Appendix A-1

OUTREACH PROCESS SUMMARY

OUTREACH APPROACH

MEDIA

Posts to COG Twitter and Facebook Accounts

October 6 Open House

- 5 Image and Text Postings

November 12-16 Events

- 11 Image and Text Postings

Posting to COG Nextdoor Accounts

October 6 Open House

- Image and Text Postings

November 12-16 Events

- Image and Text Postings

News Article in CommunityImpact

E-BLASTS

Email correspondence to Stakeholder List

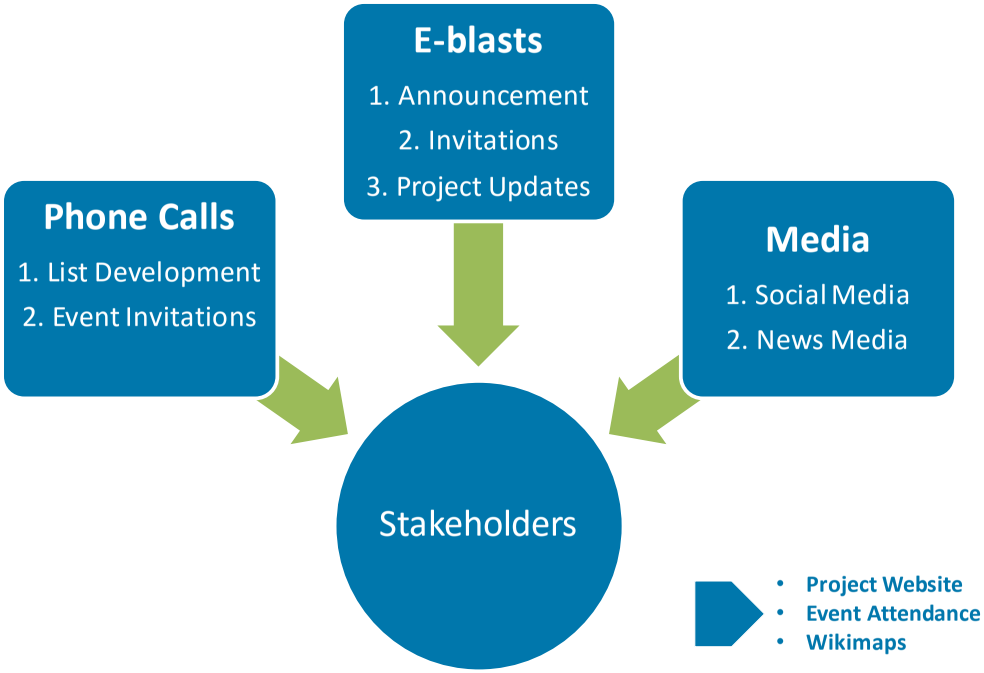
- 1,300 Recipients

October 6 Open House & November 12-16 Events

- Save the Date
- Invitation
- Invitation Reminder
- Event Recap

November 12-16 Events

- Event E-Blast
- Phone Calls



PHONE CALLS

October 6 Open House

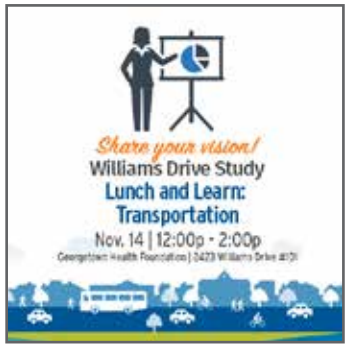
- 420 Contacts (20 Organizations, 20 Clubs, 380 Businesses)

Called by Outreach Team to introduce project, request email opt-in, invite to Oct. 6 Open House.

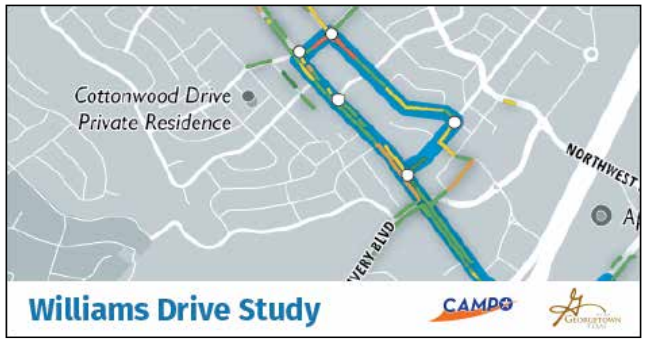
November 12-16 Events

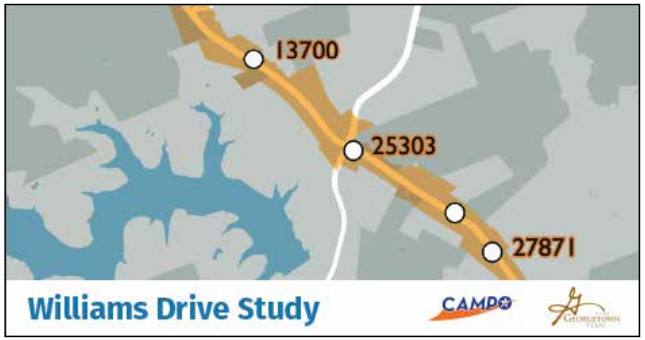
- 224 Stakeholder Contacts Called by Outreach Team as a follow up to e-blast and invite to Concept Design Events.

SOCIAL MEDIA SAMPLE IMAGES/TEXT

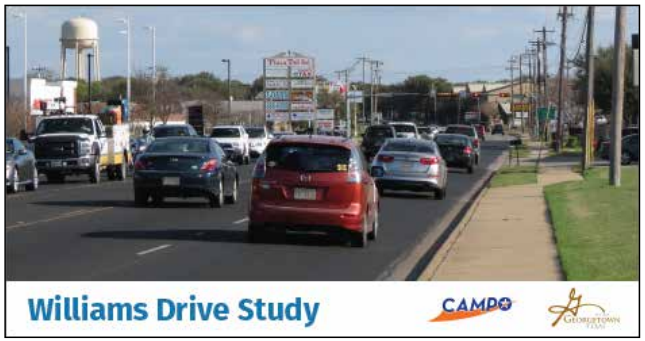


"Do you use Williams Drive? Attend Williams Drive Study Public Open House. Meet the team. 10/6 4:30-7PM (http://tinyurl.com/z95ghtd)"





"Study Launch: Transportation solutions for Williams Drive. Public Open House Thurs - 10/6 4:30-7:00PM (http://tinyurl.com/z95ghtd)"



MEDIA AND E-BLASTS

Williams Drive Study

CAMPO | Georgetown Texas

Concept Design Events
November 12-16, 2016

Special Invitation

Dear Michaela:

As part of the Williams Drive Study Concept Design events happening Nov. 12-16 (download event flyer), the Capital Area Metropolitan Planning Organization (CAMPO) and City of Georgetown invite you to be a part of a focused conversation on the topic of the **GEORGETOWN INDEPENDENT SCHOOL DISTRICT (GISD) SITE**. During this small-group discussion, you will meet with the project team and consultants to **discuss the development potential of the GISD site seen as catalyst location within the study area.**

The meeting details are below. We value your input and hope you can join us for this discussion. Please click the blue bar below to confirm your attendance. RSVPs must be received by November 11, 2016.

Tuesday, November 15, 2:15 – 3:15 pm
Georgetown Health Foundation | Community Room
Lake Aire Center
2423 Williams Drive, #101, Georgetown, TX

CONFIRM YOUR PARTICIPATION [RVSP]

ABOUT THE WILLIAMS DRIVE STUDY:
The City of Georgetown and the Capital Area Metropolitan Planning Organization (CAMPO) are partnering on the Williams Drive Study. The focus of the Williams Drive Study is to create safe and efficient transportation options while integrating smart land use, community needs, and the future economic growth of the corridor. Learn more by visiting the CAMPO project website.

Like

Nextdoor

City of Georgetown is on Nextdoor, the private social network for neighborhoods.

Texas / Georgetown / Georgetown Public Agencies / City of Georgetown

City of Georgetown
113 E 8th St, Georgetown, TX 78626 • 512-930-3655 • More info...

Activity

Williams Drive Corridor Study Op
Public Communications Manager Keith
The City of Georgetown and CAMPO
develop a plan of action that will incor
accommodations of all modes, and fu
Avenue and Jim Hogg Road. The first
the Georgetown Health Foundation C
https://georgetown.org/2016/09/22/w
Shared with City of Georgetown in Gene

THANK 12 | REPLY 1

Georgetown Edition • October 2016

CITY & COUNTY
News from Georgetown and Williamson County

Williams Drive study to seek public input

GEORGETOWN The city and the Capital Area Metropolitan Planning Organization will host a design charrette in November for the Williams Drive Corridor Study.

The comprehensive study, which began this summer, to look at multimodal transportation, land use, economic development, housing and the environment along the Williams Drive corridor from Austin Avenue to Jim Hogg Road. The study could help determine how to improve traffic and economic development in the corridor, which is a gateway to the Greater Austin area.

Design charrette meeting time:
- **Nov. 12** 9 a.m.-12:30 p.m.
- **Nov. 13** 1-4 p.m.
- **Nov. 14** 9 a.m.-7 p.m. with a lunch-and-learn session from noon-1 p.m.
- **Nov. 15** 9 a.m.-4:30 p.m., lunch-and-learn from noon-1 p.m., open house 4:30-7:30 p.m.
- **Nov. 16** 4-7:30 p.m., includes two sessions to present findings to members of the public

The charrette, a problem-solving design meeting that gathers information from the public and works to identify solutions, will be held at the Lone Star Circle of Care Community Rooms at 2324 Williams Drive.

POTENTIAL STAKEHOLDERS REACHED

- 420 Phone numbers
- 1,300 Email Accounts
- 8,100 Facebook
- 5,500 Twitter
- 33,000 Newspaper Readers
- 14,000 Community-based Listserve(i.e.; Sun City, Georgetown Chamber of Commerce)

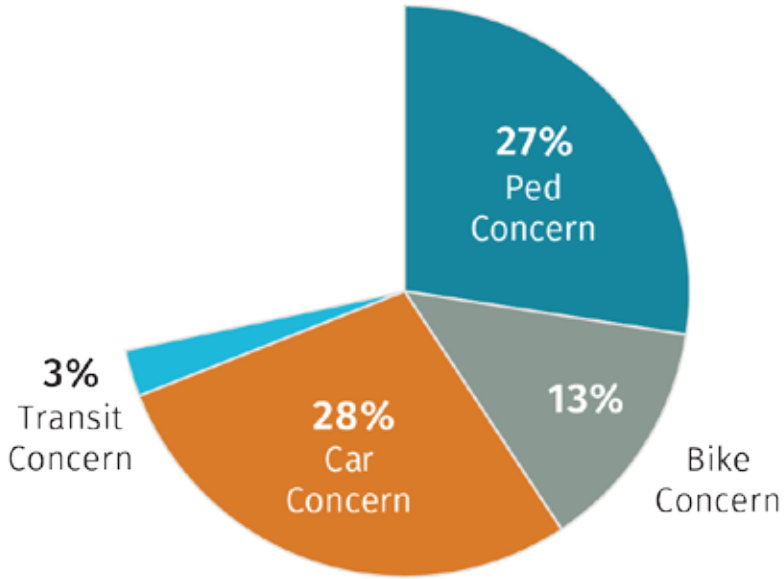
PUBLIC MEETING ATTENDANCE & COMMENTS

October 6 Open House

- 105 Attendees
- 71 Comments

November 12-16 Events

- 86 Attendees
- Over 120 comments

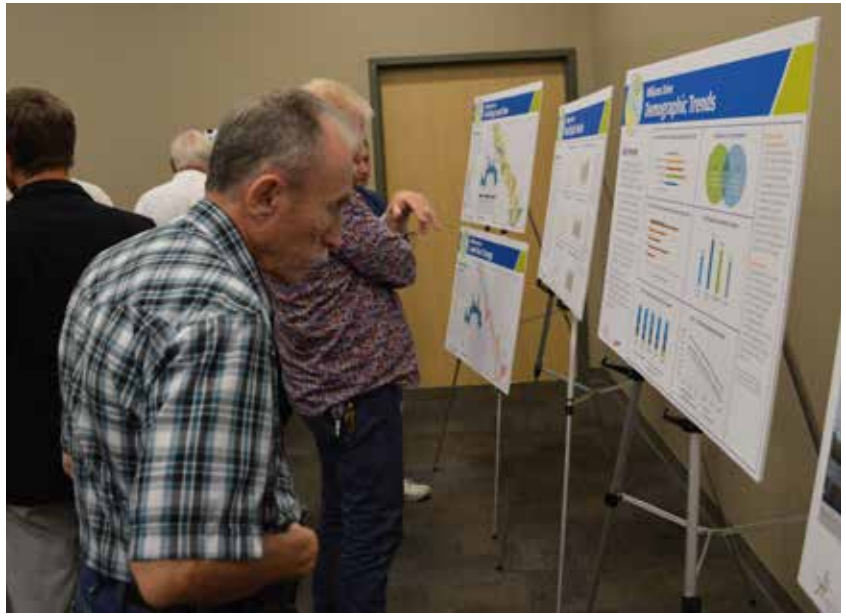


PUBLIC OPEN HOUSE #1

Public Open House #1 was held on October 6, 2016 from 4:30 - 7pm at the Georgetown Health Foundation. The purpose of the meeting was to present the results of the first phase of the study, and gather input on the challenges and opportunities within the study area. The presented material included:

- project goals and objectives,
- review of existing planning documents/ studies, and
- analysis of existing land use and transportation conditions

Share your vision for
Williams Drive.


Demographic Trends

NOVEMBER DESIGN CHARRETTE

The public input process for this project centered around a 5-day public design charrette. A Charrette is a collaborative planning and design workshop that is inclusive by nature and designed to bring different stakeholders together to build consensus and identify issues. A charrette not only rapidly produces information for the consultant team, but it enables the community to realize how much consensus exists for key issues in a constructive format.

The Williams Drive charrette was held from Friday November 12 to Wednesday November 16, 2016 at the Georgetown Health Foundation Community Rooms, 2423 Williams Drive. The charrette week included many events to inform the public and encourage participation.

SATURDAY November 12	SUNDAY November 13	MONDAY November 14	TUESDAY November 15	WEDNESDAY November 16
Hands-On Workshop 9 am - 12:30 pm	Open Design Studio 9 am - 7 pm	Open Design Studio 9 am - 4 pm	Open Design Studio 9 am - 4 pm	Closed Design Studio
		Lunch & Learn Transportation 12 - 2 pm	**Lunch & Learn Commercial & Market Development 12 - 2 pm**	
Open Design Studio 5 pm - 8 pm		**Drop-In Open Design Studio** 4 pm - 7 pm	**Drop-In Open Design Studio** 4 pm - 7 pm **P&Z/GTAB Joint Meeting** 6 pm	**Work-In Progress Presentation** 4 pm **Work-In Progress Presentation** 6 pm

PROJECT TEAM TOURS

Upon arrival in Georgetown, the project team toured the project area both by van and on foot. The tours allowed the team to experience the Williams Drive corridor from Interstate 35 to Jim Hogg in addition to the surrounding neighborhoods and regional connections. Some of the assets and issues that surround the Williams Drive corridor became immediately apparent.

First Impressions

- Distinct character changes from one end of the corridor to the other
- Wealth of large native trees and hill country vegetation
- Driving, walking, and biking along or across Williams Drive feels unsafe
- Disconnected and poor quality sidewalks and bike paths
- Close proximity to both Downtown, Lake Georgetown and the San Gabriel River
- Lack of alternative travel routes

HANDS-ON DESIGN WORKSHOP

The public portion of the charrette began Saturday morning when community members gathered at the Georgetown Health Foundation Community Rooms to roll up their sleeves and become planners and designers for the morning. The workshop included a presentation with “food for thought”, a breakout session where participants drew on maps highlighting issues, assets, opportunities and threats, and a report back where the breakout groups presented the three most important ideas from their table.

Presentation

The workshop began with a presentation that outlined the goals of the project, introduced the team and walk through the charrette week. Consultants also presented on existing conditions, and best practices for transportation and placemaking.

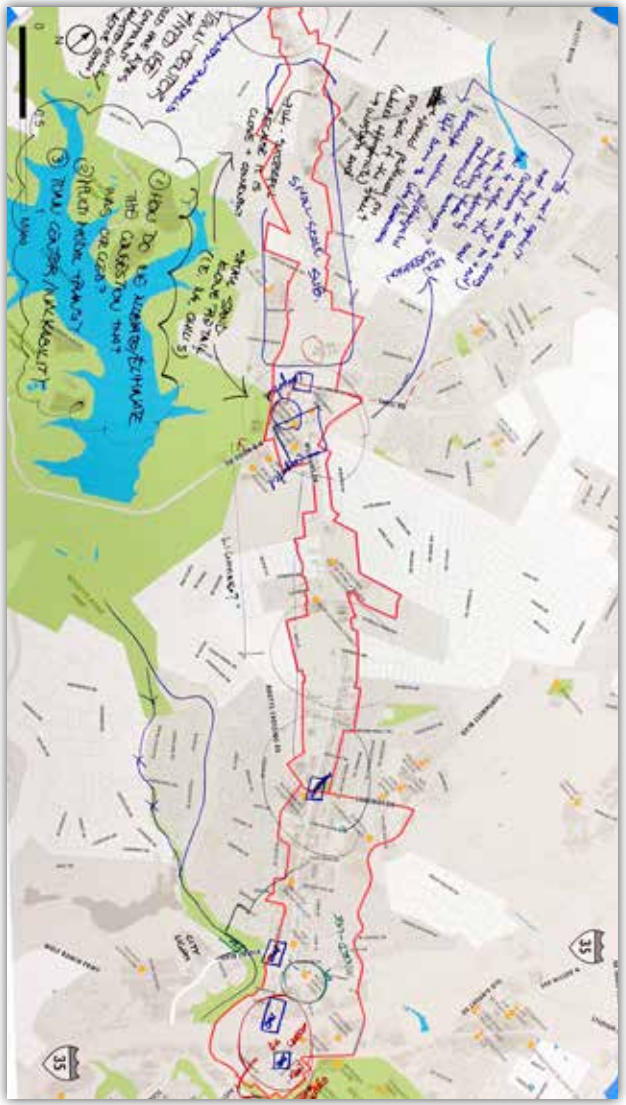
Breakout Session

Following the presentation, participants divided into groups. Each group, with the guidance of a facilitator, worked on a large map of the study area, drawing diagrams and writing ideas that describe Williams Drive today as well as illustrating concepts for the future. Highlighting issues and assets, each group provided ideas on how Williams Drive should change for the better.

Participants were also asked to design their ideal Williams Drive cross-section using pre-made components like driving lanes, sidewalks and bike lanes.

A sample of maps and cross-sections from the session are on the following page.

PARTICIPANTS IDENTIFIED ISSUES AND OPPORTUNITIES ON MAPS AND STREET SECTIONS



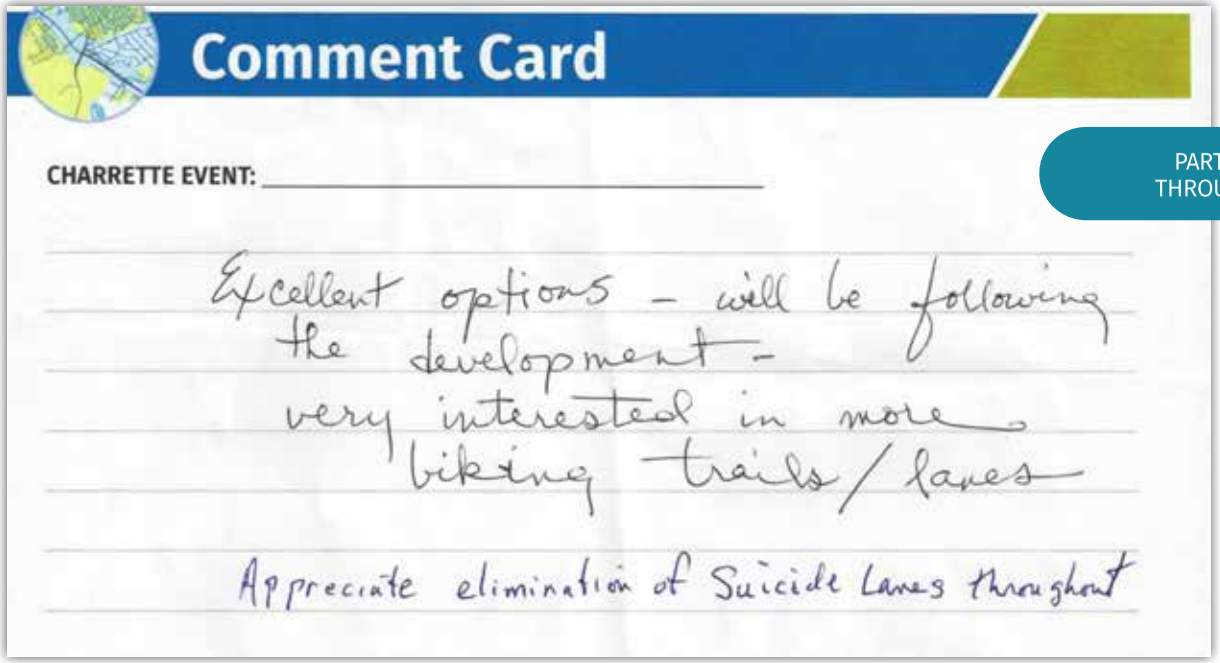
Report Back

At the conclusion of the breakout session, each group selected a spokesperson to present their ideas to the entire group. Each table selected three "big ideas" to share. The presentations allowed the groups to see common interests emerge and to build consensus around ideas. During the present back, it became clear that many of the participants shared concerns and had a similar vision for the future of the Williams Drive study area.

Big Ideas

- Mixed-use, walkable nodes across key intersections
- Walkable town center
- Improve street connectivity
- Improve safety with medians and managing access
- Multi-modal transportation options
- Improve connections to trail system

PARTICIPANTS COMMENTED ANONYMOUSLY THROUGH COMMENT CARDS AND WORD CARDS

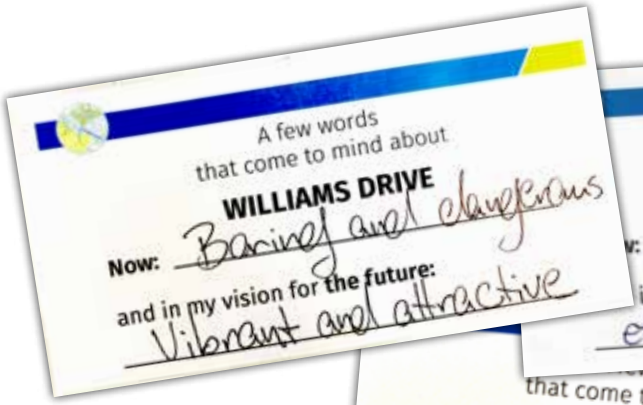


Comment Card

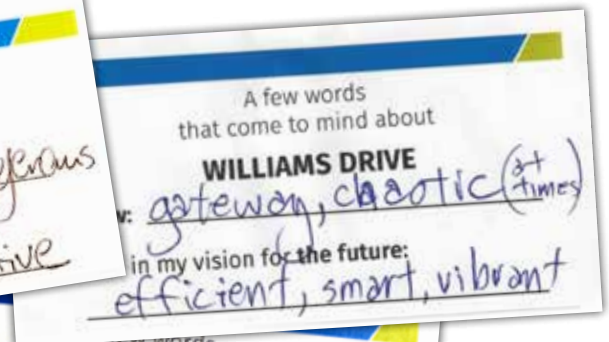
CHARRETTE EVENT: _____

Excellent options – will be following the development – very interested in more biking trails / lanes

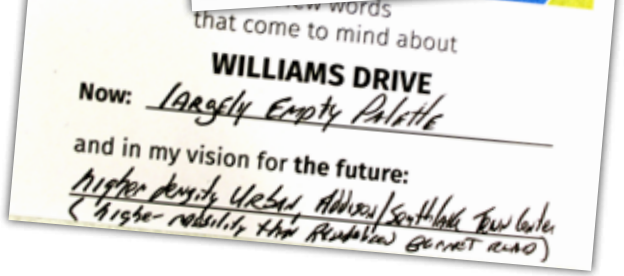
Appreciate elimination of Suicide Lanes throughout



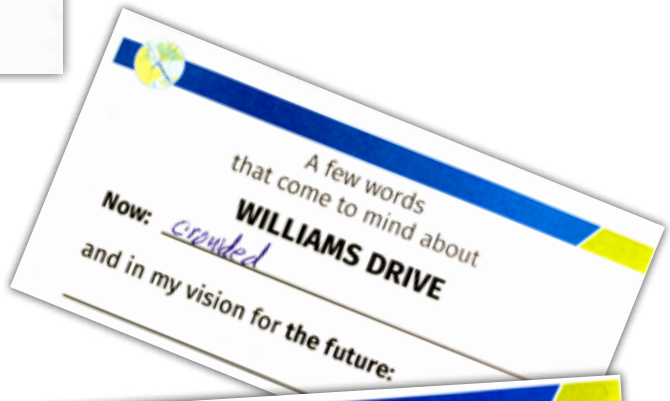
A few words that come to mind about
WILLIAMS DRIVE
Now: Boring and dangerous
and in my vision for the future: Vibrant and attractive



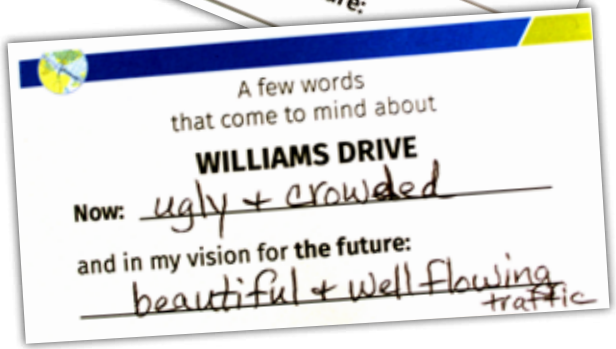
A few words that come to mind about
WILLIAMS DRIVE
Now: gateway, chaotic (at times)
and in my vision for the future: efficient, smart, vibrant



A few words that come to mind about
WILLIAMS DRIVE
Now: Largely Empty Palette
and in my vision for the future: higher density Urban Village/Southside Town Center (higher residility than Pendleton Garnet Road)



A few words that come to mind about
WILLIAMS DRIVE
Now: crowded
and in my vision for the future:



A few words that come to mind about
WILLIAMS DRIVE
Now: ugly + crowded
and in my vision for the future: beautiful + well flowing traffic

INITIAL CONCEPTS

Site Analysis

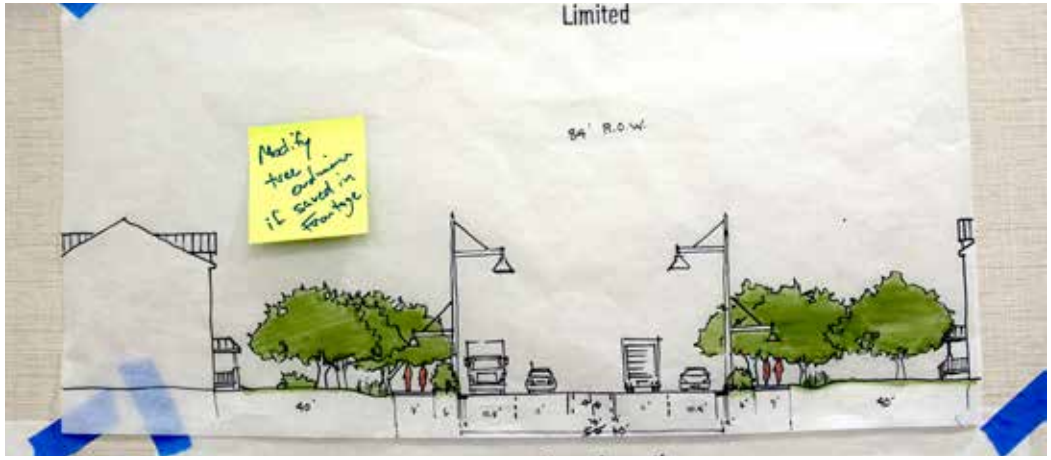
Immediately following the close of the hands-on design workshop, the team headed out into the field to check on various issues heard throughout the morning. In most cases, this additional field work helped confirm the public's view of the project area, as described in their table work earlier in the day.

Brainstorming

Once key issues from the morning workshop had been confirmed in the field the consultant team moved on to prepare an initial concept for land use and neighborhood character for the entire project area. This work continued on into Sunday as well.

MIXED USE
RETAIL (EXX)
PLAZA
PARKING
GEORGETOWN ISD SITE CONCEPT
PHASE 2 (INCL. PARCELS ALONG WILLIAMS AT RIVER)
1:100

ds-on Workshop Map
PARKWAY
SCENIC
Limited

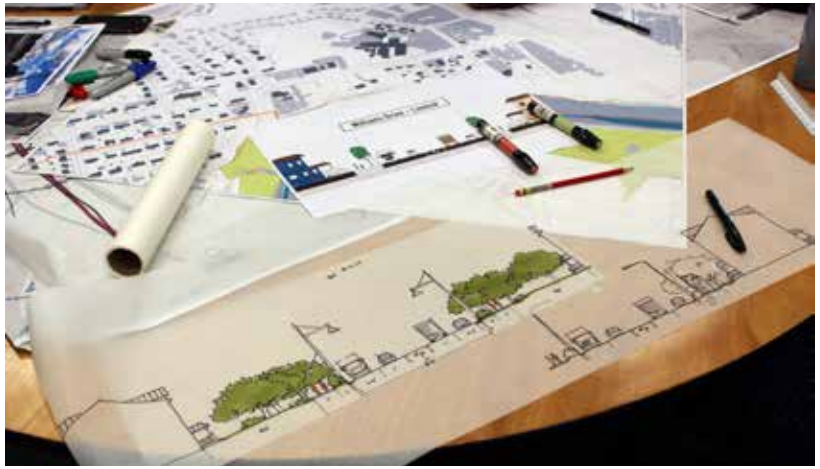

Limited
84' R.O.W.
Modify tree ordinance if saved in frontage
40'
40'

Staff Check-in

On Sunday afternoon, the consultant team presented their initial land use and character concepts to the City staff for their review. A lively discussion ensued, and in the end, the staff confirmed that they felt the consultant was on the right track.

Preliminary Concepts

- Multi-modal transportation network
- A series of landscape and setback treatments along Williams Drive in both the center and corridor areas
- Detailed character area and future land use concepts for the center area



SUN CITY LEADERSHIP VISITS THE OPEN STUDIO

FEEDBACK

Open Studio

Beginning Saturday afternoon and running through Tuesday evening, a temporary charrette studio was set up in the Georgetown Community Heath Foundation meeting rooms at 2423 Williams Drive. The charrette studio served as an on-site working space where consultant team members could analyze information, refine ideas and test conceptual scenarios. Working on-site throughout the week gave the consultant team easy access to the study area, allowing the team to observe day-to-day activity, visit local businesses and experience everyday life in the area.

Throughout the week, the community stopped by to view work in action, comment on the process and catch up on any events they may have missed. The studio offered the community the flexibility to participate in the process on their own schedule, helping to gather the maximum amount of input. Stakeholder meetings as well as lunch and learn events also took place in the studio.

Also, throughout the charrette, comment cards were available for those who wished to provide written comments.

SHANNON LN
E JANIS DR
PARK LN
FIRE STATION 2
OAK LN
DAWN DR
CRESTVIEW BAPTIST CHURCH
JUDY DR
MESQUITE LN
RIVER BEND DR
PATTI DR
WILLIAMS VILLAGE
APARTMENT HOMES
MARIPOSA
ROCKY HOLLOW TRL

Stakeholders

Stakeholder meetings were held throughout the week to allow specific stakeholder groups to discuss the project in depth with members of the consultant team. These meetings included:

- City of Georgetown planning staff;
- Public safety representatives;
- Traffic and operation experts;
- Civic, government, parks and open space personal;
- Sun City leadership;
- Georgetown ISD; and
- Housing and community services representatives.

Lunch and Learns

On Monday and Tuesday, a series of “lunch and learn” presentations were given by project team members in the charrette studio. The presentations were open to the public and served as a valuable educational opportunity, allowing attendees to have a discussion on the topic and question the team’s experts. Over the course of the two events, over 50 attendees spent an hour learning about a topic related to the project.

On Monday, the topic was transportation presented by Nelson\Nygaard and on Tuesday, the topic was commercial and market development presented by HR&A Advisors. After each presentation, there was a question and answer session with the presenter.

Campo

In advance of the first drop-in open house, CAMPO staff travelled to Georgetown and received a briefing on the project progress to date. The consultant team received comments on the materials prepared up to that time, and insights into potential revisions for the closing show.

Drop-in Open Houses

On Tuesday and Wednesday night, drop-in open houses were held at the open design studio. The drop-in nature of the event allowed to attendees to stop in anytime between 4 pm and 7 pm to check on the progress and comment on designs made since the Saturday Hands-on Design Workshop.

Maps, drawings and preliminary concepts for the project area were on display. Members of the consultant team and City staff were available throughout the evening to answer any questions or concerns.

P&Z/GTAB Joint Meeting

On Tuesday evening, a joint meeting of the Georgetown Planning and Zoning Commission and the Georgetown Transportation Advisory Board was held in the charrette studio. Both groups received a briefing on the project from the consultant team. Afterwards, comments were solicited on the various maps and other materials set up around the room.

Refinement

Based on final conversations with City staff and the previous evening meeting, the consultant team refined the concepts and drawings in preparation for the closing presentation.

CLOSING SHOW

Work In-Progress Presentation
On Wednesday evening at 4 pm and again at 6 pm, the community gathered in the charrette studio to watch a "work-in progress" presentation. The presentation included a recap of the charrette process for the week, and incorporated ideas and concepts on land use, neighborhood character, transportation and mobility.

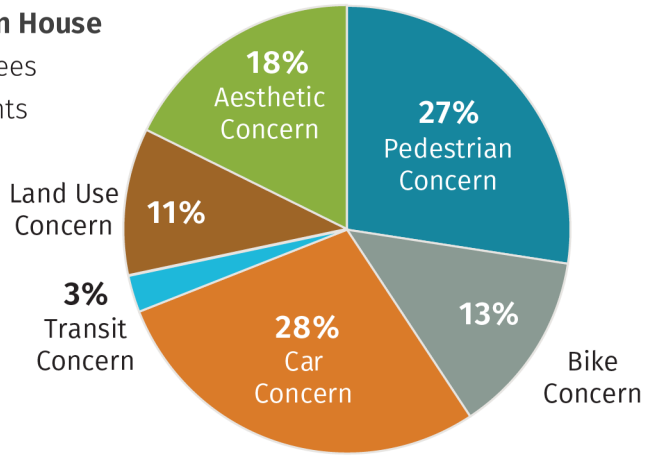
The presentation also included a more in-depth concept for the GISD site as a catalyst for new activity in the area. The work was well-received. The presentation concluded with a reminder that the work presented was a draft and that attendees must continue to offer input on the concepts and ideas. Everyone was encouraged to continue to send comments and to follow the project online.

