1.4 The Project Vision

Based on these TOD characteristics, the city of Thornton has articulated a vision that is specific to the Eastlake at 124th Station Area, that has guided development of this Plan, and that will continue to guide future development and decision making in the station area:

Create a station area that promotes and builds upon appropriate pedestrian-scale commercial development and housing near the station area and more diversified employment and educational opportunities in the wider area. It should also be innovative and should maximize connections to the surrounding neighborhoods, while also respecting and enhancing the character of Eastlake.

1.5 Purpose of This Plan

Several actions have occurred that resulted in the need for an update to the 2009 Eastlake Station Area Plan, including:

- RTD has moved forward with a design-build contract for the North Metro line and is proceeding with construction, with opening of the line up to the Eastlake at 124th Station in 2018.
- RTD has also revised its parking forecasts downward, with just over 500 parking spaces now projected as needed at the interim end-of-line station at Eastlake at 124th.
- The city of Thornton has completed Station Area Master Plans at 88th and 104th Avenues and would like to apply many of the same planning principles and guidelines to the Eastlake at 124th Station.
- The owners of two properties in the vicinity of the station area (the Lambertson family) wish to sell their properties and include them in a comprehensive development plan for the area.
- The owners of the property south of the station in the city of Northglenn wish to sell their property also, resulting in Northglenn moving toward developing a development plan that complements the city of Thornton's plans in the area.

The Plan establishes a flexible framework for private investment in development and redevelopment, while providing appropriate guidance related to the types of land uses, transportation infrastructure and station area amenities desired by the community.

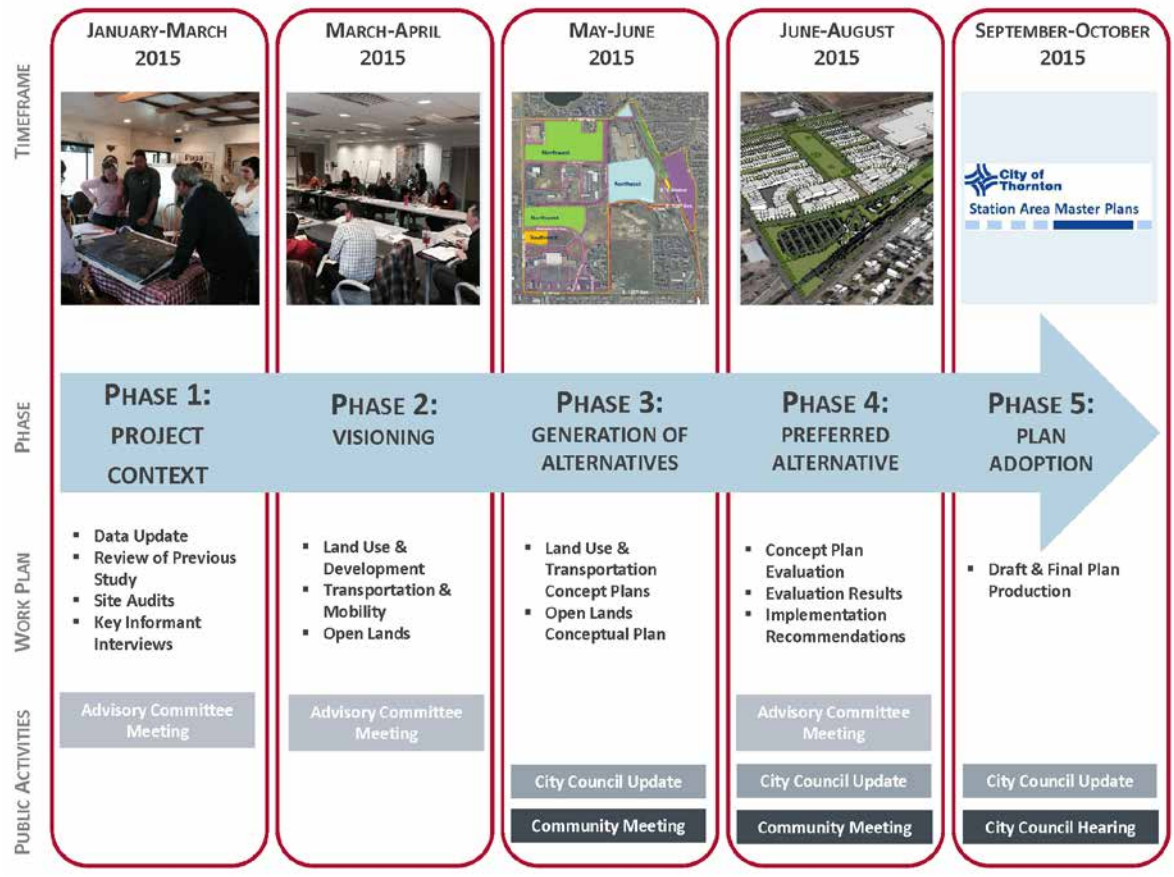
The Eastlake at 124th Station Area Master Plan Update is intended to provide a clear vision and planning framework for future private development and public investment over the next 25 years. This Station Area Master Plan will serve as a blueprint for City staff and elected officials to use as they move forward in making policy, regulatory and investment decisions needed to make TOD in the station area a reality.

1.6 The Planning Process

The Project Team initiated the planning process in January 2015 and developed the Plan through a series of five phases, as described here and shown in Figure 1.4:

- **Phase 1: Project Context** included a review of guiding principles from the 2009 plan, data collection and analysis, including updating data developed by the city in its 2009 plan with information on new property and development trends, roadway circulation and traffic, multimodal facilities, and the RTD station design. It also included stakeholder interviews and initial discussions with representatives of the City's Parks and Open Space Commission (POSAC) and Thornton Arts, Sciences, and Humanities Council (TASHCO).
- **Phase 2: Visioning.** In the second phase of the planning process, the Project Team used the information gathered in Phase 1 to articulate a station area vision that relays what elected officials, community members, and City staff would like to see in the station area as it transforms. The Project Team used the vision statement throughout the planning process as a means to ensure that the development, evaluation, and refinement of Land Use Alternatives would meet the community's articulation of what it envisions for the area.

Figure 1.4: Planning Process and Timeline



- **Phase 3: Alternative Land Use Generation and Open Lands Conceptual Plan.** This phase included the development of initial high-level alternative land use concept plans for review by the Advisory Committee, the City Council, and the public. These were then evaluated against a number of criteria including the Project Vision. The Open Lands Conceptual Plan included the development and refinement of alternative uses for the Open Lands along the railroad tracks north of the station, including an analysis of the feasibility of the adaptive re-use of the historic grain elevator.

- **Phase 4: Preferred Land Use Alternative Selection.** In the fourth phase of the planning process, the Project Team, as directed by elected officials and taking into consideration public input, carried forward and further refined the land use alternative that best met the station area vision, market realities, and desired densities for a variety of land uses within the station area. The Preferred Land Use Alternative is intended to be a flexible blueprint that illustrates a concept that can accommodate change over time while still maintaining the overall vision for transit-supportive development within the station area. This phase also entailed developing a set of guiding principles and implementation strategies to guide future development and investment.

- **Phase 5: Plan Production and Adoption.** The last phase of Plan development involved presenting the Draft Plan to City Council, posting the Draft Plan on the City's webpage for public review, and incorporating final recommendations into the document for adoption by City Council.

1.7 Community Engagement

Involving community members in the planning process was an important part of gaining broad support for the Plan.

During each phase of Plan development, the Project Team engaged City staff, City Council, regional agency partners, key stakeholders and residents to obtain their ideas and perspectives. The Project Team offered a range of community engagement activities, allowing ample opportunities for all interested community members to become informed and provide input and feedback into the Plan. Table 1.1 lists the primary community engagement activities, their dates, and the items covered at each event.

City Council Updates

The Project Team provided periodic updates and briefings to City Council throughout the duration of the planning process. City Council provided direction related to the vision for the station area, draft Land Use and Open Lands Alternatives, the Preferred Land Use and Open Lands Alternative, and final recommendations to ensure the Plan aligns with the greater goals of the Thornton community.

Community Meetings

The Project Team held two community meetings at key milestones throughout the planning process. The purpose of these meetings was to maximize information sharing and effectively incorporate the concerns, ideas and needs of the public into development of the Plan. Meeting formats included open house workshops with interactive formats as well as formal presentations with question and answer periods. All meetings were held in close proximity to the station area.

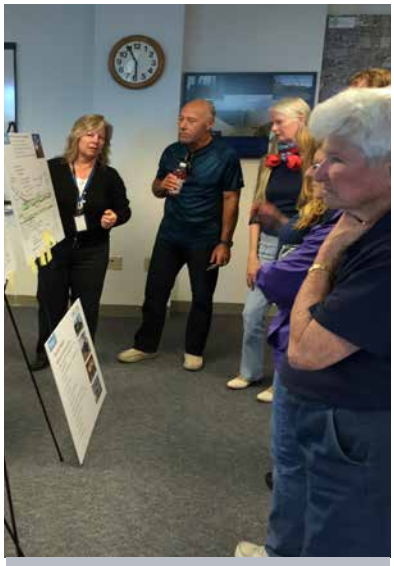
Advisory Committee

At the initiation of the planning process, the Project Team invited a cross-section of City staff, local and regional agency partners, and key property owners to join an Advisory Committee. The Committee met three times throughout the planning process at key milestones and was instrumental in addressing issues, reviewing options and alternatives, and developing recommendations as a group.

Advisory Committee Meeting No. 1

Other Outreach Activities

Other community engagement consisted of activities that were intended to provide multiple ways of participating in the process and provide access to different segments of the public, including:



Community Meeting No. 1

Eastlake Business Community Meeting

Table 1.1: Community Engagement Activities

Meeting/Activity	Date	Topic
Thornton Parks and Open Space Commission	January 27, 2015	• Open Lands key issues • Grain elevator
Key Informant Interviews (23)	February 10/12, 2015	• Station area interests and plan goals • Key issues
Thornton Arts, Sciences, and Humanities Council	February 12, 2015	• Open Lands key issues • Grain elevator
Advisory Committee No. 1	March 6, 2015	• Project introduction • Constraints and opportunities • Key issues • Project vision
Eastlake Business Owners	March 11, 2015	• Relation of Eastlake to station and new development • Preservation and gentrification
Advisory Committee No. 2	April 17, 2015	• Review of initial concepts
Council Briefing No. 1	May 12, 2015	• Review of project vision • Review of initial concepts
Community Meeting No. 1	May 14, 2015	• Project overview • Review of project vision • Review of initial concepts
ThorntonFest	May 16, 2015	• Project introduction • Key issues • Review of initial concepts
Developer Forum	June 10, 2015	• Project overview and vision • Initial concepts • Developer reaction and recommendations
Advisory Committee No. 3	June 12, 2015	• Preferred alternative
Council Briefing No. 2	June 30, 2015	• Initial review of preferred alternative
Community Meeting No. 2	July 29, 2015	• Preferred alternative • Next steps
Council Briefing No. 3	September 22, 2015	• Draft plan
Council Public Hearing	October 13 and 27, 2015	• Consideration of final plan

Key Informant Interviews

At the outset of the planning process, the Project Team conducted a series of interviews with key informants who represented a cross-section of interests within the station area and the greater Thornton community. The Project Team conducted interviews between February 10 and 12, 2015.

Thornton Committees

The project team met separately with the members of two key Thornton committees: the Parks and Open Space Committee (POSAC) on January 27, 2015, and the Thornton Arts, Science, and Humanities Council (TASHCO) on February 12, 2015, primarily to focus on Open Lands Development.

Eastlake Business Community

The project team met with members of the historic Eastlake business community on March 11, 2015, to discuss key issues of importance to Eastlake residents and business owners.

Developer Forum

As conceptual alternatives were being developed and refined, the Project Team invited local and regional developers with experience in developing TODs to provide input into the Plan. The developers relied on their experience and perception of the market to provide feedback on feasible types of development and densities for the station area. They provided a realistic appraisal of issues and opportunities which ultimately helped to inform development of a Preferred Land Use Alternative.

ThorntonFest Display Boards

Community Meeting No. 2

1.8 Organization of the Plan

This study report is divided into seven chapters, including:

- This introductory **Chapter 1**, which sets the stage for the development of the plan.
- **Chapter 2: Context of the Plan**, including updates to technical and market data, a summary of issues and opportunities guiding the plan's development, and the project vision and evaluation criteria.
- **Chapter 3: Alternative Land Use Plan Development** describes the range of Land Use Alternatives created by the Project Team. Using information from the existing conditions and market analysis, the Project Team developed a variety of Land Use Alternatives for the diverse planning areas within the station area. This chapter also incorporates the application of evaluation criteria to the alternatives.
- **Chapter 4: Preferred Alternative** presents the Preferred Land Use Alternative that best meets the station area vision. The Preferred Land Use Alternative provides a flexible framework by which the public and private sectors can move forward with future planning, development and implementation strategies to realize the station area vision.
- **Chapter 5: Open Lands Alternatives**, including a review of initial concepts and refinement through public review, concluding with final recommendations.
- **Chapter 6: Guiding Principles**, which details a number of principles used by the Project Team to develop the Preferred Land Use Alternative. These are guidelines the city can expect to see incorporated into future development plans for the station area. It also includes case studies that provide useful information and lessons learned from communities implementing TOD in similar settings.
- **Chapter 7: Implementation Strategies**, which explains the steps needed to transform the Plan into reality, with the aim of providing guidance on ways to implement projects recommended through this planning process. This chapter clearly describes the public and private tools, programs and mechanisms needed to implement the Preferred Land Use Alternative. It identifies implementation timeframes, roles and responsibilities, taking into account the city's limited fiscal resources.

Chapter 2.0 Context

2.1 Guiding Principles of the Previous Plan

The 2009 Plan established eight guiding principles to help identify the strengths, limitations, and opportunities of the station area in the creation of its development concepts. Those guiding principles provide a good starting point for this updated plan, and as this plan develops, it will be compared with the previous guiding principles to determine how well it conforms with them.

Buffer and Protect Neighborhoods

1. Buffer and Protect Neighborhoods:

The previous plan noted that the study area is surrounded by stable neighborhoods, including single-family areas and apartments, and that any new development "should not interfere with the homes and neighborhoods within the established areas. This updated plan is also aimed at preserving existing neighborhoods and enhancing their connections to, and benefits from, new development in the station area.

Celebrate Eastlake

2. Celebrate Eastlake:

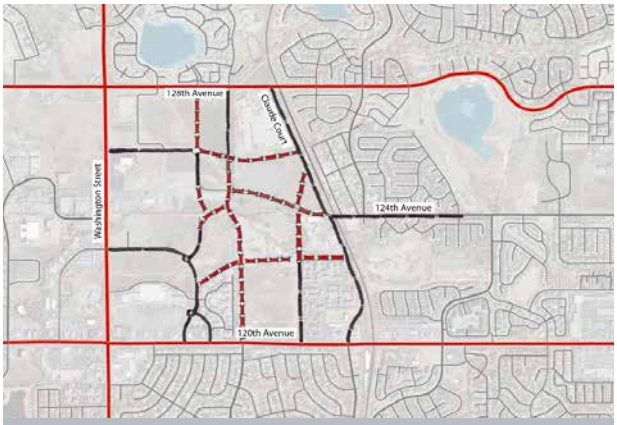
The earlier plan emphasized that the Eastlake community to the east of the station is "one of the few truly unique stops along the entire network of FasTracks stations" and that "Eastlake and its small-town qualities will become the destination transit riders and future residents to the area will be drawn to in addition to the TOD being planned." It focused on preserving the unique qualities of the district, encouraging local businesses to revitalize, and improve the area's streetscapes, sidewalks, and facades. This updated plan also will focus on preserving and building on the

unique qualities of Eastlake. The soon-to-be-updated Eastlake Subarea Plan will focus on revitalizing existing businesses and encouraging new ones, and upgrading streetscapes.

Use Trails and Greenways to Strengthen Parks and Open Space

3. Use Trails and Greenways to Strengthen Parks and Open Space:

The 2009 plan emphasized good trails connections to the station and integrating the network of planned streets to enable "users a full range of transportation options." It also focused on upgrading the open lands near the station into a "dynamic centerpiece park, linking the entire green network of the study area." This updated plan will also focus on strengthening trails connections in the area given the revised rail station design, and it will place special emphasis on a significant upgrade to the open lands near the station to make it more of a community asset.



Improve Connections and Access to Regional Roads

4. Improve Connections and Access to Regional Roads:

The previous plan emphasized new roadway connections throughout the study area as a means to help "alleviate traffic, calm motorists… and design streets to accommodate more modes of transportation than merely cars and trucks." This updated plan will help the city and local residents understand the impact of the proposed station – and new developments – on the existing and planned roadway network and will make recommendations for improvement if needed.

Don't Let Transit be a Barrier

5. Don't Let Transit be a Barrier:

The earlier plan noted that the new rail station should not "create barriers between the Eastlake District and the new transit village being contemplated to the west." It proposed improvements such as "sub-grade bicycle connections" to help improve overall connectivity and connections to open lands and park sites. This plan will re-visit those concepts based on the most recent RTD design for the corridor, and will make feasible recommendations on improving east-west connectivity throughout the project area.

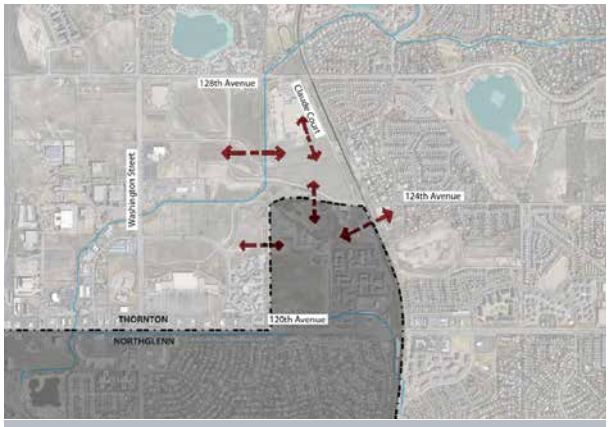
6. Focus Development Opportunities West of the Station:

The 2009 plan noted that "there are countless opportunities to partner with landowners to the west [of the station] and develop and integrated transit village on empty or underutilized parcels" and that the "commercial and industrial stability in the area should be maintained while incrementally adding new uses." This plan also will emphasize the residential development focus west of the station while encouraging the growth of appropriate employment-based development on parcels farther west

Focus Development Opportunities West of the Station

7. Foster Successful Partnerships:

The earlier plan noted that the station area is bordered by several large landowners, including the Cities of Thornton and Northglenn, the Adams 12 School District, and private owners with large holdings. It encouraged frequent and open communications with those landowners to build solid partnerships and create a development that benefits all parties. This updated plan has focused on continual dialogue with large landowners to ensure they are up-to-date on the project and to allow them to provide comments and feedback on development concepts.



Foster Sucessful Partnerships

8. Position Land Uses to be Good Neighbors:

The 2009 plan encouraged the development of an overlay district that clarifies revised land uses and design guidelines "to provide a consistent, clear strategy for landowners and potential developers" with the intent of positioning the station for "unparalleled success in the future." One of the goals of this updated plan is the establishment of clear and consistent guidelines and policies for future development so that landowners, developers, and current residents know what to expect in the future.

Position Land Uses to be Good Neighbors

2.2 Existing Conditions

The Project Area

Land Area

The Project Area, measuring approximately 400 square acres, is largely underdeveloped. It is bordered by low-density single-family neighborhoods and low-intensity flex office and industrial land uses. About fifty acres (13%) of the Project Area is currently residential in nature, while 196 acres (51%) is improved with non-residential construction. The remaining 136 acres (36%) is vacant or underutilized.

Population

Just over 3,700 people live within ½ mile of the future commuter rail station platform in Eastlake, which equates to about 3% of Thornton's total population of 124,000 residents (as illustrated in Figure 2.1).

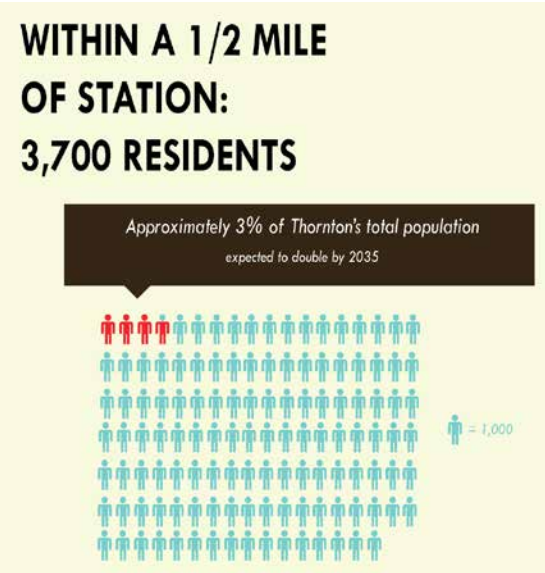
Demographic Characteristics

According to 2010 data from the Center for Neighborhood Technology's TOD database, some other demographic characteristics of the station area within ½ mile of the station include:

- Household density in the Project Area is approximately 3 units per acre.
- Population density in the Project Area is approximately 6.7 people per acre.
- Median household income in the Project Area is approximately $67,000 per year.
- Approximately 4% of workers aged 16 and over use public transportation to access jobs.

In addition, the Center for Neighborhood Technology's Housing and Transportation Affordability Index notes that the percentage of annual household income devoted to both housing and transportation costs averages approximately 45% (compared with 48% for Thornton as a whole and 49% for the Denver region).

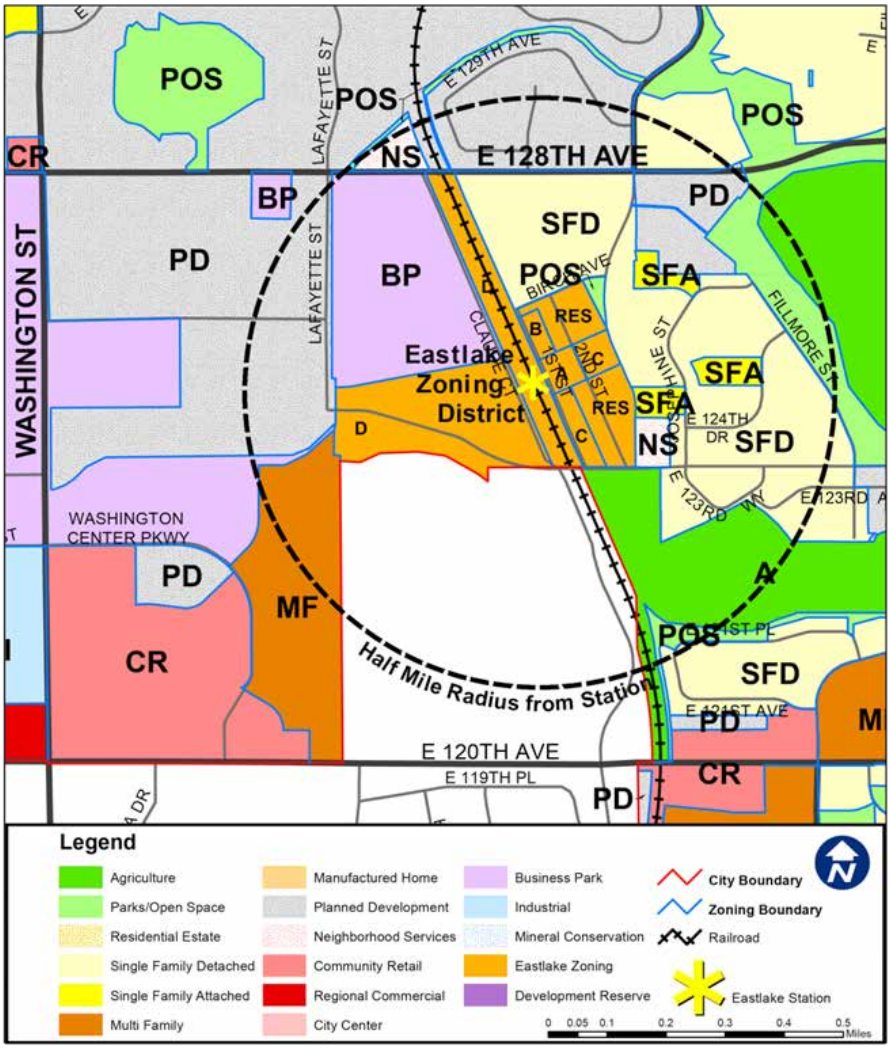
Figure 2.1: Thornton's Population within 1/2 Mile of the Station



Zoning and Land Use

Figure 2.2a denotes the overall zoning in the project area, showing the Business Park zoning northwest of the station (occupied by the Adams 12 School District facility) and Planned Development areas in the northwest portions of the Project Area.

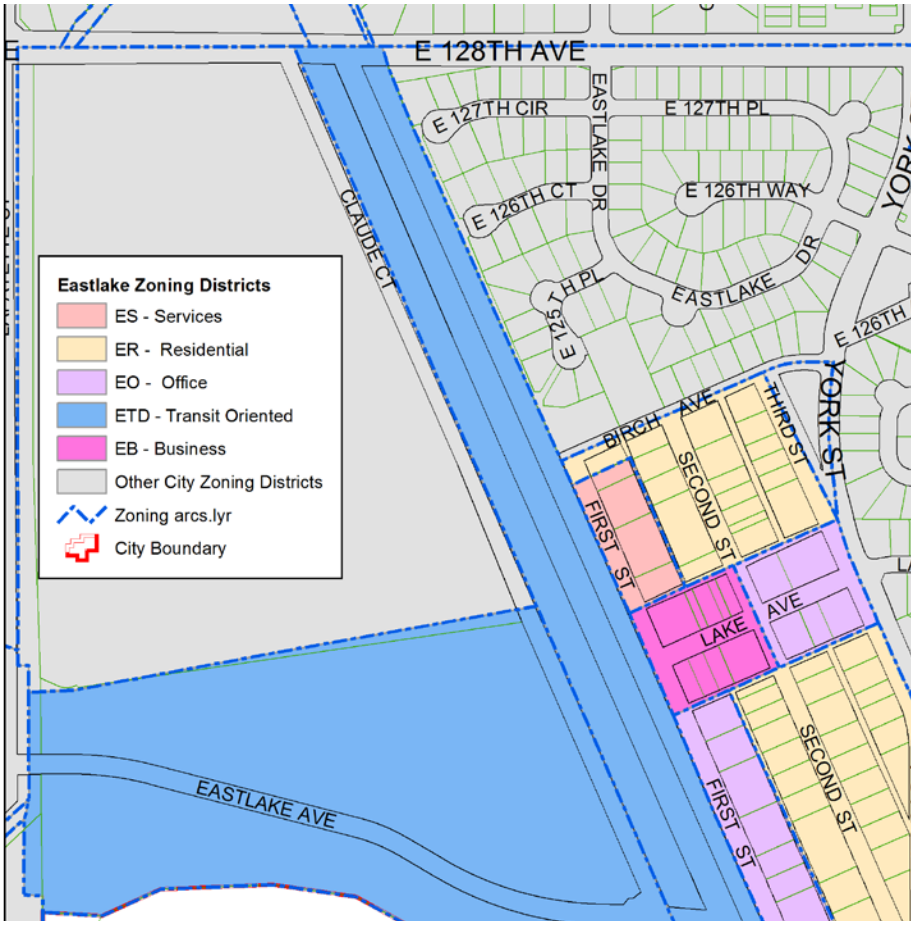
Figure 2.2a: Existing Zoning in the Project Area



Source: City of Thornton

In addition, the City of Thornton has established specific Eastlake zoning districts, with the intent of preserving and enhancing the community of Eastlake. Figure 2.2b shows the Eastlake Zoning Plan; it shows a TOD District (in blue) along the railroad right-of-way and in the undeveloped parcel to the west of the station; it also shows the commercial and residential uses allowed in the Eastlake area.

Figure 2.2b: Eastlake Zoning Plan



Source: City of Thornton

Figure 2.2c denotes the overall current land use in the Project Area, showing the large extent of public facilities (including the joint city/school district maintenance facilities in dark blue to the west of the station) and industrial uses to the north and west of the station (light blue), including property owned by the Adams 12 School District immediately south of its existing facility just north and west of the station.

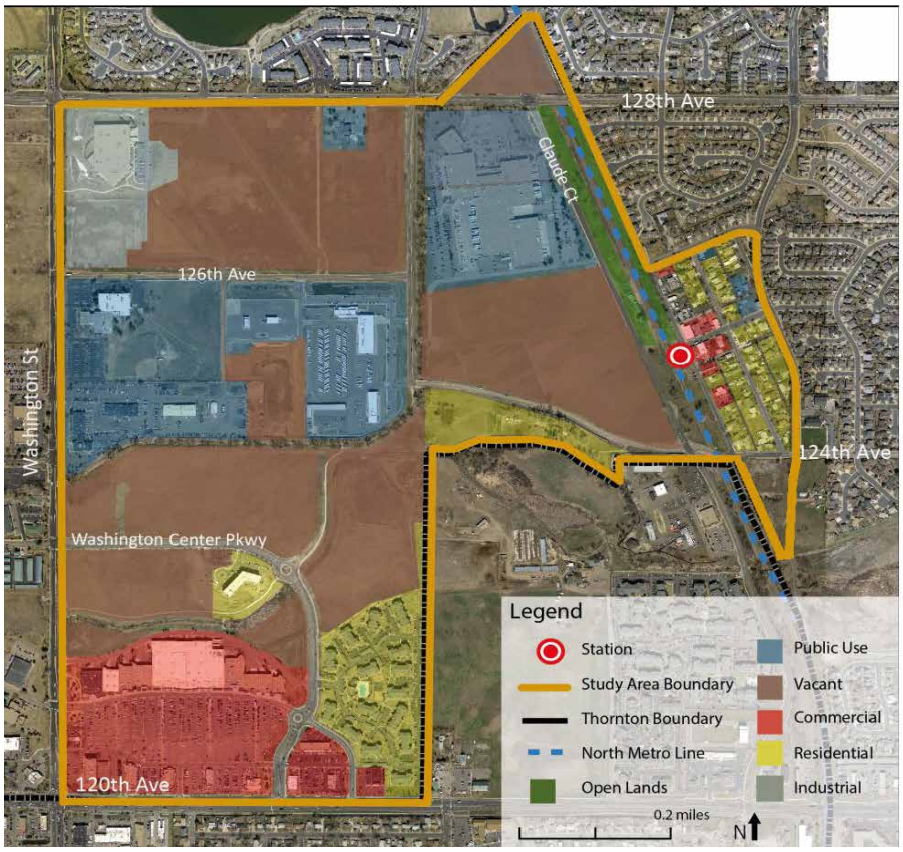
Eastlake residential area

View of Eastlake

Conclusions and Observations

The Project Area is an area of disconnected and isolated vacant and underutilized land to the west of the tracks, and stable, primarily residential areas to the east, south and north of the tracks. These conditions point to the need to establish a development plan for the area that promotes good development while maintaining the integrity of existing neighborhoods around the station.

Figure 2.2c: Current Land Use in the Project Area



Source: City of Thornton | SDG mapping

Figure 2.2c shows the large number of vacant parcels (shown in dark brown), indicating areas that have development potential.

2.3 Existing Transportation Network

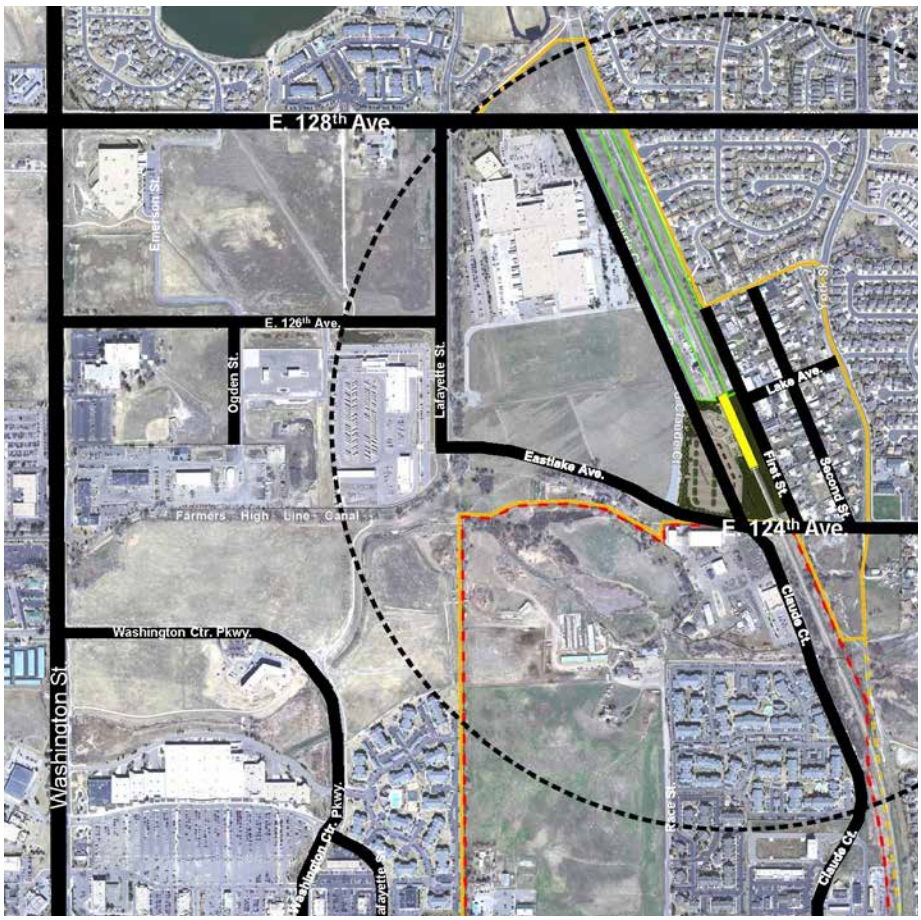
Figure 2.3a shows the current roadway network in the Project Area. It shows the major arterials that border the area (East 128th and 120th Avenues on the north and south, and Washington Street on the west), along with the primary interior roadways such as Claude Court (which runs immediately adjacent to the station) and the major local roadways in historic Eastlake. It also shows a number of internal roadways within the Project Area, some of which are disconnected from other parts of the area.

The figure shows that many major connector roads within the Project Area are designated as trails (including Eastlake Ave. and 128th Ave.), with trail connections through current vacant lands in the southwest portion of the Project Area and along the Farmers High Line Canal. In addition, designated trails run parallel to the rail line north of the station along the edges of the Open Lands, but connections to the south (through the area where the station will be located) are missing. Figure 2.3b shows the existing trail network in the Project Area.

First Street

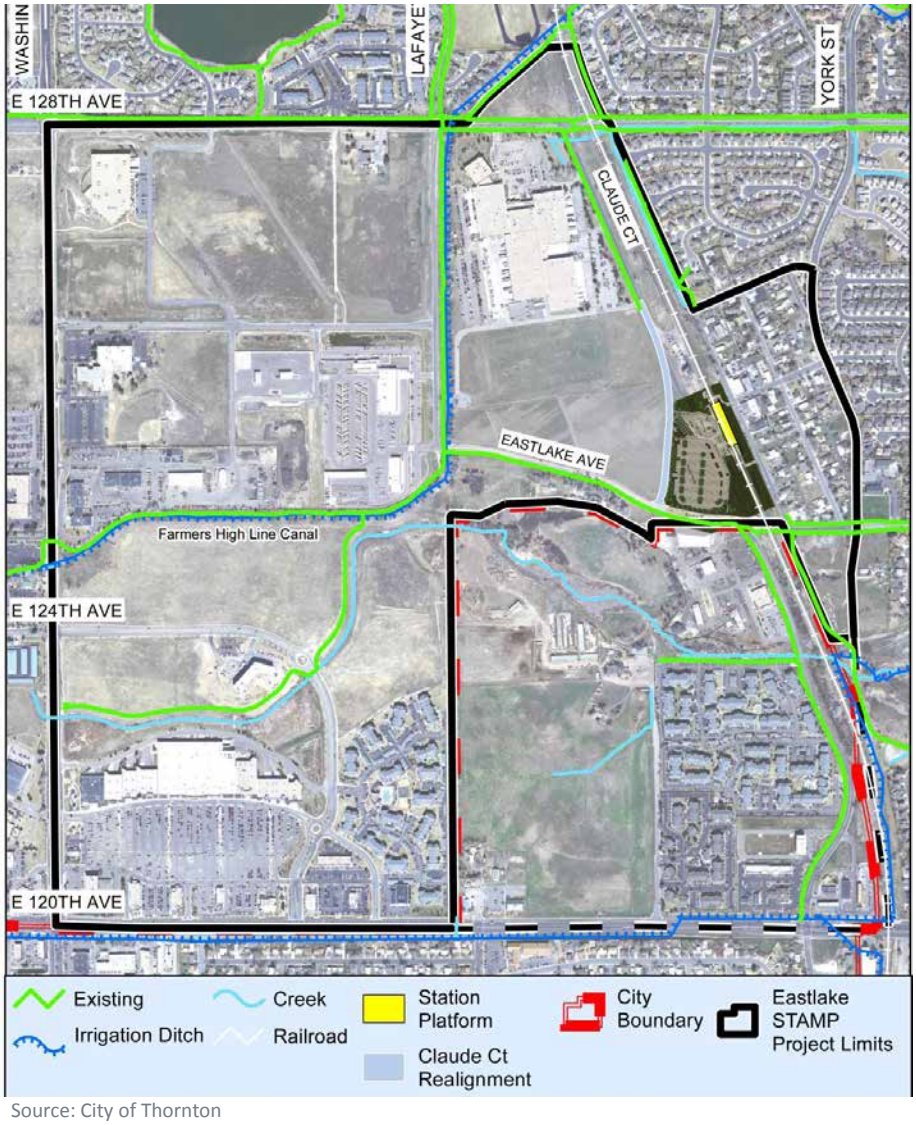
Off Street Path

Figure 2.3a: Existing Roadways in the Project Area



Source: City of Thornton

Figure 2.3b: Existing Pedestrian Circulation Network in the Project Area



Source: City of Thornton

2.4 Economic Development/Market Conditions of the Project Area

The 2009 TOD study included a market study that provided basic economic and market data and forecasts for the Project Area. The City of Thornton has undertaken an internal market analysis update for the Project Area using the 2009 study as a starting point.

Residential Market

- Multi-family Residential (16 dwelling units per acre and above): Successful residential development in close proximity to a rail transit station traditionally comes in the form of multi-family apartments and condominiums. As of March 2015, the overall apartment vacancy rate for the city of Thornton was approximately 4.3%.

More specifically, recent apartment vacancies in Thornton north of 112th Avenue were around 2.5% (Thornton Neighborhood Services Phone Survey, March 2015). These low vacancy rates indicate that there is presently a market for this type of residential development.

- Mid-density Residential (10 – 15 dwelling units per acre): The earlier Eastlake TOD Market Study was completed by Development Research Partners, and suggested that the study area could benefit from the development of mid-density residential units. The study revealed that by 2030, this area could absorb between 1600 and 2000 mid-density residential units. These medium density residences could be built in transitional zones, radiating out from higher density TOD residences built in close proximity to the station.

First Street and Lake Avenue Intersection

- Approximately 21 acres of residentially zoned property located directly north of the Red Hawk Ranch Apartments in the southern part of the Project Area could be developed as multi-family or mid-density residential, based on the final approved design. After RTD construction and the potential realignment of 124th Avenue west of Eastlake, the remaining Lambertson's parcel south of the Adams 12 facility could approach 20 acres of additional residential development. This land would be highly desirable as TOD residential.
- Live/work units: This specific land use may be applicable as a transition/ buffer between industrially focused uses located to the west of the Eastlake at 124th Station area and denser TOD residential near the station.

Institutional Market

- Senior Living: Although the overall need for senior living may fluctuate, the need will only grow based on demographics. InnovAge currently maintains a waitlist at its facility in the southwest part of the Project Area that is in excess of 300 potential additional residents. Another phase of that facility may be warranted on the adjoining parcel to the west currently owned by InnovAge, but further study is needed.

Employment

The earlier Eastlake TOD Market Study suggested that by 2030, the study area could support the following non-residential square footages:

- Between 194,000-264,000 square feet of office;
- 155,600 square feet of retail;
- 3,500 square feet of medical office;
- Up to 1 million square feet of industrial space (the then-planned Hunter-Douglas campus at full build out); and
- A potential educational facility, such as a vocational or technical school.

According to the Central Thornton Business District Map (2014), there are approximately 100 acres of available land in the 2015 Eastlake at 124th STAMP Project Area upon which to build businesses that bolster Thornton's job base. Within the Project Area, the Economic Development Department suggests that about 50,000 square feet of office and 300,000 square feet of flex/light industrial could be absorbed, based on today's market demand. These numbers equate to about 25-30% of the earlier market study totals of the 2030 expected buildout.

Office and Retail Development

In general, office and retail development in the Eastlake at 124th Station Project Area would be minimal at best according to the Economic Development Department, considering the success of existing auto-oriented retail and office opportunities along 120th Avenue and Washington. Pedestrian-scale retail within the village of original Eastlake, in close proximity to the rail station, may be supported in the future. Neighborhood-serving office development may also be supported by the market.

The industrial vacancy rate in the Central Thornton Business District is currently less than 1% and the City's Economic Development Department is seeing strong activity in industrial/flex development.

Northglenn Maintenance and Operations Area Market Assessment and Relocation Analysis

In July 2014, the City of Northglenn commissioned a team of consultants to investigate possible redevelopment opportunities of Northglenn's Maintenance and Operations (M&O) Facility (which is located within the city of Thornton). This facility is located southwest of the proposed commuter rail station and well within the ½ mile walk radius for TOD development. Although the Northglenn study indicated that moving the facility to another 10+ acre parcel within Northglenn was not feasible, one scenario suggested that the existing facility acreage could support about 120 residential units, 84,000 square feet of office, 10,000 square feet of restaurant space, and 40,000 square feet of retail space based on proximity to the future rail station. The study also concluded that there is currently no commercial or office market in this immediate area, indicating that the only way to construct these uses would be as part of a larger redevelopment of Karl's Farm Dairy (within the city of Northglenn) or as part of the Eastlake at 124th Station area redevelopment.

Although there is very little demand for a healthcare campus in the Eastlake at 124th Station area, a small amount of neighborhood serving medical office may be supported in this area.

Educational Facility

The earlier Eastlake TOD Market Study indicated the potential for an educational facility such as a vocational or technical school, assumed to be built on the 15 acres retained by the Adams 12 School District south of the existing facility (northwest of the station). The school district has indicated that it is interested in expanding its career/technical education capacity.

Observations and Conclusions

This summary of development trends and opportunities leads to the following observations and conclusions:

- There is a potential market for multi-family and mid-density residential development in close proximity to the station. There is limited opportunity or desire for residential development in other parts of the Project Area except for the potential of live/work units in some of the industrial areas.
- There may be a market for additional senior housing and other institutional developments in the study area where they currently exist. Additionally, there may be a market opportunity for some amount of health care related development.
- There is considerable opportunity for employment uses in the Project Area to supplement existing uses and those in bordering areas, including light industrial and flex development, in the western portion of the Project Area.
- While the Adams 12 School District has expressed interest in expanding and enhancing educational uses on its property directly to the south of the existing facility, there may be other opportunities for those types of uses in other bordering parcels to the west that could free up the property closest to the station for more appropriate residential development.

2.5 Balance Sheet: Issues and Opportunities Summary

As noted earlier, a variety of groups and individuals were consulted in the initial stages of this project to determine their key issues and to begin to articulate key constraints and opportunities presented by the Project Area. The most predominant comments are as follows:

- Keep and enhance the existing Eastlake “sense of place” and build upon the area’s character and heritage.
- Improve the transportation network and connectivity in the area.
- Provide for adequate future transit and business parking.
- Provide a focal point near the station, for example a plaza and innovative reuse of the grain elevator buildings and surrounding Open Lands.
- Include a mix of uses, higher-density residential closer to the station, and employment uses further out. Retain employment uses to help provide local jobs.

Chapter 3.0 Land Use Alternatives

3.1 Introduction

This chapter describes the Land Use Alternatives proposed for the Eastlake at 124th Station Project Area; alternative concepts for the Open Lands component of the project are included in Chapter 5. These Land Use Alternatives are based on the long-term planning vision for this area and are intended to create a rich mix of land uses within convenient walking distance to the station. They were developed and refined through multiple working sessions with City staff, stakeholders, and public input and, in total, are planned to meet the forecast market absorption rates for the area. The Land Use Concepts provide examples of how TOD could evolve in the Project Area and include a mix of both residential and employment-based development. Actual development will depend heavily on the local economy and real estate market, local developer response to those market conditions, incentives that may be offered by the City of Thornton, as well as RTD investment and construction.

Eastlake

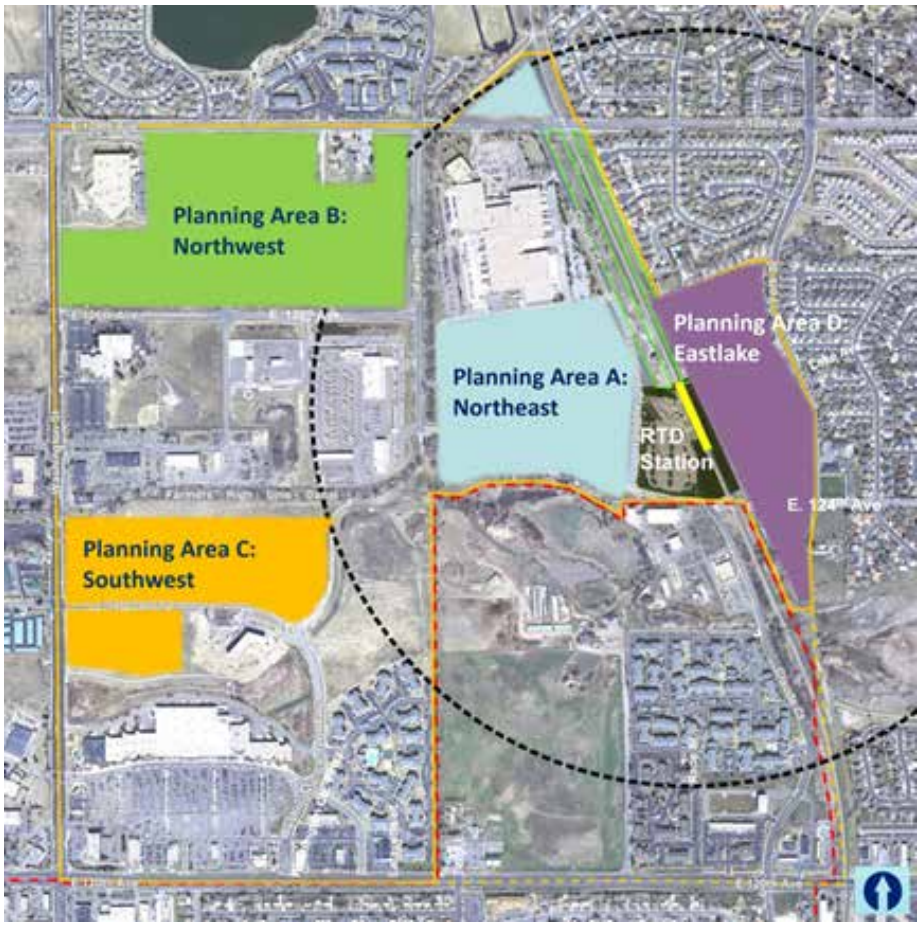
3.2 Project Planning Areas

As a first step in developing alternative land use plans for the Project Area, the area was divided into four distinct planning areas, as shown in Figure 3.1.

Using those geographic areas as an initial guide, the project team developed a range of potential land use and development concepts for review by the project's Advisory Committee and the public.

- **Planning Area A** is the northeastern portion of the primary station area, encompassing the parcels immediately west of the RTD station; it also includes a vacant triangular parcel to the north of the Adams 12 school facility, across 128th Avenue and immediately adjacent to the railroad tracks.
- **Planning Area B** is the northwestern portion of the Project Area, primarily consisting of vacant parcels bordered by 128th Avenue on the north and Washington Street on the west.
- **Planning Area C** is the southwestern portion of the Project area, located between the city of Thornton's maintenance facility to the north, and the well-established retail area to the south.
- **Planning Area D** includes all of the historic Eastlake community east of the RTD station.

Figure 3.1: Inital Project Planning Areas



3.3 Planning Area A: Northeast – Residential and/or Neighborhood Commercial Focus

The alternative land use concepts developed for Planning Area A were conceived with the intent of focusing the most intense development immediately adjacent to the RTD station. The first step in the development of land use concepts was the establishment of a hypothetical street grid. As noted in the TOD principles in Chapter 3, small blocks are a cornerstone of promoting a walkable environment within a transit-oriented development. Figure 3.2a shows the initial hypothetical street grid for the Northeast planning area. The street grid as shown is not intended to preclude larger blocks if needed to adapt to a specific development proposal on the site.

The project team then developed three categories of potential land use alternatives for consideration and evaluation in Planning Area A, as described on the following pages.

Figure 3.2a: Hypothetical Street Grid for Planning Area for Planning Area A

Concept A1: Residential Focus

This concept, as shown in Figure 3.2b, is focused entirely on residential development within the planning area. It shows a transit core closest to the RTD station that would include moderate-to-high density multifamily apartments, condominiums, and/or townhomes, with possible ground-floor commuter-serving or neighborhood-serving retail closest to the station. The western half of the area is proposed as a "transition zone" with slightly lower densities than the transit core; this area would include moderate-to-high density condominiums, townhomes, garden homes, and/or live-work spaces (which combine ground-floor retail or artisanal quasi-industrial uses with residential space above, usually occupied by the owners of the ground-floor businesses).

Figure 3.2b: Concept A1 - Residential Focus

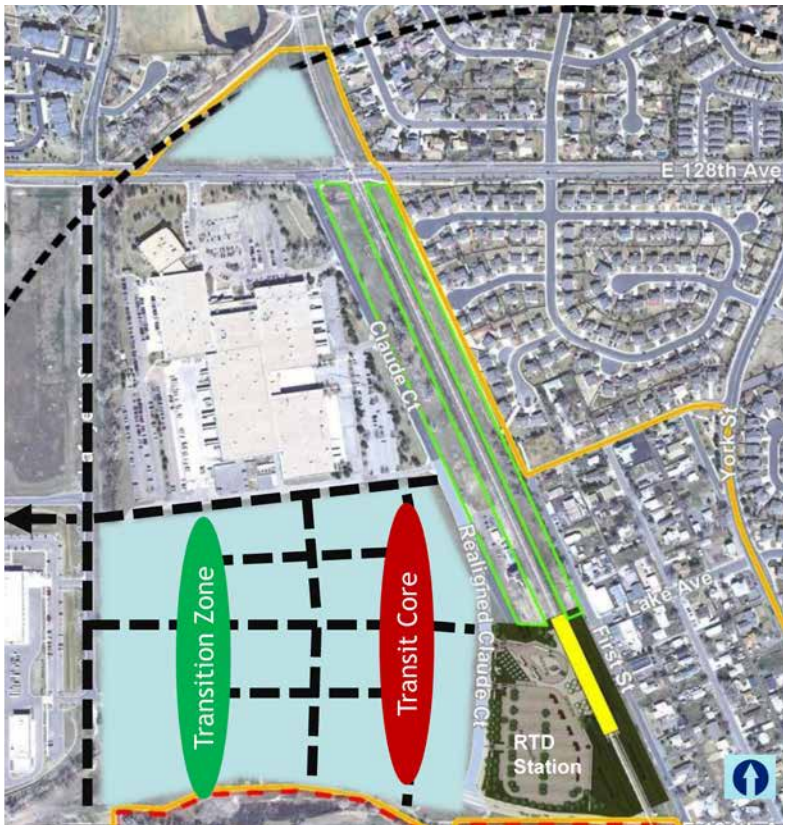
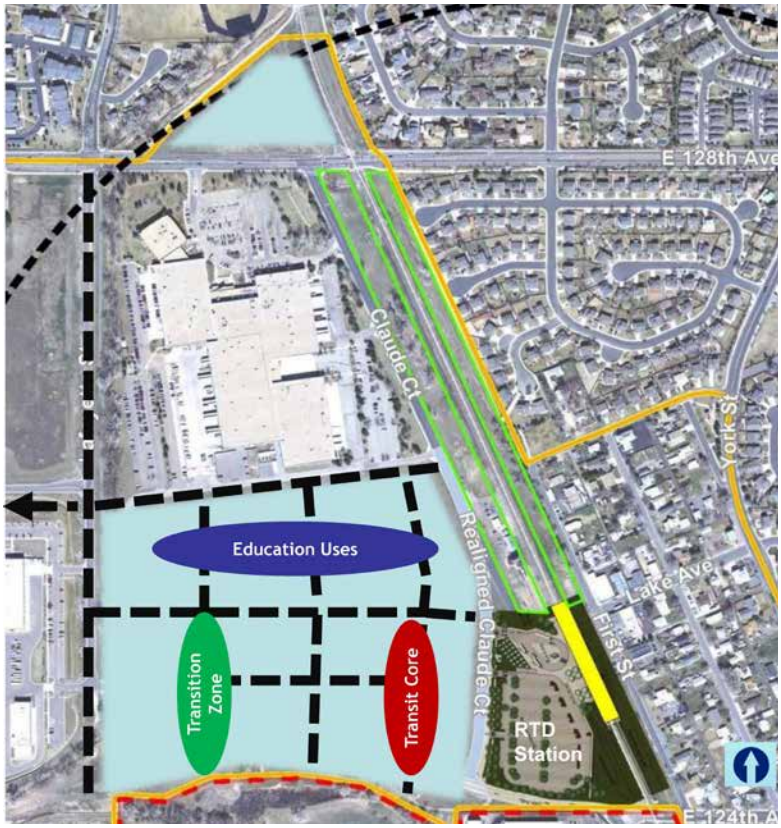


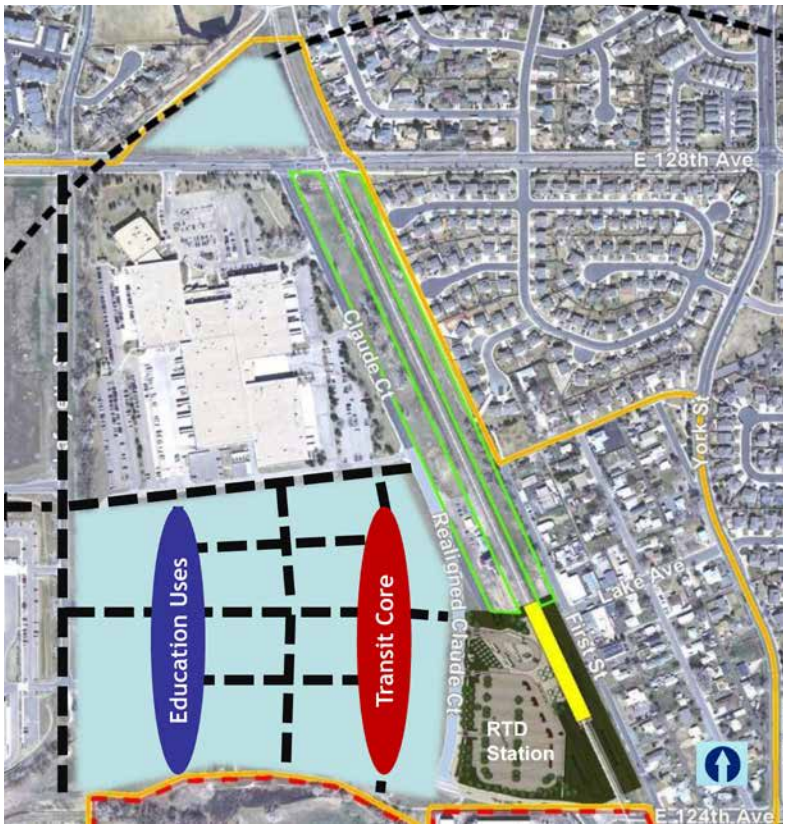
Figure 3.2c: Concept A2: Residential/Employment Focus



Concept A2: Residential/Employment Focus

This land use concept (as shown in Figure 3.2c) combines residential uses with employment-based uses. Similar to Concept A1, this concept includes a residential transit core closest to the station in the southern half of the planning area, with a lower-density transition zone to the west. However, the northern half of the area includes employment-based uses, primarily focused on education-related businesses (possibly an expansion of the Adams 12 School District facility that currently exists to the north) along with local business-serving or neighborhood-serving retail uses.

Figure 3.2d: Concept A3: Residential/Employment Focus



Concept A3: Residential/Employment Focus

This concept (shown in Figure 3.2d) is similar to Concept A2 in that it combines residential with employment-based uses. However, this concept devotes the entire western half of the planning area to employment-based uses (primarily education-focused uses, assuming an expansion of the Adams 12 school facility from the north or related uses), with the eastern half devoted to a transit core with high-density residential uses.

Figure 3.2e: Concept A4: North Project Area

Concept A4: North Project Area

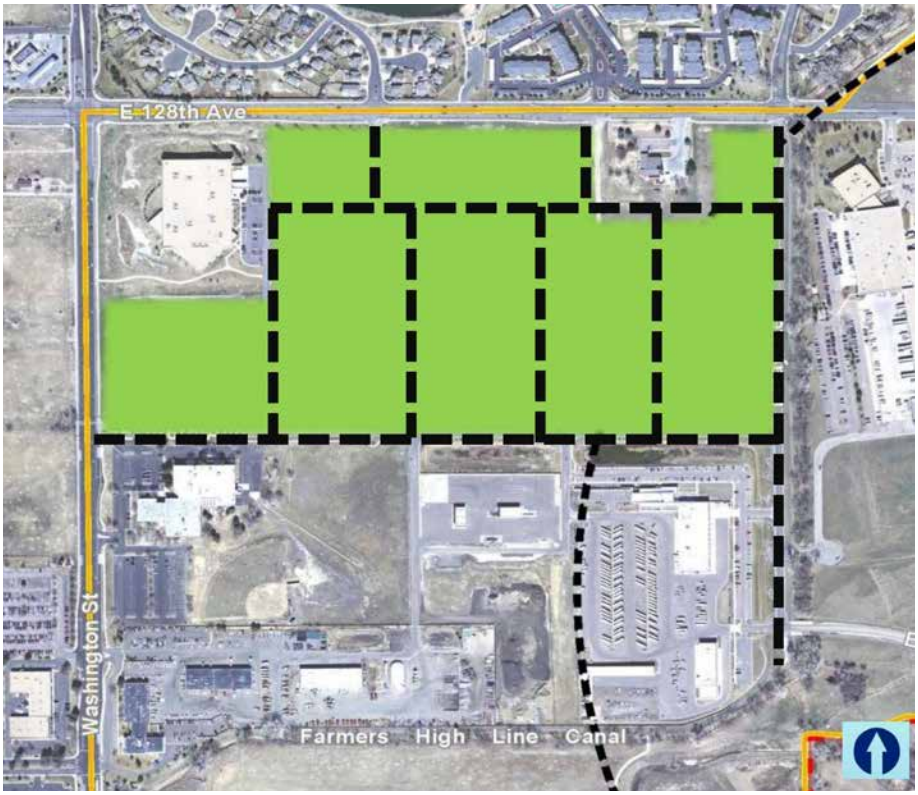
This concept (shown in Figure 3.2e) proposes a number of potential uses for the triangular parcel north of 128th Avenue and immediately west of the railroad tracks. Uses proposed for this area include moderate-density residential (such as townhomes or garden homes), neighborhood-oriented office or retail fronting 128th Avenue, or institutional or educational uses (including the potential for athletic fields).

3.4 Planning Area B: Northwest – Employment Focus

The alternative land use concepts developed for Planning Area B were focused on employment-based uses. The area is currently zoned industrial, and was at one time planned for a campus-type environment with the proposed expansion of a Hunter-Douglas manufacturing facility located at the corner of 128th Avenue and Washington Street. However, those expansion plans fell through, and Hunter-Douglas sold its facility. The City of Thornton has expressed a preference to retain employment-based uses in this area as part of its economic development strategy. Note: there is also a City of Thornton fire station in this Planning Area, fronting 128th Avenue.

As with Planning Area A, the project team established a hypothetical street grid in Planning Area B to show how it could be subdivided into manageable (and walkable) parcels (see Figure 3.3a). Similarly to Planning Area A, the street grid as shown is not intended to preclude larger blocks if needed to adapt to a specific development proposal on the site.

Figure 3.3a: Hypothetical Street Grid for Planning Area B

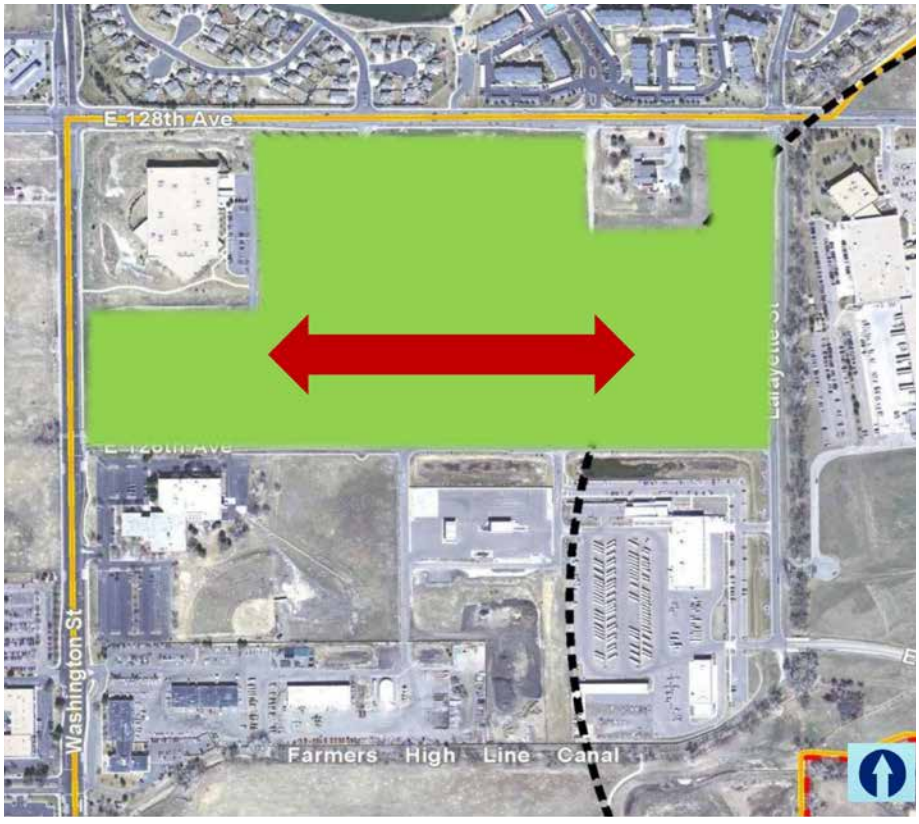


Proposed Land Use Concepts for Planning Area B

The project team developed three similar concepts for Planning Area B (illustrated in Figure 3.3b):

- B1: High-Tech Business Park/Light Industrial: This concept builds upon the success the City of Thornton has had with attracting high-tech light 'Industrial' businesses in the area immediately west of Washington Street and proposes similar types of uses to provide a good employment base for the planning area.
- B2: Education Focus: This concept focuses on attracting additional education-related uses, similar to those in the existing Adams 12 School District facility to the east. It could encompass an expansion of the existing Adams 12 facility or other public or private education uses (such as a college extension campus or a vocational job training campus).
- B3: Live/Work/Incubator: This concept mixes the earlier concept of attracting high-tech light industrial uses with business incubator start-up space and/or live-work space integrated into the development site, again in concert with the city's desire to attract additional employment-based uses in the area.

Figure 3.3b: Employment-based Land Use Concepts for Planning Area B

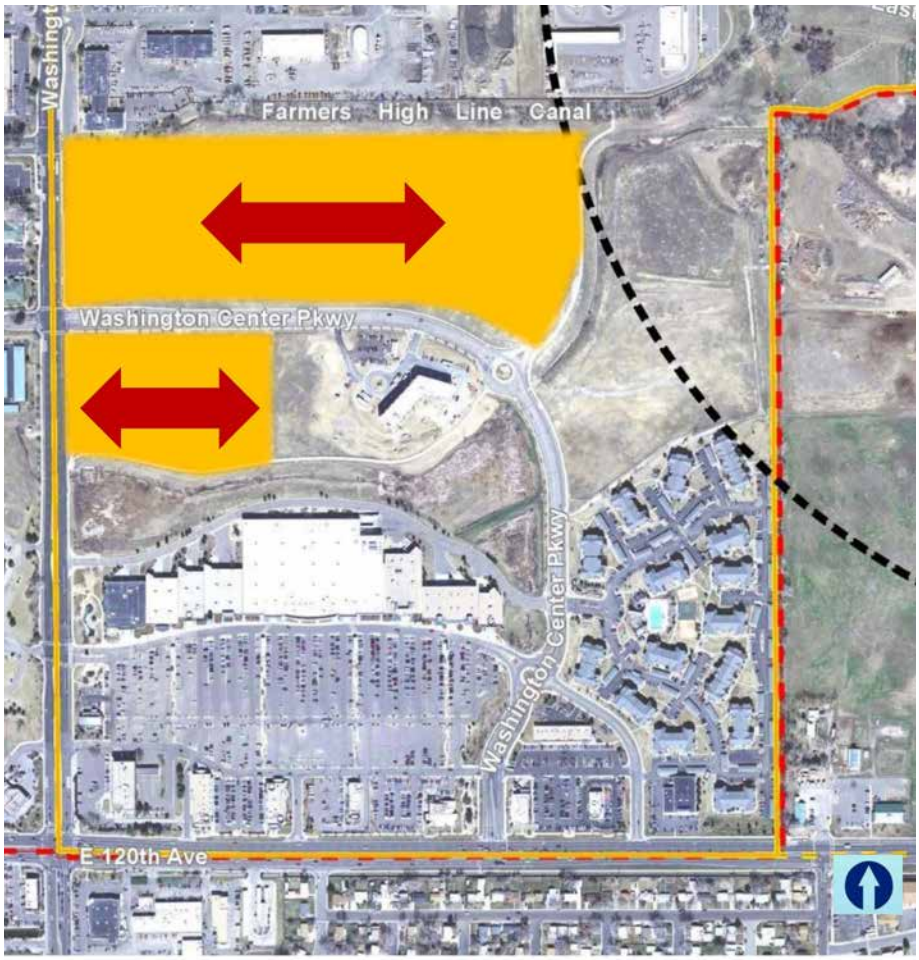


3.5 Planning Area C: Southwest – Employment and Institutional Focus

The alternative land use concepts developed for Planning Area C were focused on employment-based and institutional uses. The project team developed three concepts for this planning area, as illustrated in Figure 3.4.

- Concept C1: High-Tech Business Park/Light Industrial: This concept is similar to Concept B1 in that it capitalizes on the high-tech light industrial uses found west of Washington Street and attempts to attract it to this area.
- Concept C2: Health Care Campus: This concept is designed to focus health-care-related businesses (including clinics and/or health care research and education facilities) in the area.
- Concept C3: Institutional/Senior Housing: This concept builds upon the existing InnovAge senior housing facility (and its planned expansion) by focusing on additional senior housing or similar institutional uses.

Figure 3.4: Employment and Instituional Land Use Concept for Planning Area C



3.6 Planning Area D: Eastlake – Community Focus

For the historic Eastlake community immediately east of the station, the project team did not propose development or redevelopment concepts for this established neighborhood. Instead, it developed a number of policy options for the public and decision-makers to consider in the upcoming update of the 2003 Eastlake Subarea Plan.

Policy Option: Commercial and Business Activity

This policy option (illustrated in Figure 3.5a) reinforces the existing commercial and retail focus on Eastlake's two primary streets – First Street and Lake Avenue. It emphasizes the desire of the community to retain and attract additional small-scale entertainment-related businesses to the area to supplement those already existing.

Policy Option: Lake Avenue Gateway

This policy option (illustrated in Figure 3.5b) focuses on making Lake Avenue a strong visual and physical connection to the RTD station platform (the north edge of which will be at the foot of Lake Street at its intersection with First Avenue). This can be accomplished by creative urban design and wayfinding along Lake Avenue (including streetscape upgrades), with a visual connection to a major urban design feature on the east side of the RTD station and platform to provide good visual and physical connectivity.

Figure 3.5a: Eastlake Commercial Focus

Figure 3.5b: Lake Avenue Gateway

Policy Option: First Street Upgrades

This option (illustrated in Figure 3.5c) emphasizes a significant upgrade and enhancement of the urban environment along First Street. This could include the addition of curbs and sidewalks, landscaping, lighting, and other enhancements to improve the walkability and attractiveness of the roadway, with the aim of attracting and enhancing business and retail activity along the street. It would also include the addition of on-street parking to accommodate visitors to the area and its businesses and retail/restaurant establishments.

Policy Option: Residential South of 124th Avenue

This option (illustrated in Figure 3.5d) would extend the existing historic street grid of Eastlake south across 124th Avenue. It would accommodate low-to-moderate density residential development with architectural styles similar to those existing in Eastlake and provide additional residential opportunities in the area with close proximity to the RTD station.

Policy Option: Open Lands South of 124th Avenue

This option (illustrated in Figure 3.5e) would provide additional open lands in the area immediately south of 124th Avenue. It would be integrated with and connected to other open lands areas in the project area, including those bordering the railroad tracks to the north of the station.

Figure 3.5c: First Street Upgrades

Figure 3.5d: Residential South of 124th Avenue

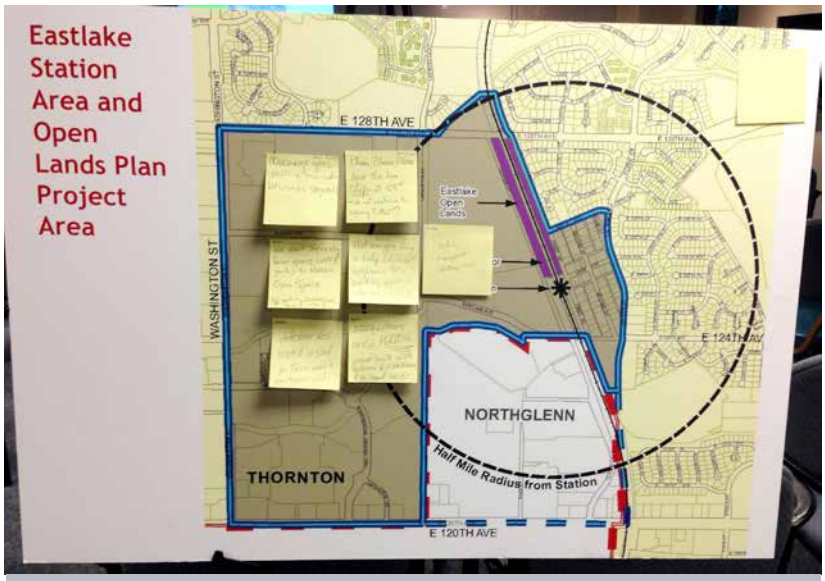
Figure 3.5e: Open Lands South of 124th Avenue

3.7 Evaluation of Development Concepts

Evaluation Criteria and Process

Following the Advisory Committee, public review of the initial concepts, and direction from the City Council, the Project Team undertook an evaluation process to help understand the challenges and opportunities of the initial land use proposals. The Project Team developed a number of key evaluation criteria to help narrow down and refine the land use concepts. Those evaluation criteria were:

- Meeting the vision: How well does each concept meet the key factors and issues expressed in the project's vision statement?
- Following the principles: How well does each concept meet the guiding principles established in the earlier study and updated for this project?
- Appropriate densities: Do the concepts allow appropriate levels of density based on their relationship to the station and adjacent areas?
- Market feasibility: How well do the concepts meet known market demands based on input from Thornton City staff and others involved in local development?
- Local identity: How well do the concepts contribute to establishing a sense of identity for the station area?
- Public comment: How well do the concepts reflect the preferences expressed by the public, Advisory Committee, and direction given by the City Council?



Public Comments at Community Meeting No. 1

The project team then produced a series of matrices that compared and contrasted the initial concepts with the criteria in broad, qualitative terms (using a "good/fair/poor" process). The results of those evaluations are shown in the following tables.

The table shows that the concept that focused on residential in the immediate station area was ranked higher than the two that mixed residential with employment. The major concern expressed for mixing residential with employment was the potential to dilute the area's attractiveness to developers and to lessen the overall identity of the station area. For the north station area, the evaluation process showed a preference for moderate-scale residential development, with some support for retail or commercial.

Planning Area A: Northeast

Table 3.1a summarizes the project team's evaluation of the initial land use concepts for Planning Area A.

Table 3.1a: Summary of Project Team Evaluation of Concepts for Planning Area A: Northeast

Concept/Major Features	Overall Evaluation	Summary of Evaluation
A1: Residential Focus	**GOOD**	• Residential development closest to platform consistent with TOD principles • Transit core provides appropriate densities • Creates strong development nexus adjacent to station • Mixed-use attracted good support from public
A2: Residential with employment in north parcel	**FAIR TO POOR**	• Mixing employment uses so close to station takes away from residential potential • Employment use could dilute attractiveness and market feasibility • Employment could be better placed elsewhere in project area • Could dilute immediate area identity around station • Public and committee preferred mixed-use residential close to station
A3: Residential with employment in west parcel	**FAIR TO POOR**	• Mixing employment uses so close to station takes away from residential potential • Employment use could dilute attractiveness and market feasibility • Employment could be better placed elsewhere in project area • Could dilute immediate area identity around station • Public and committee preferred mixed-use residential close to station
A4: North Study Area: Moderate Density Residential	**GOOD**	• Good supplement to immediate station area • Good neighbor to adjacent neighborhoods
A4: North Study Area: Neighborhood Oriented Retail or Commercial	**FAIR**	• Could provide good commercial opportunities • Market for neighborhood-serving retail in this area uncertain • Moderate support from public
A4: North Study Area: Institutional/ Educational/ Athletic Facilities	**FAIR**	• May be inconsistent with overall development intent • Need for educational/athletic use unknown

Planning Area B: Northwest

Table 3.1b summarizes the project team's evaluation of the initial land use concepts for Planning Area B.

Table 3.1b: Summary of Project Team Evaluation of Concepts for Planning Area B: Northwest

Concept/Major Features	Overall Evaluation	Summary of Evaluation
B1: High-Tech Business Park/Light Industrial	**GOOD**	• Consistent with vision to attract employment • Good use of land not adjacent to residential • Could add to area attractiveness and identity • Good support from public and committee
B2: Incubator/ live-work mixed with high-tech light industrial	**GOOD**	• New concept but could supplement employment uses • Good use of land not adjacent to residential • Could add to area appeal by providing innovative employment opportunities
B3: Education focus/ college extension/ vocational job training	**FAIR**	• Consistent with employment vision • Uncertain market and need • Moderate support from public

The table shows that land use concepts focused on high-tech/light industrial were ranked higher than the concept that focused on education-related uses. In particular, the incubator/live-work concept was cited as increasing the area's appeal to employers and entrepreneurs by providing innovative work space and employment opportunities.

Planning Area C: Southwest

Table 3.1c summarizes the project team's evaluation of the initial land use concepts for Planning Area C.

Table 3.1c: Summary of Project Team Evaluation of Concepts for Planning Area C: Southwest

Concept/Major Features	Overall Evaluation	Summary of Evaluation
C1: High-Tech Business Park/Light Industrial	FAIR TO GOOD	• Potential supplement to other employment uses • Could add to area theme and attractiveness • Good use of land not adjacent to residential • Demand uncertain given parcel size and location
C2: Health Care Campus (in southern part of Planning Area to be compatible with existing senior housing)	GOOD	• Consistent with employment goals • Good use of land not adjacent to residential • Could supplement adjacent existing facilities • Could add to area theme
C3: Institutional/ Senior Housing (in southern part of Planning Area to be compatible with existing senior housing)	GOOD	• Consistent with employment goals • Good use of land not adjacent to residential • Could supplement adjacent existing facilities • Could add to area theme

The table shows that land use concepts focusing on health care and institutional uses (including senior housing) were ranked slightly higher than the more traditional high-tech/light industrial uses. However, as the City of Thornton's Economic Development Department has indicated, land for the latter use is still in demand in this area.

3.8 Conclusions

Based on this evaluation and community feedback, the Project Team initiated development of Preferred Land Use Alternatives that best meet the vision for the station area as well as the market forecasts. The Preferred Land Use Alternatives are described in detail in the next chapter.

Chapter 4.0 Preferred Land Use Alternatives

4.1 Introduction

The Preferred Land Use Alternatives are based on the long-term planning vision for this area and are intended to create a rich mix of land uses within convenient walking or circulation distance of the station. The Preferred Alternatives also support the location of employment opportunities within this area. These recommendations are an example of how TOD could evolve in the station area. Actual development will depend heavily on the local economy and real estate market, local developer response to those market conditions, incentives that may be offered by the City, and RTD investment and construction.

The Preferred Alternatives were defined through multiple working sessions with staff, stakeholders, the public, and, at the final stage of the process, the City Council.

The intent of the Preferred Alternative is to provide a framework for a level of increased density that supports transit ridership, respects the lower density character of surrounding neighborhoods, focuses on employment uses, and ensures quality development that increases the market value of the entire area.

4.2 Overall Preferred Alternative Development Concept

Figure 4.1 summarizes the overall Preferred Alternative development concept recommendations for the project area. The proposed ratios and densities of land use types shown in the Preferred Alternative would create a strong residential community near the station and allow for a modest amount of retail to serve transit users and support both new and established neighborhoods.

Land uses planned for the Preferred Alternative include residential in the primary station area, with the highest density multifamily uses located adjacent to the station and residential densities stepping down as they near the surrounding neighborhood.

The Preferred Alternative would also focus on a strong employment base in the western part of the Project Area, with ample parks, open space, and amenities incorporated throughout the area to create a cohesive, well-connected station area.

Figure 4.1: Preferred Land Use Alternative

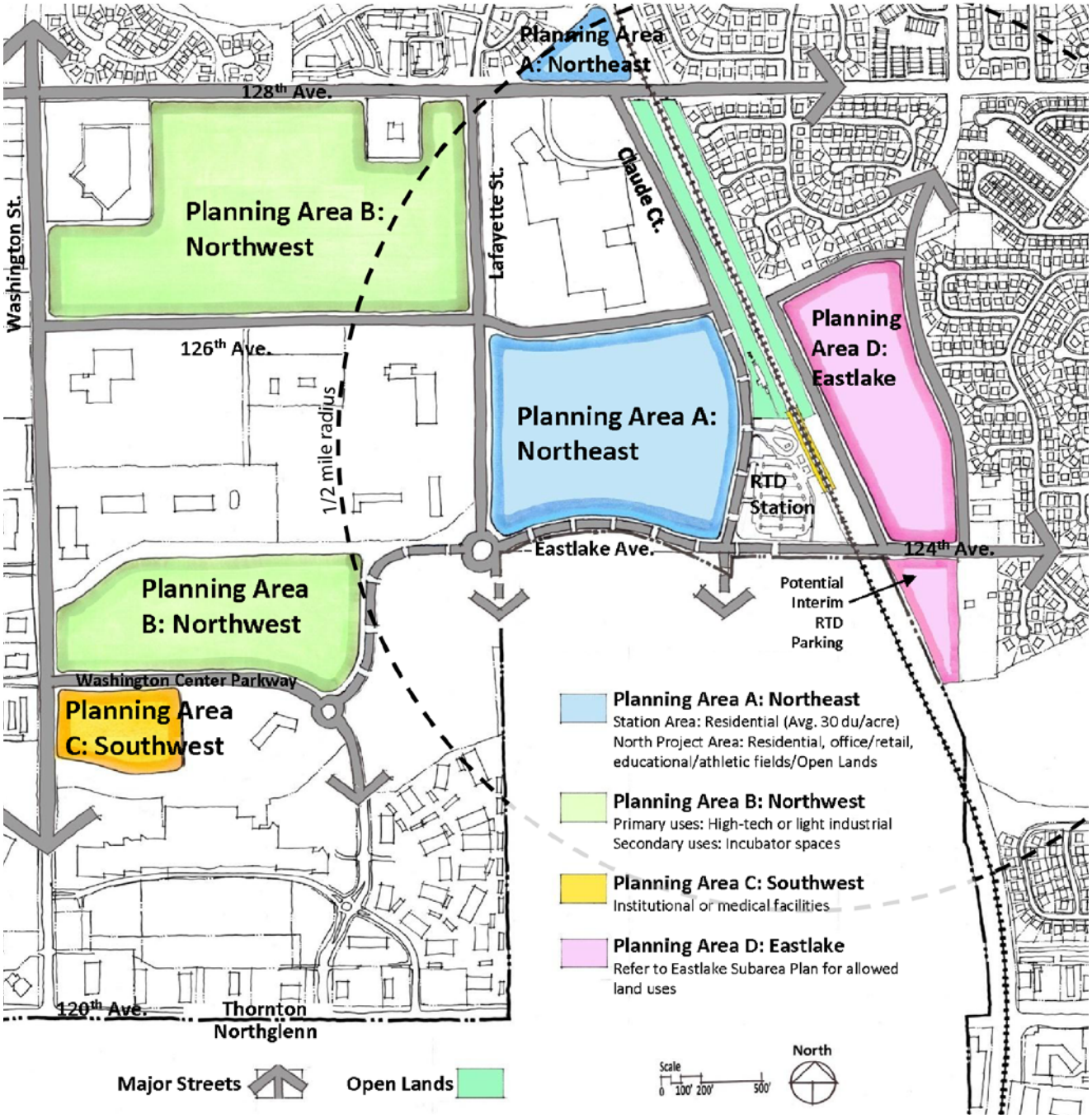


Table 4.1 summarizes the types of land use for the Eastlake at 124th Station Project Area.

Table 4.1: Proposed Station Area Land Uses and Densities

Proposed Land Uses	Components
Residential (Northeast)	1,300 du (avg 30 du/acre)
Multifamily	1,100
Single-family detached and attached	200
Commercial/Retail (Northeast)	
Primary station area	5,000 s.f.
North study area	30,000 s.f.
Light Industrial (Northwest)	1,000,000 s.f.*
Institutional (Southwest)	500,000 s.f.+

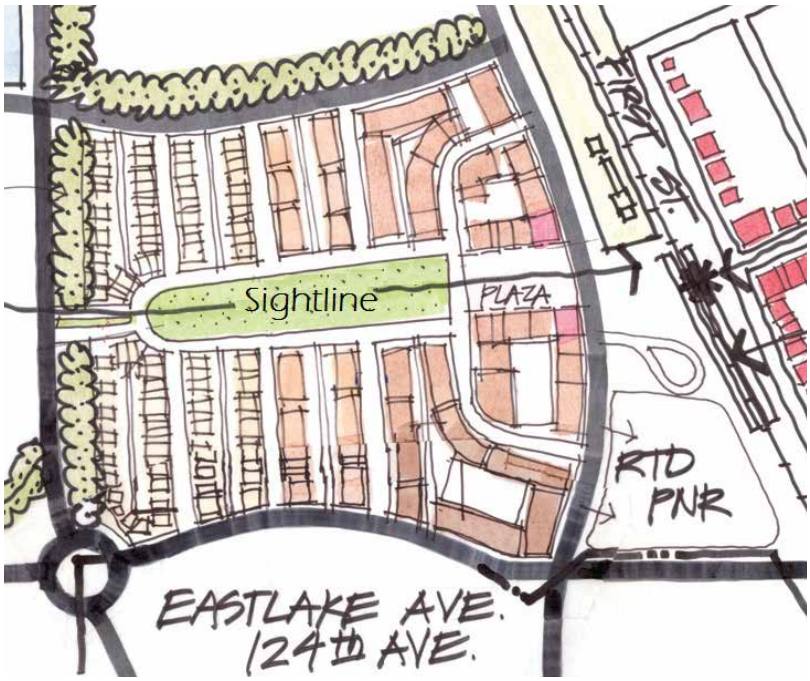
* Does not include 105,000 s.f. of light industrial already planned for northeast corner of Washington and 126th Ave.
+Option for Southwest Planning Area: either 226 residential units (senior housing) or 500,000 s.f. of institutional (health care/medical, etc.)

Planning Area A/Northeast: Residential Focus

The project team is recommending a residential focus for the area immediately adjacent to and west of the RTD station. As described earlier, the residential development consists of two primary areas:

- A moderate-to-high-density transit core, consisting of multifamily apartments, condominiums, and/or townhomes along with potential ground-floor commuter- or neighborhood-serving retail closest to the station; and
- A transition zone west of the core, consisting of moderate-to-high-density condominiums, townhomes, garden homes, and/or live-work spaces and limited employment uses.

Figure 4.2a: Preferred Development Concept for Planning Area A



The initial assumptions for density in Planning Area A is approximately 40-50 dwelling units per acre in the transit core closest to the station, scaling back to approximately 20 dwelling units per acre in the farthest west portions of the transition zone, resulting in an average density throughout the area of approximately 30 dwelling units per acre, for a total of approximately 1,300 dwelling units. Figure 4.2a is a conceptual illustration showing a potential layout for the planning area.

The concept consists of the following key features:

- A small-block street grid throughout;
- A central east-west boulevard with open lands forming an internal park as an open space 'spine' for the development area. It also allows a continuous viewshed from the west side of the development to the station and its future east side plaza bordering First Street in Eastlake, and continuing eastward along Lake Avenue to the core of Eastlake to the east;
- A central landscaped plaza immediately west of the RTD station;
- Highest-density development immediately adjacent to the station consisting of multifamily apartments and/or condos, transitioning to lower-density townhomes and garden homes to the west;
- Ground-floor neighborhood- or commuter-serving retail on the corners bordering the central plaza west of the station; and
- A greenspace buffer separating the residential area from the industrial areas to the west and north.

In addition, strongly regulating the built form to create a high-quality design will help to ensure that the core station area is distinct as a place. A mix of land uses that are designed to encourage pedestrian activity will enliven the area and encourage walkability. This includes:

- A new east-west roadway on the north end of the development along with a landscaped buffer to separate the residential area from the Adams 12 School District facility to the north.
- A new east-west roadway on the north end of the development along with a landscaped buffer to separate the residential area from the Adams 12 School District facility to the north;
- Buildings built to the front right-of-way line/zero-front setback from property line;
- Storefront design at the street level; and
- Full-width sidewalks with streetscape amenities (such as trees in tree grates, pedestrian light fixtures, and bicycle lanes where appropriate).

To provide an example of this built form, Figures 4.2b and 4.2c illustrate, with example building footprints, a conceptual build-out of the Preferred Alternative for Planning Area A.

Example of high-density residential near rail station in transit core

Example of moderate-density residential in transition zone

Figure 4.2b: Conceptual 3-D Layout for Planning Area A (looking west)

Figure 4.2c: Conceptual 3-D Layout for Planning Area A (looking east)

In addition, the project team laid out preliminary concepts for the triangular area to the north of 128th Avenue across from the Adams 12 school facility (called the North Project Area in this project); those concepts are shown in Figures 4.2d (residential concept) and 4.2e (office/commercial/retail concept).

Example moderate-density residential in North Project Area

Figure 4.2d: Preliminary Residential Concept for North Project Area

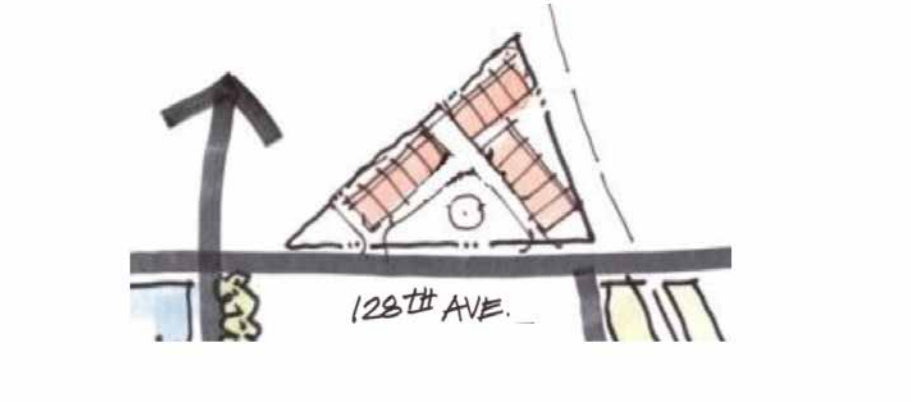
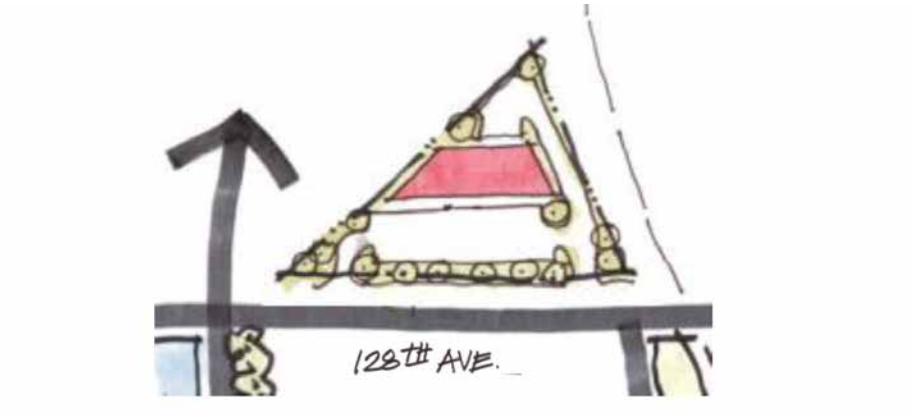
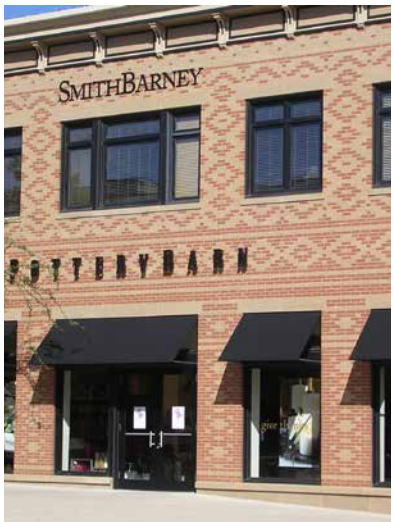


Figure 4.2e: Preliminary Office/Commercial/Retail Concept for North Project Area





Example office/commercial/retail in North Project Area

The concept consists of a row of buildings bordering the northeastern and northwestern edge of the parcel that could be moderate-density residential (such as townhomes), neighborhood-oriented office or retail fronting 128th Avenue, educational/athletic fields/open space, or a combination of the above. Potential uses could include approximately 70 dwelling units or approximately 30,000-35,000 square feet of commercial/retail.

Planning Area B/Northwest: Light Industrial Focus

The boundaries of the earlier planning areas were revised to include the parcels immediately south of the Thornton maintenance facility site into Planning Area B primarily due to the market analysis and recommendations from the City's Economic Development Department to focus on light industrial and employment-based uses in this portion of the Project Area (it was formerly part of Planning Area C), as shown in Figure 4.3.

Figure 4.3: New Boundaries of Planning Area B: Northwest

Example high-tech/light industrial

Recommendations for the revised Planning Area B are as follows, for location see figure 4.3:

- Its primary uses should consist of a high-tech business park and/or light industrial development. This coincides with the city's goal of increasing its employment base and is also consistent with previously planned uses for many of the parcels. The two sites could attract up to 1,000,000 square feet of light industrial uses. The area also could also be marketed as an "eco-innovation district" to attract development (see the information on the next page describing those types of districts).
- Secondary uses: Incubator (start-up) spaces.
- In the event a college extension campus or vocational training campus, or combination of the two contemplated locating in this area additional consideration would be given to these land uses.
- For the portion of Planning Area B located along Washington Center Parkway the City would also consider a residential/non-residential mixed-use master planned, Transit Oriented Development (TOD) community, consisting of higher density residential along with two or more non-residential preferably employment based uses. Senior/ assisted housing could be counted as one of the non-residential uses. To be successful, an integrated mixed use development of this nature would specifically need to outline how negative impacts between land uses are mitigated through design or buffering in the Planned Development Zoning (PD). The master plan would have to identify adequate open space, trail and recreation amenities for the area and ensure that there are adequate safe connections to existing trails and sidewalks, particularly those that link to the nearby transit station.

Eco-Innovation Districts

Eco-innovation districts are an emerging theme that many cities are using to attract new high-tech development and to focus such development in an identifiable (and marketable) area. The best resource that describes these districts comes from the Brookings Institution and its May 2014 report "The Rise of Innovation Districts: A New Geography of Innovation in America." The report notes that previous high-tech development trends have focused in widely scattered "suburban corridors of spatially isolated corporate campuses, accessible only by car, with little emphasis on the quality of life" or integrating a variety of uses. A local example of this type of development is the Denver Tech Center (though its access is improving through the introduction of light rail and local circulators, and it is attempting to increase its mix of uses and densities). The report notes that a new model of development is emerging in many cities. "Innovation districts" (which many cities have amended to include "eco" to focus on sustainable development) are described as:

"…geographic areas where leading-edge anchor institutions and companies cluster and connect with start-ups, business incubators, and accelerators. They are also physically compact, transit-accessible, and technically-wired and offer mixed-use housing, office, and retail. Innovation districts are the manifestation of mega-trends altering the location preferences of people and firms and, in the process, re-conceiving the very link between economy shaping, place making and social networking."

Examples of eco-innovation districts around the country that could be good examples for Thornton to study include:

- The Syracuse Connective Corridor in New York, connecting higher education institutions with downtown Syracuse, which includes the "Syracuse Technology Garden" (an incubator facility).
- Boston's Innovation District, designed to spur economic development in an underutilized area, transforming it into an "urban laboratory" to attract entrepreneurs through a large marketing campaign.
- The Pittsburgh Eco-Innovation District, a public-private partnership designed to attract new development in Pittsburgh's re-emerging Uptown District.
- Research Triangle Park in North Carolina, a well-established campus environment (similar to the Denver Tech Center) that is undertaking a 50-year master plan to transform the area into a mixed-use community while encouraging new innovative businesses to relocate into the area.
- Drexel University in Philadelphia is establishing University City to promote collaboration between the city's universities and research institutions and to create a mixed-use urban village to support it.

University City in Philadelphia

Source: Drexel University

The parcels could accommodate up to 226 dwelling units of used for senior housing, or up to 500,000 square feet of institutional uses such as medical facilities.

Example institutional/senior housing and health care facilities

Planning Area C/Southwest: Institutional Focus

The Project Team narrowed its focus in the Southwest planning area to include the two undeveloped parcels along Washington Street west of the InnovAge senior housing facility (which is planning to expand to the parcel to the west), as shown in Figure 4.4.

Figure 4.4: New Planning Area C: Southwest

The Preferred Alternative for this planning area is to focus on employment and institutional uses, primarily senior housing (to supplement the existing InnovAge facility and its planned expansion) and a health care campus with medical facilities and/or health care education facilities. This emphasis on health and senior care was deemed a good focus area for the undeveloped parcels and was seen as a means to increase the local employment base and the development attractiveness of the area.

Planning Area D/Eastlake: Community Focus

The following policy options are recommended for the historic Eastlake area and were discussed in Chapter 3 in more depth. As mentioned earlier, these will be considered in the upcoming update of the 2003 Eastlake Subarea Plan.

- Focus commercial activity on First Street and Lake Avenue where the existing commercial is located.
- Create a gateway, which could include a plaza, at the western terminus of Lake Avenue to achieve a strong visual and physical connection to the RTD station.
- Upgrade First Street to ensure it functions appropriately alongside a transit station and include design features that contribute towards the enhancement of the overall urban environment.
- Reserve the vacant property to the south of 124th Avenue and east of the railway tracks, presently used as undeveloped Open Lands, as a possible interim location for overflow transit parking for the Eastlake at 124th Station. Note this possible interim land use was not considered at the alternatives stage of this planning process because the overflow parking concept emerged later.

TOD Developer Forum Review

As part of the Preferred Alternatives assessment process, the Project Team held a meeting on June 10, 2015, with developers specializing in transit-oriented developments to receive feedback on the proposals. The forum consisted of developers who have been working on transit-oriented developments around the Denver region and who were familiar with Thornton and its demographic and development patterns. The comments of the developers who attended the forum are summarized below.

Planning Area A/Northeast

- Access to the site could be a problem; a good development needs good visibility and access, so the north-south roadways planned by Northglenn are key to success.
- Affordable housing is feasible if it is low-key and downplayed and integrated into the overall development.
- Concerns about development fees imposed by the city of Thornton. However, staff responded that those fees may be offset by other lower costs.
- Parking is a major concern – it was a major 'perceived' issue in Arvada (which reduced requirements from 2.2 spaces per unit to 1.5) but does not seem to be a problem now. Like other cities, there will be concern about park-n-ride parking spilling over into the neighborhood, but it can be managed. (Arvada instituted a local circulator shuttle serving outlying parking areas.)
- Thornton may need an intergovernmental agreement with Northglenn on joint use of the reservoir site to the south – making it a park would be a major amenity for both cities.
- The best catalyst Thornton can provide is to 'reduce risk' to the market. This area is 'business-ready'; the City should make every effort to work closely with developers and help them develop the site.
- The City should consider other ways to catalyze development to include infrastructure and development gap financing.
- A Metropolitan District is one possibility to help pay for infrastructure (maybe combine with the Northglenn site to the south?).
- Lower rental rates in Thornton make it somewhat harder to attract developers.
- There should be some type of financial incentives provided by the City to attract developers (why would they come this far north without financial incentives?).
- There is work needed at the municipal level on the regulatory and policy front before TOD can succeed here.
- If this area was in an urban renewal district, the City could reduce development fees for development within the District (or URA).
- If the Adams 12 School District moved its offices to the parcel to the west, it could put a college in the existing school administration building.

Related to the triangular piece north of 128th Avenue, the developers had the following comments:

- It is not uncommon to provide good development on a site with this shape and size.
- The approximately 3-4 acres could support good development.
- It could potentially support up to 50 townhomes if residential was desired.
- It could also support good mixed-use retail and commercial/office given its frontage.

Planning Area B/Northwest

- The area west of the Adams 12 School District site would be more amenable to school-related uses than the parcel to the south. Perhaps it could attract a community college campus.
- The 'Industry' complex within the River North Art District in Denver could be a good model for this area. It provides office and business

'incubator' space for small and mid-sized businesses.

- If the area is branded with a name like an Eco-Innovation district, it needs to be tied to incentives and good amenities for clients (good open space/trails, some supportive retail, landscaping). The name alone will not attract development.
- The live-work market is slow and seems to be a trend that is fading.
- The industrial market overall is booming. The marijuana business has absorbed many industrial sites in Denver, so new industrial is migrating to other areas.

Planning Area C/Southwest

- Consensus was that senior housing and/or health-care or other supportive activity would work well here.

Planning Area D/Eastlake

- Eastlake is a 'special place' similar to Olde Town Arvada; it is a 'gold mine' and 'crown jewel' that needs urban design upgrades and other incentives to attract new development.
- There needs to be a 'critical mass' of people and activity adjacent to the station to support commercial and retail activities in Eastlake.
- Let Eastlake 'be what it wants to be'.
- Small businesses should fill underutilized sites as the market dictates.
- Let it retain its feeling of a 'funky neighborhood'.
- Its uniqueness could encourage development at the TOD site west of the tracks and could be a major attraction.
- It could potentially be a 'cultural center' for Thornton.
- While the good structures could be re-used and re-adapted, new development could provide more modern architecture while still fitting in with the historic nature of the area.
- Could be similar to Olde Town Arvada's standards (3-story maximums, with the third story set back); though most development has been 2-story.
- There is a need to honor Eastlake but it also needs a "street wall" of storefront façades.
- If done right, Eastlake could be as successful as Main Street Louisville.

TOD Developer Forum

4.3 Circulation and Transportation Network Analysis

Proposed Roadway Network

Figure 4.5a shows existing and proposed roadways in the Project Area. The figure shows that a number of additional roadways are planned, including:

- The realignment of Claude Court to border the west side of the new RTD station;
- The realignment of Eastlake Avenue west from 124th Avenue to border the municipal limits of Thornton and Northglenn;
- The addition of a roundabout linking Lafayette Street with the realigned Eastlake Avenue and with Washington Center Parkway to the southwest; and
- Potential connections off Lafayette (Irma Drive) and Claude Court (Race Street) south into Northglenn.

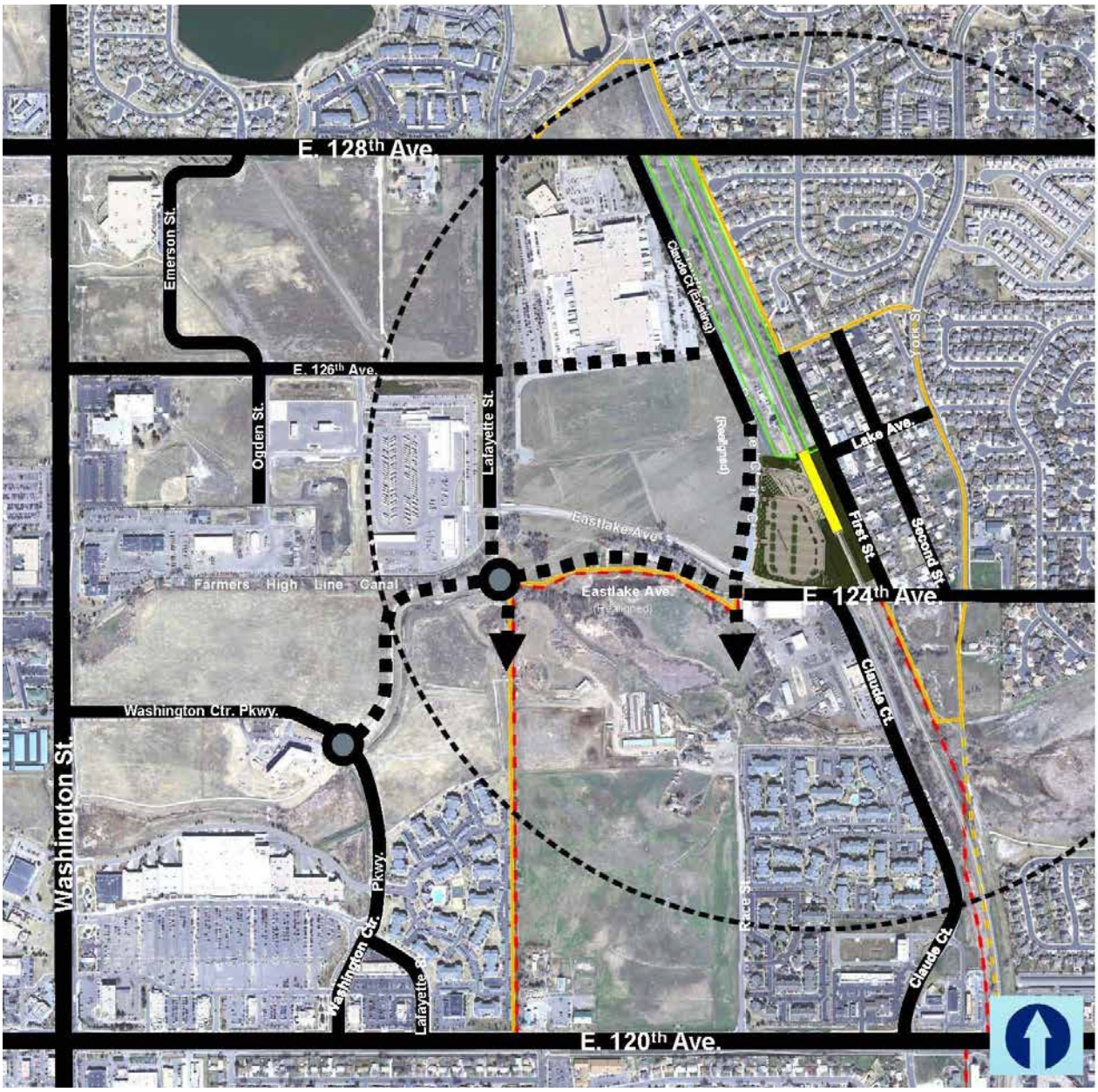
Future Roadway Plans and Traffic Analysis

To evaluate the future transportation network related to the Preferred Alternative, the Project Team conducted a detailed transportation analysis, which can be found in Appendix A. The analysis was carried out for a short-term horizon (Year 2020) and a long-term build out horizon (Year 2035). It included developing traffic volume projections for each time horizon that incorporated background traffic already on the transportation network, trips generated by the planned RTD station, and trips to be generated by the development of the parcels in the Station Master Plan study area as part of the Preferred Alternative. This was followed by the operational analysis, which evaluated the following two key elements:

1. Roadway cross-sections to determine the number of lanes that would be required for good operations; and

2. Intersection operations to determine the appropriate traffic control and lane geometry.

Figure 4.5a: Existing and Proposed Roadways in the Project Area



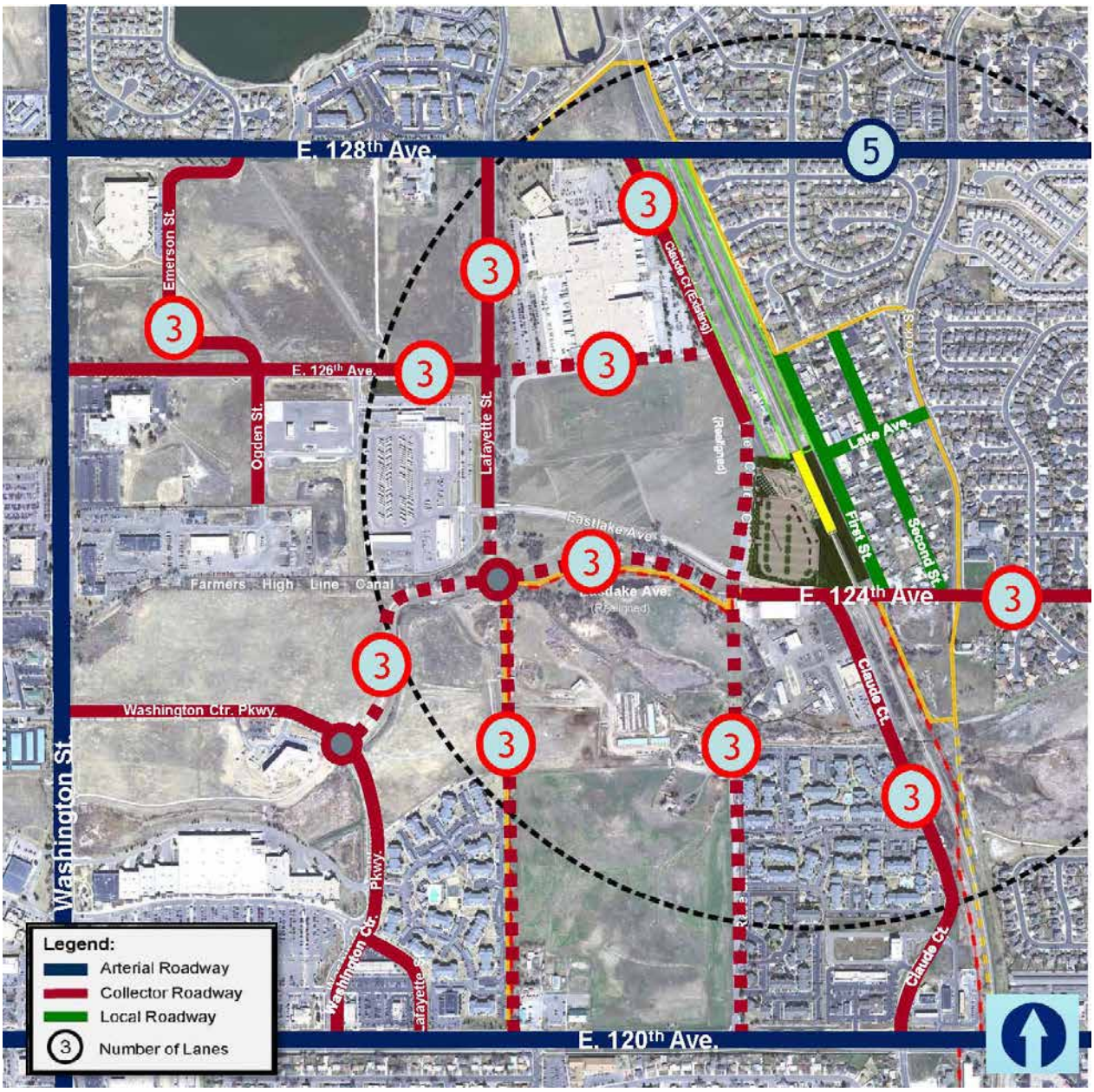
Source: City of Thornton

The proposed development plan – including plans of Thornton and Northglenn – includes a number of new roadways and will result in a total of fifteen intersections of interest. These internal roadway improvements include:

- Extending East 126th Avenue to the east, running just south of the Adams County School District Building, until it terminates at Claude Court.
- The entire alignment of Eastlake Avenue and its intersection with Lafayette Street will be shifted to the south. A roundabout will be constructed to serve as the new intersection. Eastlake will be extended through the roundabout to the southwest until it connects to Washington Center Parkway at the existing roundabout.
- Furthermore, the City of Northglenn has indicated a desire to extend Irma Drive from East 120th Avenue to Eastlake Avenue, becoming the south approach to the roundabout at Eastlake Avenue and Lafayette Street.
- The alignment of Claude Court north of Eastlake Avenue and its intersection with Eastlake Avenue will be shifted west to make room for the planned rail station. As with Irma Drive, the City of Northglenn extends Race Street to meet Eastlake Avenue at the same point as Claude Court, creating a four-legged intersection. The alignment of Claude Court south of East 124th Avenue will not change.

In all cases, it is planned that these newly constructed internal roadways will have a three-lane cross-section plus bike lanes with a center turn lane. A schematic showing the anticipated future roadways and intersections can be seen in Figure 4.5b. The future roadways are displayed as dashed lines.

Figure 4.5b: Details on Proposed Roadway Improvements in the Project Area



Source: City of Thornton

Observations and Conclusions

The results of the analysis lead to the following conclusions and observations:

- All internal roadways (Lafayette Street, Eastlake Avenue, Irma Street, Race Street, Claude Court, and East 126th Avenue) will operate within the City of Thornton's standard as three-lane roadways.
- East 128th Avenue will need to be widened from two lanes to four lanes between the railroad tracks and east of the York Street intersection. Without this improvement, the East 128th Avenue / York Street intersection will operate above capacity and may result in drivers searching for alternate routes such as East 124th Avenue.
- The existing roundabout on Washington Center Parkway and the proposed roundabout at Eastlake Avenue/Lafayette Street/Irma Street will both operate well as one-lane roundabouts through the Year 2035.
- The Eastlake Avenue/Claude Court/Race Street intersection should be constructed with all-way stop control. However, it will require additional turn-lanes which is generally not ideal at all-way stop intersections. If possible, a one-lane roundabout should be considered here, which will operate well and create some consistency with the other roundabouts along Eastlake Avenue/East 124th Avenue.
- East 124th Avenue in the vicinity of the tracks is expected to operate well with minimal queues at the Claude Court and First Street intersection. The eastbound and westbound left-turn movements are anticipated to experience minimal queues and are not expected to create any operational issues across the railroad tracks.
- All other intersections are anticipated to operate at the City of Thornton Level of Service "D" threshold or better through the Year 2035.

4.4 Parking

One of the most common issues raised by the public and stakeholders during the development of this Plan was parking, including:

- If and how the proposed RTD Park-n-ride can accommodate commuter parking and its potential impact on surrounding neighborhoods (primarily focused on overflow parking);
- How to manage parking within new proposed residential development areas, including the proper ratio of parking spaces to residential units, on-street vs. off-street parking, and related issues; and
- Improving and enhancing parking in the historic Eastlake community to improve local access and facilitate new (primarily retail) development in the area along First Street, Lake Avenue, and other streets.

Note that additional 'overflow' parking for the RTD station of approximately 130 spaces is tentatively proposed by RTD to be located on the parcel south of 124th Avenue, east of the tracks. RTD has stated that it will re-evaluate the need for this overflow parking if the agency is successful in funding and constructing the remainder of the North Metro corridor by 2018.

A discussion on the relationship of parking to TOD-type development and potential measures to manage parking is included in the guiding principles outlined in Chapter 6 of this document.

4.5 Trails Connections

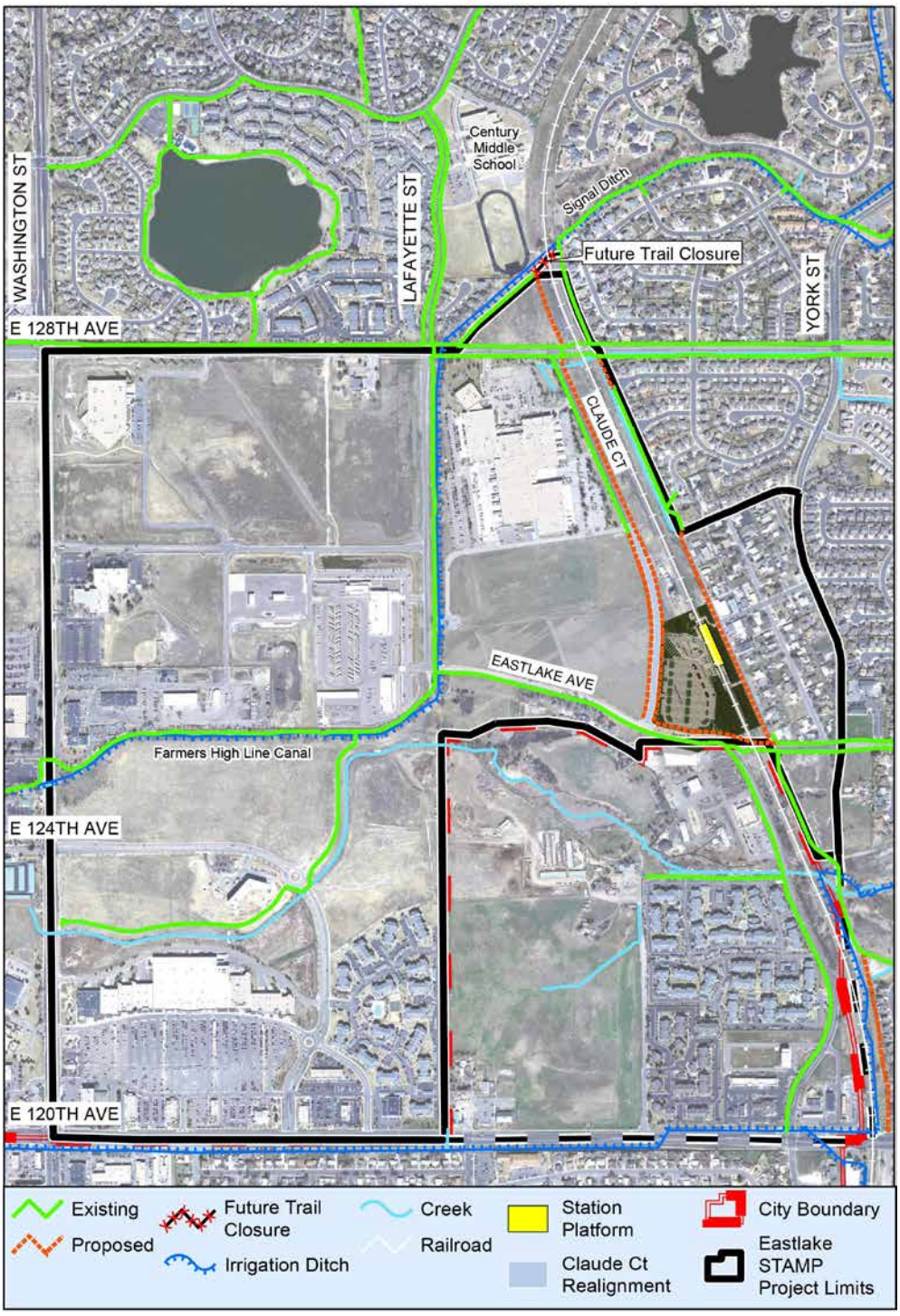
Figure 4.5c shows the existing and proposed pedestrian circulation network in the Project Area. It shows proposed additions to the trail network that include:

- Addition of a trail north of 128th Ave. and west of the rail line to correspond with trail connections to the south of 128th Ave.;
- The closing of the trail that crosses the rail line north of 128th Ave. since pedestrians will no longer be able to cross the active RTD rail line;
- The addition of trails bordering the realigned Claude Court west of the RTD station; and
- The extension of the trail on the east side of the rail line (along First St. in Eastlake) to connect with trails south and east-west on 124th Ave.

Existing trail connections and filling trail connections gaps are also addressed in the conceptual plans developed for the Open Lands portions of the Project Area and are described in more detail in Chapter 5. The implementation of these trail improvements in the development area and the Open Lands should provide significantly improved pedestrian and bicycle connectivity throughout the Project Area. In addition, the construction of new roads within the Project Area are planned as "complete streets"

with bicycle and pedestrian facilities and should provide significant multi-modal connectivity for future residents, employees, and visitors. These improvements, combined with the implementation of bicycle facilities at the station and potentially other future improvements (such as bicycle sharing facilities) will greatly improve multi-modal connectivity around the station.

Figure 4.5c: Existing and Proposed Pedestrian Circulation Network



4.6 Water and Sewer

Sanitary sewer for Planning Area A (station area) will flow north to 128th Avenue, where it joins an existing 18-inch sewer flowing east. An existing 8-inch line was constructed to serve the "Huffy Business Park" which may need to be supplemented with a new line along Claude Court for both depth and capacity. For Planning Area A, north of 128th Avenue, sewer will connect to the line in 128th Avenue. For Planning Area B, the western portion will need to flow to an existing sewer in Emerson Street, flowing north across to 128th Avenue; the eastern portion is served by an existing sewer that flows past Fire Station #5 to 128th Avenue, then east. Planning Area C has an existing sewer in Washington Center Parkway that flows north to the eastern sewer in Planning Area B.

Water service for Planning Area A (station area) would connect to a 12-inch loop to the north around the Adams 12 property. Planning Area A north of 128th Avenue would connect into the "Zone 3" line on 128th Avenue. For Planning Area B, an 8-inch loop water exists in Emerson Street at the west edge. Planning Area C is served by an existing 12-inch water main in Washington Center Parkway. All three of the planning areas are "Zone 3". The above-mentioned loops connect to a 24-inch main in Washington Street and/or a 24-inch main in 128th Avenue

There are no public sewer mains crossing the tracks to the east other than at 128th Avenue. The 18-inch sanitary sewer in 128th Avenue initially received flows from a 136th Avenue Big Dry Creek pump station. This flow now goes north and the 18-inch line should therefore have adequate capacity. Water service cannot connect across the tracks into existing Eastlake, as this is on a lower-pressure water zone.

Signal Ditch Trail at 128th & Lafayette St.

Chapter 5.0 Open Lands Alternatives

5.1 Introduction

This portion of the project was focused on the development and refinement of alternative uses for the Open Lands along the railroad tracks north of the station, including an analysis of the feasibility of the adaptive re-use of the historic grain elevator. Figure 5.1 shows the location of the Open Lands examined as part of this study. The area comprises two strips of land on either side of the railroad tracks from the platform to E. 128th Avenue. The strip on the west side of the tracks is approximately 100 feet wide; the strip on the east side of the tracks is approximately 70 feet wide. In addition, a historic grain elevator is located at the southern end of the western Open Lands tract; this structure is owned by the City of Thornton and is on the National Register of Historic Places. Its interior is in disrepair and is not open to the public; however, the City also owns a historic caboose that is on display on the south end of the elevator. In addition, the City owns a house north of the grain elevator that was formerly used as an office for the elevator and now houses a beauty shop.

Figure 5.1: Location of Open Lands Corridors in the Project Area

5.2 Issues and Opportunities

A number of key issues and opportunities related to the Open Lands were identified during the project team's meetings with key stakeholders, the project Advisory Committee, the Parks and Open Space Advisory Commission (POSAC), and the Thornton Arts, Sciences and Humanities Council (TASHCO). Potential uses of the Open Lands area discussed by stakeholders included:

- Railroad and farming museum
- Bicycle station
- Public restrooms/drinking fountains
- Community meeting center
- Art gallery and arts center/arts incubator space
- Sculpture park
- Farmers market
- Retail, including bakery, microbrewery, coffee shop, and ice cream shop
- Ice skating rink
- Music venue/gazebo or band shell
- Playground
- Small lending library
- Children's playground/garden/natural play area
- Zip line/climbing wall/bungee jumping/indoor skydiving
- Outdoor play fountains

Grain Elevator

In addition, stakeholders were asked for ideas for re-use of the historic Grain Elevator. Some of those ideas included:

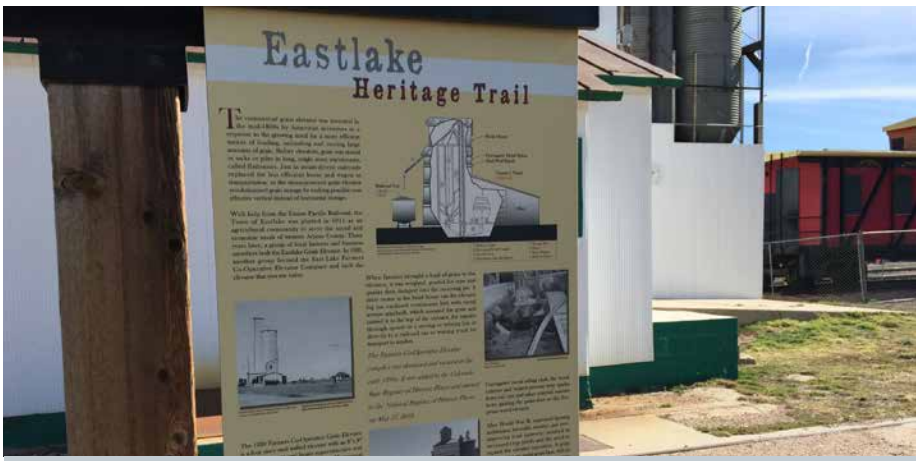
- A coffee shop or brewery with the inclusion of historical information to encourage people to visit and learn about the history of the area.
- Using the caboose as a coffee shop or place to hold birthday parties.
- A playground area including the caboose's interior.
- A flexible space that allows individuals to lease out small spaces for use, including local artists or small business owners.
- A day care facility.
- A rock climbing wall.
- An indoor skydiving facility.

5.3 Open Lands Alternatives

Based on comments and input from the public and key stakeholders, the project team developed three concepts for the development of the Open Lands:

- Phase I short-term improvements, focused on relatively low-cost, easily implementable actions that can begin to upgrade the Open Lands areas and integrate them with the RTD station;
- Phase II mid-term improvements, with a slightly higher level of investment and infrastructure with the addition of permanent features and structures; and
- Phase III long-term improvements, with the highest level of investment and including the adaptive re-use of the grain elevator and its related facilities.

Phase III is focused on the restoration and adaptive re-use of the grain elevator building and adjacent properties located in the Open Lands area.