After the presentation, meeting attendees were asked to view and comment on draft material that was posted in the hallway outside the room, and to fill out exit surveys if they wished. Members from the consultant team and City staff were on hand to answer questions.

KEY PUBLIC CONCERNS

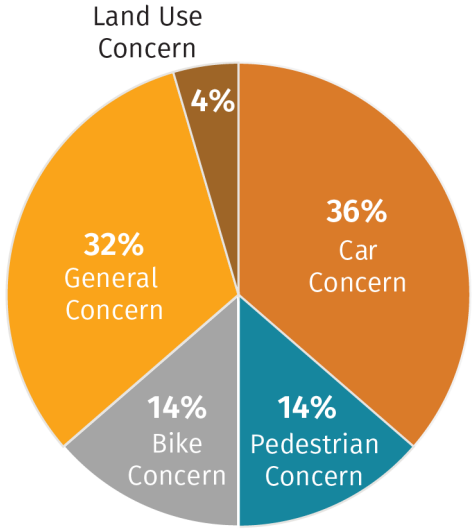
October Open House

- 105 Attendees
- 71 Comments



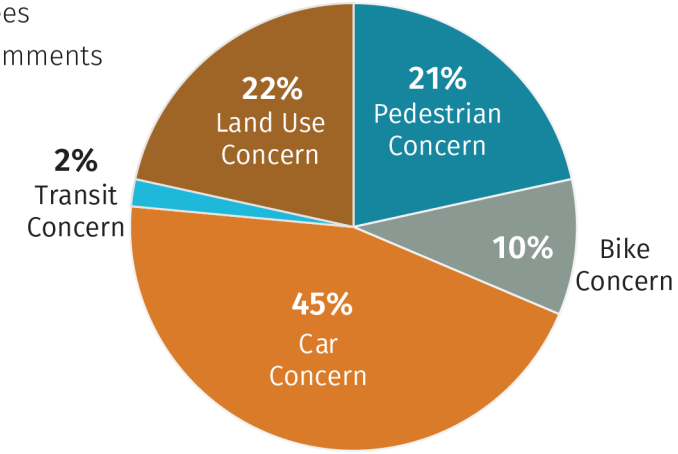
March Open House

- 72 Attendees
- 21 Comments



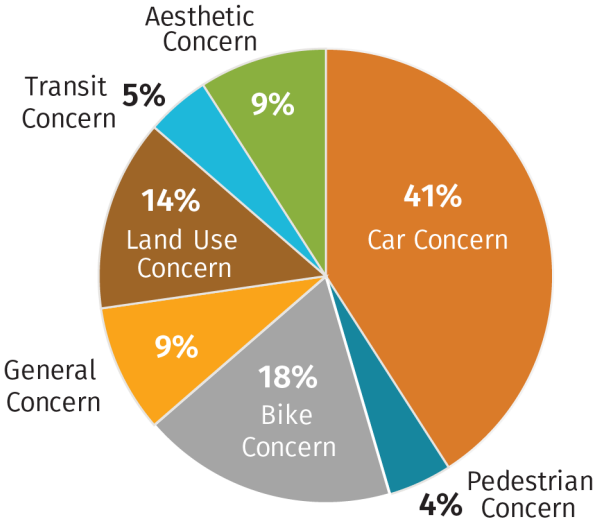
November Charrette Events

- 86 Attendees
- Over 50 Comments



Public Meeting #4

- 58 Attendees
- 22 Comments



Outreach Efforts

1,300 member email list

8,100 views

5,500 views

33,000 newspaper readers

400+ phone calls

Public Meeting #1

Comment	Location (if applicable)	Area of Concern	Mode
Need sidewalk and bicycle path from Williams Drive to riverwalk/ Booty's Crossing Park along DB Wood Dr. Current sidewalk ends at Fire Department	Williams Drive/ DB Wood Road at Booty's Crossing Park	Bicycle/Pedestrian Concern	Bike/ Walk
Need better lighting between Lakeway to Sun City/ Jim Hogg Road	Williams Drive between Lakeway dr to Jim Hogg	Aesthetic Concern	Built Form
Motel broken fence, drug raids, and dilapidated	Williams Drive and Clay Street	Aesthetic Concern	Built Form
Allow development here to accentuate the Rive	Williams Drive, just south of Rivery Blvd.	Land Use Concern	Built Form
Need to reserve frontage for commercial, services, office, etc. and serve needs of nearby residents of Sun City.	Williams Drive near Sun City (Del Webb intersection and up)	Land Use Concern	Built Form
West end of Williams Needs more grocery store options- why is the HEB the only grocery store in the City?	West end of Williams Drive	Land Use Concern	Built Form
Political sign board at Del Webb and Williams Drive is an eyesore	Williams Drive at Del Webb	Land Use Concern	Built Form
Need a turn lane for Rivery Rd off of Williams Drive.	Williams Drive at Rivery Rd.	Vehicle Concern	Car
Traffic lights not in sync. Traffic in PM not able to turn left, causing west traffic to back up.	Williams Drive and Lakeway Dr, River Bend Dr., and Rivery Blvd.	Vehicle Concern	Car
Williams Drive needs to extend past Austin Avenue and connect to North College Street, or newer plans to any newer roads	Williams Drive at Austin Avenue (proposed to North College)	Vehicle Concern	Car
Need more left turning lanes from Austin Avenue onto Williams Drive	Austin Avenue at Williams Drive	Vehicle Concern	Car
2008 road bond project???	FM 971 (between Austin and NE Inner Loop)	Vehicle Concern	Car
Recommend 6 lanes for all of Williams Drive	All of Williams Drive	Vehicle Concern	Car
Light synchronization	Williams Drive at Woodlake Drive	Vehicle Concern	Car
Poor vehicle flow and very crowded parking at HEB at Williams Drive and DB Wood Road- crowded every time of day (dot #33)	Williams Drive and DB Wood Rd. (HEB)	Vehicle Concern	Car
Ever since the Walmart general area was built, the increase in traffic flow on Mesquite Road has increased significantly. It could be considered as a minor artery. (dot # 34)	Mesquite Road	Vehicle Concern	Car
Putting two bus stops on Dawn Dr. will add to the traffic. Dawn Dr. already has lots of traffic and for a curvy road, people travel too fast.	Dawn Dr.	Vehicle Concern	Car
Upgrade the stoplight to a pole, not wire, long distance traffic signal (dot 36)	Williams Drive at Serenada Dr.	Vehicle Concern	Car
Verde Vista Extension to Williams Drive	Verde Vista dead end	Vehicle Concern	Car
Traffic study on light timing	Williams Drive and Shell Rd/DB Wood Road	Vehicle Concern	Car
While not in the study, we use DB Wood to exit Williams and get to 35. They need 2 left turn lanes on University to make it a more attractive option and reduce Williams Drive traffic.	University Drive at DB Woods (outside study area)	Vehicle Concern	Car
Deceleration lane to enter HEB coming from Sun City/ W	Williams Drive at and DB Wood Road (HEB)	Vehicle Concern	Car
Heavy traffic on NW to bus route on Dawn Drive	Dawn Drive	Vehicle/Pedestrian Concern	Car/Walk/Transit
Bus route should pick up apartments on Northwest Drive (Between Lakeway and Central)	Northwest Drive between Lakeway and Central	Vehicle Concern	Transit
Wider sidewalks to cross Austin Avenue	Williams Drive at Austin Avenue	Pedestrian Concern	Walk

Sidewalks on Shell Road from Bowling to Overlook	Shell Road from Bowling to Overlook	Pedestrian Concern	Walk
Sidewalks from Merrick Apartments at Estrella to DB Wood	Estrella to DB Wood Road	Pedestrian Concern	Walk
Split up traffic crossing I-35 and Austin Avenue- Add a Bridge, one way each. SE bound, branch off of Cedar Drive. Swing around behind River View Mall, cross over I-35 and connect to W. Morrow Street.	Alternative Route	Car	
Split up traffic crossing I-35 and Austin Ave- NW bound goes off of Austin Avenue N. or Republic Square at Chamber Way, cross over I-35, connect to Park Ln., then connect to Dawn Drive, to Lakeway or Wagonwheel before re-merging to Williams Dr.	Alternative Route	Car	
6. Significant redesign for Austin Avenue, past Rivery. Need to allow better thru traffic movement.	Austin Avenue- past Rivery	Car	
Additional traffic on Dawn Dr with bus service on that street. We already have a huge amount of traffic and people speeding. This is a two curve street as it is. There are a number of children on this street and it makes it almost impossible for them to ride bicycles except on the sidewalk- which walkers also use.	Dawn Drive	Car/ Transit /Bike/Walk	
Link east Georgetown to west Georgetown with a land mass over 35 from 29 to North Loop. Fill in with buildings, parks, and pedestrian malls.	From 29 to North Loop.	Walk	
I saw nothing relating to the Randall's development at the corner of Hogg Road and Williams Drive	Hogg Road and Williams Drive	Built form	
The traffic on Mesquite Rd increased so much since the development of Walmart and all the other retail in the area. I feel that Mesquite can now be considered a minor artery street.	Mesquite Road	Car	
Suggest moving bus route to Northwest.	Northwest Drive	Transit	
Other roads that need bike access off William's Drive are Lakeway- all the way to Austin Avenue on the other side of the interstate.	Williams Drive- all roads connecting from Lakeway to Austin Ave.	Bike	
Right-hand turn from Williams Drive onto I-35 Frontage Road if you are headed east is a train wreck. Needs to be expanded for people heading south.	Williams Drive at 1-35 Frontage Road intersection	Car	
Williams Drive and N. Austin Avenue intersection is a disaster. Left turns off of Williams into the Chipotle/ Starbucks should be prohibited to alleviate traffic back ups. Left turns into McDonalds at the same intersection should be prohibited.	Williams Drive at Austin Avenue	Car	
Red light be installed at Williams Drive and CR 245	Williams Drive at CR 245	Car	
You are probably using traffic flow data of a year ago that is flawed, as it does not include peak shopping hours at HEB (10am-12pm and 2-4pm)	Williams Drive at DB Wood (HEB)	Car	
Consider over-pass at crucial intersections: Williams Drive at DB Wood and Lakeway	Williams Drive at DB Wood and Lakeway Intersection	Car	
Red lights be installed at Ronald Reagan and Williams Drive	Williams Drive at Ronald Reagan	Car	
Shoulders on Williams Drive- used by cyclists. When a right hand turn lane take away the shoulder, a bike-through access should be added similar to what is occurring up and down Farmer/Ronald Reagan.	Williams Drive Corridor	Bike	

If we can fix the vehicular and pedestrian issues then we can talk about bicycles but it is Texas, it is hot and the percentage of the population impacted by bike lanes is miniscule.	Williams Drive Corridor	Bike/Car/Walk	
2. Need to reserve road frontage for commercial, retail, offices, services, etc. to support the needs of nearby residents.	Williams Drive Corridor	Built Form	
3. Multi-family developments in area need to be restricted. They put much more traffic on roads and commute beyond the local area.	Williams Drive Corridor	Built form/ Car	
Uninterrupted turn lane down the middle of Williams Drive, giving ample opportunity for conflicting left hand turns. This should be divided by a median.	Williams Drive Corridor	Car	
Williams Drive- Add right hand turn lanes.	Williams Drive Corridor	Car	
5. Widen Williams Drive. Add additional traffic lanes.	Williams Drive Corridor	Car	
I drive from my house in old town to Embree (most of the 6-miles) on average round trip twice a day.	Williams Drive Corridor	Car	
Make right hand turn lanes along the whole of Williams Drive (not just intersections. Need to stop the back up of cars when turning into businesses.	Williams Drive Corridor	Car	
Lack of sidewalk- I see little reason why the entire 6-mile strip should not have a sidewalk on both sides.	Williams Drive Corridor	Walk	
Williams Drive- Add sidewalks.	Williams Drive Corridor	Walk	
Plan/encourage for more and better development beyond Jim Hogg now to prevent future problems.	Williams Drive- past Jim Hogg	Built form	
Future of Williams Drive- extending toward North College to Highway 29	Williams Drive to Highway 29	Car	
As one gets closer to 35 the traffic increases. Fact.	Williams Drive toward I-35 intersection	Car	
6 bike clubs/organizations in Georgetown and cycling continues to grow. We need to modernize our thinking on our roads, not one size fits all.		Bike	
New developments needed north to 195 and south to 29.		Built Form	
4. Consider greater employment opportunities within immediate and nearby area.		Built form	
Re-think further into the future and make alternative north/south corridors more attractive and wider to pull more traffic off Williams.		Car	
1. No reasonable alternative routes to downtown- there is only Williams Dr.		Car	
7. Consider parallel road to compliment and relieve Williams Dr road volume.		Car	
8. Add continuous turn lanes at major intersections.		Car	
Interconnect between business parking lots to keep cars off streets.		Car	
Very well presented, I appreciate being allowed to be part of this process.			
Your study doesn't extend to Williams Dr and 3405 as it should.			
Your poster presentation contains incorrect street connections.			
Think bigger. Hold a design charrette for city planning or invited universities (Texas Tech/Houston/Arlington/UTSA/Am) I would not considering how badly Austin turned out.			
Living in Sun City. Areas of concern include:			
9. Look to shorten distance between points of origin (home) and destination (whatever that may be).			

Charrette

Comment	Location (if applicable)	Area of Concern	Mode
Too much asphalt		Vehicle/Roadway	Vehicle/Roadway
Landscaped median with designated left-turns to lots/businesses		Vehicle/Roadway	Vehicle/Roadway
How to widen the road without adversely impacting commercial businesses		Vehicle/Roadway	Vehicle/Roadway
Have shared use pathway on one side of the street at western end		Bike/Ped	Bike/Ped
Town Center use at Jim Hogg		Land Use	Land Use
Small standalone retail on western end		Land Use	Land Use
Small scale sub divisions on western end		Land Use	Land Use
Congested	D B Wood Road/Williams Drive	Vehicle/Roadway	Vehicle/Roadway
Multi-modal transit		Transit	Transit
Town Center Walkability		Pedestrian	Pedestrian
Street Lighting	D B Wood Road to Serenada	Pedestrian/Vehicle/Roadway	Pedestrian/Vehicle/Roadway
Congested	Lakeway	Vehicle/Roadway	Vehicle/Roadway
Congested	Rivery	Vehicle/Roadway	Vehicle/Roadway
Congested	I-35	Vehicle/Roadway	Vehicle/Roadway
Congested	Austin Avenue	Vehicle/Roadway	Vehicle/Roadway
Mixed Use development	GISD site	Land Use	Land Use
Mixed Use development	I-35/Austin Avenue	Land Use	Land Use
Landscaping	I-35 Interchange	Vehicle/Roadway	Vehicle/Roadway
Mixed Use development at major intersections		Land Use	Land Use
Interconnectivity in road design		Vehicle/Roadway	Vehicle/Roadway
Safety/access management with medians		Vehicle/Roadway	Vehicle/Roadway
Interconnectivity between parcels		Land Use	Land Use
Access management away from intersections		Vehicle/Roadway	Vehicle/Roadway
Shell Road connection to Williams Not safe	Shell Road	Vehicle/Roadway	Vehicle/Roadway
Access between properties and subivisions		Vehicle/Roadway	Vehicle/Roadway
Speeding vehicles (Need slower speed in Centers Area)	Lakeway Dr EB	Vehicle/Roadway	Vehicle/Roadway
Walkable center	Lakeway/Booty's	Pedestrian	Pedestrian
Better Connectivity to street grid and downtown		Vehicle/Roadway	Vehicle/Roadway
Put needs near where people live (Basic services - small centers)		Land Use	Land Use
Drive traffic off corridor to use 195 and 29		Vehicle/Roadway	Vehicle/Roadway
Need Green Pockets to connect to City trail system		Bike/Ped	Bike/Ped
No sidewalks or opportunities to cross	I-35/Williams Drive	Pedestrian	Pedestrian
Traffic on Dawn Drive from Lakeway to Central Dr	Dawn Drive	Vehicle/Roadway	Vehicle/Roadway

Traffic on Mesquite Rd from River Bend to Country Club Rd		Vehicle/Roadway	Vehicle/Roadway
Modify tree ordinance to save trees along road frontage		Land Use	Land Use
Bury Utilities		Land Use	Land Use
Street Lighting		Vehicle/Roadway	Vehicle/Roadway
Need to fund façade improvements		Land Use	Land Use
No Roundabout on Rivery Blvd		Vehicle/Roadway	Vehicle/Roadway
Include shared use path along Williams Drive		Bike/Ped	Bike/Ped
Include sidewalks along the entirety of the corridor		Pedestrian	Pedestrian
Buffered bike lanes and sidewalks where appropriate		Bike/Ped	Bike/Ped
Create buffer from sidewalks to roadway		Pedestrian	Pedestrian
Cycle track in centers areas		Bike/Ped	Bike/Ped
Remove TWCTL to include medians an left-turn pockets		Vehicle/Roadway	Vehicle/Roadway
Excellent options - very interested in more biking trails & lanes		Bike	
Appreciate elimination of suicide lanes		Vehicle/Roadway	
Access management = safety		Vehicle/Roadway	
Traffic Signal Optimization		Vehicle/Roadway	
Density: Are the decision makers on board		Land Use	

Public Meeting #3

Comment	Location (if applicable)	Mode
Light timing on Williams Drive is an easy and cheap fix		Car
Seems too much work on bike paths. This is not Austin		Bike
Sceondary route needed rom Sedro Trail Road (Charparro Estates)	Sedro Trail	Car
We have been dealing with increased traffic since Sun City was built. The City allowed Sun City to block the secondary route with homes but we still don't have a secondary route. Please fix this problem that the City created. We have been waiting 20+ years	Sun City	Car
Well done and impressive		General
The small hurdles will be worth the effort		General
Looking forward to the I35/Austin Avenue final plan	i35/Austin Ave	Car
This looks great.		General
Cost will be enormous but so will the cost of doing nothing.		General
I know it's minor but lighting should be considered particularly with the projected increase in pedestrian and bicycle traffic		Lighting
Concerned that emphasis are not on other corridors (Austin Ave, University Ave to D.B Woods)	Downtown/other areas	General
Concerned that other priorities are for development and not the new City Hall and municipal buildings.		General
I think the priorities are not in the right place and the study is the wrong place and places the old town on the back burner		General
The CCTL on Williams is being eliminated. At times of high traffic there will not be an avalable passage way for emergency vehicles		Car
Otherwise the concepts look reasonable. The parking and interconnectivity is a good approach. Potential problems could be access to buisnesses		Parking/Connectivity
Signal control could allow for :go green: to allow thru traffic to clear roadway and not bottleneck in meregncy situations		car
Make Wildwood Drive entrance to 2 lanes. Left lane is required and other lane can be left, right or straight (just like Rivery Blvd)	Wildwood	car
Nw Blvd: If proposed changes include diverting school age buses to NW Blvd, wouldn't sidewalks be vital for safety on the main thoorughfare. Concerned that pedestrian safety at this area	NW Blvd	Pedestrian
There are lots of bikes, walkers and kids on NW Blvd from Frost School, how will this work with increased traffic	NW Blvd	Pedestrian/Bike
Lower Income housing - concern that ir is right in the middle of low density safer neighborhood on NW Blvd. Crime, crime, crime, lock doors, no walking around at night	Rivery Blvd	Housing
School buses take 25mins to load and unload on NW Blvd at 7am sharp and 3:15pm everryday. Where is your common sense.	NW Blvd	Car

Public Meeting #4

Comment	Mode
Respect North Lake deed restrictions along Williams Drive and 3405	Land Use
Use eminent domain to remove unsightly businesses operating in residential buildings from Lakeway Drive to I-35. Expand the roadway	Land Use/ Vehicle
Plan needs to include expansion of Shell Road and D. B Wood to 4-lanes, median.	Vehicle
Williams Drive at Austin Avenue has to be addressed	Vehicle
Transit/Bus stops need to have turn-out lanes	Transit
Building of the new Randalls on Jim Hogg will trigger more development on west Williams. What are the long-term plans there? Cheaper to build now than in 5-10 years.	Land Use/Vehicle
Not clear in plans include below grade storm drains, no line item for storm drains listed on boards	General
I just moved to Georgetown from Austin. Overall a good plan	General
The proposed Verde Vista extension runs through two large lots R039522 (14.5ac) and R039520 (9.4ac). Please do not allow this extension to be a major cut-through road from Shell Rd to Williams Drive. It needs a low peed limit and some way to deter bikers from excessive speed an going through each gear at max rpm like they do late at night on Williams Drive	Vehicle
We have a valuable asset in the current Williams Drive corridor s it has wide, smooth surfaced shoulders. Using part of the shoulders as bike lanes will benefit the community now an in the future.	Bike
I like the fact that the project is sectioned out into 6 component/areas as this road varies greatly on density. I can see the use of bicycles explode with these proposed improvements for their mobility as Georgetown and Sun City I see already high usage. I love the asthestic improvements that I see Georgetown already does a good of so far. It would be interesting to see projected demographics for Williams Drive corridor over the timeframe and just how much traffic will increase over its current. Another item I would like to see is when/how construction would take place while having the least impact on congesting current traffic.	Bike/Vehicle/Aesthestic
Pro's: Timed lights, sidewalks, trees, medians	Vehicle/Aesthestic/Walk
Con's: Bike lanes - the reality is that <1% of traffic may use the lanes, that precious real estate needs to be saved for cars. Also is far too dangerous to ride a bike on Williams, even with "protected zone". If goal is to allow less "carbon" then the space would be better served as a bus lane.	Bike/Vehicle
Don't make the same mistake as other Cities have. Bike lanes sound good on paper but are better served in an urban setting not the Williams corridor which is a main traffic artery. People will be killed/	Bike/Vehicle

Survey - Study Goal Comments

Comment	Mode
Too much emphasis has been put on growth without enough thought put into the effects of this growth.	Land Use
Central Texas and Georgetown in particular are in hyper drive expansion and will be for a long time to come. Cedar Park has gotten it right, Georgetown not so. Williams Drive needs to be seven lanes. All the thilngs about cutting down on driveways, bringing businesses upt to the street, etc are all fine if you solve the basic probelm first. This plan does not and I happen to think it is actually anti-business. However, Georgetown needs to hire the planner from Cedar Park because they understand gestting ready for future expansion. I have been to every state in the US and 84 countries around the world. I know this plan will saddle Georgetown for years to come and unfortunately, the crowding they are talking about of businesses up to the street will mean future expansions will be impossible. This is a terrible plan.	Vehicle/Land-Use
We need a train rail in Georgetown and round rock, and no more fast food joints or storage facilities.	Transit
should include storm drains, it seems a mistake to develop and improve without them	General
number one should be create, not enhance. number 2 is so full of buzz words it doesn't mean anything. number four is a masked sentence that really just says encourage development. a goal should be added that says maintain traffic flow that allows drivers to travel through corridor at posted sipped limit. no one wants another 620.	Vehicle
Bike transportation is my main priority. It's nice to see multimodal transport as a top goal	Bike
If we want to enhance bus routes, your plans need to go out to Sun City.	Transit
It's still uncontrolled growth that just repeats and gets worst.	Land-Use
A bus should stop at Sun City and make stops at the grocery stores, going on to the Wolf Ranch Shopping Center, City Lights Theater, and back to Sun City. Many residents are no longer able to drive.	Transit
Looking at the final study is the first time some communities have seen Proposed New Sabine Drive Connections to Williams. Not pleased at all that the map shows Sabine Drive connecting to Williams as a cut thru to Bootys. This connection would require drivers to drive all the way thru our neighborhood residential streets just to get to Bootys. We are an over 55 community with a slow 20-25 MPH speed limit and we don't need people racing thru our development. This is not a practical connection. In addition, we've always been told that the area where the new connection is suggested is protected due to caves and springs.	Vehicle
Congestion and lights west of I-35 On williams drive will continue to be an issue. It is becoming o the same that happened to 183 in Austin years ago as the city pushed west.	Vehicle

Survey - Plan Improvements

Comment	Mode
In general, the plan consists of old ideas that will turn Georgetown into another Austin. I'm not in favor of that at all. Driving higher density ideas to a roadway that will remain a four lane road will not alleviate traffic or improve quality of life for those that currently live her and want to continue a small town/city look and feel. Driving alternative routes to existing residential area like northwest Blvd will drive people out of their homes. You need to rethink the high density and commercial development along Williams drive. What is wrong with a few pockets of undeveloped land?	Land-Use
The worst issue on Williams is the traffic light timing. Feom beginning to end the flow does not fit the traffic and causes long back ups.	Vehicle
Yes - 3 lanes each way with a turning lane. This plan will end up killing Williams Drive.	Vehicle
A train rail, zoning restrictions on fast food places and storage facilities. And lift the zoning restrictions on small houses and encourage them to be built	Transit/Land-Use
Spend less money.	General
No	General
below ground storm drains, you cannot have a first class project without them... big mistake to build and improve but just depend on ditches along the road	General
Develop not just mixed-use communities but mixed-use/mixed-income communities along Williams Dr.	Land-Use
continue and implement additional milestone and plan checking points with community involvement and surveys as the progress takes place.	General
Good plan - but will it ever get done. Would be good to see some things happen quicker than indicated, especially for bicyclists and pedestrians.th	Bike
Relocate the entrance/exit from chipotle onto Williams drive and move it to enter directly onto the entrance ramp for IH 35	Vehicle
The intersection at Austin Ave. and Williams Drive has not been addressed as far as I can tell. Need to purchase the land where the businesses are and move that intersection further away from I35.	Vehicle
Slow growth until you build sustainable infrastructure while keeping a Quailty of Life that doesn't create urban sprawl all the way up IH 35 like a cancer. The present pattern is to saturate one area into over congestion then repeat the same pattern with the next city. Eventually, killing the community life to urban cancer before moving to the next victim. Sane Growth is being smart and sensitive to maintaining community life not simple based on greed and over development. It makes community life ugly and unstable. Look at the obvious mess building all around Georgetown.	Land-Use
Widen Williams dr to 3 lanes both directions	Vehicle
Bike safety signage and restripes of busy right-hand turn lanes on Williams Drive right now. Safety features cannot wait 0-4 years or more. Bike plan should be included in 2017-2018 budget.	Bike

See comment on Question #1. I was told that a test was done for Sun City but it was decided that the route wouldn't get enough users. I was also told that the test was done during a time when it was raining almost every day so that the test had skewed results due to the weather.	Vehicle
Aesthetically pleasing with trees, plants, low signage.	Aesthetic
Bringing Williams down to 35 MPH is going the wrong way. Williams can tolerate 40-45 easily. Extending the 35 mph even further slows down the gridlock even more.	Vehicle

Survey - Other Comments

Comment	Mode
I thought no I covered it in item 2. Commuters in Georgetown do not ride their bikes to work. Recreational biking is best left to parks and recreation organizations. I'm not for increasing the density of population in the Williams drive area west of Serenada Drive. We like our suburban/rural areas and life.	Bike/Land-Use
I would also add that these cross walk areas on the side road are redicullous. They have 4" upliftson the sides that are a hazard to pedestrians, wheel chairs and mowing. The designer of these should be shot. Go get a designer from Cedar Park and get this thing right.	Pedestrian
Georgetown needs to stop the expansion of residential communities around Williams and west of Shell/DB Woods. Williams rd will not be able to take the expansion. Georgetown should focus the expansion efforts east of the I-35 corridor and east of the inner loop and SH29. Growth west of I-35 and around Williams has stressed the local populace.	Land-Use
NA	General
it may be over ambitious to include six miles in the project, maybe should reduce length to do a better job. Do from I-35 to end of existing development about at Sudsy Car Wash.	General
Now is the time to plan for more east-west bridges across I-35 and more larger roads going north-south. We're top dependent on Williams Dr. to move folks around. We need thse systems to make Georgetown a better place in which to live. Also, we need to take measures to slow down growth. Our road systems and bridges are not keeping up with our accelerated growth.	Vehicle/Land-Use
Tis looks a lot better than the hap hazard development and method currently employed.	Land-Use
Don't see the point of sidewalks and bike lanes way out on Williams Dr. There is not a lot of foot traffic here. Also not sure a bike lane is necessary either. Just seems like these are going to expensive unnecessary changes without much benefit. Nothing against bikers or eskers but we have plenty of trails in Georgetown. I know this is a different part of Williams but it would make sense to tackle where it dead ends into Austin Avenue.	Bike/Pedestrian
Thank you and let's make it happen!	General
I was unable to go to events, but did call on the phone with ideas and comments about issues. I am glad to see there is no mention of the "X" type of intersection at Williams and I35. I also thought there was going to be another overpass over I35 where Northwest Blvd ends. That would relieve pressure from inexperienced high school drivers.	Vehicle
It's a mess from Austin avenue to DB woods and growing worst. Stop the growth in these over developed areas. Instead spread out growth ares before it becomes a knot of lights and traffic. Tell developers to move on to Jarrell.	Land-Use/Vehicle
Widen the road	Vehicle
Thank you very much for putting so much work into the process. Bravo to the City. But now, we need to see some progress happen. Cyclists have been waiting for almost 20 years for the City to do anything. Let's get to some low-hanging fruit that is inexpensive.	Bike
We just moved to Sun City in August and so we're a bit late in giving our opinion.	General

The study is expressing the problems that too much growth is placing on Williams Drive but the study shows that the city is planning to increase demands by building more multi-family units, more retail, increased demands on this already over burdened route. The limited alternate routes are still thru residential areas so have limited capacity for relief. And although bike and pedestrian routes are great, they will only have very limited elevation of the roadway. In fact, motorist have to slow down or stop to enter driveways that pedestrian and bike routes cross.	Vehicle/Bike
Once the Randalls opens at Jim Hogg Road and Williams that intersection is going to become a nightmare, especially for us residents who live off Jimm Hogg Road.	Vehicle
30 years behind!	General

Appendix A-2

PUBLIC INVOLVEMENT MATERIALS

October 2016

WILLIAMS DRIVE STUDY

Public Involvement Plan

According to U.S. Census Bureau estimates, between July 2014 and July 2015, Georgetown was the nation's fastest-growing city among those with populations of 50,000 or more. The city's population has surged with growing families and new residents seeking to enjoy the natural environment, active lifestyle and charm of the downtown historic district. City of Georgetown planners estimate that by 2030, more than 130,000 people will call the area home.

As the residential growth of the city pushes to the northwest, pressure has increased on the Williams Drive corridor to continue to provide a safe and efficient roadway for commuters, schools, business patrons, and others who travel through for services or recreation. Currently, over 29,000 vehicles use this arterial on a daily basis, often times finding themselves delayed by chronically congested intersections.

Williams Drive also provides unique economic development opportunities that not only impact traffic patterns, but also influence the visual character of the community through its development and land use patterns. The corridor currently has a variety of land uses and zoning districts (single and two-family residential, office, commercial, personal service, auto service, recreational and institutional uses) that have influenced inconsistent development patterns and generated concern over the compatibility of future land uses, traffic volume and circulation.

As one of the City's main corridors, Williams Drive must safely and reliably fulfill its role of a critical regional arterial. In addition, it must serve the community's mobility needs with the potential of becoming a vibrant, multi-modal corridor with defined and dynamic centers that seeks to improve the quality of life for area residents.

For this Study, the City of Georgetown (City) and the Capital Area Metropolitan Planning Organization (CAMPO) have identified two spatial study areas on Williams Drive:

- **Corridor Plan (linear study) -** access management strategies, multi-modal transportation elements, safety and operation improvements, and recommendations for its built-form
- **Centers Plan (districts/areas study) -** predictable and high quality gateway tying together transportation, economic development, housing choices, and placemaking recommendations

The purpose of the Williams Drive Study is to develop a plan of action for successful improvements on both the Corridor and Center Plan areas that advance the core elements of the CAMPO Platinum Planning Program and emerging city. CAMPO's Platinum Planning Program is a comprehensive multimodal transportation planning process that offers a progressive, integrated, and inclusive examination of transportation, land use, and other planning areas. The program will be developed through:

a) An effective outreach program that engages stakeholders as participants in the design.
b) A transformative physical design based on market practicality, technical requirements, and available financial resources required for its implementation.
c) An engaging design process that inspires participation across the life-cycle of the study from design through implementation.

The goal of the Williams Drive Study is to address historic and emerging mobility and economic development issues along the corridor by:

- Improving transportation safety, mobility and connectivity;
- Promoting development in the corridor that will establish the area as a premier gateway for Georgetown, and into the Capital Area by:
  - » Identifying short, mid, and long-term vehicular transportation improvements to improve safety;
  - » Promoting multimodal (including transit, pedestrian and bicycle) mobility, safety and accessibility; and
  - » Enhancing the quality of life for residents, workers and visitors along the Williams Drive corridor.

To adequately and efficiently inform the Study, this comprehensive public involvement process will utilize a variety of tactics to reach the growing number of stakeholders within the study area, and understand their needs and desires. In doing so, a platform will be provided for stakeholders to voice their concerns and ideas, as well as a method to document their input, and allow their ideas to become part of the solution for Williams Drive. The insights gathered through the public involvement process will inform sound decision-making by City staff and the private marketplace as the planning process moves forward.

PUBLIC ENGAGEMENT APPROACH

1. Inclusive and Diverse: Stakeholders utilizing Williams Drive are diverse, and so participation will be inclusive and available to a variety of demographic, socioeconomic, education and other identifying characteristics. The public involvement process recognizes that individuals and groups bring varied experiences and challenges to participation, such as conflicts in schedule. In anticipation of this, multiple outreach opportunities will seek to accommodate the needs of stakeholders, including the translation of flyers, invitations, surveys and other materials into Spanish.

The Study's Outreach Team will engage community stakeholders in the area to bring opportunities for participation to hard-to-reach groups, and work with City/CAMPO staff to leverage digital media tools to facilitate an online dialogue and share updates about the project. In addition to transportation, pedestrian, and bicycling stakeholders, and property and business owners, efforts will be made to activate churches and houses of worship, community and non-profit organizations and other groups within the area to encourage wide participation in the process.

Two large stakeholder groups important to the project's success are the neighborhood and homeowner associations and businesses along the corridor. Residential stakeholders include both homeowners and renters. To ensure the Outreach Team connects with both groups, the team will conduct outreach to each association, those within direct proximity and others within a 3-mile radius, as well as apartment complexes or multi-family housing units in the area. In order to solicit comments from staff at local businesses, the team will reach out directly to business management. The Outreach Team will also engage the business property owners to further develop recommendation insights.

Efforts to connect and engage with these stakeholders will be conducted early and often throughout the process, primarily through email correspondence, and personal phone calls when email is not available. A log of stakeholders contacted and information shared will be constantly communicated to the Client Team.

2. Transparent: Building trust between the Outreach Team and stakeholders will happen through best practices in transparency. Stakeholders will be provided with a project timeline detailing the various public input opportunities and methods throughout the project. Feedback received during the outreach efforts will be available to the public, and will help shape the technical recommendations. The Study Draft Plan will discuss how public input and comments were used and incorporated as part of the review, analysis, and recommendations.

3. Open to Feedback: The Outreach Team will listen to constructive feedback. Regardless of the source of feedback, staying flexible and receptive to suggestions from the community about the process will help create bridges within stakeholder groups.

4. Engaging: To make the process interesting, accessible and relevant, outreach efforts will include multiple ways to interact and provide input. In addition to more traditional methods such as public meetings, open house events and surveys, the process will include a hands-on design workshop, drop-in sessions and lunch-and-learn events, as well as an interactive online mapping tool. Throughout the process, community members will have the opportunity to interact with experts from city staff and the planning team.

PURPOSE

The goal of the public participation process is to help stakeholders understand how the project will affect their lives, why participation is important to the process, and encourage their involvement through the multiple implementation phases and corridor maturity.

The Outreach Team will engage stakeholders early and often promoting accessibility in all communications.

Through an inclusive and transparent process, the Outreach Team will use best practices in data management to collect public feedback, and then consolidate the information to make it relevant and understandable for stakeholders. The team will help the lead consultant shape communication tools and information to make it easy for the community to participate. To achieve the public involvement goals, the team will:

- Provide numerous opportunities for public participation and comments. Opportunities include an online and paper survey tool and comment submission forms, three (3) public meetings, and one (1) Design Charrette. Public events will be hosted at different times to provide multiple options for participants to learn about the Study area and share comments. Varied outreach tactics will be used to connect with hard-to-reach stakeholders less likely to be involved in the process, such as collaborating with key community organizations to help inform and engage their networks.
- Understand how mobility and land use compatibility issues and opportunities affect groups in that area.
- Provide a framework that documents stakeholder input and demonstrate a clear link between public comment and recommended solutions. Consistency in documenting feedback and a commitment to transparency will help to drive further public involvement.

PARTICIPANTS

- **Existing Stakeholders –** Outreach to civic, professional, religious, GISD, City staff, and community organizations currently using Williams Drive and connecting adjacent facilities for recreational, work, school and living purposes.
- **New Stakeholders –** Outreach to new voices, including arts and cultural groups, minority populations, homeless or physically impaired advocates, and other community-based and multi-cultural organizations.
- **Influencers and leaders –** Identify and contact key community influencers and leaders for ongoing communication, updates, and surveys.

VISION DEFINITION AND COMMUNITY OUTREACH

COMMUNITY OUTREACH

The Outreach Team will collect comments that define the physical, functional, economic, and mobility use of Williams Drive to create a vision for this corridor. Two concept plans will be created for each spatial study area: a Corridor Concept Plan that will focus on transportation performance measures, land use, urban design and area connectivity; and a Center Concept Plan that will provide more detailed strategies for segments of the corridor.

To gather feedback, the Outreach Team will engage the community using the following tactics:

1. **Public Meetings:** There will be three (3) Public Meetings in addition to the Design Charrette detailed below.

   a) The first Public Meeting, scheduled for October 6, 2016, will introduce the project purpose and goals, existing conditions and the process for public engagement.
   b) After the development of the Draft Williams Drive Corridor Transportation and Land Use Plan, another Public Meeting will be held (tentatively January 2017) for public review and comment on the recommendations, strategies and priorities in the Plan.
   c) A final Public Meeting will be held (tentatively March 2017) to present and celebrate the final Plan.

2. **Design Charrette:** This weeklong event, scheduled for November 12-16, will engage the community through a phased, multi-day, intense problem-solving program. The Steering Committee will identify key speakers for each day. The Charrette will include the following public engagement opportunities:

- Saturday, 9a-12:30p: Hands on public workshop where participants highlight problems, identify opportunities and draw their vision for the corridor.
- Sunday – Open Design Studio 1p-4p
- Monday - Open Design Studio 9a-7p; Lunch and Learn 12-1p
- Tuesday - Open Design Studio 9a-4:30p; Lunch and Learn 12-1p; Drop in Open House 4:30-7:30p for the public to comment on work in progress.
- Wednesday – Presentation 4p-7:30p (2 sessions) to present results to the public

The Outreach Team will invite public officials, local media, and all affected stakeholders within the study area to all Public Meetings and the Design Charrette. The Client Team will assist by notifying public officials and launching media release announcements for each Public Meeting, while the Outreach Team will manage outreach to all other stakeholders groups.

The Outreach Team will develop collateral materials, including flyers and business cards to notify stakeholders and the general public about the meetings. The Outreach Team will also support the lead consultant to develop exhibits, questionnaires, sign-in sheets, and comment forms to gather feedback from each meeting. Public input will be compiled, documented, and made available to the public on the project website.

3. **Stakeholder Meetings:** To accommodate participants with inflexible time constraints, the Outreach Team will solicit interest by Stakeholders for small group presentations or Design Charrette discussions with City/CAMPO Staff and members of the Project Team in addition to scheduled public meetings. Project collateral and print survey materials will be used for the Stakeholder Meetings for discussion and documentation of the input received.

4. **Online Survey:** Understanding that scheduling conflicts can be an obstacle for some stakeholders to attend a Public Meeting, the Outreach Team will create online and paper survey(s) for public input. The surveys will be launched and made available during the public comment periods of the study. The Outreach Team will promote the surveys to the Outreach List contacts, and through a combination of flyer distribution, posters, and social media activity via City social media accounts. Print versions will be made available for use at Public Meetings, Design Charrette, and Stakeholder Meetings.

COMMUNITY OUTREACH

5. Wikimap Tool: An interactive online mapping tool will be used to solicit comments about intersections, destinations, and related challenges and opportunities within the study area. The tool will facilitate participation in the study area by allowing residents to provide location-specific comments at times that are convenient for them. All comments will be organized and made available to the technical team and on the project website.

6. Outreach List: The Outreach Team will create and maintain a robust Outreach List to update stakeholders on the project, share key dates, and send meeting invites. The List will include contact information for interested stakeholders in the Williams Drive corridor. A compiled list of all names and addresses of persons notified of the public forums, including those of all adjacent property owners and businesses will be added to the public documentation. People wishing to receive notification about the Study will be able to sign-up through the Project's website.

Outreach to the list of stakeholders will be primarily through email contact, which will include save the date, Public Meeting notices and reminders, and other project updates. When email is not available, efforts will be made to contact stakeholders by phone or direct mail. Public involvement efforts will include outreach to the following stakeholder groups, but will not be limited to:

- Business and Property Owners
- Neighborhood residents
- CAMPO Transportation Policy Board Members
- City of Georgetown staff, boards, and commissions
- Public Officials from the County, City and School District
- Chamber of Commerce
- Convention and Visitors Bureau
- Non-profits, faith-based, and other community-serving organizations and their clients
- School and University communities, including students, parents, and faculty staff
- Transportation, pedestrian, and bicycling stakeholder groups

SAMPLE LIST OF POTENTIAL STAKEHOLDERS

Mobility groups and advocacy sample including, but not limited to:

- Georgetown Cyclopaths
- Sun City TX Cyclists

Neighborhood and Home Owner Associations sample including, but not limited to:

- Briarwood
- Casa Loma
- Chaparro Estates
- Country Club Acres
- Country Club Estates
- Country West
- Crestview Addition
- Cypress Creek at River Bend
- Estrella
- Falls of San Gabriel
- Fountainwood
- Four-T Ranch
- Gabriel Estates
- Gabriel Heights
- Gateway Northwest
- Giles Estates
- Heritage Oaks
- Lakewood Estates
- Mariposa Apartment Homes
- North Lake
- Oak Ridge
- Olde Oaks
- Quail Meadow
- Reata Trails
- Ridgewood Estates
- Serenada
- Serenada West
- Sun City Texas Community Association
- The Enclave
- The Oaks Gracious Retirement Living
- Village of River Bend
- Wesleyan At Estrella Independent Living
- Westlake of the Woods
- Westwood Town Homes
- Williams Addition
- Woodlake
- Woodland Park
- Woods of Fountainwood

SAMPLE LIST OF POTENTIAL STAKEHOLDERS (CONTINUED)

Community and non-profit groups including, but not limited to:

- Aquadilos Swimming
- Courageous Conversations Planning Group
- Crestview Baptist Church
- Douglas Benolds Middle School
- Faith in Action Caregivers
- Faith Lutheran Church
- Farmers Market
- Ford Elementary School
- Georgetown Art Works
- Georgetown Health Foundation
- Georgetown Independent School District
- Georgetown Soccer Association
- Iglesia Nueva Vida Georgetown
- Jack Frost Elementary School
- Raye McCoy Elementary School
- San Gabriel Presbyterian
- Servicios Bilingues
- St. Helen Catholic Church: Comite Hispano
- St. John's Methodist Church
- Village Elementary School
- Wellspring United Methodist Church
- Williamson County Museum

Civic, Businesses, and Business Associations including, but not limited to:

- Catfish Parlour
- City of Georgetown Boards and Commissions
- Convention and Visitors Bureau
- Gabriels Funeral Chapel
- Georgetown Chamber of Commerce
- Georgetown Commission on Aging
- Georgetown Cultural Citizen Memorial Association
- Georgetown Cyclewerx
- Georgetown Economic Development Corporation (GEDCO)
- Georgetown Main Street Program
- Georgetown Transportation Advisory Board
- Georgetown Transportation Enhancement Corporation (GTEC)
- Georgetown Youth Advisory Board (YAB)
- La Playa Mexican Restaurant
- La Quinta
- Mariachi De Jalisco
- Pit Barbecue
- Plaka Greek Café
- Sheriff's Posse
- Twin Liquors

7. Website and Social Media: Understanding that stakeholders prefer to receive information through a variety of mediums, the Outreach Team will work with CAMPO and City staff to post project updates and other content to the CAMPO and City websites, respectively, to keep the public informed. Additionally, the Outreach Team will coordinate with City/CAMPO staff to leverage the City's social media accounts to expand messaging reach and grow the base of public involvement participants. Social media efforts will include creating a project specific hashtag for use on Twitter. These digital efforts will promote all opportunities for public involvement on the project.

8. Earned Media: Earned traditional media is an effective tactic for expanding the reach for public involvement messaging. The Outreach Team, working with City/CAMPO staff, will distribute media advisories through the city's public communications department websites, newsletter, cable access channel and social media accounts, and conduct media outreach to local media ahead of Public Meetings. The goal is to inform the public about the project and promote the Public Meetings to increase attendance. Local media outreach will target, but not be limited to print media including Community Impact, Williamson County Sun, The Advocate, and Georgetown View Magazine.

ANTICIPATED TIMELINE	
Month	Tasks
August 2016	» PIP Draft » Stakeholder Database Development » Planning for Steering Committee Meeting 1 » Planning for Public Meeting 1
September 2016	» PIP Finalized » **Steering Committee Meeting 1 (Sep 14th)** » Public Outreach Materials Finalized » Public Meeting 1 Plans Finalized » Public Outreach Efforts for Public Meeting 1
October 2016	» **Steering Committee Meeting 2 (Oct 5th)** » **Public Meeting 1 (Oct 6th)** » Planning for Public Meeting 2 (Charrette) » Public Outreach Efforts for Public Meeting 2
November 2016	» Public Outreach Efforts for Public Meeting 2 » **Steering Committee Meeting 3** » **Public Meeting 2 (Charrette) (Nov 12-16)**
December 2016	» Public Outreach Efforts to Promote Charrette Results » Plan for Public Meeting 3
February 2017	» Plan for Public Meeting 3 » Public Outreach for Public Meeting 3
March 2017	» **Stakeholder Meeting 5** » **Public Meeting 3**
April 2017	» **Steering Committee Meeting 4**
May 2017	» **Public Meeting 4**

Ongoing – E-blast communications, social media, website updates, briefings to City Council, Steering Committee on key milestones.

ROLES AND RESPONSIBILITIES	
City/CAMPO Staff	Consultant Team
» Stakeholder identification » Coordination of dates and locations for public meetings, design charrette, stakeholder meetings, steering committee meetings » Facilitation of steering committee meetings » Maintenance and management of project Web site » Maintenance and management of social media postings on City accounts » Timely review of Public Information Plan communication related documents and materials » Distribution of Public Open House press releases to news media » Distribution of meeting notices and letters to public officials and media » Printing of communication materials » Staffing for meetings	» PIP » Stakeholder identification and database development (provided by City's databases/ maintenance) » Interest list (mailing list) development and maintenance » Management and maintenance of e-newsletter distribution » Spanish-language translation » Distribution of meeting notices to general public to promote public meetings and Design Charrette » Online and print survey tool implementation » Exhibits for public and stakeholder meetings » Supporting the consulting team with logistics for public meetings » Drafting of meeting notices and media releases » Drafting and preparation of public meeting collateral: flyer and/or postcard, questionnaires, sign-in sheets, comment forms » Documenting participation and input received at public meetings » Drafting of project updates for print and online

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Share your vision for Williams Drive.

Williams Drive, as a vital gateway for Georgetown, must provide mobility through an efficient and reliable transportation network. That is why the Capital Area Metropolitan Planning Organization (CAMPO) and Georgetown have partnered to conduct a comprehensive study of the Williams Drive Corridor. The study will focus on creating safe and efficient transportation options while integrating smart land use, community needs, and the future economic growth of the corridor.

Your input is an essential part of the study. Please join us and share your ideas of what would make Williams Drive a premier gateway for Georgetown.

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Join us and share your ideas...

PUBLIC OPEN HOUSE

OCTOBER 6, 2016
4:30pm - 7:00pm
Georgetown Health Foundation
Lake Aire Center
2423 Williams Drive, #101
Georgetown, TX

Stay Informed

Receive meeting notices and updates on the project:

http://www.campotexas.org/campo-plans/campo-2045-platinum-plan/georgetown-williams-drive

Project Calendar and opportunities to get involved:

Oct. 2016 — **Public Open House**
Understanding Conditions & Needs

Nov. 2016 — **Design Workshop**
Developing the Plan

Jan. 2017 — **Public Meeting**
Providing Recommendations & Setting Priorities

Mar. 2017 — **Final Public Meeting**
Delivering the Plan

Comparta su visión de Williams Drive.

Williams Drive, como entrada vital a Georgetown, debe facilitar la circulación eficiente y confiable del transporte. La Organización de Planeamiento del Área Metropolitana de la Capital (CAMPO) y Georgetown colaboran en un estudio exhaustivo del Corredor Williams Drive, para crear opciones seguras y eficientes de transporte, integrando el uso inteligente del terreno, las necesidades de la comunidad, y el futuro crecimiento económico del corredor.

Sus comentarios son importantes para este estudio. Por favor únase a nosotros y comparta sus ideas para hacer Williams Drive una entrada principal a Georgetown.

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Únase y comparta sus ideas...

Reunión Abierta al Público

6 DE OCTUBRE 2016
4:30pm - 7:00pm
Georgetown Health Foundation
Lake Aire Center
2423 Williams Drive, #101
Georgetown, TX

Manténgase informado

Reciba notificaciones de las reuniones y actualizaciones del proyecto:

http://www.campotexas.org/campo-plans/campo-2045-platinum-plan/georgetown-williams-drive

Calendario del proyecto y oportunidades para involucrarse:

Oct. 2016 — **Reunión Abierta al Público**
Entendiendo las Condiciones y Necesidades

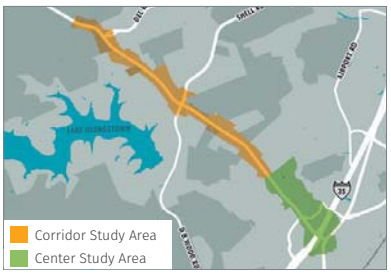
Nov. 2016 — **Taller de Diseño Público**
Desarrollo del Plan

Ene. 2017 — **Reunión Pública**
Recomendaciones y Prioridades

Mar. 2017 — **Reunión Pública Final**
Entrega del Plan

Share your vision for Williams Drive.

About the Williams Drive Study...



Williams Drive is a transforming corridor and a critical arterial, being both a "to" place as well as a "through" place. More than 29,000 cars access the Williams Drive corridor daily, and the trend is expected to grow with the City's expanding population. Transforming Williams Drive into a safe, reliable, and vibrant multimodal corridor with defined and dynamic centers takes a multidisciplinary approach.

The **City of Georgetown** is partnering with the **Capital Area Metropolitan Planning Organization (CAMPO)** as part of the Platinum Planning Program on the Williams Drive Study to plan for the future of the corridor.

This study will develop a plan of action that will incorporate:

- safe and efficient transportation operations,
- safe accommodations of all modes,
- integration of smart transportation and land use,
- the community's needs and the future economic growth of Williams Drive, between Austin Avenue and Jim Hogg Road.

The plan will recommend improvements that will spur both public and private investment dollars. Possible recommendations may include improvements such as:

- redesigning intersections,
- synchronized traffic signal timing,
- vehicle turning lanes,
- public parking,
- sidewalks,
- bike lanes, or transit options.

The plan will also explore how to position Williams Drive as a premier gateway for the City of Georgetown.

The City and CAMPO will work closely with the community throughout this project to gather ideas and identify solutions the community values for the future of Williams Drive. Public input will be collected and incorporated in each phase of the study. The public engagement process will be inclusive, transparent, and engaging. Input will be documented and the insights gathered from the community will shape the plans for Williams Drive and support future decision-making by the City, CAMPO and the private marketplace.

WHAT IS?

Multimodal Corridors:
Transportation facilities which accommodate auto, bus, bicycle and pedestrian travel.

Corridor Area Development:
A context-sensitive plan for six miles on Williams Drive, which addresses access management strategies, multi-modal transportation elements, safety and operational improvements, and recommendations for a private realm built-form that supports different modes of transportation and a sense of place.

Centers Area Development:
A plan for a vibrant mixed-use center and gateway along Williams Drive from an area south of Austin Avenue to Lakeway Drive, consistent with the City's 2030 Comprehensive Plan.

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Project Timeline...

JULY 2016

AUG 2016

SEPT 2016

OCT 2016

NOV 2016

DEC 2016

JAN 2017

FEB 2017

MAR 2017

Public Meeting Understanding Conditions & Needs

Concept Design Workshop - Public Charrette

Public Meeting Recommendations & Priorities

Public Meeting Final Presentation

PROJECT KICK OFF

EXISTING CONDITIONS ASSESSMENT

- Share project goals and objectives
- Comprehensive review of existing studies
- Analysis of existing transportation and land use
- Gather input on existing strengths and weaknesses

Engagement methods: Website, E-newsletters, Public Open House

CONCEPT DEVELOPMENT & REFINEMENT

- Engage community to highlight problems, identify opportunities and generate their vision for the corridor
- Gather input on existing strengths and weaknesses
- Share details on the project and get feedback on the "work-in-progress" multi-modal transportation and land use plans

Engagement methods: Website, E-newsletters, Survey, Public Presentations. Concept Design Workshop: Open Design Studio, Lunch-and-Learn, Technical and Stakeholder Meetings, Drop-in Open House, Public Presentations

RECOMMENDATIONS & IMPLEMENTATION STRATEGIES

- Review results of Design Workshop, performance metrics and evaluation criteria
- Present draft recommendations, strategies and priorities for plan
- Gather feedback on recommendations, strategies and priorities, refine draft plans

Engagement methods: Website, E-newsletters, Survey, Stakeholder Meetings and Presentations at Community Events, Public Open House

FINAL REPORT & RECOMMENDATIONS

- Present final plan including recommendations, strategies, and priorities
- Present implementation timeline for projects

Engagement methods: Website, E-newsletters, Public Open House

Join us and share your ideas...

CONCEPT DESIGN WORKSHOP PUBLIC CHARRETTE

NOVEMBER 12-16, 2016

(See website for calendar of activities)

Georgetown Health Foundation

Lake Aire Center
2423 Williams Drive, #101
Georgetown, TX

Stay Informed

Receive meeting notices and updates on the project:

http://www.campotexas.org/campo-plans/campo-2045-platinum-plan/georgetown-williams-drive

Share your vision for Williams Drive.

Participate in Concept Design Events

The Capital Area Metropolitan Planning Organization (CAMPO) and City of Georgetown invite you to an interactive series of events to help shape the future of Williams Drive. The focus of the Williams Drive Study is to create safe and efficient transportation options while integrating smart land use, community needs, and the future economic growth of the corridor.

From a Hands-On Design Workshop, to Lunch and Learns and Drop-in Open Houses, these events will provide you with opportunities to share your ideas on how to make Williams Drive a premier gateway for Georgetown.

Location for all events:

Georgetown Health Foundation Community Room
Lake Aire Center
2423 Williams Drive, #101
Georgetown, TX

Don't miss this!

HANDS-ON WORKSHOP

Sat., Nov. 12, 9 am - 12:30 pm

Join us for a presentation about Williams Drive, the public input process and the development of the corridor plan. After the presentation, break into small groups and draw your vision for the future, highlighting problems and identifying opportunities. Ideas from each group will then be reported back to participants.

OPEN DESIGN STUDIO

Sun., Nov. 13 through Wednesday Nov. 15

The design studio will be open to the public for most of the week, so stop in and see what the team is up to, share your ideas and check out the process. This is an opportunity to provide input as plans are evolving!

LUNCH AND LEARN

Mon. Nov. 14 and Tues. Nov. 15, 12 pm - 2 pm

Have lunch and join the discussions on specific topics of the project.

EVENING DROP-IN OPEN DESIGN STUDIO

Mon. Nov. 14 and Tues. Nov. 15, 4 pm - 7 pm

Stop by the open house to see the work so far, ask questions and offer ideas. The event is informal, so drop in whenever you can that evening and comment on the progress!

WORK-IN PROGRESS PRESENTATION

Wed. Nov. 16, 4 pm - 8 pm (Presentation at 4 pm and 6 pm)

Attend the work in progress presentation to see a summary of the week's activities, view developments so far and learn about next steps. After the presentation, check out drawings from the week that will be hung around the room.

CAMPO

Georgetown Texas

Join us and share your ideas...

ALL EVENTS ARE OPEN TO THE PUBLIC					
Time	**Sat. Nov. 12**	**Sun. Nov. 13**	**Mon. Nov. 14**	**Tues. Nov. 15**	**Wed. Nov. 16**
9:00 AM	**Hands-on Public Design Workshop** 9:00 AM - 12:30 PM	**Open Design Studio** 9:00 AM - 7:00 PM	**Open Design Studio** 9:00 AM - 12:00 PM	**Open Design Studio** 9:00 AM - 12:00 PM	
10:00 AM					
11:00 AM					
12:00 AM			**Lunch and Learn** *Transportation* 12:00 PM - 2:00 PM	**Lunch and Learn** *Commercial & Market Development* 12:00 PM - 2:00 PM	
1:00 PM					
2:00 PM			**Open Design Studio** 2:00 PM - 4:00 PM	**Open Design Studio** 2:00 PM - 7:00 PM	
3:00 PM					
4:00 PM			**Evening Drop-in Open Design Studio** 4:00 PM - 7:00 PM	**Evening Drop-in Open Design Studio** 4:00 PM - 7:00 PM P&Z* and GTAB* Joint Meeting at 6:00pm	**Work In Progress Presentation** 4:00 PM - 8:00 PM *Presentations at 4:00 PM & 6:00 PM*
5:00 PM	**Open Design Studio** 5:00 PM - 8:00 PM				
6:00 PM					
7:00 PM					
8:00 PM					
9:00 PM					

* Planning and Zoning Commission (P&Z). Georgetown Transportation Advisory Board (GTAB)

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Stay Informed

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Come see the vision for Williams Drive.

It's time...

See how the future of Williams Drive is taking shape.

Georgetown residents, business owners and civic leaders will join the Williams Drive project team on March 9 for an open house showing the draft concepts for Williams Drive.

What's next...

Your feedback from the design events has been conceptualized into a plan for Williams Drive. Join us for this open house to learn about the recommended approaches, and provide your input. You're an essential part of the study.

Public Open House

MARCH 9, 2016 4-7pm
Georgetown Health Foundation Community Rooms
Lake Aire Center
2423 Williams Drive, #101
Georgetown, TX

The focus of the Williams Drive Study is to create safe and efficient transportation options while integrating smart land use, community needs, and the future economic growth of the corridor. The Study is a partnership between the Capital Area Metropolitan Planning Organization (CAMPO) and the City of Georgetown.

See you there!

CAMPO

EST. 1848 GEORGETOWN TEXAS

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www.campotexas.org/campo-plans/campo-2045-platinum-plan/georgetown-williams-drive

Wikimaps Site:

www.wikimapping.com/wikimap/Williams-Drive-Study.html

Williams Drive Study

March 9, 2017 | Open House

The Williams Drive Concept Plan...

The Williams Drive Study "Concept Plan" captures the vision of the community for the corridor and incorporates transportation and land use.

The Concept Plan group areas for Williams Drive area based on existing conditions, needs, public input and technical study.

Future efforts will identify relevant projects and policies to improve the transportation network and supportive land uses to enhance mobility, connectivity, safety, and multimodal options, support economic development and enhance a sense of place.

The complete Concept Plan may be viewed online at: https://transportation.georgetown.org/williams-drive

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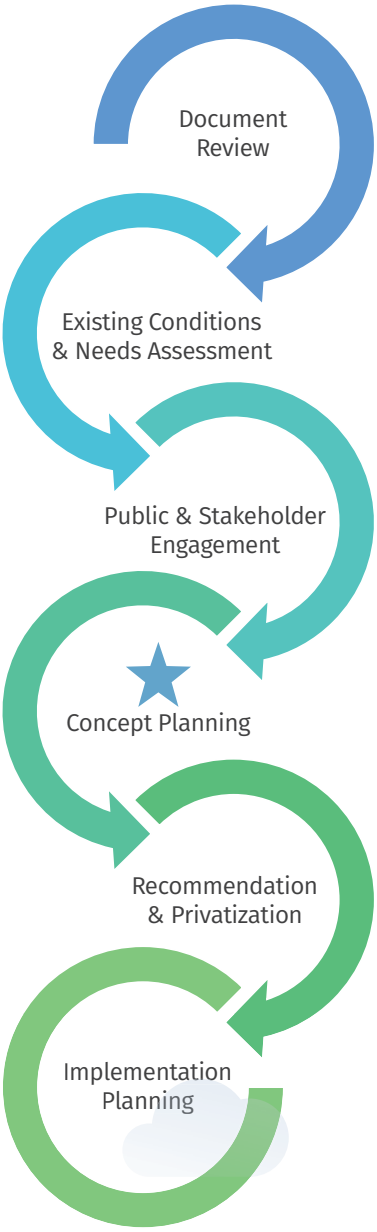
Stay Involved and Informed

Sign up to receive meeting notices and updates on the project:
https://transportation.georgetown.org/williams-drive

Wikimaps Site:

www.wikimapping.com/wikimap/Williams-Drive-Study.html

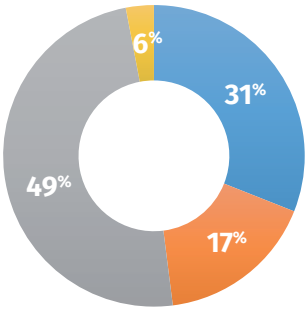
The Elements of the Study



What we heard...

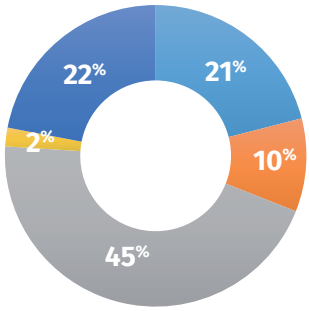
October 6 Open House

- 105 Attendees
- 71 Comments



November 12-16 Events

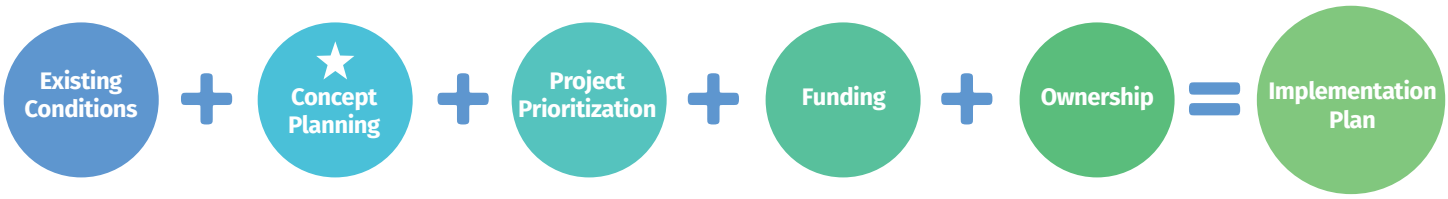
- 86 Attendees
- 120+ Comments



WILLIAMS DRIVE - PRIMARY CHALLENGES			
ISSUE	TRAFFIC CONGESTION/ CIRCULATION	TRAFFIC OPERATIONS & SAFETY	REDEVELOPMENT & REINVESTMENT BARRIERS

POTENTIAL FIX	• Improve traffic flow
	• Recognize the importance of land use decisions on traffic volume, street design, and access management
	• Create alternative routes and improve connectivity
	• Consider plans for additional future traffic capacity in the area
		• Develop an access management plan for the corridor
		• Set block standards for street/ driveway connection
		• Establish a unified signal management plan
		• Establish new street design criteria
			• Create development strategy that is not "one-size-fits-all"
			  • Land Use
			  • Development Standards
			  • Utilities/Public Improvements
			• Partner with landowners of catalytic sites
			• Recruit retailers

WILLIAMS DRIVE - PRIMARY CHALLENGES		
ISSUE	AESTHETIC ENHANCEMENTS	PEDESTRIAN/BICYCLE IMPROVEMENTS
POTENTIAL FIX	• Consider new Gateway design standards • Consider zoning solutions for older properties to offer flexibility for redevelopment • Adjust non-conforming site requirements to ensure incremental improvements and upgrades	• Focus attention through Capital Improvement Program (CIP) planning • Provide incentives/grants • Consider on- and off-street bicycle facility improvements where appropriate



Next Steps (and how we get there)

The Williams Drive Study Final report will include specific improvements to transportation infrastructure that will improve multimodal transportation safety, connectivity and access. The Final Report will include investment strategies and policies to leverage the desired land use and housing mix, and development types in accordance with the City's 2030 Comprehensive Plan.

Final Plan Presentation Public Meeting #4

APRIL 6, 2017, 4pm-7pm

Lake Aire Center
2423 Williams Drive, #101
Georgetown, TX

Public Comment Period Open through April 14, 2017.
Provide your Comments Online at: https://www.transportation.georgetown.org/williams-drive

Appendix B

EXISTING CONDITIONS ASSESSMENT

December 2016

WILLIAMS DRIVE STUDY

Existing Conditions Assessment

LEAD AGENCIES

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STAY CONNECTED

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EXECUTIVE SUMMARY

DEMOGRAPHICS AND MARKET CHARACTERISTICS

The purpose of this report is to identify and assess key issues affecting mobility and economic vitality along Williams Drive between Austin Avenue and Jim Hogg Road. The following highlights represent the key existing conditions that characterize the corridor and impact future opportunities.

Demographics

Significant population growth - Both Georgetown and the Williams Drive corridor have experienced significant population growth, especially since 2010. Because of this recent rapid expansion, and expected growth, it is important to review the capacity and functionality of Williams Drive in terms of traffic management, residential housing supply, the establishment of new utility networks, and other related considerations which enable future growth.

Expansion of the retiree population - Because the retiree population will continue to expand over time, it is crucial to tailor Williams Drive transportation design, real estate offerings, and related services towards this older demographic.

Income disparities between Corridor Area and Center Area residents - Compared to the rest of Texas, Georgetown is predominantly white, older, educated, and wealthier. Residents within the Corridor Area earn significantly more than the rest of Georgetown (and Texas overall). In contrast, there is a higher concentration of poverty within the Centers Area.

Economy

Commuting workers - Many residents commute in and out of Georgetown for work. In 2014, approximately 80% of the labor force living in Georgetown commuted to other cities for work. Approximately 79% of the labor force lived outside of Georgetown while commuting into the city, and 21% lived and worked within Georgetown.

Public service focus - The top employers in Georgetown are Williamson County government, Georgetown Independent School District (GISD), the City of Georgetown, St. David's Georgetown Hospital, and Southwestern University.

Williamson County industry concentrations - Williamson County is distinguished by high concentrations of employment in Trade, Transportation, Utilities, Leisure and Hospitality, and Professional/Business Services.

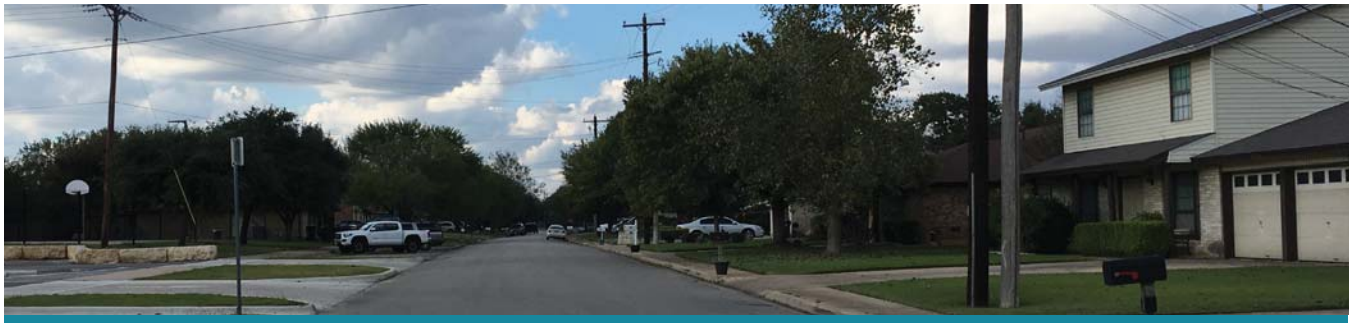
Real Estate

Ongoing residential demand - Because Williams Drive has been experiencing a population boom, a significant amount of new residential product is under construction or in pre-development. Rents have increased over time and demonstrate a strong demand for multifamily residential real estate well into the future. However, even as rents have risen, there has been a rise in multifamily vacancy rates, indicating that there has been turnover as new product has come to market and people have traded older stock for new.