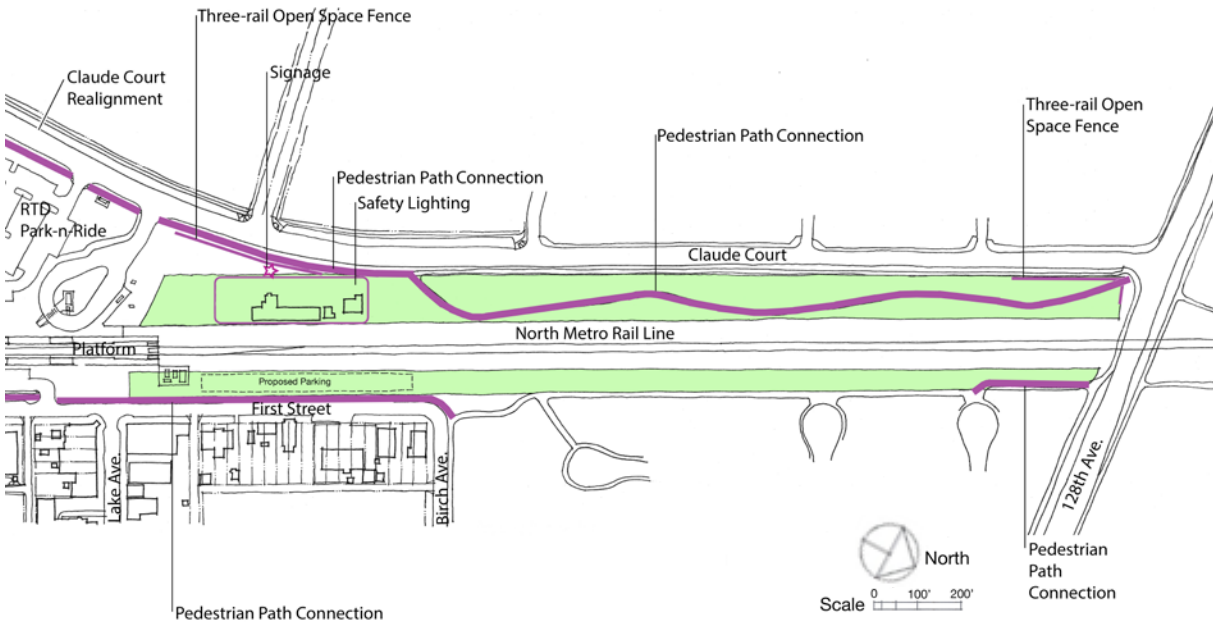


Eastlake Heritage Trail sign information

Phase I Improvements

Figure 5.2 illustrates the major features of proposed Phase I improvements for the Open Lands areas.

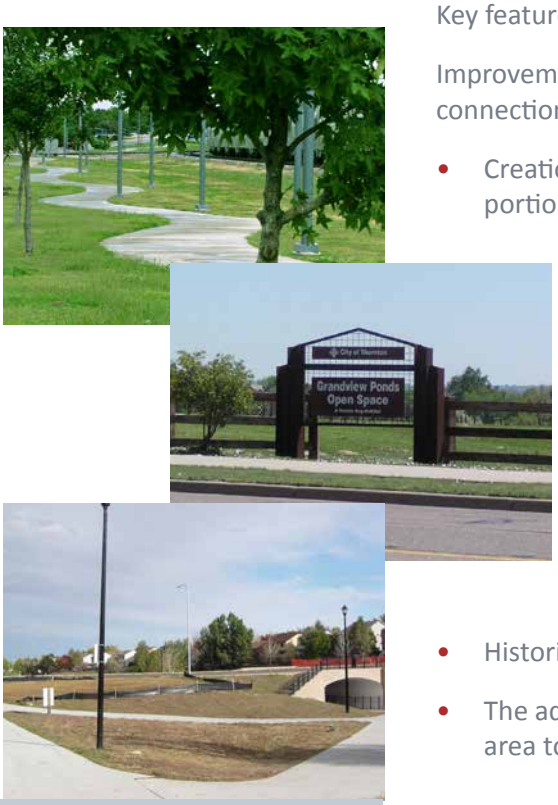
Figure 5.2: Phase I Open Lands Concepts



Key features of Phase I improvements include:

Improvements of existing trail connections and filling gaps of trail connections. This includes:

- Creation of new trails from north to south through the western portion of the Open Lands area, connecting the RTD station with 128th Avenue;
- Adding designated trails to the eastern edge of realigned Claude Court adjacent to the RTD station; and
- Designation of a trail along First Street in Eastlake to provide connections from north to south through the community.
- Addition of architecturally compatible or historic fencing along the edges of the Open Lands areas to provide pedestrian guidance to the areas and segregate the Open Lands from traffic on Claude Court;
- Historically compatible signage/wayfinding throughout the area; and
- The addition of historically compatible lighting fixtures throughout the area to promote safety, visibility, and after-hours use.

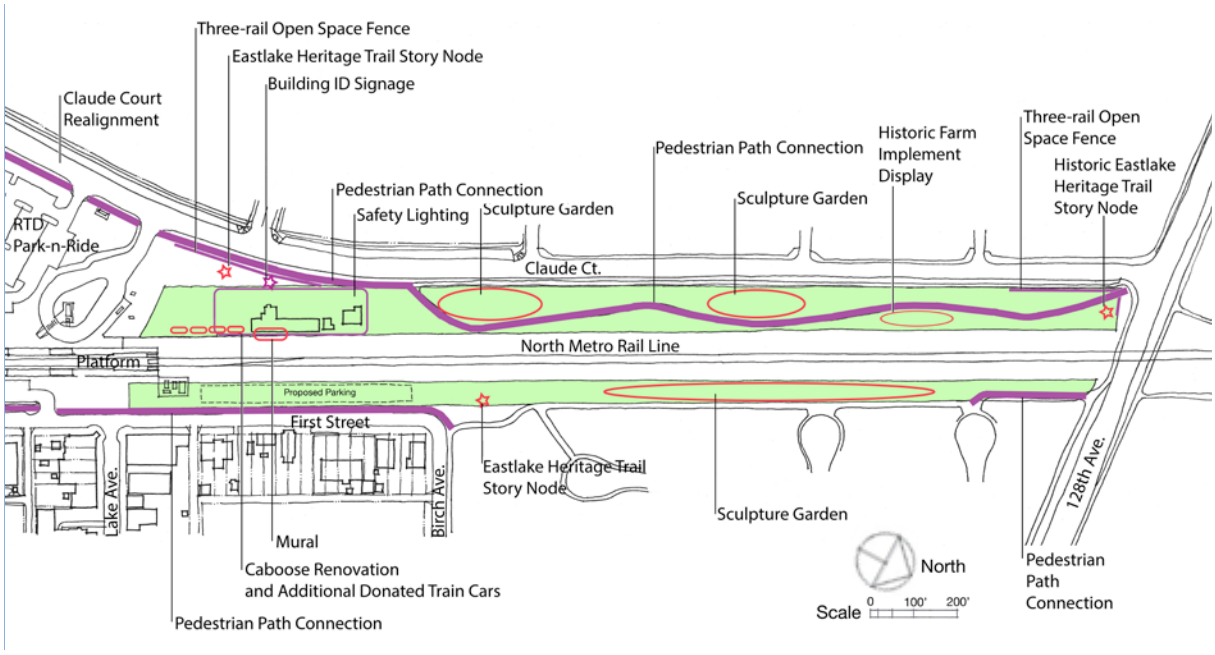


Example trail improvements, signage, and lighting proposed for Phase I

Phase II Improvements

Figure 5.3 illustrates the major features of proposed Phase II Open Lands area improvements.

Figure 5.3: Phase II Open Lands Concepts



Key features of Phase II improvements include:

- Historic farm implements displays to reinforce the area's agricultural heritage;
- The addition of artwork and sculptures reflecting the area's heritage, possibly in designated 'sculpture gardens';
- Heritage trail story nodes, with historical implements and interpretive wayfinding telling the story of the area (similar to other historic information sites in the Eastlake area);
- Adding artwork or a mural to the side of the grain elevator building to reflect the agricultural and/or railroad heritage of the area; and
- The addition of railroad features including additional cars (with further renovations of the existing caboose) and other railroad-related implements and historic markers to tell the story of the railroads in the area. There is enough existing railroad track to accommodate two or three additional rail cars.

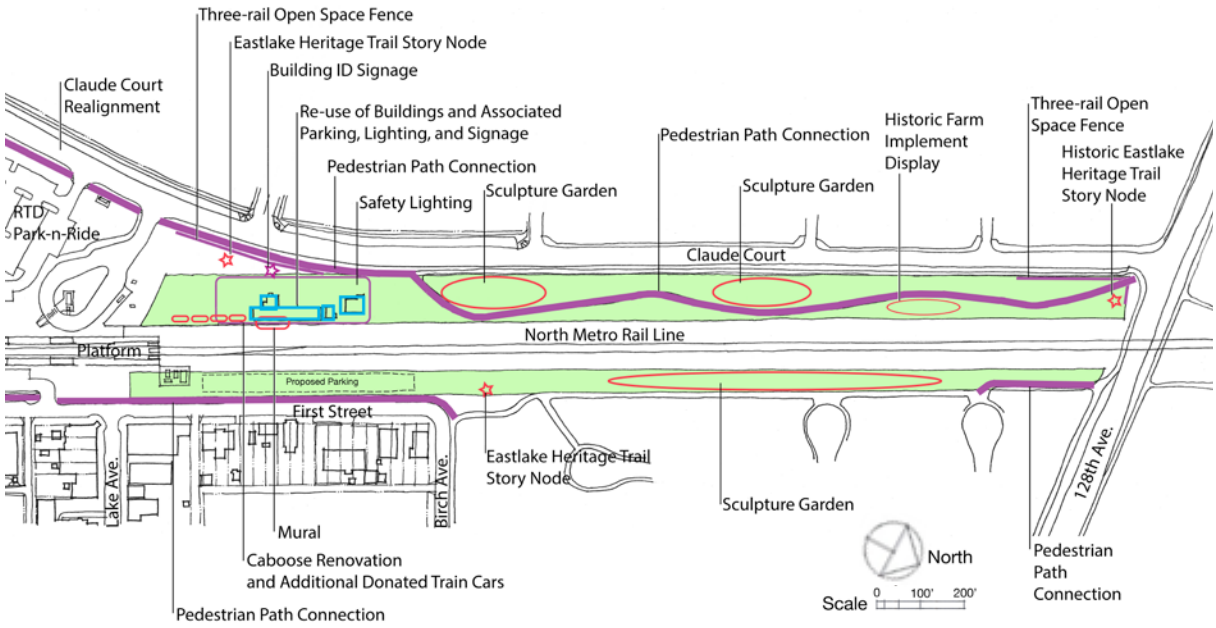
Example sculptures, story nodes, and railcars proposed for Phase II

Phase III Improvements

Figure 5.4a illustrates the major features of proposed Phase III improvements for the Open Lands areas. It includes renovation of the existing building and potentially use of its interior for one of the uses mentioned by stakeholders, along with the addition of safety lighting, parking, and other improvements designed to make the building an attraction in its own right. As established by discussions with stakeholders, the key goals of renovation of the grain elevator should include:

- Integrating one or more locally-owned-and-operated businesses in the structure itself and on adjacent properties (including the potential of a brewery or restaurant);
- Encouraging the development of businesses and attractions that are mutually supportive of and complementary to other activities and uses planned for the Open Lands areas;
- Promoting the development of businesses and attractions that support the historic themes of the area;
- Attracting a diverse mix of people at all times of the day including weekends; and
- Providing uses that are of interest to commuters, residents, and visitors to the area.

Figure 5.4a: Phase III Open Lands Concepts



As noted earlier, there were a large number of potential uses of the grain elevator and related properties proposed by stakeholders. After additional public input, the most common and popular ideas proposed for the facility include:

- A brewery, deli, and/or coffee shop;
- An art gallery and artists' co-op facility;
- A community meeting place;
- A farmers market;
- A bicycle station, including bike rental/sharing and bike maintenance and sales;
- A railroad/agricultural museum with historic displays; and
- A lending library.

Figure 5.4b shows a 3-D visualization of potential Phase III improvements in the Open Lands.

Obviously, the implementation of any of these ideas will depend on funding. Depending on the level of investment desired by the City, it will need to explore a range of public and private grant programs and other funding mechanisms to implement these proposals, especially the adaptive re-use of the grain elevator.

Grain Elevator view from the railroad tracks

Figure 5.4b: Conceptual 3-D Layout of Phase III Open Lands Development

Potential costs

Table 5.1 summarizes potential conceptual costs for Open Lands improvements. Additional details on the renovation of the grain elevator and associated components are found Appendix B.

Table 5.1: Conceptual Capital Costs for Open Lands Phased Improvements

Proposed Improvement	Estimated Conceptual Capital Cost
Phase I	
Fencing	$16,000
Pedestrian path connections	$110,000
Safety lighting	$4,500
Signage/wayfinding	$5,000
Phase II	
Heritage trail story nodes	$5,000 each
Mural	Up to $100,000
Caboose renovation	$20,000-$40,000
Additional railroad cars	Acquired through donations
Sculpure gardens	$100,000-$250,000
Historic farm implement display	$25,000-$100,000
Phase III	
Re-use of grain elevator and related buildings	$650,000
Associated parking, lighting, and signage	$350,000

Case Studies on the Adaptive Re-Use of Grain Elevators

A number of communities around the country have undertaken similar renovations of grain elevators with varying levels of investment. Appendix B includes a complete summary of those efforts. Some of the most prominent examples include:

- Louisville Grain Elevator, Louisville, CO: The city of Louisville is undertaking a renovation of its historic grain elevator located just south of its central business district. The City Council has approved plans for an addition that could encourage a restaurant with an outdoor patio and upper deck, with offices and small retail planned to fill the remaining space. The City is contributing $500,000 for re-stabilizing the building and is working with a local developer for the renovation of the facility.
- Center of Gravity Rock Gym, Wichita Falls, TX: This facility in downtown Wichita Falls has been renovated to include a climbing wall in its interior
- Rocktown, Oklahoma City, OK: Rocktown Climbing Gym is housed in a former grain elevator in Oklahoma City. The business is a cooperating effort between a local youth-oriented nonprofit and other local supporters with an emphasis on serving youth through adventure-based education, mentoring, and life skills cultivation. It includes after-school programs and summer day camps.
- Wassaic Project, Wassaic, NY: This facility is located in a refurbished mill and livestock auction house and functions as a dynamic arts residency and exhibition space. It hosts artists-in-residence programs and music and film events along with a summer festival.

Chapter 6.0 Guiding Principles

6.1 Introduction

TOD is not simply higher-density housing near a transit station. An authentic and complete neighborhood with amenities such as stores, parks, landscaping, and engaging streetscapes supports a lifestyle that is attractive to people who choose to live close to transit stations. The interweaving of the transit station, adjacent mixed-use development, and surrounding residential neighborhoods is essential to creating a signature place of enduring value, strong character, and local activity. By virtue of the principles that guide its development – compactness, clear edges, human-scaled architecture, walkable streets, public spaces and amenities – it should be perceived as a distinctive place and an appealing destination. Supporting each unique project in the station area are basic TOD planning and design principles that will ensure an enduring and engaging neighborhood environment, including public and private spaces and related infrastructure. The following pages describe and illustrate detailed guiding principles for station area design and development. These have been used in the development of the Preferred Land Use Alternatives for this project and should serve as a guide for future public and private decision-making. The last section of this chapter provides a description of relevant examples and case studies from station area projects that have similar characteristics to the Eastlake at 124th Station Area.

Neighborhood-scaled retail stores and restaurants create a dynamic and distinct place

Storefront windows and architectural featrues in a mixeduse project create visual interest for pedestrians

6.2 Land Use

Horizontal mixed-use development facilitates convenient walking access for neighborhood residents

A mix of product types attracts many income levels in the station area

Affordable housing products should be designed to a high quality design standard

L1: Create a Mix of Uses

To fully realize the potential for the Eastlake at 124th Station to become a community asset and a distinctive place, the station area should incorporate a mix of uses. The predominant character of the immediate station area should be residential, but a mix of neighborhood-scaled commercial uses at targeted locations within the core station area will support and complement the entire station area and surrounding neighborhoods. This mix should include the types of uses that people want and need, including housing, retail and restaurants, small offices, and other amenities such as educational and employment facilities where appropriate. The more complete the mixture of origins (homes) and destinations (retail and office), the greater the level of activity in the station area beyond traditional business hours – helping to create a safe environment and a thriving community – that is not abandoned after 5 pm. The neighborhood-scaled mixed-use development envisioned for the station area can be mixed both horizontally and vertically. Vertical mixed-use development, where commercial or office space is located on the ground floor and residential or office above, has witnessed a re-emergence as a transit- and pedestrian-friendly building form. If the market does not yet exist for vertical mixed-use development in the station area, allowing development of space that emphasizes urban form over land use type can provide flexibility needed by the development community. For instance, ground floor uses may transition from residential to retail or office over time as market forces evolve.

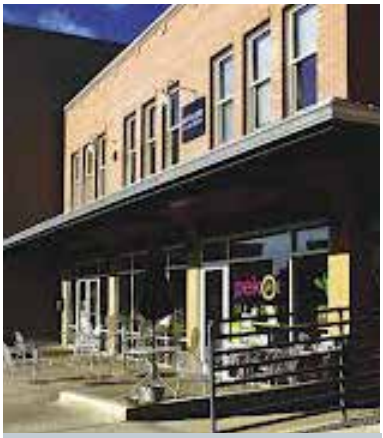
L2: Integrate Mixed-Income Housing

The station area should be designed to encourage a choice of residential unit sizes and pricing levels to serve a diversity of residents. The introduction of higher-density housing, as well as a mix of housing types near the Station, will provide choices for several income levels and can help promote access for the transit-dependent and reduce the need for private automobiles for all trips. An appropriate housing mix will also cater to people at all stages of their lives, including students, single adults, couples with or without children, and seniors aging in place. A key component of providing quality housing for a mix of income levels is ensuring that the design and architectural quality of more affordable residential products are on par with the design of market-rate housing products. To attract a mix of incomes, it will be important that the new residential environment meets this standard of quality. Differentiating the area from other competitive offerings in the marketplace and taking advantage of the presence of transit will be critical in ensuring the concept of an inclusive community.

L3: Create a Gradient of Densities

The appropriate transitioning of densities from higher-intensity uses within close proximity to the RTD Station to less-intense uses adjacent to surrounding single-family neighborhoods or commercial or employment centers is a key guiding principle for the station area. The compatibility of new development with surrounding neighborhoods is a value that has been expressed by members of the community throughout the planning process. To achieve this, densities should be tapered down as distances from the station increase so that the scale and proportion of new structures is in keeping with the surrounding areas. Higher-density uses, such as apartments or other multi-family housing, should be established within closer proximity to the commuter rail station (the transit core), promoting a more compact and walkable scale of development with a mix of uses. Locating higher-density uses closer to the station can promote ridership on the North Metro line by allowing more potential transit riders to live within convenient walking distance of the station. With a variety of building types and architecture, greater densities can be achieved without negative visual impacts of massiveness and monotony. As noted by community residents and the project's advisory committee, the station area should include retail services, amenities, and attractions that increase the overall quality and value of surrounding neighborhoods (including the historic Eastlake neighborhood east of the station). To create a market for, and help sustain, these desired retail uses, higher residential densities are needed near the station and will allow residents and commuters to access everyday services by foot or bicycle. Also to this end, lower-density and/or auto-oriented uses should be discouraged within the station core.

Transitioning densities from multifamily to single-family residential development ensure compatibility with surrounding neighborhoods



Transitioning building heights increase the visual scale of development closer to the transit station

L4: Buffer Residential Areas from Industrial Uses

Due to the diversity of market conditions and City of Thornton policy focus in the Project Area, the Preferred Alternative is a healthy mixture of residential along with employment-based land uses. The Eastlake at 124th Station presents a unique opportunity in the Denver metro area to provide regional transit access to and from a strong residential core and a strong employment area. However, as the station area develops, a "common sense" approach should be used to ensure residential areas are well-buffered from employment and light industrial areas. This could include the use of landscaped buffers, and possibly fences or walls. In the case of the Eastlake at 124th Station area, the tree-lined Farmers High Line Canal is already located along Lafayette Street west of the primary residential core development area; this area should be enhanced to provide a good visual and noise buffer between the proposed residential areas to the east and the existing and proposed industrial areas to the west (including the existing municipal service facilities). Similar buffers should be used where appropriate to ensure compatibility between these land uses.

L5: Create Transit-Supportive, Walkable Employment Areas

Industrial and distribution activities may benefit from proximity to TOD. Though TOD, particularly town centers, can function almost self-sufficiently with a diverse mix of housing, jobs, and services, these are not intended to be physically isolated, stand-alone places. TOD should instead embrace its existing context, serving as a highly accessible amenity for nearby residents and workers. This reciprocal relationship is essential to the viability of TOD. Adjacent neighborhoods and employment centers rely on the TOD for mobility and access, while the development depends on the community's commercial support. TOD should connect with adjacent areas – including employment areas – in two critical ways. First, a refined grid of streets and pedestrian links to surrounding areas should facilitate easily accessible routes to the TOD for people on foot or bike. The ability to arrive quickly and safely at a TOD through alternative modes of transportation expands the potential base of transit riders, including local employees. Inside the TOD, this tight network of streets and sidewalks frames development and promotes convenient movement among activities. Street grids also disperse traffic and alleviate vehicular congestion. The development should plan for appropriate transitions of scale and access, when possible, from the architecture and place-making elements of the broader community to create a setting that fully complements its neighbors, including employment uses.

Street trees and on-street parking buffer pedestrians from traffic

Active edges promote an engaging urban realm environment

6.3 Urban Design

U1: Create Active Edges

Creating a sense of place within the station area is very much tied to creating a quality pedestrian environment. This is particularly important in the area immediately west of the station, which is the appropriate area for a robust mix of residential and potentially supportive retail and commercial uses. Where practical within the transit core, local roadways should be lined with active edges, meaning that buildings front the street and are designed to accommodate retail, office or other active ground floor uses, and which are directly accessible to people walking by. This often requires establishing a "build-to" line, where structures are built to a continuous line rather than set back beyond the line. In this way, the space of the street is formed by the buildings and adjacent sidewalks rather than parking lots or unused landscaped areas. In addition to orienting building facades and entrances to the street, amenities such as seating can further enhance this active edge to create a welcoming environment. Along secondary streets, active edges can be formed by creating build-to lines and/or street trees or other streetscape elements. While structure placement should be more flexible, buildings should be street-facing and parking areas should be well screened.

U2: Develop Anchored Corners

The concept of active edges is especially important at those intersections within the station area where mixed-use buildings are located. These key points identify the entrance to the station, and when buildings are pushed up to the intersection, can "anchor" the corner. This anchor will provide a distinct focal point, or landmark, within the station area and create an inviting environment that is not entirely dominated by parking lots. Instead, appropriate building massing and orientation and active building fronts are inviting to residents, visitors, and transit patrons on both sides of the street. Where access and lot configurations hinder the ability to push buildings to the street edge, distinctive signage, public art, screening of parking areas, and landscaping can help to create a more active street edge and anchor a corner.

Distinctive architectural features create iconic places

U3: Incorporate Multimodal Street Design

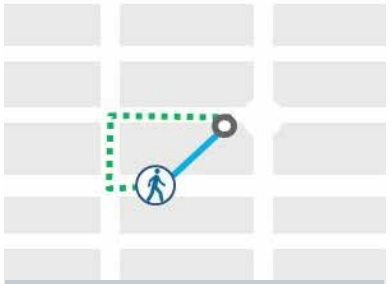
The design of streets themselves should reflect a dual concept of the street as both a vehicular thoroughfare and civic space. Therefore, it is important that access be prioritized and balanced by travel mode, giving top priority to pedestrians and cyclists to the extent possible and practical. Prioritizing pedestrian movements in and around the station entails a number of design principles that should be incorporated into future development. For instance, street trees and landscaping (or even parking) can create a visual buffer between roadways and sidewalks, thereby providing a sense of enclosure and comfort for pedestrians. Traffic-calming measures such as widened pedestrian bulb-outs at intersections and mid-block crossings are additional features that will further improve safety for pedestrians.

Inviting street corners feature landscaping, distinctive lighting and storefront windows

6.4 Mobility and Circulation

M1: Design Well-Connected Streets

As the primary means of access and circulation for vehicular, bicycle, and pedestrian traffic, streets will serve an important function within the station planning area. A well-designed station area will benefit from an organized, understandable, and walkable network of streets and sidewalks. Relatively small blocks and well-connected streets allow for autos, pedestrians, and bicyclists to use direct routes and provide multiple ways to get to and from any given point within the station area and beyond. As a rule of thumb, blocks within the station area should be no more than a five-minute walk around their perimeters (approximately 1,320 feet). This helps to promote a well-connected and walkable neighborhood that is comfortable, safe, and designed to a human scale.



A well connected street network enables shorter and more direct connections and a greater number of routes for pedestrians

A disconnected street network results in long walking distances and few route options

Convenient bicycle access to a commuter rail station reduces single-occupant auto trips

Co-locating multiuse paths along natural drainage features creates a neighborhood amenity

Distinct wayfinding lets travelers know how long the expected trip will take via walking or cycling

M2: Create Good Trails and Open Lands Spaces and Linkages

A key guiding principle for the station area is a well-designed network of trails, Open Lands, and parks that serves a number of important functions, primary among them being the creation of off-street walking and biking connections. The trails and Open Lands network should be designed to link destinations within the station area and to points beyond while unifying the character and identity of the station area itself. Strong connections should be built to existing community assets and adjacent neighborhoods such as the historic Eastlake area. Developing multiuse trails along existing drainage features can create distinct off-street linkages. These ditches should be left open unless there is a critical and compelling infrastructure need for a portion to be piped. Developing key Open Lands and trails investments through the station area creates an attractive alternative to on-street walking and bicycling and provides the added benefit of creating new off-road connections for residents of surrounding neighborhoods. Any new development on the periphery of the station area should provide these trail linkages. In addition, the Open Lands adjacent to the rail line itself (along with the grain elevator) should be re-purposed to provide significant additional amenities that are major community assets.

M3: Utilize Good Signage and Wayfinding

Wayfinding is more than merely signage. It is a system of information elements that support movement at all stages of a trip. Effective wayfinding throughout the station area will help travelers to easily access their destinations in a way that reduces the stress of travel and can reduce the perceived distance between places. Successful wayfinding strategies integrate and utilize signage, spatial planning, lighting, structural elements, and surface finishes alongside other building elements to create a coherent whole, thereby communicating clear and consistent messages and directions throughout the urban realm. Wayfinding and transit user information should be closely integrated with the commuter rail station itself and the surrounding station area. Some communities have required developers to prepare Wayfinding Plans that identify a movement strategy (showing how information is disclosed through various areas in and around a transit facility or public space), a signage typology, and a location plan.

M4: Incorporate Alleys into Neighborhoods

One of the most effective ways to create a more welcoming and appealing residential neighborhood is to place porches, entryways, trees, and detached sidewalks in front of homes – and garages in the rear. To do this, residents would use alleys located behind houses to park in rear-loading garages or driveways. This street/alley configuration (which currently exists in historic Eastlake) creates a more comfortable walking environment along the street, as driveway curb cuts are not necessary, auto-pedestrian conflicts are minimized, and more space is allocated for on-street parking, which can slow auto speeds and create a buffer between auto traffic and pedestrians. Alleys would also afford public service workers access to utilities and waste collection. They would be designed for safety and security and for property access (at low speeds) but are not intended to accommodate through traffic, although they may be an alternate means of circulation for pedestrians and bicyclists. This type of design standard is already required for new construction in the historic Eastlake area and should be applied throughout the station area.

Well-maintained alleys serve a number of functions – from parking to service access

6.5 Parking Management Strategies

TOD does not mean "no cars". Even with high transit utilization, many people will come and go by automobile and need a place to park. But a defining characteristic of TOD is that it requires less parking than similar development in non-transit locations. Parking is shared as much as possible, taking advantage of dove-tailing uses and reducing further the actual number of spaces provided. And that parking which is required is designed so as not to dominate the visual or pedestrian environment. In addition, effective management of parking is one of the best tools available to encourage a shift away from single-occupant autos and toward transit, bicycling, and walking. Properly managed, parking supply characteristics, such as price, location, and convenience, can positively influence mode choices to reduce single-occupant auto trips and help move the station area and the city toward more sustainable modes of transportation. Extensive research exists related to parking management practices in general and parking policies around TOD projects in particular. Relevant parking management options and guiding principles for consideration within the Station Area include:

P1: Reduce Parking Ratios Currently Required by City Code

One of the best and most recent studies of the relationship between TOD, parking needs, and traffic generation was prepared by the federally-funded Transportation Research Board in 2008. Researchers examined seventeen built TOD's and concluded that "…under the right conditions lowering residential parking ratios by 50% for TODs in station areas with quality transit service can result in:

- An increase in the density of a residential TOD by 20% to 33% depending on the residential building type;

- Savings on residential parking costs from 5% to 36% after accounting for increases in the number of units to be parked from increased residential density; and
- Potentially greater developer profits and/or increased housing affordability from higher densities, lower capital costs for parking, and reduced traffic impact fees."

The study concludes that "tightening residential TOD parking ratios to reflect the actual transportation performance of TODs will be a very important step toward realizing the expected community benefits of TOD and enhancing their financial feasibility." (Source: TCRP Report 128, Effects of TOD on Housing, Parking, and Travel, 2008).

Current City of Thornton parking requirements are typical of suburban community parking standards and likely result in excess parking and an inefficient use of land. For instance, the City requires four parking spaces per single-family dwelling and one space per 500 square feet of multifamily dwelling floor area (plus guest parking). There are numerous examples of emerging parking standards specific for TOD areas that reduce these standards, but one of the most relevant and applicable to Thornton may be the City of Aurora's TOD District parking requirements. Within the TOD District, the City of Aurora requires two parking spaces per single-family dwelling unit and one parking space per multifamily dwelling unit. Given emerging evidence of successful reductions in parking ratios, parking requirements for development within the station area should be reduced by 20-50% from the current City Code standards.

P2: Utilize Effective Parking Minimums and Maximums

A way to discourage excessive vehicle use and encourage the use of

alternative transportation is to limit the supply of parking through parking maximums (which prescribe a maximum number of parking spaces required per development unit – usually a relatively low number – instead of a minimum). With this strategy, parking availability can accurately influence future modal split targets and encourage alternative modes of travel. Consideration should be given to relaxing parking rates within the station area in exchange for developers' implementation of measures that promote a shift in travel modes, such as increasing the provision of bicycle parking.

P3: Utilize Shared Parking Where Possible

Shared parking can be used as an efficiency tool, which recognizes that a single parking space can be shared between different land use types. The reason for this is clear: there are temporal shifts in the demand for parking spaces between various land uses. For example, one particular land use may generate its peak demand at lunch and dinner times, while another land use may generate peak demands from 9 a.m. to 5 p.m. business hours. This strategy lends itself to public-private partnerships where public uses (such as transit parking or parking related to civic buildings) dominate during the weekday but private parking (related to retail or other private uses)

dominates in the evenings and on weekends.

P4: Unbundle Parking from Development

The costs of residential or commercial parking are often indirectly passed on to occupants when bundled into their purchase or lease costs. Unbundling parking, including renting or selling spaces exclusive from a property sale, can help to reduce the total amount of parking required for a building while promoting a "user pays" approach to parking. In addition, unbundled parking promotes housing affordability as parking spaces are not tied to any particular residential unit or commercial space. The cost of a parking space is then borne only by those building occupants who opt-in to pay for its use. Several cities encourage building owners, occupants, and employers to charge for parking as an unbundled cost to occupants in exchange for parking requirement reductions or increased building height and density.

P5: Utilize Paid Parking if Appropriate

The utilization of fees associated with parking both reflects the true costs associated with parking and automobile ownership, and can influence users to consider other modes of travel. Money collected can be allocated towards multimodal infrastructure and programs. Further, efforts could be made to encourage building owners and occupants to implement a paid parking system on all or part of their developments, and to charge more for single-occupant vehicle parking spaces than for rideshare or car share spaces to further incent the use of these modes of transportation. Consideration could also be given to charges for short-stay on-street parking spaces. Obviously, paid parking systems should be implemented as the market (and related demand) requires and should only be used in conjunction with an overall neighborhood parking management strategy that takes into account potential impacts on surrounding neighborhoods.

6.6 Summary of Guiding Principles

Table 6.1 summarizes the guiding principles developed for the Eastlake at 124th Station Area and its related development.

Table 6.1: Summary of Guiding TOD Principles

Category	Guiding Principles	Key Features
Land Use	L1: Create a mix of uses	• Focus on residential land uses nearest the station • Promote community-scaled commercial uses at targeted locations • Mix both horizontally and vertically • Ensure flexibility to adapt to changing market needs
	L2: Integrated Mixed-Income Housing	• Provide a choice of residential sizes and price points • Cater to people at all stages of life, particularly seniors • Ensure good design of housing at all levels
	L3: Create a gradient of densities	• Focus highest density around station • Reduce density as development approaches established neighborhoods or employment centers
	L4: Buffer residential areas from industrial uses	• Include natural buffers where feasible • Ensure that all areas are "good neighbors" to others
	L5: Create transit-supportive, walkable employment areas	• Provide good access for employees from station • Include multimodal improvements throughout all development areas, including employment areas
Urban Design	U1: Create Active Edges	• Line core streets with a strong mix of uses to create a good pedestrian environment • Establish 'build-to' lines for structures • Orient buildings and entrances to streets • Use streetscapes as active edges and to screen parking areas
	U2: Develop anchored corners	• Create visible gateways to the station core and at key intersections • Minimize visibility of parking lots
	U3: Incorporate multimodal street design	• Give priority to pedestrians and bicyclists where possible • Use effective traffic calming measures to improve pedestrian safety

Category	Guiding Principles	Key Features
Mobility and Circulation	M1: Design well-connected streets	• Design small blocks • Focus on a human-scale grid system to provide direct routes to destinations
	M2: Create good trails and Open Lands spaces and linkages	• Provide good connections to existing facilities • Integrate facilities into the design of new development • Integrate design with existing drainage features • Re-purpose grain elevator and Open Lands near station to become a major community asset
	M3: Utilize good signage and wayfinding	• Focus on the needs of the user • Integrate with lighting, structures, and surface finishes • Focus on wayfinding to and from the station • Develop a wayfinding plan for new developments
	M4: Incorporate alleys into neighborhoods	• Eliminate garage entrances from roadways • Promote active residential front spaces • Reduce curb cuts • Eliminate many auto-pedestrian conflicts • Provide easy access for neighborhood services • Design alleys for multimodal access
Parking Management Strategies	P1: Reduce parking ratios	• Reduce required parking by 20-50% of current city code standards
	P2: Utilize effective parking minimums and maximums	• Use parking maximums when possible to encourage developers from providing too much parking
	P3: Utilize shared parking where possible	• Provide proper balance of temporal use of parking • Consider sharing transit parking
	P4: Unbundle parking from development	• Give residents the choice to use parking if needed • Encourage use of alternative modes
	P5: Utilize paid parking if appropriate	• Regulate usage and provide a potential revenue source • Coordinate with neighborhood parking strategy

Case Studies

The Project Team conducted a peer system review of comparable station areas in the Denver region and around the country that have characteristics similar to those found in the Eastlake at 124th Station Area. The review focused on station areas in outlying/suburban portions of light rail or commuter rail lines. These case studies provide the city of Thornton with relevant examples of TOD plans, best practices, and lessons learned that have direct relevance to this Plan. Two seemed most directly relevant: the Federal Boulevard Station in Denver, and the Buckner Station in Dallas.

Federal Boulevard Station

The Federal Station is on RTD's Gold Line commuter rail line just north of the intersection of Federal Boulevard and I-76 as shown in the figure below, with the current station layout (now under construction) shown in the figure on the next page. The area south of the railroad track east of Federal is a storage unit building and outside storage and south of that is land with a couple homes and outbuildings on it. To the west of Federal is largely an industrial type business, and two smaller businesses (Safety Systems and King's Customs Cycles). Clear Creek runs southwest to northeast near the intersection of the rail corridor and Federal Boulevard. Northwest of the railroad is a small parcel with a used car dealership. On the northeast side of the intersection is home with a business and unused land. Behind them to the east is an industrial area. The population of the surrounding neighborhoods from 2000 to 2010 has only increased by 10.5% but the jobs for the area (from 2002 to 2009) has increased substantially by almost 45%. The median household income has decreased slightly (7.2%).

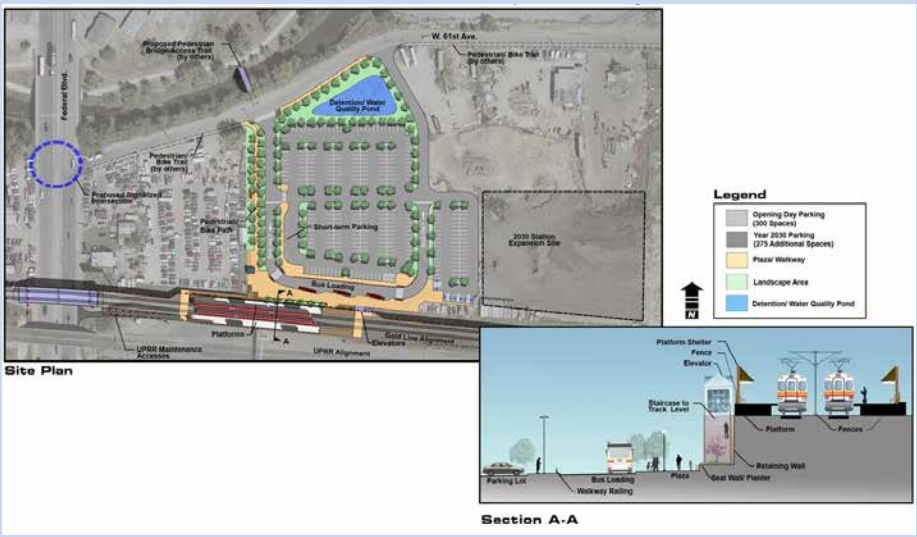
Federal Boulevard Station

Plans and Results

The Adams County Clear Creek Transit Village Vision Plan was incorporated into the county's Clear Creek Valley TOD Plan amendment to the Comprehensive Plan by the Planning Commission in September of 2009 and ratified by the Board of County Commissioners October 5, 2009. The TOD Group, LLC (a developer) informed Adams County of its plan to develop 21 acres west of Federal Blvd. north of Clear Creek into transit oriented development and has purchased the property at 6001 Federal Blvd. The plan calls for minimum gross residential density of 25-75 units per acre depending on location, and parking maximums. The concept design figure shows the concept design for approved Planned Unit Development for the station area, which includes primarily commercial and retail uses along Federal Blvd. on the northeast corner of the site, a mix of residential and commercial uses along Clear Creek and Federal, and residential throughout most of the rest of the site.

This PUD is a component of the larger Vision Plan – a proposed 'mixed use village center' - for the area between Federal and Pecos Blvd. to the east. One possible concept is shown in the figure below and is focused on a comprehensive approach to the entire corridor, including improvements to the Creek as a greenspace, additional mixed use development on other corners of the Federal/Gold Line intersection, and new commercial and industrial development along the corridor.

Federal Station Layout



Soucre: RTD

Lessons Learned for Thornton:

- *Establish good corridor linkages and a regional vision*
- *Include employment-based development (commercial and light industrial)*
- *Take advantage of greenspace*

Concept Design for Federal Station Development PUD

Adams County Clear Creek Valley TOD Plan – Option 1

Soucre: Adams County

Buckner Station, Dallas, TX

The Buckner station is a light rail station in the southeastern part of the city of Dallas, served by Dallas Area Rapid Transit (see the figure below). It has a relatively large park-and-ride lot to the northeast of the station platform, and is centered in a light industrial area that is surrounded by primarily single-family residences. It showed both population and employment decreases between 2000 and 2010, and its median household income, while increasing between 2000 and 2009, is still relatively low compared with other areas.

Dalles Area Rapid Transit Buckner Station

Plans and Results

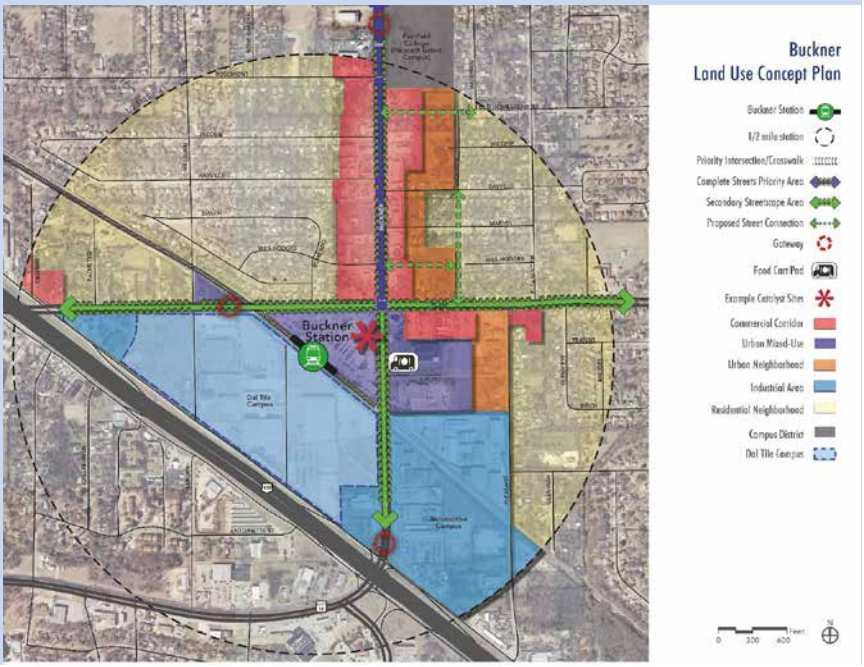
The Buckner station area was the subject of a station area plan conducted by the city of Dallas in February 2013. The station's land use concept plan is shown in the figure on the next page. Its major features include:

- A commercial core to the north of the station along South Buckner Blvd. to include a 'complete streets' design
- An urban mixed use area immediately surrounding the station.
- Transition zones with medium-density and single-family residential between the higher density zones around the station and surrounding neighborhoods.
- Retention and enhancement of the industrial zone to the south.
- A campus district to the southeast of the station to integrate educational, health, and business facilities with pedestrian-friendly links to the surrounding neighborhoods.

The plan identified a potential catalyst development site on the site of the existing park-and-ride. It consists of structured parking combined with medium-density multi-family residential along with ground-floor retail. DART has subsequently issued an RFP for development of the site and an architect is to be selected momentarily.

Lessons learned for Thornton:

- *Establish a strong commercial core with 'complete streets' along major thoroughfares*
- *Establish transition densities between the station and surrounding neighborhoods*
- *Capitalize on industrial uses*
- *Enhance a campus development with additional types of uses*
- *Include joint development on the station site if possible*



Chapter 7.0 Implementation

This plan is designed to establish a vision for the future of the Eastlake at 124th Station area. To achieve that vision – as conceptualized in the Preferred Alternative – the city and its partners will take many purposeful and focused steps over the course of several years. This will require ongoing collaboration and strong partnerships between the City, RTD, other public agencies, the private sector, and the citizens of Thornton.

This chapter sets forth the recommended implementation strategies, roles, and responsibilities and suggested timeframes for implementation. To ensure that identified strategies are realistic and achievable, the Project Team considered the market analysis, input from the developer forum, and impacts to the city and property owners. Having been vetted through these inputs, all of the following strategies are achievable based on fiscal constraints and market realities. These strategies, used in combination with each other, are intended to ensure the full development potential of the station area is met as envisioned by the STAMP. Implementation strategies are organized by the following categories:

- Plan Administration
- Land Use and Urban Design
- Transportation
- Infrastructure
- Financing
- Community

The tables that follow include a description of each strategy, the entities responsible for its implementation and an associated timeframe. Those strategies that should be implemented in the short-term are immediate actions that will be implemented within the next 1-2 years. Strategies with a medium-term timeframe will likely be implemented before and shortly after the opening of the commuter rail station and are expected to be put in place within 3-6 years. Strategies with a long-term timeframe are likely to occur in the in the 7+ year timeframe; and those strategies with an ongoing timeframe can occur within any of these timeframes. The highest priority implementation strategies are shown in red text with a corresponding implementation number that is starred as shown: ★ PA-1 ★

Table 7.1: Plan Administration Implementation Strategies

Number	Strategy	Responsibility	Timeframe
Plan Administration			
★ PA-1 ★	**Adopt the Eastlake at 124th Station Area Master Plan Update:** Formally adopt the STAMP, emphasizing the Vision, Preferred Alternative, Guiding Principles and Implementation Strategies as the core Plan elements intended to guide public and private development and investment decisions related to land use, multimodal circulation, and Open Lands. The City will review future development proposals within the STAMP area for compliance with the core Plan elements.	City Council, City Development	Short-term
★ PA-2 ★	**Update the Eastlake Subarea Plan** to to guide development and future investments in the original Eastlake neighborhood. This plan focuses on residential and commercial in the original Eastlake neighborhood east of the station. This plan will also include parking management strategies for both on-street and off-street parking within both the project area and surrounding neighborhoods.	City Council, City Development	Short-term
★ PA-3 ★	**Create an urban design linkage overlay plan.** This plan will address ways to interconnect areas west and east side of the railway line to make sure the area functions together as a whole entity.	City Council, City Development	Short-term
★ PA-4 ★	**Create conceptual plans** for the design of First Street and a future plaza at the western terminus of Lake Street.	City Council, Infrastructure, City Development, Community Services	Short-term
PA-5	**Comprehensive Plan Amendment:** Amend the City of Thornton Comprehensive Plan to reference the Eastlake at 124th STAMP as an area plan that details how this vision will be achieved in the station area. The Future Land Use Map should be consistent with the recommended land uses contained in the STAMP.	City Council, City Development	Short-term
PA-6	**Propose implementation strategies for annual consideration in City Council Work Plans:** Prioritize implementation strategies for annual inclusion into the City Council Work Plan.	City Manager's Office, City Development, City Council	Ongoing

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Number	Strategy	Responsibility	Timeframe
Plan Administration			
PA-7	**Dedicated TOD Staff:** Assess current staff capacity, and if needed, work towards the creation of a staff position or combination of positions dedicated solely to implementation of the station area master plans and TOD development along the North Metro line. Duties would include attracting and working with private sector interests to ensure new development and redevelopment meets the vision for each station area; proactive communication with property owners, developers and the surrounding community; pursuing planning and infrastructure funding opportunities; and serving as a single point of contact for all City department reviews and project implementation activities to ensure public and private sector actions are synchronized.	City Staff	Ongoing
PA-8	**Marketing Strategy:** Coordinate and actively market TOD efforts for new development and redevelopment within the study area. This will include strong coordination among the various City divisions – Economic Development, Communications, Policy Planning, Neighborhood Services, and Development Engineering – for the regulatory, policy, and entitlement requirements associated with redevelopment. A marketing and communications campaign to attract potential developers and investors could include the following strategies: • Business outreach (community leader and business briefings); • Public information program (facts sheets and briefing folders); • Marketing outreach (a "developer kit" with site information about the area's development potential); and • Media/public relations (local media pitches).	Economic Development, Communications, City Development	Ongoing
PA-9	**Monitor Plan Progress:** Conduct a periodic review of the STAMP to assess effectiveness and progress toward implementation. As needed and appropriate, recommended changes could include STAMP updates, amendments to governing regulations and/or consideration of new or modified financing strategies.	City Development	Ongoing

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Table 7.2: Land Use and Design Implementation Strategies

Number	Strategy	Responsibility	Timeframe
Land Use and Design			
★ LU-1 ★	**Rezoning:** Pursue rezoning of the station area where identified to a new Planned Development (PD) zone category with Planned Development Standards that would identify the permitted land uses and density ranges recommended by this STAMP, as well as Design and Streetscape Standards. The zoning district should be implemented as a specific zoning plan, not an overlay district, to ensure that the area develops and redevelops as the city desires.	City Council, City Development	Short-term
★ LU-2 ★	**Design Standards:** Develop Design Standards as part of the new PD zone category that are consistent with the Guiding Principles described in Chapter 6. If development is proposed prior to rezoning occurring, the developer must establish design standards consistent with Chapter 6. Design Standards should be specific for the core station area and transition areas (but not the industrial areas), and should address pedestrian-scaled architectural standards, building orientation, build-to lines and setbacks, building façade transparency requirements, building heights, lot coverage, parking standards and location, among other standards.	City Development	Short-term
★ LU-3 ★	**Streetscape Design Standards:** Either as part of rezoning or as part of any development proposal submitted to the City prior to rezoning, develop streetscape design standards for all streets within the station area that exceed the minimum standards set forth in the City's Street Standards and Specifications. Based on Guiding Principles described in Chapter 6, the Streetscape Standards will define the desired street environment, from a visual and pedestrian standpoint. Standards will include recommended sidewalk dimensions, tree plantings and landscaping as well as urban design elements such as curb treatments, public art, paving, lighting and distinct wayfinding and signage. These standards should clearly establish the level of quality and investment expected and will establish a framework for new roadways as well as improvements to existing roadways.	City Development	Short-term

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Number	Strategy	Responsibility	Timeframe
Land Use and Design			
★ LU-4 ★	**Parking Standards and Management:** As part of the Planned Development Standards for this station area, the parking standards should be reduced (an estimated 20-50% reduction) otherwise TOD will likely not be developed, as envisioned, at this station area. The City should implement parking maximums, rather than minimums, and develop a comprehensive parking management plan for the station area and surrounding neighborhoods. Note: this will focus on the west side of the rail line since the Eastlake Subarea plan will address parking on the east side.	City Development	Short-term
LU-5	**Housing Mix:** Work with developers to attract an appropriate mix of housing and incomes to the station area based on previous market analysis. This should include a range of 20 – 45% affordable housing in the station area. The City should work with project developers on design standards and infrastructure provision to ensure a high quality redevelopment and to help close infrastructure gaps. This may include: • Facilitating conversations with organizations involved with affordable housing, regional affordable and market rate developers, and potential funding partners. • Reaching out to organizations to explore interest in financing a mix of affordable housing or land banking property. If there is interest, facilitate conversations between such organizations and developers to ensure mixed income housing development in the station area.	City Development, Outside Housing Organizations	Ongoing
LU-6	**Business Attraction:** Work on attracting personal and business services to the station area, including educational, medical, recreational, youth-oriented, and other services that would serve the community. Also work on attracting employment-related businesses. Explore the potential for small commuter-serving and neighborhood-serving retail.	Economic Development, City Development	Ongoing

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Table 7.3: Transportation Implementation Strategies

Number	Strategy	Responsibility	Timeframe
Transportation			
★ T-1 ★	**Coordination with RTD and Regional Rail Partners (RRP):** Continue to work with RTD and RRP, the North Metro design/build contractor, to ensure that the design and construction of the Eastlake at 124th Station meets the city's needs, improves transit's visibility and ridership, and provides a new civic space in the station area that is beneficial to both the City and RTD. The City should encourage RTD to provide good design and rider amenities to ensure the facility is of the highest quality possible.	City Development, Infrastructure, RTD, RRP	Ongoing
T-2	**Prioritize Pedestrian and Bicycle Routes to Transit:** Prioritize pedestrian and bicycle routes that provide direct, safe and convenient travel from development areas and surrounding neighborhoods into the station area and through the station area to the transit platform. Routes should include on-street and off-street facilities, including pedestrian and bicycle connections to non-residential development areas and surrounding neighborhoods. These routes will be installed as new development occurs.	Community Services, Infrastructure, City Development	Short-to-medium term
T-3	**Regional Multi-Use Trails:** Develop comprehensive multi-use paths and linkages in the Open Lands paralleling the North Metro tracks and adjacent areas to ensure trail continuity and direct bicycle and pedestrian connections to station platforms. Pursue funding for these trail connections.	Community Services, Infrastructure, City Development	Short-to-medium term
T-4	**Monitor parking:** Consider programs to monitor parking in the station area and surrounding neighborhoods (including Eastlake) and mitigate overflow parking impacts, as needed. Strategies may include neighborhood parking permits, shared parking and education campaigns to inform park-n-ride users of alternative travel modes.	To be determined	Short-to-medium term
T-5	**Examine the potential for an internal circulator:** Work with RTD, private providers, and stakeholders to explore the potential feasibility of an internal circulator system to serve both residential and employment uses to help reduce traffic congestion and promote sustainability.	City Development, RTD, private sector	Short-to-medium term

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Table 7.4: Infrastructure Implementation Strategies

Number	Strategy	Responsibility	Timeframe
Infrastructure			
★ I-1 ★	**Station Enhancement/Betterment Projects:** Determine preferred station design upgrades and fund the cost of these enhancements through coordination with RTD/RRP. Design of the commuter rail station will set the standard for the quality of development desired in the station area. Given the limited budget of RRP, it is likely that the City will also want to see upgraded urban design features that make a signature statement, letting travelers know that the station area is a unique place. Betterment projects could include higher quality design materials and features at the rail platform and parking structure, wayfinding and signage, and public art at the platform and on the transit plaza, chosen and designed in a cohesive and comprehensive manner.	City Development, Community Services, Infrastructure, RTD, RRP	Short-term
★ I-2 ★	**Realignment of Claude Ct.:** Relocate Claude Ct. north of 124th Ave. To the west to accommodate the RTD station parking area. Claude Ct. will become the most important route transecting the station area and designing a street that sets the standard for the quality and image of the station area will help attract private investment and upgrade the overall character of adjoining neighborhoods. The recommended configuration and design speed for Claude Ct. should accommodate commuter traffic as well as provide access into new development areas. Claude Ct. should be designed as a "Complete Street" multimodal corridor that provides safe and efficient access for vehicles, bicycles and pedestrians. Streetscape enhancements for Claude Ct. should be developed as part of the Planned Development Standards.	Infrastructure, City Development	Short-term

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Number	Strategy	Responsibility	Timeframe
Infrastructure			
I-3	**Open Lands Improvements:** Continue to work to develop the phased implementation of improvements in the Open Lands bordering the railroad tracks, and work to secure both public and private funding and grants for those improvements (including maintenance).	Community Services, City Development	Short-to-long-term
I-4	**Grain Elevator:** Continue to refine the cost estimates for adaptive re-use of the grain elevator and associated properties and facilities. Develop a public-private partnership to fund and maintain the facility, and work with the private sector to attract retail or other desired uses for the building.	Community Services, City Development, Infrastructure, Private Sector	Short-to-long-term
I-5	**Roadway improvements:** Continue to examine roadway capacity and congestion issues after station opening and after development occurs to determine if additional roadway upgrades in or near the station area are needed.	Infrastructure, City Development	Medium-to-long-term
★ **I-6** ★	**Sewer and water service:** Model future capacity and identify needed future water and sewer connections to ensure that there will be sufficient capacity for development in this area.	Infrastructure, City Development	Short-term

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Table 7.5: Funding and Financing Implementation Strategies

Number	Strategy	Responsibility	Timeframe
Funding and Financing			
F-1	**Prioritize TOD Projects:** Based upon the prioritization of Capital Improvement Plan projects within the station area, strategically pursue grant funding and public-private partnerships to pursue catalyst projects and infrastructure improvements, particularly related to enhanced pedestrian, bicycle and intersection facilities and public spaces.	City Development, Infrastructure, Community Services	Ongoing
F-2	**Financing Tools: Investigate the following financing tools:** • **Title 32 Metropolitan District:** Metro districts created by developers could provide financing for needed infrastructure and development improvements. • **Urban Renewal:** Explore an Urban Renewal Area to help offset the cost of needed infrastructure improvements. • **Business Improvement District (BID):** Encourage local business owners to work together to form a BID or other mechanisms for cooperative action.	Economic Development, City Development, Private Sector	Short-to-medium-term
F-3	**Other Public and Non-Profit Funds:** Explore the use of Great Outdoors Colorado (GOCO), Adams County Open Space, Safe Routes to School, Colorado State Historical Society, and other potential public or non-profit organizations to help pay for Open Lands improvements in the station area.	Community Services, Infrastructure	Ongoing
F-4	**Development Incentives:** The City should consider various incentive tools for developers who propose development consistent with the Preferred Alternative and Guiding Principles set forth in the approved STAMP, including but not limited to: • Rebate of development fees. • Rebate of a portion of new sales taxes. • Rebate of a portion of use taxes on construction. • Rebate of the City's real property taxes paid on a new facility. • Rebate of the City's personal property taxes paid on a new facility. • Expedited reviews • Other incentives as appropriate given the proposed development.	City Development, Management Services, Economic Development	Ongoing

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Number	Strategy	Responsibility	Timeframe
Funding and Financing			
F-5	**Affordable Housing:** For residential projects, work with developers on obtaining financing including low income housing tax credits (LIHTCs), and determine if HUD 221 (d) (3) and (4) financing, CDBG and HOME funds could be used at this project location.	City Development, Private Developers, Outside Housing Organizations	Ongoing
F-6	**Continue to Work with Property Owners:** Based upon the STAMP, work with private property owners on potential redevelopment of strategic parcels. When it is appropriate, consider potential financing tools include Urban Renewal, Tax Increment Financing, Special Districts, Public Improvement fees, development incentives as described above, and additional City incentives, and other financing mechanisms to facilitate redevelopment.	Economic Development, City Development	Short-to-medium-term

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Table 7.6: Community Implementation Strategies

Number	Strategy	Responsibility	Timeframe
Community			
C-1	**Ongoing Community Engagement:** Continue to engage the community for rezoning actions or specific development proposals. This should include keeping the website updated with current information about the project and appropriate City contact information, hosting community meetings or other outreach for rezoning or development proposals as needed, and looking into the possibility of supporting a community stakeholder group.	City Development	Ongoing
C-2	**Ongoing Property Owner Engagement:** As needed, meet with station area property owners to work towards developing the Land Use Concepts as envisioned in the STAMP.	City Development	Ongoing
C-3	**Eastlake Business Owners Association:** Work with existing and future Eastlake business owners on the west side of the rail line to establish a formal business association to provide guidance on future development in that area. Coordinate these activities with businesses in original Eastlake on the east side of the rail line.	Economic Development, City Development	Short-to-medium-term

Timeframe Key
Short = 1-2 years
Medium = 3-6 years
Long = 7+ years

Appendix A: Traffic and Circulation Analysis Technical Memo

To:	City of Thornton
From:	Apex Design, PC
Date:	September 22, 2015
Re:	**Eastlake Station Area Master Plan – Revised Transportation Network Analysis**

Purpose

The purpose of this memo is to document the transportation analysis completed as part of the Eastlake Station Area Master Plan. The proposed plan includes development of eight land parcels near the North Metro Corridor Commuter Rail 124th Avenue/Eastlake Station. These parcels are planned to include approximately 3,370 residential dwelling units (55% apartments, 45% condos), 1.27 million square feet of general light industrial space, and 5,000 square feet of specialty retail use. The study area is bounded by Washington Street on the west, East 128th Avenue on the north, York Street on the east, and East 120th Avenue on the south.

Site Location

The eight parcels planned for development will all be located west of Claude Court, east of Washington Avenue, north of East 120th Avenue, and south of East 128th Avenue. A graphic displaying the exact location of the parcels is attached as Figure 1. Specific access for the parcels has not been developed, but it was assumed that each would have at least one access point to each adjacent roadway, with the exception of the major arterial roadways. Trips were then assigned to the most convenient access points depending on their destination.

The analysis also accounts for the 124th Avenue/Eastlake rail station which will be located just northwest of the existing East 124th Avenue/Claude Court intersection. As part of the station improvements, the existing approach on the north side of the intersection will be shifted west and intersect Eastlake Avenue at a new intersection. The main parking area for the planned station will have access points on Claude Court, north of East 124th Avenue. A proposed secondary parking area east of the tracks will be served via a new intersection with East 124th Avenue between First Street and York Street.

Existing Conditions

The study area currently contains ten intersections, including six signalized intersections, three two-way stop-controlled (TWSC) intersections, and one all-way stop-controlled (AWSC) intersection. Existing weekday morning and evening peak-hour volumes for each intersection were gathered for the analysis. These counts are shown in the attached Tables 2A and 2B and displayed graphically in Figures 2 and 3.

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

The rail station site is currently occupied by the southbound approach of the East 124th Avenue and Claude Court intersection, which will be moved to the west. With the exception of Parcel O, all parcels planned for development are currently undeveloped. Parcel O is currently the Northglenn Maintenance & Operations Facility.

East 128th Avenue is an arterial roadway in the vicinity of the planned station, with signalized intersections at Lafayette Street, Claude Court, and York Street. It is a four-lane roadway west of the Claude Court intersection and a two-lane roadway to the east. It has left turn lanes at all intersections and right turn lanes at the signalized intersections (with the exception of Lafayette Street). Volumes for East 128th Avenue were collected in 2013. The City of Thornton plans to widen East 128th Avenue to four lanes further east to York Street prior to opening day of the commuter rail station. There are additional plans to widen further east to Colorado Boulevard prior to the Year 2020.

East 120th Avenue is also a major arterial roadway in the area, providing access to I-25 west of Washington Street. It has signalized intersections at Irma Drive and Claude Court. It is a four-lane roadway between Claude Court and Irma Drive. To the west of Irma Drive, there are three through lanes in the westbound direction and two through lanes in the eastbound direction. It has left turn lanes at all intersections and right turn lanes at the signalized intersections. Volumes for East 120th Avenue were collected in 2014. The City of Northglenn is planning to widen East 120th Avenue to a six-lane cross-section before the Year 2020.