Driving residential demand through new policies and incentives - Although Georgetown's population is expected to continue growing into the future, the Corridor Area Plan will only receive a small portion of this population growth unless there is a targeted strategy to drive residential growth in the area.

Variety of residential product options along Williams Drive - Although residential demand is anticipated to remain strong in the coming years, it is important to review the types of housing products that are prioritized and developed. The older demographic has led to a population whose preferences are for single family homes on larger tracts of land. While overall residential demand is strong and the corridor is an attractive location for residents, demand for smaller units that are integrated into a mixed-use development might be limited.

Correlation with Austin's commercial real estate market - While Austin's office inventory and rents are rapidly increasing, Georgetown's office inventory has not grown significantly over the past 5 years and rents remain stagnant. Many Georgetown residents commute to Round Rock and Austin for work. In this way, real estate strategies need to be targeted to Georgetown and the Corridor's specific context.



KEY MARKET FINDINGS: GEORGETOWN AND STUDY AREA

City of Georgetown	Williams Drive (Corridor Area)
Georgetown's population has expanded at almost twice the rate of the state of Texas and is expected to continue growing into the future. Overall, Georgetown's population is primarily white, middle class, educated, and older in comparison to the rest of Texas. There has already been an expansion of residential development around Williams Drive and residential demand will continue into the near future.	Greater concentrations of wealth lie along the Corridor Area in comparison to the Centers Area. Residents along the Williams Drive corridor are primarily home-owners with home values well above the state median value. In contrast, residents within the Centers Area are typically renters and more racially diverse with lower median incomes than the rest of Georgetown.
Georgetown's economy is focused on public service-oriented jobs in local government, education, and healthcare sectors. A significant portion of Georgetown's population commutes to work in nearby cities such as Round Rock and Austin. Along Williams Drive, there has been little office development activity in recent years.	It does not appear that office demand will substantially increase over time and, therefore, office products may not be a lucrative use of space along Williams Drive. Additionally, because of a sizeable commuting population, it is important to consider personal vehicles and road/highway accessibility as a key design priority for Williams Drive.
Based on conversations with local realtors and brokers, many Georgetown residents prefer a small town, suburban lifestyle with traditional, single-family homes.	As new residential development is planned for Williams Drive, it will be crucial to provide a range of residential options that cater to these suburban preferences.
To drive residential demand, especially along the Corridor Area, the City of Georgetown should consider developing a targeted set of policies and economic incentives.	Based on projected population growth and current real estate prices, among other data points, estimated demand for new housing in the study area will be less than 100 units annually in the near future. In this way, there is not expected to be a significant amount of organic residential demand in these areas.

Conclusions:

The capacity and functionality of Williams Drive in terms of traffic management, residential housing supply, and the establishment of new utility networks will be critical considerations to mitigate the pressures of a rapidly growing city.

The tailoring of Williams Drive transportation design, real estate offerings, and related services will need to suit all demographics ranging across ages and races.

Future residential growth as part of mixed-use developments within the current environment may not be seen as opportunities by developers. Development policies and economic incentives may be needed to spur activity.

MOBILITY CHARACTERISTICS

Roadway Dimensions

Right-of-way along the Williams Drive corridor varies significantly. The corridor's right-of-way (lot line to lot line) ranges from 66 feet—on the east end of the corridor—to 135 feet—on the west end of the corridor.

Curb-to-curb roadway width ranges between 60 feet from I-35 to Lakeway Drive with a 5-lane cross-section to 80-ft at Jim Hogg Road with the same 5-lane cross-section and 10-ft shoulders. Although travel lane widths of 12-ft typically remain unchanged for the entire corridor, sidewalk widths expand and narrow almost on a block-by-block basis with numerous blocks missing sidewalk altogether.

Lane Configurations

Williams Drive is a five lane cross section with two travel lanes in each direction and a constant two-way left-turn lane. There are no medians along the corridor's length.

Crash Corridor

Within the Williams Drive study area there were 1313 reported crashes from 2010 to 2015 with the highest number occurring at or near Shell Road and Williams Drive.

Traffic Volumes

Daily traffic volumes (ADT) along the corridor ranges between 32,697 just west of I-35 and 13,700 west of Shell Road.

Signalized Intersections

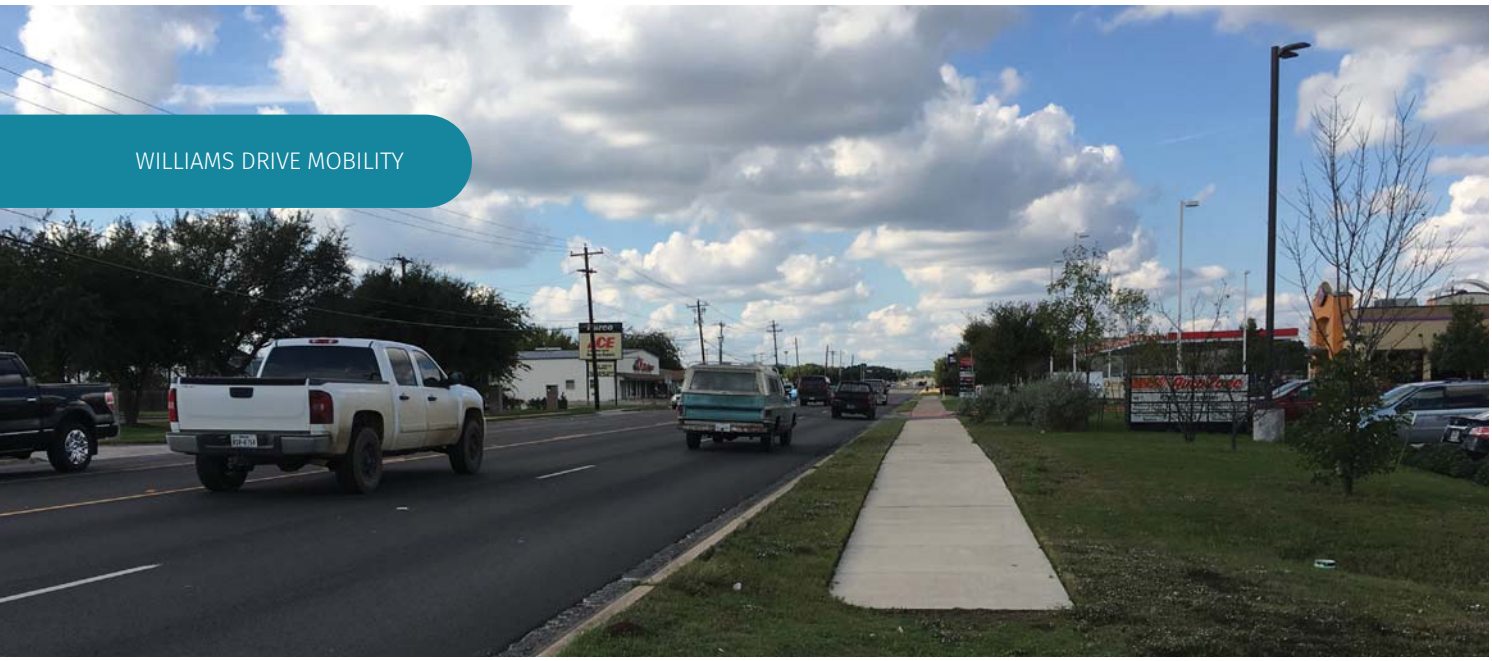
There are 12 signalized intersections within the Williams Drive study area: Five (5) west of Shell Road are within a coordinated system while the remaining seven (7) are uncoordinated, with the exception of the two I-35 frontage road intersections. The limited number of signalized crossings increases effective block distances for those only willing or able to cross at signalized intersections.

Distance Between Signals

From Austin Avenue west to Serenada Drive, the average distance between traffic signals is approximately a third of a mile (1,700 feet). However, further west from Shell Road to Jim Hogg Road the spacing extends to just under a half mile (2,500 feet) as commercial activity lessens.

Driveways

The number and length of driveways creates conflicts for pedestrians, bicyclists, and automobile traffic flow. Along the corridor between I-35 and Jim Hogg Road, there over 150 driveways providing business and residential access. This equates to approximately 25 driveways per mile.



Sidewalk Conditions

Sidewalks throughout the corridor vary in the quality with many of the facilities substandard or missing. Along the corridor, sidewalk pavement quality is poor due to widths being predominantly narrow (<5 feet in width) and obstructions like sign posts, utility poles, and driveway slopes being more prevalent.

Marked Crossings

Marked crosswalks are primarily located at signalized intersections, with one unsignalized marked crossing on the corridor at the GISD site at Morris Drive.

Cycling on Williams Drive

Bicycle facilities along Williams Drive are limited to 10-ft wide shoulders west of Lakeway Drive but are not signed as formal bicycle facilities. Subsequently, many cyclists choose to ride on the sidewalk or use indirect neighborhood connections.

Transit Service

The Williams Drive corridor is currently not served by fixed-route transit. However, demand response services are offered by CARTS that serve the study area. In 2017, a four-route transit system will bring fixed route services to the eastern portion of Williams Drive at 60 minute headways with complimentary paratransit service.

Mode Split

According to American Community Survey data collected by the U.S. Census Bureau, travel behavior in the Williams Drive corridor is similar to Citywide averages. The mode share for commute trips on the corridor is primarily single-occupancy vehicles at around 81%. Around 1% of trips are made by foot, 8% are carpools, and nearly 8% of people work from home.

LAND USE CHARACTERISTICS

Williams Drive supports a diverse mix of land uses, including residential neighborhoods and a variety of commercial uses fronting Williams Drive, including a large number of retailers.

Existing Zoning

The predominant zoning along Williams Drive are General Commercial (C-3) and Local Commercial (C-1), supporting a wide range of commercial activities. Single-family residential zoning (RS) incorporates approximately 20% of the land-area, multi-family zoning represents 8% of the total land area. The Centers area has a greater percentage of general commercial in proximity to the I-35 facility with the Corridor area having more local commercial zoning. Both local and general commercial zoning uses enable upper story residential uses.

Future Land Use

The City's Comprehensive Plan illustrates a pattern of community commercial activity surrounding the major intersection nodes supported by a band of mixed-use neighborhoods along the corridor. The area adjacent to the I-35 interchange is designate as a mixed-use gateway area which could support additional community commercial uses.

Susceptibility to Change

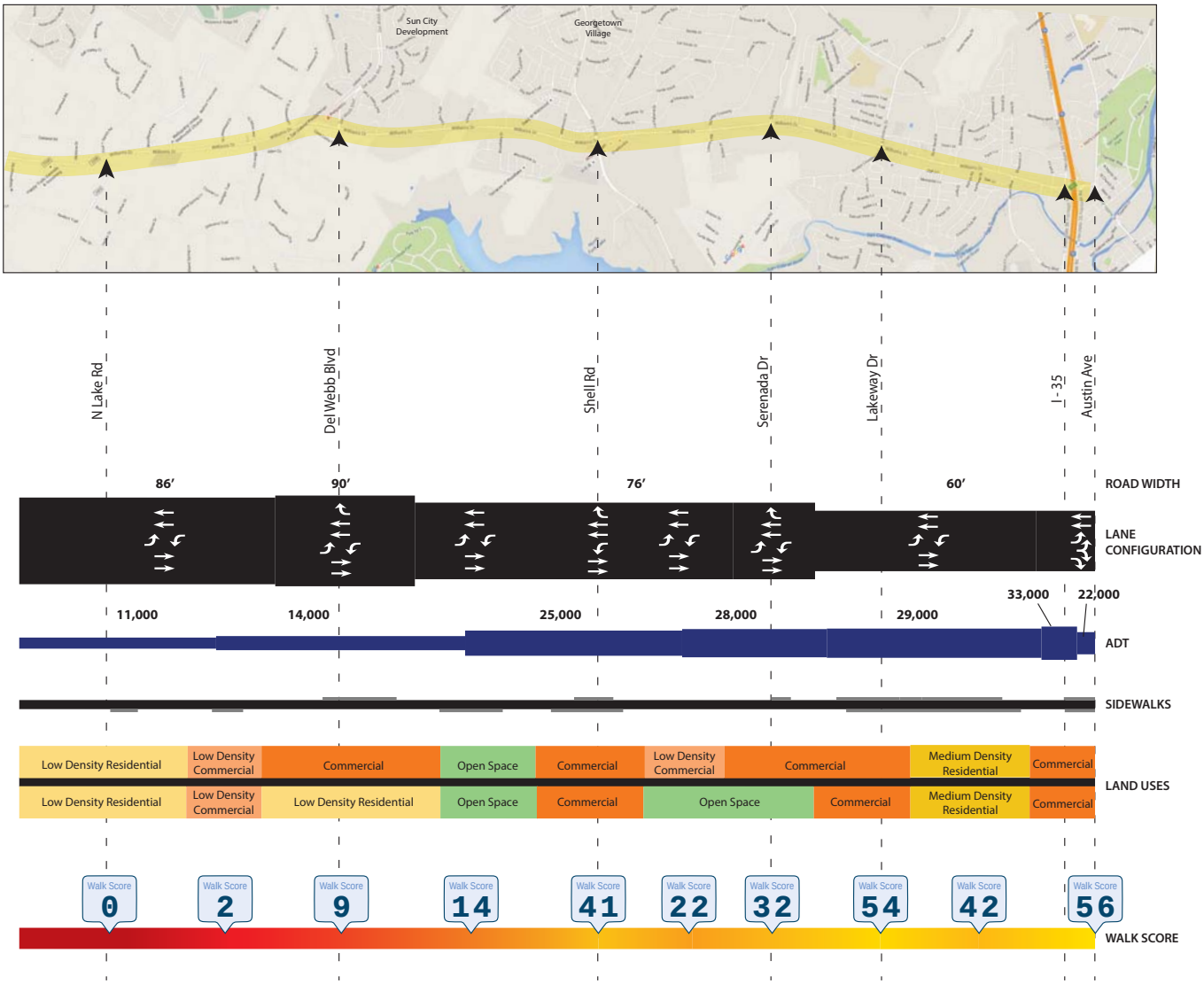
Development within the study area will occur at different points in time. However, some parcels are more susceptible to change than others, based on factors such as age of property, impact of future projects (i.e., roadways, adjacent development) and property owner willingness to change.

INTEGRATED PLANNING

Coordinating (or integrating) land use and transportation planning and development is a key element of "smart growth", sustainable development and other similar concepts such as CAMPO's Platinum Planning program. These concepts all incorporate policies, principles, and strategies intended to preserve and enhance valued natural and cultural resources and facilitate "healthy", sustainable communities and neighborhoods. These approaches along Williams Drive will enable a balance of mixed uses (including housing, educational, employment, recreational, retail, and service opportunities) which recognize the importance of spatial or geographic proximity, form, and design of those uses.

As such, the consideration of land use and transportation through the Williams Drive study enables the community to assess and evaluate how land use decisions effect the transportation system and can increase viable options for people to access and develop opportunities, goods, services, and other resources to improve the quality of their lives. In turn, the transportation planning elements are evaluating the effects that the existing and future transportation systems may have on land use development demand, choices, and patterns.

Figure 1 Williams Drive Conditions



The graphic in Figure 1 represents a quick summary of some of the existing conditions along Williams Drive. The graphic illustrates changes in both the physical cross-section of the roadway as well as the character along Williams Drive. Between North Lake Road and I-35, the width of the roadway changes from 90 feet wide to only 60 feet wide. The widest portion of the roadway is also the segment with the least amount of traffic volume, while the segment with the highest traffic volume has the most narrow measurement. The Walk Score numbers are from an online index that analyzes walkability based on nearby pedestrian amenities. A score between 50-69 indicates that an area is "somewhwat walkable" and some errands can be accomplished on foot. A score between 25-49 indicates that an area is "car-dependent" and most errands require a car. A score between 0-24 indicates that all errands require a car.

The following chart describes the primary challenges identified within the study area and includes potential solutions to mitigate those challenges.

	WILLIAMS DRIVE - PRIMARY CHALLENGES	
	Traffic Congestion / Circulation	Traffic Operations & Safety
ISSUE CAUSES	• 29,000 vehicles use Williams Drive on a daily basis • 7,000 area residents commute outside of study area • 95% of area residents own at least 1 vehicle; 80% drive alone to work • Lack of alternative routes to I-35 and major destinations	• 150+ curb cuts (and increasing) along the corridor • Lack of alternative streets and network connectivity • Unsynchronized traffic signals • Heavy traffic volumes at intersections • Continuous two-way center left turn lanes throughout the corridor
POTENTIAL FIX	• Improve traffic flow • Recognize the importance of land use decisions on traffic volume, street design, and access management • Create alternative routes and improve connectivity • Consider plans for additional future traffic capacity in the area	• Develop an access management plan for the corridor • Set block standards for street/ driveway connection • Establish a unified signal management plan • Establish new street design criteria

WILLIAMS DRIVE - PRIMARY CHALLENGES		
Redevelopment and Reinvestment Barriers	Aesthetic Enhancements	Pedestrian/Bicycle Improvements
• Redevelopment of older parcels challenging due to new development requirements • Fragmented ownership and smaller, disjointed parcels • Zoning districts & land uses not customized to corridor	• Older developments built without zoning codes or through iterations of codes • Landscaping, signage, parking lots, front yard/ gateway treatments – nonconforming to today's standards	• Sidewalks are neither continuous nor desirable • Lack of dedicated bicycle paths and lanes • Existing and new driveways, speeds, and site design are not conducive to non-vehicular modes of transport

• Create development strategy that is not "one-size-fits-all"
  • Land Use
  • Development Standards
  • Utilities/Public Improvements
• Partner with landowners of catalytic sites
• Recruit retailers
	• Consider new Gateway design standards
	• Consider zoning solutions for older properties to offer flexibility for redevelopment
	• Adjust non-conforming site requirements to ensure incremental improvements and upgrades
		• Focus attention through Capital Improvement Program (CIP) planning
		• Provide incentives/grants
		• Consider on- and off-street bicycle facility improvements where appropriate

INTRODUCTION

GOALS AND OBJECTIVES

Williams Drive is an evolving corridor and a critical arterial. Like many suburban arterials, it is both a "to" place as well as a "through" place. As a corridor, Williams Drive must safely and reliably fulfill its role as a regional arterial, while also serving as a destination in and of itself. More than 29,000 vehicles access Williams Drive daily, and this number is expected to grow with the region's expanding population.

The CAMPO Platinum Planning Program is the locally-driven approach for CAMPO's long-range planning projects. Recommendations from plans completed through the Platinum Planning Program may be used in CAMPO's 2045 Regional Transportation Plan and certain projects may be eligible for future CAMPO-allocated Federal funding. The Platinum Planning Program emphasizes the following elements:

- **Multimodal and Mixed-Use**
- **Housing**
- **Environment**
- **Economic Development**
- **Equity**

Defining Williams Drive as a vibrant, multimodal corridor with distinct and dynamic centers requires a multidisciplinary approach. The Williams Drive Study will develop a plan that applies the elements of CAMPO's Platinum Planning Program, and establishes Williams Drive as a premier gateway for Georgetown and the Capital Region.

This study builds upon projects identified by CAMPO, the City of Georgetown and TxDOT, as well as previously committed funding within the corridor that will inform and impact development and mobility patterns as part of the City's approved 2015 Transportation Bond program. In 2006, the City accepted a Master Redevelopment Plan for a portion of the Corridor and established a TIRZ designed to further the development within the district limits in accordance with this plan. At that time, the City also designated this portion of the corridor with a Specialty Mixed Use Future Land Use designation, and created a new City-wide mixed-use zoning district with the intent of drafting and adopting a mixed-use Regulating Plan for the area.

Based on these prior and envisioned events, the Williams Drive Study will recommend policy, programming, projects and an implementation plan for the study area that address and enhance mobility, safety, and livability throughout the corridor.

Goals for the study area will guide the development of improvement alternatives as the study progresses. The development of these goals involves stakeholder input based upon the scope of work and CAMPO's Platinum Planning Program. Consistent with the purpose statement, the focus is to incorporate safety, efficient transportation operations, safe accommodations of all modes, and integration of smart transportation and land use, community needs, and the future economic growth of Williams Drive.

Goal 1. Enhance multimodal movement and transportation operations.

- **Objective 1.** Maintain reliable and efficient traffic operations.
- **Objective 2.** Minimize delay to persons and goods movement.
- **Objective 3.** Enhance connectivity to adjacent neighborhoods.
- **Objective 4.** Improve intermodal and multimodal connections.
- **Objective 5.** Develop cost-effective improvements to the existing transportation network and multimodal facilities.
- **Objective 6.** Promote safety and security by improving multimodal transportation throughout the corridor.

Goal 2. Support corridor-wide and regional sustainable growth and economic development.

- **Objective 1.** Enable and plan for context sensitive economic activity in the corridor.
- **Objective 2.** Ensure consistency of transportation actions with economic development actions, relevant regional and local plans, and available municipal economic development policies.
- **Objective 3.** Enhance connectivity and access to major residential, industrial, commercial and recreational sites.
- **Objective 4.** Ensure equity of transportation throughout the study area to enhance access to education, employment, housing, and recreation.

Goal 3. Protect and enhance quality of life.

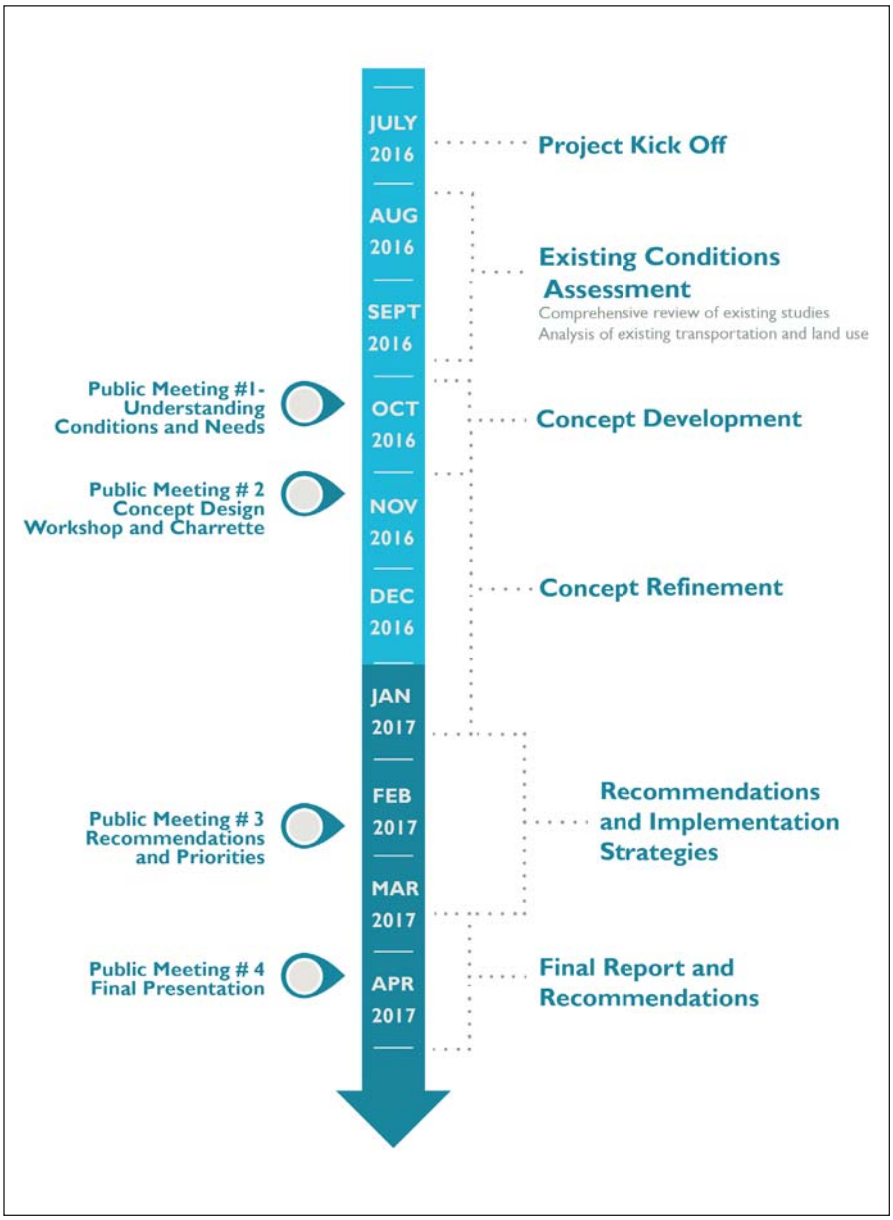
- **Objective 1.** Minimize adverse impacts from transportation actions and the use of transportation facilities and services to avoid or minimize disproportionately adverse environmental, public health, social, and economic effects, on vulnerable populations.
  Objective 2. Provide a well-connected, multi-modal transportation network to increase people's ability to access destinations that can influence their health and well-being, such as jobs, health care services, and parks.
- **Objective 3.** Protect unique environmental resources, including the San Gabriel Park and San Gabriel River.
- **Objective 4.** Support sustainable forms of development and the attainment of "Quality Communities" objectives.

Goal 4. Encourage development that creates a variety of context sensitive mixed-use services that are accessible to neighborhoods.

- **Objective 1.** To encourage context sensitive mixed-use, multi-modal development that will increase travel options within existing urbanized areas and along the corridor as a means to accommodate new population growth, reduce land consumption, preserve valuable open space, conserve ecosystem functions, protect water quality, and improve community health.
- **Objective 2.** To promote reinvestment in underutilized vacant properties, opportunities for context sensitive mixed-use development, and possibilities for suburban retrofits where appropriate.
- **Objective 3.** To encourage transit-supportive land uses and complete street principles along and connecting to the Williams Drive corridor as part of the transportation system that makes up the built environment.
- **Objective 4.** To capitalize on existing investments in infrastructure by encouraging development in areas where infrastructure is being underutilized or planned for expansion without straining fiscal budgets or creating new environmental impacts.

PROJECT SCHEDULE

Figure 2 Project Timeline



The Williams Drive Study is a nine-month long collaborative planning effort. The graphic in Figure 2 illustrates the project timeline with approximate dates for each phase of the project and the related public meetings. Four public meetings will be held throughout the process, one during each phase of the project.

This document is the Existing Conditions Assessment and represents the culmination of the first phase of the study, the comprehensive review of existing studies and the analysis of existing transportation and land use conditions.

EXISTING PLANS AND PROPOSED/PLANNED PROJECTS

AREA PLANS

2003 Williams Drive Corridor Study

The 2003 Williams Drive Corridor Study was developed to guide the development and redevelopment along Williams Drive from the I-35 intersection northwest to Jim Hogg Road. The study examined the relationships between existing land uses, vehicle and pedestrian routes, and market development patterns in order to develop the Future Land Use Plan for the project area. Consistent with future land use planning for the area, this study analyzed the benefits of promoting commercial vitality along the corridor, as well as improving the overall character of the roadway.

2005 Williams Drive Gateway Redevelopment Study

The 2005 Williams Drive Gateway Redevelopment Study was developed by the City to aid in the completion of the Williams Drive Gateway Redevelopment Master Plan. The Gateway area is bounded by I-35 to the east, the San Gabriel River to the south, Northwest Boulevard to the north, and approximately Morris Drive/Park Lane/Cedar Ridge Apartments to the west.

The study identified the existing conditions of land use, environment, economic development, real estate, transportation, and utilities of the project area providing an existing conditions framework to identify issues to be addressed in the Master Plan.

2006 Williams Drive Gateway Redevelopment Master Plan

The 2006 Williams Drive Gateway Redevelopment Master Plan was developed to transform the Williams Drive Gateway area, an underperforming opportunity site, and revitalize it into a destination. Building on the baseline conditions of the 2005 Williams Drive Gateway Redevelopment Study, the key elements of the master plan included:

- An expanded street network to improve mobility and access within the study area and surrounding area
- The redevelopment of the former Mc Coy Elementary School parcel to integrate the proposed street network changes and provide space for a new civic square
- Emphasis on multi-story mixed use buildings along the main corridors
- Establish the Gateway area as a destination located between downtown and the northwest areas of Williams Drive
- A Tax Increment Reinvestment Zone (City Ordinance 2006-104)

Specific transportation recommendations included in the plan are:

- A new north-south "Main Street" connecting Williams Drive and Northwest Boulevard (approved extension of Rivery Boulevard).
- A landscaped median along Williams Drive
- A bridge over I-35 connecting Northwest Boulevard and FM 971 (approved Northwest Boulevard Bridge)
- Improved traffic flow and access management along the I-35 southbound Frontage Road and Williams Drive

CITYWIDE PLANS

2030 Comprehensive Plan

The 2030 Comprehensive Plan was adopted in 2008 along with the Land Use Element. The City has previously adopted individual plans for each of the other elements typical of any comprehensive plan, including an Overall Transportation Plan. The intent of the 2030 Comprehensive Plan is to provide the framework to merge the other elements through the coordination of the various documents. Updated in 2014, the Overall Transportation Plan is the City's guiding document for transportation management and planning.

2014 Overall Transportation Plan

The 2014 Overall Transportation Plan was developed as part of the 2030 Comprehensive Plan with the intent to:

- Implement roadway improvements to enhance traffic flow and safety
- Advance toward a functional multi-modal transportation system and reduce reliance on single-occupant automobiles
- Guide the growth and development of the City to balance land use and transportation conditions

Key recommendations of the plan include:

- The development of a bicycle master plan
- The development of a transit master plan
- Improvements to the Williams Drive Gateway to relieve traffic congestion at the I-35 interchange at Williams Drive and Austin Avenue
- Context Sensitive Design cross sections that enable roadway configuration to complement various land use types and forms

The Overall Transportation Plan identifies Williams Drive as one of the most heavily traveled roadways in the City, and as being overcapacity between I-35 and Lakeway Drive. The plan provides the following recommendations specific to the Williams Drive study area:

- Intersection improvements at Williams Drive and Rivery Boulevard, as well as Williams Drive and Austin Avenue
- Rivery Boulevard extension from Williams Drive to Northwest Boulevard
- Widening of the I-35 southbound Frontage Road from Williams Drive to Rivery Boulevard

2015 Sidewalk Master Plan

The 2015 Sidewalk Master Plan was developed as an update to the 2001 City of Georgetown Sidewalk Study. Adopted by City Council in 2015, the Sidewalk Master Plan was designed with the vision of improving and integrating the city's pedestrian network by the year 2025. The intent of the plan was to:

- Inventory existing the existing pedestrian infrastructure
- Identify gaps in infrastructure and design deficiencies
- Develop an implementation plan for all pedestrian infrastructure improvements within the city limits

Implementation of the plan is guided by the prioritization of proposed pedestrian improvements. Improvement projects in the Williams Drive study area are included in the second priority tier. Priority One projects are anticipated to be completed between 2015 and 2024, while Priority Two projects are anticipated to be completed in the subsequent ten-year period.

2016 Transit Development Plan

In accordance with the 2014 Overall Transportation Plan recommendations, the City adopted the 2016 Transit Development Plan (TDP). Operation of the transit system is recommended to begin by August 2017. Results of the plan include:

- An assessment of the transit needs for the city's growing population
- Recommended routes to serve the community
- Financial plans to support implementation and operations

Of the four routes currently recommended by the TDP, there is only one route (Route 4 Blue) that will provide service along Williams Drive.

REGIONAL DOCUMENTS

2040 CAMPO Regional Transportation Plan

The 2040 CAMPO Regional Transportation Plan is the long-range transportation plan for the capital area, including Williamson County. Georgetown projects identified by the Regional Transportation plan focused around the I-35 and Williams Drive interchange. As part of TxDOT's Mobility35 Implementation Plan, the interchange is planned to be reconfigured to alleviate congestion.

The Mobility35 Implementation Plan (TxDOT)

The Mobility35 Implementation Plan was developed to identify recommended projects that will provide cumulative benefits to the I-35 corridor. Three projects are identified in the plan at Williams Drive or directly adjacent along the I-35 corridor. The Mobility35 Implementation plan provides a high-level assessment of each of these projects including:

- Preliminary engineering and feasible solutions
- Preliminary environmental assessment to identify potential constraints
- Preliminary costs and time frames

PROJECT PIPELINE

There are a number of ongoing and planned transportation projects in proximity to Williams Drive, as well as in other areas of Williamson County, but each has potential to impact the use of Williams Drive in the future. The projects listed in the chart in Figure 3 on the following page were identified through the document review process.

The following terminology is used to indicate the status of each project:

PLAN:

The project has been approved for plan development or is in the plan development phase.

DESIGN:

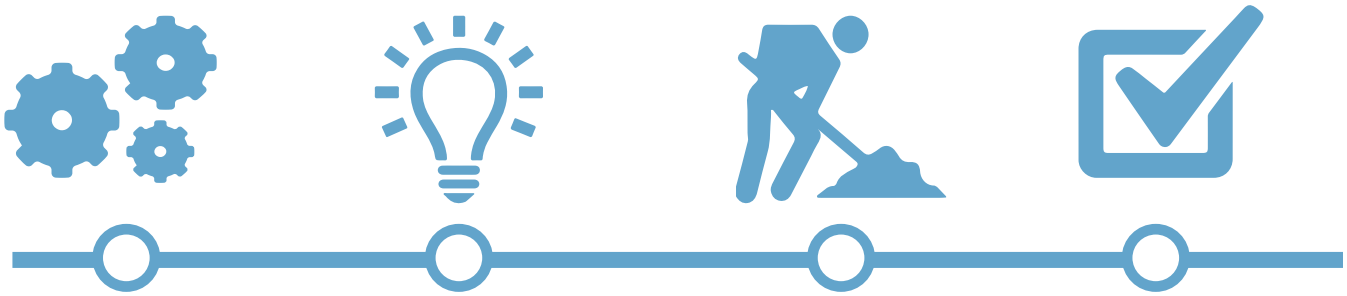
The project is prepared for final design or is in the process of final design for construction.

CONSTRUCTION:

The project is prepared for construction, under construction, or partially constructed.

COMPLETE:

The project is complete and in use.



Funding for transportation infrastructure programs within the City is provided from a number of sources including:

- GTEC-4B Sales Tax
- 2015 City Road Bond
- Private development
- Tax Increment Reinvestment Zones
- City General Fund

Figure 3 On-Going and Planned Transportation Projects

Project	Description	Source	Status	Estimated Completion
DB Wood Road - Cedar Breaks Road to Lake Overlook	Widening to 4-lane roadway with median	2015 Bond Election, CAMPO Regional Transportation Plan	Design	After 2025
I-35 NB Frontage Road - Williams Drive to Lakeway Bridge	Construction of new frontage road on NB I-35 connecting Williams Drive to Lakeway Bridge	2015 Bond Election, 2014 Overall Transportation Plan, My35	Design	2023
I-35 north Main-line Improvements - just south of Williams Drive to just north of Dry Berry Creek	Widening, modifications to ramps/bridges, auxiliary lanes	CAMPO Regional Transportation Plan, Mobility35 Implementation Plan	Plan	2020
I-35 SB Frontage Road - Williams Drive to Rivery Boulevard	Adding a dedicated turn lane onto Rivery Boulevard	2015 Bond Election	Design	2025
I-35 south Main-line Improvements - just south of Williams Drive to just south of RM 1431	Widening, modifications to ramps/bridges, auxiliary lanes	CAMPO Regional Transportation Plan, Mobility35 Implementation Plan	Plan	2023
I-35 / Williams Drive Interchange	Construction of new interchange and reconstruction of frontage roads	CAMPO Regional Transportation Plan, Mobility35 Implementation Plan	Design	2022
I-35 / SH 29 Interchange - just south of Williams Drive to just south of SH 29	New interchange, ramps, underpass, widening	CAMPO Regional Transportation Plan, Mobility35 Implementation Plan	Design	2024
Northwest Boulevard Bridge- Fontana Drive to Austin Avenue	Construction of new bridge over I-35 to connect Northwest Boulevard to Austin Avenue	2015 Bond Election	Design	2020
Rivery Boulevard Extension- Williams Drive to Northwest Boulevard	Connect Williams Drive to Northwest Boulevard	2015 Bond Election	Design	2019
SH 29- Widening at the Wolf Ranch Development	Widening to 5-lane roadway	2014 Overall Transportation Plan	Complete	
Shell Road- Williams Drive to Shell Spur Road	Widening to 5-lane roadway	2015 Bond Election, 2014 Overall Transportation Plan, CAMPO Regional Transportation Plan, 2030 Comprehensive Plan	Plan	2026
Williams Drive- Northwest of Cedar Breaks Road	Widening to 5-lane roadway	2014 Overall Transportation Plan	Complete	
Williams Drive- Rivery Boulevard to Frontage Road	Add eastbound right-turn lane on Williams Drive between Rivery Boulevard & Frontage Road	2015 Bond Election	Design	2018

CORRIDOR CHARACTERISTICS

Demographics and Real Estate Market Assessment

Within the broader Williams Drive Study, this market analysis serves as a preliminary step to understand Georgetown's current demographic, economic, and real estate context and inform the planning process with relevant market considerations.

The goals for this market analysis include:

- Evaluate the current demographic conditions for Williams Drive, Georgetown, and the region;
- Identify potential areas of growth and outline contextual information;
- Highlight general residential and retail demand along the corridor; and,
- Provide the planning team with key market findings and implications based on current data and stakeholder input, as well as relevant findings and related projects within Georgetown.

DEMOGRAPHICS

KEY FINDINGS

Significant Population Growth

Both Georgetown and the Williams Drive corridor have experienced significant population growth, especially since 2010, with growth rates of 17% and 12%, respectively. Because of this recent rapid expansion, and projected growth, it is important to review the capacity and functionality of Williams Drive in terms of traffic management, residential housing supply, the establishment of new utility networks, and other related considerations to mitigate the pressures of a rapidly growing city.

Income Disparities Between Corridor and Center Area Residents

Compared to State averages, Georgetown is predominantly white, older, educated, and wealthier. Residents within the Corridor Area earn significantly more than the rest of Georgetown (and Texas overall). In contrast, there is a higher concentration of poverty within the Centers Area.

Growth of a Diverse Population

Diversity of the population along the corridor is expected to increase over time, so it will be crucial to tailor Williams Drive transportation design, real estate offerings, and related services to suit all demographics.

Williamson County Industry Concentrations

Williamson County is distinguished by high concentrations of employment in Trade, Transportation, Utilities, Leisure and Hospitality, and Professional/ Business Services.

Public Service Focus

The top employers in Georgetown are Williamson County government, Georgetown Independent School District (GISD), the City of Georgetown, St. David's Georgetown Hospital, and Southwestern University.

Figure 4 Population by Region (2016)

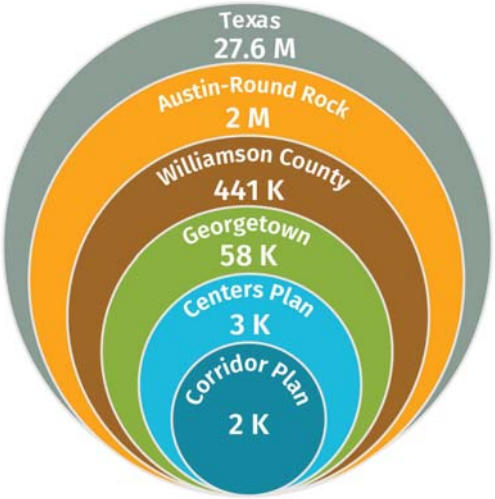
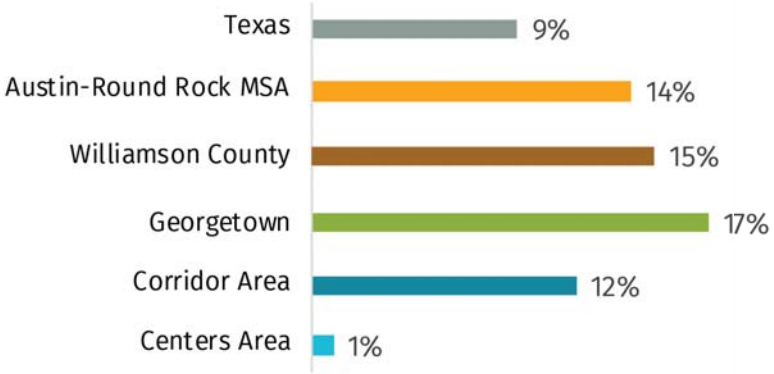


Figure 5 Population Change by Region (2010 - 2016)



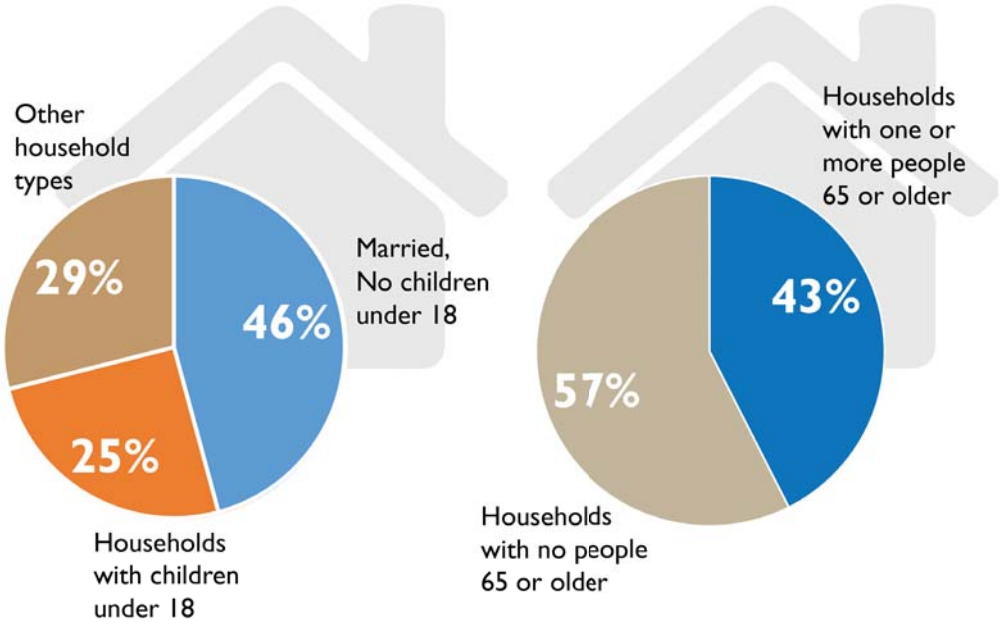
Source: Esri, Texas Demographic Center

Since 2010, Georgetown has seen its population expand at nearly twice the rate as the state of Texas. New residents have concentrated along Williams Drive, thus increasing the area's population.

Population

The City of Georgetown, as well as the entire Williams Drive corridor, has experienced significant population growth in recent years, a trend that is expected to persist into the future, as shown in Figure 4 and Figure 5. Georgetown has even surpassed the growth rate for the Austin-Round Rock MSA (14%), which has likewise seen significant growth. The population in the Centers Area has also grown slightly since 2010 but nowhere close to the growth rates for the City and Corridor Area.

Figure 6 Household Characteristics



Overall, Georgetown has a much older population, with a higher concentration of older residents along the Williams Drive corridor.

Age Demographics

As shown in Figure 6, around 40% of the Williams Drive study area's residential population is also part of the workforce, which highlights a prevalence of retired residents and families with children in the area. School-age children and senior citizens are the segment of the population who benefit most from having a multitude of mobility options as in many cases driving is not an option. As illustrated by the charts in Figure 5 above, 25% of households in the project study area have children under the age of 18 and 43% of households include one or more people age 65 or older.

*Note: The population taken into account for the Williams Drive area extends beyond the boundaries of the study area, as there are many residents living outside those boundaries that use Williams Drive on a daily basis.

Data Source(s): B11004 – Family Type by Presence and Age of Related Children Under 18 Years ACS 2010-2014
B11007 – Households by Presence of People 65 Years and Over, Household Size And Household Type ACS 2010-2014

In general, Georgetown has a much older population with a median age of 46 years old, well above the state's median age of 34 years, shown in Figure 7. Residents within the Williams Drive Corridor Area boundaries have a similar median age of 45 years old; while, in contrast, residents within the Centers Area boundaries are somewhat younger at a median age of 37 years old.

Figure 7 Median Age (2016)

Based on the projected population growth shown in Figure 8, Williamson County is expected to easily outpace state population growth rates and experience significant growth in all age brackets with continued emphasis on its retiree population.

Figure 8 Projected Population Change Through 2021

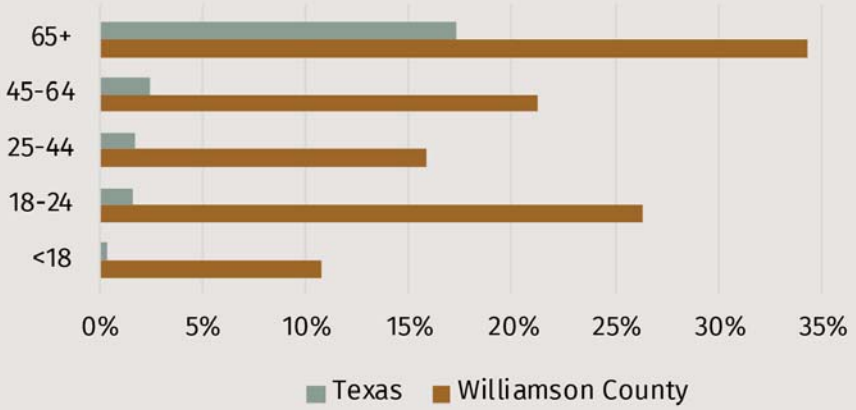


Figure 9 Households by Poverty Status (2010 - 2014 ACS Estimate)

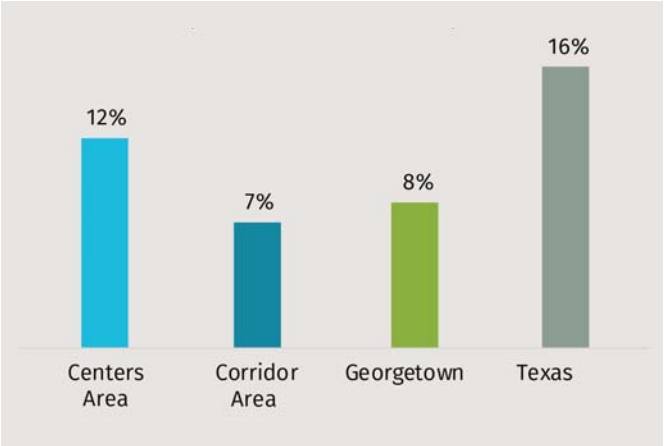


Figure 10 Median Household Income (2016)

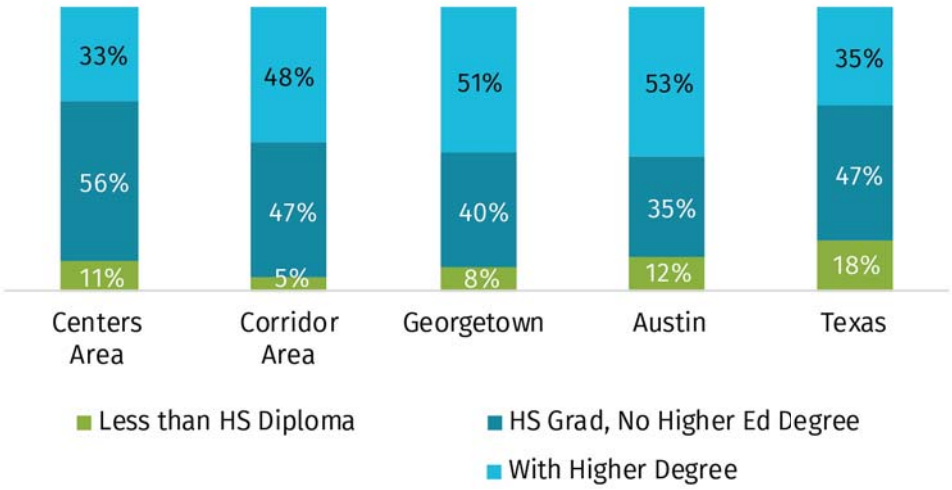
Residents along the Corridor Area are wealthier than Georgetown overall and over 38% wealthier than the Centers Area residents. There is a higher concentration of poverty within the Centers Area.

Income

Based on U.S. Census data, the Centers Area has a significantly higher concentration of poverty: 12% of households earned income below the poverty level. In contrast, only 7% of the Corridor Area's population earned below the poverty level, which is on par with the city of Georgetown overall, as shown in Figure 9.

Georgetown is marked by a solid middle class with a median household income of approximately $67K, which is almost 20% above median income levels for the state of Texas, as shown in Figure 10. Residents along the Williams Drive corridor have even higher median levels of household income ($78K).

Figure 11 Educational Attainment for Age 25+ (2016)



Over half of Georgetown's adult residents have at least a Bachelor's Degree, with Corridor Area residents mirroring these high education attainment rates. In contrast, Centers Area residents are predominantly high school graduates with no higher education degree.

Educational Attainment

As shown in Figure 11, Georgetown's degree-holding population (51%) is comparable to Austin (53%). Only 8% of Georgetown's adult population has less than a high school diploma, which is significantly lower than the state of Texas's rate (18%).

Residents within the Centers Area boundaries are less educated than Georgetown overall or Corridor Area residents: adults within the Centers Area Plan are mainly high school graduates (56%) with a higher percentage of high school dropouts (11%). Only 33% of Centers Area residents have a higher education degree.

Figure 12 Hispanic Origin (2016)

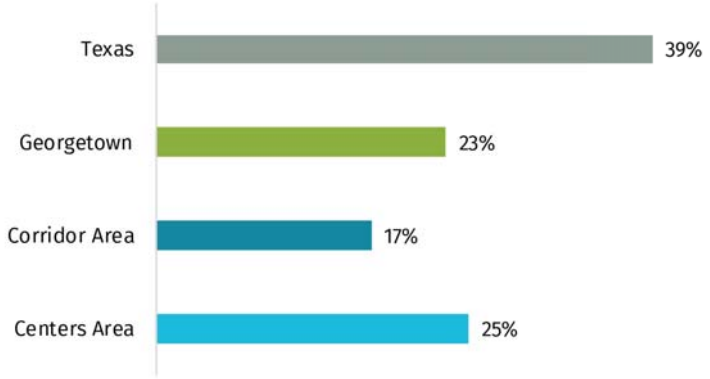
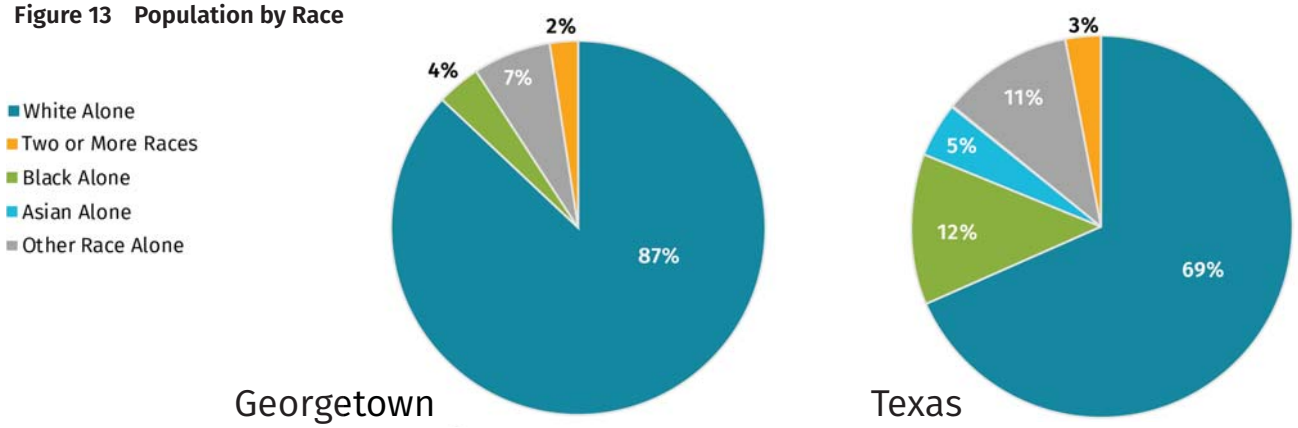


Figure 13 Population by Race



Corridor Area residents are predominantly White, similar to Georgetown's general population. There is a greater concentration of Hispanic residents within the Centers Area boundaries than along the Corridor.

Race and Ethnicity

Overall, Georgetown residents are primarily Caucasian (87%) with a smaller Hispanic population (23%) in comparison with Texas, which is approximately 40% Hispanic, as shown in Figure 13. There is a greater concentration of Hispanic residents closer to downtown within the Centers Area boundaries (25%) rather than along the Corridor Area (17%), as shown in Figure 12.

REAL ESTATE MARKET

KEY FINDINGS

Ongoing Residential Demand

Because Williams Drive has been experiencing a population boom, a significant amount of new residential product is under construction or in pre-development. Rents have increased over time and demonstrate a strong demand for multifamily residential real estate well into the future. However, even as rents have risen, there has been a rise in multifamily vacancy rates, indicating that there has been turnover as new product has come to market and people have traded older stock for new. This increase in vacancy has the potential to be sustained as the city is currently experiencing a large amount of product under construction or in development. Many more units are in the planning stage. While population growth is robust, the total units under development or in planning (>15,000) may not be able to be absorbed in the near term.

Correlation with Austin's Commercial Real Estate Market

While Austin's office inventory and rents are rapidly increasing, Georgetown's office inventory has not grown significantly over the past 5 years and rents remain stable. The population growth will likely drive a market demand for some minimal amount of office space in the future, limited to smaller footprints such as banks, doctors' and law offices, etc.

Lack of New Housing in the Centers Area

The median age of housing in the Centers Area is 30 years old. A majority (61%) of the housing in this area was built prior to 1990, indicating that the housing stock is aging and may be approaching the point at which significant investment is needed for upgrades/maintenance.

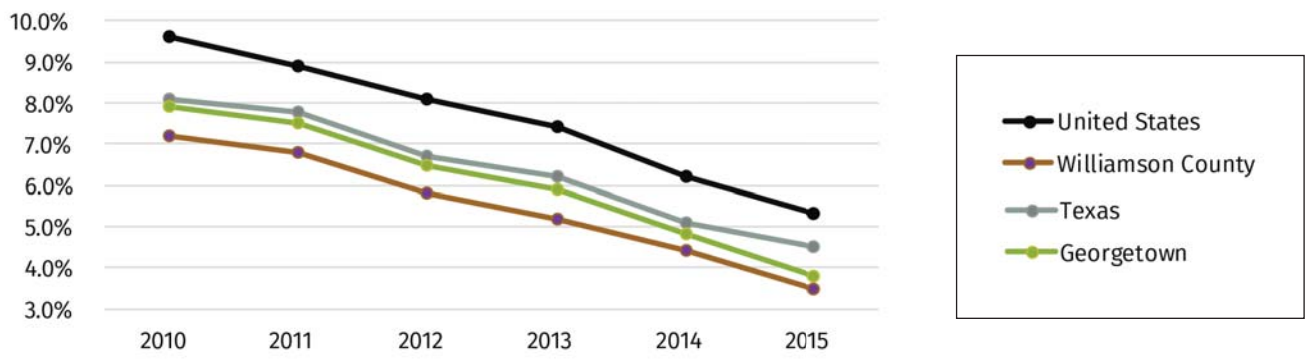
Driving Residential Demand Through New Policies and Incentives

The City of Georgetown does not currently have policies and incentives in place that prioritize residential growth in and around the Williams Drive corridor. Although Georgetown's population is expected to continue growing into the future, the Corridor Area Plan will only receive a small portion of this population growth unless there is a targeted strategy to drive residential growth in the area.

Variety of Residential Product Options Along Williams Drive

Even though residential demand will remain strong in the coming years, it will be important to review the types of housing products that are prioritized and developed. The older demographic and preference for available land and larger houses that Georgetown offers has led to a population whose preferences are for single family homes on larger tracts of land. While overall residential demand is strong and the corridor is an attractive location for residents, demand for smaller units that are integrated into a mixed-use development might lower than in other areas of the city. While promoting connectivity between retail, commercial, and residential uses is desirable in many places, developers might not see many opportunities for mixed-use products along the corridor in the current environment.

Figure 14 Unemployment Rates (2010 - 2015)



During the past 5 years, Georgetown and Williamson County overall have maintained low unemployment rates in comparison to both Texas and the national average. Williamson County is distinguished by high concentrations of employment in Trade, Transportation, Utilities, Leisure and Hospitality, and Professional/Business Services.

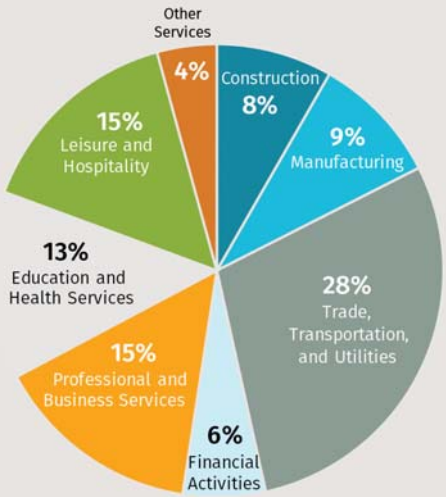
Employment and Industry

Both Williamson County and Georgetown have maintained unemployment rates below national and state averages, even coming out of the Recession, as shown in Figure 14. Georgetown is driven by public service, education, and healthcare-focused jobs with the top five employers including: Williamson County government, Georgetown Independent School District (GISD), the City of Georgetown, St. David's Georgetown Hospital, and Southwestern University.

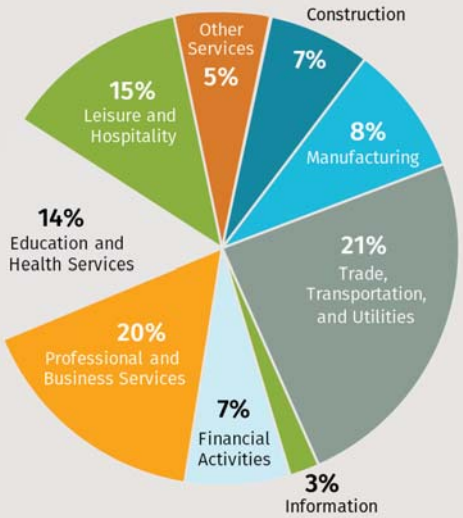
Figure 15 illustrates employment by industry for Williamson County, Texas, and the Corridor and Centers Areas of Georgetown. Williamson County has high concentrations in the following industries: Wholesale Trade, Utilities, Construction, Retail Trade, Mining, Quarrying, and Oil/Gas Extraction. Texas reflects high concentrations of similar industries to Williamson County but has higher employment percentages in Information and Professional/Business Services industries.

Both the Centers Area and Corridor Area have significant service/retail sectors, which is evident with the strip retail and small offices throughout the study area. It is important to note that the retail in the Corridor Area makes up a smaller percentage of employment, but makes up a similar portion of the total businesses as in the Centers Area. This is likely due to the larger big-box stores clustered at the I-35 interchange compared to the smaller sized retail shops along the corridor.

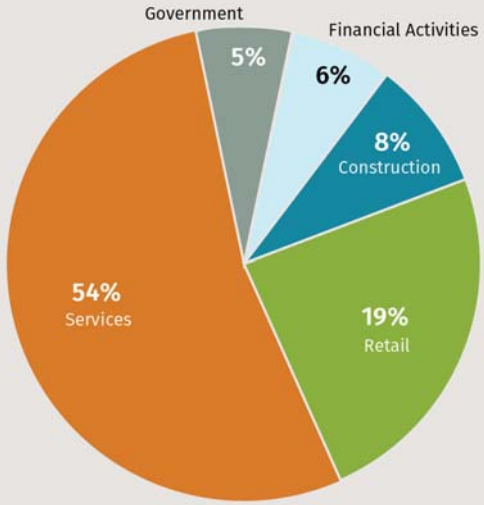
Figure 15 Employment by Industry (2015)



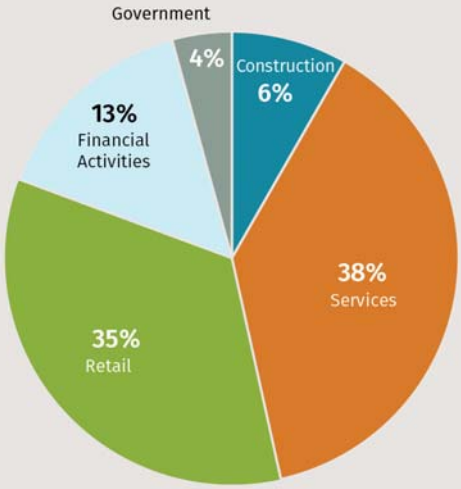
Williamson County



Texas

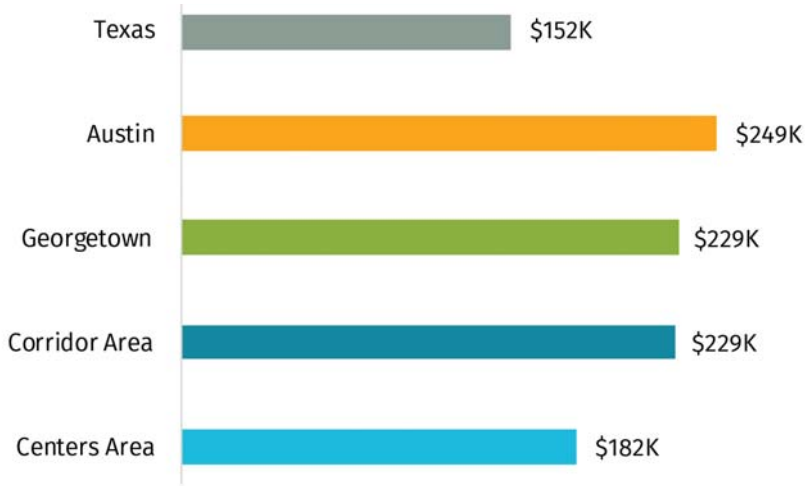


Corridor Area



Centers Area

Figure 16 Median Home Value (2016)



As of 2016, Georgetown's homes are valued 50% greater than the median home value for Texas. Greater wealth is concentrated along the Williams Drive Corridor with homes valuing 25% more than those within the Centers Area.

Rent within the Centers Area is on par with the City of Georgetown. The City of Georgetown's multifamily vacancy rates are much higher than the Center Area, indicating that the Centers Area is fairly saturated.

Residential Overview

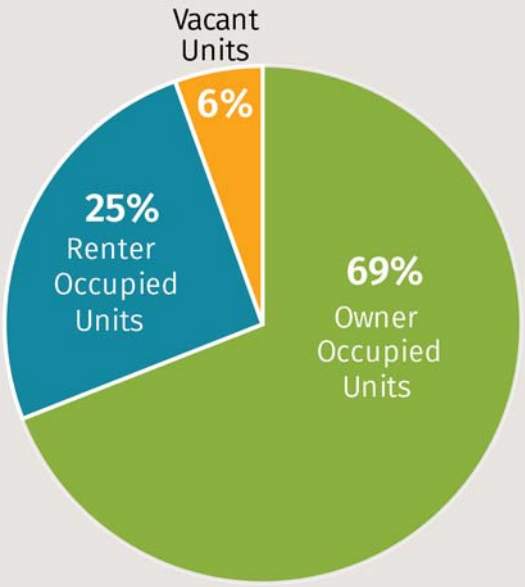
The median home value along the Corridor closely resembles the overall median home value for the city of Georgetown ($228-$229K), as shown in Figure 16. As of 2016, Georgetown's homes are valued 50% higher than the median home value for Texas. Homes along Williams Drive are $46K more valuable than homes within the Centers Area (a 25% increase in value).

In 2015, Georgetown's residential market was primarily comprised of homeowners, and the Corridor Area is likewise predominantly owner-occupied. In contrast, within the Center Area boundaries, renters currently dominate the market, as shown in Figure 17.

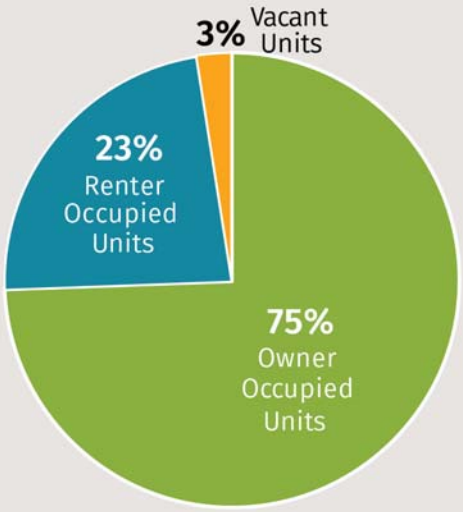
Over the past 5 years, multifamily vacancy rates in the Centers Area consistently stayed below 3%, while Georgetown's overall vacancy rates have been more volatile. As of 2015, Georgetown had a 7.5% vacancy rate, significantly higher than the 1% vacancy rate in the Centers Area, as shown in Figure 18.

In general, multifamily rents have remained consistent between the Centers Area and Georgetown, as shown in Figure 19. During 2015, there was a slight increase in Georgetown's rental price.

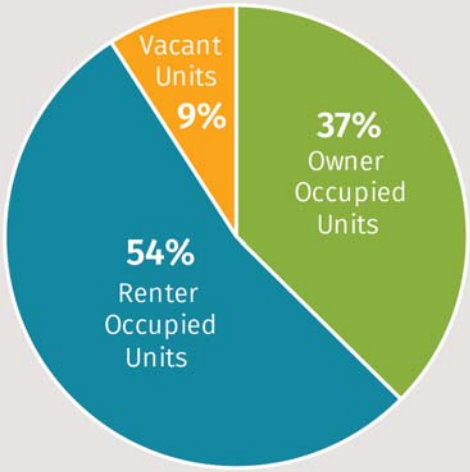
Figure 17 Housing Occupancy (2016)



Georgetown



Corridor Area



Centers Area

Figure 18 Multifamily Vacancy Rates (2010 - 2015)

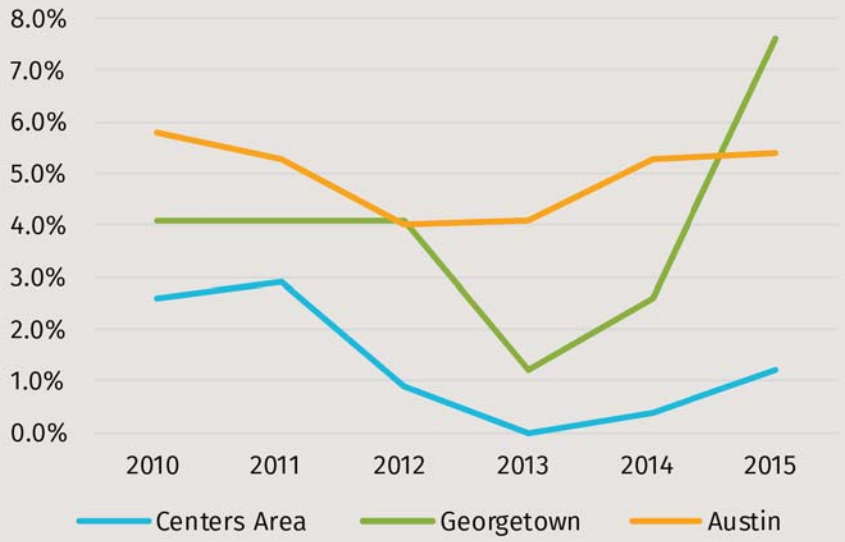
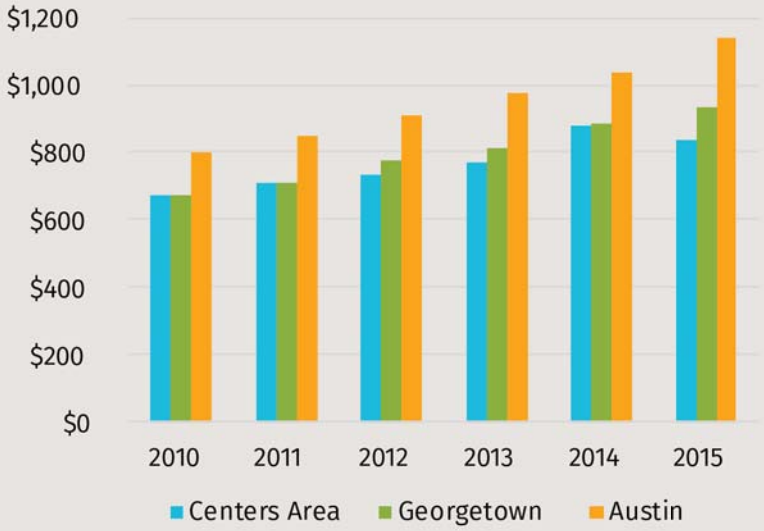


Figure 19 Effective Rent per Unit (2010 - 2015)



At the natural rates of growth consistent with past trends and absent intervention to increase development, there will be demand annually for less than 100 units of new housing in the study area.