Claude Court currently runs between East 120th Avenue and East 128th Avenue through the planned rail station site. The roadway's intersections with East 120th Avenue and East 128th Avenue are signalized while the intersection with East 124th Avenue/Eastlake Avenue is currently an all-way stop-controlled (AWSC) intersection. It is a two-lane roadway with left and right turn lanes at all intersections mentioned above. The volumes at these intersections are shown in the attached Tables 2A and 2B.

East 124th Avenue is a collector roadway providing access to the immediate areas and the residential developments to the east. The roadway has three lanes which includes a two-way left-turn lane (TWLTL). East 124th Avenue has an AWSC intersection at Claude Court, with left and right turning lanes. To the east of Claude Court, traffic on East 124th Avenue does not have to stop at First Street and York Street. However, all-way Stop intersections exist at Fillmore Street and Steele Street. East 124th Avenue continues to the west of Claude Court as Eastlake Avenue. Currently, this roadway only provides access to some industrial and residential properties and terminates at Lafayette Street.

Lafayette Street begins at Eastlake Avenue in the industrial area and continues north, across East 128th Avenue, into the residential neighborhoods. The roadway has two lanes and is controlled by a three-way stop at Eastlake Avenue and a traffic signal at East 128th Avenue.

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

Planned Roadway Improvements

The proposed development plan includes a number of new roadways and will result in a total of 15 intersections of interest. These internal roadway improvements include extending East 126th Avenue to the east, running just south of the Adams County School District Building, until it terminates at Claude Court.

The entire alignment of Eastlake Avenue and its intersection with Lafayette Street will be shifted to the south. A roundabout will be constructed to serve as the new intersection. Eastlake will be extended through the roundabout to the southwest until it connects to Washington Center Parkway at the existing roundabout. Furthermore, the City of Northglenn has indicated a desire to extend Irma Drive from East 120th Avenue to Eastlake Avenue, becoming the south approach to the roundabout at Eastlake Avenue and Lafayette Street.

The alignment of Claude Court north of Eastlake Avenue and its intersection with Eastlake Avenue will be shifted west to make room for the planned rail station. As with Irma Drive, the City of Northglenn will potentially extend Race Street to meet Eastlake Avenue at the same point as Claude Court, creating a four-legged intersection. The alignment of Claude Court south of East 124th Avenue will not change.

In all cases, it is planned that these newly constructed internal roadways will have a three-lane cross-section with a TWLTL. Later in the memo, the analysis will confirm whether this is appropriate. A schematic showing the anticipated future roadways and intersections can be seen in the attached Figure 1. The future roadways are displayed as dashed lines.

In order to evaluate the potential transportation impacts of the proposed development plan, existing, short-term, and long-term analyses were performed. The short-term time period was assumed to be the Year 2020, which will represent completion of the planned rail station and approximately 25 percent of the surrounding development. The long-term time period was assumed to be the Year 2035, which represents full build-out of the area.

Development Plan Trip Generation

Estimates of the trips generated by the planned rail station and surrounding parcels were made in order to determine future conditions in the study area.

To determine the trip generation for each developed parcel, trip generation rates found in the Institute of Transportation Engineers' (ITE) *Trip Generation, 8th Edition* were used. For the residential parcels, a combination of Apartment (ITE land use code 220) and Condo/Townhouse (ITE land use code 230) was used. General Light Industrial (ITE land use code 110) was used for all industrial parcels and Specialty Retail (ITE land use code 814) was used for the commercial land uses.

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

Due to the proximity of the rail station, the residential parcels were considered Transit Oriented Developments (TODs) which typically include lower trip generation rates than a typical residential development. The reasoning behind the lower trip generation rates is that residents near a transit station are very likely to utilize the rail service for many of their trips and therefore do not drive as frequently as residents of more typical residential communities. To determine an appropriate trip reduction, suggested factors contained in the Transit Cooperative Research Program (TCRP) *Report* 128 were used to make an adjustment to the trip generation estimates. Specifically, the reduction factors were 0.56 for weekday daily trips, 0.51 for AM peak trips, and 0.52 for PM peak trips.

Based on the above methodology, the proposed development plan for the study area is anticipated to generate approximately 20,800 weekday daily trips, 2,165 AM peak hour trips, and 2,440 PM peak hour trips. The detailed trip generation calculations are included in the attached Table 1.

Station-generated trips, also shown in Table 1 for reference, were taken directly from the recently completed *North Metro Rail Line 124th Avenue/Eastlake Station Traffic Update* (Stantec, April 2015).

Trip Distribution and Assignment

To assign the proposed development plans trips to the surrounding roadway network, trip distributions were assumed based on existing travel patterns and nearby land uses/activity centers. Washington Street, East 120th Avenue, and East 128th Avenue were assigned the highest percentage of trips. The specific distribution percentages for each roadway are shown in the attached Figure 4 and were assumed to apply to both peak periods.

The distributions shown in Figure 4 and the trip-generation estimates shown in Table 1 were used to develop the trip assignments for each parcel in the study area. The trips generated by each parcel are summarized for the Years 2020 and 2035 in the attached Tables 2A and 2B and are shown graphically in Figures 5 and 6.

Future Conditions

Once trips from each parcel were assigned, future traffic volumes at each intersection were developed. These estimates included the development plan trips, the background trips already on the roadways, and the trips generated by the planned rail station.

To determine the future background conditions in the study area, without the proposed developments, future traffic volumes were estimated. First, the existing volumes were adjusted due to the revised geometry and additional roadways planned throughout the area. An annual growth rate of 1.0 percent was then applied to the adjusted existing traffic volumes, which is consistent with other studies performed in the area. This

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

resulted in the future background (without-project) traffic volumes for the years 2020 and 2035.

Station-generated trip assignment was taken directly from the recently completed *North Metro Rail Line 124th Avenue/Eastlake Station Traffic Update* (Stantec, April 2015).

The future volume projections at each intersection are shown in the attached Tables 2A and 2B and are shown graphically in Figures 7 through 10.

Operational Analysis

To determine future operations with the proposed development plan, an operational analysis was performed. The analysis was performed for existing conditions and future Year 2020 and Year 2035 conditions. Both the weekday AM peak and PM peak hour conditions were evaluated.

The analysis was performed in the Synchro capacity analysis software which utilizes the 2010 *Highway Capacity Manual* (HCM) methodology, published by the Institute of Transportation Engineers. The HCM measures the operations of an intersection or movement based on the average delay experienced by drivers and assigns a Level of Service (LOS) using a letter grade scale. LOS "A" means very little delay for drivers while LOS "F" means significant congestion and delays. LOS "D" typically represents the operational capacity of an intersection or movement.

The proposed development plan and roadways will result in 15 intersections of interest. At the signalized intersections, AWSC intersections, and roundabouts, the LOS and delay (in seconds per vehicle) was reported for each approach. At the TWSC or one-way stop-control intersections, the LOS and delay were only evaluated for the stop-controlled approaches since the major street approaches typically do not experience any delay. The results of the capacity analysis are shown in the attached Tables 3A and 3B.

As shown in Tables 3A and 3B, all signalized, AWSC, and roundabout intersections in the study area are anticipated to operate at the City of Thornton LOS "D" threshold or better through the Year 2035. Some individual movements are anticipated to operate at LOS "E", and include:

- York Street / East 128th Avenue – southbound approach during morning peak
- Lafayette Street / East 128th Avenue – northbound approach during morning peak
- East 120th Avenue / Irma Street – northbound approach during both the morning and evening peaks

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

For the TWSC intersections, the intersection operations are more effectively evaluated based on the critical (or minor street) approach Level of Service. Based on the results, all minor street approaches are expected to operate within the LOS "D" threshold.

Detailed reports from the capacity analysis are attached at the end of this memo.

In addition to the operational analysis, the following specific analyses were performed to provide additional documentation on anticipated future conditions.

Internal Roadway Cross-Sections

The internal roadways in the study area (Lafayette Street, Eastlake Avenue, Irma Street, Race Street, Claude Court, and East 126th Avenue) were evaluated to determine whether a three-lane cross-section would provide sufficient capacity to accommodate future traffic. For this evaluation, the anticipated Year 2035 daily volumes on each roadway were estimated since they represent the full build out of the area and are likely to indicate the maximum need for each roadway. A schematic showing the Year 2035 daily volume estimates is included in the attached Figure 11.

The largest volumes are anticipated on the new alignment of Claude Court, near the planned rail station location, and on East 124th Avenue, between the two Claude Court intersections. These locations are expected to carry over 8,000 vehicles per day. According to capacity thresholds outlined in the *2009 City of Thornton Transportation Plan*, this level of traffic would result in these roadways operating at LOS "C" assuming a three-lane cross-section. The other internal roadways in the study area are expected to operate at LOS "A" or "B" in the Year 2035. As a result, the proposed three-lane cross-section for all internal roadways will be sufficient to accommodate the planned rail station and full build-out of the surrounding areas.

East 128th Avenue Widening

East 128th Avenue was also evaluated to determine whether the roadway would provide sufficient capacity with future volumes. West of Claude Court, the roadway currently has two lanes in each direction with a planned widening to provide four lanes to York Street prior to opening of the commuter rail station. The City has further plans to extend the widening to Colorado Boulevard prior to the Year 2020. In the Year 2035, daily traffic volumes east of York Street are anticipated to approach approximately 20,000 vehicles per day. According to the *2009 City of Thornton Transportation Plan*, this level of traffic will significantly exceed the capacity of a two-lane roadway.

As a result, the planned widening of East 128th Avenue will be necessary to maintain good operations between York Street and Colorado Boulevard. Once widened, the roadway would be expected to operate at LOS "A" per the City's Transportation Plan capacity thresholds. Without the widening, traffic from the study area may be encouraged to utilize East 124th Avenue to access Colorado Boulevard, especially since East 124th Avenue is anticipated to operate at LOS "A" through the Year 2035 per the

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

City's Transportation Plan capacity thresholds. This would be highly undesirable to the residential developments and school property along the roadway.

Roundabouts
Both the existing one-lane roundabout at Washington Center Parkway and proposed one-lane roundabout at Eastlake Avenue/Lafayette Street were analyzed in this study. The existing roundabout will have three approaches once Eastlake Avenue is extended and all are anticipated to operate at LOS "A" in the Year 2035. The proposed Eastlake Avenue/Lafayette Street roundabout will have four approaches. The Lafayette Street (southbound) approach will operate at LOS "B" while the other three approaches will operate at LOS "A" in the Year 2035. Furthermore, the analysis shows an overall LOS "A" rating for both roundabouts. Therefore, both roundabouts are expected to operate efficiently as one-lane roundabouts through the Year 2035.

Eastlake Avenue/Claude Ct. (North)/Race Street
During the initial analysis, the Eastlake Avenue/Claude Court/Race Street intersection operated poorly as a TWSC intersection. To improve its performance, the intersection was converted to an AWSC. Under these conditions, it is anticipated to operate at LOS "C" overall with an overall intersection delay of 20.7 seconds per vehicle in the Year 2035. However, the intersection will require additional turn-lanes which are generally not ideal at AWSC intersections due to the additional decision making that drivers must perform. If possible, a one-lane roundabout should be considered at this location in order to reduce delay and improve efficiency for all movements. It would also provide some consistency with the other roundabouts along Eastlake Avenue/East 124th Avenue and potentially reduce vehicle speeds in the vicinity of the railroad crossing.

Claude Court (South)/East 124th Avenue
If the City of Northglenn extends Race Street, Claude Court south of East 124th Avenue will not see a large increase in future volumes. This, and the conversion to a three-legged intersection with northbound stop-control, will result in good operations through the Year 2035.

East 124th Avenue at Railroad Tracks
With the Claude Court (South)/East 124th Avenue intersection being converted to TWSC, eastbound and westbound traffic is not expected to need to stop in the vicinity of the railroad tracks. The only exception is eastbound/westbound left-turn traffic. However, the anticipated queues for these movements are expected to be 25 feet or less which is anticipated to be sufficiently accommodated by the left-turn lanes that will be provided. As a result, the left-turning traffic is not anticipated to create any operational issues across the railroad tracks.

Race Street Extension
As previously mentioned, it was assumed in the analysis that Race Street would be extended between East 120th Avenue and Eastlake Avenue and tie into the re-aligned Claude Court north of Eastlake Avenue to create a 4-legged intersection. However, this

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

is a planned improvement and there is a potential that the extension is not constructed in the near term. This would require traffic to utilize Claude Court south of East 124th Avenue to access East 120th Avenue. The anticipated operations of this condition on opening day of the planned RTD Eastlake Station were analyzed as part of the *North Metro Rail Line 124th Avenue/Eastlake Station Traffic Update* (Stantec, April 2015). That report found that with TWSC, both intersections would operate at LOS "C" or better with no anticipated problems in the vicinity of the railroad tracks.

It is important to note that the *North Metro Rail Line 124th Avenue/Eastlake Station Traffic Update* report did not assume any station-area development. If development occurs, it is likely that traffic volumes will increase and may cause operational issues at the Claude Court intersections. To determine this, another iteration of the Year 2020 analysis was performed which assumed that Race Street is not extended and that the additional traffic generated by the development of the adjacent parcels (25 percent of build-out) would need to utilize Claude Court to access East 120th Avenue.

The initial results of this revised analysis indicate that the critical approaches at both Claude Court intersections would operate at LOS "F" indicating significant delays and queuing. As a result, both intersections would need to be converted to all-way stop control. Even with this configuration, the north Claude Court intersection would operate at LOS "E" (indicating operations above capacity) and the south Claude Court intersection would operate at LOS "D" (indicating operations at capacity). The detailed results of the analysis are attached at the back of this memo.

It is important to note that an all-way stop configuration at the south Claude Court intersection with East 124th Avenue would be undesirable from a safety aspect due to the potential of vehicles queuing into the track area and not being able to clear during train events. This is supported by the analysis results which indicate that the westbound approach at this intersection would be expected to experience 95th %-tile queues of approximately three vehicles.

A more appropriate option would be to install a traffic signal at this location and interconnected the traffic signal with the commuter rail tracks to provide (1) good traffic operations, and (2) a safe crossing of the commuter rail. With traffic signal control, the intersection would operate at LOS "B" indicating good operations with minimal delay and queuing. To provide safe operations during train events, the traffic signal will need to be interconnected with the rail system. This will allow the signal to provide a track clearance interval prior to train arrival to ensure that the track area is clear.

As a result, it is recommended that the City of Northglenn extend Race Street prior to, or concurrently, with any significant development of the station-area parcels. If this does not occur, the intersection of East 124th Avenue / Claude Court (south) should be monitored and a traffic signal should be installed when the northbound approach begins to experience poor operations. The traffic signal should be interconnected with the

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

commuter rail tracks to provide a safe clearance interval of the track area during train events.

Findings and Recommendations

The following list summarizes the major findings of the analysis:

- All internal roadways (Lafayette Street, Eastlake Avenue, Irma Street, Race Street, Claude Court, and East 126th Avenue) will operate well as 3-lane roadways with Level of Service "C" or better. This is consistent with previous findings, including the *2009 City of Thornton Transportation Plan*.
- East 128th Avenue should be widened from two lanes to four lanes between York Street and Colorado Boulevard by the Year 2035. The additional capacity is needed to maintain good Level of Service and discourage use of East 124th Avenue east of the study area as a way to access Colorado Boulevard.
- The existing roundabout on Washington Center Parkway and the proposed roundabout at Eastlake Avenue/Lafayette Street/Irma Street will both operate well as one-lane roundabouts through the Year 2035.
- The Eastlake Avenue/Claude Court/Race Street intersection is anticipated to operate poorly as a TWSC intersection. When analyzed as an AWSC intersection, the intersection is anticipated to operate acceptably through the Year 2035. However, it will require additional turn-lanes which is generally not ideal at AWSC intersections. If possible, a one-lane roundabout should be considered here which will operate well and with less delay than the AWSC.
- If the City of Northglenn constructs Race Street, Claude Court south of East 124th Avenue is not anticipated to see a large increase in volume. The intersection of Claude Court and East 124th Avenue, which will be converted to a three-legged intersection, is anticipated to operate well through the Year 2035 with northbound stop control.
- Eastbound/westbound traffic on East 124th Avenue will not be stopping at any of the intersections in the vicinity of the railroad tracks (Claude Court, First Street, or York Street). The exception is eastbound/westbound left-turn traffic, but the anticipated queues at these movements are anticipated to be minimal and are not expected to create any operational issues across the railroad tracks. This assumes that Race Street is extended to provide another access to East 120th Avenue.
- If Race Street is not extended prior to, or concurrently, with any significant development of the station-area parcels, operations in the vicinity of the railroad tracks are expected to be poor and may cause operational and/or safety issues. In this scenario, a traffic signal should be installed at the intersection of East 124th Avenue / Claude Court (south) concurrent with development of station-

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

area parcels. The traffic signal should be interconnected with the commuter rail tracks to provide a safe clearance interval of the track area during train events.

Apex Design, PC
1675 Larimer Street, Suite 480
Denver, CO 80202
303.339.0440 office | 303.325.7743 fax

Table 1
Trip Generation Estimates

Parcel	Land Use	ITE Code	Quantity	Trip Rate	Total Trips	TOD Reduction	Reduced Total Trips	% In	Trips In	% Out	Trips Out
Weekday Daily Trips											
B & C	Industrial	110	758,000 SF	6.97	5,284	N/A	5,284	50	2,642	50	2,642
G	Industrial	110	353,000 SF	6.97	2,460	N/A	2,460	50	1,230	50	1,230
I	Industrial	110	148,000 SF	6.97	1,032	N/A	1,032	50	516	50	516
H	Residential	230	510 DU	5.81	2,964	0.56	1,660	50	830	50	830
N	Residential	230	1,010 DU	5.81	5,868	0.56	3,286	50	1,643	50	1,643
F	Residential	220	1,290 DU	6.65	8,579	0.56	4,804	50	2,402	50	2,402
O	Residential	220	560 DU	6.65	3,724	0.56	2,086	50	1,043	50	1,043
	Commercial	814	5,000 SF	44.32	222	N/A	222	50	111	50	111
				Total	**30,132**		**20,834**		**10,417**		**10,417**
Weekday AM Peak Hour											
B & C	Industrial	110	758,000 SF	1.01	766	N/A	766	90	689	10	77
G	Industrial	110	353,000 SF	1.01	357	N/A	357	90	321	10	36
I	Industrial	110	148,000 SF	1.01	149	N/A	149	90	134	10	15
H	Residential	230	510 DU	0.44	224	0.51	114	19	22	81	92
N	Residential	230	1,010 DU	0.44	444	0.51	226	19	43	81	183
F	Residential	220	1,290 DU	0.55	710	0.51	362	29	105	71	257
O	Residential	220	560 DU	0.55	308	0.51	157	29	46	71	111
	Commercial	814	5,000 SF	6.84	34	N/A	34	48	16	52	18
				Total	**2,992**		**2,166**		**1,376**		**790**
	RTD Station-Generated Trips				*255*				*204*		*51*
Weekday PM Peak Hour											
B & C	Industrial	110	758,000 SF	1.08	819	N/A	819	14	115	86	704
G	Industrial	110	353,000 SF	1.08	381	N/A	381	14	53	86	328
I	Industrial	110	148,000 SF	1.08	160	N/A	160	14	22	86	138
H	Residential	230	510 DU	0.52	265	0.52	138	64	88	36	50
N	Residential	230	1,010 DU	0.52	525	0.52	273	64	175	36	98
F	Residential	220	1,290 DU	0.67	864	0.52	449	61	274	39	175
O	Residential	220	560 DU	0.67	375	0.52	195	61	119	39	76
	Commercial	814	5,000 SF	5.02	25	N/A	25	56	14	44	11
				Total	**3,414**		**2,440**		**860**		**1,580**
	RTD Station-Generated Trips				*244*				*61*		*183*

Notes: Trip Generation rates taken from the Institute of Transportation Engineers' (ITE) *Trip Generation, 8th Edition*.
TOD reduction values were estimated using Transit Cooperative Research Program (TCRP) *Report 128*.
RTD Station-Generated Trips taken from the *NMRL, 124th Avenue / Eastlake Station Traffic Update*, April 2015.

Table 2A
Traffic Volume Summary

	Weekday AM Peak Hour												Weekday PM Peak Hour											
	Northbound			Southbound			Eastbound			Westbound			Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Irma Street / East 120th Avenue																								
Existing	89	0	36	13	2	4	2	634	37	34	1,672	1	114	4	84	8	2	7	14	1,864	138	74	1,408	7
Year 2020 Background	94	0	38	14	2	4	2	673	39	36	1,775	1	121	4	89	8	2	7	15	1,979	146	79	1,495	7
Year 2035 Background	110	0	44	16	2	5	2	781	46	42	2,061	1	140	5	104	10	2	9	17	2,297	170	91	1,735	9
Year 2020 Station Trips	0	0	0	0	0	0	0	24	0	0	10	0	0	0	0	0	0	0	0	14	0	0	23	0
Year 2035 Station Trips	0	0	0	0	0	0	0	55	0	0	21	0	0	0	0	0	0	0	0	31	0	0	50	0
Year 2020 Parcel Trips	2	4	0	6	3	27	43	9	1	1	33	30	1	3	1	31	5	50	30	34	3	1	13	7
Year 2035 Parcel Trips	9	16	1	22	10	109	171	34	2	5	130	119	2	10	5	125	20	200	120	134	11	3	51	29
Year 2020 Total Traffic	97	4	38	19	5	31	45	706	40	37	1,817	31	122	7	90	40	7	57	45	2,026	149	79	1,530	15
Year 2035 Total Traffic	119	16	45	38	12	114	173	870	48	47	2,212	120	142	15	109	135	22	209	137	2,462	181	94	1,836	38
Race Street / East 120th Avenue																								
Existing	0	0	0	9	0	49	8	661	0	0	1,641	7	0	0	0	5	0	32	37	1,957	0	0	1,494	27
Year 2020 Background	0	0	0	29	0	75	65	645	0	0	1,513	32	0	0	0	19	0	53	220	1,897	0	0	1,380	62
Year 2035 Background	0	0	0	33	0	87	75	749	0	0	1,756	37	0	0	0	22	0	62	255	2,202	0	0	1,602	71
Year 2020 Station Trips	0	0	0	2	0	7	17	7	0	0	3	9	0	0	0	5	0	14	9	5	0	0	9	3
Year 2035 Station Trips	0	0	0	6	0	14	40	15	0	0	7	19	0	0	0	11	0	31	21	10	0	0	19	6
Year 2020 Parcel Trips	0	0	0	18	0	6	3	14	0	0	54	7	0	0	0	11	0	4	6	57	0	0	17	18
Year 2035 Parcel Trips	0	0	0	70	0	22	11	56	0	0	215	26	0	0	0	45	0	15	23	228	0	0	69	73
Year 2020 Total Traffic	0	0	0	48	0	88	85	666	0	0	1,569	47	0	0	0	35	0	71	234	1,959	0	0	1,406	83
Year 2035 Total Traffic	0	0	0	109	0	123	126	820	0	0	1,978	82	0	0	0	78	0	108	299	2,440	0	0	1,690	150
Claude Court / East 120th Avenue																								
Existing	19	25	31	82	33	196	79	592	8	20	1,387	68	16	51	65	130	47	180	255	1,635	23	64	1,293	93
Year 2020 Background	20	27	33	54	19	29	28	648	8	21	1,496	48	17	54	69	25	10	19	90	1,749	24	68	1,405	66
Year 2035 Background	23	31	38	63	22	33	32	752	10	25	1,736	55	20	63	80	30	11	22	105	2,031	28	79	1,632	76
Year 2020 Station Trips	0	7	0	7	2	3	7	0	0	0	0	12	0	3	0	12	5	9	5	0	0	0	0	4
Year 2035 Station Trips	0	14	0	12	5	7	15	0	0	0	0	25	0	6	0	25	10	19	10	0	0	0	0	8
Year 2020 Parcel Trips	7	0	0	3	0	3	2	25	4	0	52	2	4	0	0	2	0	2	3	56	8	0	30	4
Year 2035 Parcel Trips	27	1	0	13	1	13	6	100	14	0	209	7	15	1	0	9	1	9	13	225	31	0	119	14
Year 2020 Total Traffic	27	34	33	64	21	35	36	673	12	21	1,548	62	21	57	69	40	15	30	98	1,806	32	68	1,435	73
Year 2035 Total Traffic	50	46	38	88	28	53	53	852	24	25	1,945	87	35	70	80	64	22	50	128	2,256	59	79	1,751	98
Claude Court / East 128th Avenue																								
Existing	160	0	59	0	0	0	0	464	130	107	894	0	120	0	75	0	0	0	0	1,052	174	37	548	0
Year 2020 Background	172	0	63	0	0	0	0	497	139	115	958	0	129	0	80	0	0	0	0	1,128	187	40	588	0
Year 2035 Background	199	0	73	0	0	0	0	578	162	133	1,113	0	149	0	93	0	0	0	0	1,309	217	46	682	0
Year 2020 Station Trips	4	0	12	0	0	0	0	0	17	51	0	0	14	0	46	0	0	0	0	0	5	16	0	0
Year 2035 Station Trips	6	0	23	0	0	0	0	0	26	94	22	0	23	0	84	0	0	0	0	0	8	28	81	0
Year 2020 Parcel Trips	5	0	12	0	0	0	0	23	2	5	16	0	3	0	8	0	0	0	0	18	5	12	24	0
Year 2035 Parcel Trips	18	0	47	0	0	0	0	92	9	19	65	0	12	0	30	0	0	0	0	70	19	49	95	0
Year 2020 Total Traffic	180	0	87	0	0	0	0	520	159	170	975	0	146	0	134	0	0	0	0	1,145	196	68	611	0
Year 2035 Total Traffic	223	0	143	0	0	0	0	670	197	246	1,200	0	184	0	207	0	0	0	0	1,379	244	123	858	0
Lafayette Street / East 128th Avenue																								
Existing	33	85	24	158	37	139	99	422	30	25	757	208	8	13	16	83	9	66	107	1,141	15	1	557	103
Year 2020 Background	35	91	26	169	40	149	106	452	32	27	812	223	9	14	17	89	10	71	115	1,223	16	1	597	110
Year 2035 Background	41	106	30	197	46	173	123	525	37	31	942	259	10	16	20	103	11	82	133	1,420	19	1	693	128
Year 2020 Station Trips	0	0	1	6	0	0	0	10	0	0	2	2	0	0	0	2	0	0	0	3	0	1	8	5
Year 2035 Station Trips	0	0	2	8	0	0	0	16	0	0	6	3	0	0	1	2	0	0	0	5	0	0	21	10
Year 2020 Parcel Trips	18	5	5	0	7	3	0	3	20	22	14	1	25	9	23	1	5	1	3	15	18	6	4	1
Year 2035 Parcel Trips	71	21	20	1	29	11	1	12	78	86	56	3	99	35	92	3	20	2	11	58	73	24	17	2
Year 2020 Total Traffic	53	96	32	176	47	152	106	465	52	48	828	226	33	23	40	92	15	71	117	1,241	34	8	609	116
Year 2035 Total Traffic	112	127	52	206	75	184	124	553	115	117	1,004	265	109	51	113	108	31	84	144	1,483	92	25	731	140
York Street / East 128th Avenue																								
Existing	40	57	24	40	108	269	103	325	28	40	673	29	29	84	38	34	70	93	237	712	43	36	452	59
Year 2020 Background	43	61	26	43	116	288	110	348	30	43	722	31	31	90	41	36	75	100	254	763	46	39	485	63
Year 2035 Background	50	71	30	50	134	335	128	405	35	50	838	36	36	105	47	42	87	116	295	886	54	45	563	73
Year 2020 Station Trips	0	2	3	0	6	4	1	11	0	14	40	0	0	5	13	0	2	1	4	40	0	4	14	0
Year 2035 Station Trips	0	1	3	0	4	11	3	19	0	11	79	0	0	3	10	0	1	3	10	71	0	3	24	0
Year 2020 Parcel Trips	0	2	3	1	1	9	4	13	0	1	27	0	0	1	2	0	2	5	11	30	0	2	15	0
Year 2035 Parcel Trips	0	7	10	4	2	36	17	53	0	3	107	0	0	4	6	1	7	19	44	120	0	9	60	0
Year 2020 Total Traffic	43	65	31	44	122	301	116	373	30	58	788	31	31	96	55	37	79	105	269	833	46	45	514	63
Year 2035 Total Traffic	50	79	43	54	140	382	148	477	35	64	1,024	36	36	112	63	43	95	138	349	1,077	54	57	647	73
Claude Court / East 124th Avenue (Claude Court North in 2020, 2035)																								
Existing	46	31	143	41	79	2	1	18	39	56	33	62	34	80	151	99	66	4	3	46	20	34	17	54
Year 2020 Background	7	49	44	73	58	2	1	34	28	21	54	100	8	153	129	132	48	4	3	58	14	12	46	147
Year 2035 Background	8	57	51	85	67	3	1	39	33	24	62	116	9	178	150	154	56	5	4	67	17	14	53	170
Year 2020 Station Trips	0	26	0	11	9	0	2	0	0	0	0	53	0	12	0	52	19	2	0	0	0	0	0	12
Year 2035 Station Trips	0	59	0	23	20	2	1	0	0	0	0	120	0	27	0	116	42	4	1	0	0	0	0	26
Year 2020 Parcel Trips	7	7	3	4	7	0	2	7	6	1	22	6	9	9	2	5	8	1	1	18	4	3	14	9
Year 2035 Parcel Trips	26	27	10	14	28	1	6	26	23	3	87	24	36	34	6	18	32	5	3	70	16	10	57	34
Year 2020 Total Traffic	13	82	46	88	74	2	5	40	34	22	75	159	17	174	131	189	75	8	4	75	18	15	60	167
Year 2035 Total Traffic	34	143	61	122	115	6	8	65	56	27	149	260	45	239	156	288	130	14	8	137	33	24	110	230

Table 2B
Traffic Volume Summary

	Weekday AM Peak Hour												Weekday PM Peak Hour											
	Northbound			Southbound			Eastbound			Westbound			Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Claude Court South / East 124th Avenue																								
Year 2020 Background	37	0	68	0	0	0	0	78	73	40	137	0	75	0	141	0	0	0	0	187	132	25	129	0
Year 2035 Background	43	0	79	0	0	0	0	90	85	47	159	0	88	0	164	0	0	0	0	217	154	29	150	0
Year 2020 Station Trips	22	0	4	0	0	0	0	6	5	7	24	0	5	0	7	0	0	0	0	30	22	4	20	0
Year 2035 Station Trips	48	0	6	0	0	0	0	12	11	13	42	0	11	0	13	0	0	0	0	68	48	6	29	0
Year 2020 Parcel Trips	4	0	2	0	0	0	0	12	2	1	18	0	3	0	1	0	0	0	0	21	4	2	13	0
Year 2035 Parcel Trips	15	0	6	0	0	0	0	49	7	3	70	0	10	0	4	0	0	0	0	84	16	7	53	0
Year 2020 Total Traffic	63	0	73	0	0	0	0	96	80	48	178	0	83	0	149	0	0	0	0	238	158	31	162	0
Year 2035 Total Traffic	106	0	91	0	0	0	0	151	103	63	271	0	109	0	181	0	0	0	0	369	218	42	232	0
Lafayette Street / Eastlake Avenue																								
Existing	0	0	0	39	0	5	5	6	0	0	12	70	0	0	0	65	0	27	12	5	0	0	6	35
Year 2020 Background	0	0	0	43	0	5	5	7	0	0	13	77	0	0	0	71	0	30	13	5	0	0	7	38
Year 2035 Background	0	0	0	50	0	6	6	8	0	0	15	89	0	0	0	83	0	34	15	6	0	0	8	44
Year 2020 Station Trips	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Year 2035 Station Trips	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	4	0
Year 2020 Parcel Trips	2	78	5	8	16	21	7	3	1	9	10	21	1	23	10	21	81	8	25	10	2	7	4	9
Year 2035 Parcel Trips	9	311	18	31	65	82	27	10	2	35	38	83	5	92	39	84	323	33	99	40	9	26	15	35
Year 2020 Total Traffic	2	78	5	50	16	26	12	11	1	9	23	97	1	23	10	92	81	38	38	15	2	7	12	47
Year 2035 Total Traffic	9	311	18	81	65	88	33	19	2	35	55	172	5	92	39	167	323	67	114	47	9	26	27	79
First Street / East 124th Avenue																								
Existing	0	0	0	5	0	39	19	70	0	0	162	9	0	0	0	13	0	17	21	276	0	0	141	9
Year 2020 Background	0	0	0	6	0	44	22	80	0	0	184	10	0	0	0	15	0	19	24	314	0	0	160	10
Year 2035 Background	0	0	0	7	0	52	25	92	0	0	214	12	0	0	0	17	0	22	28	365	0	0	186	12
Year 2020 Station Trips	0	0	0	0	0	0	0	25	0	0	40	0	0	0	0	0	0	0	0	29	0	0	14	0
Year 2035 Station Trips	0	0	0	0	0	0	0	34	0	0	69	0	0	0	0	0	0	0	0	53	0	0	20	0
Year 2020 Parcel Trips	0	0	0	0	0	0	0	14	0	0	18	0	0	0	0	0	0	0	0	22	0	0	15	0
Year 2035 Parcel Trips	0	0	0	0	0	0	0	56	0	0	73	0	0	0	0	0	0	0	0	89	0	0	59	0
Year 2020 Total Traffic	0	0	0	6	0	44	22	119	0	0	253	10	0	0	0	15	0	19	24	365	0	0	190	10
Year 2035 Total Traffic	0	0	0	7	0	52	25	182	0	0	356	12	0	0	0	17	0	22	28	507	0	0	265	12
York Street / East 124th Avenue																								
Existing	0	0	0	38	0	67	30	63	0	0	148	34	0	0	0	75	0	62	73	207	0	0	100	66
Year 2020 Background	0	0	0	43	0	76	34	72	0	0	168	39	0	0	0	85	0	71	83	236	0	0	114	75
Year 2035 Background	0	0	0	50	0	89	40	83	0	0	196	45	0	0	0	99	0	82	96	274	0	0	132	87
Year 2020 Station Trips	0	0	0	0	0	20	5	8	0	0	30	0	0	0	0	0	0	6	18	28	0	0	9	0
Year 2035 Station Trips	0	0	0	0	0	15	4	14	0	0	54	0	0	0	0	0	0	4	13	49	0	0	16	0
Year 2020 Parcel Trips	0	0	0	0	0	1	4	10	0	0	17	0	0	0	0	0	0	4	2	20	0	0	11	0
Year 2035 Parcel Trips	0	0	0	0	0	5	15	40	0	0	68	0	0	0	0	0	0	16	9	79	0	0	44	0
Year 2020 Total Traffic	0	0	0	43	0	98	43	90	0	0	215	39	0	0	0	85	0	81	103	283	0	0	134	75
Year 2035 Total Traffic	0	0	0	50	0	109	59	137	0	0	318	45	0	0	0	99	0	102	118	402	0	0	192	87
Lafayette Street / East 126th Avenue																								
Existing	45	30	0	0	16	76	182	0	58	0	0	0	34	13	0	0	12	13	22	0	53	0	0	0
Year 2020 Background	48	32	0	0	17	81	195	0	62	0	0	0	36	14	0	0	13	14	24	0	57	0	0	0
Year 2035 Background	56	37	0	0	20	95	227	0	72	0	0	0	42	16	0	0	15	16	27	0	66	0	0	0
Year 2020 Station Trips	0	0	0	0	0	0	0	6	0	0	2	0	0	0	0	0	0	0	0	2	0	0	6	0
Year 2035 Station Trips	0	0	0	0	0	0	0	10	0	0	3	0	0	0	0	0	0	0	0	3	0	0	10	0
Year 2020 Parcel Trips	48	66	0	2	30	2	21	2	9	0	5	5	14	40	0	6	68	21	4	6	49	0	4	4
Year 2035 Parcel Trips	190	265	0	8	120	9	83	8	35	0	21	21	54	158	0	22	272	84	14	22	196	0	14	14
Year 2020 Total Traffic	96	98	0	2	47	84	216	8	71	0	7	5	50	53	0	6	81	35	27	8	106	0	10	4
Year 2035 Total Traffic	246	302	0	8	140	104	310	18	107	0	24	21	96	174	0	22	287	100	41	25	262	0	24	14
Claude Courth / East 126th Avenue																								
Existing	0	94	0	0	122	0	0	0	0	0	0	0	0	137	0	0	169	0	0	0	0	0	0	0
Year 2020 Background	0	103	0	0	133	0	0	0	0	0	0	0	0	150	0	0	185	0	0	0	0	0	0	0
Year 2035 Background	0	119	0	0	155	0	0	0	0	0	0	0	0	174	0	0	215	0	0	0	0	0	0	0
Year 2020 Station Trips	2	16	0	0	68	0	0	0	6	0	0	0	6	60	0	0	21	0	0	0	2	0	0	0
Year 2035 Station Trips	3	29	0	0	120	0	0	0	10	0	0	0	10	107	0	0	36	0	0	0	3	0	0	0
Year 2020 Parcel Trips	0	13	0	0	5	2	4	0	0	0	0	0	0	8	0	0	13	4	3	0	0	0	0	0
Year 2035 Parcel Trips	0	50	0	0	20	6	15	0	0	0	0	0	0	32	0	0	52	16	11	0	0	0	0	0
Year 2020 Total Traffic	2	131	0	0	206	2	4	0	6	0	0	0	6	218	0	0	219	4	3	0	2	0	0	0
Year 2035 Total Traffic	3	198	0	0	295	6	15	0	10	0	0	0	10	313	0	0	303	16	11	0	3	0	0	0
Washington Street / East 126th Avenue																								
Existing	0	451	145	95	1,119	0	0	0	0	118	0	92	0	961	57	18	858	0	0	0	0	55	0	47
Year 2020 Background	0	474	152	100	1,176	0	0	0	0	124	0	97	0	1,010	60	19	902	0	0	0	0	58	0	49
Year 2035 Background	0	550	177	116	1,365	0	0	0	0	144	0	112	0	1,173	70	22	1,047	0	0	0	0	67	0	57
Year 2020 Station Trips	0	0	2	4	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2	0	4
Year 2035 Station Trips	0	0	3	7	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	3	0	7
Year 2020 Parcel Trips	0	9	28	31	30	0	0	0	0	8	0	14	0	33	10	16	10	0	0	0	0	30	0	34
Year 2035 Parcel Trips	0	36	111	122	121	0	0	0	0	33	0	57	0	131	39	65	41	0	0	0	0	120	0	136
Year 2020 Total Traffic	0	483	182	134	1,206	0	0	0	0	132	0	113	0	1,043	70	37	912	0	0	0	0	90	0	87
Year 2035 Total Traffic	0	586	291	245	1,486	0	0	0	0	177	0	172	0	1,304	109	90	1,088	0	0	0	0	190	0	200
Washington Center Parkway / Eastlake Avenue																								
Existing	0	29	0	0	33	0	0	0	0	0	0	0	0	100	0	0	115	0	0	0	0	0	0	0
Year 2020 Background	0	31	0	0	35	0	0	0	0	0	0	0	0	106	0	0	122	0	0	0	0	0	0	0
Year 2035 Background	0	36	0	0	41	0	0	0	0	0	0	0	0	123	0	0	142	0	0	0	0	0	0	0
Year 2020 Station Trips	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Year 2035 Station Trips	0	0	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	2	0	0	2
Year 2020 Parcel Trips	0	18	14	6	2	0	0	0	0	5	0	25	0	3	5	25	19	0	0	0	0	15	0	11
Year 2035 Parcel Trips	0	73	54	24	9	0	0	0	0	19	0	98	0	13	20	100	74	0	0	0	0	59	0	44
Year 2020 Total Traffic	0	49	16	6	37	0	0	0	0	5	0	25	0	109	5	25	141	0	0	0	1	15	0	12
Year 2035 Total Traffic	0	109	55	24	50	0	0	0	0	20	0	99	0	136	21	100	216	0	0	0	2	59	0	46

Table 3A
Intersection Level of Service Summary

	Existing Conditions				Year 2020				Year 2035 (Build Out)			
	AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
Intersection / Approach	LOS	Delay (sec./veh.)	LOS	Delay (sec./veh.)	LOS	Delay (sec./veh.)	LOS	Delay (sec./veh.)	LOS	Delay (sec./veh.)	LOS	Delay (sec./veh.)
York Street / East 128th Avenue - Signalized												
Northbound	C	35.0	C	27.9	D	37.5	D	39.0	C	31.6	D	37.7
Southbound	F	152.2	C	28.6	E	68.5	D	40.0	E	57.0	D	39.5
Eastbound	C	32.0	E	65.9	C	24.2	B	10.7	C	31.7	A	4.5
Westbound	D	44.6	C	27.6	B	17.5	C	22.8	C	32.2	D	37.2
Overall Intersection	**E**	**66.4**	**D**	**47.9**	**C**	**32.5**	**B**	**19.5**	**D**	**37.7**	**B**	**19.8**
Claude Courth / East 128th Avenue - Signalized												
Northbound	D	43.8	D	40.7	C	33.2	D	41.7	D	37.9	D	51.5
Eastbound	B	12.8	D	37.9	A	7.8	A	1.2	B	10.2	A	2.1
Westbound	A	3.3	A	2.2	A	2.1	C	20.3	A	2.5	C	21.6
Overall Intersection	**B**	**11.3**	**C**	**27.7**	**A**	**7.9**	**B**	**11.8**	**A**	**9.8**	**B**	**14.9**
Lafayette Street / East 128th Avenue - Signalized												
Northbound	D	44.9	C	28.0	D	45.9	D	39.8	E	55.8	D	53.7
Southbound	D	38.3	C	27.4	D	39.9	D	39.3	D	50.0	D	42.9
Eastbound	B	17.1	C	30.0	B	16.5	C	20.5	B	17.4	C	23.6
Westbound	C	27.9	B	15.2	A	7.6	A	1.5	B	10.7	A	2.7
Overall Intersection	**C**	**27.9**	**C**	**25.1**	**B**	**18.4**	**B**	**16.9**	**C**	**23.3**	**C**	**22.0**
Washington Street / East 126th Avenue - Signalized												
Northbound	B	14.7	B	14.7	B	15.1	B	17.3	B	18.0	C	21.7
Southbound	A	7.7	A	4.6	A	8.1	B	10.2	B	19.3	B	10.7
Westbound	C	22.0	D	39.4	C	22.8	C	29.4	B	17.7	D	36.7
Overall Intersection	**B**	**11.2**	**B**	**10.5**	**B**	**11.8**	**B**	**15.3**	**B**	**18.7**	**B**	**19.3**
Claude Court / East 120th Avenue - Signalized												
Northbound	D	40.1	D	44.3	D	40.4	D	44.6	D	43.5	D	50.7
Southbound	D	49.5	D	54.4	D	42.3	D	44.0	D	46.7	D	51.4
Eastbound	B	12.9	B	14.1	B	12.3	B	19.2	B	11.3	B	19.8
Westbound	C	20.7	C	32.4	B	17.4	B	18.0	B	18.1	B	18.5
Overall Intersection	**C**	**22.8**	**C**	**25.8**	**B**	**18.0**	**C**	**20.3**	**B**	**18.7**	**C**	**21.4**
Irma Street / East 120th Avenue - Signalized												
Northbound	D	48.1	D	51.2	D	44.0	D	46.1	E	61.5	E	69.1
Southbound	D	44.8	D	45.8	D	39.9	D	41.8	D	48.2	D	49.6
Eastbound	A	9.3	C	21.4	B	12.1	C	21.1	B	18.5	C	30.8
Westbound	A	2.9	A	3.2	B	17.9	B	16.1	C	28.2	C	29.2
Overall Intersection	**A**	**7.2**	**B**	**15.8**	**B**	**18.0**	**C**	**21.0**	**C**	**28.0**	**C**	**33.4**
First Street / East 124th Avenue - Two-Way Stop Controlled												
Southbound	A	9.6	B	10.6	B	10.4	B	11.6	B	11.5	B	13.8
Eastbound	-	1.6	-	0.5	-	1.2	-	0.5	-	1.0	-	0.5
York Street / East 124th Avenue - Two-Way Stop Controlled												
Southbound	B	10.3	B	12.3	B	11.4	C	15.1	B	13.8	C	22.4
Eastbound	-	2.5	-	2.0	-	2.5	-	2.1	-	2.4	-	1.8

Table 3B
Intersection Level of Service Summary

Intersection / Approach	Existing Conditions AM Peak LOS	Existing Conditions AM Peak Delay (sec./veh.)	Existing Conditions PM Peak LOS	Existing Conditions PM Peak Delay (sec./veh.)	Year 2020 AM Peak LOS	Year 2020 AM Peak Delay (sec./veh.)	Year 2020 PM Peak LOS	Year 2020 PM Peak Delay (sec./veh.)	Year 2035 (Build Out) AM Peak LOS	Year 2035 (Build Out) AM Peak Delay (sec./veh.)	Year 2035 (Build Out) PM Peak LOS	Year 2035 (Build Out) PM Peak Delay (sec./veh.)
Race Street / East 120th Avenue - Two-Way Stop Controlled (Existing) / Signalized (2020, 2035)												
Southbound	E	48.2	F	96.4	D	47.5	D	49.9	D	50.4	D	53.0
Eastbound	-	0.2	-	0.3	A	0.6	A	5.2	A	2.5	A	8.1
Westbound					A	0.7	A	1.3	A	1.5	A	3.5
Overall Intersection					**A**	**3.3**	**A**	**4.9**	**A**	**5.5**	**A**	**8.1**
Claude Court / East 124th Avenue - All-Way Stop Controlled												
Northbound	A	9.0	A	9.8								
Southbound	A	9.0	A	9.3								
Eastbound	A	8.4	A	9.1								
Westbound	A	9.0	A	9.0								
Overall Intersection	**A**	**8.9**	**A**	**9.4**								
Claude Court (North) / Race Street / Eastlake Avenue - All-Way Stop Controlled												
Northbound					A	9.2	B	11.2	B	12.8	C	21.8
Southbound					A	9.7	B	12.3	B	12.1	C	23.8
Eastbound					A	9.0	B	11.0	B	11.7	C	19.0
Westbound					A	9.2	B	10.8	B	12.7	C	16.1
Overall Intersection					**A**	**9.3**	**B**	**11.4**	**B**	**12.4**	**C**	**20.7**
Claude Court (South) / Eastlake Avenue - Two-Way Stop Controlled												
Northbound					B	10.8	B	12.8	B	14.0	C	18.6
Westbound					-	1.7	-	1.4	-	1.5	-	1.5
Lafayette Street / East 126th Avenue - All-Way Stop Controlled												
Northbound					A	9.8	A	8.5	C	20.1	B	12.2
Southbound					A	9.4	A	8.5	C	17.4	C	21.8
Eastbound					B	11.3	A	8.2	C	22.8	B	14.8
Westbound					A	8.5	A	7.9	B	11.7	B	10.6
Overall Intersection					**B**	**10.4**	**A**	**8.4**	**C**	**20.2**	**C**	**16.7**
Washington Center Parkway / Eastlake Avenue - Roundabout												
Northbound					A	3.8	A	4.3	A	4.8	A	5.2
Southbound					A	3.6	A	4.8	A	4.0	A	6.8
Westbound					A	3.7	A	3.8	A	4.9	A	4.9
Overall Intersection					**A**	**3.7**	**A**	**4.8**	**A**	**4.7**	**A**	**6.0**
Lafayette Street / Irma Street / Eastlake Avenue - Roundabout												
Northbound					A	4.3	A	4.1	A	8.0	A	6.7
Southbound					A	4.2	A	5.3	A	6.2	B	11.1
Eastbound					A	3.7	A	4.6	A	4.6	A	9.6
Westbound					A	4.9	A	4.1	A	9.7	A	5.8
Overall Intersection					**A**	**4.5**	**A**	**4.8**	**A**	**7.8**	**A**	**9.5**
Claude Court / East 126th Avenue - Two-Way Stop Controlled												
Northbound					-	0.1	-	0.2	-	0.1	-	0.2
Eastbound					B	10.0	B	10.9	B	11.7	B	13.4

Figure 1
Eastlake Station Area Parcels

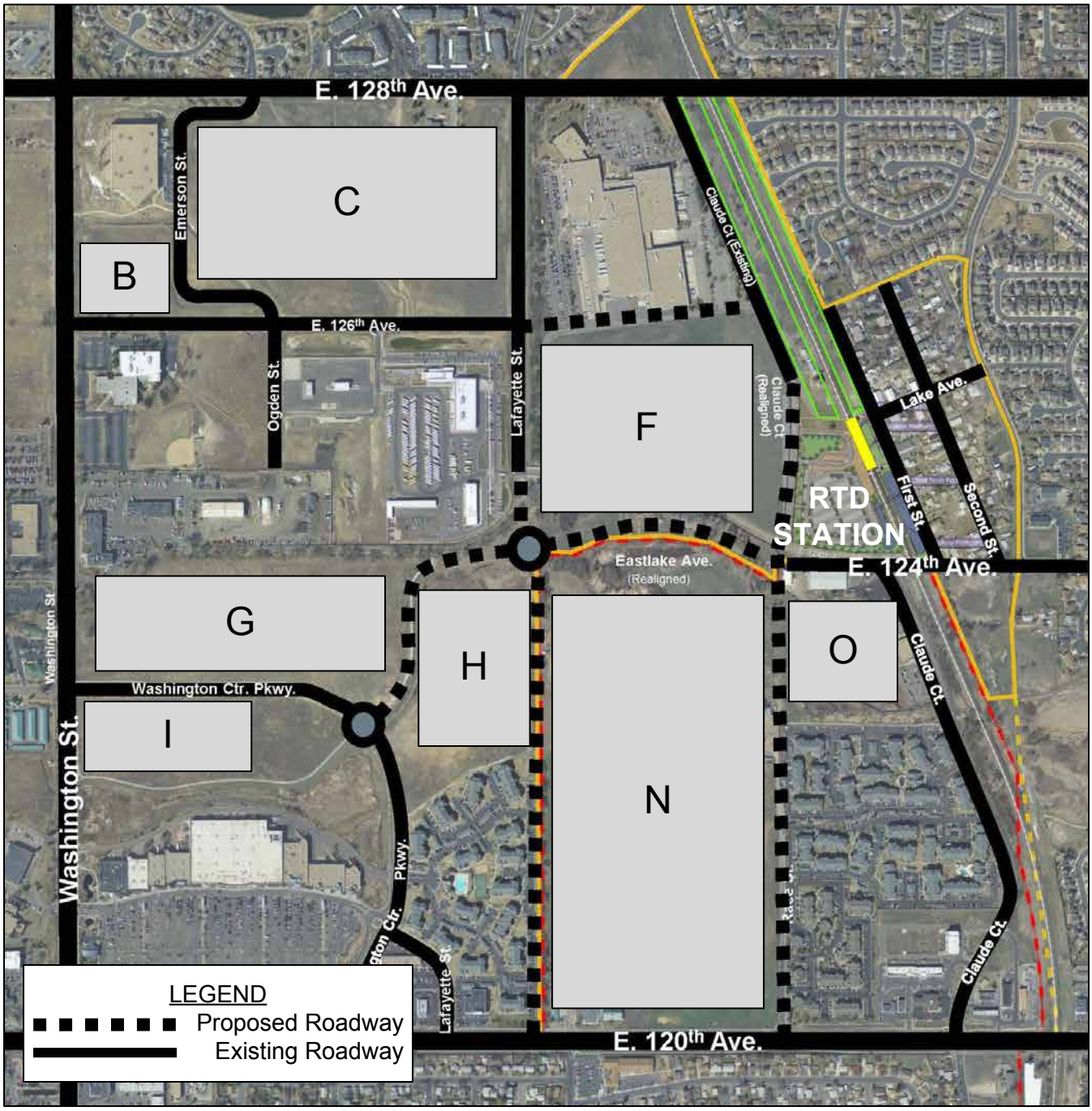
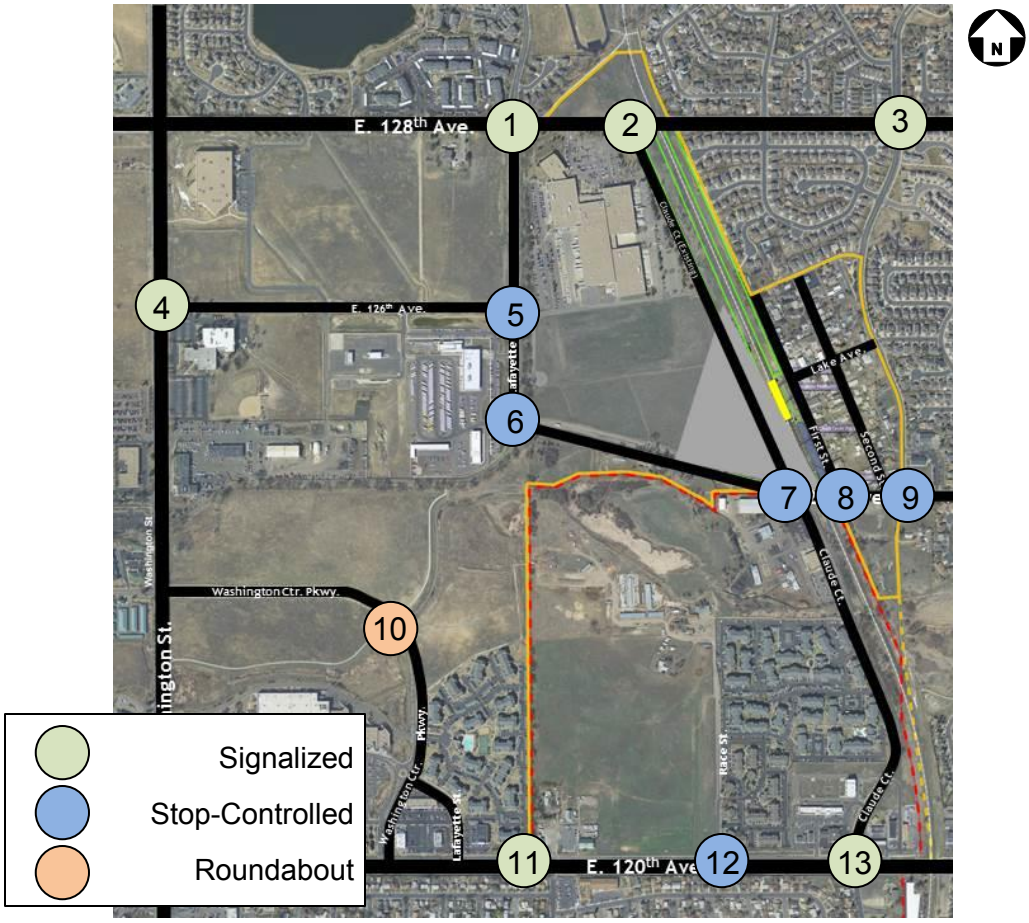


Figure 2
Existing AM Peak Intersection Volumes



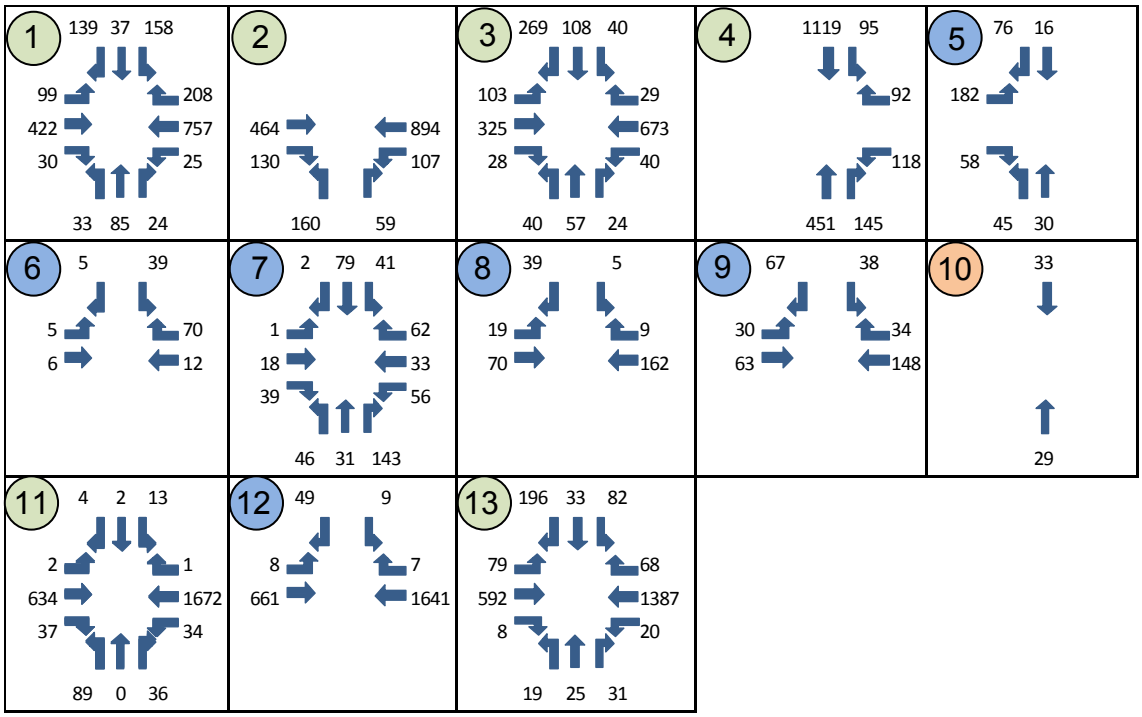
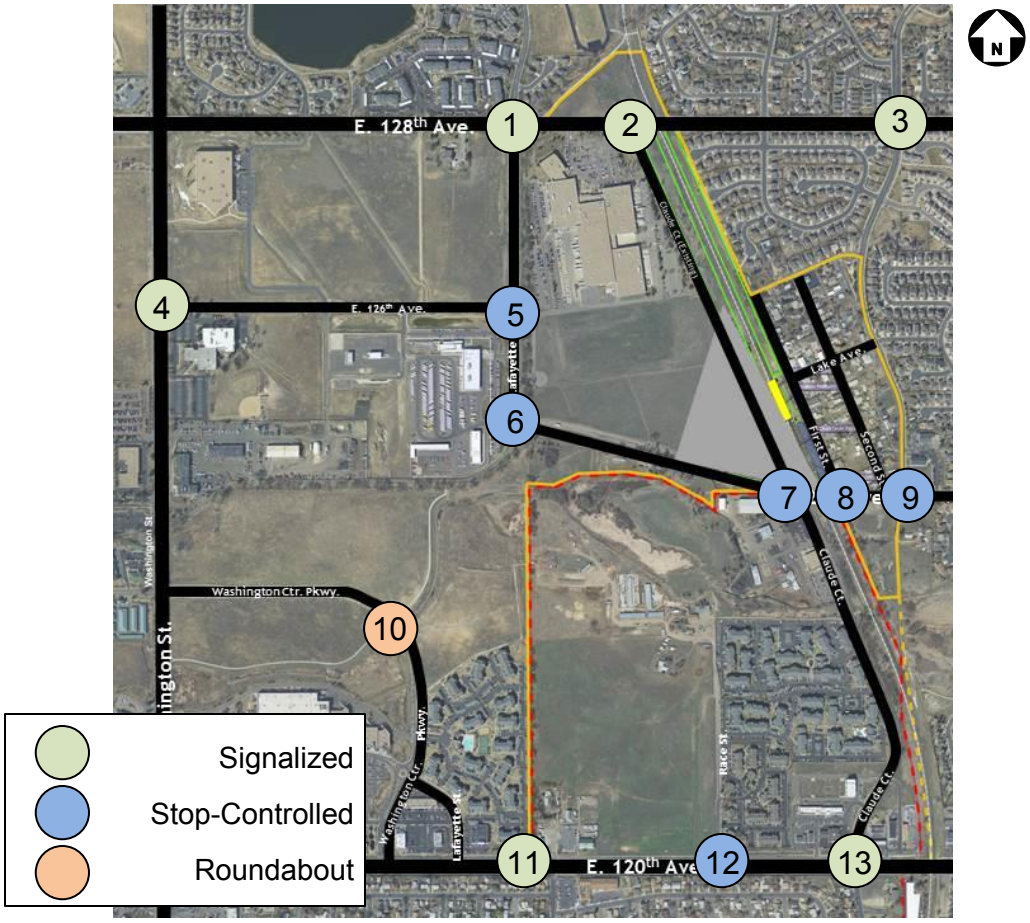