Georgetown has grown rapidly and its population is forecasted to grow to over 77,000 inhabitants by 2021. Using data from the U.S. Census Bureau, ESRI Business Analyst, and the Texas Demographic Center, an analysis was conducted of the potential demand for new housing in Georgetown over the next five years. This approach looks at migration into Georgetown, as well as the rate of housing turnover within the City, to understand the total potential demand for new housing. Income profiles and current home pricing were also looked at to further discern what percentage of this demand could afford to either rent or buy new housing stock.

The population of Williamson County is expanding substantially: The County grew by 28%, 120,000 people, between 2010 and 2016. The State of Texas Demographic Center estimates Williamson County will grow by another 20%, or 115,000 to 120,000 people between 2016 and 2021. The proportion of the population of Georgetown to the Williamson County population has been stable between 11% and 12% since 2000, indicating the City's growth rate has historically matched that of the County's. The City's current expansion policies and approach to development indicates this relationship will continue.

Given the low vacancy and continued demand from migration and turnover, and given the current income demographics, it is estimated that these effects will generate demand for 9,000 new housing units in Williamson County on an annual basis. This will translate into a need for 1,200 new units in Georgetown annually over the next five years.

At the natural rate of growth that is consistent with past trends, it is estimated that the Corridor Area would capture approximately 2% of the market for new residential units in Georgetown and the built-out Centers Area would capture less than 1%.

Between 2010 and 2016, the Corridor grew by 300 people, declining from 4% to 3.5% of the total Georgetown population. New housing is being built in large developments located near to major roadways such as Williams Drive, but outside the boundaries of the corridor study area, explaining the low capture rate. The Centers Area is a built-out urban neighborhood that grew by 30 people between 2010 and 2016.

The widespread availability of undeveloped land for new construction and the affordable prices for new housing in Georgetown makes redevelopment of established urban areas unattractive economically, indicating that little new development will naturally occur in this area.

Figure 20 Office Vacancy Rate (2010 - 2015)

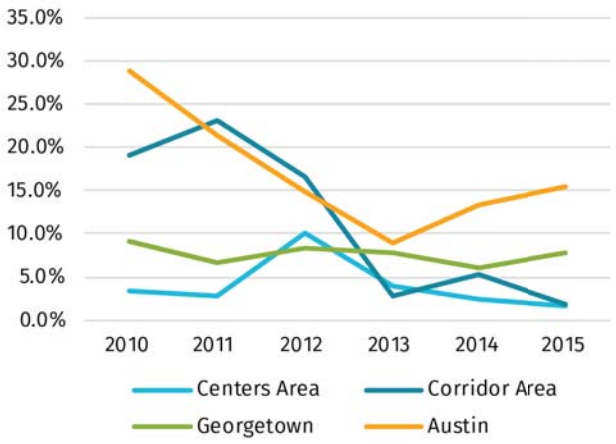
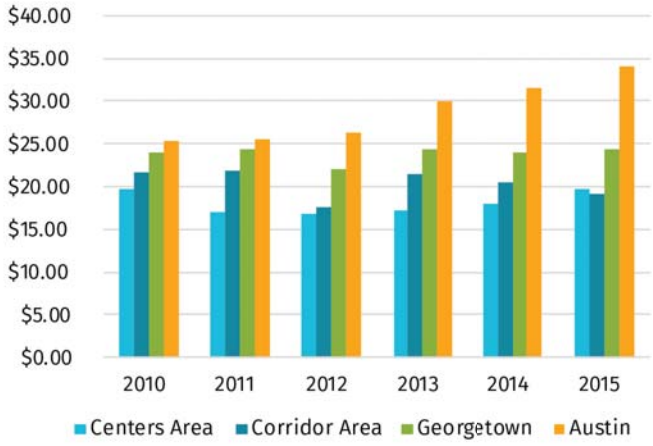


Figure 21 Gross Rent per Square Foot Overall (2010 - 2015)



There is a small inventory of office space within the Centers Area and along the Williams Drive Corridor; however, office expansion has remained stagnant in both areas for the past 5 years.

Williams Drive Corridor has a stable retail market marked by low vacancy rates and above average rental rates. During the past 5 years, Corridor Area retail rents have caught up with Austin's average rents.

Office and Retail

Currently, the Centers Area has a greater concentration of office space with 229K square feet. In contrast, the Corridor Area has only 100K square feet of office space. Neither focus area has experienced office growth during the past 5 years. However, from 2010 to 2015, Georgetown experienced a modest 4% increase in office space and currently has a total inventory of 1.5M square feet. Additionally, Austin experienced a 40% increase in office space during the same period and currently has a total inventory of 14.5M square feet.

Since 2013, vacancy rates have remained relatively low in the Centers Area and Corridor Area (under 5%), shown in Figure 20 and Figure 22. In general, Georgetown experiences higher rates of office vacancy, as shown in Figure 20. The Corridor Area has experienced the lowest retail vacancy rates of the study geographies during the past 5 years. In contrast, vacancy rates within the Centers Area have been much higher and more volatile, as shown in Figure 22.

Starting in 2014, retail rents along the Corridor have surpassed Georgetown's average rent and caught up to Austin's retail rent, as shown in Figure 21 and Figure 23. Retail rent within the Centers Area has remained stable for the past three years, hovering just below $15.00 per square foot.

Figure 22 Retail Vacancy Rate (2010 - 2015)

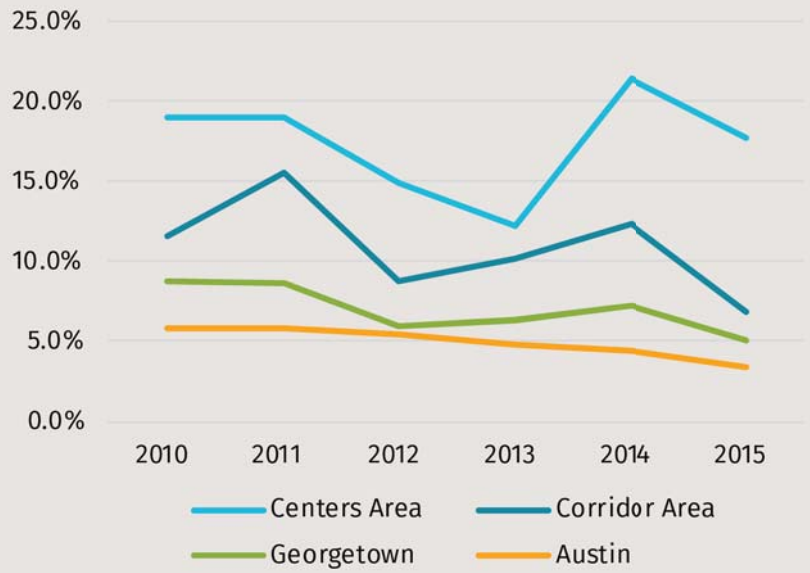
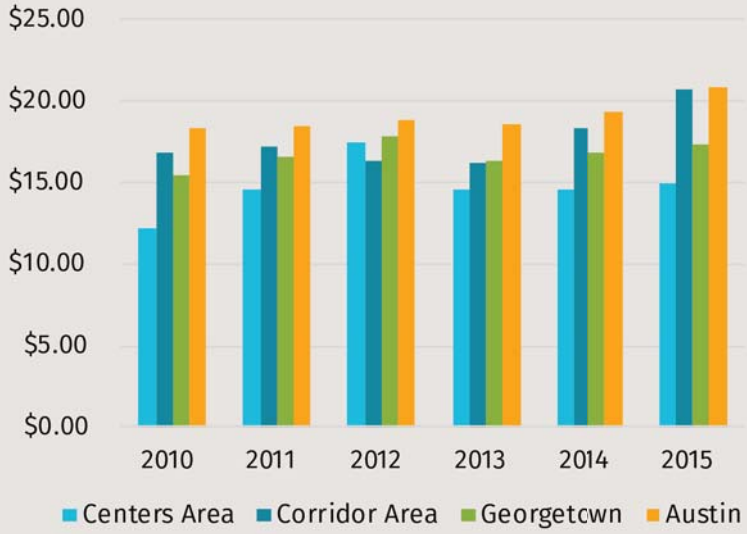


Figure 23 Rent per Square Foot - All Service Types



TAX REVENUE ANALYSIS

KEY FINDINGS

Assessed Property Value Increase

The assessed value of property in the Corridor and Centers areas have increased notably since 2005, by $181 million in the Corridor Area and by $150 million in the Centers Area. The growth in assessed values is primarily due to increased assessments on properties that have had assessed values of $0 since 2005, implying new development or reuse that has occurred in that time period. Growth in properties with assessed value of $0 in 2005 is equal to $149 million in the Corridor area, and $102 million in the Centers Area.

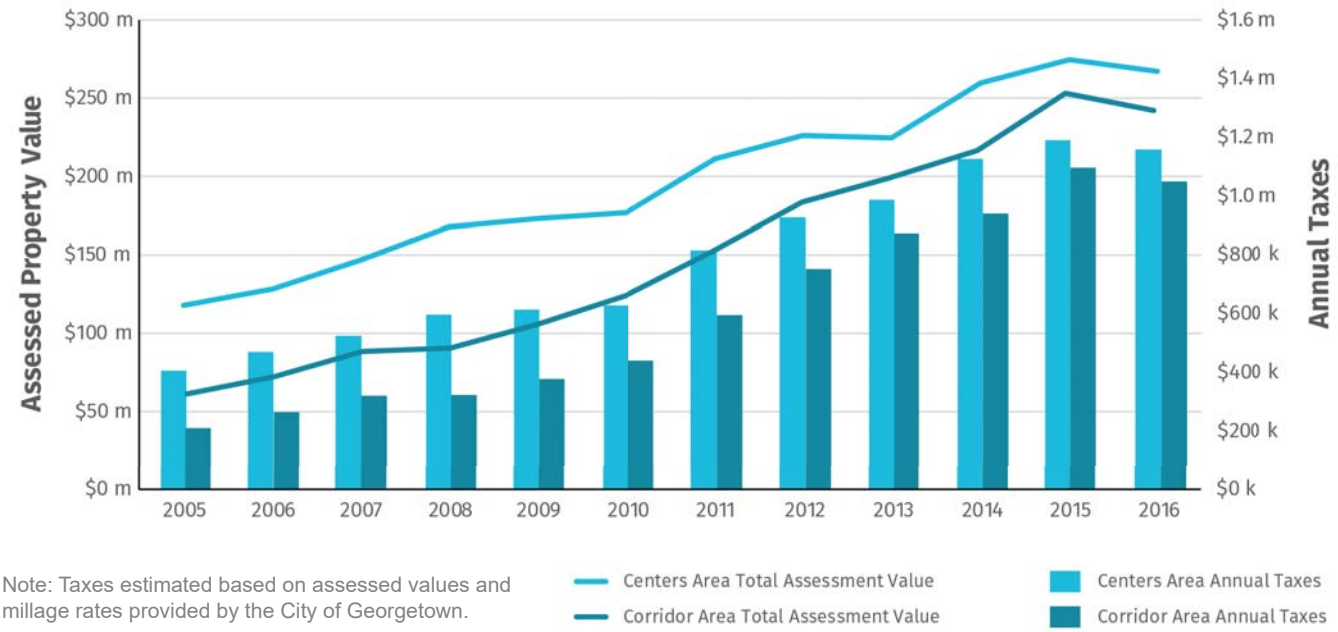
Low Property Tax Rates

Although assessed values have increased notably, tax revenues have not increased as substantially because the property tax rate throughout all of Georgetown is low, $.0432 for each $100 in property value.

Property Tax Increases

Property tax rates have increased within the study area from a millage of $.03463 per $100 of value in 2005 to $.434 per $100 of value in 2016. Because of this, property tax revenues have also seen a moderate increase, from approximately $212,000 in 2005 to $1.05 million in 2016 in the Corridor area, and from approximately $408,000 to $1.16 million in the Centers area for the same time period.

Figure 24 Total Assessment and City of Georgetown Taxes (2005 - 2016)



Note: Taxes estimated based on assessed values and millage rates provided by the City of Georgetown.

The tax revenues earned by the City of Georgetown from the Centers Area and the Corridor are directly linked to the assessed value of the underlying properties.

Property Tax Rates

The property tax millage applied to all properties, regardless of use, has increased from $0.3463 per $100 of value in 2005 to $0.434 per $100 of value in 2016, as shown in Figure 24. This modest increase over the past decade indicates that if current trends continue, much of the growth in tax revenues in the future will come from increased assessment values as opposed to rising taxes. Although the millage applied by the City of Georgetown is comparable to surrounding cities such as Austin, Cedar Park, and Round Rock, it is low and thus the properties in the study area produce relatively little in taxes. Furthermore, the low millage means that increased values correspond with little increase in taxes. Within the Corridor there remain swaths of undeveloped land where new construction may generate increased value, whereas in the more developed Centers Area increased assessment value would likely come from increased demand driving rising property values and from redevelopment of existing properties into higher value uses.

Figure 25 Corridor Area Assessed Value Growth (2005 - 2016)

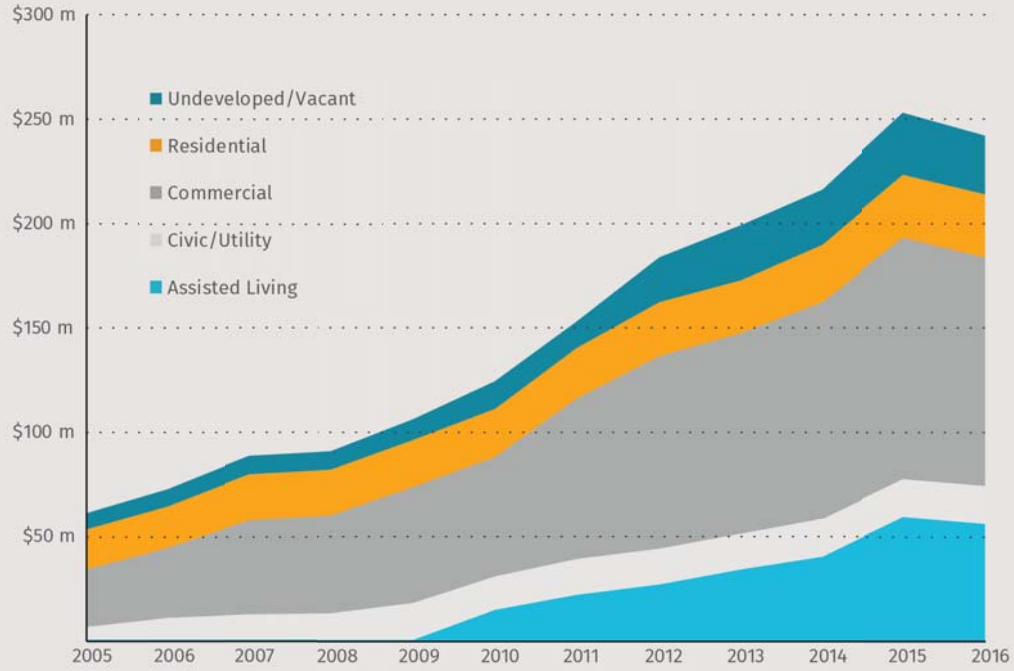
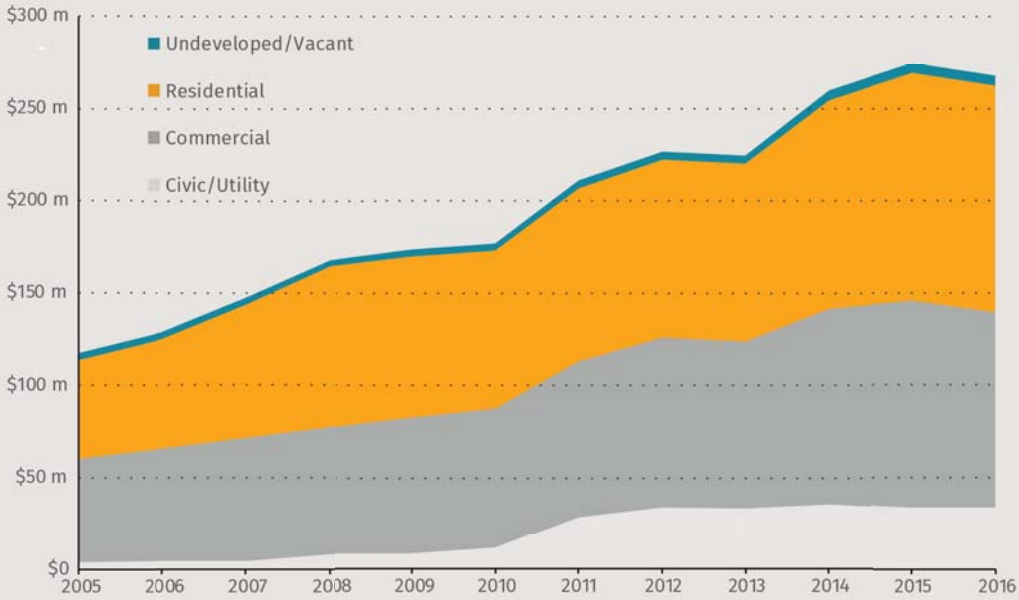


Figure 26 Centers Area Assessed Value Growth (2005 - 2016)



Property Valuation

In 2016 the total assessed value of the Corridor was approximately $242 million, as illustrated in Figure 25, of which $109 million was classified as commercial and $56 million as assisted living. Assessed land values had increased by approximately $180 million from 2005, notably in the commercial sector (increase of $82 million) and the assisted living category. The assisted living property values increased from a base of less than $1 million in 2005, indicating a substantial amount of assisted living development, all of which occurred in the last decade. From 2015 to 2016 total assessed values fell by $9 million, reducing tax revenues by approximately $50,000. All land use categories experienced declining values indicating that there was little new development that year and that the annual re-assessment process found lower land values throughout Georgetown. Within the Corridor, undeveloped/vacant land retained an assessed value of $28 million in 2016, indicating substantial potential for new growth on empty land.

The tax revenues associated with the Corridor closely track the increase in assessment value, and rose from $212,000 in 2005 to $1.05 million in 2016. The sources of this growth were primarily from commercial and assisted living properties, on which annual taxes increased by $622,000 collectively, in line with the increased assessment value from new development of these uses. Residential taxes in the Corridor increased modestly, by $50,000 reflecting the limited amount of residential development within the narrow Corridor study area.

The Centers area total valuation in 2016 was $267.5 million, as illustrated in Figure 26, of which $122.5 million was residential properties and $106 million was commercial properties. There were almost no parcels categorized as assisted living (just $139,000 in assessment value in 2016), and little undeveloped land ($5.5 million in assessment value). Assessed values had increased by $150 million since 2005, of which $50 million came from increased commercial property value and $70 million from increased residential values. A review of the 73 properties classified as commercial by CoStar reveals that just two retail buildings and four office buildings totaling 20,000 rentable square feet have been built since 2005. This indicates that the increase in commercial valuation was due to rising land values and not new construction. Likewise, only one multifamily development, a rent restricted 130-unit property called Cypress Creek, was built between 2005 and 2016, indicating that the increase in residential values was also due to rising land prices and not new construction.

The taxes generated by the Centers area increased from $407,000 in 2005 to $1.2 million in 2016, an increase of 185% or $753,000. The increase in the tax millage during that time from $0.3463 per $100 in value to $0.434 per $100 in value accounted for approximately $235,000 of that increase, while the remainder appears due to rising land values as there was little new development. Substantial additional increase in the tax values in the Centers area will likely require redevelopment of the aging commercial centers at the intersection of Williams Drive and Lakeway Drive and at Williams Drive and I-35, as well as continued residential infill development on the remaining vacant parcels.

Figure 27 Corridor Area Growth in Value of Properties with Assessed Value of $0 in 2005 (2005 - 2016)

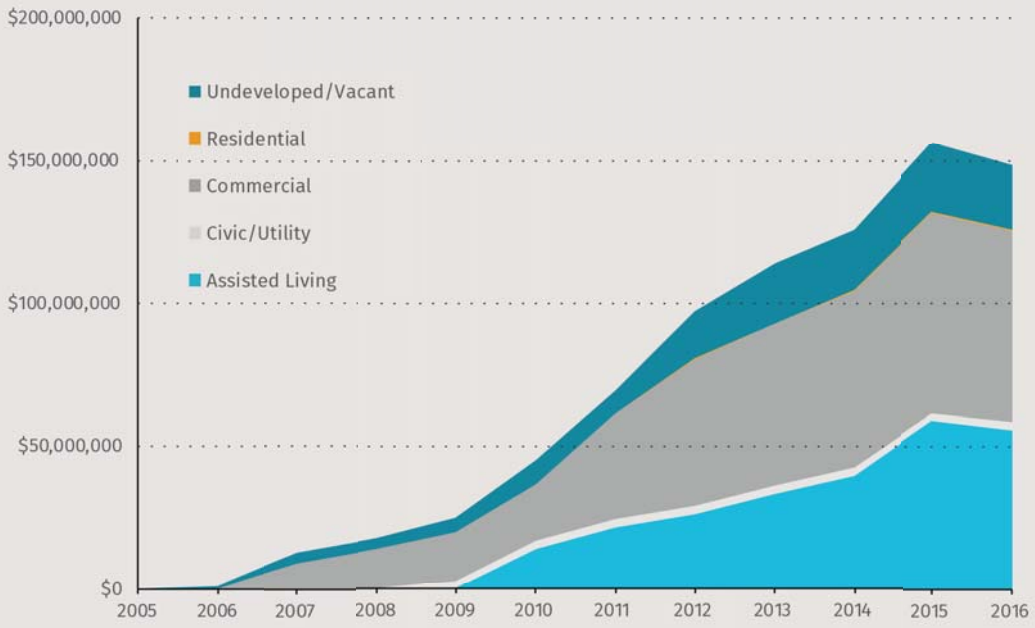
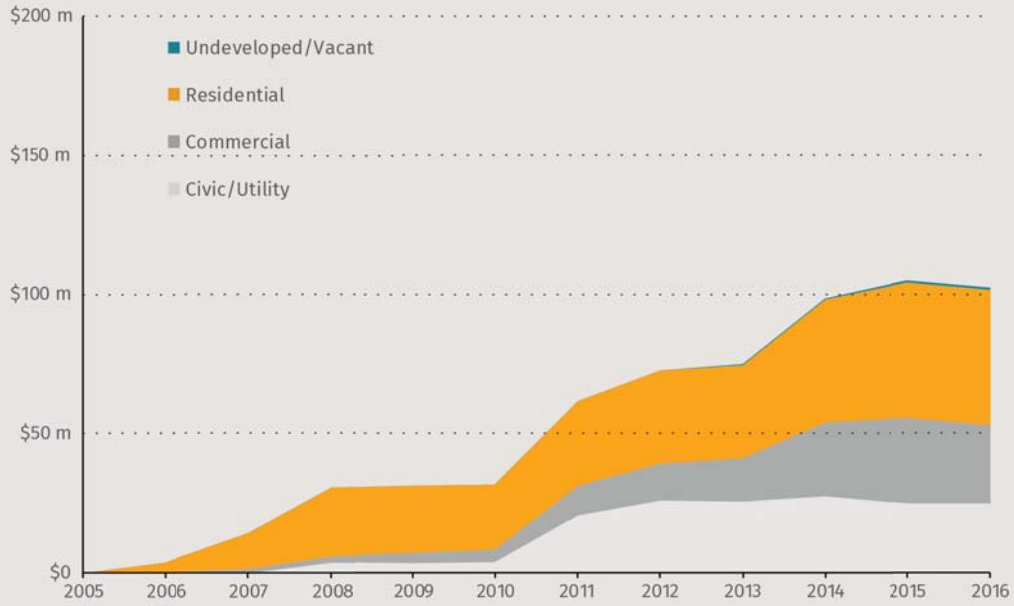


Figure 28 Centers Area Growth in Value of Properties with Assessed Value of $0 in 2005 (2005 - 2016)



Williams Gateway Tax Increment Reinvestment Zone (TIRZ)

The Williams Gateway TIRZ is 57 parcels totaling 77.5 acres at the intersection of Williams Drive and Interstate-35. The TIRZ is a tool for the City to use the incremental increase in taxes from participating agencies above a base year for improvements in the zone. Property owners in the zone pay real estate taxes to three jurisdictions, the City of Georgetown, the Georgetown Independent School District, and Williamson County. Of these jurisdictions, the City of Georgetown is the only participating agency in the TIRZ and has the lowest tax millage, $0.424 per $100 of value compared to $1.409 per $100 of value for Georgetown ISD and $0.476529 per $100 of value for Williamson County. As the City of Georgetown is the only participating agency, the Williams Gateway TIRZ is a vehicle for the City to reserve future tax revenues from the general fund for dedicated projects in the zone. The Williams Gateway was created by Ordinance 2006-104 in 2006 and will last through December 31, 2031. The TIRZ includes the commercial properties along the I-35 frontage road from Northwest Boulevard to the San Gabriel River, and extends north-west along Williams Drive several blocks from the highway to include a 16-acre Georgetown Independent School District (ISD) site that is no-longer in use. Of the 56 parcels, 4 are tax exempt and 11 are vacant. The tax-exempt properties include a 0.5-acre City of Georgetown parking facility at the corner of Williams Drive and the I-35 frontage road, a 3.4-acre vacant City of Georgetown parcel paralleling the San Gabriel River, a 0.5-acre parcel that is the headquarters of a local non-profit, and the 16-acre Georgetown ISD site.

The TIRZ does not include the commercial properties on the south-east side of I-35 between the highway and North Austin Avenue that extend from Apple Creek Drive in the north to West Morrow Street to the south. The TIRZ also does not include the commercial properties north-east of the old Georgetown ISD school site along Williams Drive to Rivery Boulevard. Since the establishment of the TIRZ development has occurred on two properties within the zone, a Candlewood Suites and a Holiday Inn Express at the corner of Northwest Boulevard and the I-35 frontage road.

The assessed value of the properties in the Williams Gateway TIRZ have increased from $15.4 million in 2006 to $34.0 million in 2016. Of that $34.0 million in total value, $6.1 million are the four tax-exempt properties. The bulk of this tax-exempt value is the 16-acre Georgetown ISD site which had an assessed value of $5.2 million in 2016. The assessed value of the properties in the TIRZ increased sharply from 2013 to 2015, corresponding to the development of the two hotel properties. The development of these hotels increased the assessed property values by approximately $9.2 million, while ongoing appreciation of the value of the remaining parcels in the zone during that two-year period was $2.7 million. The annual City of Georgetown taxes increased from approximately $47,500 in 2007 to $121,000 in 2016, creating a $73,500 increment for improvement projects in the TIRZ. These data indicate that further substantial increase of the tax revenues from the TIRZ will come from development of the remaining 11 vacant properties, expansion of the TIRZ to include properties that will subsequently develop, or from participation in the TIRZ by Williamson County and the Georgetown ISD.

Local brokers and developers have underscored the importance of Georgetown's unique suburban experience, ongoing demand for residential real estate along the Corridor, and potentially conflicting housing and spending preferences by different age groups.

To supplement information from real estate databases, the project team conducted informational interviews with local real estate brokers and developers. Although this feedback is based on individual experiences and opinions, this may provide relevant insight into the current perspective of Georgetown's real estate market and potential growth.

Preference for suburban experience| Multiple contacts mentioned the importance of the suburban, small town experience as a key reason for why residents have been attracted to Georgetown. Residents may have chosen Georgetown specifically because it is not a dense, urban environment. In this way, it may be challenging to co-locate different types of properties and amenities because it does not exactly align with expectations for suburban living.

Ongoing residential demand | Contacts agree that there has been significant growth and population expansion along Williams Drive. Because of this, there will be demand for residential options well into the future. In terms of the types of housing, it may be important to consider housing at different price points, including condominium or townhouse developments to provide single-family housing that is not a traditional suburban home.

Disconnect between housing and spending preferences between retiree and millennial populations | The retiree and millennial populations in Georgetown have different preferences in terms of housing and using disposable income. Contacts explained that retirees may be more cautious about spending their savings and prefer living in traditional, suburban homes. In contrast, millennials may not always prefer to live in a traditional, single-family home and may spend more of their disposable income in the local economy. Demand may change over time as the baby boomer population declines; however, it will still be important to provide a variety of real estate products and amenities for different age groups and their respective preferences.

Commuting as a key part of Georgetown's population | Many residents commute to nearby Round Rock or Austin for work and reside in Georgetown due to cheaper costs of living, quality schools, and the small-town experience. For these residents, transportation and access to nearby cities is a major factor in their quality of life and work experience.

Densification plans and phasing within the context of a growing retiree population | Because the retiree population has driven demand in the past (and will continue to influence demand into the future), densification plans should be considered carefully and development phasing should be based on preferences both now and into the future. There may be limited development over time and, therefore, the City should balance residential needs of both the retiree population as well as other age and demographic groups rather than prioritizing density as a city-wide goal.

WILLIAMS DRIVE

REGIONAL CONTEXT

Georgetown's location immediately north of Austin places it as a key location in the region. Because of this, connectivity and access to major regional destinations is critical. As a significant corridor connecting area residents to I-35, as well as other regional corridors, Williams Drive is an important piece of this regional network.

Beyond its regional connections, Williams Drive also provides a connection between many residents of Georgetown and the city's downtown. The portion of the corridor within City of Georgetown limits (and project study area) is about 7 miles long, extending from the northwestern edge of Downtown to Jim Hogg Road. The map on the following page shows the location of the project study areas along Williams Drive.

The two primary areas of analysis, which can be seen on the map, are the Centers Area and the Corridor Area. The San Gabriel River, San Gabriel Park, and Lakeway Drive broadly define the Centers Area, which is situated north of downtown. For purposes of this analysis, the Corridor Area boundaries begin at Lakeway Drive and run along the length of Williams Drive to Georgetown's city limits. These boundaries have been established by CAMPO and City of Georgetown for the Williams Drive Study.

STUDY AREA MAP

CORRIDOR PLAN

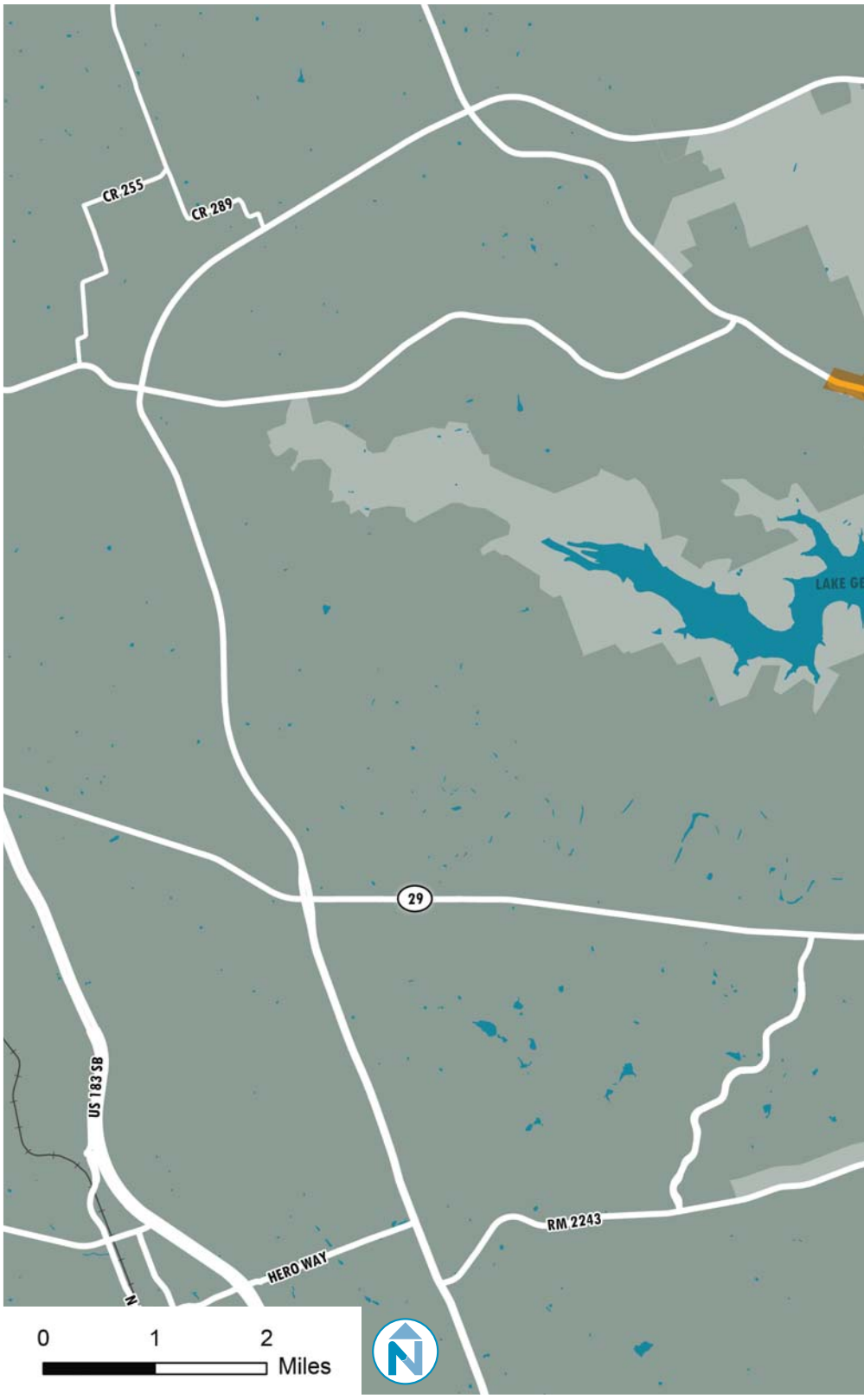
Development of a context-sensitive plan for 7 miles on Williams Drive, which addresses access management strategies, multi-modal transportation elements, safety and operational improvements, and recommendations for a private realm built-form that supports different modes of transportation and a sense of place.

CENTERS PLAN

Development of a plan for a vibrant mixed-use center and gateway along Williams Drive from an area south of Austin Avenue to Lakeway Drive, consistent with the City's 2030 Comprehensive Plan and special taxing district and land use overlays.