Figure 3
Existing PM Peak Intersection Volumes



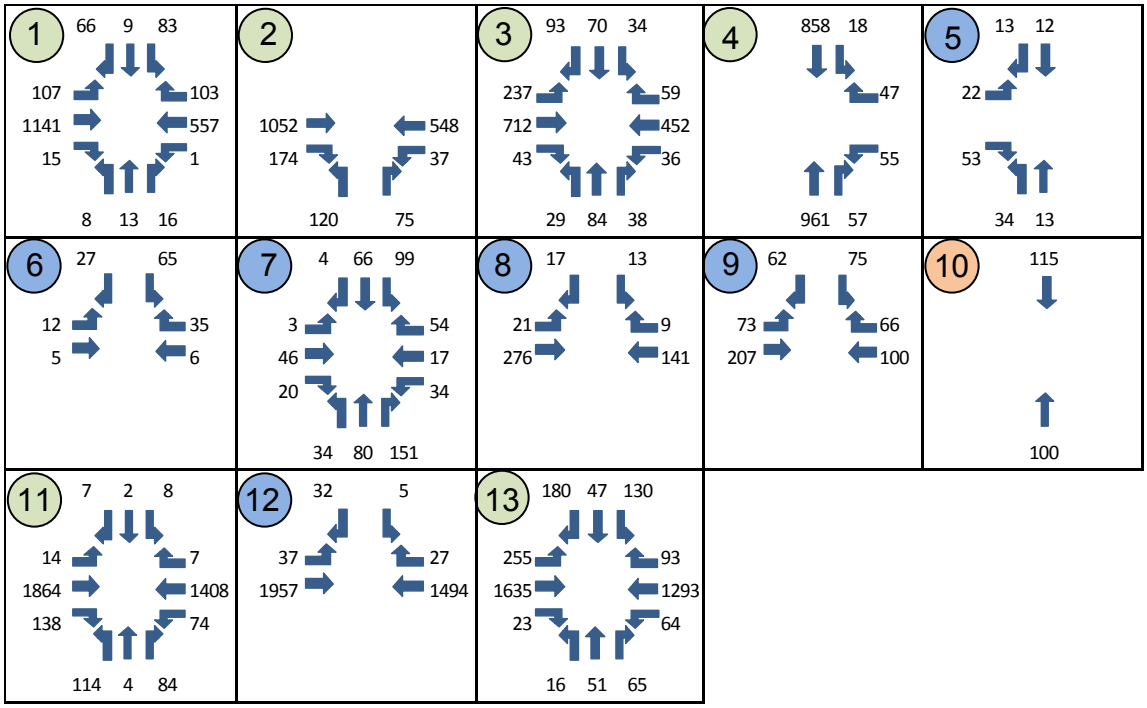


Figure 4
Eastlake Station Area Trip Distributions

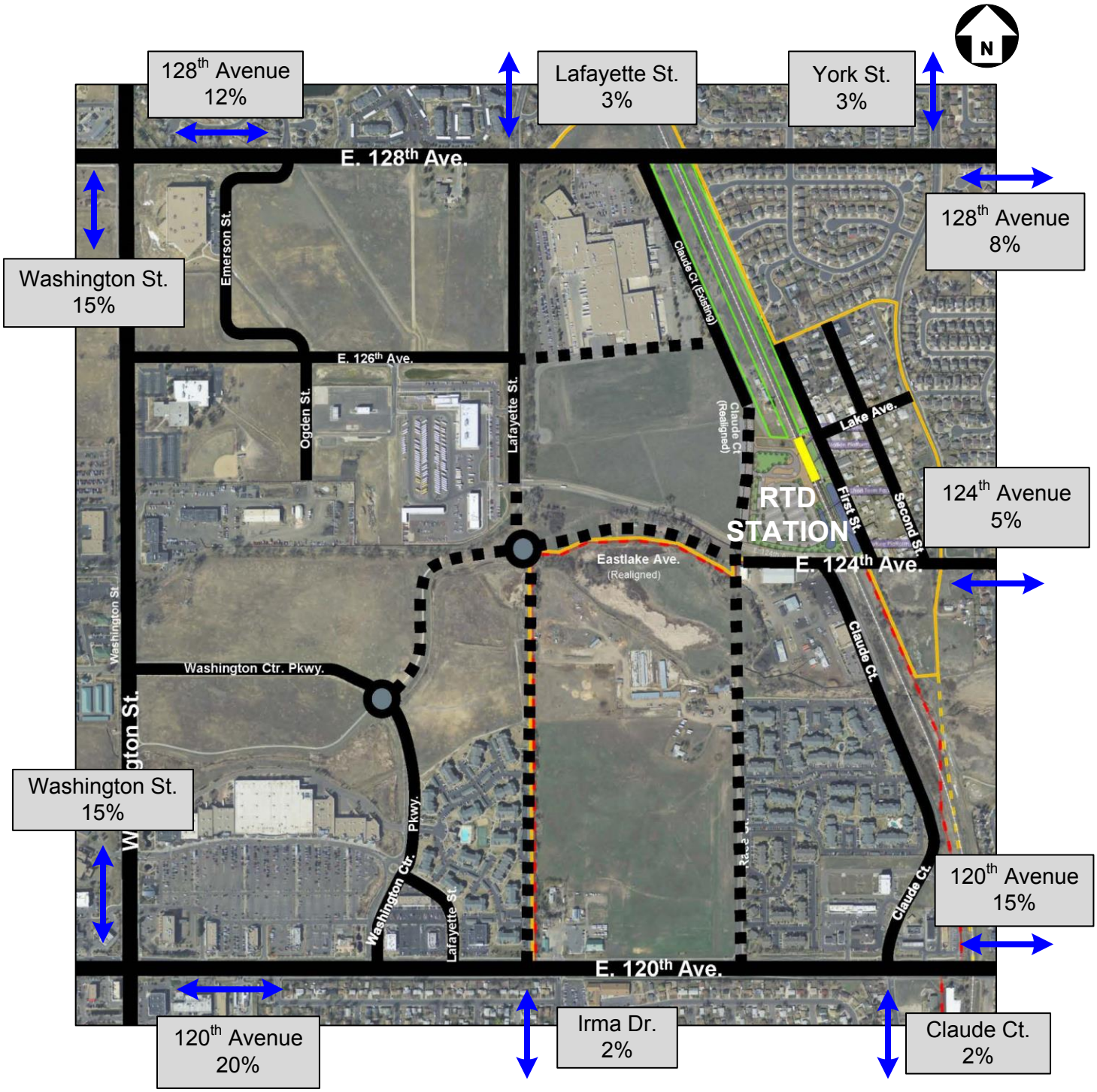
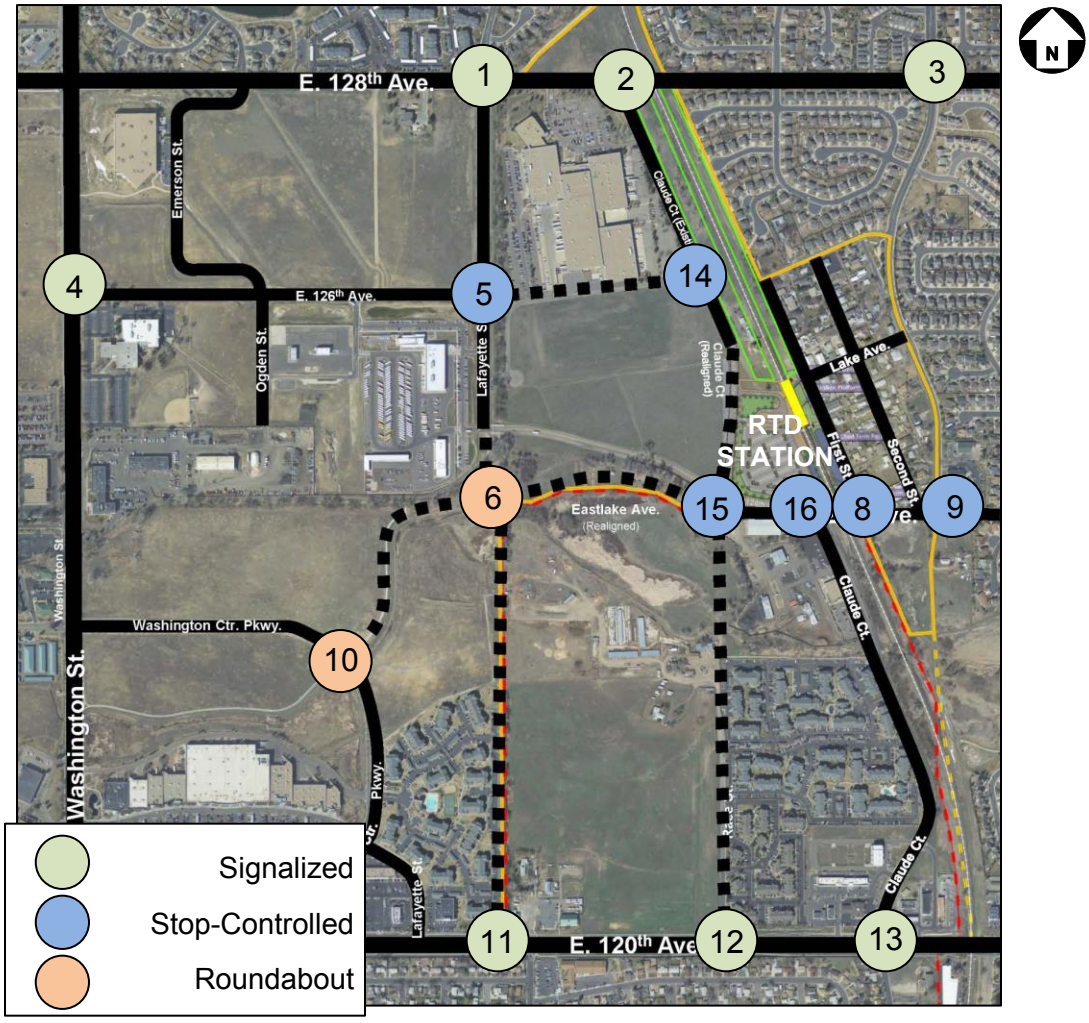


Figure 5
Parcel-Generated AM Peak Volumes



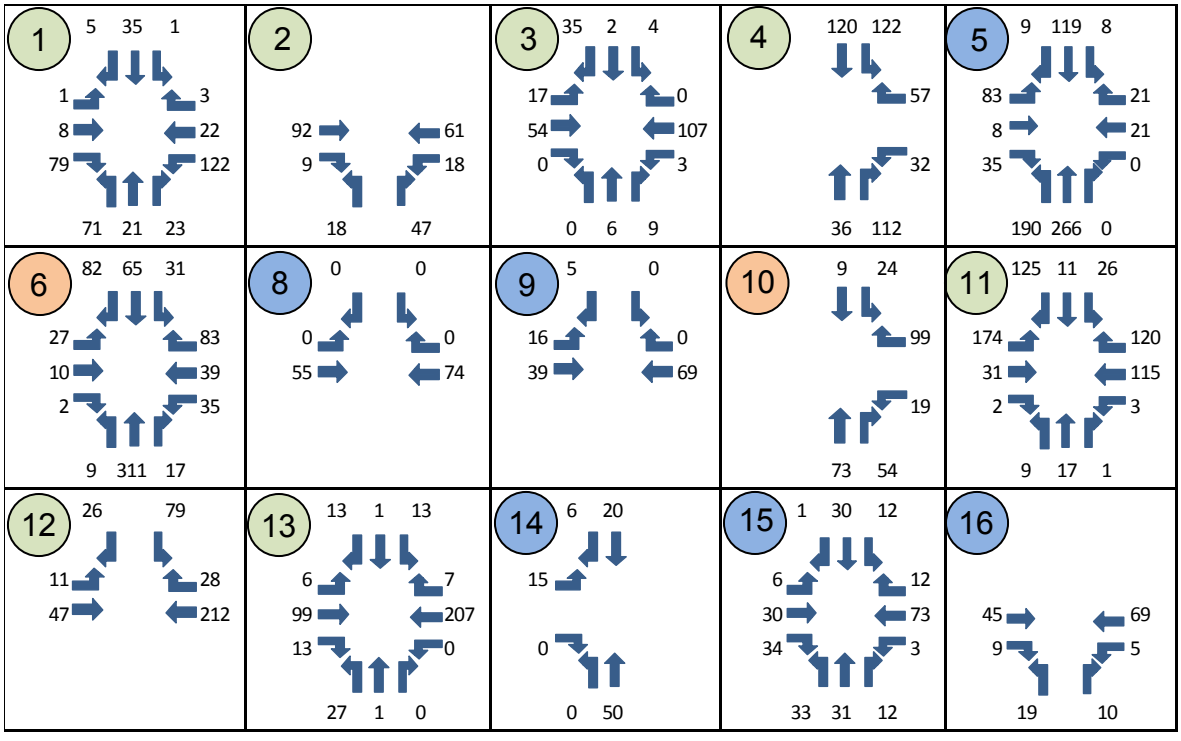
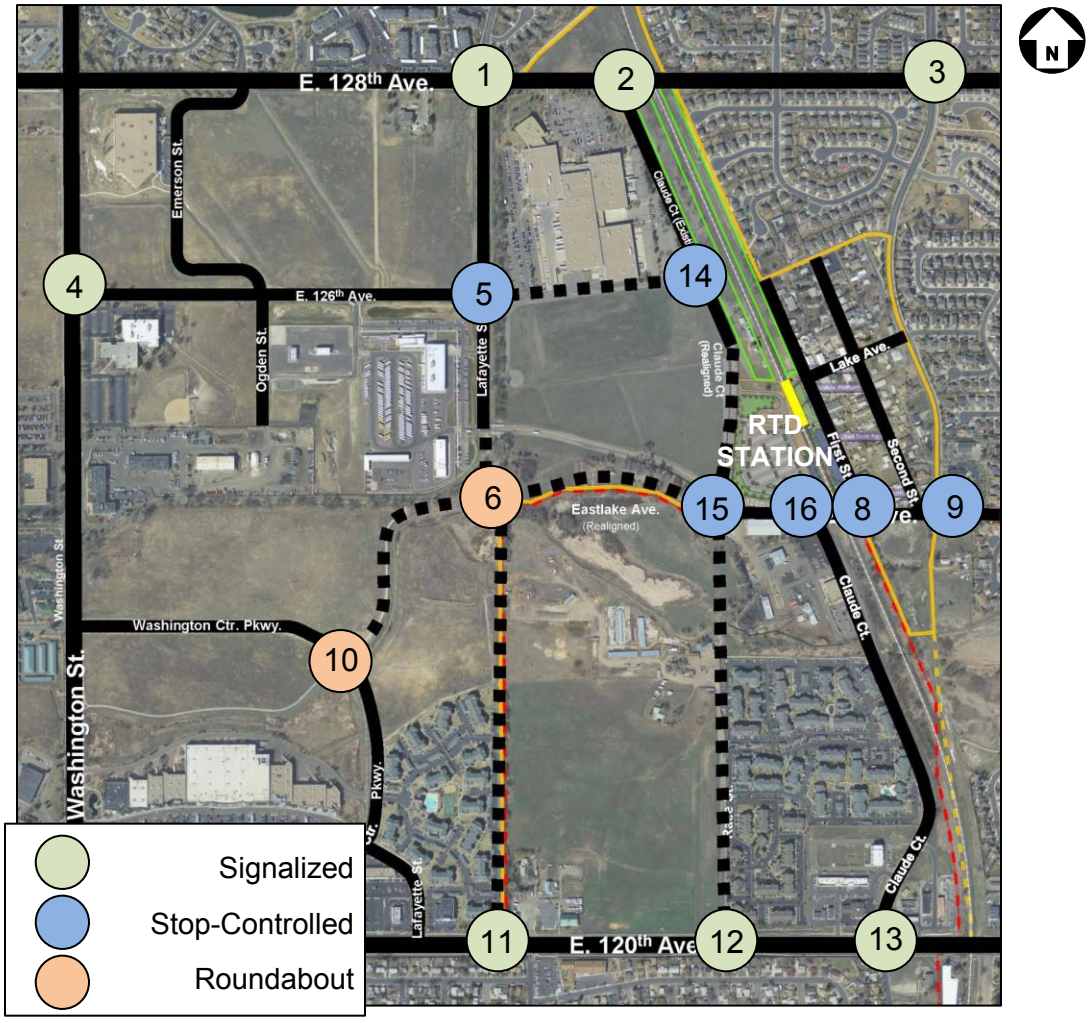


Figure 6
Parcel-Generated PM Peak Volumes



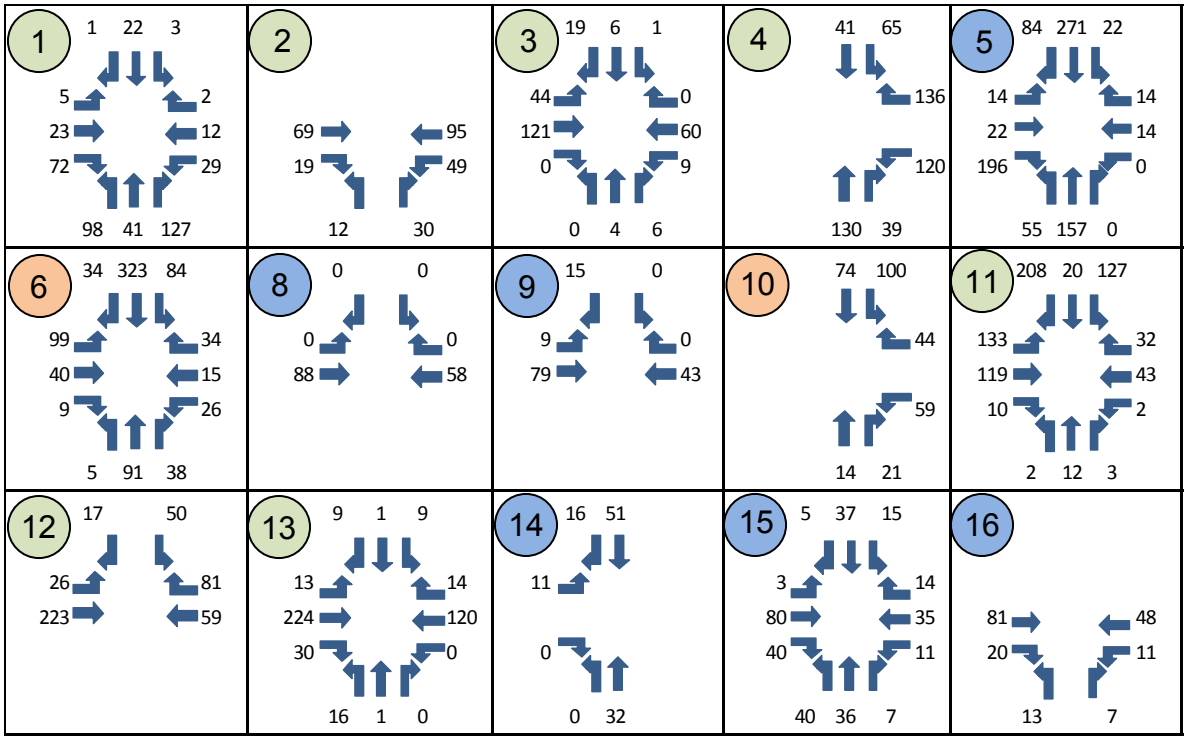
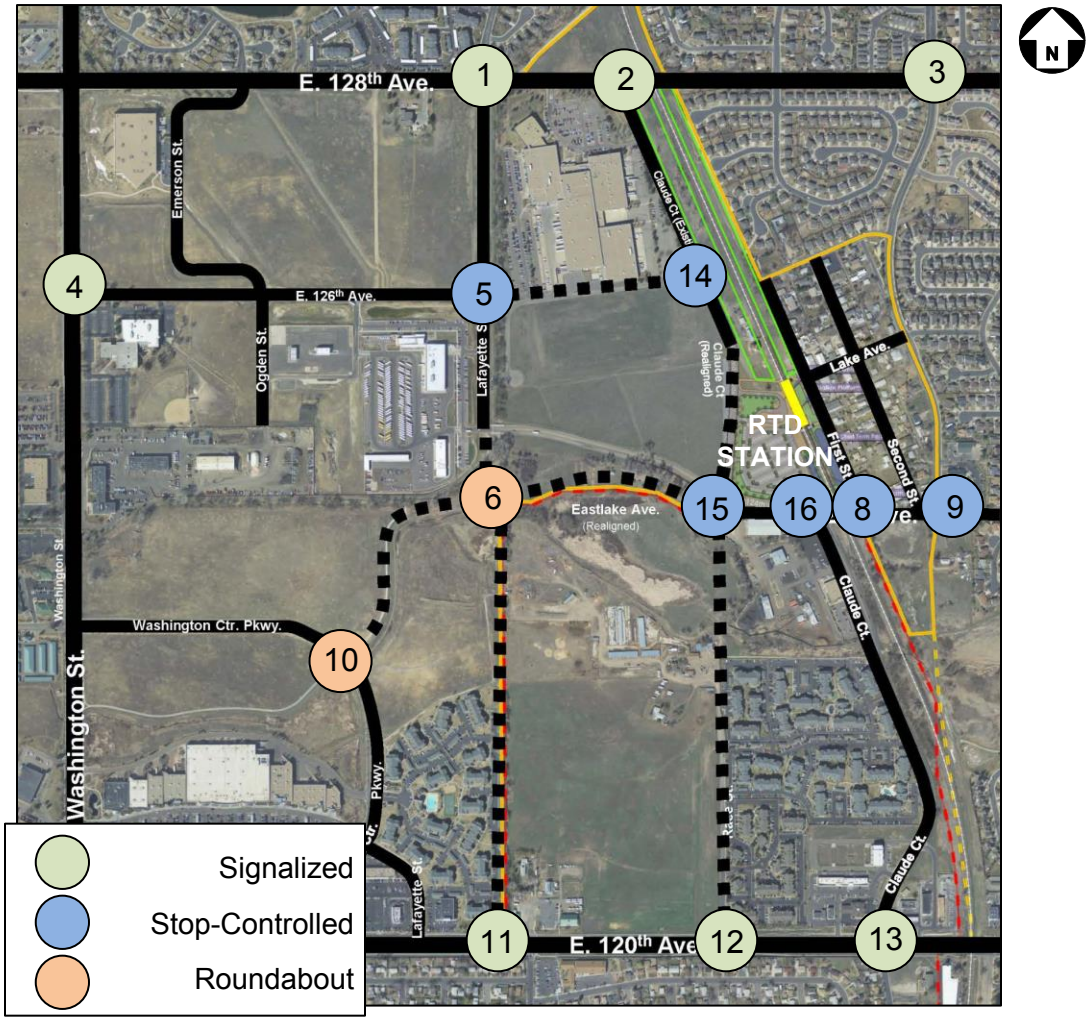


Figure 7
2020 AM Peak Intersection Volumes



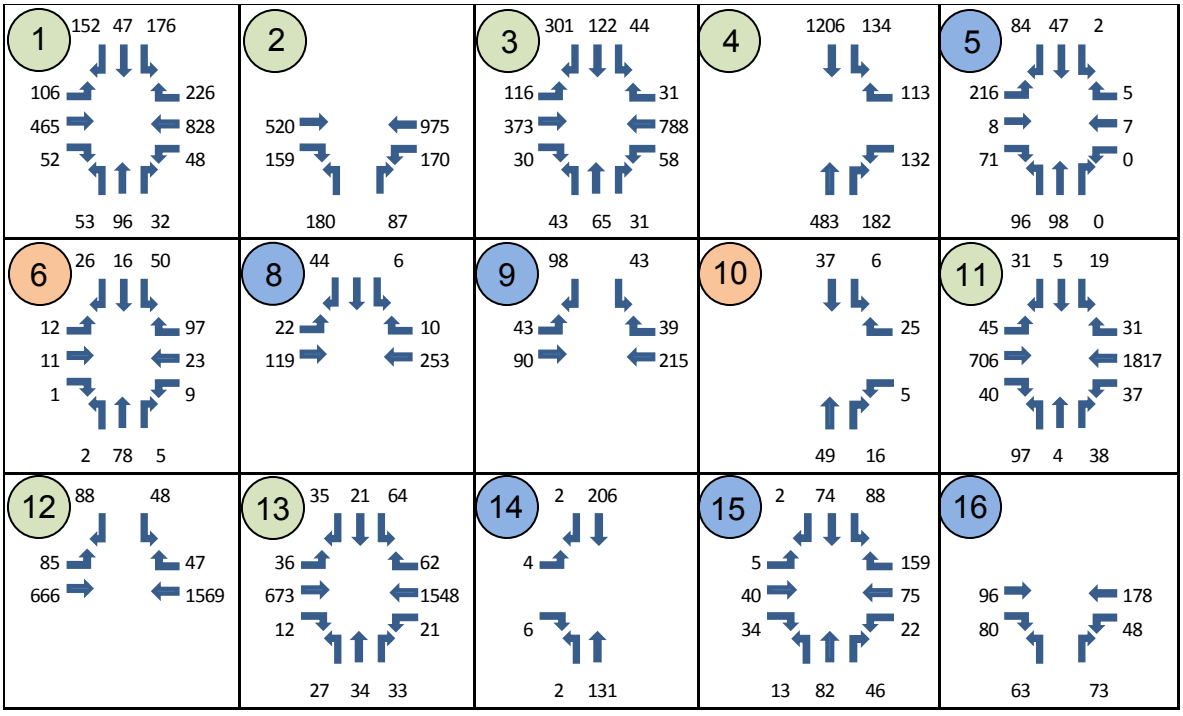
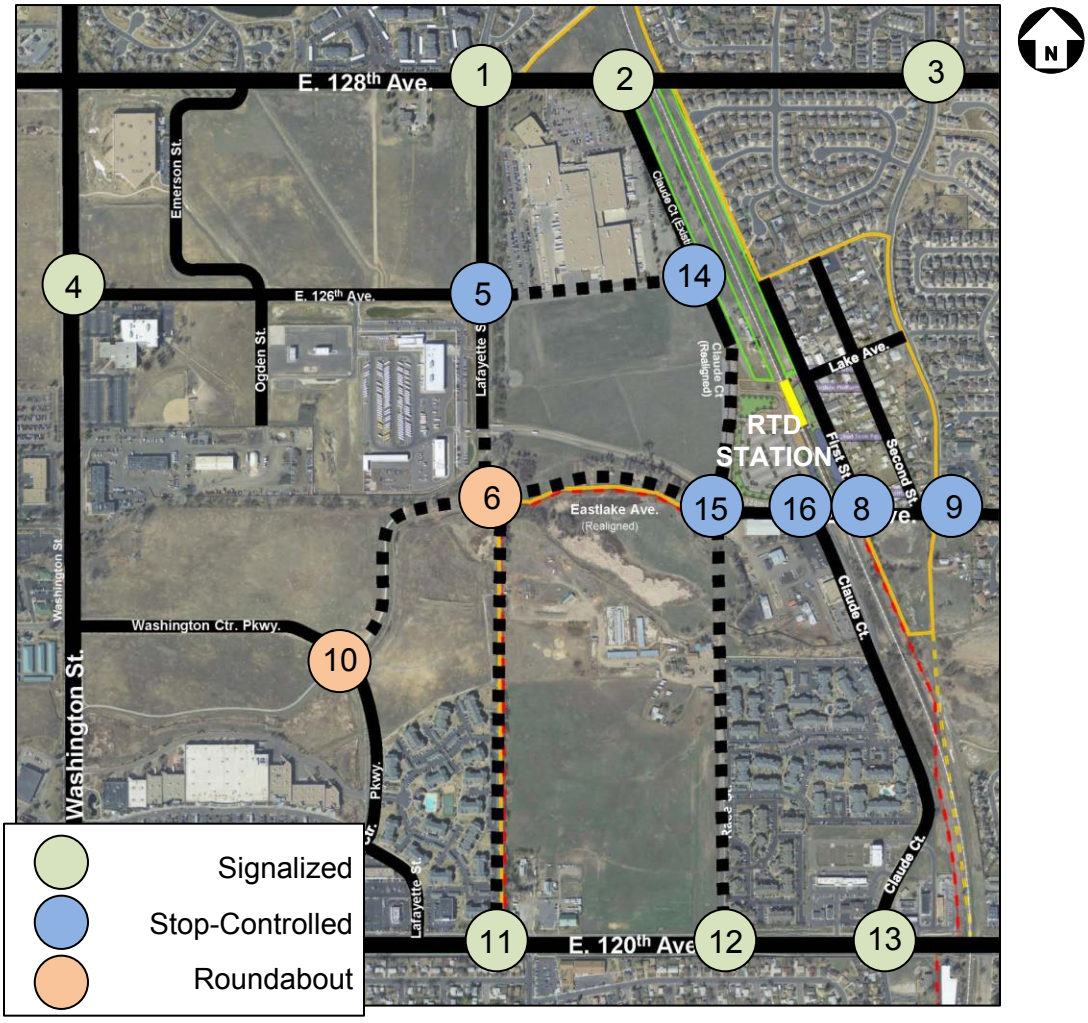


Figure 8
2020 PM Peak Intersection Volumes



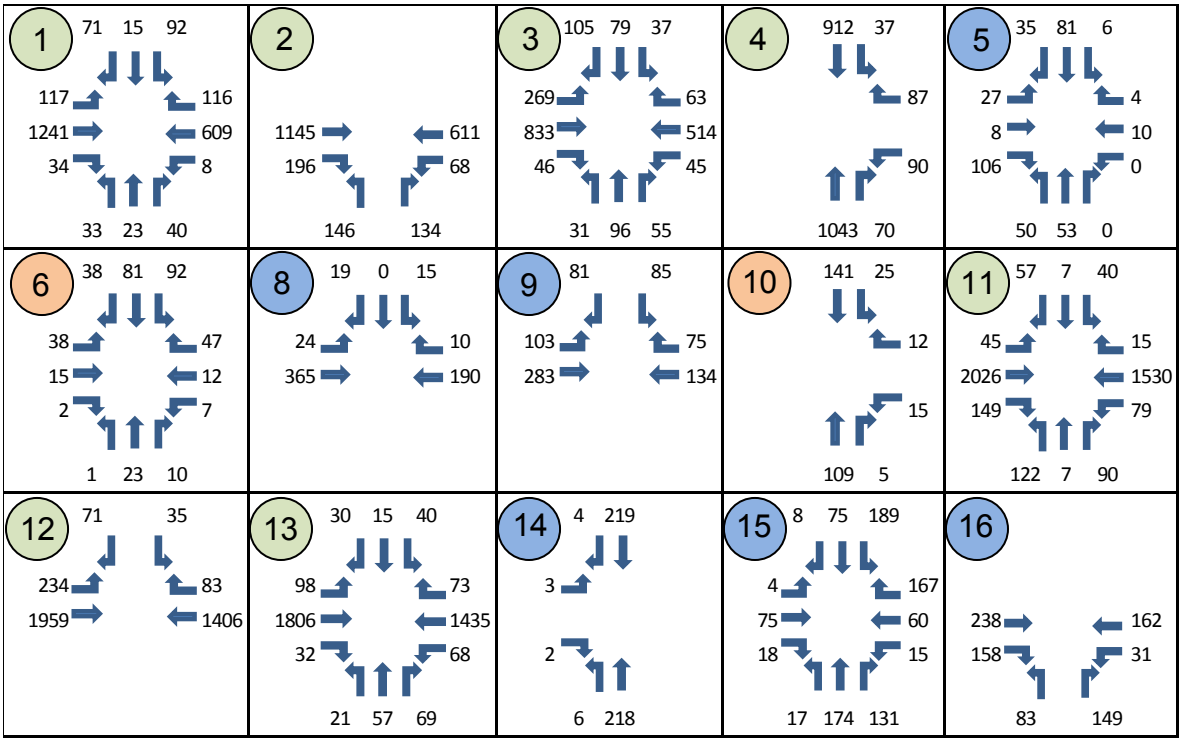
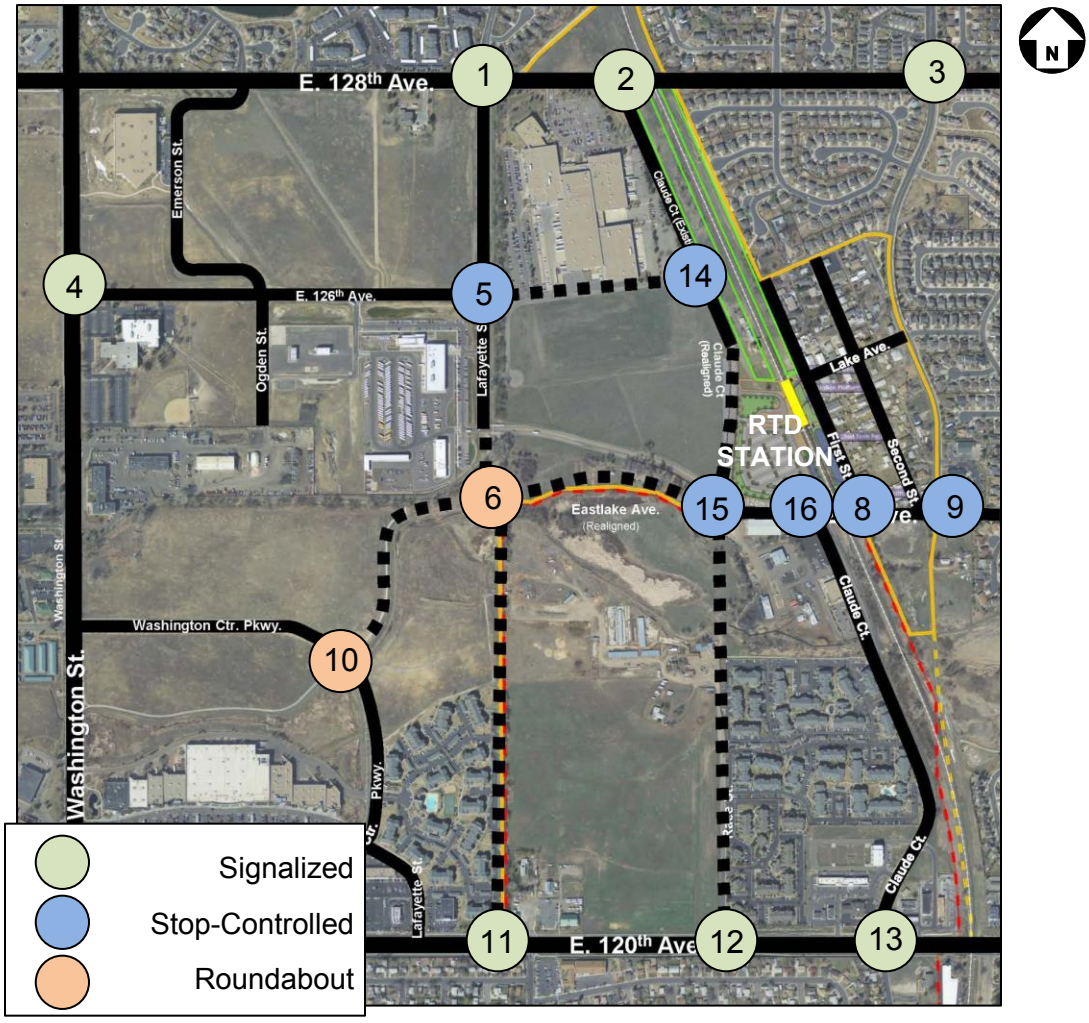


Figure 9
2035 AM Peak Intersection Volumes



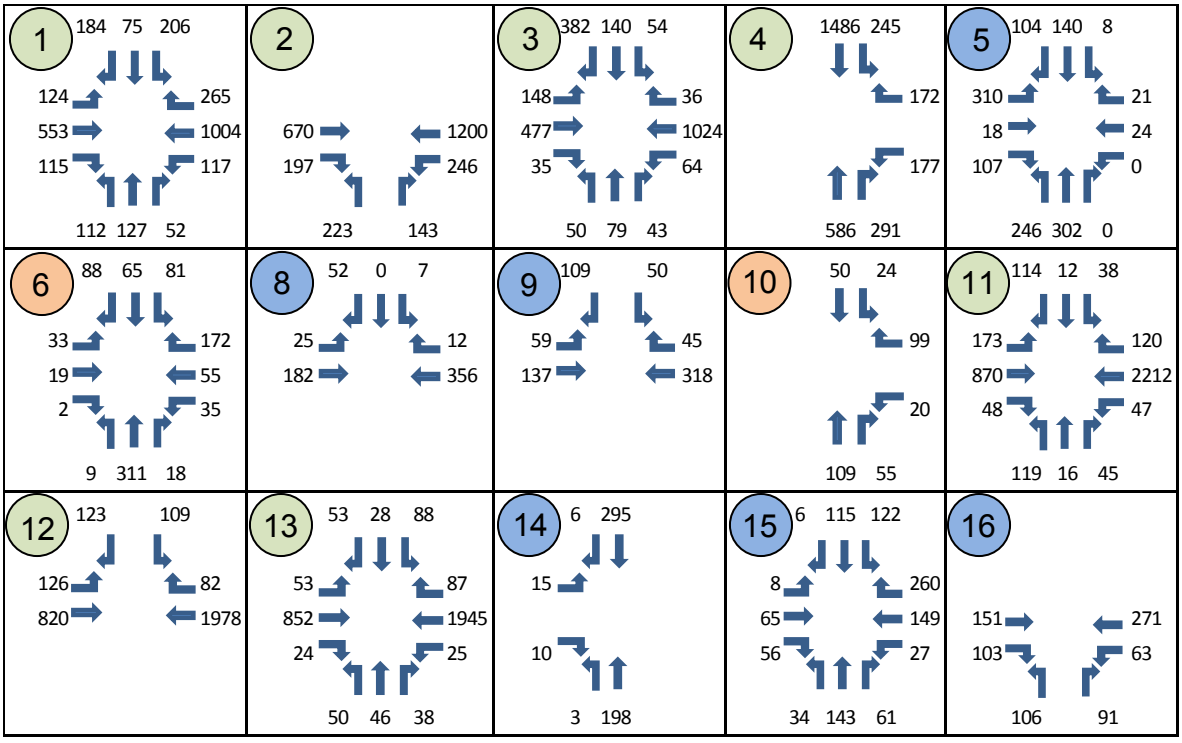
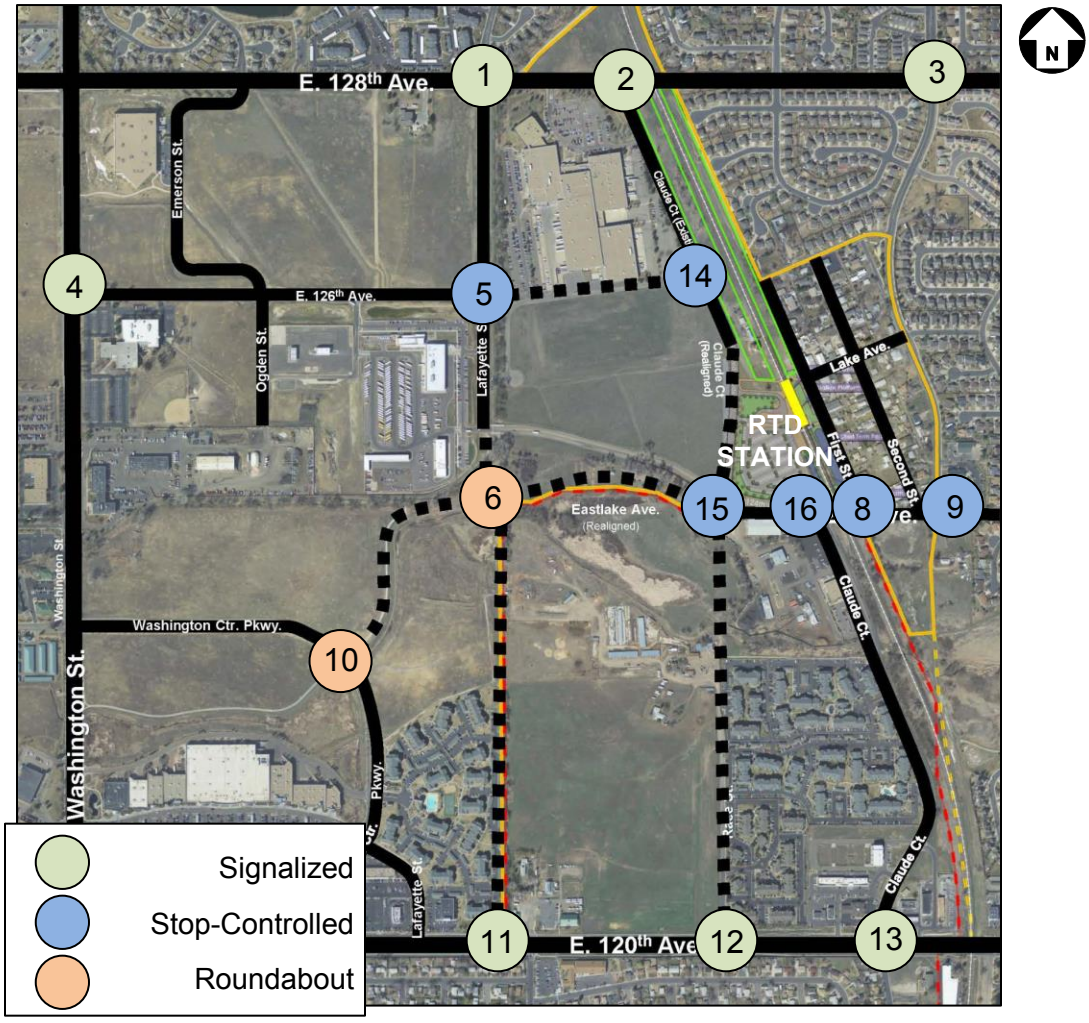


Figure 10
2035 PM Peak Intersection Volumes



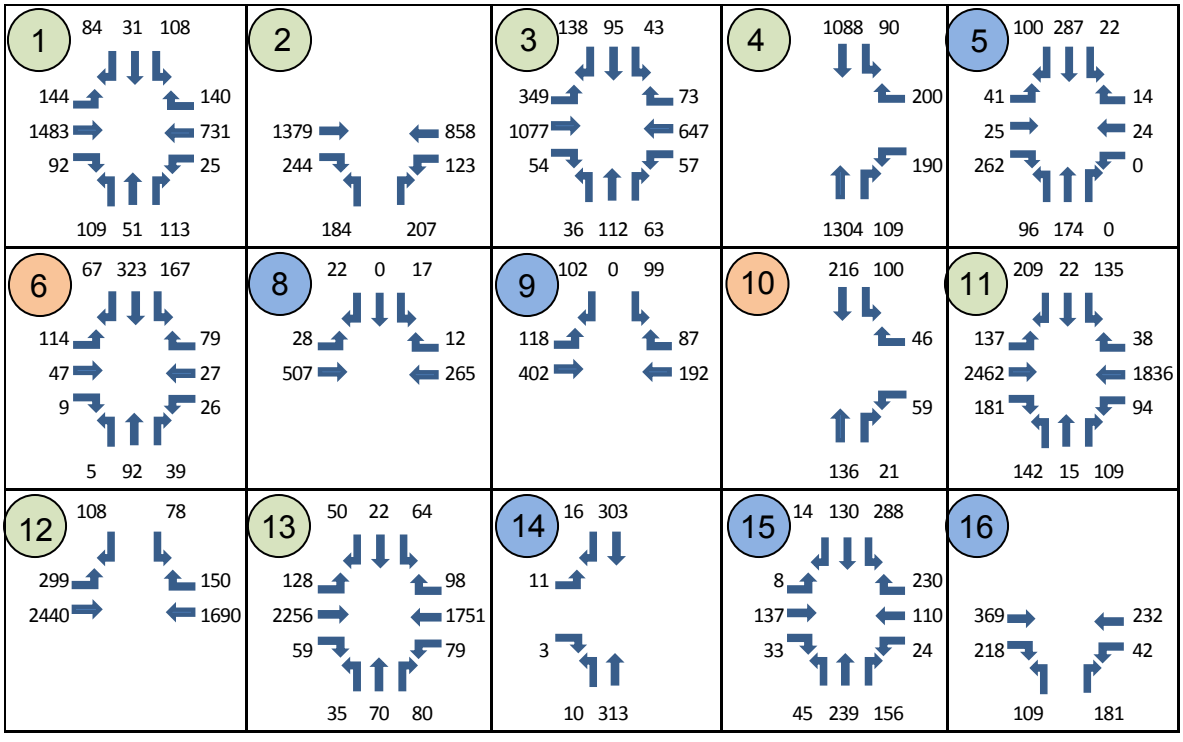
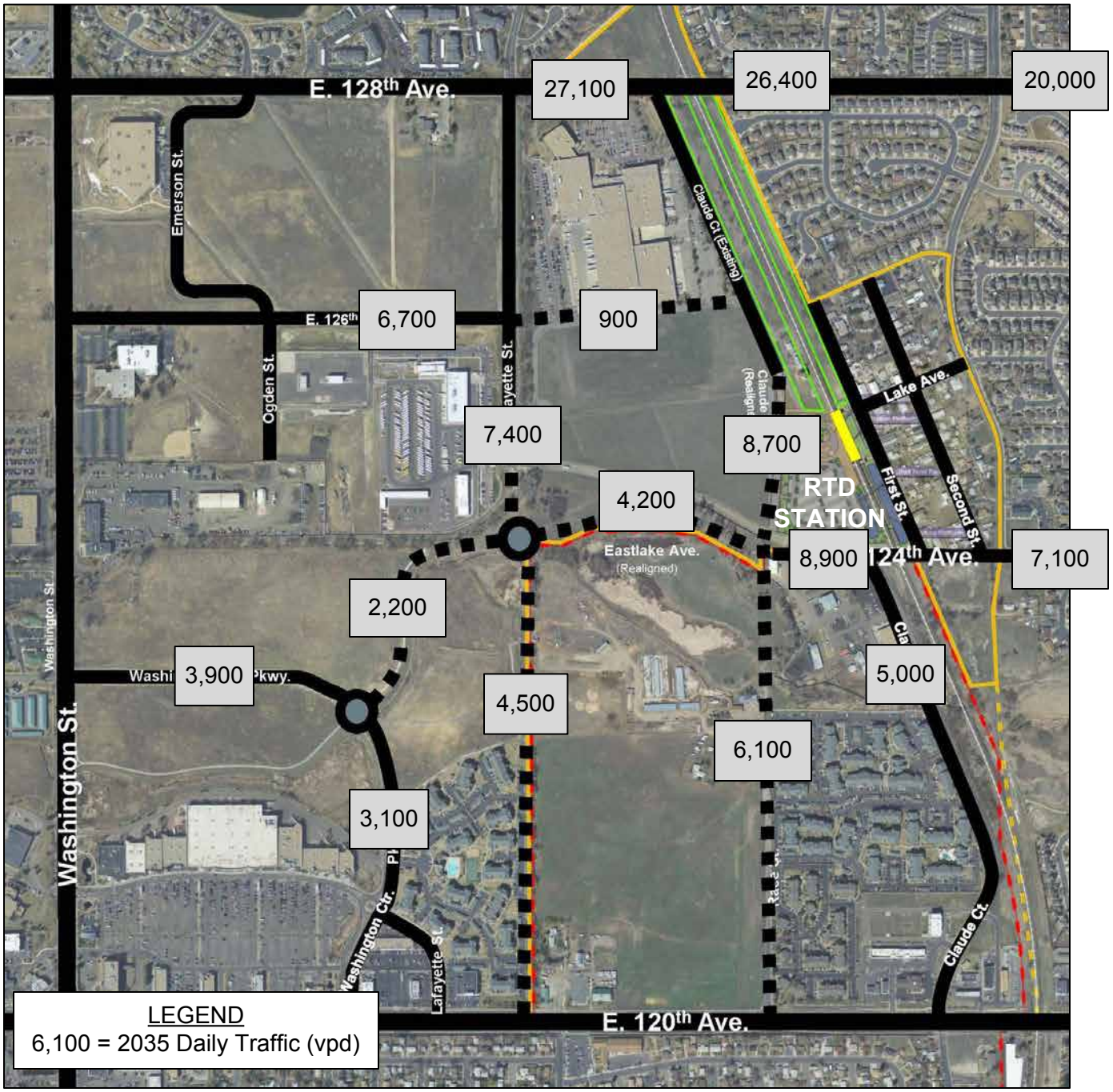


Figure 11
2035 Daily Volumes



Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	1	18	39	0	56	33	62	0	46	31	143
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1	20	42	0	61	36	67	0	50	34	155
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	8.4	9	9
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	18%	0%	32%	0%	35%	0%	98%
Vol Right, %	0%	82%	0%	68%	0%	65%	0%	2%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	46	174	1	57	56	95	41	81
LT Vol	46	0	1	0	56	0	41	0
Through Vol	0	31	0	18	0	33	0	79
RT Vol	0	143	0	39	0	62	0	2
Lane Flow Rate	50	189	1	62	61	103	45	88
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.08	0.246	0.002	0.089	0.102	0.145	0.072	0.13
Departure Headway (Hd)	5.765	4.683	6.14	5.152	6.009	5.046	5.854	5.333
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	620	764	580	691	595	707	610	669
Service Time	3.514	2.432	3.904	2.916	3.764	2.8	3.611	3.09
HCM Lane V/C Ratio	0.081	0.247	0.002	0.09	0.103	0.146	0.074	0.132
HCM Control Delay	9	9	8.9	8.4	9.5	8.7	9.1	8.9
HCM Lane LOS	A	A	A	A	A	A	A	A
HCM 95th-tile Q	0.3	1	0	0.3	0.3	0.5	0.2	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	41	79	2
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	45	86	2
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	9
HCM LOS	A

Lane

HCM 2010 Signalized Intersection Summary
5: York Street & 128th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	103	325	28	40	673	29	40	57	24	40	108	269
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	112	353	30	43	732	32	43	62	26	43	117	292
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	281	782	665	494	782	665	454	261	222	518	261	222
Arrive On Green	0.03	0.14	0.14	0.10	0.42	0.42	0.17	0.14	0.14	0.17	0.14	0.14
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	112	353	30	43	732	32	43	62	26	43	117	292
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.3	17.4	1.6	1.2	37.5	1.2	1.7	3.0	1.4	1.7	5.8	14.0
Cycle Q Clear(g_c), s	3.3	17.4	1.6	1.2	37.5	1.2	1.7	3.0	1.4	1.7	5.8	14.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	281	782	665	494	782	665	454	261	222	518	261	222
V/C Ratio(X)	0.40	0.45	0.05	0.09	0.94	0.05	0.09	0.24	0.12	0.08	0.45	1.32
Avail Cap(c_a), veh/h	281	782	665	494	782	665	454	261	222	518	261	222
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.1	32.5	25.7	13.4	27.7	17.2	24.6	38.3	37.6	24.4	39.5	43.0
Incr Delay (d2), s/veh	4.2	1.9	0.1	0.3	19.8	0.1	0.4	2.1	1.1	0.3	5.5	170.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	9.4	0.7	0.6	23.4	0.5	0.9	1.7	0.7	0.9	3.4	16.6
LnGrp Delay(d),s/veh	26.3	34.4	25.8	13.7	47.6	17.3	25.0	40.4	38.7	24.8	45.0	213.9
LnGrp LOS	C	C	C	B	D	B	C	D	D	C	D	F
Approach Vol, veh/h		495			807			131			452	
Approach Delay, s/veh		32.0			44.6			35.0			152.2	
Approach LOS		C			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	47.0	21.0	18.0	14.0	47.0	21.0	18.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	10.0	42.0	17.0	14.0	10.0	42.0	17.0	14.0
Max Q Clear Time (g_c+I1), s	3.2	19.4	3.7	16.0	5.3	39.5	3.7	5.0
Green Ext Time (p_c), s	0.0	8.2	0.1	0.0	0.1	1.6	0.1	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	66.4
HCM 2010 LOS	E

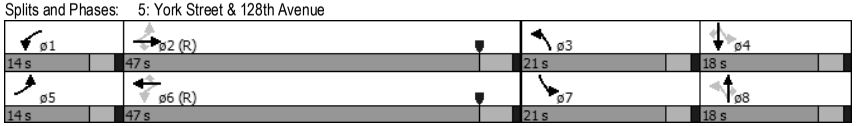
Timing Report, Sorted By Phase
5: York Street & 128th Avenue

8/28/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	14	47	21	18	14	47	21	18
Maximum Split (%)	14.0%	47.0%	21.0%	18.0%	14.0%	47.0%	21.0%	18.0%
Minimum Split (s)	9	10	9.5	30.5	9	10	9.5	30.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	8	22	69	90	8	22	69	90
End Time (s)	22	69	90	8	22	69	90	8
Yield/Force Off (s)	18	64	86	4	18	64	86	4
Yield/Force Off 170(s)	18	64	86	4	18	64	86	4
Local Start Time (s)	44	58	5	26	44	58	5	26
Local Yield (s)	54	0	22	40	54	0	22	40
Local Yield 170(s)	54	0	22	40	54	0	22	40

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	90
Offset: 64 (64%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 5: York Street & 128th Avenue



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	464	130	107	894	160	59
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	504	141	116	972	174	64
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1080	918	617	1378	302	269
Arrive On Green	0.58	0.58	0.24	1.00	0.17	0.17
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583
Grp Volume(v), veh/h	504	141	116	972	174	64
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583
Q Serve(g_s), s	15.6	4.1	1.8	0.0	9.0	3.5
Cycle Q Clear(g_c), s	15.6	4.1	1.8	0.0	9.0	3.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1080	918	617	1378	302	269
V/C Ratio(X)	0.47	0.15	0.19	0.71	0.58	0.24
Avail Cap(c_a), veh/h	1080	918	617	1378	302	269
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.1	9.7	5.1	0.0	38.2	35.9
Incr Delay (d2), s/veh	1.4	0.4	0.7	3.1	7.8	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	1.9	0.9	1.2	5.1	1.7
LnGrp Delay(d),s/veh	13.5	10.0	5.8	3.1	46.0	38.0
LnGrp LOS	B	B	A	A	D	D
Approach Vol, veh/h	645			1088	238	
Approach Delay, s/veh	12.8			3.3	43.8	
Approach LOS	B			A	D	

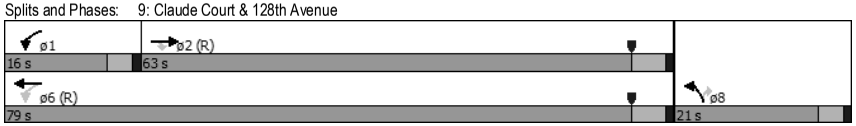
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	16.0	63.0				79.0		21.0
Change Period (Y+Rc), s	4.0	5.0				5.0		4.0
Max Green Setting (Gmax), s	12.0	58.0				74.0		17.0
Max Q Clear Time (g_c+I1), s	3.8	17.6				2.0		11.0
Green Ext Time (p_c), s	0.2	17.0				19.8		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Phase Number	1	2	6	8
Movement	WBL	EBT	WBTL	NBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	16	63	79	21
Maximum Split (%)	16.0%	63.0%	79.0%	21.0%
Minimum Split (s)	9.5	29.5	28.5	27.5
Yellow Time (s)	3	4	4	3
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	No
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	31	47	31	10
End Time (s)	47	10	10	31
Yield/Force Off (s)	43	5	5	27
Yield/Force Off 170(s)	43	5	5	27
Local Start Time (s)	26	42	26	5
Local Yield (s)	38	0	0	22
Local Yield 170(s)	38	0	0	22

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	80
Offset: 5 (5%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	

Splits and Phases: 9: Claude Court & 128th Avenue



HCM 2010 Signalized Intersection Summary
10: Lafayette Street & 128th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	99	422	30	25	757	208	33	85	24	158	37	139
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	108	459	33	27	823	226	36	92	26	172	40	151
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	350	1799	805	541	1281	352	328	245	69	430	86	323
Arrive On Green	0.09	0.51	0.51	0.05	0.47	0.47	0.05	0.17	0.17	0.13	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	2746	754	1774	1398	395	1774	342	1292
Grp Volume(v), veh/h	108	459	33	27	530	519	36	0	118	172	0	191
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1730	1774	0	1793	1774	0	1635
Q Serve(g_s), s	3.3	8.8	1.3	0.9	27.4	27.4	1.9	0.0	7.0	8.8	0.0	11.9
Cycle Q Clear(g_c), s	3.3	8.8	1.3	0.9	27.4	27.4	1.9	0.0	7.0	8.8	0.0	11.9
Prop In Lane	1.00		1.00	1.00		0.44	1.00		0.22	1.00		0.79
Lane Grp Cap(c), veh/h	350	1799	805	541	826	807	328	0	314	430	0	409
V/C Ratio(X)	0.31	0.26	0.04	0.05	0.64	0.64	0.11	0.00	0.38	0.40	0.00	0.47
Avail Cap(c_a), veh/h	350	1799	805	541	826	807	328	0	314	430	0	409
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.1	16.7	14.8	14.3	24.4	24.4	36.8	0.0	43.7	31.4	0.0	38.2
Incr Delay (d2), s/veh	2.3	0.3	0.1	0.2	3.8	3.9	0.7	0.0	3.4	2.8	0.0	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	4.4	0.6	0.5	14.1	13.8	1.0	0.0	3.7	4.6	0.0	5.8
LnGrp Delay(d),s/veh	18.3	17.0	14.9	14.5	28.2	28.3	37.5	0.0	47.1	34.2	0.0	42.0
LnGrp LOS	B	B	B	B	C	C	D		D	C		D
Approach Vol, veh/h		600			1076			154			363	
Approach Delay, s/veh		17.1			27.9			44.9			38.3	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	66.0	10.0	34.0	15.0	61.0	19.0	25.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	6.0	61.0	6.0	30.0	11.0	56.0	15.0	21.0
Max Q Clear Time (g_c+I1), s	2.9	10.8	3.9	13.9	5.3	29.4	10.8	9.0
Green Ext Time (p_c), s	0.0	15.3	0.0	1.6	0.1	12.3	0.2	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	27.9
HCM 2010 LOS	C

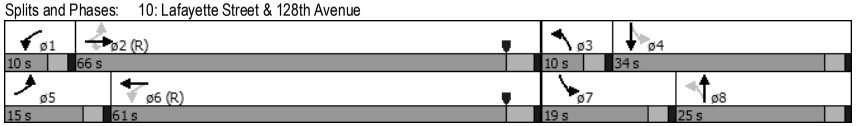
Timing Report, Sorted By Phase
10: Lafayette Street & 128th Avenue

8/28/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	10	66	10	34	15	61	19	25
Maximum Split (%)	8.3%	55.0%	8.3%	28.3%	12.5%	50.8%	15.8%	20.8%
Minimum Split (s)	9.5	27	9.5	28.5	9.5	27	9.5	22.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	49	59	5	15	49	64	5	24
End Time (s)	59	5	15	49	64	5	24	49
Yield/Force Off (s)	55	0	11	45	60	0	20	45
Yield/Force Off 170(s)	55	0	11	45	60	0	20	45
Local Start Time (s)	49	59	5	15	49	64	5	24
Local Yield (s)	55	0	11	45	60	0	20	45
Local Yield 170(s)	55	0	11	45	60	0	20	45

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	75
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 10: Lafayette Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
15: Washington Street & East 126th Avenue

8/28/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	118	92	451	145	95	1119
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	128	100	490	158	103	1216
Adj No. of Lanes	1	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	384	343	1298	581	652	2183
Arrive On Green	0.22	0.22	0.37	0.37	0.18	0.62
Sat Flow, veh/h	1774	1583	3632	1583	1774	3632
Grp Volume(v), veh/h	128	100	490	158	103	1216
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1583	1774	1770
Q Serve(g_s), s	3.7	3.2	6.1	4.2	1.5	12.0
Cycle Q Clear(g_c), s	3.7	3.2	6.1	4.2	1.5	12.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	384	343	1298	581	652	2183
V/C Ratio(X)	0.33	0.29	0.38	0.27	0.16	0.56
Avail Cap(c_a), veh/h	384	343	1298	581	652	2183
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.8	19.6	14.0	13.4	6.2	6.7
Incr Delay (d2), s/veh	2.3	2.1	0.8	1.2	0.5	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.6	3.1	2.0	0.8	6.1
LnGrp Delay(d),s/veh	22.2	21.8	14.8	14.5	6.7	7.7
LnGrp LOS	C	C	B	B	A	A
Approach Vol, veh/h	228		648			1319
Approach Delay, s/veh	22.0		14.7			7.7
Approach LOS	C		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	15.0	28.0				43.0		17.0
Change Period (Y+Rc), s	4.0	6.0				6.0		4.0
Max Green Setting (Gmax), s	11.0	22.0				37.0		13.0
Max Q Clear Time (g_c+I1), s	3.5	8.1				14.0		5.7
Green Ext Time (p_c), s	0.1	9.9				14.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

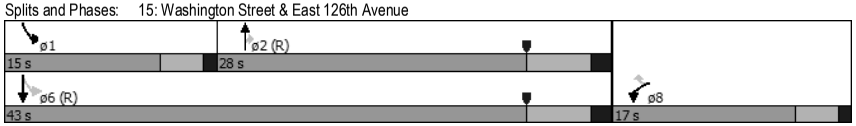
Timing Report, Sorted By Phase
15: Washington Street & East 126th Avenue

8/28/2015

Phase Number	1	2	6	8
Movement	SBL	NBT	SBTL	WBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	15	28	43	17
Maximum Split (%)	25.0%	46.7%	71.7%	28.3%
Minimum Split (s)	9.5	27	24	29
Yellow Time (s)	3	4.5	4.5	3
All-Red Time (s)	1	1.5	1.5	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	23	38	23	6
End Time (s)	38	6	6	23
Yield/Force Off (s)	34	0	0	19
Yield/Force Off 170(s)	34	0	0	19
Local Start Time (s)	23	38	23	6
Local Yield (s)	34	0	0	19
Local Yield 170(s)	34	0	0	19

Intersection Summary	
Cycle Length	60
Control Type	Pretimed
Natural Cycle	70
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow	