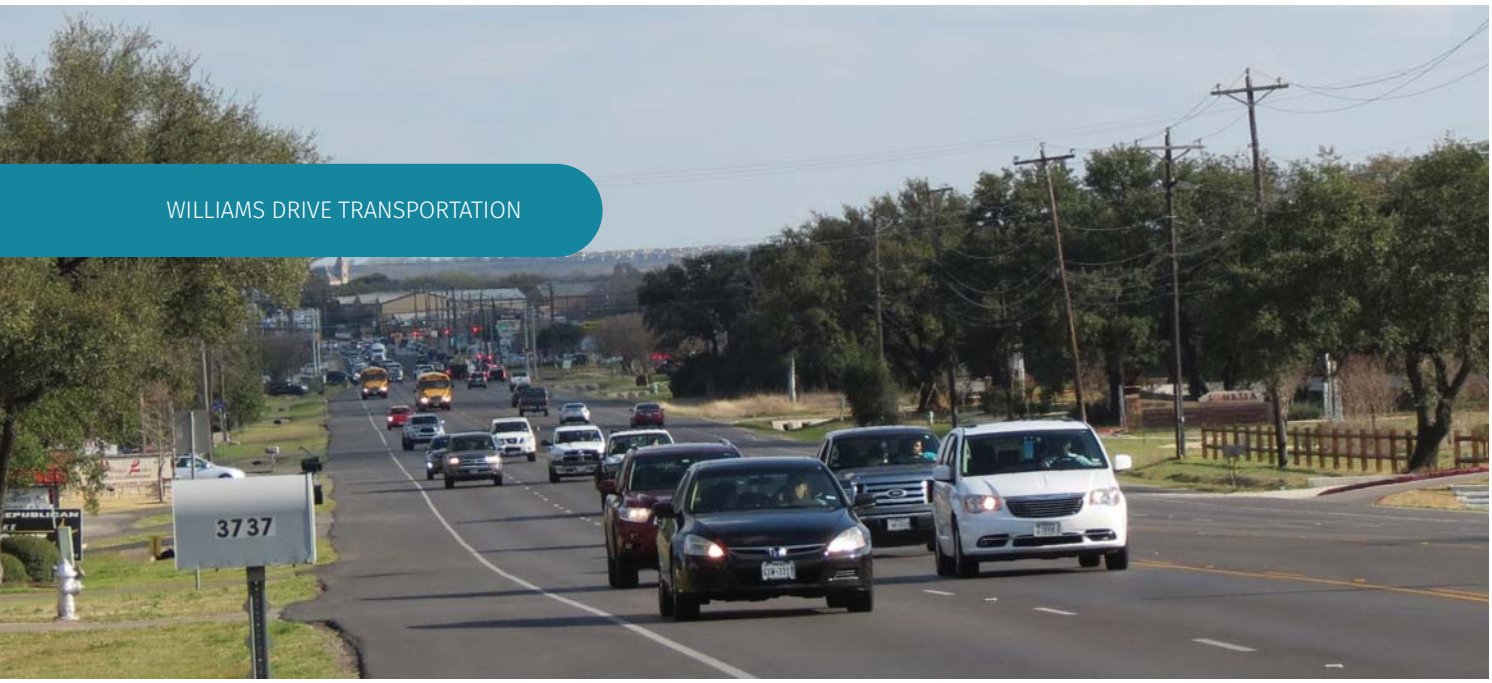
Corridor Study Area

Center Study Area



195
SUN CITY BLVD
DEL WEBB BLVD
SHELL RD
AIRPORT RD
WILLIAMS DRIVE
ORGETOWN
35
D B WOOD RD
130
DOWNTOWN
29
W UNIVERSITY AVE
SE INNER LOOP
S AUSTIN AVE
SAM HOUSTON AVE
LEANDER RD
130
CHANDLER RD
35
WESTINGHOUSE RD

CURRENT TRAVEL PATTERNS



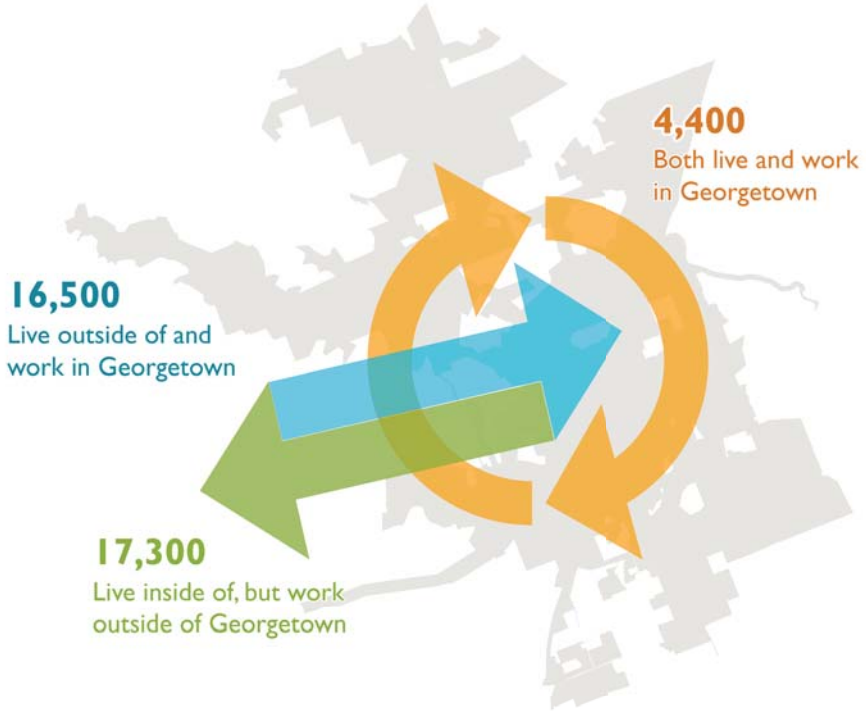
Fewer than 20% of the workers who live in the study area also work in the area, pointing to the importance of the Williams Drive connection to I-35 and a potential need for improved regional connectivity.

A significant population of Georgetown residents commute to work in nearby cities such as Round Rock and Austin. Although they work in neighboring cities, these residents prefer Georgetown's lifestyle and cost of living. In 2014, approximately 80% of the labor force living in Georgetown commuted to other cities for work. Approximately 79% of the labor force lived outside of Georgetown while commuting into the city, and 21% lived and worked within Georgetown (Figure 29).

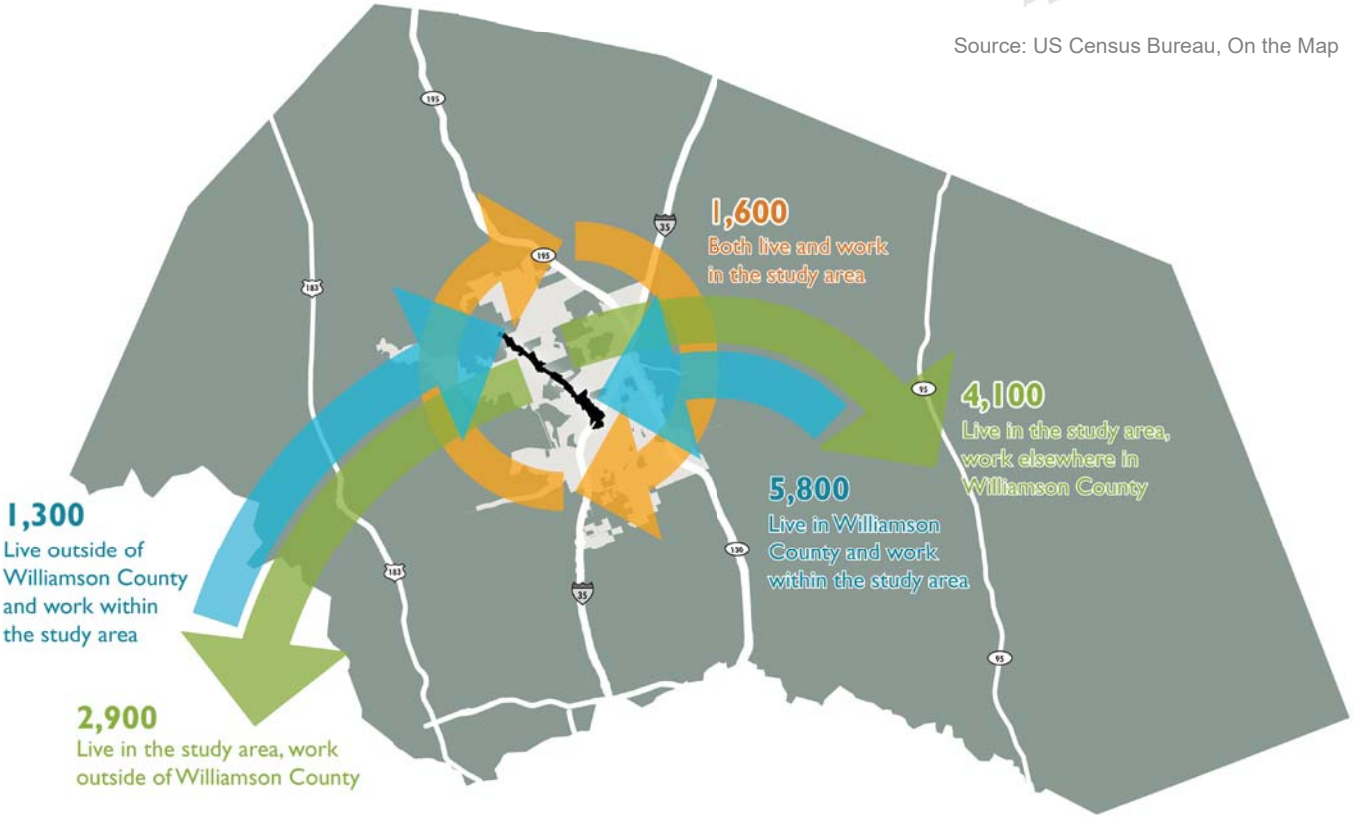
Commute patterns for the area along Williams Drive identify a key dynamic in how the corridor interacts with the rest of the region. As shown in Figure 29, data from the U.S. Census American Community Survey indicate that majority of the workers living in the area commute out of the area to get to work. More than 30% of these workers commute outside of Williamson County, primarily into Travis County (Austin).

Figure 29 Daily Commute Travel Flows

*Note: The population taken into account for the Williams Drive area extends beyond the boundaries of the study area, as there are many residents living outside those boundaries that use Williams Drive on a daily basis. This "capture area" can be seen highlighted in the Williamson County graphic below, and is based on Traffic Analysis Zones.



Source: US Census Bureau, On the Map

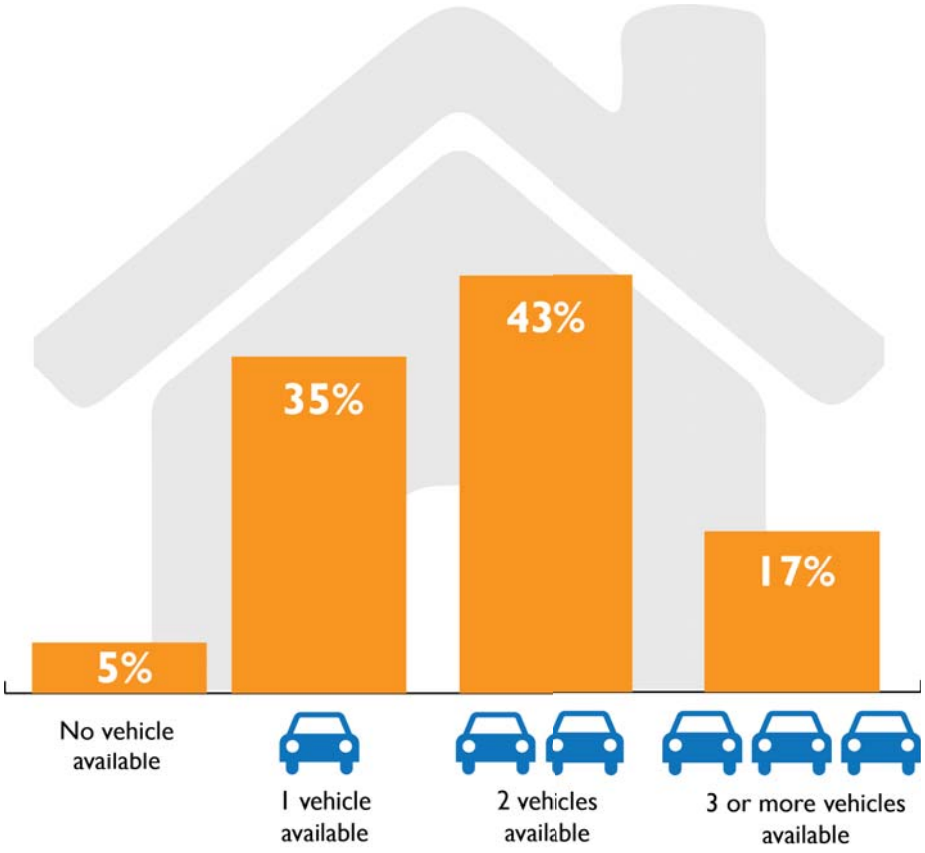


Source: A302100 – Total Workers (Workers 16 years and over) ACS 2006-2010 http://ctpp.transportation.org/Pages/5-Year-Data.aspx

Vehicle Ownership

A vast majority of households in the study area have at least one vehicle available for transportation, as shown in Figure 30. However, 5% of households in the study area do not have access to a vehicle at all. Those households, along with larger households that may only have one vehicle available, are likely dependent on other modes of transportation such as walking and bicycling. While it is possible that these households are retired residents living in communities with access to services, having additional transportation options allows for more independence for those desiring to age in place.

Figure 30 Study Area Household Vehicle Availability



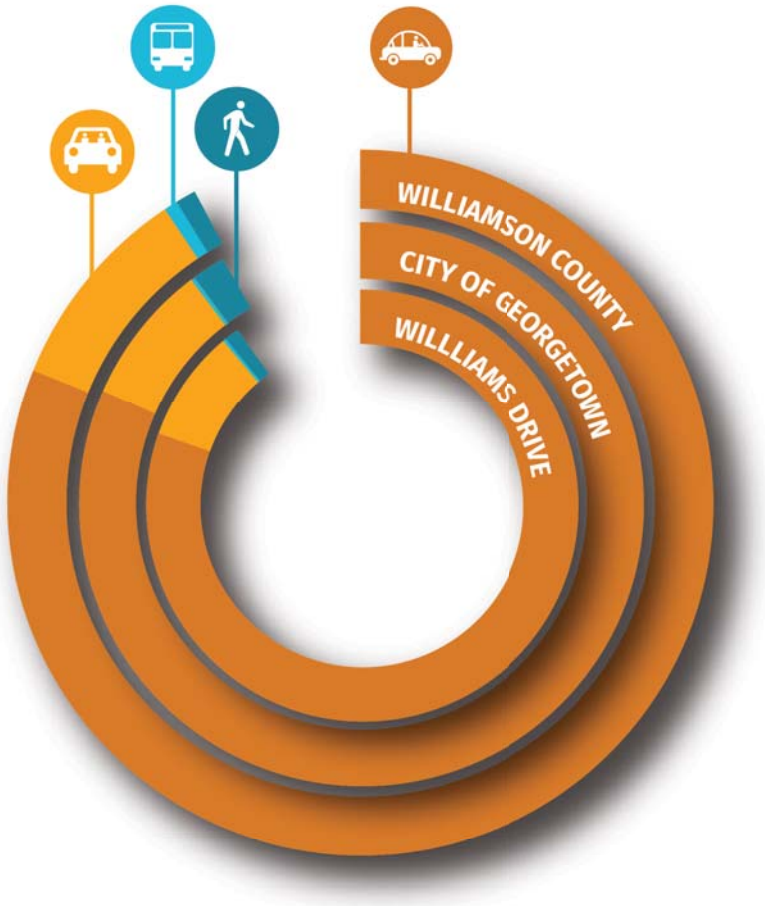
*Note: The population taken into account for the Williams Drive area extends beyond the boundaries of the study area, as there are many residents living outside those boundaries that use Williams Drive on a daily basis.

Source(s): B25044 – Tenure by Vehicles Available ACS 2010-2014

Mode Choice

As shown in Figure 31, the City of Georgetown and surrounding Williamson County exhibit a dominating preference for (and dependence on) driving as the primary mode of transportation. With the exception of Downtown, Georgetown has developed in a way that living (and traveling) without a car is difficult. Like many other cities in the United States, Georgetown was built with separated land uses, low densities, and a generally disconnected street network. As a result, most residents drive to work and use their cars on a daily basis, and Williams Drive is no exception.

Figure 31 Mode Split in Context



Approximately 80% of residents along the corridor drive alone to work.

Around 8% of residents carpool.

Very few residents along Williams Drive choose alternative modes of transportation:

Less than 1% of residents use transit.

Around 2% of residents travel on foot.

The percentage of residents along the corridor that bike to work is negligible.

Nearly 10% of residents take a cab or work from home.

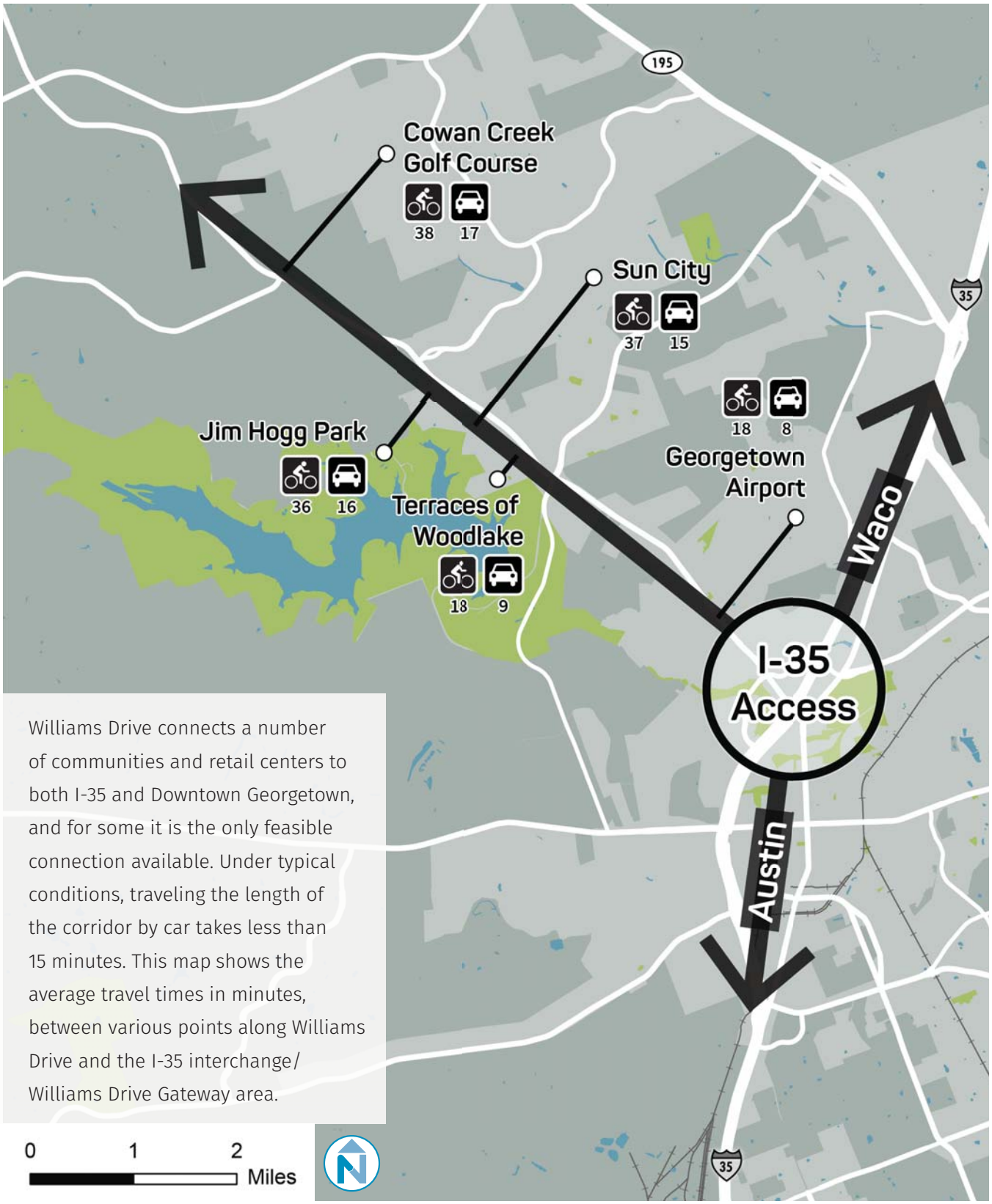
*Note: The population taken into account for the Williams Drive area extends beyond the boundaries of the study area, as there are many residents living outside those boundaries that use Williams Drive on a daily basis.

Source: American Community Survey 2010 - 2014, Means of Transportation to Work

CAR ORIENTED ENVIRONMENT

The car oriented development of Williams Drive has limited both the ability and desire for residents to walk or bike as a mode of transportation. Many sections of Williams Drive are either missing sidewalks or have poor sidewalk conditions. Where quality sidewalks exist, there is limited connectivity from those facilities to others along Williams Drive or within adjacent neighborhoods and retail centers. In addition to a lack of sidewalk connectivity, there is a general lack of street connectivity that also negatively impacts walkability. Greater street connectivity provides more route options and creates a sense of shorter travel distances for pedestrians. Bicycle facilities do not exist along Williams Drive, and are limited to a recreational trail south of the corridor with no connection to Williams Drive. Vehicular speeds on Williams Drive currently do not support a bicycle-friendly environment.

While the City of Georgetown does not yet have a traditional transit system, there is currently a demand-response transit service in place. This service is provided by the Capital Area Rural Transportation System (CARTS), and operates anywhere within the City limits. It is a point to point service that is utilized along Williams Drive, and is primarily used for travel between housing developments, retail centers, and medical centers along the corridor. The City, however, recently adopted a fixed-network bus system that will provide service to the eastern-most portion of the Williams Drive study area.



Williams Drive connects a number of communities and retail centers to both I-35 and Downtown Georgetown, and for some it is the only feasible connection available. Under typical conditions, traveling the length of the corridor by car takes less than 15 minutes. This map shows the average travel times in minutes, between various points along Williams Drive and the I-35 interchange/ Williams Drive Gateway area.

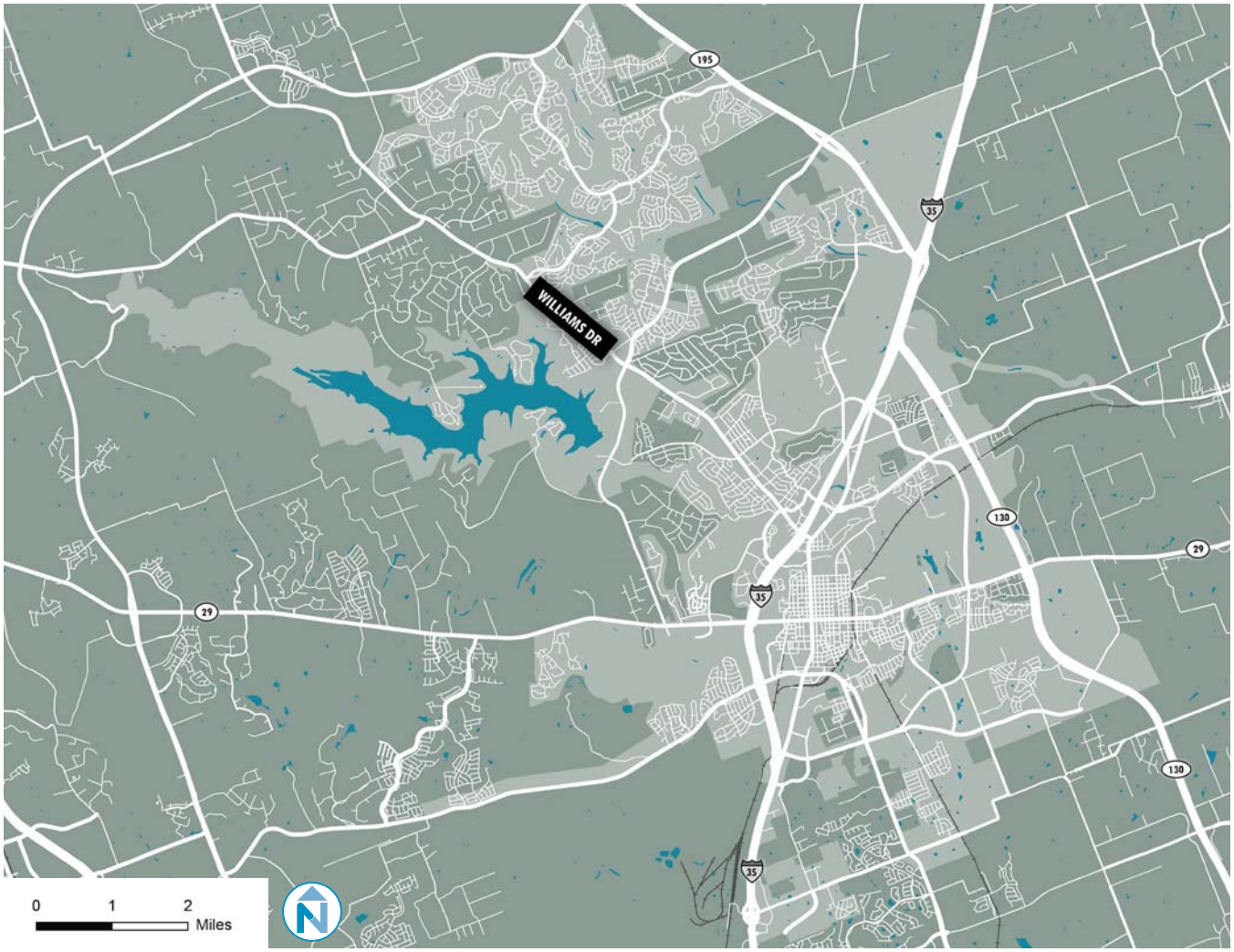
"Because of the poor connectivity of these collectors, the city is facing increasing congestion problems in certain areas. Improving connectivity of the roadway network should be a priority."

-- 2030 Comprehensive Plan

STREET NETWORK AND TRAVEL OPTIONS

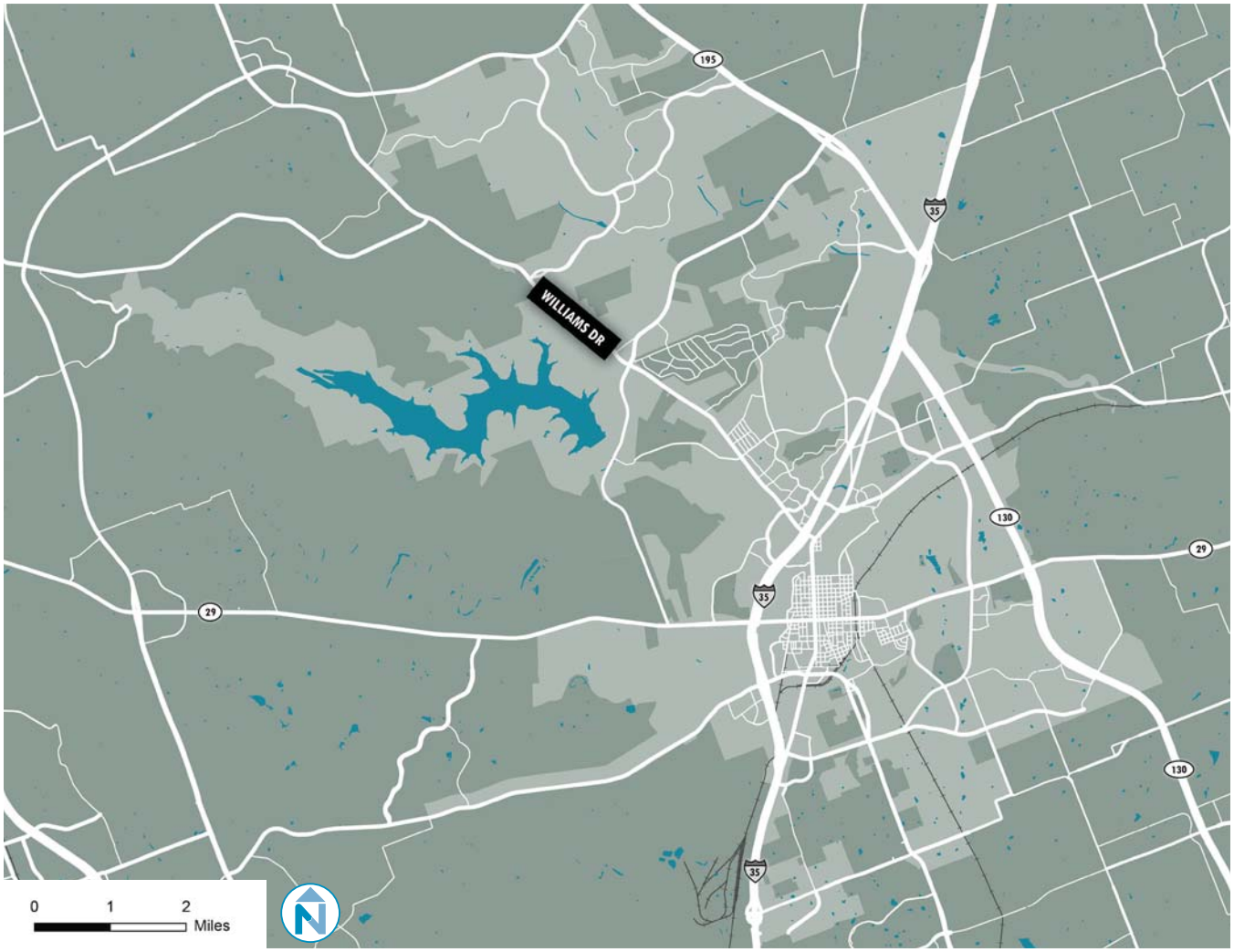
In the 2030 Comprehensive Plan, it is noted that most traffic in Georgetown utilizes the major arterials, while the collector roads that are meant to provide alternatives and distribute traffic lack the connectivity to effectively do so. Looking at a map of the streets in Georgetown, as shown in Figure 32, it would appear that the city has a fairly extensive network.

Figure 32 Map of Existing Street Network



However, when the dead-end streets, cul-de-sacs, and inefficient streets that loop back to where they started are removed from the map, as shown in Figure 33**,** it becomes apparent how few travel options exist. This is particularly true for longer distance travel, and illustrates the demand that is placed on corridors such as Williams Drive. A limited roadway network can contribute to congestion and limits the possible routes for emergency vehicles, which can lead to longer response times.

Figure 33 Map of Effective Street Network



THE CORRIDOR

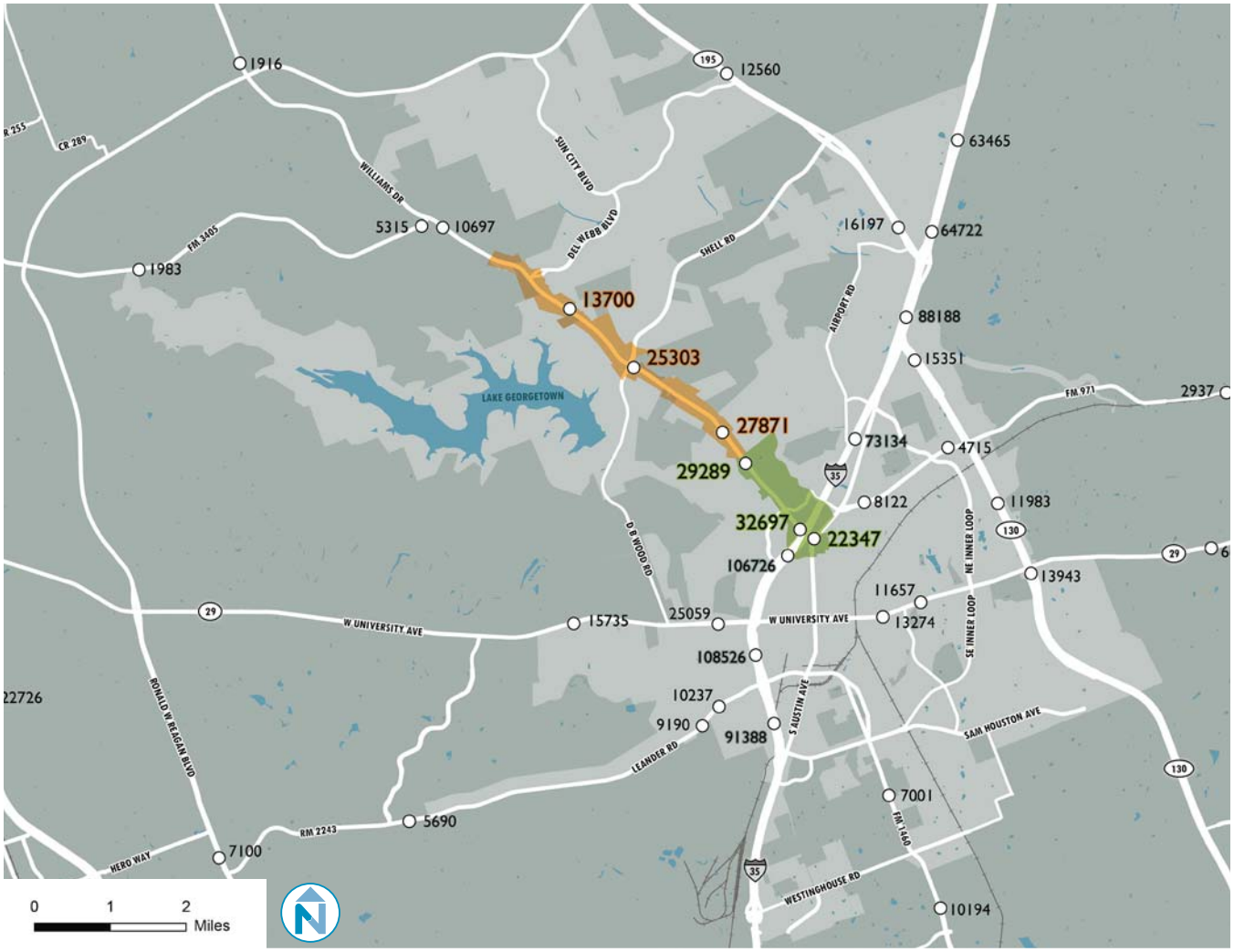
Williams Drive is primarily a four-lane street with a continuous two-way center left-turn lane. As one of few major street connections to I-35 and into Downtown, Williams Drive serves as a primary route for motorists traveling both into and out of the City. Few alternatives exist for residents along Williams Drive to access I-35 and Downtown.

Williams Drive has the highest daily traffic volumes of any major corridor in the greater Georgetown area, making it significant in the overall street network.