Splits and Phases: 15: Washington Street & East 126th Avenue



HCM 2010 Signalized Intersection Summary
17: Claude Court & 120th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	79	592	8	20	1387	68	19	25	31	82	33	196
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	86	643	9	22	1508	74	21	27	34	89	36	213
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	262	2124	950	531	2035	910	277	156	197	299	388	330
Arrive On Green	0.07	0.60	0.60	0.04	0.57	0.57	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1126	751	945	1336	1863	1583
Grp Volume(v), veh/h	86	643	9	22	1508	74	21	0	61	89	36	213
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1126	0	1696	1336	1863	1583
Q Serve(g_s), s	2.2	10.7	0.3	0.6	37.9	2.5	1.8	0.0	3.5	7.0	1.9	14.8
Cycle Q Clear(g_c), s	2.2	10.7	0.3	0.6	37.9	2.5	3.7	0.0	3.5	10.6	1.9	14.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.56	1.00		1.00
Lane Grp Cap(c), veh/h	262	2124	950	531	2035	910	277	0	353	299	388	330
V/C Ratio(X)	0.33	0.30	0.01	0.04	0.74	0.08	0.08	0.00	0.17	0.30	0.09	0.65
Avail Cap(c_a), veh/h	262	2124	950	531	2035	910	277	0	353	299	388	330
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.2	11.7	9.7	9.2	18.9	11.4	39.8	0.0	39.0	43.4	38.3	43.4
Incr Delay (d2), s/veh	3.3	0.4	0.0	0.1	2.5	0.2	0.5	0.0	1.1	2.5	0.5	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	5.3	0.1	0.3	19.1	1.1	0.6	0.0	1.8	2.8	1.0	7.3
LnGrp Delay(d),s/veh	19.6	12.1	9.7	9.3	21.4	11.5	40.4	0.0	40.1	45.9	38.8	52.8
LnGrp LOS	B	B	A	A	C	B	D		D	D	D	D
Approach Vol, veh/h		738			1604			82			338	
Approach Delay, s/veh		12.9			20.7			40.1			49.5	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		31.0	11.0	78.0		31.0	14.0	75.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		25.0	5.0	72.0		25.0	8.0	69.0
Max Q Clear Time (g_c+I1), s		5.7	2.6	12.7		16.8	4.2	39.9
Green Ext Time (p_c), s		1.5	0.0	31.8		1.1	0.1	20.6

Intersection Summary	
HCM 2010 Ctrl Delay	22.8
HCM 2010 LOS	C

Timing Report, Sorted By Phase
17: Claude Court & 120th Avenue

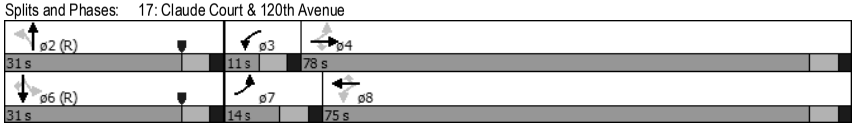
8/28/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize						
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	31	11	78	31	14	75
Maximum Split (%)	25.8%	9.2%	65.0%	25.8%	11.7%	62.5%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	95	6	17	95	6	20
End Time (s)	6	17	95	6	20	95
Yield/Force Off (s)	0	11	89	0	14	89
Yield/Force Off 170(s)	109	11	78	109	14	78
Local Start Time (s)	95	6	17	95	6	20
Local Yield (s)	0	11	89	0	14	89
Local Yield 170(s)	109	11	78	109	14	78

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	75

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

Splits and Phases: 17: Claude Court & 120th Avenue



HCM 2010 Signalized Intersection Summary
28: Urma Street & 120th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	634	37	34	1672	1	89	0	36	13	2	4
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	2	689	40	37	1817	1	97	0	39	14	2	4
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	300	2300	1029	543	2300	1029	278	0	251	247	88	176
Arrive On Green	0.04	0.65	0.65	0.08	1.00	1.00	0.16	0.00	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1404	0	1583	1363	556	1111
Grp Volume(v), veh/h	2	689	40	37	1817	1	97	0	39	14	0	6
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1404	0	1583	1363	0	1667
Q Serve(g_s), s	0.0	10.2	1.1	0.8	0.0	0.0	7.5	0.0	2.6	1.1	0.0	0.4
Cycle Q Clear(g_c), s	0.0	10.2	1.1	0.8	0.0	0.0	7.9	0.0	2.6	3.6	0.0	0.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.67
Lane Grp Cap(c), veh/h	300	2300	1029	543	2300	1029	278	0	251	247	0	264
V/C Ratio(X)	0.01	0.30	0.04	0.07	0.79	0.00	0.35	0.00	0.16	0.06	0.00	0.02
Avail Cap(c_a), veh/h	300	2300	1029	543	2300	1029	278	0	251	247	0	264
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	5.7	9.1	7.5	6.0	0.0	0.0	46.0	0.0	43.6	45.1	0.0	42.7
Incr Delay (d2), s/veh	0.0	0.3	0.1	0.2	2.9	0.0	3.4	0.0	1.3	0.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	5.0	0.5	0.4	0.9	0.0	3.2	0.0	1.2	0.4	0.0	0.2
LnGrp Delay(d),s/veh	5.8	9.5	7.6	6.2	2.9	0.0	49.4	0.0	44.9	45.6	0.0	42.8
LnGrp LOS	A	A	A	A	A	A	D		D	D		D
Approach Vol, veh/h		731			1855			136			20	
Approach Delay, s/veh		9.3			2.9			48.1			44.8	
Approach LOS		A			A			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		25.0	11.0	84.0		25.0	11.0	84.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		19.0	5.0	78.0		19.0	5.0	78.0
Max Q Clear Time (g_c+I1), s		9.9	2.8	12.2		5.6	2.0	2.0
Green Ext Time (p_c), s		0.3	0.0	42.8		0.4	0.0	46.6

Intersection Summary	
HCM 2010 Ctrl Delay	7.2
HCM 2010 LOS	A

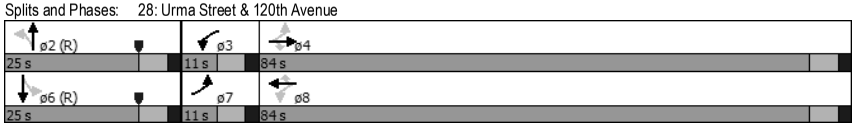
Timing Report, Sorted By Phase
28: Urma Street & 120th Avenue

8/28/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize		Yes	Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	25	11	84	25	11	84
Maximum Split (%)	20.8%	9.2%	70.0%	20.8%	9.2%	70.0%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	46	71	82	46	71	82
End Time (s)	71	82	46	71	82	46
Yield/Force Off (s)	65	76	40	65	76	40
Yield/Force Off 170(s)	54	76	29	54	76	29
Local Start Time (s)	101	6	17	101	6	17
Local Yield (s)	0	11	95	0	11	95
Local Yield 170(s)	109	11	84	109	11	84

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	90
Offset: 65 (54%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	

Splits and Phases: 28: Urma Street & 120th Avenue



Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	19	70	162	9	5	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	55	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	21	76	176	10	5	42

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	186	0	-	0	298	181
Stage 1	-	-	-	-	181	-
Stage 2	-	-	-	-	117	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1388	-	-	-	693	862
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	908	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1388	-	-	-	683	862
Mov Cap-2 Maneuver	-	-	-	-	683	-
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	894	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1388	-	-	-	837
HCM Lane V/C Ratio	0.015	-	-	-	0.057
HCM Control Delay (s)	7.6	-	-	-	9.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	30	63	148	34	38	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	75	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	68	161	37	41	73

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	161	0	-	0	295	161
Stage 1	-	-	-	-	161	-
Stage 2	-	-	-	-	134	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1418	-	-	-	696	884
Stage 1	-	-	-	-	868	-
Stage 2	-	-	-	-	892	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1418	-	-	-	680	884
Mov Cap-2 Maneuver	-	-	-	-	680	-
Stage 1	-	-	-	-	868	-
Stage 2	-	-	-	-	871	-

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	10.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1418	-	-	-	797
HCM Lane V/C Ratio	0.023	-	-	-	0.143
HCM Control Delay (s)	7.6	-	-	-	10.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	8	661	1641	7	9	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	718	1784	8	10	53

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1784	0	-	0	2161	892
Stage 1	-	-	-	-	1784	-
Stage 2	-	-	-	-	377	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	344	-	-	-	40	285
Stage 1	-	-	-	-	120	-
Stage 2	-	-	-	-	663	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	344	-	-	-	39	285
Mov Cap-2 Maneuver	-	-	-	-	39	-
Stage 1	-	-	-	-	120	-
Stage 2	-	-	-	-	646	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	48.2
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	344	-	-	-	144
HCM Lane V/C Ratio	0.025	-	-	-	0.438
HCM Control Delay (s)	15.7	-	-	-	48.2
HCM Lane LOS	C	-	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	2

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	3	46	20	0	34	17	54	0	34	80	151
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	3	50	22	0	37	18	59	0	37	87	164
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	9.1	9	9.8
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	35%	0%	70%	0%	24%	0%	94%
Vol Right, %	0%	65%	0%	30%	0%	76%	0%	6%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	34	231	3	66	34	71	99	70
LT Vol	34	0	3	0	34	0	99	0
Through Vol	0	80	0	46	0	17	0	66
RT Vol	0	151	0	20	0	54	0	4
Lane Flow Rate	37	251	3	72	37	77	108	76
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.059	0.333	0.006	0.112	0.064	0.112	0.174	0.111
Departure Headway (Hd)	5.74	4.778	6.33	5.611	6.277	5.235	5.814	5.27
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	622	748	562	634	568	679	614	676
Service Time	3.497	2.534	4.107	3.387	4.05	3.007	3.577	3.033
HCM Lane V/C Ratio	0.059	0.336	0.005	0.114	0.065	0.113	0.176	0.112
HCM Control Delay	8.9	9.9	9.1	9.1	9.5	8.7	9.8	8.7
HCM Lane LOS	A	A	A	A	A	A	A	A
HCM 95th-tile Q	0.2	1.5	0	0.4	0.2	0.4	0.6	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	99	66	4
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	108	72	4
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	9.3
HCM LOS	A

Lane

HCM 2010 Signalized Intersection Summary
5: York Street & 128th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	237	712	43	36	452	59	29	84	38	34	70	93
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	258	774	47	39	491	64	32	91	41	37	76	101
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	371	745	633	214	745	633	506	484	412	510	484	412
Arrive On Green	0.05	0.27	0.27	0.08	0.40	0.40	0.09	0.26	0.26	0.09	0.26	0.26
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	258	774	47	39	491	64	32	91	41	37	76	101
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	8.0	40.0	2.2	1.2	21.5	2.5	1.2	3.8	2.0	1.4	3.1	5.0
Cycle Q Clear(g_c), s	8.0	40.0	2.2	1.2	21.5	2.5	1.2	3.8	2.0	1.4	3.1	5.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	371	745	633	214	745	633	506	484	412	510	484	412
V/C Ratio(X)	0.69	1.04	0.07	0.18	0.66	0.10	0.06	0.19	0.10	0.07	0.16	0.25
Avail Cap(c_a), veh/h	371	745	633	214	745	633	506	484	412	510	484	412
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.9	36.6	22.8	21.8	24.4	18.8	21.6	28.8	28.1	21.6	28.5	29.2
Incr Delay (d2), s/veh	10.3	43.4	0.2	1.9	4.5	0.3	0.2	0.9	0.5	0.3	0.7	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	29.6	1.0	0.7	12.0	1.2	0.6	2.1	0.9	0.7	1.7	2.4
LnGrp Delay(d),s/veh	31.1	80.0	23.0	23.7	29.0	19.1	21.8	29.6	28.6	21.9	29.2	30.7
LnGrp LOS	C	F	C	C	C	B	C	C	C	C	C	C
Approach Vol, veh/h		1079			594			164			214	
Approach Delay, s/veh		65.9			27.6			27.9			28.6	
Approach LOS		E			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	45.0	13.0	30.0	12.0	45.0	13.0	30.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	8.0	40.0	9.0	26.0	8.0	40.0	9.0	26.0
Max Q Clear Time (g_c+I1), s	3.2	42.0	3.2	7.0	10.0	23.5	3.4	5.8
Green Ext Time (p_c), s	0.0	0.0	0.0	1.3	0.0	8.5	0.0	1.3

Intersection Summary	
HCM 2010 Ctrl Delay	47.9
HCM 2010 LOS	D

Timing Report, Sorted By Phase
5: York Street & 128th Avenue

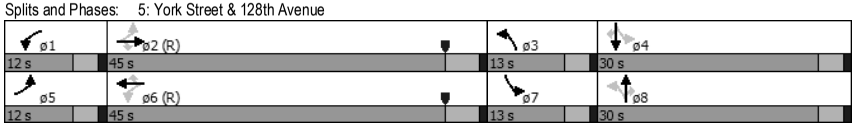
8/28/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	12	45	13	30	12	45	13	30
Maximum Split (%)	12.0%	45.0%	13.0%	30.0%	12.0%	45.0%	13.0%	30.0%
Minimum Split (s)	9	10	9.5	30.5	9	10	9.5	30.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	6	18	63	76	6	18	63	76
End Time (s)	18	63	76	6	18	63	76	6
Yield/Force Off (s)	14	58	72	2	14	58	72	2
Yield/Force Off 170(s)	14	58	72	2	14	58	72	2
Local Start Time (s)	48	60	5	18	48	60	5	18
Local Yield (s)	56	0	14	44	56	0	14	44
Local Yield 170(s)	56	0	14	44	56	0	14	44

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	90

Offset: 58 (58%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Splits and Phases: 5: York Street & 128th Avenue



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1052	174	37	548	120	75
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1143	189	40	596	130	82
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1080	918	285	1378	302	269
Arrive On Green	1.00	1.00	0.24	1.00	0.17	0.17
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583
Grp Volume(v), veh/h	1143	189	40	596	130	82
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583
Q Serve(g_s), s	58.0	0.0	0.6	0.0	6.6	4.5
Cycle Q Clear(g_c), s	58.0	0.0	0.6	0.0	6.6	4.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1080	918	285	1378	302	269
V/C Ratio(X)	1.06	0.21	0.14	0.43	0.43	0.30
Avail Cap(c_a), veh/h	1080	918	285	1378	302	269
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	19.0	0.0	37.2	36.3
Incr Delay (d2), s/veh	44.1	0.5	1.0	1.0	4.4	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.2	0.1	0.7	0.4	3.6	2.2
LnGrp Delay(d),s/veh	44.1	0.5	20.0	1.0	41.6	39.2
LnGrp LOS	F	A	C	A	D	D
Approach Vol, veh/h	1332			636	212	
Approach Delay, s/veh	37.9			2.2	40.7	
Approach LOS	D			A	D	

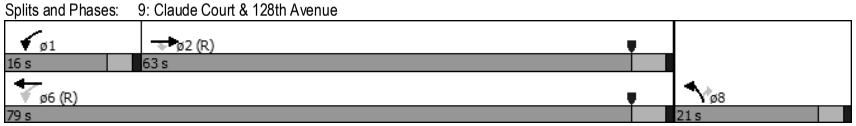
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	16.0	63.0				79.0		21.0
Change Period (Y+Rc), s	4.0	5.0				5.0		4.0
Max Green Setting (Gmax), s	12.0	58.0				74.0		17.0
Max Q Clear Time (g_c+I1), s	2.6	60.0				2.0		8.6
Green Ext Time (p_c), s	0.0	0.0				29.9		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	27.7
HCM 2010 LOS	C

Phase Number	1	2	6	8
Movement	WBL	EBT	WBTL	NBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	16	63	79	21
Maximum Split (%)	16.0%	63.0%	79.0%	21.0%
Minimum Split (s)	9.5	29.5	28.5	27.5
Yellow Time (s)	3	4	4	3
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	No
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	55	71	55	34
End Time (s)	71	34	34	55
Yield/Force Off (s)	67	29	29	51
Yield/Force Off 170(s)	67	29	29	51
Local Start Time (s)	26	42	26	5
Local Yield (s)	38	0	0	22
Local Yield 170(s)	38	0	0	22

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	110
Offset: 29 (29%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	

Splits and Phases: 9: Claude Court & 128th Avenue



HCM 2010 Signalized Intersection Summary
10: Lafayette Street & 128th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	107	1141	15	1	557	103	8	13	16	83	9	66
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	116	1240	16	1	605	112	9	14	17	90	10	72
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	501	1486	665	243	1044	193	511	184	224	559	47	340
Arrive On Green	0.14	0.42	0.42	0.14	0.70	0.70	0.10	0.24	0.24	0.10	0.24	0.24
Sat Flow, veh/h	1774	3539	1583	1774	2984	551	1774	767	931	1774	197	1416
Grp Volume(v), veh/h	116	1240	16	1	358	359	9	0	31	90	0	82
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1765	1774	0	1698	1774	0	1613
Q Serve(g_s), s	3.4	31.3	0.6	0.0	10.2	10.3	0.3	0.0	1.4	3.5	0.0	4.1
Cycle Q Clear(g_c), s	3.4	31.3	0.6	0.0	10.2	10.3	0.3	0.0	1.4	3.5	0.0	4.1
Prop In Lane	1.00		1.00	1.00		0.31	1.00		0.55	1.00		0.88
Lane Grp Cap(c), veh/h	501	1486	665	243	619	618	511	0	408	559	0	387
V/C Ratio(X)	0.23	0.83	0.02	0.00	0.58	0.58	0.02	0.00	0.08	0.16	0.00	0.21
Avail Cap(c_a), veh/h	501	1486	665	243	619	618	511	0	408	559	0	387
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.7	25.9	17.0	18.3	11.3	11.3	22.0	0.0	29.4	23.0	0.0	30.4
Incr Delay (d2), s/veh	1.1	5.7	0.1	0.0	3.9	3.9	0.1	0.0	0.4	0.6	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	16.3	0.3	0.0	5.4	5.5	0.2	0.0	0.7	1.8	0.0	2.0
LnGrp Delay(d),s/veh	14.8	31.6	17.1	18.3	15.2	15.2	22.0	0.0	29.8	23.6	0.0	31.7
LnGrp LOS	B	C	B	B	B	B	C		C	C		C
Approach Vol, veh/h		1372			718			40			172	
Approach Delay, s/veh		30.0			15.2			28.0			27.4	
Approach LOS		C			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	47.0	14.0	28.0	18.0	40.0	14.0	28.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	7.0	42.0	10.0	24.0	14.0	35.0	10.0	24.0
Max Q Clear Time (g_c+I1), s	2.0	33.3	2.3	6.1	5.4	12.3	5.5	3.4
Green Ext Time (p_c), s	0.0	7.0	0.0	0.5	0.2	15.0	0.1	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	25.1
HCM 2010 LOS	C

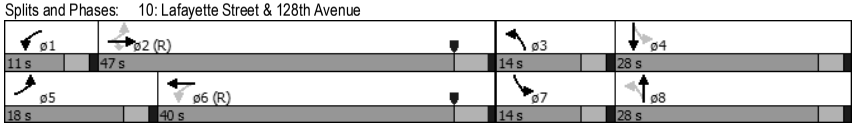
Timing Report, Sorted By Phase
10: Lafayette Street & 128th Avenue

8/28/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	11	47	14	28	18	40	14	28
Maximum Split (%)	11.0%	47.0%	14.0%	28.0%	18.0%	40.0%	14.0%	28.0%
Minimum Split (s)	9.5	27	9.5	28.5	9.5	27	9.5	22.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	56	67	14	28	56	74	14	28
End Time (s)	67	14	28	56	74	14	28	56
Yield/Force Off (s)	63	9	24	52	70	9	24	52
Yield/Force Off 170(s)	63	9	24	52	70	9	24	52
Local Start Time (s)	47	58	5	19	47	65	5	19
Local Yield (s)	54	0	15	43	61	0	15	43
Local Yield 170(s)	54	0	15	43	61	0	15	43

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	80
Offset: 9 (9%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 10: Lafayette Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
15: Washington Street & East 126th Avenue

8/28/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	55	47	961	57	18	858
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	60	51	1045	62	20	933
Adj No. of Lanes	1	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	266	237	2088	934	497	2654
Arrive On Green	0.15	0.15	0.59	0.59	0.12	0.75
Sat Flow, veh/h	1774	1583	3632	1583	1774	3632
Grp Volume(v), veh/h	60	51	1045	62	20	933
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1583	1774	1770
Q Serve(g_s), s	3.0	2.8	17.2	1.7	0.3	8.9
Cycle Q Clear(g_c), s	3.0	2.8	17.2	1.7	0.3	8.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	266	237	2088	934	497	2654
V/C Ratio(X)	0.23	0.21	0.50	0.07	0.04	0.35
Avail Cap(c_a), veh/h	266	237	2088	934	497	2654
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.4	37.3	11.9	8.7	5.6	4.2
Incr Delay (d2), s/veh	2.0	2.1	0.9	0.1	0.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	1.4	8.5	0.8	0.2	4.4
LnGrp Delay(d),s/veh	39.3	39.4	12.8	8.9	5.8	4.6
LnGrp LOS	D	D	B	A	A	A
Approach Vol, veh/h	111		1107			953
Approach Delay, s/veh	39.4		12.6			4.6
Approach LOS	D		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	16.0	65.0				81.0		19.0
Change Period (Y+Rc), s	4.0	6.0				6.0		4.0
Max Green Setting (Gmax), s	12.0	59.0				75.0		15.0
Max Q Clear Time (g_c+I1), s	2.3	19.2				10.9		5.0
Green Ext Time (p_c), s	0.0	22.1				27.3		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	10.5
HCM 2010 LOS	B

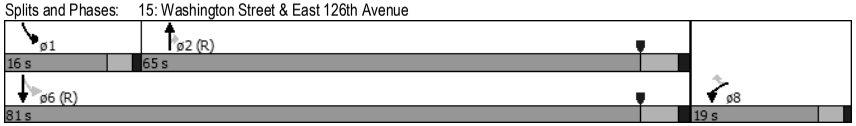
Timing Report, Sorted By Phase
15: Washington Street & East 126th Avenue

8/28/2015

Phase Number	1	2	6	8
Movement	SBL	NBT	SBTL	WBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	16	65	81	19
Maximum Split (%)	16.0%	65.0%	81.0%	19.0%
Minimum Split (s)	9.5	27	24	29
Yellow Time (s)	3	4.5	4.5	3
All-Red Time (s)	1	1.5	1.5	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	25	41	25	6
End Time (s)	41	6	6	25
Yield/Force Off (s)	37	0	0	21
Yield/Force Off 170(s)	37	0	0	21
Local Start Time (s)	25	41	25	6
Local Yield (s)	37	0	0	21
Local Yield 170(s)	37	0	0	21

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	70
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow	

Splits and Phases: 15: Washington Street & East 126th Avenue



HCM 2010 Signalized Intersection Summary
17: Claude Court & 120th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	255	1635	23	64	1293	93	16	51	65	130	47	180
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	277	1777	25	70	1405	101	17	55	71	141	51	196
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	425	2153	963	217	1652	739	260	148	191	231	373	317
Arrive On Green	0.24	0.81	0.81	0.04	0.47	0.47	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1128	740	955	1260	1863	1583
Grp Volume(v), veh/h	277	1777	25	70	1405	101	17	0	126	141	51	196
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1128	0	1694	1260	1863	1583
Q Serve(g_s), s	9.3	34.6	0.4	2.4	42.1	4.4	1.5	0.0	7.7	13.1	2.7	13.6
Cycle Q Clear(g_c), s	9.3	34.6	0.4	2.4	42.1	4.4	4.2	0.0	7.7	20.8	2.7	13.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.56	1.00		1.00
Lane Grp Cap(c), veh/h	425	2153	963	217	1652	739	260	0	339	231	373	317
V/C Ratio(X)	0.65	0.83	0.03	0.32	0.85	0.14	0.07	0.00	0.37	0.61	0.14	0.62
Avail Cap(c_a), veh/h	425	2153	963	217	1652	739	260	0	339	231	373	317
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.4	7.8	4.5	16.9	28.3	18.2	41.2	0.0	41.5	50.5	39.5	43.8
Incr Delay (d2), s/veh	7.5	3.8	0.0	3.9	5.7	0.4	0.5	0.0	3.1	11.5	0.8	8.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	17.3	0.2	1.4	21.8	2.0	0.5	0.0	3.9	5.3	1.5	6.7
LnGrp Delay(d),s/veh	31.0	11.6	4.6	20.8	34.0	18.6	41.7	0.0	44.6	61.9	40.2	52.6
LnGrp LOS	C	B	A	C	C	B	D		D	E	D	D
Approach Vol, veh/h		2079			1576			143			388	
Approach Delay, s/veh		14.1			32.4			44.3			54.4	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		30.0	11.0	79.0		30.0	28.0	62.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		24.0	5.0	73.0		24.0	22.0	56.0
Max Q Clear Time (g_c+I1), s		9.7	4.4	36.6		22.8	11.3	44.1
Green Ext Time (p_c), s		2.0	0.0	32.9		0.3	0.6	11.4

Intersection Summary	
HCM 2010 Ctrl Delay	25.8
HCM 2010 LOS	C

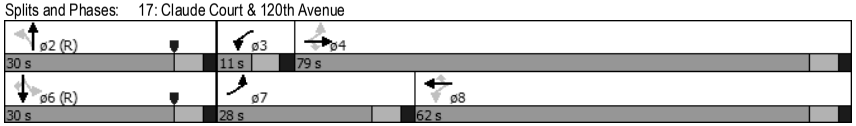
Timing Report, Sorted By Phase
17: Claude Court & 120th Avenue

8/28/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize						
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	30	11	79	30	28	62
Maximum Split (%)	25.0%	9.2%	65.8%	25.0%	23.3%	51.7%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	96	6	17	96	6	34
End Time (s)	6	17	96	6	34	96
Yield/Force Off (s)	0	11	90	0	28	90
Yield/Force Off 170(s)	109	11	79	109	28	79
Local Start Time (s)	96	6	17	96	6	34
Local Yield (s)	0	11	90	0	28	90
Local Yield 170(s)	109	11	79	109	28	79

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	80
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	

Splits and Phases: 17: Claude Court & 120th Avenue



HCM 2010 Signalized Intersection Summary
28: Urma Street & 120th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	1864	138	74	1408	7	114	4	84	8	2	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	15	2026	150	80	1530	8	124	4	91	9	2	8
Adj No. of Lanes	1	2	1	1	2	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	352	2300	1029	167	2300	1029	274	11	242	196	52	207
Arrive On Green	0.04	0.65	0.65	0.08	1.00	1.00	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1399	67	1526	1295	326	1306
Grp Volume(v), veh/h	15	2026	150	80	1530	8	124	0	95	9	0	10
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1399	0	1593	1295	0	1632
Q Serve(g_s), s	0.3	56.2	4.4	1.8	0.0	0.0	9.9	0.0	6.4	0.8	0.0	0.6
Cycle Q Clear(g_c), s	0.3	56.2	4.4	1.8	0.0	0.0	10.5	0.0	6.4	7.2	0.0	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.96	1.00		0.80
Lane Grp Cap(c), veh/h	352	2300	1029	167	2300	1029	274	0	252	196	0	258
V/C Ratio(X)	0.04	0.88	0.15	0.48	0.67	0.01	0.45	0.00	0.38	0.05	0.00	0.04
Avail Cap(c_a), veh/h	352	2300	1029	167	2300	1029	274	0	252	196	0	258
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	5.8	17.2	8.1	25.5	0.0	0.0	47.2	0.0	45.2	48.4	0.0	42.8
Incr Delay (d2), s/veh	0.2	5.3	0.3	9.6	1.5	0.0	5.3	0.0	4.2	0.4	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	28.7	2.0	2.1	0.5	0.0	4.2	0.0	3.1	0.3	0.0	0.3
LnGrp Delay(d),s/veh	6.0	22.5	8.4	35.1	1.5	0.0	52.5	0.0	49.4	48.8	0.0	43.0
LnGrp LOS	A	C	A	D	A	A	D		D	D		D
Approach Vol, veh/h		2191			1618			219			19	
Approach Delay, s/veh		21.4			3.2			51.2			45.8	
Approach LOS		C			A			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		25.0	11.0	84.0		25.0	11.0	84.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		19.0	5.0	78.0		19.0	5.0	78.0
Max Q Clear Time (g_c+I1), s		12.5	3.8	58.2		9.2	2.3	2.0
Green Ext Time (p_c), s		0.5	0.0	19.2		0.7	0.0	68.3

Intersection Summary	
HCM 2010 Ctrl Delay	15.8
HCM 2010 LOS	B

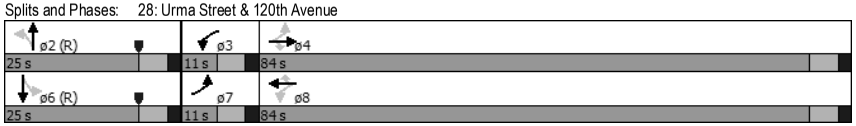
Timing Report, Sorted By Phase
28: Urma Street & 120th Avenue

8/28/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize		Yes	Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	25	11	84	25	11	84
Maximum Split (%)	20.8%	9.2%	70.0%	20.8%	9.2%	70.0%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	46	71	82	46	71	82
End Time (s)	71	82	46	71	82	46
Yield/Force Off (s)	65	76	40	65	76	40
Yield/Force Off 170(s)	54	76	29	54	76	29
Local Start Time (s)	101	6	17	101	6	17
Local Yield (s)	0	11	95	0	11	95
Local Yield 170(s)	109	11	84	109	11	84

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	90
Offset: 65 (54%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	

Splits and Phases: 28: Urma Street & 120th Avenue



Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	21	276	141	9	13	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	55	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	23	300	153	10	14	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	163	0	-	0	504	158
Stage 1	-	-	-	-	158	-
Stage 2	-	-	-	-	346	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1416	-	-	-	528	887
Stage 1	-	-	-	-	871	-
Stage 2	-	-	-	-	716	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1416	-	-	-	519	887
Mov Cap-2 Maneuver	-	-	-	-	519	-
Stage 1	-	-	-	-	871	-
Stage 2	-	-	-	-	704	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1416	-	-	-	679
HCM Lane V/C Ratio	0.016	-	-	-	0.048
HCM Control Delay (s)	7.6	-	-	-	10.6
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	73	207	100	66	75	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	75	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	79	225	109	72	82	67

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	109	0	-	0	493	109
Stage 1	-	-	-	-	109	-
Stage 2	-	-	-	-	384	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1481	-	-	-	535	945
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	688	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1481	-	-	-	506	945
Mov Cap-2 Maneuver	-	-	-	-	506	-
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	651	-

Approach	EB	WB	SB
HCM Control Delay, s	2	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1481	-	-	-	641
HCM Lane V/C Ratio	0.054	-	-	-	0.232
HCM Control Delay (s)	7.6	-	-	-	12.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.9

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	37	1957	1494	27	5	32
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	2127	1624	29	5	35

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1624	0	-	0	2768	812
Stage 1	-	-	-	-	1624	-
Stage 2	-	-	-	-	1144	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	397	-	-	-	15	322
Stage 1	-	-	-	-	146	-
Stage 2	-	-	-	-	266	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	397	-	-	-	13	322
Mov Cap-2 Maneuver	-	-	-	-	13	-
Stage 1	-	-	-	-	146	-
Stage 2	-	-	-	-	239	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	96.4
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	397	-	-	-	76
HCM Lane V/C Ratio	0.101	-	-	-	0.529
HCM Control Delay (s)	15.1	-	-	-	96.4
HCM Lane LOS	C	-	-	-	F
HCM 95th %tile Q(veh)	0.3	-	-	-	2.2

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	216	8	71	0	0	7	5	0	96	98	0
Future Vol, veh/h	0	216	8	71	0	0	7	5	0	96	98	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	235	9	77	0	0	8	5	0	104	107	0
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	11.3	8.5	9.8
HCM LOS	B	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	10%	100%	58%	0%	36%
Vol Right, %	0%	0%	0%	90%	0%	42%	0%	64%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	98	216	79	0	12	2	131
LT Vol	96	0	216	0	0	0	2	0
Through Vol	0	98	0	8	0	7	0	47
RT Vol	0	0	0	71	0	5	0	84
Lane Flow Rate	104	107	235	86	0	13	2	142
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.177	0.166	0.389	0.115	0	0.021	0.004	0.208
Departure Headway (Hd)	6.114	5.609	5.965	4.83	5.982	5.687	6.221	5.262
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	583	635	599	735	0	633	571	676
Service Time	3.892	3.387	3.741	2.605	3.682	3.387	4.004	3.044
HCM Lane V/C Ratio	0.178	0.169	0.392	0.117	0	0.021	0.004	0.21
HCM Control Delay	10.2	9.5	12.5	8.2	8.7	8.5	9	9.4
HCM Lane LOS	B	A	B	A	N	A	A	A
HCM 95th-tile Q	0.6	0.6	1.8	0.4	0	0.1	0	0.8

HCM 2010 AWSC
11: East 126th Avenue & Lafayette Street 9/15/2015

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	2	47	84
Future Vol, veh/h	0	2	47	84
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	2	51	91
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	9.4
HCM LOS	A

Lane

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	5	42	37	0	22	72	156	0	15	83	47
Future Vol, veh/h	0	5	42	37	0	22	72	156	0	15	83	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	5	46	40	0	24	78	170	0	16	90	51
Number of Lanes	0	1	1	0	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	9	9.2	9.2
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	15%	0%	100%	0%	23%	0%	100%	0%
Vol Thru, %	85%	0%	0%	53%	77%	0%	0%	97%
Vol Right, %	0%	100%	0%	47%	0%	100%	0%	3%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	98	47	5	79	94	156	87	76
LT Vol	15	0	5	0	22	0	87	0
Through Vol	83	0	0	42	72	0	0	74
RT Vol	0	47	0	37	0	156	0	2
Lane Flow Rate	107	51	5	86	102	170	95	83
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.169	0.07	0.009	0.129	0.16	0.227	0.16	0.128
Departure Headway (Hd)	5.714	4.931	6.231	5.395	5.644	4.821	6.099	5.576
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	622	718	570	658	631	739	583	637
Service Time	3.501	2.717	4.019	3.183	3.412	2.589	3.885	3.362
HCM Lane V/C Ratio	0.172	0.071	0.009	0.131	0.162	0.23	0.163	0.13
HCM Control Delay	9.7	8.1	9.1	9	9.5	9	10.1	9.2
HCM Lane LOS	A	A	A	A	A	A	B	A
HCM 95th-tile Q	0.6	0.2	0	0.4	0.6	0.9	0.6	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	87	74	2
Future Vol, veh/h	0	87	74	2
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	95	80	2
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	9.7
HCM LOS	A

Lane

Intersection	
Intersection Delay, s/veh	4.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	26	140	92	99
Demand Flow Rate, veh/h	26	143	94	101
Vehicles Circulating, veh/h	82	102	80	37
Vehicles Exiting, veh/h	56	72	28	207
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.7	4.9	4.3	4.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	26	143	94	101
Cap Entry Lane, veh/h	1041	1020	1043	1089
Entry HV Adj Factor	0.991	0.982	0.982	0.977
Flow Entry, veh/h	26	140	92	99
Cap Entry, veh/h	1032	1002	1024	1064
V/C Ratio	0.025	0.140	0.090	0.093
Control Delay, s/veh	3.7	4.9	4.3	4.2
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Intersection	
Intersection Delay, s/veh	3.7
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	32	70	47
Demand Flow Rate, veh/h	33	71	48
Vehicles Circulating, veh/h	54	7	5
Vehicles Exiting, veh/h	24	46	82
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	3.7	3.8	3.6
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	33	71	48
Cap Entry Lane, veh/h	1071	1122	1124
Entry HV Adj Factor	0.970	0.985	0.983
Flow Entry, veh/h	32	70	47
Cap Entry, veh/h	1038	1105	1105
V/C Ratio	0.031	0.063	0.043
Control Delay, s/veh	3.7	3.8	3.6
LOS	A	A	A
95th %tile Queue, veh	0	0	0

HCM 2010 Signalized Intersection Summary
5: York Street & 128th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	116	373	30	58	788	31	43	65	31	44	122	301
Future Volume (veh/h)	116	373	30	58	788	31	43	65	31	44	122	301
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	126	405	33	63	857	34	47	71	34	48	133	327
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	402	1947	871	563	1888	844	294	404	343	387	404	343
Arrive On Green	0.02	0.18	0.18	0.04	0.53	0.53	0.05	0.22	0.22	0.05	0.22	0.22
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	126	405	33	63	857	34	47	71	34	48	133	327
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.7	11.7	2.1	1.9	17.9	1.2	2.4	3.7	2.1	2.4	7.2	24.5
Cycle Q Clear(g_c), s	3.7	11.7	2.1	1.9	17.9	1.2	2.4	3.7	2.1	2.4	7.2	24.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	402	1947	871	563	1888	844	294	404	343	387	404	343
V/C Ratio(X)	0.31	0.21	0.04	0.11	0.45	0.04	0.16	0.18	0.10	0.12	0.33	0.95
Avail Cap(c_a), veh/h	402	1947	871	563	1888	844	294	404	343	387	404	343
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.0	26.9	22.9	11.7	17.2	13.4	33.4	38.3	37.6	33.2	39.6	46.4
Incr Delay (d2), s/veh	2.0	0.2	0.1	0.4	0.8	0.1	1.2	0.9	0.6	0.7	2.2	38.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	5.8	0.9	1.0	8.9	0.6	1.3	2.0	1.0	1.3	4.0	14.3
LnGrp Delay(d),s/veh	15.0	27.1	23.0	12.1	18.0	13.4	34.5	39.2	38.2	33.9	41.8	84.5
LnGrp LOS	B	C	C	B	B	B	C	D	D	C	D	F
Approach Vol, veh/h		564			954			152			508	
Approach Delay, s/veh		24.2			17.5			37.5			68.5	
Approach LOS		C			B			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	71.0	10.0	30.0	11.0	69.0	10.0	30.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	66.0	6.0	26.0	7.0	64.0	6.0	26.0
Max Q Clear Time (g_c+I1), s	3.9	13.7	4.4	26.5	5.7	19.9	4.4	5.7
Green Ext Time (p_c), s	0.0	12.7	0.0	0.0	0.0	12.3	0.0	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	32.5
HCM 2010 LOS	C

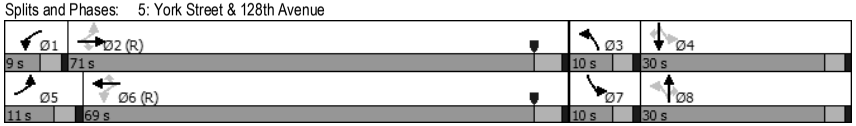
Timing Report, Sorted By Phase
5: York Street & 128th Avenue

9/15/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	9	71	10	30	11	69	10	30
Maximum Split (%)	7.5%	59.2%	8.3%	25.0%	9.2%	57.5%	8.3%	25.0%
Minimum Split (s)	9	10	9.5	30.5	9	10	9.5	30.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	111	0	71	81	111	2	71	81
End Time (s)	0	71	81	111	2	71	81	111
Yield/Force Off (s)	116	66	77	107	118	66	77	107
Yield/Force Off 170(s)	116	66	77	107	118	66	77	107
Local Start Time (s)	45	54	5	15	45	56	5	15
Local Yield (s)	50	0	11	41	52	0	11	41
Local Yield 170(s)	50	0	11	41	52	0	11	41

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	70
Offset: 66 (55%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 5: York Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
9: Claude Court & 128th Avenue

9/15/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Traffic Volume (veh/h)	520	159	170	975	180	87
Future Volume (veh/h)	520	159	170	975	180	87
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	565	173	185	1060	196	95
Adj No. of Lanes	2	1	1	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1445	647	632	2183	547	488
Arrive On Green	0.82	0.82	0.35	1.00	0.31	0.31
Sat Flow, veh/h	3632	1583	1774	3632	1774	1583
Grp Volume(v), veh/h	565	173	185	1060	196	95
Grp Sat Flow(s),veh/h/ln	1770	1583	1774	1770	1774	1583
Q Serve(g_s), s	5.2	3.1	5.0	0.0	10.3	5.3
Cycle Q Clear(g_c), s	5.2	3.1	5.0	0.0	10.3	5.3
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1445	647	632	2183	547	488
V/C Ratio(X)	0.39	0.27	0.29	0.49	0.36	0.19
Avail Cap(c_a), veh/h	1445	647	632	2183	547	488
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.0	6.8	8.6	0.0	32.3	30.5
Incr Delay (d2), s/veh	0.8	1.0	1.2	0.8	1.8	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	1.4	2.5	0.2	5.3	2.4
LnGrp Delay(d),s/veh	7.8	7.8	9.7	0.8	34.1	31.4
LnGrp LOS	A	A	A	A	C	C
Approach Vol, veh/h	738			1245	291	
Approach Delay, s/veh	7.8			2.1	33.2	
Approach LOS	A			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	25.0	54.0				79.0		41.0
Change Period (Y+Rc), s	4.0	5.0				5.0		4.0
Max Green Setting (Gmax), s	21.0	49.0				74.0		37.0
Max Q Clear Time (g_c+I1), s	7.0	7.2				2.0		12.3
Green Ext Time (p_c), s	0.4	18.2				21.2		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	7.9
HCM 2010 LOS	A

Timing Report, Sorted By Phase
9: Claude Court & 128th Avenue

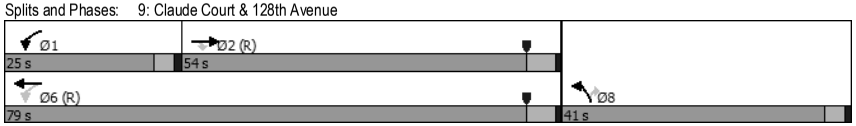
9/15/2015

Phase Number	1	2	6	8
Movement	WBL	EBT	WBTL	NBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	25	54	79	41
Maximum Split (%)	20.8%	45.0%	65.8%	34.2%
Minimum Split (s)	9.5	29.5	28.5	27.5
Yellow Time (s)	3	4	4	3
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	No
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	46	71	46	5
End Time (s)	71	5	5	46
Yield/Force Off (s)	67	0	0	42
Yield/Force Off 170(s)	67	0	0	42
Local Start Time (s)	46	71	46	5
Local Yield (s)	67	0	0	42
Local Yield 170(s)	67	0	0	42

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	70

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

Splits and Phases: 9: Claude Court & 128th Avenue



HCM 2010 Signalized Intersection Summary
10: Lafayette Street & 128th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	106	464	52	57	819	226	53	96	32	176	49	150
Future Volume (veh/h)	106	464	52	57	819	226	53	96	32	176	49	150
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	115	504	57	62	890	246	58	104	35	191	53	163
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	422	1799	805	509	1280	353	307	234	79	413	101	310
Arrive On Green	0.09	0.51	0.51	0.10	0.93	0.93	0.05	0.17	0.17	0.13	0.25	0.25
Sat Flow, veh/h	1774	3539	1583	1774	2742	757	1774	1334	449	1774	403	1240
Grp Volume(v), veh/h	115	504	57	62	574	562	58	0	139	191	0	216
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1729	1774	0	1783	1774	0	1644
Q Serve(g_s), s	3.5	9.8	2.2	2.1	7.4	7.4	3.1	0.0	8.4	9.9	0.0	13.6
Cycle Q Clear(g_c), s	3.5	9.8	2.2	2.1	7.4	7.4	3.1	0.0	8.4	9.9	0.0	13.6
Prop In Lane	1.00		1.00	1.00		0.44	1.00		0.25	1.00		0.75
Lane Grp Cap(c), veh/h	422	1799	805	509	826	807	307	0	312	413	0	411
V/C Ratio(X)	0.27	0.28	0.07	0.12	0.70	0.70	0.19	0.00	0.45	0.46	0.00	0.53
Avail Cap(c_a), veh/h	422	1799	805	509	826	807	307	0	312	413	0	411
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.1	16.9	15.0	13.8	2.4	2.4	37.3	0.0	44.3	31.9	0.0	38.9
Incr Delay (d2), s/veh	1.6	0.4	0.2	0.5	4.8	4.9	1.4	0.0	4.5	3.7	0.0	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	4.9	1.0	1.0	4.0	3.9	1.6	0.0	4.5	5.2	0.0	6.7
LnGrp Delay(d),s/veh	13.7	17.3	15.2	14.3	7.2	7.3	38.7	0.0	48.8	35.6	0.0	43.6
LnGrp LOS	B	B	B	B	A	A	D		D	D		D
Approach Vol, veh/h		676			1198			197			407	
Approach Delay, s/veh		16.5			7.6			45.9			39.9	
Approach LOS		B			A			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	66.0	10.0	34.0	15.0	61.0	19.0	25.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	6.0	61.0	6.0	30.0	11.0	56.0	15.0	21.0
Max Q Clear Time (g_c+I1), s	4.1	11.8	5.1	15.6	5.5	9.4	11.9	10.4
Green Ext Time (p_c), s	0.0	17.7	0.0	1.8	0.1	17.4	0.2	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	18.4
HCM 2010 LOS	B

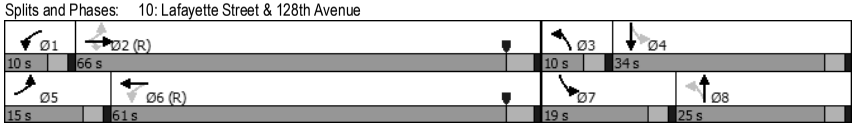
Timing Report, Sorted By Phase
10: Lafayette Street & 128th Avenue

9/15/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	10	66	10	34	15	61	19	25
Maximum Split (%)	8.3%	55.0%	8.3%	28.3%	12.5%	50.8%	15.8%	20.8%
Minimum Split (s)	9.5	27	9.5	28.5	9.5	27	9.5	22.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	49	59	5	15	49	64	5	24
End Time (s)	59	5	15	49	64	5	24	49
Yield/Force Off (s)	55	0	11	45	60	0	20	45
Yield/Force Off 170(s)	55	0	11	45	60	0	20	45
Local Start Time (s)	49	59	5	15	49	64	5	24
Local Yield (s)	55	0	11	45	60	0	20	45
Local Yield 170(s)	55	0	11	45	60	0	20	45

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	80
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 10: Lafayette Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
15: Washington Street & East 126th Avenue

9/15/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	132	113	483	182	134	1206
Future Volume (veh/h)	132	113	483	182	134	1206
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	143	123	525	198	146	1311
Adj No. of Lanes	1	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	384	343	1298	581	632	2183
Arrive On Green	0.22	0.22	0.37	0.37	0.18	0.62
Sat Flow, veh/h	1774	1583	3632	1583	1774	3632
Grp Volume(v), veh/h	143	123	525	198	146	1311
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1583	1774	1770
Q Serve(g_s), s	4.1	4.0	6.6	5.4	2.2	13.5
Cycle Q Clear(g_c), s	4.1	4.0	6.6	5.4	2.2	13.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	384	343	1298	581	632	2183
V/C Ratio(X)	0.37	0.36	0.40	0.34	0.23	0.60
Avail Cap(c_a), veh/h	384	343	1298	581	632	2183
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.0	20.0	14.1	13.8	6.4	7.0
Incr Delay (d2), s/veh	2.7	2.9	0.9	1.6	0.9	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	2.0	3.4	2.6	1.2	6.7
LnGrp Delay(d),s/veh	22.8	22.9	15.1	15.3	7.3	8.2
LnGrp LOS	C	C	B	B	A	A
Approach Vol, veh/h	266		723			1457
Approach Delay, s/veh	22.8		15.1			8.1
Approach LOS	C		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	15.0	28.0				43.0		17.0
Change Period (Y+Rc), s	4.0	6.0				6.0		4.0
Max Green Setting (Gmax), s	11.0	22.0				37.0		13.0
Max Q Clear Time (g_c+I1), s	4.2	8.6				15.5		6.1
Green Ext Time (p_c), s	0.2	10.2				14.6		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	11.8
HCM 2010 LOS	B

Timing Report, Sorted By Phase
15: Washington Street & East 126th Avenue

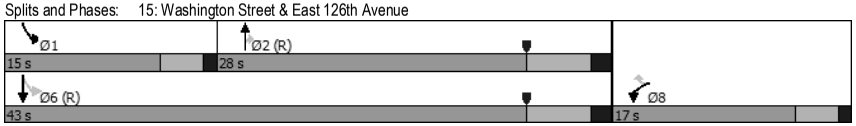
9/15/2015

Phase Number	1	2	6	8
Movement	SBL	NBT	SBTL	WBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	15	28	43	17
Maximum Split (%)	25.0%	46.7%	71.7%	28.3%
Minimum Split (s)	9.5	27	24	29
Yellow Time (s)	3	4.5	4.5	3
All-Red Time (s)	1	1.5	1.5	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	23	38	23	6
End Time (s)	38	6	6	23
Yield/Force Off (s)	34	0	0	19
Yield/Force Off 170(s)	34	0	0	19
Local Start Time (s)	23	38	23	6
Local Yield (s)	34	0	0	19
Local Yield 170(s)	34	0	0	19

Intersection Summary	
Cycle Length	60
Control Type	Pretimed
Natural Cycle	70

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

Splits and Phases: 15: Washington Street & East 126th Avenue



HCM 2010 Signalized Intersection Summary
17: Claude Court & 120th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	673	12	21	1548	62	27	34	33	64	21	35
Future Volume (veh/h)	36	673	12	21	1548	62	27	34	33	64	21	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	39	732	13	23	1683	67	29	37	36	70	23	38
Adj No. of Lanes	1	3	1	1	3	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	289	2966	924	529	2882	897	325	181	176	289	388	330
Arrive On Green	0.08	0.58	0.58	0.06	0.57	0.57	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1774	5085	1583	1774	5085	1583	1336	869	845	1322	1863	1583
Grp Volume(v), veh/h	39	732	13	23	1683	67	29	0	73	70	23	38
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	1583	1336	0	1714	1322	1863	1583
Q Serve(g_s), s	1.0	8.4	0.4	0.6	25.7	2.3	2.1	0.0	4.2	5.5	1.2	2.3
Cycle Q Clear(g_c), s	1.0	8.4	0.4	0.6	25.7	2.3	3.3	0.0	4.2	9.8	1.2	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.49	1.00		1.00
Lane Grp Cap(c), veh/h	289	2966	924	529	2882	897	325	0	357	289	388	330
V/C Ratio(X)	0.13	0.25	0.01	0.04	0.58	0.07	0.09	0.00	0.20	0.24	0.06	0.12
Avail Cap(c_a), veh/h	289	2966	924	529	2882	897	325	0	357	289	388	330
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.1	12.2	10.5	8.7	16.8	11.8	39.4	0.0	39.3	43.3	38.1	38.5
Incr Delay (d2), s/veh	1.0	0.2	0.0	0.2	0.9	0.2	0.5	0.0	1.3	2.0	0.3	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	4.0	0.2	0.3	12.2	1.0	0.8	0.0	2.1	2.2	0.6	1.1
LnGrp Delay(d),s/veh	12.1	12.4	10.5	8.9	17.7	11.9	39.9	0.0	40.6	45.3	38.4	39.2
LnGrp LOS	B	B	B	A	B	B	D		D	D	D	D
Approach Vol, veh/h		784			1773			102			131	
Approach Delay, s/veh		12.3			17.4			40.4			42.3	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		31.0	13.0	76.0		31.0	15.0	74.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		25.0	7.0	70.0		25.0	9.0	68.0
Max Q Clear Time (g_c+I1), s		6.2	2.6	10.4		11.8	3.0	27.7
Green Ext Time (p_c), s		0.9	0.0	36.3		0.7	0.0	28.2

Intersection Summary	
HCM 2010 Ctrl Delay	18.0
HCM 2010 LOS	B

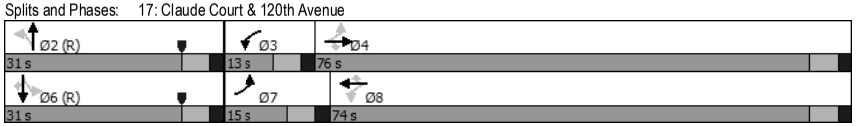
Timing Report, Sorted By Phase
17: Claude Court & 120th Avenue

9/15/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize						
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	31	13	76	31	15	74
Maximum Split (%)	25.8%	10.8%	63.3%	25.8%	12.5%	61.7%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	105	16	29	105	16	31
End Time (s)	16	29	105	16	31	105
Yield/Force Off (s)	10	23	99	10	25	99
Yield/Force Off 170(s)	119	23	88	119	25	88
Local Start Time (s)	95	6	19	95	6	21
Local Yield (s)	0	13	89	0	15	89
Local Yield 170(s)	109	13	78	109	15	78

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	60
Offset: 10 (8%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	

Splits and Phases: 17: Claude Court & 120th Avenue



HCM 2010 Signalized Intersection Summary
26: 120th Avenue & Race Street

9/15/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	85	664	1569	48	51	89
Future Volume (veh/h)	85	664	1569	48	51	89
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	92	722	1705	52	55	97
Adj No. of Lanes	1	3	3	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	439	3878	3072	957	288	257
Arrive On Green	0.24	1.00	1.00	1.00	0.16	0.16
Sat Flow, veh/h	1774	5253	5253	1583	1774	1583
Grp Volume(v), veh/h	92	722	1705	52	55	97
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	1583	1774	1583
Q Serve(g_s), s	1.5	0.0	0.0	0.0	3.2	6.6
Cycle Q Clear(g_c), s	1.5	0.0	0.0	0.0	3.2	6.6
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	439	3878	3072	957	288	257
V/C Ratio(X)	0.21	0.19	0.55	0.05	0.19	0.38
Avail Cap(c_a), veh/h	439	3878	3072	957	288	257
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	3.6	0.0	0.0	0.0	43.4	44.8
Incr Delay (d2), s/veh	1.1	0.1	0.7	0.1	1.5	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	0.2	1.8	1.7	6.2
LnGrp Delay(d),s/veh	4.7	0.1	0.7	0.1	44.9	49.0
LnGrp LOS	A	A	A	A	D	D
Approach Vol, veh/h		814	1757		152	
Approach Delay, s/veh		0.6	0.7		47.5	
Approach LOS		A	A		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				96.0		24.0	19.0	77.0
Change Period (Y+Rc), s				4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s				91.5		19.5	14.5	72.5
Max Q Clear Time (g_c+I1), s				2.0		8.6	3.5	2.0
Green Ext Time (p_c), s				44.7		0.3	0.1	39.9

Intersection Summary	
HCM 2010 Ctrl Delay	3.3
HCM 2010 LOS	A

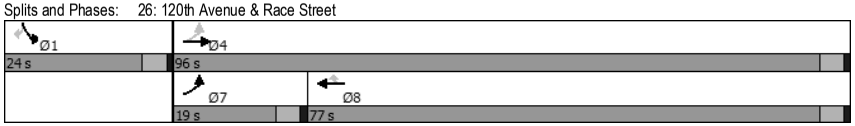
Timing Report, Sorted By Phase
26: 120th Avenue & Race Street

9/15/2015

Phase Number	1	4	7	8
Movement	SBL	EBTL	EBL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize			Yes	Yes
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	24	96	19	77
Maximum Split (%)	20.0%	80.0%	15.8%	64.2%
Minimum Split (s)	9.5	22.5	9.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7		7
Flash Dont Walk (s)		11		11
Dual Entry	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	6	30	30	49
End Time (s)	30	6	49	6
Yield/Force Off (s)	25.5	1.5	44.5	1.5
Yield/Force Off 170(s)	25.5	110.5	44.5	110.5
Local Start Time (s)	0	24	24	43
Local Yield (s)	19.5	115.5	38.5	115.5
Local Yield 170(s)	19.5	104.5	38.5	104.5

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	45
Offset: 6 (5%), Referenced to phase 2: and 6:, Start of Green	

Splits and Phases: 26: 120th Avenue & Race Street



HCM 2010 Signalized Intersection Summary
28: Urma Street & 120th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	705	40	37	1814	31	97	4	38	20	5	35
Future Volume (veh/h)	46	705	40	37	1814	31	97	4	38	20	5	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	50	766	43	40	1972	34	105	4	41	22	5	38
Adj No. of Lanes	1	3	1	1	3	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	232	3009	937	497	2966	924	313	30	305	311	39	297
Arrive On Green	0.06	0.59	0.59	0.05	0.58	0.58	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1774	5085	1583	1774	5085	1583	1358	143	1462	1356	187	1424
Grp Volume(v), veh/h	50	766	43	40	1972	34	105	0	45	22	0	43
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	1583	1358	0	1605	1356	0	1611
Q Serve(g_s), s	1.2	8.7	1.4	1.0	31.7	1.1	8.2	0.0	2.7	1.6	0.0	2.6
Cycle Q Clear(g_c), s	1.2	8.7	1.4	1.0	31.7	1.1	10.8	0.0	2.7	4.4	0.0	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.91	1.00		0.88
Lane Grp Cap(c), veh/h	232	3009	937	497	2966	924	313	0	334	311	0	336
V/C Ratio(X)	0.22	0.25	0.05	0.08	0.66	0.04	0.33	0.00	0.13	0.07	0.00	0.13
Avail Cap(c_a), veh/h	232	3009	937	497	2966	924	313	0	334	311	0	336
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.4	11.8	10.3	8.5	17.0	10.6	43.0	0.0	38.7	40.5	0.0	38.6
Incr Delay (d2), s/veh	2.1	0.2	0.1	0.3	1.2	0.1	2.9	0.0	0.8	0.4	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	4.1	0.6	0.5	15.1	0.5	3.3	0.0	1.3	0.6	0.0	1.2
LnGrp Delay(d),s/veh	15.5	12.0	10.4	8.8	18.2	10.7	45.9	0.0	39.5	40.9	0.0	39.4
LnGrp LOS	B	B	B	A	B	B	D		D	D		D
Approach Vol, veh/h		859			2046			150			65	
Approach Delay, s/veh		12.1			17.9			44.0			39.9	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		31.0	12.0	77.0		31.0	13.0	76.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		25.0	6.0	71.0		25.0	7.0	70.0
Max Q Clear Time (g_c+I1), s		12.8	3.0	10.7		6.4	3.2	33.7
Green Ext Time (p_c), s		0.6	0.0	43.4		0.8	0.0	29.4

Intersection Summary	
HCM 2010 Ctrl Delay	18.0
HCM 2010 LOS	B

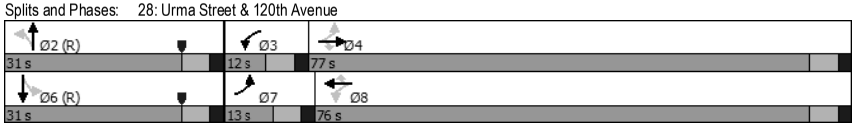
Timing Report, Sorted By Phase
28: Urma Street & 120th Avenue

9/15/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize		Yes	Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	31	12	77	31	13	76
Maximum Split (%)	25.8%	10.0%	64.2%	25.8%	10.8%	63.3%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	35	66	78	35	66	79
End Time (s)	66	78	35	66	79	35
Yield/Force Off (s)	60	72	29	60	73	29
Yield/Force Off 170(s)	49	72	18	49	73	18
Local Start Time (s)	95	6	18	95	6	19
Local Yield (s)	0	12	89	0	13	89
Local Yield 170(s)	109	12	78	109	13	78

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	65
Offset: 60 (50%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	

Splits and Phases: 28: Urma Street & 120th Avenue



Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	95	81	49	178	64	74
Future Vol, veh/h	95	81	49	178	64	74
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	90	-	0	25
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	103	88	53	193	70	80

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	191	0	447	147
Stage 1	-	-	-	-	147	-
Stage 2	-	-	-	-	300	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1383	-	569	900
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	752	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1383	-	547	900
Mov Cap-2 Maneuver	-	-	-	-	547	-
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	723	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.7	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	547	900	-	-	1383	-
HCM Lane V/C Ratio	0.127	0.089	-	-	0.039	-
HCM Control Delay (s)	12.5	9.4	-	-	7.7	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.4	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	22	119	253	10	6	44
Future Vol, veh/h	22	119	253	10	6	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	55	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	129	275	11	7	48

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	286	0	-	0	457	280
Stage 1	-	-	-	-	280	-
Stage 2	-	-	-	-	177	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1276	-	-	-	562	759
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	854	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1276	-	-	-	551	759
Mov Cap-2 Maneuver	-	-	-	-	551	-
Stage 1	-	-	-	-	767	-
Stage 2	-	-	-	-	838	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1276	-	-	-	726
HCM Lane V/C Ratio	0.019	-	-	-	0.075
HCM Control Delay (s)	7.9	-	-	-	10.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	43	90	215	39	43	98
Future Vol, veh/h	43	90	215	39	43	98
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	75	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	47	98	234	42	47	107

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	234	0	-	0	425	234
Stage 1	-	-	-	-	234	-
Stage 2	-	-	-	-	191	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1333	-	-	-	586	805
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	841	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1333	-	-	-	565	805
Mov Cap-2 Maneuver	-	-	-	-	565	-
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	811	-

Approach	EB	WB	SB
HCM Control Delay, s	2.5	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1333	-	-	-	713
HCM Lane V/C Ratio	0.035	-	-	-	0.215
HCM Control Delay (s)	7.8	-	-	-	11.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	4	6	2	131	206	2
Future Vol, veh/h	4	6	2	131	206	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	7	2	142	224	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	372	225	226	0	-	0
Stage 1	225	-	-	-	-	-
Stage 2	147	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	629	814	1342	-	-	-
Stage 1	812	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	628	814	1342	-	-	-
Mov Cap-2 Maneuver	628	-	-	-	-	-
Stage 1	812	-	-	-	-	-
Stage 2	879	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1342	-	728	-	-
HCM Lane V/C Ratio	0.002	-	0.015	-	-
HCM Control Delay (s)	7.7	-	10	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	27	8	106	0	0	10	4	0	50	53	0
Future Vol, veh/h	0	27	8	106	0	0	10	4	0	50	53	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	29	9	115	0	0	11	4	0	54	58	0
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	8.2	7.9	8.5
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	7%	100%	71%	0%	70%
Vol Right, %	0%	0%	0%	93%	0%	29%	0%	30%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	50	53	27	114	0	14	6	116
LT Vol	50	0	27	0	0	0	6	0
Through Vol	0	53	0	8	0	10	0	81
RT Vol	0	0	0	106	0	4	0	35
Lane Flow Rate	54	58	29	124	0	15	7	126
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.084	0.081	0.046	0.155	0	0.022	0.01	0.169
Departure Headway (Hd)	5.56	5.057	5.665	4.51	5.301	5.1	5.552	4.837
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	646	709	634	797	0	703	646	743
Service Time	3.285	2.783	3.384	2.229	3.027	2.826	3.277	2.562
HCM Lane V/C Ratio	0.084	0.082	0.046	0.156	0	0.021	0.011	0.17
HCM Control Delay	8.8	8.2	8.7	8.1	8	7.9	8.3	8.5
HCM Lane LOS	A	A	A	A	N	A	A	A
HCM 95th-tile Q	0.3	0.3	0.1	0.5	0	0.1	0	0.6

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	6	81	35
Future Vol, veh/h	0	6	81	35
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	7	88	38
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	8.5
HCM LOS	A

Lane

Intersection	
Intersection Delay, s/veh	11.4
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	4	78	24	0	15	55	162	0	18	174	131
Future Vol, veh/h	0	4	78	24	0	15	55	162	0	18	174	131
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	4	85	26	0	16	60	176	0	20	189	142
Number of Lanes	0	1	1	0	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	11	10.8	11.2
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	9%	0%	100%	0%	21%	0%	100%	0%
Vol Thru, %	91%	0%	0%	76%	79%	0%	0%	90%
Vol Right, %	0%	100%	0%	24%	0%	100%	0%	10%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	192	131	4	102	70	162	188	84
LT Vol	18	0	4	0	15	0	188	0
Through Vol	174	0	0	78	55	0	0	76
RT Vol	0	131	0	24	0	162	0	8
Lane Flow Rate	209	142	4	111	76	176	204	91
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.357	0.214	0.009	0.203	0.14	0.285	0.377	0.154
Departure Headway (Hd)	6.155	5.398	7.268	6.59	6.638	5.817	6.646	6.072
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	582	662	491	542	539	615	539	589
Service Time	3.908	3.15	5.036	4.358	4.397	3.576	4.401	3.826
HCM Lane V/C Ratio	0.359	0.215	0.008	0.205	0.141	0.286	0.378	0.154
HCM Control Delay	12.3	9.6	10.1	11	10.5	10.9	13.4	9.9
HCM Lane LOS	B	A	B	B	B	B	B	A
HCM 95th-tile Q	1.6	0.8	0	0.8	0.5	1.2	1.7	0.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	188	76	8
Future Vol, veh/h	0	188	76	8
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	204	83	9
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	12.3
HCM LOS	B

Lane

Intersection	
Intersection Delay, s/veh	4.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	59	72	37	229
Demand Flow Rate, veh/h	60	73	38	234
Vehicles Circulating, veh/h	200	68	160	22
Vehicles Exiting, veh/h	56	129	100	119
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.6	4.1	4.1	5.3
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	60	73	38	234
Cap Entry Lane, veh/h	925	1056	963	1105
Entry HV Adj Factor	0.978	0.983	0.987	0.980
Flow Entry, veh/h	59	72	37	229
Cap Entry, veh/h	905	1038	950	1083
V/C Ratio	0.065	0.069	0.039	0.212
Control Delay, s/veh	4.6	4.1	4.1	5.3
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	1

Intersection	
Intersection Delay, s/veh	4.5
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	29	123	180
Demand Flow Rate, veh/h	29	125	184
Vehicles Circulating, veh/h	120	28	16
Vehicles Exiting, veh/h	33	172	133
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	3.8	4.3	4.8
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	29	125	184
Cap Entry Lane, veh/h	1002	1099	1112
Entry HV Adj Factor	1.000	0.981	0.978
Flow Entry, veh/h	29	123	180
Cap Entry, veh/h	1002	1078	1087
V/C Ratio	0.029	0.114	0.165
Control Delay, s/veh	3.8	4.3	4.8
LOS	A	A	A
95th %tile Queue, veh	0	0	1

HCM 2010 Signalized Intersection Summary
5: York Street & 128th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	269	833	46	45	514	63	31	96	55	37	79	105
Future Volume (veh/h)	269	833	46	45	514	63	31	96	55	37	79	105
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	292	905	50	49	559	68	34	104	60	40	86	114
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	601	1947	871	388	1534	686	359	404	343	356	404	343
Arrive On Green	0.21	0.73	0.73	0.04	0.43	0.43	0.05	0.22	0.22	0.05	0.22	0.22
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	292	905	50	49	559	68	34	104	60	40	86	114
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	9.3	12.5	1.1	1.8	12.8	3.1	1.7	5.6	3.7	2.0	4.5	7.3
Cycle Q Clear(g_c), s	9.3	12.5	1.1	1.8	12.8	3.1	1.7	5.6	3.7	2.0	4.5	7.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	601	1947	871	388	1534	686	359	404	343	356	404	343
V/C Ratio(X)	0.49	0.46	0.06	0.13	0.36	0.10	0.09	0.26	0.17	0.11	0.21	0.33
Avail Cap(c_a), veh/h	601	1947	871	388	1534	686	359	404	343	356	404	343
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.6	8.9	7.4	17.0	22.9	20.1	33.0	39.0	38.3	33.1	38.6	39.7
Incr Delay (d2), s/veh	2.8	0.8	0.1	0.7	0.7	0.3	0.5	1.5	1.1	0.6	1.2	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	6.1	0.5	0.9	6.4	1.4	0.9	3.0	1.7	1.1	2.5	3.4
LnGrp Delay(d),s/veh	14.4	9.7	7.5	17.7	23.6	20.4	33.5	40.5	39.4	33.8	39.8	42.3
LnGrp LOS	B	A	A	B	C	C	C	D	D	C	D	D
Approach Vol, veh/h		1247			676			198			240	
Approach Delay, s/veh		10.7			22.8			39.0			40.0	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	71.0	10.0	30.0	23.0	57.0	10.0	30.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	66.0	6.0	26.0	19.0	52.0	6.0	26.0
Max Q Clear Time (g_c+I1), s	3.8	14.5	3.7	9.3	11.3	14.8	4.0	7.6
Green Ext Time (p_c), s	0.0	16.1	0.0	1.5	0.5	14.7	0.0	1.5

Intersection Summary		
HCM 2010 Ctrl Delay		19.5
HCM 2010 LOS		B

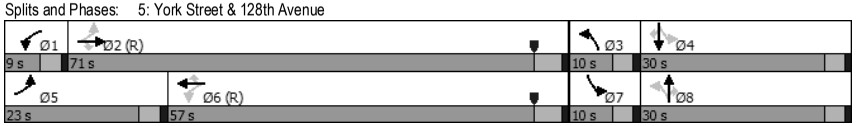
Timing Report, Sorted By Phase
5: York Street & 128th Avenue

9/15/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	9	71	10	30	23	57	10	30
Maximum Split (%)	7.5%	59.2%	8.3%	25.0%	19.2%	47.5%	8.3%	25.0%
Minimum Split (s)	9	10	9.5	30.5	9	10	9.5	30.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	88	97	48	58	88	111	48	58
End Time (s)	97	48	58	88	111	48	58	88
Yield/Force Off (s)	93	43	54	84	107	43	54	84
Yield/Force Off 170(s)	93	43	54	84	107	43	54	84
Local Start Time (s)	45	54	5	15	45	68	5	15
Local Yield (s)	50	0	11	41	64	0	11	41
Local Yield 170(s)	50	0	11	41	64	0	11	41

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	75
Offset: 43 (36%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 5: York Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
9: Claude Court & 128th Avenue

9/15/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Traffic Volume (veh/h)	1145	196	68	611	146	134
Future Volume (veh/h)	1145	196	68	611	146	134
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1245	213	74	664	159	146
Adj No. of Lanes	2	1	1	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	2065	924	405	2448	414	369
Arrive On Green	1.00	1.00	0.02	0.23	0.23	0.23
Sat Flow, veh/h	3632	1583	1774	3632	1774	1583
Grp Volume(v), veh/h	1245	213	74	664	159	146
Grp Sat Flow(s),veh/h/ln	1770	1583	1774	1770	1774	1583
Q Serve(g_s), s	0.0	0.0	1.7	18.5	9.1	9.3
Cycle Q Clear(g_c), s	0.0	0.0	1.7	18.5	9.1	9.3
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2065	924	405	2448	414	369
V/C Ratio(X)	0.60	0.23	0.18	0.27	0.38	0.40
Avail Cap(c_a), veh/h	2065	924	405	2448	414	369
HCM Platoon Ratio	2.00	2.00	0.33	0.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	7.0	21.4	38.7	38.8
Incr Delay (d2), s/veh	1.3	0.6	1.0	0.3	2.7	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.1	0.9	9.2	4.7	4.4
LnGrp Delay(d),s/veh	1.3	0.6	8.0	21.7	41.4	42.0
LnGrp LOS	A	A	A	C	D	D
Approach Vol, veh/h	1458			738	305	
Approach Delay, s/veh	1.2			20.3	41.7	
Approach LOS	A			C	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	13.0	75.0				88.0		32.0
Change Period (Y+Rc), s	4.0	5.0				5.0		4.0
Max Green Setting (Gmax), s	9.0	70.0				83.0		28.0
Max Q Clear Time (g_c+I1), s	3.7	2.0				20.5		11.3
Green Ext Time (p_c), s	0.1	28.5				27.7		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	11.8
HCM 2010 LOS	B

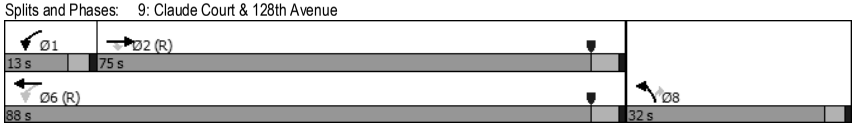
Timing Report, Sorted By Phase
9: Claude Court & 128th Avenue

9/15/2015

Phase Number	1	2	6	8
Movement	WBL	EBT	WBTL	NBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	13	75	88	32
Maximum Split (%)	10.8%	62.5%	73.3%	26.7%
Minimum Split (s)	9.5	29.5	28.5	27.5
Yellow Time (s)	3	4	4	3
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	No
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	37	50	37	5
End Time (s)	50	5	5	37
Yield/Force Off (s)	46	0	0	33
Yield/Force Off 170(s)	46	0	0	33
Local Start Time (s)	37	50	37	5
Local Yield (s)	46	0	0	33
Local Yield 170(s)	46	0	0	33

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	70
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	

Splits and Phases: 9: Claude Court & 128th Avenue



HCM 2010 Signalized Intersection Summary
10: Lafayette Street & 128th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	116	1232	34	10	608	116	33	24	49	92	15	71
Future Volume (veh/h)	116	1232	34	10	608	116	33	24	49	92	15	71
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	126	1339	37	11	661	126	36	26	53	100	16	77
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	544	1947	871	257	1583	301	357	110	223	374	58	280
Arrive On Green	0.07	0.55	0.55	0.10	1.00	1.00	0.05	0.20	0.20	0.06	0.21	0.21
Sat Flow, veh/h	1774	3539	1583	1774	2968	565	1774	548	1117	1774	280	1346
Grp Volume(v), veh/h	126	1339	37	11	394	393	36	0	79	100	0	93
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1763	1774	0	1666	1774	0	1625
Q Serve(g_s), s	3.7	32.9	1.3	0.3	0.0	0.0	1.9	0.0	4.8	5.3	0.0	5.8
Cycle Q Clear(g_c), s	3.7	32.9	1.3	0.3	0.0	0.0	1.9	0.0	4.8	5.3	0.0	5.8
Prop In Lane	1.00		1.00	1.00		0.32	1.00		0.67	1.00		0.83
Lane Grp Cap(c), veh/h	544	1947	871	257	944	940	357	0	333	374	0	339
V/C Ratio(X)	0.23	0.69	0.04	0.04	0.42	0.42	0.10	0.00	0.24	0.27	0.00	0.27
Avail Cap(c_a), veh/h	544	1947	871	257	944	940	357	0	333	374	0	339
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.3	19.5	12.4	13.8	0.0	0.0	34.5	0.0	40.3	35.1	0.0	39.9
Incr Delay (d2), s/veh	1.0	2.0	0.1	0.3	1.4	1.4	0.6	0.0	1.7	1.7	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	16.5	0.6	0.2	0.4	0.4	1.0	0.0	2.3	2.8	0.0	2.8
LnGrp Delay(d),s/veh	11.3	21.6	12.5	14.1	1.4	1.4	35.1	0.0	42.0	36.8	0.0	41.9
LnGrp LOS	B	C	B	B	A	A	D		D	D		D
Approach Vol, veh/h		1502			798			115			193	
Approach Delay, s/veh		20.5			1.5			39.8			39.3	
Approach LOS		C			A			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	71.0	10.0	29.0	12.0	69.0	11.0	28.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	6.0	66.0	6.0	25.0	8.0	64.0	7.0	24.0
Max Q Clear Time (g_c+I1), s	2.3	34.9	3.9	7.8	5.7	2.0	7.3	6.8
Green Ext Time (p_c), s	0.0	20.3	0.0	0.9	0.1	29.6	0.0	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	16.9
HCM 2010 LOS	B

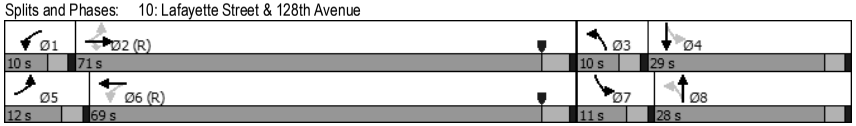
Timing Report, Sorted By Phase
10: Lafayette Street & 128th Avenue

9/15/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	10	71	10	29	12	69	11	28
Maximum Split (%)	8.3%	59.2%	8.3%	24.2%	10.0%	57.5%	9.2%	23.3%
Minimum Split (s)	9.5	27	9.5	28.5	9.5	27	9.5	22.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	12	22	93	103	12	24	93	104
End Time (s)	22	93	103	12	24	93	104	12
Yield/Force Off (s)	18	88	99	8	20	88	100	8
Yield/Force Off 170(s)	18	88	99	8	20	88	100	8
Local Start Time (s)	44	54	5	15	44	56	5	16
Local Yield (s)	50	0	11	40	52	0	12	40
Local Yield 170(s)	50	0	11	40	52	0	12	40

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	90
Offset: 88 (73%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 10: Lafayette Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
15: Washington Street & East 126th Avenue

9/15/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	90	87	1043	70	37	912
Future Volume (veh/h)	90	87	1043	70	37	912
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	98	95	1134	76	40	991
Adj No. of Lanes	1	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	479	427	1876	839	320	2230
Arrive On Green	0.27	0.27	0.53	0.53	0.06	0.63
Sat Flow, veh/h	1774	1583	3632	1583	1774	3632
Grp Volume(v), veh/h	98	95	1134	76	40	991
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1583	1774	1770
Q Serve(g_s), s	4.3	4.7	22.2	2.4	0.9	14.4
Cycle Q Clear(g_c), s	4.3	4.7	22.2	2.4	0.9	14.4
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	479	427	1876	839	320	2230
V/C Ratio(X)	0.20	0.22	0.60	0.09	0.12	0.44
Avail Cap(c_a), veh/h	479	427	1876	839	320	2230
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.2	28.3	16.3	11.6	11.0	9.5
Incr Delay (d2), s/veh	1.0	1.2	1.5	0.2	0.8	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	2.2	11.1	1.1	0.5	7.2
LnGrp Delay(d),s/veh	29.2	29.5	17.7	11.8	11.8	10.2
LnGrp LOS	C	C	B	B	B	B
Approach Vol, veh/h	193		1210			1031
Approach Delay, s/veh	29.4		17.3			10.2
Approach LOS	C		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	10.0	59.0				69.0		31.0
Change Period (Y+Rc), s	4.0	6.0				6.0		4.0
Max Green Setting (Gmax), s	6.0	53.0				63.0		27.0
Max Q Clear Time (g_c+I1), s	2.9	24.2				16.4		6.7
Green Ext Time (p_c), s	0.0	19.7				26.6		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	15.3
HCM 2010 LOS	B

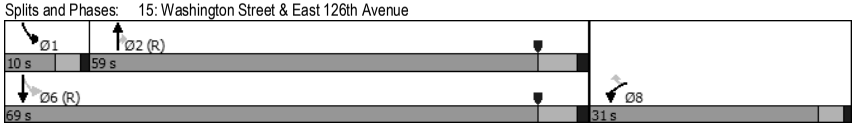
Timing Report, Sorted By Phase
15: Washington Street & East 126th Avenue

9/15/2015

Phase Number	1	2	6	8
Movement	SBL	NBT	SBTL	WBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	10	59	69	31
Maximum Split (%)	10.0%	59.0%	69.0%	31.0%
Minimum Split (s)	9.5	27	24	29
Yellow Time (s)	3	4.5	4.5	3
All-Red Time (s)	1	1.5	1.5	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	37	47	37	6
End Time (s)	47	6	6	37
Yield/Force Off (s)	43	0	0	33
Yield/Force Off 170(s)	43	0	0	33
Local Start Time (s)	37	47	37	6
Local Yield (s)	43	0	0	33
Local Yield 170(s)	43	0	0	33

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	70
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow	

Splits and Phases: 15: Washington Street & East 126th Avenue



HCM 2010 Signalized Intersection Summary
17: Claude Court & 120th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	98	1806	32	68	1435	73	21	57	69	40	15	30
Future Volume (veh/h)	98	1806	32	68	1435	73	21	57	69	40	15	30
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	107	1963	35	74	1560	79	23	62	75	43	16	33
Adj No. of Lanes	1	3	1	1	3	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	344	2882	897	271	2797	871	321	154	186	222	373	317
Arrive On Green	0.10	0.57	0.57	0.08	0.55	0.55	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1774	5085	1583	1774	5085	1583	1351	769	930	1247	1863	1583
Grp Volume(v), veh/h	107	1963	35	74	1560	79	23	0	137	43	16	33
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	1583	1351	0	1699	1247	1863	1583
Q Serve(g_s), s	2.7	32.7	1.2	1.9	23.9	2.8	1.7	0.0	8.4	3.7	0.8	2.0
Cycle Q Clear(g_c), s	2.7	32.7	1.2	1.9	23.9	2.8	2.5	0.0	8.4	12.2	0.8	2.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.55	1.00		1.00
Lane Grp Cap(c), veh/h	344	2882	897	271	2797	871	321	0	340	222	373	317
V/C Ratio(X)	0.31	0.68	0.04	0.27	0.56	0.09	0.07	0.00	0.40	0.19	0.04	0.10
Avail Cap(c_a), veh/h	344	2882	897	271	2797	871	321	0	340	222	373	317
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.5	18.4	11.5	14.4	17.5	12.8	39.7	0.0	41.8	47.1	38.7	39.2
Incr Delay (d2), s/veh	2.3	1.3	0.1	2.5	0.8	0.2	0.4	0.0	3.5	1.9	0.2	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	15.6	0.5	1.1	11.3	1.3	0.7	0.0	4.3	1.4	0.4	1.0
LnGrp Delay(d),s/veh	13.8	19.7	11.6	16.9	18.3	13.0	40.2	0.0	45.3	49.0	38.9	39.9
LnGrp LOS	B	B	B	B	B	B	D		D	D	D	D
Approach Vol, veh/h		2105			1713			160			92	
Approach Delay, s/veh		19.2			18.0			44.6			44.0	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		30.0	16.0	74.0		30.0	18.0	72.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		24.0	10.0	68.0		24.0	12.0	66.0
Max Q Clear Time (g_c+I1), s		10.4	3.9	34.7		14.2	4.7	25.9
Green Ext Time (p_c), s		1.0	0.1	31.1		0.8	0.1	36.9

Intersection Summary	
HCM 2010 Ctrl Delay	20.3
HCM 2010 LOS	C

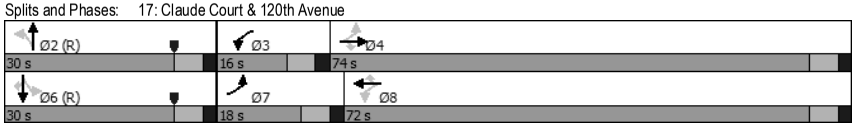
Timing Report, Sorted By Phase
17: Claude Court & 120th Avenue

9/15/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize						
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	30	16	74	30	18	72
Maximum Split (%)	25.0%	13.3%	61.7%	25.0%	15.0%	60.0%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	100	10	26	100	10	28
End Time (s)	10	26	100	10	28	100
Yield/Force Off (s)	4	20	94	4	22	94
Yield/Force Off 170(s)	113	20	83	113	22	83
Local Start Time (s)	96	6	22	96	6	24
Local Yield (s)	0	16	90	0	18	90
Local Yield 170(s)	109	16	79	109	18	79

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	65
Offset: 4 (3%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	

Splits and Phases: 17: Claude Court & 120th Avenue



HCM 2010 Signalized Intersection Summary
26: 120th Avenue & Race Street

9/15/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	235	1958	1404	85	37	71
Future Volume (veh/h)	235	1958	1404	85	37	71
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	255	2128	1526	92	40	77
Adj No. of Lanes	1	3	3	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	663	4005	2521	785	244	218
Arrive On Green	0.25	0.79	0.99	0.99	0.14	0.14
Sat Flow, veh/h	1774	5253	5253	1583	1774	1583
Grp Volume(v), veh/h	255	2128	1526	92	40	77
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	1583	1774	1583
Q Serve(g_s), s	4.7	18.3	0.8	0.1	2.4	5.3
Cycle Q Clear(g_c), s	4.7	18.3	0.8	0.1	2.4	5.3
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	663	4005	2521	785	244	218
V/C Ratio(X)	0.38	0.53	0.61	0.12	0.16	0.35
Avail Cap(c_a), veh/h	663	4005	2521	785	244	218
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	4.0	4.7	0.3	0.3	45.7	46.9
Incr Delay (d2), s/veh	1.7	0.5	1.1	0.3	1.4	4.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	8.7	0.4	3.2	1.3	5.0
LnGrp Delay(d),s/veh	5.7	5.2	1.3	0.6	47.1	51.4
LnGrp LOS	A	A	A	A	D	D
Approach Vol, veh/h		2383	1618		117	
Approach Delay, s/veh		5.2	1.3		49.9	
Approach LOS		A	A		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				99.0		21.0	35.0	64.0
Change Period (Y+Rc), s				4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s				94.5		16.5	30.5	59.5
Max Q Clear Time (g_c+I1), s				20.3		7.3	6.7	2.8
Green Ext Time (p_c), s				65.7		0.2	0.7	51.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.9
HCM 2010 LOS	A

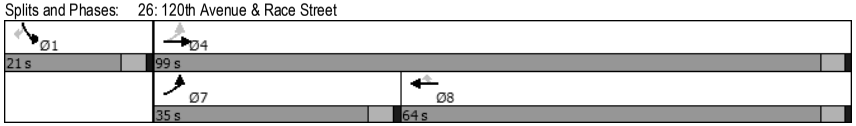
Timing Report, Sorted By Phase
26: 120th Avenue & Race Street

9/15/2015

Phase Number	1	4	7	8
Movement	SBL	EBTL	EBL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize			Yes	Yes
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	21	99	35	64
Maximum Split (%)	17.5%	82.5%	29.2%	53.3%
Minimum Split (s)	9.5	22.5	9.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7		7
Flash Dont Walk (s)		11		11
Dual Entry	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	104	5	5	40
End Time (s)	5	104	40	104
Yield/Force Off (s)	0.5	99.5	35.5	99.5
Yield/Force Off 170(s)	0.5	88.5	35.5	88.5
Local Start Time (s)	0	21	21	56
Local Yield (s)	16.5	115.5	51.5	115.5
Local Yield 170(s)	16.5	104.5	51.5	104.5

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	45
Offset: 104 (87%), Referenced to phase 2: and 6:, Start of Green	

Splits and Phases: 26: 120th Avenue & Race Street



HCM 2010 Signalized Intersection Summary
28: Urma Street & 120th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	2023	149	79	1528	16	122	7	90	40	7	59
Future Volume (veh/h)	48	2023	149	79	1528	16	122	7	90	40	7	59
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	52	2199	162	86	1661	17	133	8	98	43	8	64
Adj No. of Lanes	1	3	1	1	3	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	2882	897	214	3009	937	298	26	321	267	39	310
Arrive On Green	0.04	0.57	0.57	0.07	0.59	0.59	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1774	5085	1583	1774	5085	1583	1323	121	1481	1283	179	1431
Grp Volume(v), veh/h	52	2199	162	86	1661	17	133	0	106	43	0	72
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	1583	1323	0	1601	1283	0	1610
Q Serve(g_s), s	1.4	39.6	5.9	2.2	23.8	0.5	11.0	0.0	6.7	3.5	0.0	4.4
Cycle Q Clear(g_c), s	1.4	39.6	5.9	2.2	23.8	0.5	15.4	0.0	6.7	10.2	0.0	4.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.92	1.00		0.89
Lane Grp Cap(c), veh/h	249	2882	897	214	3009	937	298	0	347	267	0	349
V/C Ratio(X)	0.21	0.76	0.18	0.40	0.55	0.02	0.45	0.00	0.31	0.16	0.00	0.21
Avail Cap(c_a), veh/h	249	2882	897	214	3009	937	298	0	347	267	0	349
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.7	19.9	12.6	21.9	14.9	10.1	44.9	0.0	39.4	43.7	0.0	38.5
Incr Delay (d2), s/veh	1.9	2.0	0.4	5.6	0.7	0.0	4.8	0.0	2.3	1.3	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	18.9	2.7	2.0	11.3	0.2	4.4	0.0	3.2	1.3	0.0	2.1
LnGrp Delay(d),s/veh	13.6	21.8	13.0	27.4	15.6	10.1	49.6	0.0	41.7	45.0	0.0	39.9
LnGrp LOS	B	C	B	C	B	B	D		D	D		D
Approach Vol, veh/h		2413			1764			239			115	
Approach Delay, s/veh		21.1			16.1			46.1			41.8	
Approach LOS		C			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		32.0	14.0	74.0		32.0	11.0	77.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		26.0	8.0	68.0		26.0	5.0	71.0
Max Q Clear Time (g_c+I1), s		17.4	4.2	41.6		12.2	3.4	25.8
Green Ext Time (p_c), s		1.1	0.1	25.6		1.4	0.0	42.9

Intersection Summary	
HCM 2010 Ctrl Delay	21.0
HCM 2010 LOS	C

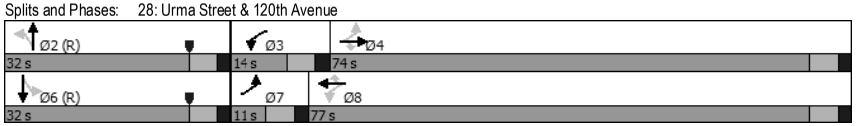
Timing Report, Sorted By Phase
28: Urma Street & 120th Avenue

9/15/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize		Yes	Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	32	14	74	32	11	77
Maximum Split (%)	26.7%	11.7%	61.7%	26.7%	9.2%	64.2%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	41	73	87	41	73	84
End Time (s)	73	87	41	73	84	41
Yield/Force Off (s)	67	81	35	67	78	35
Yield/Force Off 170(s)	56	81	24	56	78	24
Local Start Time (s)	94	6	20	94	6	17
Local Yield (s)	0	14	88	0	11	88
Local Yield 170(s)	109	14	77	109	11	77

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	75
Offset: 67 (56%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	

Splits and Phases: 28: Urma Street & 120th Avenue



Intersection	
Int Delay, s/veh	4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	238	159	32	161	84	150
Future Vol, veh/h	238	159	32	161	84	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	90	-	0	25
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	259	173	35	175	91	163

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	432	0	590	345
Stage 1	-	-	-	-	345	-
Stage 2	-	-	-	-	245	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1128	-	470	698
Stage 1	-	-	-	-	717	-
Stage 2	-	-	-	-	796	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1128	-	455	698
Mov Cap-2 Maneuver	-	-	-	-	455	-
Stage 1	-	-	-	-	717	-
Stage 2	-	-	-	-	771	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	455	698	-	-	1128	-
HCM Lane V/C Ratio	0.201	0.234	-	-	0.031	-
HCM Control Delay (s)	14.9	11.7	-	-	8.3	-
HCM Lane LOS	B	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	0.9	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	24	365	190	10	15	19
Future Vol, veh/h	24	365	190	10	15	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	55	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	397	207	11	16	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	217	0	-	0	661	212
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	449	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1353	-	-	-	427	828
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	643	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1353	-	-	-	419	828
Mov Cap-2 Maneuver	-	-	-	-	419	-
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	631	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	11.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1353	-	-	-	579
HCM Lane V/C Ratio	0.019	-	-	-	0.064
HCM Control Delay (s)	7.7	-	-	-	11.6
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	103	283	134	75	85	81
Future Vol, veh/h	103	283	134	75	85	81
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	75	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	112	308	146	82	92	88

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	146	0	-	0	678	146
Stage 1	-	-	-	-	146	-
Stage 2	-	-	-	-	532	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1436	-	-	-	418	901
Stage 1	-	-	-	-	881	-
Stage 2	-	-	-	-	589	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1436	-	-	-	385	901
Mov Cap-2 Maneuver	-	-	-	-	385	-
Stage 1	-	-	-	-	881	-
Stage 2	-	-	-	-	543	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	15.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1436	-	-	-	534
HCM Lane V/C Ratio	0.078	-	-	-	0.338
HCM Control Delay (s)	7.7	-	-	-	15.1
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	1.5

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	3	2	6	218	219	4
Future Vol, veh/h	3	2	6	218	219	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	2	7	237	238	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	490	240	242	0	-	0
Stage 1	240	-	-	-	-	-
Stage 2	250	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	537	799	1324	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	792	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	534	799	1324	-	-	-
Mov Cap-2 Maneuver	534	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	788	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1324	-	616	-	-
HCM Lane V/C Ratio	0.005	-	0.009	-	-
HCM Control Delay (s)	7.7	-	10.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Intersection Delay, s/veh	20.2
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	310	18	107	0	0	24	21	0	246	302	0
Future Vol, veh/h	0	310	18	107	0	0	24	21	0	246	302	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	337	20	116	0	0	26	23	0	267	328	0
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	22.8	11.7	20.1
HCM LOS	C	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	14%	100%	53%	0%	57%
Vol Right, %	0%	0%	0%	86%	0%	47%	0%	43%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	246	302	310	125	0	45	8	244
LT Vol	246	0	310	0	0	0	8	0
Through Vol	0	302	0	18	0	24	0	140
RT Vol	0	0	0	107	0	21	0	104
Lane Flow Rate	267	328	337	136	0	49	9	265
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.554	0.633	0.712	0.245	0	0.108	0.019	0.527
Departure Headway (Hd)	7.457	6.945	7.741	6.619	8.291	7.953	7.978	7.157
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	487	522	472	546	0	451	450	507
Service Time	5.171	4.659	5.441	4.319	6.026	5.688	5.695	4.874
HCM Lane V/C Ratio	0.548	0.628	0.714	0.249	0	0.109	0.02	0.523
HCM Control Delay	19.1	20.9	27.4	11.5	11	11.7	10.8	17.6
HCM Lane LOS	C	C	D	B	N	B	B	C
HCM 95th-tile Q	3.3	4.4	5.6	1	0	0.4	0.1	3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	8	140	104
Future Vol, veh/h	0	8	140	104
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	9	152	113
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	17.4
HCM LOS	C

Lane

Intersection	
Intersection Delay, s/veh	12.4
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	8	70	67	0	27	134	248	0	40	147	63
Future Vol, veh/h	0	8	70	67	0	27	134	248	0	40	147	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	76	73	0	29	146	270	0	43	160	68
Number of Lanes	0	1	1	0	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	11.7	12.7	12.8
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	21%	0%	100%	0%	17%	0%	100%	0%
Vol Thru, %	79%	0%	0%	51%	83%	0%	0%	95%
Vol Right, %	0%	100%	0%	49%	0%	100%	0%	5%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	187	63	8	137	161	248	120	123
LT Vol	40	0	8	0	27	0	120	0
Through Vol	147	0	0	70	134	0	0	117
RT Vol	0	63	0	67	0	248	0	6
Lane Flow Rate	203	68	9	149	175	270	130	134
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.386	0.114	0.018	0.272	0.319	0.431	0.262	0.248
Departure Headway (Hd)	6.828	6.006	7.431	6.571	6.557	5.76	7.228	6.684
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	524	592	479	542	546	620	494	533
Service Time	4.611	3.789	5.225	4.364	4.334	3.537	5.013	4.469
HCM Lane V/C Ratio	0.387	0.115	0.019	0.275	0.321	0.435	0.263	0.251
HCM Control Delay	13.9	9.6	10.4	11.8	12.4	12.9	12.6	11.7
HCM Lane LOS	B	A	B	B	B	B	B	B
HCM 95th-tile Q	1.8	0.4	0.1	1.1	1.4	2.2	1	1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	120	117	6
Future Vol, veh/h	0	120	117	6
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	130	127	7
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	12.1
HCM LOS	B

Lane

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	59	285	368	255
Demand Flow Rate, veh/h	60	291	375	260
Vehicles Circulating, veh/h	201	392	148	110
Vehicles Exiting, veh/h	169	131	113	573
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.6	9.7	8.0	6.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	60	291	375	260
Cap Entry Lane, veh/h	924	764	974	1012
Entry HV Adj Factor	0.976	0.979	0.982	0.979
Flow Entry, veh/h	59	285	368	255
Cap Entry, veh/h	902	747	957	991
V/C Ratio	0.065	0.381	0.385	0.257
Control Delay, s/veh	4.6	9.7	8.0	6.2
LOS	A	A	A	A
95th %tile Queue, veh	0	2	2	1

Intersection	
Intersection Delay, s/veh	4.7
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	130	178	80
Demand Flow Rate, veh/h	132	181	82
Vehicles Circulating, veh/h	120	27	22
Vehicles Exiting, veh/h	88	77	230
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	4.9	4.8	4.0
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	132	181	82
Cap Entry Lane, veh/h	1002	1100	1105
Entry HV Adj Factor	0.985	0.981	0.975
Flow Entry, veh/h	130	178	80
Cap Entry, veh/h	987	1079	1077
V/C Ratio	0.132	0.165	0.074
Control Delay, s/veh	4.9	4.8	4.0
LOS	A	A	A
95th %tile Queue, veh	0	1	0

HCM 2010 Signalized Intersection Summary
5: York Street & 128th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	148	477	35	64	1024	36	50	79	43	54	140	382
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	161	518	38	70	1113	39	54	86	47	59	152	415
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	325	1711	765	435	1475	660	333	528	449	460	528	449
Arrive On Green	0.04	0.16	0.16	0.04	0.42	0.42	0.05	0.28	0.28	0.05	0.28	0.28
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	161	518	38	70	1113	39	54	86	47	59	152	415
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	5.6	15.5	2.4	2.7	32.1	1.8	2.5	4.2	2.6	2.8	7.6	30.5
Cycle Q Clear(g_c), s	5.6	15.5	2.4	2.7	32.1	1.8	2.5	4.2	2.6	2.8	7.6	30.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	325	1711	765	435	1475	660	333	528	449	460	528	449
V/C Ratio(X)	0.50	0.30	0.05	0.16	0.75	0.06	0.16	0.16	0.10	0.13	0.29	0.93
Avail Cap(c_a), veh/h	325	1711	765	435	1475	660	333	528	449	460	528	449
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.2	32.6	27.1	18.6	29.8	20.9	27.8	32.3	31.8	27.7	33.6	41.8
Incr Delay (d2), s/veh	5.3	0.5	0.1	0.8	3.6	0.2	1.0	0.7	0.5	0.6	1.4	27.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	7.7	1.1	1.4	16.4	0.8	1.3	2.2	1.2	1.4	4.1	16.8
LnGrp Delay(d),s/veh	28.5	33.0	27.2	19.4	33.4	21.1	28.8	33.0	32.2	28.2	34.9	69.1
LnGrp LOS	C	C	C	B	C	C	C	C	C	C	C	E
Approach Vol, veh/h		717			1222			187			626	
Approach Delay, s/veh		31.7			32.2			31.6			57.0	
Approach LOS		C			C			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	63.0	10.0	38.0	17.0	55.0	10.0	38.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	58.0	6.0	34.0	13.0	50.0	6.0	34.0
Max Q Clear Time (g_c+I1), s	4.7	17.5	4.5	32.5	7.6	34.1	4.8	6.2
Green Ext Time (p_c), s	0.0	17.5	0.0	0.5	0.2	10.3	0.0	3.2

Intersection Summary	
HCM 2010 Ctrl Delay	37.7
HCM 2010 LOS	D

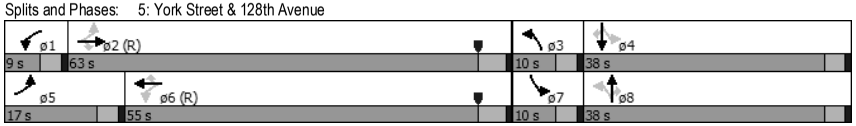
Timing Report, Sorted By Phase
5: York Street & 128th Avenue

8/28/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	9	63	10	38	17	55	10	38
Maximum Split (%)	7.5%	52.5%	8.3%	31.7%	14.2%	45.8%	8.3%	31.7%
Minimum Split (s)	9	10	9.5	30.5	9	10	9.5	30.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	112	1	64	74	112	9	64	74
End Time (s)	1	64	74	112	9	64	74	112
Yield/Force Off (s)	117	59	70	108	5	59	70	108
Yield/Force Off 170(s)	117	59	70	108	5	59	70	108
Local Start Time (s)	53	62	5	15	53	70	5	15
Local Yield (s)	58	0	11	49	66	0	11	49
Local Yield 170(s)	58	0	11	49	66	0	11	49

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	80
Offset: 59 (49%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 5: York Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
9: Claude Court & 128th Avenue

8/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Volume (veh/h)	670	197	246	1200	223	143
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	728	214	267	1304	242	155
Adj No. of Lanes	2	1	1	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1386	620	632	2271	503	449
Arrive On Green	0.78	0.78	0.43	1.00	0.28	0.28
Sat Flow, veh/h	3632	1583	1774	3632	1774	1583
Grp Volume(v), veh/h	728	214	267	1304	242	155
Grp Sat Flow(s),veh/h/ln	1770	1583	1774	1770	1774	1583
Q Serve(g_s), s	9.1	4.8	7.0	0.0	13.6	9.3
Cycle Q Clear(g_c), s	9.1	4.8	7.0	0.0	13.6	9.3
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1386	620	632	2271	503	449
V/C Ratio(X)	0.53	0.35	0.42	0.57	0.48	0.35
Avail Cap(c_a), veh/h	1386	620	632	2271	503	449
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.9	8.4	7.6	0.0	35.7	34.2
Incr Delay (d2), s/veh	1.4	1.5	2.1	1.1	3.3	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	2.3	3.6	0.3	7.1	4.4
LnGrp Delay(d),s/veh	10.3	10.0	9.7	1.1	39.0	36.3
LnGrp LOS	B	A	A	A	D	D
Approach Vol, veh/h	942			1571	397	
Approach Delay, s/veh	10.2			2.5	37.9	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	30.0	52.0				82.0		38.0
Change Period (Y+Rc), s	4.0	5.0				5.0		4.0
Max Green Setting (Gmax), s	26.0	47.0				77.0		34.0
Max Q Clear Time (g_c+I1), s	9.0	11.1				2.0		15.6
Green Ext Time (p_c), s	0.7	22.8				32.9		1.2

Intersection Summary	
HCM 2010 Ctrl Delay	9.8
HCM 2010 LOS	A

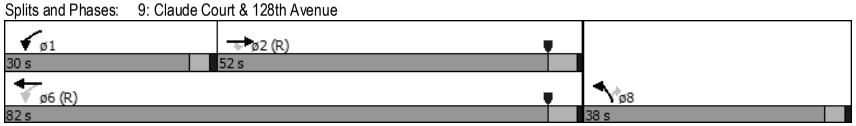
Timing Report, Sorted By Phase
9: Claude Court & 128th Avenue

8/28/2015

Phase Number	1	2	6	8
Movement	WBL	EBT	WBTL	NBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	30	52	82	38
Maximum Split (%)	25.0%	43.3%	68.3%	31.7%
Minimum Split (s)	9.5	29.5	28.5	27.5
Yellow Time (s)	3	4	4	3
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	No
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	42	72	42	4
End Time (s)	72	4	4	42
Yield/Force Off (s)	68	119	119	38
Yield/Force Off 170(s)	68	119	119	38
Local Start Time (s)	43	73	43	5
Local Yield (s)	69	0	0	39
Local Yield 170(s)	69	0	0	39

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	70
Offset: 119 (99%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	

Splits and Phases: 9: Claude Court & 128th Avenue



HCM 2010 Signalized Intersection Summary
10: Lafayette Street & 128th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	123	549	115	152	970	265	112	127	55	206	82	177
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	134	597	125	165	1054	288	122	138	60	224	89	192
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	381	1787	800	464	1308	355	252	195	85	358	118	256
Arrive On Green	0.09	0.50	0.50	0.12	0.95	0.95	0.07	0.16	0.16	0.13	0.22	0.22
Sat Flow, veh/h	1774	3539	1583	1774	2753	747	1774	1232	536	1774	526	1136
Grp Volume(v), veh/h	134	597	125	165	675	667	122	0	198	224	0	281
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1731	1774	0	1768	1774	0	1662
Q Serve(g_s), s	4.1	12.1	5.1	5.9	9.7	10.1	6.9	0.0	12.7	12.0	0.0	18.9
Cycle Q Clear(g_c), s	4.1	12.1	5.1	5.9	9.7	10.1	6.9	0.0	12.7	12.0	0.0	18.9
Prop In Lane	1.00		1.00	1.00		0.43	1.00		0.30	1.00		0.68
Lane Grp Cap(c), veh/h	381	1787	800	464	841	822	252	0	280	358	0	374
V/C Ratio(X)	0.35	0.33	0.16	0.36	0.80	0.81	0.48	0.00	0.71	0.63	0.00	0.75
Avail Cap(c_a), veh/h	381	1787	800	464	841	822	252	0	280	358	0	374
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.3	17.7	16.0	13.7	1.8	1.8	39.3	0.0	47.9	34.0	0.0	43.4
Incr Delay (d2), s/veh	2.5	0.5	0.4	2.1	8.0	8.6	6.5	0.0	14.0	8.0	0.0	13.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	6.0	2.3	3.1	5.2	5.3	3.8	0.0	7.3	6.6	0.0	10.0
LnGrp Delay(d),s/veh	14.8	18.2	16.4	15.8	9.8	10.4	45.8	0.0	61.9	42.0	0.0	56.4
LnGrp LOS	B	B	B	B	A	B	D		E	D		E
Approach Vol, veh/h		856			1507			320			505	
Approach Delay, s/veh		17.4			10.7			55.8			50.0	
Approach LOS		B			B			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.4	65.6	12.0	31.0	15.0	62.0	20.0	23.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	7.4	60.6	8.0	27.0	11.0	57.0	16.0	19.0
Max Q Clear Time (g_c+I1), s	7.9	14.1	8.9	20.9	6.1	12.1	14.0	14.7
Green Ext Time (p_c), s	0.0	23.4	0.0	1.5	0.1	23.0	0.1	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	23.3
HCM 2010 LOS	C

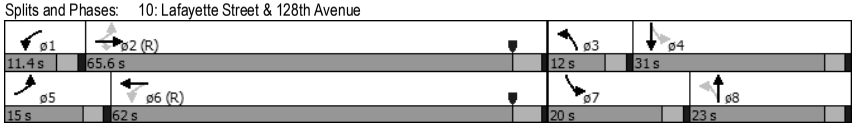
Timing Report, Sorted By Phase
10: Lafayette Street & 128th Avenue

8/28/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	11.4	65.6	12	31	15	62	20	23
Maximum Split (%)	9.5%	54.7%	10.0%	25.8%	12.5%	51.7%	16.7%	19.2%
Minimum Split (s)	9.5	27	9.5	28.5	9.5	27	9.5	22.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	44	55.4	1	13	44	59	1	21
End Time (s)	55.4	1	13	44	59	1	21	44
Yield/Force Off (s)	51.4	116	9	40	55	116	17	40
Yield/Force Off 170(s)	51.4	116	9	40	55	116	17	40
Local Start Time (s)	48	59.4	5	17	48	63	5	25
Local Yield (s)	55.4	0	13	44	59	0	21	44
Local Yield 170(s)	55.4	0	13	44	59	0	21	44

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	90
Offset: 116 (97%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 10: Lafayette Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
15: Washington Street & East 126th Avenue

8/28/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	177	172	586	291	245	1486
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	192	187	637	316	266	1615
Adj No. of Lanes	1	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	562	501	1239	554	419	1829
Arrive On Green	0.32	0.32	0.35	0.35	0.10	0.52
Sat Flow, veh/h	1774	1583	3632	1583	1774	3632
Grp Volume(v), veh/h	192	187	637	316	266	1615
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1583	1774	1770
Q Serve(g_s), s	5.0	5.5	8.6	9.7	5.5	24.3
Cycle Q Clear(g_c), s	5.0	5.5	8.6	9.7	5.5	24.3
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	562	501	1239	554	419	1829
V/C Ratio(X)	0.34	0.37	0.51	0.57	0.63	0.88
Avail Cap(c_a), veh/h	562	501	1239	554	419	1829
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.7	15.9	15.5	15.8	11.1	12.9
Incr Delay (d2), s/veh	1.7	2.1	1.5	4.2	7.2	6.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	2.7	4.4	4.9	3.4	13.3
LnGrp Delay(d),s/veh	17.4	18.0	17.0	20.1	18.3	19.5
LnGrp LOS	B	B	B	C	B	B
Approach Vol, veh/h	379		953			1881
Approach Delay, s/veh	17.7		18.0			19.3
Approach LOS	B		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	10.0	27.0				37.0		23.0
Change Period (Y+Rc), s	4.0	6.0				6.0		4.0
Max Green Setting (Gmax), s	6.0	21.0				31.0		19.0
Max Q Clear Time (g_c+I1), s	7.5	11.7				26.3		7.5
Green Ext Time (p_c), s	0.0	8.3				4.3		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	18.7
HCM 2010 LOS	B

Timing Report, Sorted By Phase
15: Washington Street & East 126th Avenue

8/28/2015

Phase Number	1	2	6	8
Movement	SBL	NBT	SBTL	WBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	10	27	37	23
Maximum Split (%)	16.7%	45.0%	61.7%	38.3%
Minimum Split (s)	9.5	27	24	29
Yellow Time (s)	3	4.5	4.5	3
All-Red Time (s)	1	1.5	1.5	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	29	39	29	6
End Time (s)	39	6	6	29
Yield/Force Off (s)	35	0	0	25
Yield/Force Off 170(s)	35	0	0	25
Local Start Time (s)	29	39	29	6
Local Yield (s)	35	0	0	25
Local Yield 170(s)	35	0	0	25

Intersection Summary	
Cycle Length	60
Control Type	Pretimed
Natural Cycle	70
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow	

Splits and Phases: 15: Washington Street & East 126th Avenue

HCM 2010 Signalized Intersection Summary
17: Claude Court & 120th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	852	24	25	1945	87	50	46	38	88	28	53
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	58	926	26	27	2114	95	54	50	41	96	30	58
Adj No. of Lanes	1	3	1	1	3	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	231	3136	976	446	3009	937	293	182	149	251	357	303
Arrive On Green	0.07	0.62	0.62	0.04	0.59	0.59	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1774	5085	1583	1774	5085	1583	1304	948	777	1300	1863	1583
Grp Volume(v), veh/h	58	926	26	27	2114	95	54	0	91	96	30	58
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	1583	1304	0	1726	1300	1863	1583
Q Serve(g_s), s	1.4	10.2	0.8	0.7	34.9	3.1	4.3	0.0	5.4	8.2	1.6	3.7
Cycle Q Clear(g_c), s	1.4	10.2	0.8	0.7	34.9	3.1	5.8	0.0	5.4	13.6	1.6	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.45	1.00		1.00
Lane Grp Cap(c), veh/h	231	3136	976	446	3009	937	293	0	331	251	357	303
V/C Ratio(X)	0.25	0.30	0.03	0.06	0.70	0.10	0.18	0.00	0.28	0.38	0.08	0.19
Avail Cap(c_a), veh/h	231	3136	976	446	3009	937	293	0	331	251	357	303
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.8	10.8	9.0	8.4	17.1	10.6	42.2	0.0	41.4	47.2	39.8	40.7
Incr Delay (d2), s/veh	2.6	0.2	0.1	0.3	1.4	0.2	1.4	0.0	2.1	4.4	0.5	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	4.9	0.3	0.4	16.6	1.4	1.6	0.0	2.8	3.2	0.9	1.7
LnGrp Delay(d),s/veh	17.4	11.0	9.0	8.7	18.5	10.9	43.6	0.0	43.4	51.6	40.3	42.1
LnGrp LOS	B	B	A	A	B	B	D		D	D	D	D
Approach Vol, veh/h		1010			2236			145			184	
Approach Delay, s/veh		11.3			18.1			43.5			46.7	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		29.0	11.0	80.0		29.0	14.0	77.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		23.0	5.0	74.0		23.0	8.0	71.0
Max Q Clear Time (g_c+I1), s		7.8	2.7	12.2		15.6	3.4	36.9
Green Ext Time (p_c), s		1.2	0.0	49.5		0.8	0.0	30.0

Intersection Summary	
HCM 2010 Ctrl Delay	18.7
HCM 2010 LOS	B

Timing Report, Sorted By Phase
17: Claude Court & 120th Avenue

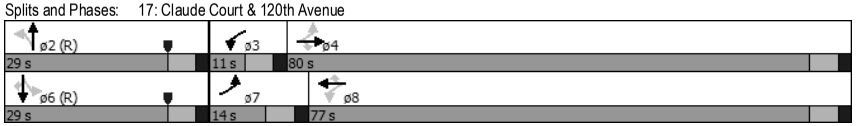
8/28/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize						
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	29	11	80	29	14	77
Maximum Split (%)	24.2%	9.2%	66.7%	24.2%	11.7%	64.2%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	91	0	11	91	0	14
End Time (s)	0	11	91	0	14	91
Yield/Force Off (s)	114	5	85	114	8	85
Yield/Force Off 170(s)	103	5	74	103	8	74
Local Start Time (s)	97	6	17	97	6	20
Local Yield (s)	0	11	91	0	14	91
Local Yield 170(s)	109	11	80	109	14	80

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	70

Offset: 114 (95%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Splits and Phases: 17: Claude Court & 120th Avenue



HCM 2010 Signalized Intersection Summary
26: 120th Avenue & Race Street

8/28/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	127	811	1976	84	119	127
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	138	882	2148	91	129	138
Adj No. of Lanes	1	3	3	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	386	3835	2988	930	303	270
Arrive On Green	0.26	1.00	1.00	1.00	0.17	0.17
Sat Flow, veh/h	1774	5253	5253	1583	1774	1583
Grp Volume(v), veh/h	138	882	2148	91	129	138
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	1583	1774	1583
Q Serve(g_s), s	0.0	0.0	0.0	0.0	7.8	9.5
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	7.8	9.5
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	386	3835	2988	930	303	270
V/C Ratio(X)	0.36	0.23	0.72	0.10	0.43	0.51
Avail Cap(c_a), veh/h	386	3835	2988	930	303	270
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.7	0.0	0.0	0.0	44.5	45.2
Incr Delay (d2), s/veh	2.6	0.1	1.5	0.2	4.3	6.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	0.4	3.1	4.2	8.9
LnGrp Delay(d),s/veh	17.3	0.1	1.5	0.2	48.8	51.9
LnGrp LOS	B	A	A	A	D	D
Approach Vol, veh/h		1020	2239		267	
Approach Delay, s/veh		2.5	1.5		50.4	
Approach LOS		A	A		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				95.0		25.0	20.0	75.0
Change Period (Y+Rc), s				4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s				90.5		20.5	15.5	70.5
Max Q Clear Time (g_c+I1), s				2.0		11.5	2.0	2.0
Green Ext Time (p_c), s				8.4		0.5	5.5	36.6

Intersection Summary	
HCM 2010 Ctrl Delay	5.5
HCM 2010 LOS	A

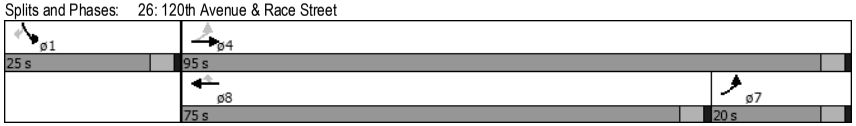
Timing Report, Sorted By Phase
26: 120th Avenue & Race Street

8/28/2015

Phase Number	1	4	7	8
Movement	SBL	EBTL	EBL	WBT
Lead/Lag			Lag	Lead
Lead-Lag Optimize			Yes	Yes
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	25	95	20	75
Maximum Split (%)	20.8%	79.2%	16.7%	62.5%
Minimum Split (s)	9.5	22.5	9.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7		7
Flash Dont Walk (s)		11		11
Dual Entry	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	11	36	111	36
End Time (s)	36	11	11	111
Yield/Force Off (s)	31.5	6.5	6.5	106.5
Yield/Force Off 170(s)	31.5	115.5	6.5	95.5
Local Start Time (s)	0	25	100	25
Local Yield (s)	20.5	115.5	115.5	95.5
Local Yield 170(s)	20.5	104.5	115.5	84.5

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	55
Offset: 11 (9%), Referenced to phase 2: and 6:, Start of Green	

Splits and Phases: 26: 120th Avenue & Race Street



HCM 2010 Signalized Intersection Summary
28: Urma Street & 120th Avenue

8/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	176	867	48	45	2198	121	119	17	45	42	14	128
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	191	942	52	49	2389	132	129	18	49	46	15	139
Adj No. of Lanes	1	3	1	1	3	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	295	3136	976	334	2712	844	190	85	231	269	30	278
Arrive On Green	0.13	0.62	0.62	0.04	0.53	0.53	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1774	5085	1583	1774	5085	1583	1228	443	1207	1329	157	1450
Grp Volume(v), veh/h	191	942	52	49	2389	132	129	0	67	46	0	154
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	1583	1228	0	1650	1329	0	1607
Q Serve(g_s), s	7.1	10.5	1.6	1.7	49.6	5.1	12.6	0.0	4.1	3.6	0.0	10.3
Cycle Q Clear(g_c), s	7.1	10.5	1.6	1.7	49.6	5.1	22.9	0.0	4.1	7.7	0.0	10.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.73	1.00		0.90
Lane Grp Cap(c), veh/h	295	3136	976	334	2712	844	190	0	316	269	0	308
V/C Ratio(X)	0.65	0.30	0.05	0.15	0.88	0.16	0.68	0.00	0.21	0.17	0.00	0.50
Avail Cap(c_a), veh/h	295	3136	976	334	2712	844	190	0	316	269	0	308
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	47.3	10.8	9.1	16.1	24.6	14.3	53.6	0.0	40.9	44.1	0.0	43.4
Incr Delay (d2), s/veh	10.5	0.2	0.1	0.9	4.5	0.4	17.8	0.0	1.5	1.4	0.0	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	5.0	0.7	0.9	24.1	2.3	5.2	0.0	2.0	1.4	0.0	5.1
LnGrp Delay(d),s/veh	57.8	11.1	9.2	17.1	29.2	14.6	71.4	0.0	42.4	45.5	0.0	49.1
LnGrp LOS	E	B	A	B	C	B	E		D	D		D
Approach Vol, veh/h		1185			2570			196			200	
Approach Delay, s/veh		18.5			28.2			61.5			48.2	
Approach LOS		B			C			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		29.0	11.0	80.0		29.0	21.0	70.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		23.0	5.0	74.0		23.0	15.0	64.0
Max Q Clear Time (g_c+I1), s		24.9	3.7	12.5		12.3	9.1	51.6
Green Ext Time (p_c), s		0.0	0.0	9.7		1.5	3.4	11.1

Intersection Summary	
HCM 2010 Ctrl Delay	28.0
HCM 2010 LOS	C

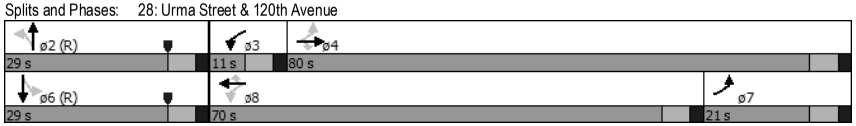
Timing Report, Sorted By Phase
28: Urma Street & 120th Avenue

8/28/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lag	Lead
Lead-Lag Optimize		Yes	Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	29	11	80	29	21	70
Maximum Split (%)	24.2%	9.2%	66.7%	24.2%	17.5%	58.3%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	41	70	81	41	20	70
End Time (s)	70	81	41	70	41	20
Yield/Force Off (s)	64	75	35	64	35	14
Yield/Force Off 170(s)	53	75	24	53	35	3
Local Start Time (s)	97	6	17	97	76	6
Local Yield (s)	0	11	91	0	91	70
Local Yield 170(s)	109	11	80	109	91	59

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	80
Offset: 64 (53%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	

Splits and Phases: 28: Urma Street & 120th Avenue



Intersection	
Int Delay, s/veh	4.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	148	105	65	269	110	95
Future Vol, veh/h	148	105	65	269	110	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	90	-	0	25
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	161	114	71	292	120	103

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	275	0	652	218
Stage 1	-	-	-	-	218	-
Stage 2	-	-	-	-	434	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1288	-	433	822
Stage 1	-	-	-	-	818	-
Stage 2	-	-	-	-	653	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1288	-	409	822
Mov Cap-2 Maneuver	-	-	-	-	409	-
Stage 1	-	-	-	-	818	-
Stage 2	-	-	-	-	617	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	14
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	409	822	-	-	1288	-
HCM Lane V/C Ratio	0.292	0.126	-	-	0.055	-
HCM Control Delay (s)	17.4	10	-	-	8	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	1.2	0.4	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	25	182	356	12	7	52
Future Vol, veh/h	25	182	356	12	7	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	55	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	198	387	13	8	57

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	400	0	-	0	645	393
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	252	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1159	-	-	-	437	656
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	790	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1159	-	-	-	427	656
Mov Cap-2 Maneuver	-	-	-	-	427	-
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	772	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1159	-	-	-	617
HCM Lane V/C Ratio	0.023	-	-	-	0.104
HCM Control Delay (s)	8.2	-	-	-	11.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	59	137	318	45	50	109
Future Vol, veh/h	59	137	318	45	50	109
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	75	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	64	149	346	49	54	118

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	346	0	-	0	623	346
Stage 1	-	-	-	-	346	-
Stage 2	-	-	-	-	277	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1213	-	-	-	450	697
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	770	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1213	-	-	-	426	697
Mov Cap-2 Maneuver	-	-	-	-	426	-
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	729	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1213	-	-	-	581
HCM Lane V/C Ratio	0.053	-	-	-	0.297
HCM Control Delay (s)	8.1	-	-	-	13.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	1.2

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	15	10	3	198	295	6
Future Vol, veh/h	15	10	3	198	295	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	3	215	321	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	546	324	327	0	-	0
Stage 1	324	-	-	-	-	-
Stage 2	222	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	499	717	1233	-	-	-
Stage 1	733	-	-	-	-	-
Stage 2	815	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	498	717	1233	-	-	-
Mov Cap-2 Maneuver	498	-	-	-	-	-
Stage 1	733	-	-	-	-	-
Stage 2	813	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.7	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1233	-	567	-	-
HCM Lane V/C Ratio	0.003	-	0.048	-	-
HCM Control Delay (s)	7.9	-	11.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	41	25	262	0	0	24	14	0	96	174	0
Future Vol, veh/h	0	41	25	262	0	0	24	14	0	96	174	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	45	27	285	0	0	26	15	0	104	189	0
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	14.8	10.6	12.2
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	0%	0%	100%	0%
Vol Thru, %	0%	100%	0%	9%	100%	63%	0%	74%
Vol Right, %	0%	0%	0%	91%	0%	37%	0%	26%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	174	41	287	0	38	22	387
LT Vol	96	0	41	0	0	0	22	0
Through Vol	0	174	0	25	0	24	0	287
RT Vol	0	0	0	262	0	14	0	100
Lane Flow Rate	104	189	45	312	0	41	24	421
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.203	0.34	0.089	0.525	0	0.083	0.045	0.71
Departure Headway (Hd)	6.987	6.477	7.216	6.059	7.516	7.251	6.771	6.079
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	511	552	494	593	0	497	527	593
Service Time	4.769	4.258	4.994	3.836	5.216	4.951	4.54	3.847
HCM Lane V/C Ratio	0.204	0.342	0.091	0.526	0	0.082	0.046	0.71
HCM Control Delay	11.6	12.6	10.7	15.4	10.2	10.6	9.9	22.5
HCM Lane LOS	B	B	B	C	N	B	A	C
HCM 95th-tile Q	0.8	1.5	0.3	3	0	0.3	0.1	5.8

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	22	287	100
Future Vol, veh/h	0	22	287	100
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	24	312	109
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	21.8
HCM LOS	C

Lane

Intersection	
Intersection Delay, s/veh	20.7
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	8	148	57	0	26	88	210	0	50	241	157
Future Vol, veh/h	0	8	148	57	0	26	88	210	0	50	241	157
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	161	62	0	28	96	228	0	54	262	171
Number of Lanes	0	1	1	0	0	0	1	1	0	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	19	16.1	21.8
HCM LOS	C	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	17%	0%	100%	0%	23%	0%	100%	0%
Vol Thru, %	83%	0%	0%	72%	77%	0%	0%	91%
Vol Right, %	0%	100%	0%	28%	0%	100%	0%	9%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	291	157	8	205	114	210	284	148
LT Vol	50	0	8	0	26	0	284	0
Through Vol	241	0	0	148	88	0	0	134
RT Vol	0	157	0	57	0	210	0	14
Lane Flow Rate	316	171	9	223	124	228	309	161
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.689	0.333	0.022	0.509	0.287	0.475	0.706	0.342
Departure Headway (Hd)	7.838	7.028	8.951	8.231	8.331	7.489	8.238	7.655
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	459	509	398	437	430	479	438	467
Service Time	5.626	4.816	6.744	6.023	6.118	5.275	6.028	5.445
HCM Lane V/C Ratio	0.688	0.336	0.023	0.51	0.288	0.476	0.705	0.345
HCM Control Delay	26.4	13.3	11.9	19.3	14.5	16.9	28.7	14.4
HCM Lane LOS	D	B	B	C	B	C	D	B
HCM 95th-tile Q	5.1	1.4	0.1	2.8	1.2	2.5	5.4	1.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	284	134	14
Future Vol, veh/h	0	284	134	14
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	309	146	15
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	23.8
HCM LOS	C

Lane

HCM 2010 Roundabout
20: Urma Street & Eastlake Avenue 8/28/2015

Intersection	
Intersection Delay, s/veh	9.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	185	143	147	606
Demand Flow Rate, veh/h	188	147	150	618
Vehicles Circulating, veh/h	573	233	364	64
Vehicles Exiting, veh/h	109	281	397	316
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.6	5.8	6.7	11.1
Approach LOS	A	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	188	147	150	618
Cap Entry Lane, veh/h	637	895	785	1060
Entry HV Adj Factor	0.984	0.976	0.980	0.981
Flow Entry, veh/h	185	143	147	606
Cap Entry, veh/h	627	873	769	1039
V/C Ratio	0.295	0.164	0.191	0.583
Control Delay, s/veh	9.6	5.8	6.7	11.1
LOS	A	A	A	B
95th %tile Queue, veh	1	1	1	4

HCM 2010 Roundabout
31: Washington Center Parkway & Eastlake Avenue 8/28/2015

Intersection	
Intersection Delay, s/veh	6.0
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	114	171	344
Demand Flow Rate, veh/h	116	174	351
Vehicles Circulating, veh/h	151	111	65
Vehicles Exiting, veh/h	134	305	202
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	4.9	5.2	6.8
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193
Entry Flow, veh/h	116	174	351
Cap Entry Lane, veh/h	972	1011	1059
Entry HV Adj Factor	0.983	0.983	0.981
Flow Entry, veh/h	114	171	344
Cap Entry, veh/h	955	994	1039
V/C Ratio	0.119	0.172	0.331
Control Delay, s/veh	4.9	5.2	6.8
LOS	A	A	A
95th %tile Queue, veh	0	1	1

HCM 2010 Signalized Intersection Summary
5: York Street & 128th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	349	1077	54	57	647	73	36	112	63	43	95	138
Future Volume (veh/h)	349	1077	54	57	647	73	36	112	63	43	95	138
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	379	1171	59	62	703	79	39	122	68	47	103	150
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	627	1888	844	273	1091	488	360	435	369	362	435	369
Arrive On Green	0.53	1.00	1.00	0.04	0.31	0.31	0.05	0.23	0.23	0.05	0.23	0.23
Sat Flow, veh/h	1774	3539	1583	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	379	1171	59	62	703	79	39	122	68	47	103	150
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	11.6	0.0	0.0	2.8	20.6	4.4	1.9	6.4	4.1	2.3	5.4	9.6
Cycle Q Clear(g_c), s	11.6	0.0	0.0	2.8	20.6	4.4	1.9	6.4	4.1	2.3	5.4	9.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	627	1888	844	273	1091	488	360	435	369	362	435	369
V/C Ratio(X)	0.60	0.62	0.07	0.23	0.64	0.16	0.11	0.28	0.18	0.13	0.24	0.41
Avail Cap(c_a), veh/h	627	1888	844	273	1091	488	360	435	369	362	435	369
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.0	0.0	0.0	26.3	35.8	30.2	31.6	37.7	36.8	31.8	37.3	39.0
Incr Delay (d2), s/veh	4.3	1.5	0.2	1.9	2.9	0.7	0.6	1.6	1.1	0.7	1.3	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	0.4	0.0	1.5	10.5	2.0	1.0	3.5	1.9	1.2	2.9	4.5
LnGrp Delay(d),s/veh	14.2	1.5	0.2	28.2	38.8	30.9	32.2	39.3	37.9	32.6	38.6	42.2
LnGrp LOS	B	A	A	C	D	C	C	D	D	C	D	D
Approach Vol, veh/h		1609			844			229			300	
Approach Delay, s/veh		4.5			37.2			37.7			39.5	
Approach LOS		A			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	69.0	10.0	32.0	36.0	42.0	10.0	32.0
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	64.0	6.0	28.0	32.0	37.0	6.0	28.0
Max Q Clear Time (g_c+I1), s	4.8	2.0	3.9	11.6	13.6	22.6	4.3	8.4
Green Ext Time (p_c), s	0.0	25.7	0.0	1.8	1.1	10.8	0.0	1.9

Intersection Summary	
HCM 2010 Ctrl Delay	19.8
HCM 2010 LOS	B

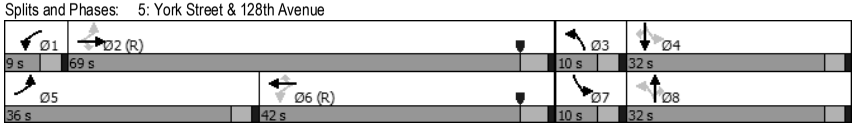
Timing Report, Sorted By Phase
5: York Street & 128th Avenue

9/15/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	9	69	10	32	36	42	10	32
Maximum Split (%)	7.5%	57.5%	8.3%	26.7%	30.0%	35.0%	8.3%	26.7%
Minimum Split (s)	9	10	9.5	30.5	9	10	9.5	30.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	81	90	39	49	81	117	39	49
End Time (s)	90	39	49	81	117	39	49	81
Yield/Force Off (s)	86	34	45	77	113	34	45	77
Yield/Force Off 170(s)	86	34	45	77	113	34	45	77
Local Start Time (s)	47	56	5	15	47	83	5	15
Local Yield (s)	52	0	11	43	79	0	11	43
Local Yield 170(s)	52	0	11	43	79	0	11	43

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	80
Offset: 34 (28%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 5: York Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
9: Claude Court & 128th Avenue

9/15/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1379	244	123	858	184	207
Future Volume (veh/h)	1379	244	123	858	184	207
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1499	265	134	933	200	225
Adj No. of Lanes	2	1	1	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	2053	918	400	2536	370	330
Arrive On Green	1.00	1.00	0.03	0.24	0.21	0.21
Sat Flow, veh/h	3632	1583	1774	3632	1774	1583
Grp Volume(v), veh/h	1499	265	134	933	200	225
Grp Sat Flow(s),veh/h/ln	1770	1583	1774	1770	1774	1583
Q Serve(g_s), s	0.0	0.0	3.0	26.5	12.1	15.7
Cycle Q Clear(g_c), s	0.0	0.0	3.0	26.5	12.1	15.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2053	918	400	2536	370	330
V/C Ratio(X)	0.73	0.29	0.34	0.37	0.54	0.68
Avail Cap(c_a), veh/h	2053	918	400	2536	370	330
HCM Platoon Ratio	2.00	2.00	0.33	0.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	6.3	23.1	42.4	43.8
Incr Delay (d2), s/veh	2.3	0.8	2.3	0.4	5.6	10.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.2	1.7	13.1	6.5	7.9
LnGrp Delay(d),s/veh	2.3	0.8	8.6	23.5	48.0	54.7
LnGrp LOS	A	A	A	C	D	D
Approach Vol, veh/h	1764			1067	425	
Approach Delay, s/veh	2.1			21.6	51.5	
Approach LOS	A			C	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	16.4	74.6				91.0		29.0
Change Period (Y+Rc), s	4.0	5.0				5.0		4.0
Max Green Setting (Gmax), s	12.4	69.6				86.0		25.0
Max Q Clear Time (g_c+I1), s	5.0	2.0				28.5		17.7
Green Ext Time (p_c), s	0.2	42.7				38.6		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	14.9
HCM 2010 LOS	B

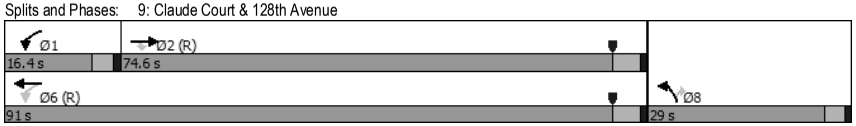
Timing Report, Sorted By Phase
9: Claude Court & 128th Avenue

9/15/2015

Phase Number	1	2	6	8
Movement	WBL	EBT	WBTL	NBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize				
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	16.4	74.6	91	29
Maximum Split (%)	13.7%	62.2%	75.8%	24.2%
Minimum Split (s)	9.5	29.5	28.5	27.5
Yellow Time (s)	3	4	4	3
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	No
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	35	51.4	35	6
End Time (s)	51.4	6	6	35
Yield/Force Off (s)	47.4	1	1	31
Yield/Force Off 170(s)	47.4	1	1	31
Local Start Time (s)	34	50.4	34	5
Local Yield (s)	46.4	0	0	30
Local Yield 170(s)	46.4	0	0	30

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	80
Offset: 1 (1%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	

Splits and Phases: 9: Claude Court & 128th Avenue



HCM 2010 Signalized Intersection Summary
10: Lafayette Street & 128th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	1448	92	31	725	140	109	58	148	108	32	83
Future Volume (veh/h)	137	1448	92	31	725	140	109	58	148	108	32	83
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	149	1574	100	34	788	152	118	63	161	117	35	90
Adj No. of Lanes	1	2	1	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	513	1952	873	198	1522	294	336	86	219	261	94	243
Arrive On Green	0.08	0.55	0.55	0.09	1.00	1.00	0.06	0.18	0.18	0.08	0.20	0.20
Sat Flow, veh/h	1774	3539	1583	1774	2961	571	1774	465	1188	1774	463	1190
Grp Volume(v), veh/h	149	1574	100	34	471	469	118	0	224	117	0	125
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	1774	1770	1762	1774	0	1653	1774	0	1653
Q Serve(g_s), s	4.2	43.1	3.6	1.0	0.0	0.0	6.5	0.0	15.3	6.2	0.0	7.8
Cycle Q Clear(g_c), s	4.2	43.1	3.6	1.0	0.0	0.0	6.5	0.0	15.3	6.2	0.0	7.8
Prop In Lane	1.00		1.00	1.00		0.32	1.00		0.72	1.00		0.72
Lane Grp Cap(c), veh/h	513	1952	873	198	910	906	336	0	304	261	0	337
V/C Ratio(X)	0.29	0.81	0.11	0.17	0.52	0.52	0.35	0.00	0.74	0.45	0.00	0.37
Avail Cap(c_a), veh/h	513	1952	873	198	910	906	336	0	304	261	0	337
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.8	21.7	12.9	17.9	0.0	0.0	37.2	0.0	46.2	35.9	0.0	41.1
Incr Delay (d2), s/veh	1.4	3.7	0.3	1.9	2.1	2.1	2.9	0.0	14.7	5.5	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	22.0	1.6	0.6	0.5	0.5	3.4	0.0	8.3	3.4	0.0	3.9
LnGrp Delay(d),s/veh	11.2	25.4	13.1	19.8	2.1	2.1	40.1	0.0	60.9	41.4	0.0	44.2
LnGrp LOS	B	C	B	B	A	A	D		E	D		D
Approach Vol, veh/h		1823			974			342			242	
Approach Delay, s/veh		23.6			2.7			53.7			42.9	
Approach LOS		C			A			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	71.2	10.8	28.5	14.0	66.7	13.2	26.1
Change Period (Y+Rc), s	4.0	5.0	4.0	4.0	4.0	5.0	4.0	4.0
Max Green Setting (Gmax), s	5.5	66.2	6.8	24.5	10.0	61.7	9.2	22.1
Max Q Clear Time (g_c+I1), s	3.0	45.1	8.5	9.8	6.2	2.0	8.2	17.3
Green Ext Time (p_c), s	0.0	17.6	0.0	1.9	0.1	38.6	0.0	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	22.0
HCM 2010 LOS	C

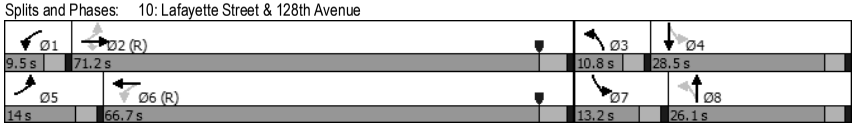
Timing Report, Sorted By Phase
10: Lafayette Street & 128th Avenue

9/15/2015

Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	9.5	71.2	10.8	28.5	14	66.7	13.2	26.1
Maximum Split (%)	7.9%	59.3%	9.0%	23.8%	11.7%	55.6%	11.0%	21.8%
Minimum Split (s)	9.5	27	9.5	28.5	9.5	27	9.5	22.5
Yellow Time (s)	3	4	3	3	3	4	3	3
All-Red Time (s)	1	1	1	1	1	1	1	1
Minimum Initial (s)	5	5	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)								
Flash Dont Walk (s)								
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	12.3	21.8	93	103.8	12.3	26.3	93	106.2
End Time (s)	21.8	93	103.8	12.3	26.3	93	106.2	12.3
Yield/Force Off (s)	17.8	88	99.8	8.3	22.3	88	102.2	8.3
Yield/Force Off 170(s)	17.8	88	99.8	8.3	22.3	88	102.2	8.3
Local Start Time (s)	44.3	53.8	5	15.8	44.3	58.3	5	18.2
Local Yield (s)	49.8	0	11.8	40.3	54.3	0	14.2	40.3
Local Yield 170(s)	49.8	0	11.8	40.3	54.3	0	14.2	40.3

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	90
Offset: 88 (73%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 10: Lafayette Street & 128th Avenue



HCM 2010 Signalized Intersection Summary
15: Washington Street & East 126th Avenue

9/15/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	190	200	1304	109	90	1088
Future Volume (veh/h)	190	200	1304	109	90	1088
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	207	217	1417	118	98	1183
Adj No. of Lanes	1	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	444	396	1840	823	299	2300
Arrive On Green	0.25	0.25	0.52	0.52	0.09	0.65
Sat Flow, veh/h	1774	1583	3632	1583	1774	3632
Grp Volume(v), veh/h	207	217	1417	118	98	1183
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1583	1774	1770
Q Serve(g_s), s	9.9	11.9	32.0	3.9	2.2	17.6
Cycle Q Clear(g_c), s	9.9	11.9	32.0	3.9	2.2	17.6
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	444	396	1840	823	299	2300
V/C Ratio(X)	0.47	0.55	0.77	0.14	0.33	0.51
Avail Cap(c_a), veh/h	444	396	1840	823	299	2300
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.8	32.6	19.2	12.4	15.4	9.2
Incr Delay (d2), s/veh	3.5	5.4	3.2	0.4	2.9	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	5.8	16.4	1.8	1.5	8.8
LnGrp Delay(d),s/veh	35.3	38.0	22.4	12.8	18.3	10.0
LnGrp LOS	D	D	C	B	B	B
Approach Vol, veh/h	424		1535			1281
Approach Delay, s/veh	36.7		21.7			10.7
Approach LOS	D		C			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	13.0	58.0				71.0		29.0
Change Period (Y+Rc), s	4.0	6.0				6.0		4.0
Max Green Setting (Gmax), s	9.0	52.0				65.0		25.0
Max Q Clear Time (g_c+I1), s	4.2	34.0				19.6		13.9
Green Ext Time (p_c), s	0.1	15.7				33.9		1.1

Intersection Summary	
HCM 2010 Ctrl Delay	19.3
HCM 2010 LOS	B

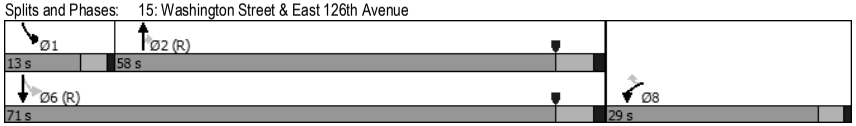
Timing Report, Sorted By Phase
15: Washington Street & East 126th Avenue

9/15/2015

Phase Number	1	2	6	8
Movement	SBL	NBT	SBTL	WBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	13	58	71	29
Maximum Split (%)	13.0%	58.0%	71.0%	29.0%
Minimum Split (s)	9.5	27	24	29
Yellow Time (s)	3	4.5	4.5	3
All-Red Time (s)	1	1.5	1.5	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)				
Flash Dont Walk (s)				
Dual Entry	No	Yes	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	35	48	35	6
End Time (s)	48	6	6	35
Yield/Force Off (s)	44	0	0	31
Yield/Force Off 170(s)	44	0	0	31
Local Start Time (s)	35	48	35	6
Local Yield (s)	44	0	0	31
Local Yield 170(s)	44	0	0	31

Intersection Summary	
Cycle Length	100
Control Type	Pretimed
Natural Cycle	80
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow	

Splits and Phases: 15: Washington Street & East 126th Avenue



HCM 2010 Signalized Intersection Summary
17: Claude Court & 120th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	128	2256	59	79	1751	98	35	70	80	64	22	50
Future Volume (veh/h)	128	2256	59	79	1751	98	35	70	80	64	22	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	139	2452	64	86	1903	107	38	76	87	70	24	54
Adj No. of Lanes	1	3	1	1	3	1	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	306	3094	963	210	2924	910	276	139	159	167	326	277
Arrive On Green	0.10	0.61	0.61	0.07	0.57	0.57	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1774	5085	1583	1774	5085	1583	1316	794	909	1218	1863	1583
Grp Volume(v), veh/h	139	2452	64	86	1903	107	38	0	163	70	24	54
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	1583	1316	0	1702	1218	1863	1583
Q Serve(g_s), s	3.3	43.8	2.0	2.2	30.5	3.7	3.0	0.0	10.5	6.7	1.3	3.5
Cycle Q Clear(g_c), s	3.3	43.8	2.0	2.2	30.5	3.7	4.3	0.0	10.5	17.2	1.3	3.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.53	1.00		1.00
Lane Grp Cap(c), veh/h	306	3094	963	210	2924	910	276	0	298	167	326	277
V/C Ratio(X)	0.45	0.79	0.07	0.41	0.65	0.12	0.14	0.00	0.55	0.42	0.07	0.19
Avail Cap(c_a), veh/h	306	3094	963	210	2924	910	276	0	298	167	326	277
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	17.8	9.6	22.6	17.3	11.6	43.2	0.0	45.2	53.0	41.4	42.3
Incr Delay (d2), s/veh	4.8	2.2	0.1	5.8	1.1	0.3	1.0	0.0	7.1	7.6	0.4	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	20.8	0.9	2.0	14.4	1.7	1.2	0.0	5.5	2.6	0.7	1.7
LnGrp Delay(d),s/veh	22.1	19.9	9.7	28.5	18.5	11.9	44.2	0.0	52.2	60.6	41.8	43.8
LnGrp LOS	C	B	A	C	B	B	D		D	E	D	D
Approach Vol, veh/h		2655			2096			201			148	
Approach Delay, s/veh		19.8			18.5			50.7			51.4	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		27.0	14.0	79.0		27.0	18.0	75.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		21.0	8.0	73.0		21.0	12.0	69.0
Max Q Clear Time (g_c+I1), s		12.5	4.2	45.8		19.2	5.3	32.5
Green Ext Time (p_c), s		1.1	0.1	26.8		0.3	0.2	35.8

Intersection Summary	
HCM 2010 Ctrl Delay	21.4
HCM 2010 LOS	C

Timing Report, Sorted By Phase
17: Claude Court & 120th Avenue

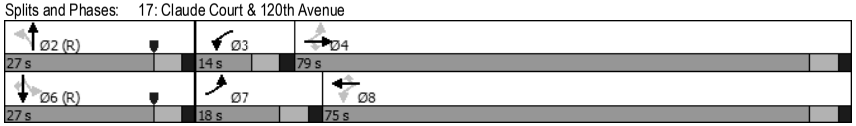
9/15/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize						
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	27	14	79	27	18	75
Maximum Split (%)	22.5%	11.7%	65.8%	22.5%	15.0%	62.5%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	98	5	19	98	5	23
End Time (s)	5	19	98	5	23	98
Yield/Force Off (s)	119	13	92	119	17	92
Yield/Force Off 170(s)	108	13	81	108	17	81
Local Start Time (s)	99	6	20	99	6	24
Local Yield (s)	0	14	93	0	18	93
Local Yield 170(s)	109	14	82	109	18	82

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	80

Offset: 119 (99%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Splits and Phases: 17: Claude Court & 120th Avenue



HCM 2010 Signalized Intersection Summary
26: 120th Avenue & Race Street

9/15/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	303	2435	1682	158	83	110
Future Volume (veh/h)	303	2435	1682	158	83	110
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	329	2647	1828	172	90	120
Adj No. of Lanes	1	3	3	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	617	3962	2437	759	259	231
Arrive On Green	0.26	0.78	0.96	0.96	0.15	0.15
Sat Flow, veh/h	1774	5253	5253	1583	1774	1583
Grp Volume(v), veh/h	329	2647	1828	172	90	120
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	1583	1774	1583
Q Serve(g_s), s	7.6	28.8	6.4	0.7	5.5	8.4
Cycle Q Clear(g_c), s	7.6	28.8	6.4	0.7	5.5	8.4
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	617	3962	2437	759	259	231
V/C Ratio(X)	0.53	0.67	0.75	0.23	0.35	0.52
Avail Cap(c_a), veh/h	617	3962	2437	759	259	231
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.3	6.1	1.4	1.3	46.1	47.4
Incr Delay (d2), s/veh	3.3	0.9	2.2	0.7	3.7	8.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.2	13.6	2.5	6.1	2.9	7.9
LnGrp Delay(d),s/veh	16.5	7.0	3.6	2.0	49.8	55.5
LnGrp LOS	B	A	A	A	D	E
Approach Vol, veh/h		2976	2000		210	
Approach Delay, s/veh		8.1	3.5		53.0	
Approach LOS		A	A		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				98.0		22.0	36.0	62.0
Change Period (Y+Rc), s				4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s				93.5		17.5	31.5	57.5
Max Q Clear Time (g_c+I1), s				30.8		10.4	9.6	8.4
Green Ext Time (p_c), s				61.2		0.3	1.0	48.1

Intersection Summary	
HCM 2010 Ctrl Delay	8.1
HCM 2010 LOS	A

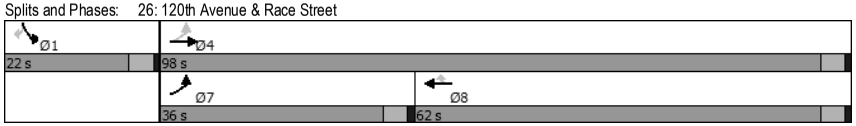
Timing Report, Sorted By Phase
26: 120th Avenue & Race Street

9/15/2015

Phase Number	1	4	7	8
Movement	SBL	EBTL	EBL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize			Yes	Yes
Recall Mode	Max	Max	Max	Max
Maximum Split (s)	22	98	36	62
Maximum Split (%)	18.3%	81.7%	30.0%	51.7%
Minimum Split (s)	9.5	22.5	9.5	22.5
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	1	1	1	1
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7		7
Flash Dont Walk (s)		11		11
Dual Entry	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	110	12	12	48
End Time (s)	12	110	48	110
Yield/Force Off (s)	7.5	105.5	43.5	105.5
Yield/Force Off 170(s)	7.5	94.5	43.5	94.5
Local Start Time (s)	0	22	22	58
Local Yield (s)	17.5	115.5	53.5	115.5
Local Yield 170(s)	17.5	104.5	53.5	104.5

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	50
Offset: 110 (92%), Referenced to phase 2: and 6:, Start of Green	

Splits and Phases: 26: 120th Avenue & Race Street



HCM 2010 Signalized Intersection Summary
28: Urma Street & 120th Avenue

9/15/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	151	2448	181	93	1828	42	142	17	107	137	23	216
Future Volume (veh/h)	151	2448	181	93	1828	42	142	17	107	137	23	216
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	164	2661	197	101	1987	46	154	18	116	149	25	235
Adj No. of Lanes	1	3	1	1	3	1	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	287	2839	884	141	2500	778	177	54	350	288	39	363
Arrive On Green	0.11	0.56	0.56	0.04	0.49	0.49	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1774	5085	1583	1774	5085	1583	1115	217	1399	1250	154	1452
Grp Volume(v), veh/h	164	2661	197	101	1987	46	154	0	134	149	0	260
Grp Sat Flow(s),veh/h/ln	1774	1695	1583	1774	1695	1583	1115	0	1616	1250	0	1607
Q Serve(g_s), s	4.7	58.2	7.5	3.4	39.1	1.8	12.6	0.0	8.1	13.3	0.0	17.4
Cycle Q Clear(g_c), s	4.7	58.2	7.5	3.4	39.1	1.8	30.0	0.0	8.1	21.4	0.0	17.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.87	1.00		0.90
Lane Grp Cap(c), veh/h	287	2839	884	141	2500	778	177	0	404	288	0	402
V/C Ratio(X)	0.57	0.94	0.22	0.72	0.79	0.06	0.87	0.00	0.33	0.52	0.00	0.65
Avail Cap(c_a), veh/h	287	2839	884	141	2500	778	177	0	404	288	0	402
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.1	24.6	13.4	28.1	25.4	16.0	55.2	0.0	36.8	45.6	0.0	40.3
Incr Delay (d2), s/veh	8.1	7.5	0.6	26.9	2.7	0.1	40.1	0.0	2.2	6.5	0.0	7.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	29.1	3.4	2.7	18.8	0.8	7.1	0.0	3.9	5.1	0.0	8.6
LnGrp Delay(d),s/veh	31.2	32.0	14.0	55.0	28.2	16.1	95.2	0.0	39.0	52.1	0.0	48.1
LnGrp LOS	C	C	B	D	C	B	F		D	D		D
Approach Vol, veh/h		3022			2134			288			409	
Approach Delay, s/veh		30.8			29.2			69.1			49.6	
Approach LOS		C			C			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		36.0	11.0	73.0		36.0	19.0	65.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0	6.0	6.0
Max Green Setting (Gmax), s		30.0	5.0	67.0		30.0	13.0	59.0
Max Q Clear Time (g_c+I1), s		32.0	5.4	60.2		23.4	6.7	41.1
Green Ext Time (p_c), s		0.0	0.0	6.8		2.1	0.2	17.8

Intersection Summary	
HCM 2010 Ctrl Delay	33.4
HCM 2010 LOS	C

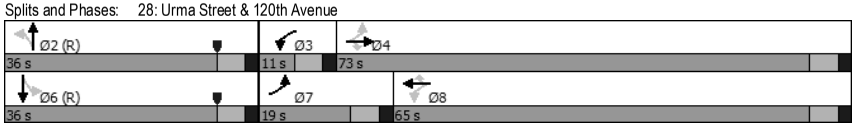
Timing Report, Sorted By Phase
28: Urma Street & 120th Avenue

9/15/2015

Phase Number	2	3	4	6	7	8
Movement	NBTL	WBL	EBTL	SBTL	EBL	WBTL
Lead/Lag		Lead	Lag		Lead	Lag
Lead-Lag Optimize		Yes	Yes		Yes	Yes
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	36	11	73	36	19	65
Maximum Split (%)	30.0%	9.2%	60.8%	30.0%	15.8%	54.2%
Minimum Split (s)	24	11	24	24	11	24
Yellow Time (s)	4	4	4	4	4	4
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	5	5	5	5	5	5
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)	7		7	7		7
Flash Dont Walk (s)	11		11	11		11
Dual Entry	Yes	No	Yes	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	18	54	65	18	54	73
End Time (s)	54	65	18	54	73	18
Yield/Force Off (s)	48	59	12	48	67	12
Yield/Force Off 170(s)	37	59	1	37	67	1
Local Start Time (s)	90	6	17	90	6	25
Local Yield (s)	0	11	84	0	19	84
Local Yield 170(s)	109	11	73	109	19	73

Intersection Summary	
Cycle Length	120
Control Type	Pretimed
Natural Cycle	90
Offset: 48 (40%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	

Splits and Phases: 28: Urma Street & 120th Avenue



HCM 2010 TWSC
21: Claude Court & Eastlake Avenue 9/15/2015

Intersection	
Int Delay, s/veh	5.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	367	222	46	228	112	184
Future Vol, veh/h	367	222	46	228	112	184
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	-	90	-	0	25
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	399	241	50	248	122	200

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	640	0	868	520
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	348	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	944	-	323	556
Stage 1	-	-	-	-	597	-
Stage 2	-	-	-	-	715	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	944	-	306	556
Mov Cap-2 Maneuver	-	-	-	-	306	-
Stage 1	-	-	-	-	597	-
Stage 2	-	-	-	-	677	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	18.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	306	556	-	-	944	-
HCM Lane V/C Ratio	0.398	0.36	-	-	0.053	-
HCM Control Delay (s)	24.3	15.1	-	-	9	-
HCM Lane LOS	C	C	-	-	A	-
HCM 95th %tile Q(veh)	1.8	1.6	-	-	0.2	-

HCM 2010 TWSC
22: 1st Street 9/15/2015

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	28	507	265	12	17	22
Future Vol, veh/h	28	507	265	12	17	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	55	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	551	288	13	18	24

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	301	0	-	0	907	295
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	612	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1260	-	-	-	306	744
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	541	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1260	-	-	-	299	744
Mov Cap-2 Maneuver	-	-	-	-	299	-
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	528	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1260	-	-	-	451
HCM Lane V/C Ratio	0.024	-	-	-	0.094
HCM Control Delay (s)	7.9	-	-	-	13.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	118	402	192	87	99	102
Future Vol, veh/h	118	402	192	87	99	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	75	-	-	75	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	128	437	209	95	108	111

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	209	0	-	0	902	209
Stage 1	-	-	-	-	209	-
Stage 2	-	-	-	-	693	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1362	-	-	-	308	831
Stage 1	-	-	-	-	826	-
Stage 2	-	-	-	-	496	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1362	-	-	-	279	831
Mov Cap-2 Maneuver	-	-	-	-	279	-
Stage 1	-	-	-	-	826	-
Stage 2	-	-	-	-	449	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	22.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1362	-	-	-	421
HCM Lane V/C Ratio	0.094	-	-	-	0.519
HCM Control Delay (s)	7.9	-	-	-	22.4
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	2.9

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	11	3	10	313	303	16
Future Vol, veh/h	11	3	10	313	303	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	3	11	340	329	17

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	700	338	347	0	-	0
Stage 1	338	-	-	-	-	-
Stage 2	362	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	405	704	1212	-	-	-
Stage 1	722	-	-	-	-	-
Stage 2	704	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	401	704	1212	-	-	-
Mov Cap-2 Maneuver	401	-	-	-	-	-
Stage 1	722	-	-	-	-	-
Stage 2	698	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.4	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1212	-	442	-	-
HCM Lane V/C Ratio	0.009	-	0.034	-	-
HCM Control Delay (s)	8	-	13.4	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 2010 AWSC
21: Claude Court & Eastlake Avenue 9/15/2015

Intersection	
Intersection Delay, s/veh	15.9
Intersection LOS	C

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Traffic Vol, veh/h	0	85	289	0	92	242	0	297	158
Future Vol, veh/h	0	85	289	0	92	242	0	297	158
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	92	314	0	100	263	0	323	172
Number of Lanes	0	1	1	0	1	1	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	14.3	14.8	18.1
HCM LOS	B	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	0%	100%	0%
Vol Thru, %	0%	0%	100%	0%	0%	100%
Vol Right, %	0%	100%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	297	158	85	289	92	242
LT Vol	297	0	0	0	92	0
Through Vol	0	0	85	0	0	242
RT Vol	0	158	0	289	0	0
Lane Flow Rate	323	172	92	314	100	263
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.641	0.283	0.172	0.524	0.201	0.491
Departure Headway (Hd)	7.147	5.93	6.717	6.001	7.233	6.722
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	504	603	531	597	494	534
Service Time	4.911	3.694	4.492	3.777	5.011	4.499
HCM Lane V/C Ratio	0.641	0.285	0.173	0.526	0.202	0.493
HCM Control Delay	21.9	11	10.9	15.3	11.8	15.9
HCM Lane LOS	C	B	B	C	B	C
HCM 95th-tile Q	4.5	1.2	0.6	3	0.7	2.7

HCM 2010 AWSC
27: Eastlake Avenue & Claude Court 9/15/2015

Intersection	
Intersection Delay, s/veh	13.9
Intersection LOS	B

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Traffic Vol, veh/h	0	8	137	0	174	395	0	237	6
Future Vol, veh/h	0	8	137	0	174	395	0	237	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	149	0	189	429	0	258	7
Number of Lanes	0	1	1	0	1	1	0	1	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	2	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	2
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	2
HCM Control Delay	11.1	13.8	16
HCM LOS	B	B	C

Lane	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	0%	100%	0%
Vol Thru, %	0%	100%	100%	0%	0%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	8	137	174	395	237	6
LT Vol	8	0	0	0	237	0
Through Vol	0	137	174	0	0	0
RT Vol	0	0	0	395	0	6
Lane Flow Rate	9	149	189	429	258	7
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.016	0.259	0.301	0.6	0.494	0.01
Departure Headway (Hd)	6.767	6.259	5.738	5.029	6.899	5.687
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	529	573	626	717	523	629
Service Time	4.511	4.002	3.47	2.761	4.633	3.42
HCM Lane V/C Ratio	0.017	0.26	0.302	0.598	0.493	0.011
HCM Control Delay	9.6	11.2	10.9	15.1	16.2	8.5
HCM Lane LOS	A	B	B	C	C	A
HCM 95th-tile Q	0	1	1.3	4	2.7	0

HCM 2010 AWSC
21: Claude Court & Eastlake Avenue 9/15/2015

Intersection	
Intersection Delay, s/veh	32.6
Intersection LOS	D

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Traffic Vol, veh/h	0	210	413	0	72	202	0	403	341
Future Vol, veh/h	0	210	413	0	72	202	0	403	341
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	228	449	0	78	220	0	438	371
Number of Lanes	0	1	1	0	1	1	0	1	1

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	2	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	2	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	2	0	2
HCM Control Delay	29.8	17.2	40.7
HCM LOS	D	C	E

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2
Vol Left, %	100%	0%	0%	0%	100%	0%
Vol Thru, %	0%	0%	100%	0%	0%	100%
Vol Right, %	0%	100%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	403	341	210	413	72	202
LT Vol	403	0	0	0	72	0
Through Vol	0	0	210	0	0	202
RT Vol	0	341	0	413	0	0
Lane Flow Rate	438	371	228	449	78	220
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.942	0.671	0.474	0.843	0.188	0.497
Departure Headway (Hd)	7.845	6.622	7.587	6.867	8.659	8.142
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	464	549	477	530	417	446
Service Time	5.545	4.322	5.287	4.567	6.359	5.842
HCM Lane V/C Ratio	0.944	0.676	0.478	0.847	0.187	0.493
HCM Control Delay	56.6	21.8	16.9	36.3	13.4	18.6
HCM Lane LOS	F	C	C	E	B	C
HCM 95th-tile Q	11.2	5	2.5	8.7	0.7	2.7

HCM 2010 AWSC
27: Eastlake Avenue & Claude Court 9/15/2015

Intersection	
Intersection Delay, s/veh	43.4
Intersection LOS	E

Movement	EBU	EBL	EBT	WBU	WBT	WBR	SBU	SBL	SBR
Traffic Vol, veh/h	0	8	205	0	88	501	0	418	14
Future Vol, veh/h	0	8	205	0	88	501	0	418	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	9	223	0	96	545	0	454	15
Number of Lanes	0	1	1	0	1	1	0	1	1

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	2	2	0
Conflicting Approach Left	SB		WB
Conflicting Lanes Left	2	0	2
Conflicting Approach Right		SB	EB
Conflicting Lanes Right	0	2	2
HCM Control Delay	16.8	45.1	54.3
HCM LOS	C	E	F

Lane	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	0%	100%	0%
Vol Thru, %	0%	100%	100%	0%	0%	0%
Vol Right, %	0%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	8	205	88	501	418	14
LT Vol	8	0	0	0	418	0
Through Vol	0	205	88	0	0	0
RT Vol	0	0	0	501	0	14
Lane Flow Rate	9	223	96	545	454	15
Geometry Grp	7	7	7	7	7	7
Degree of Util (X)	0.02	0.472	0.186	0.951	0.943	0.026
Departure Headway (Hd)	8.148	7.631	7.003	6.285	7.619	6.398
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	441	475	515	577	477	563
Service Time	5.872	5.355	4.716	3.998	5.319	4.098
HCM Lane V/C Ratio	0.02	0.469	0.186	0.945	0.952	0.027
HCM Control Delay	11	17	11.3	51	55.8	9.3
HCM Lane LOS	B	C	B	F	F	A
HCM 95th-tile Q	0.1	2.5	0.7	12.6	11.4	0.1

HCM 2010 Signalized Intersection Summary
21: Claude Court & Eastlake Avenue

9/21/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	210	413	72	202	403	341
Future Volume (veh/h)	210	413	72	202	403	341
Number	2	12	1	6	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	228	449	78	220	438	0
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	806	685	467	1026	500	446
Arrive On Green	0.43	0.43	0.06	0.55	0.28	0.00
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583
Grp Volume(v), veh/h	228	449	78	220	438	0
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583
Q Serve(g_s), s	5.7	16.1	1.6	4.3	16.9	0.0
Cycle Q Clear(g_c), s	5.7	16.1	1.6	4.3	16.9	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	806	685	467	1026	500	446
V/C Ratio(X)	0.28	0.66	0.17	0.21	0.88	0.00
Avail Cap(c_a), veh/h	806	685	505	1066	917	818
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	13.1	16.1	9.2	8.2	24.5	0.0
Incr Delay (d2), s/veh	0.9	4.8	0.2	0.1	5.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	7.9	0.8	2.2	9.0	0.0
LnGrp Delay(d),s/veh	14.0	20.9	9.4	8.3	29.6	0.0
LnGrp LOS	B	C	A	A	C	
Approach Vol, veh/h	677			298	438	
Approach Delay, s/veh	18.6			8.6	29.6	
Approach LOS	B			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	8.4	37.0		26.2		45.4		
Change Period (Y+Rc), s	4.5	6.0		6.0		6.0		
Max Green Setting (Gmax), s	5.5	31.0		37.0		41.0		
Max Q Clear Time (g_c+I1), s	3.6	18.1		18.9		6.3		
Green Ext Time (p_c), s	0.0	3.7		1.3		4.8		

Intersection Summary	
HCM 2010 Ctrl Delay	19.9
HCM 2010 LOS	B

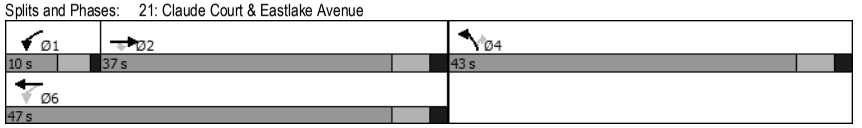
Timing Report, Sorted By Phase
21: Claude Court & Eastlake Avenue

9/21/2015

Phase Number	1	2	4	6
Movement	WBL	EBT	NBL	WBTL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	None	Max	None	None
Maximum Split (s)	10	37	43	47
Maximum Split (%)	11.1%	41.1%	47.8%	52.2%
Minimum Split (s)	9.5	24	11	24
Yellow Time (s)	3.5	4	4	4
All-Red Time (s)	1	2	2	2
Minimum Initial (s)	5	5	5	5
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7		7
Flash Dont Walk (s)		11		11
Dual Entry	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes
Start Time (s)	0	10	47	0
End Time (s)	10	47	0	47
Yield/Force Off (s)	5.5	41	84	41
Yield/Force Off 170(s)	5.5	30	84	30
Local Start Time (s)	80	0	37	80
Local Yield (s)	85.5	31	74	31
Local Yield 170(s)	85.5	20	74	20

Intersection Summary		
Cycle Length		90
Control Type	Semi Act-Uncoord	
Natural Cycle		60

Splits and Phases: 21: Claude Court & Eastlake Avenue



Appendix B: Grain Elevator Adaptive Re-Use Feasibility Analysis

APPENDIX B: Grain Elevator Adaptive Re-use Feasibility Analysis

Introduction

The purpose of this memorandum is to review the issues associated with the adaptive re-use of the historic grain elevator located just north of the new RTD Eastlake at 124th rail station as part of the Station Area Master Plan Update. The project team measured and drew the site and building floor plans in a diagrammatic manner to help understand the size and layout of the spaces in the building, relationships to nearby land uses and proposed station area development. The team also attended meetings of the POSAC and TASHCO, and facilitated brainstorming sessions to develop lists of potential uses for the buildings.

The team then developed a short list of potential uses for the building, based on the team's preliminary assessment of the site and building's suitability for adaptive reuses that would serve the community and support development in the area.

Goals

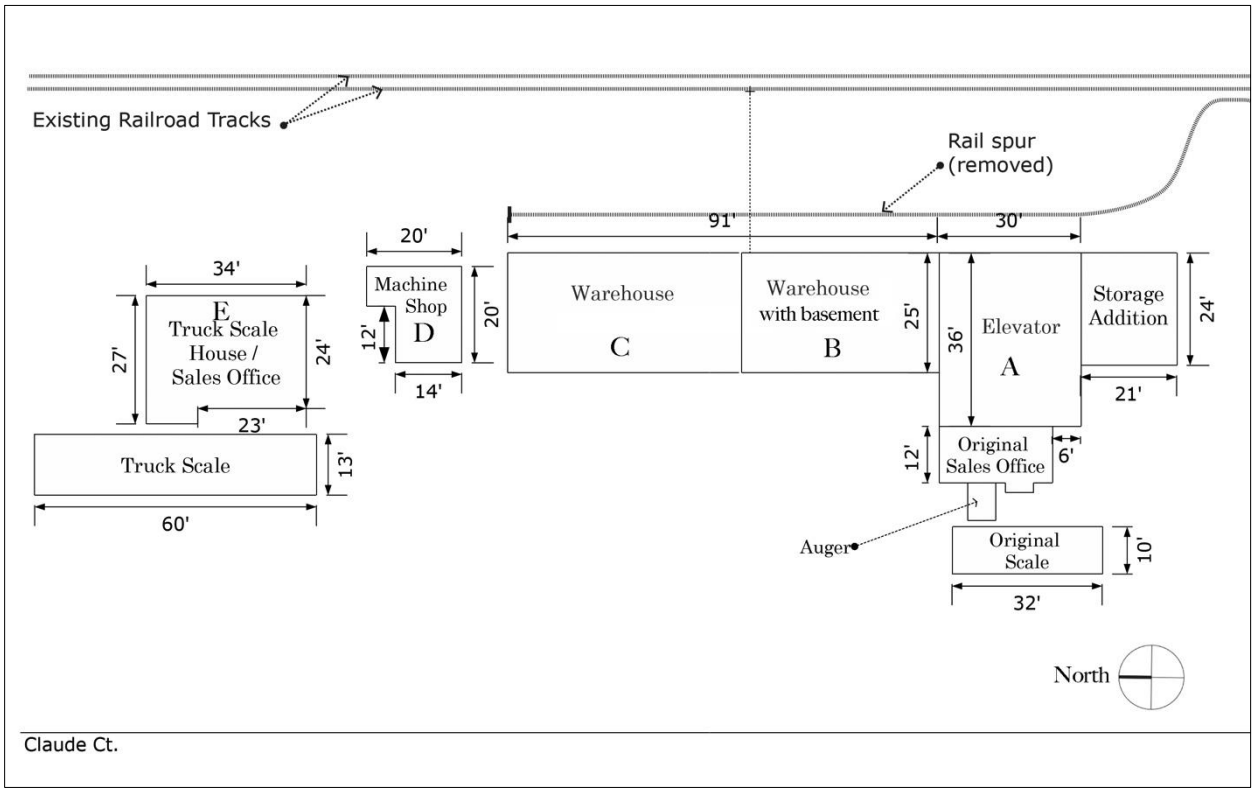
The best way to preserve the historic grain elevator is to adapt it to a new use, one that is economically sustainable. That way, the likelihood of ongoing maintenance and upkeep of the building is improved. The goals of adaptively reusing the Eastlake grain elevator and associated buildings include:

- Provide a venue for locally-owned and operated businesses;
- Attract mutually supportive businesses and attractions;
- Attract businesses that support the chosen theme(s) or brand;
- Attract a mix of people, diversity; and
- Attract uses that support commuters, residents, businesses, and local history.

Eastlake Grain Elevator Description

The layout of the grain elevator and associated features is shown in Figure 1 below. The grain elevator itself (item A on the figure below) is 30’ by 36’ and has the 24’ by 12’ original office space attached at the front. The storage addition to the south is filled with silos and is not usable under any reuse scenario. Warehouse space B is 39’ by 25’ and could be used as a part of the elevator space as the two buildings have the same floor elevation and are open to each other. Warehouse space B has a basement, accessible by a set of very steep stairs beneath a door in the floor at the north end of the space. Warehouse space C (52’ by 25’), although adjacent to warehouse space B, has a floor elevation about 4’ below that of warehouse B. Stairs could be built in space C to connect the two spaces, and a lift could provide handicapped access if it was deemed necessary to combine the two spaces. The small storage building (D) is about the size of a one-car garage. The Truck Scale House/Sales Office (E) is now a hair salon. The salon owner rents the space from the city under an agreement that predates the purchase of the property by the city. Table 1 summarizes the components of the grain elevator and square footage of each.

Figure 1: Grain Elevator and Associated Buildings Layout



Source City of Thornton

Table 1: Grain Elevator Components and Size

Space	Size in Square Feet
A	1080
B	1000 + 1000 basement
C	1250
D	368
E	948

Possible Uses for the Grain Elevator

Uses that were suggested for the adaptive re-use of the existing buildings throughout the outreach activities of the Station Area Master Plan Update include:

- Coffee Shop or Deli, with Snacks, Sandwiches, Baked Goods, Restrooms
- Artists Co-op
- Art Gallery
- Bicycle Station (Rental and Repair Shop)
- Local History Museum
- Lending Library
- Brewery with restaurant

The various spaces in the existing buildings are better suited for some uses and less for others. Most of the spaces are not large enough to accommodate every use that has been suggested. Also, one of the spaces has a basement, which makes it a better fit for uses that require significant storage space, such as an art gallery. Table 2 shows potential square footage needs for the most popular proposed uses of the grain elevator.

Table 2: Conceptual Square Footage Needs of Potential Grain Elevator Uses

Use	Approximate Area Required in Square Feet
Coffee Shop or Deli	600 – 1200 SF
Artist's Co-op	2000 including storage
Art Gallery	1000 – 2000 including storage
Bicycle Rental/Repair	600 – 1200
Local History Museum	500 – 1500
Lending Library	600 – 1200

Table 3 shows the project team's estimate of the most complementary mix and placement of uses within the existing spaces of the grain elevator.

Table 3: Potential Mix and Placement of Grain Elevator Uses

Space	Size in Square Feet	Proposed Use
A	1080	Local History Museum, or Coffee Shop/Museum
B	1000 + 1000 basement	Coffee Shop/Deli or Art Gallery
C	1250	Artist's Co-op
D	368	Barber Shop, as an extension of the hair salon
E	948	Hair Salon, to remain in place

Renovation Costs

The cost to renovate the existing buildings consists mostly of the costs to provide HVAC, electrical, and plumbing improvements to the buildings (with the exception of building E, the hair salon). The structures are sound. The other major cost is the site improvements, including the paving of parking and drives, landscaping, electrical, lighting, and signage. Table 4 shows estimated costs for improvements to the interior spaces only with the intent of making the spaces leasable and do not include any estimate of costs to improve the exterior of the buildings. It is expected that tenants may want to improve the spaces, and possibly the exterior, above and beyond the basic improvements that the city or a developer might provide.

Table 4: Conceptual Renovation Costs for Existing Grain Elevator Components

Space	Cost Estimate to bring buildings to base level of improvement
A	$190,000
B	$230,000
C	$190,000
D	$40,000
E	$0
Site	$350,000
Total	$980,000

New Building Construction

There is room on the site in the immediate vicinity of the grain elevator to add new buildings and parking if there was impetus to add new uses that, together with the new uses in the grain elevator buildings, would complement and mutually support each other, and enhance the viability of all uses when taken as a whole. The concept sketch in Figure 2b shows three potential new buildings: One at the south end, bordering the RTD property where the original grain elevator foundations are located (NC1 in the figure); a second building slightly north of the first one (NC2); and a third building at the north end of the grain elevator complex (NC3). Figure 2b shows more detail on the potential new buildings along with conceptual uses, and Figure 2c is a 3-D layout showing the new buildings and their relation to the original grain elevator components.

Figure 2a: Potential New Buildings at Grain Elevator Site

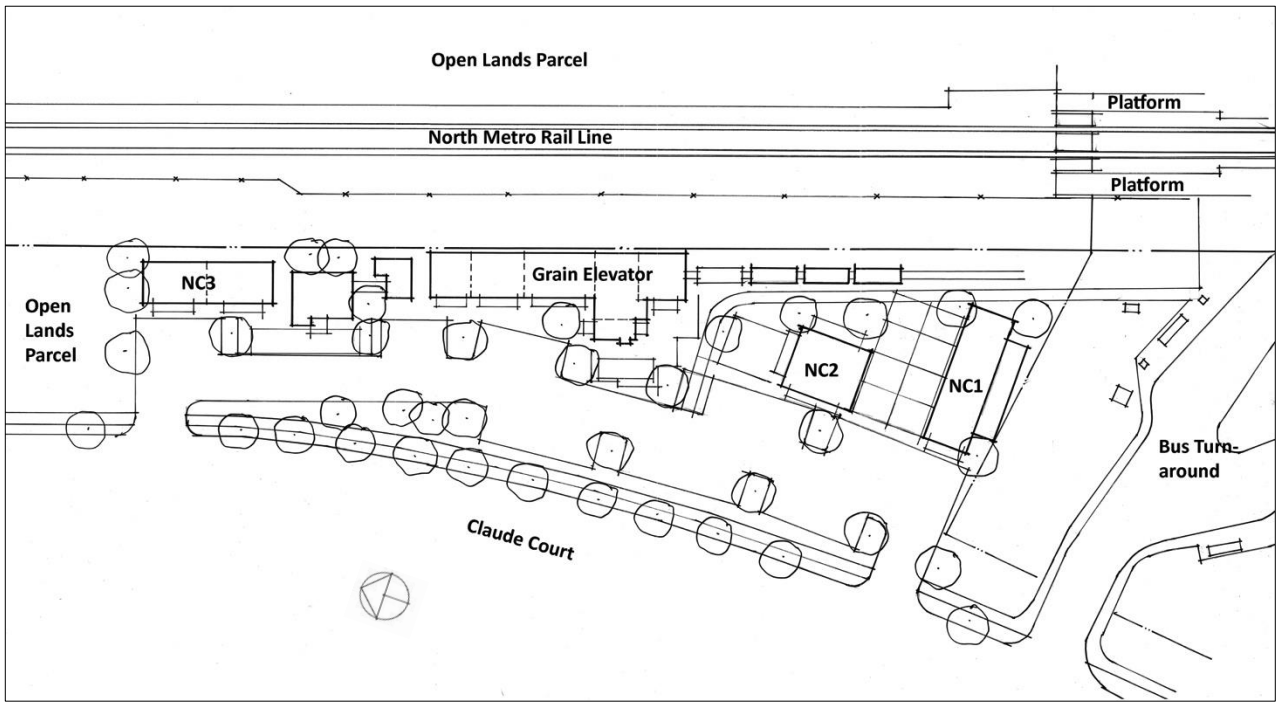


Figure 2b: Conceptual Layout of Grain Elevator and New Buildings (with potential uses)

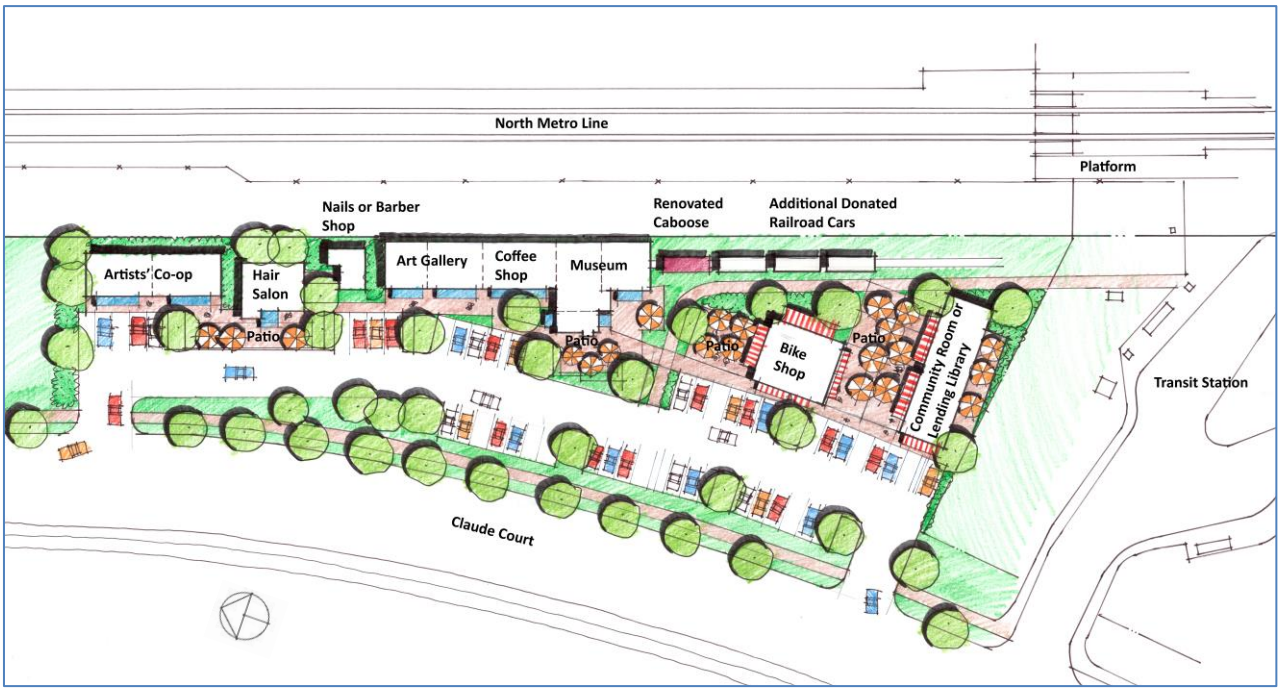


Figure 2c: Conceptual 3-D Layout of Grain Elevator and New Buildings

Table 5 shows potential construction costs of the proposed new buildings.

Table 5: Conceptual Construction Costs of New Buildings

New Building	Area (SF)	Cost Estimate (at $200/SF)
NC1	1,875	$375,000
NC2	1,400	$280,000
NC3	1,540	$308,000
Total	4,815	$963,000

Redevelopment Strategies

The City has an opportunity to use the unique historic assets of the grain elevator and associated buildings to attract economic opportunities to the area. But with that opportunity comes the potential to compromise those same qualities. Fortunately, there are ways to ensure that the historic character of the buildings is preserved.

Following are brief outlines of three scenarios for the redevelopment of the grain elevator property:

1. **Public:** The City restores and renovates the existing buildings to the level at which they are fit for tenant finish by tenants. The City also constructs new buildings (if desired) and either occupies them or leases them to tenants. In this scenario, the City is solely responsible for the execution of project, its maintenance and operations.

2. **Private:** The City sells the property to a developer with conditions, such as the developer must obtain approval from the city (through the TASHCO) before making any changes to the exterior, etc. In this scenario, the City has ensured that the property's historic value is safeguarded, either through local historic designation or a conservation easement.
3. **Public/private:** The City maintains ownership of the property and contracts with a developer who handles the restoration, renovation, and new construction. In this scenario, the City maintains control over the redevelopment process, until it is complete, and then executes a long-term lease to the developer. The City may also want to ensure that the property's historic value is safeguarded, either through local historic designation or a conservation easement.

In each scenario, gap financing will most likely be necessary. This could be in the form of cash, such as in the Louisville, CO case study (see below). It could also be in the form of Tax Increment Financing if the City chose to include the property in a TIF District, perhaps inside a larger area that included Lake Avenue and First Street, and possibly also including the parcels west of Claude Court. There are also a number of grant opportunities for this type of project. Possible grant sources include EPA Smart Growth grants, the Boettcher Foundation, and others.

Case Studies

A search was conducted to identify similar sites and structures around the US that are publically owned and have been adapted to house a variety of public uses. We found only one grain elevator that was publicly owned (Louisville, CO), and is currently planned to be redeveloped by a private developer for private uses. We found descriptions of a handful of other grain elevator reuse projects around the country, however, in every case, the elevator is a much larger structure and does not have much to offer as a case study. On the following pages, we have included a description of the project in Louisville, CO, and three others that are representative of adaptive reuse projects in the small to mid- size range.

Grain Elevator Adaptive Reuse, Louisville, CO

On May 19, 2015, the Louisville City Council approved plans for the renovation and reuse of the historic grain elevator in downtown Louisville. Plans include an addition on the east side of the grain elevator building that could accommodate restrooms and a kitchen for future tenants. A new 26,000-square-foot building is proposed for the north lot that the developers hope will attract a local restaurant with an outdoor patio and an upper deck. Offices and other small retail will likely fill the remaining space. The warehouse on the Caranci property to the south will be expanded to 25,000 square feet, increasing space for the existing tenant, JumpNRope, and make room for new tenants Caranci hopes will complement the fitness studio.

Though the plans are for predominantly new construction, all of the buildings will be mining-themed using large timbers and other architectural elements and materials to pay homage to the site's history. Nearly 7,000 square feet of outdoor space in front of the elevator building will create a park-like atmosphere for the public.

The City is contributing $500,000 for re-stabilization of the building (foundation work and walls). The developer will be responsible for any aesthetic improvements and tenant finishes. The developer is going through a PUD process to entitle redevelopment on the parcel that they will be buying once the re-stabilization process is done. They are hoping to put an addition on the back of the grain elevator. There are really only two leasable spaces (2,000 ft^2 space and 500 ft^2). The city is hoping to get a restaurant use that does not interfere with the visual historical components of the building.

After the developer completes the re-stabilization process on the building, they will then be able to purchase the other building on the site for $200,000 and the City will then turn over the ownership to them in exchange for the landmark status on the building. This local landmark status means that the building stays and cannot be demolished without the City's permission.

The City of Louisville was able to ensure that the buildings would be preserved by granting them local historic landmark status, which by virtue of the city's historic landmark ordinance requires that the future owner, in this case the developer, obtain approval from the local historic preservation commission for any proposed exterior changes to the existing buildings and for any new building construction on the property. Most interior changes would be allowed. Another way to accomplish this, according to a Louisville city planner, is through a conservation easement. The city determined that the local ordinance or a conservation easement would provide greater control than state or national landmark status.

The Louisville project is relevant because it is about the same size as the Eastlake Grain Elevator, and so will require a similar approach in terms of providing complementary uses in new adjacent buildings, and guaranteeing the preservation of the buildings under the future ownership.

More information can be found at:
http://www.coloradohometownweekly.com/news/louisville/ci_28101226/developers-seek-final-approval-louisville

Center of Gravity Rock Gym, Wichita Falls, TX
Center of Gravity Rock Gym is located in an historic grain elevator in Wichita Falls, TX, with a large black and white sign on the wall facing the road. It is approximately two miles south of the Sheppard Air Force Base main gate, next to the Texoma Cycling Center, and the Wichita River statue.

More information can be found at:
928-221-0063
Cogrockgym@gmail.com

Rock Town, Oklahoma City, OK
Rocktown Climbing Gym in Oklahoma City is housed in a grain elevator made up of 16 full silos and in-between rooms. It climbs up to 90 feet tall and 140 in total length. Rocktown is a cooperative effort between Touchstone Youth Project, a 501(c)(3) nonprofit organization and Aaron and Lisa Gibson. Touchstone Youth Project is the majority owner of Rocktown and the Gibsons hold a minority interest. The mission of Touchstone is to serve youth through adventure-based education, mentoring and life skills cultivation. Touchstone operates after-school programs and summer day camps at Rocktown. Low-income youth participate at no cost.

More information can be found at:
http://www.climbing.com/?archive=rocktown-climbing-gym-oklahoma-city-ok

Wassaic Project, Wassaic, NY
The Wassaic Project is located in a refurbished mill and livestock auction house. While it primarily functions as a dynamic arts residency and exhibition space, The Wassaic Project also doubles as a restoration venture that is breathing life back into the town's historic buildings.

In 2005 the mill had been closed, condemned, and on the point of demolition when an architect and developer team stepped in and embarked on a major renovation. They maintained the original character of the building and created a usable space for the community.

The Wassaic Project has over its history expanded its programming, hosting open studios for its artists-in-residence throughout the year, as well as music and film events, but its annual summer festival remains the biggest draw. In addition to keeping the festival free, the Wassaic Project connects with the community by offering affordable artist-led workshops for adults and children, and they recently partnered with the local fire department for a fundraiser.

The summer festival attendance has increased from 500 to 4,000; developed the exhibitions program which includes 3 or more exhibitions per year in over 8,000 square feet of gallery space; launched the guest curator program which has worked with 21 curators in 4 years; developed the education program and started collaborating with local school systems for the 2012-2013 school year; and seamlessly integrated the Wassaic Project into the community and architecture of Wassaic, NY. The Wassaic Project has created collaborative programming with MASS MoCA, Recession Arts, the Invisible Dog, Galapagos Art Space, New Amsterdam Records, The Aldrich Museum, Allegra Laviola Gallery, Columbia University, the New School, and CUNY Hostos.

More information can be found at: http://wassaicproject.org/about/history/#sthash.kBSZIhFq.dpuf