Annual Average Daily Traffic (AADT) counts collected by TxDOT in 2013 are shown on the map in Figure 34. These counts illustrate the regional dependence on Williams Drive and its significance in the overall street network. As shown, Williams Drive has the highest daily traffic volumes of any major corridor in Georgetown and surrounding areas, aside from I-35.

It is also worth noting that the volumes along I-35 are much lower on the north side of Williams Drive than they are to the south. This may be due to the fact that there are many more people traveling southward toward Austin than there are traveling north toward Temple or Waco. If residents along Williams Drive had an alternative route or connection in the southbound direction, this could potentially alleviate some of the demand at I-35 and Williams Drive.

Figure 34 Williams Drive and Other Northwest Arterials Traffic Volume



Source: TXDOT 2013

30,000+
cars per day travel on Williams Drive through the Center Study Area

< 20,000
cars per day travel on Williams Drive in the northwestern portion of the Corridor study area

○ Annual Average Daily Traffic Count Location

Corridor Study Area

Center Study Area

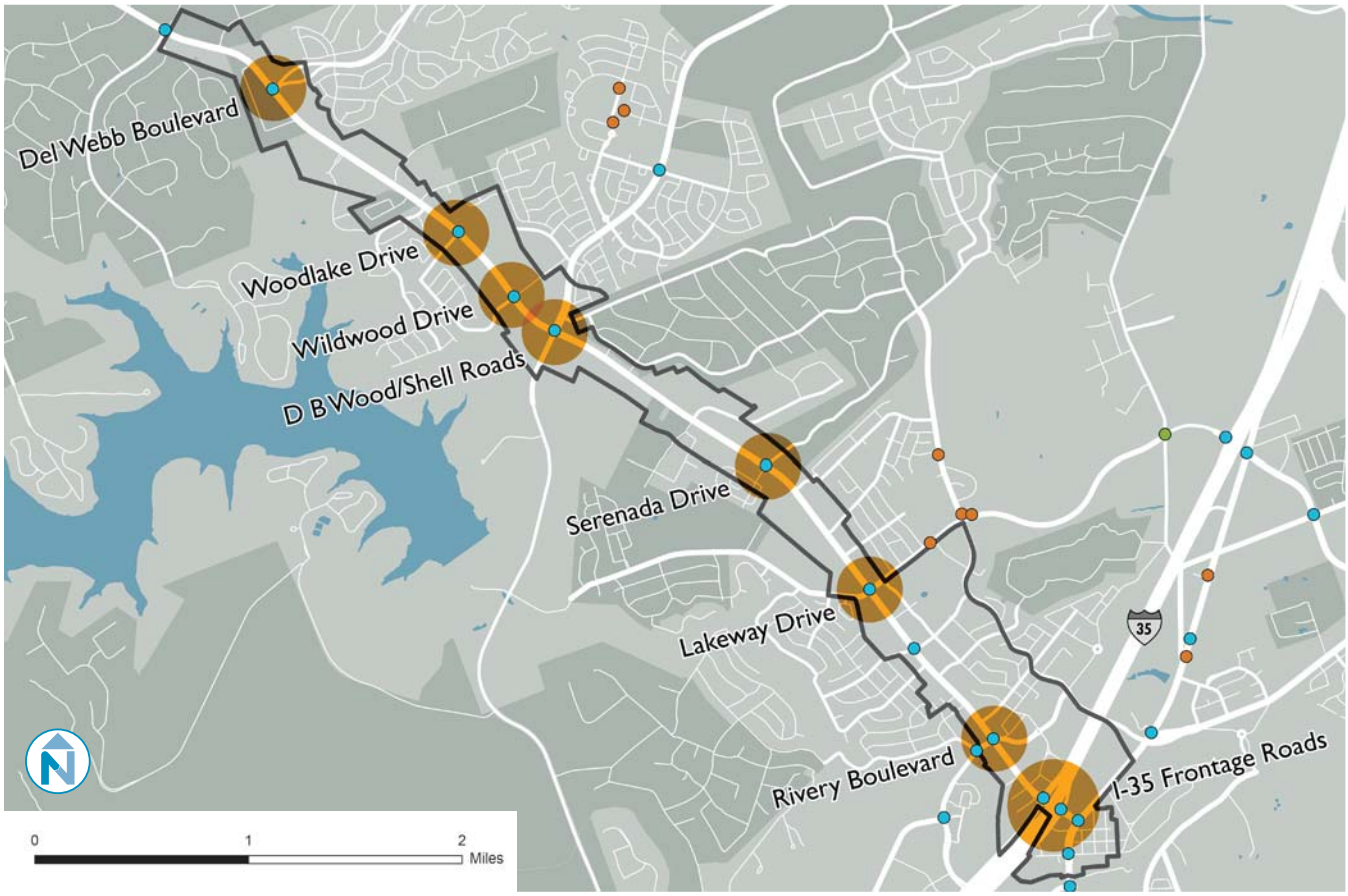
Circulation and Key Intersections

The traffic signal system along the corridor is split into two sections – east of Shell Road and west of Shell Road. West of Shell Road to Jim Hogg Road the City controls five (5) signalized intersections that are within a coordinated system through a fiber connection. This system was last coordinated in 2012. East of Shell Road to the I-35 interchange and Austin Avenue, the traffic signal system is uncoordinated and comprises eight (8) signalized intersections including the I-35 northbound and southbound frontage road signals. The I-35 signals are controlled by Texas Department of Transportation under a single timing plan and individual cabinet. The remaining signals are City controlled and are run on an actuated timing plan without coordination.

This is due in part to the spacing between intersections (1.2 miles between Serenada Drive and Shell Road) and the combination of old and new equipment.

The key intersections highlighted in Figure 35 have experienced volumes ranging from 2,100 to 3,500 vehicles during the busiest hour of the day. The more significant volumes occur near I-35, and at the intersection of Williams Drive with D B Wood and Shell Roads. As these nodes represent important convergence points in the regional transportation network, they see an elevated turning movement count during peak hours relative to total traffic (38-53%).

Figure 35 Map of Existing Street Network



Traffic Signals

- School Signal
- City of Georgetown Signal
- Future City of Georgetown Signal
- TxDOT Signal

Key Intersection

Figure 36 Underutilized Right Turn Lanes

Facility/Location	AM/PM Peak Hour Volumes
Channelized Right Turn from Williams Drive WB to I-35 NB Frontage	32/73
Channelized Right Turn from I-35 SB Frontage to Williams Drive	83/97
Right Turn Only Lane from Williams Drive WB to Serenada Drive	53/61
Right Turn Only Lane from D B Wood Road NB to Williams Drive	72/87
Right Turn Only Lane from Del Webb Boulevard SB to Williams Drive	59/42

As shown in Figure 38, the intersection Levels of Service (LOS) and the associated vehicle delay vary along the corridor with the highest delay at the major intersections of D B Wood/Shell Road, Lakeway Drive and the I-35 interchange including Austin Avenue. As a corridor overall, Williams Drive operates acceptably with an arterial Level of Service C or better during the peak hours. However, it is noted that the section of the corridor from I-35 to Lakeway Drive does have segments of arterial LOS ranging from B (at Rivery Blvd) to E (at I-35 interchange) which is a function of both vehicle volume and roadway operations.

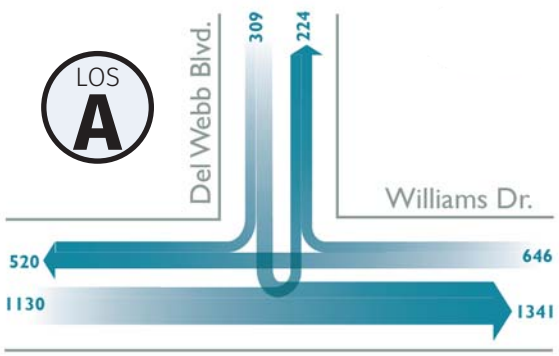
Figure 37 illustrates the turning movement counts at the key intersections along Williams Drive. Further study of activity and turning movements of the identified key intersections revealed segments of Williams Drive that diffuse or contribute to traffic via side streets and driveways during peak hours.

While the data for each intersection was taken over the past couple of years, the information highlights the significant movements occurring at driveways and minor roadways between major intersections. This is due in large part to the roadway configuration with the continuous two-way center turn lane, over 150 driveways and unsignalized intersections along the corridor and also due to demand generated by the commercial land uses.

Figure 37 Turning Movement Counts for Key Williams Drive Intersections

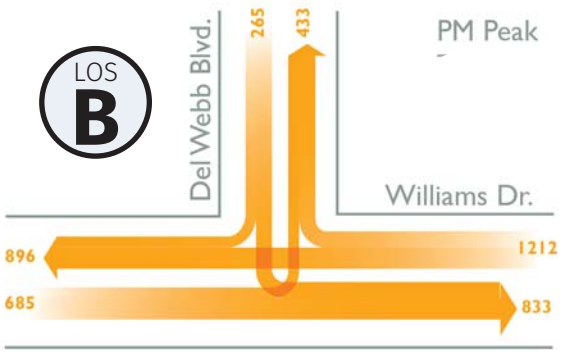
Del Webb Boulevard (2015)

AM Peak - 2,085 Vehicles



AM Delay - 9.6 seconds

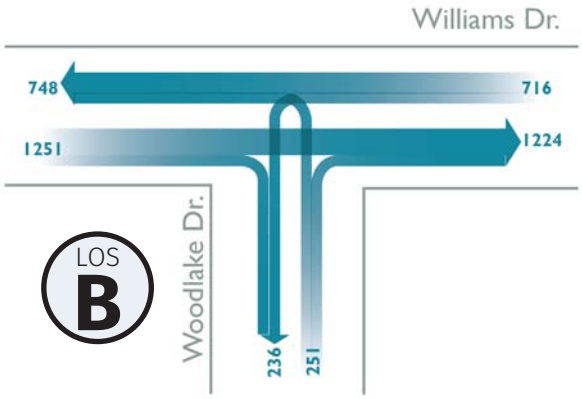
PM Peak - 2,162 Vehicles



PM Delay - 11.9 seconds

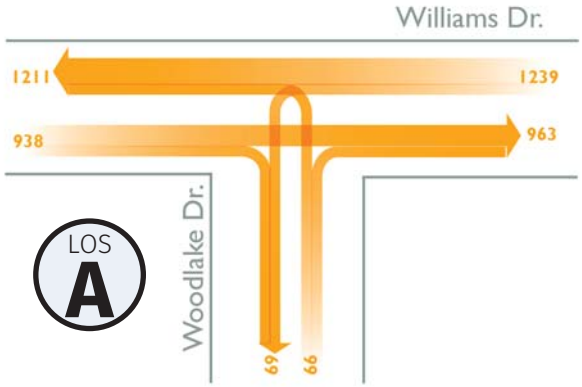
Woodlake Drive (2014)

AM Peak - 2,208 Vehicles



AM Delay - 11.4 seconds

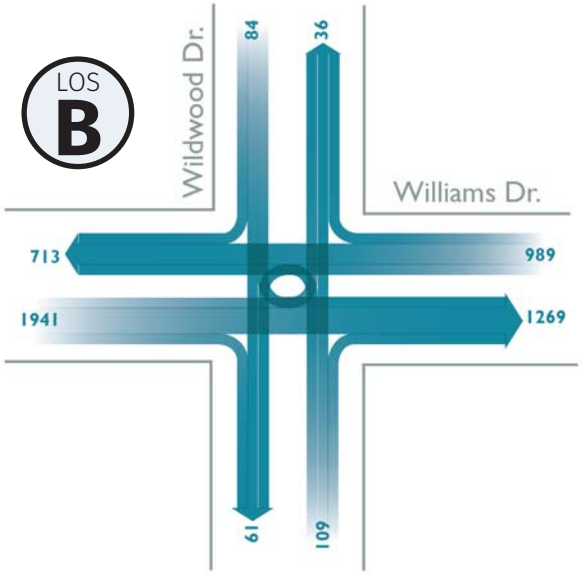
PM Peak - 2,243 Vehicles



PM Delay - 3.6 seconds

Wildwood Drive (2014)

AM Peak - 2,079 Vehicles



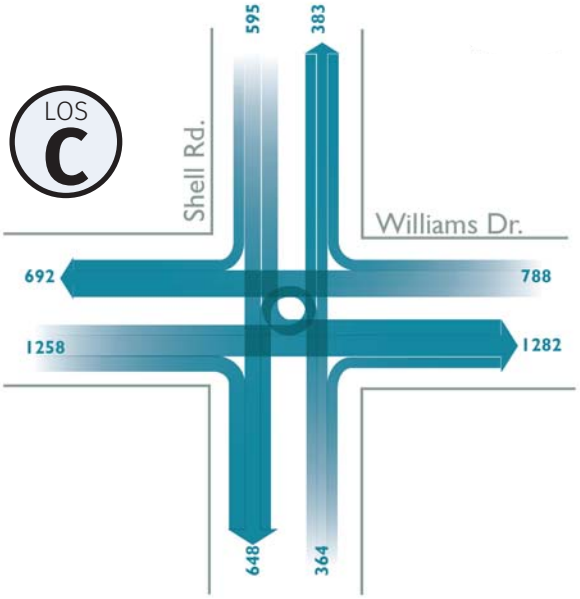
AM Delay - 14.1 seconds

PM Peak - 2,361 Vehicles

PM Delay - 39 seconds

DB Woods/ Shell Road (2014)

AM Peak - 3,005 Vehicles



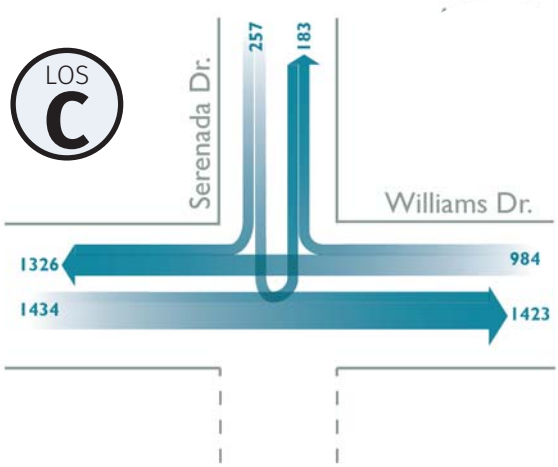
AM Delay - 22.1 seconds

PM Peak - 3,181 Vehicles

PM Delay - 36.5 seconds

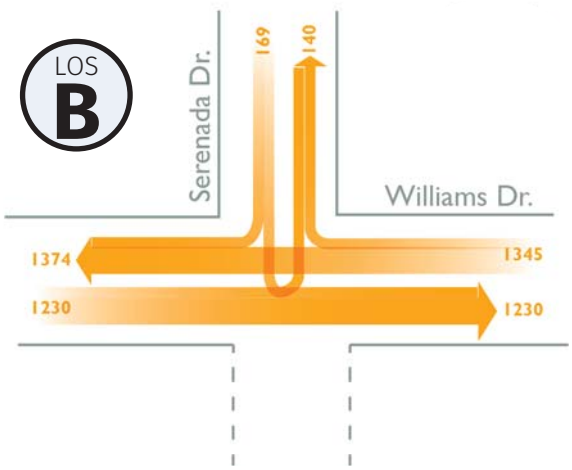
Serenada Drive (2016)

AM Peak - 2,675 Vehicles



AM Delay - 31 seconds

PM Peak - 2,744 Vehicles

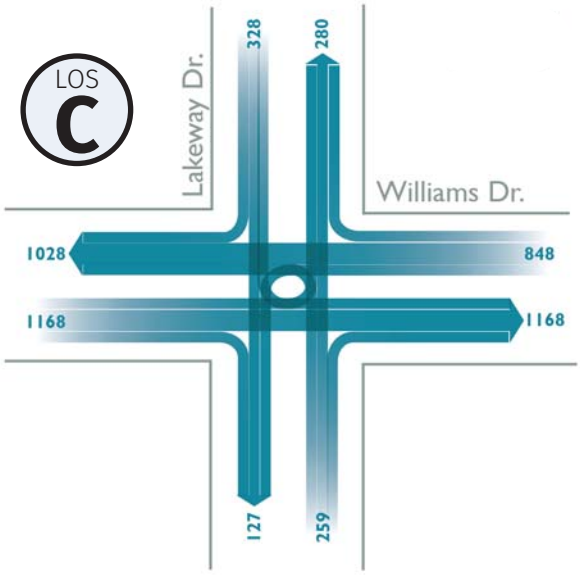


PM Delay - 13.6 seconds

Note: Dashed lines indicate street did not exist at time of data collection

Lakeway Drive (2016)

AM Peak - 2,603 Vehicles



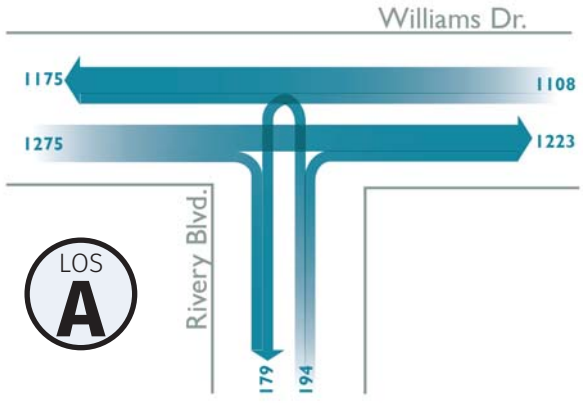
AM Delay - 29.3 seconds

PM Peak - 3,044 Vehicles

PM Delay - 38.6 seconds

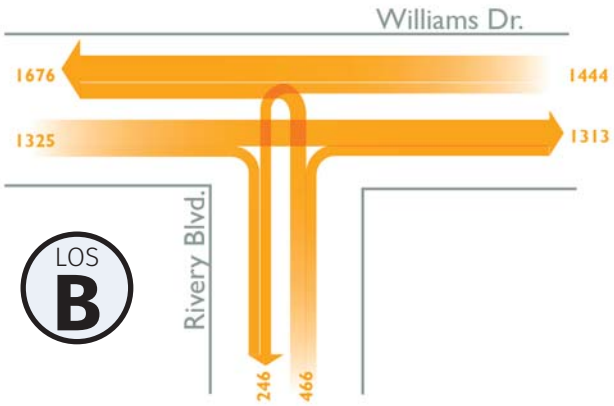
Rivery Boulevard (2013)

AM Peak - 2,577 Vehicles



AM Delay - 8.4 seconds

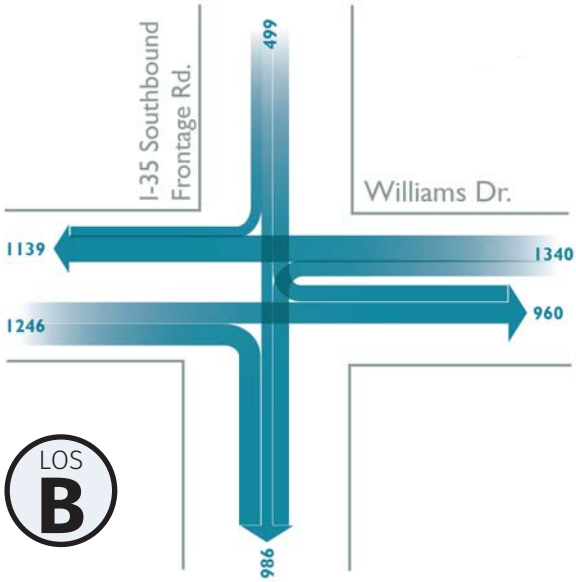
PM Peak - 3,235 Vehicles



PM Delay - 13.7 seconds

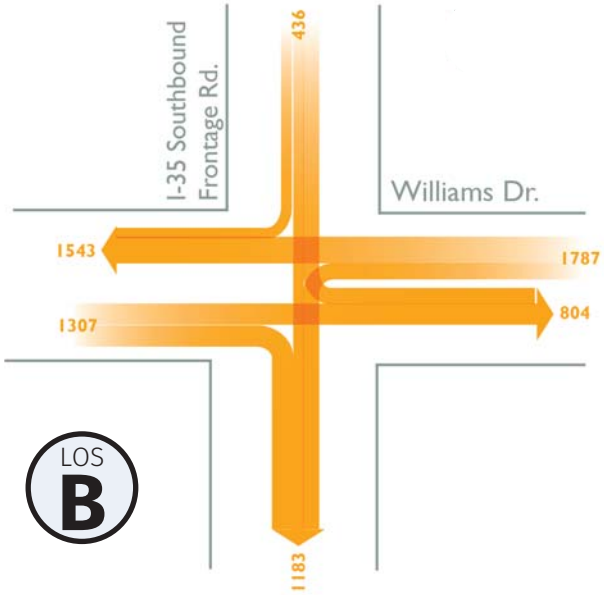
I-35 Southbound Frontage Road (2013)

AM Peak - 3,085 Vehicles



AM Delay - 16.6 seconds

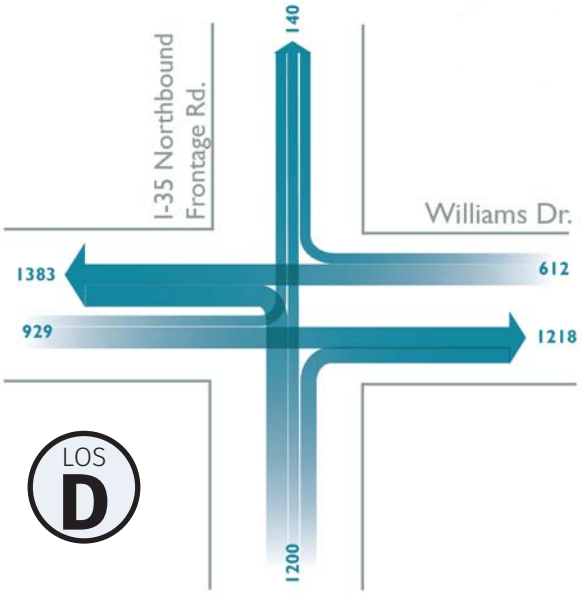
PM Peak - 3,530 Vehicles



PM Delay - 14.8 seconds

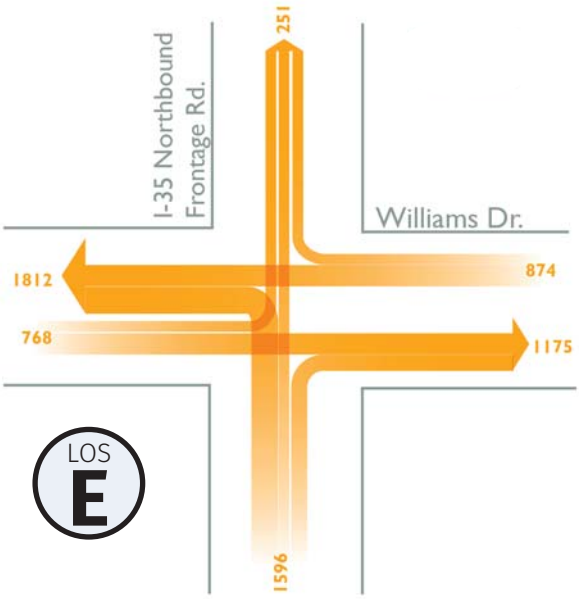
I-35 Northbound Frontage Road (2013)

AM Peak - 2,741 Vehicles



AM Delay - 39.3 seconds

PM Peak - 3,238 Vehicles



PM Delay - 58.4 seconds

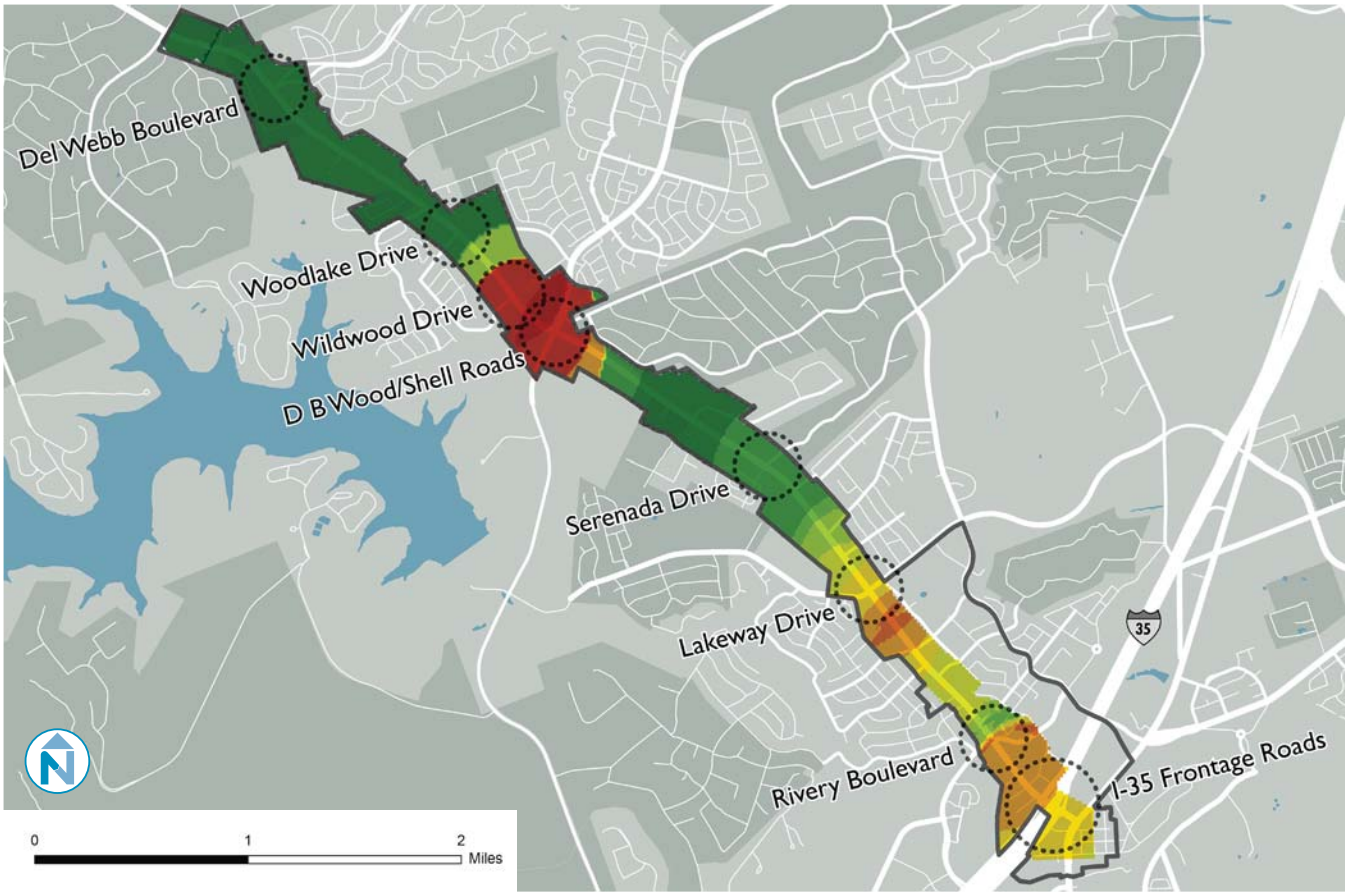
Figure 38 Summary of Intersection Conditions

Intersection	AM		PM	
	LOS	Delay	LOS	Delay
Jim Hogg Road	B	13.1	A	8.2
Del Webb Boulevard	A	9.6	B	11.9
Woodlake Drive	B	11.4	A	3.6
Wildwood Drive	B	14.1	D	39
Shell / D B Wood Road	C	22.1	D	36.5
Serenada Drive	C	31	B	13.6
Lakeway Drive	C	29.3	D	38.6
Rivery Boulevard	A	8.4	B	13.7
I-35 SB Frontage Road	B	16.6	B	14.8
I-35 NB Frontage Road	D	39.3	E	58.4
Austin Avenue	B	15.3	B	19.5

Roadway Safety

The highest concentration of motor vehicle crashes along the Williams Drive corridor occurs in or near the proximate intersections at D B Wood/Shell Roads and Wildwood Drive, as illustrated in Figure 39. While corridor volume is not at its highest on this stretch of road, roadway width is large (76 feet) and turning movements are very high compared to the rest of the corridor. Other areas with elevated crash concentrations include the segment between Rivery Boulevard and Lakeway Drive, which was previously identified as a transition area with a high number of turning movements during peak periods and the highest daily traffic volumes.

Figure 39 Williams Drive Motor Vehicle Collision Concentration



837
Crashes within the study area between 2010 - 2015

Key Intersections

Concentration of Crashes
Low
Medium
High

Health and Safety

Creating a physical environment that encourages citizens to choose active transportation for short trips has health, social, and environmental benefits. Because the transportation system helps shape how communities are designed and operate, it can have a significant influence on public health. By influencing the travel decisions that people make - and thus their levels of physical activity, air pollution exposure, and risk of crash involvement - transportation planning decisions can affect major health outcomes.

Automobile travel is positively associated with sedentary living and increased body weight, whereas increased walking, bicycling, and public transit ridership are correlated with reduced chronic disease.[1] Access to convenient active transportation opportunities benefit the individual through the addition of physical activity to their daily routine.

Transportation is also a major source of pollution, generating air, soil, water, and even noise pollutants. Even moderate concentrations of ground-level ozone and particle pollution in the air make it more difficult to breathe for older adults, young children, and those who suffer from respiratory problems such as asthma, bronchitis, and emphysema.[2] Any trips made on foot or by bicycle help community members reduce any negative impact on air quality and greenhouse gas emissions that affect these common respiratory problems.

Finally, well-functioning transportation alternatives improve equity, allowing the elderly, disabled, low-income, and youth to fully participate in their community when useful, safe, and low-cost transportation options are available.

1 Harvard T.H. Chan School of Public Health. "Physical Activity and Obesity."

2 American Lung Association, 2015. State of the Air 2015.

Walking

In 2014, the City adopted the Sidewalk Master Plan. This Master Plan included a citywide assessment of existing sidewalk facilities and the prioritization of future sidewalk improvement projects. Along Williams Drive the assessment identified 6.7 miles of missing sidewalk, 0.4 miles of sidewalk as having limited failure, and 0.07 miles of sidewalk as completely failing. Limited failure indicates that the sidewalk is functional; however, there are spots where the sidewalk is failing. Sidewalk failures include excessive slope, faulting, distortion, or sunken areas. Completely failing indicates the sidewalk cannot be used by wheelchairs and is difficult for all pedestrians.

Most of the Williams Drive corridor has major gaps in sidewalk facilities, resulting in a lack of overall pedestrian connectivity. Functioning sidewalk facilities on Williams Drive are generally present at major shopping centers, such as the centers located at the intersection of Williams Drive and DB Wood Road. These sidewalk facilities are located directly in front of and along the edge of the shopping center, but end at or just beyond the property line. Gaps in the sidewalk network also exist along side streets that connect Williams Drive to adjacent residential communities. As shown in Figure 40, there are a number of schools within or near the study area that are surrounded by streets with poor quality or non-existent sidewalks.

The map in Figure 40 also identifies locations where there have been recorded pedestrian-involved crashes. Most of these crashes appear to have occurred within or near shopping center parking lots, indicating a potential issue with the design of these land uses and the lack of safe pedestrian accommodations surrounding them.

Figure 40 Existing Pedestrian Facilities and Crash Locations

7

Pedestrian-involved crashes within the study area between 2010 - 2015

(2 located at the corner of DB Wood Road and Williams Drive)

Pedestrian-Involved Crash Location

City Facility

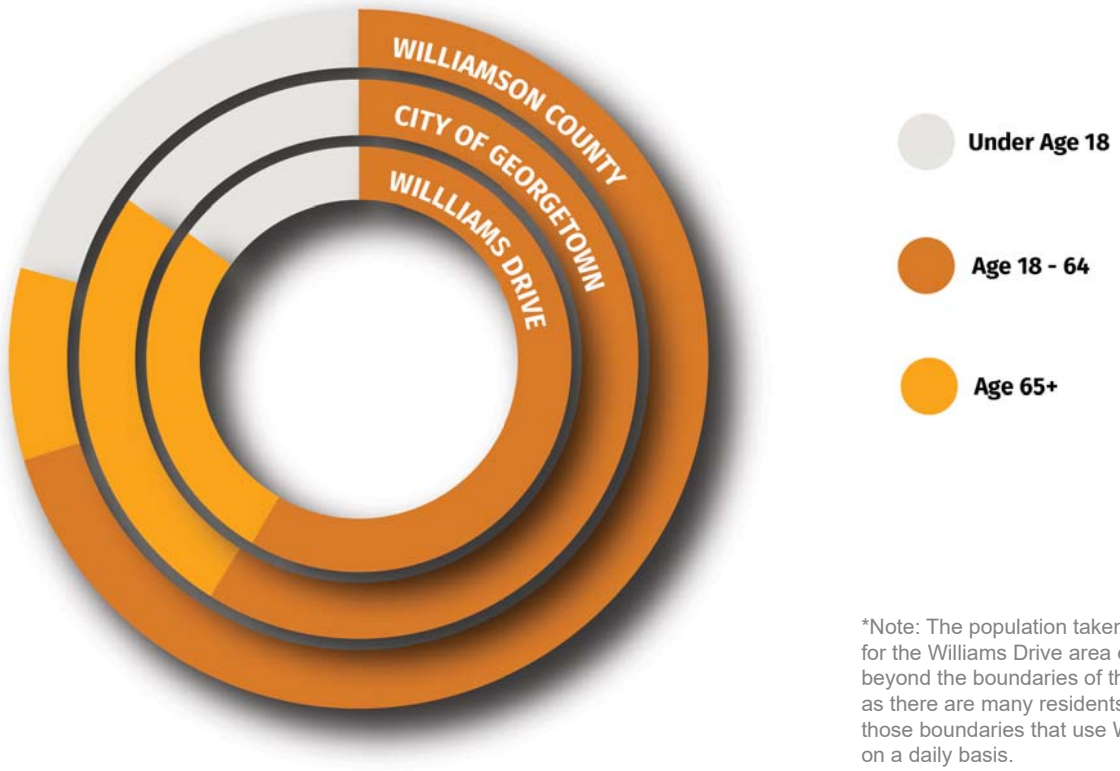
School

Sidewalk Conditions

- Excellent
- Good
- Passable
- Limited Failure
- Failing
- No Sidewalk

The chart in Figure 41 illustrates the breakdown of age groups along Williams Drive in comparison to that within both the City and the County. The population taken into account for the Williams Drive area extends beyond the boundaries of the study area, as there are many residents living outside those boundaries that use Williams Drive on a daily basis. Both Georgetown and Williams Drive have a much higher percentage of seniors than the County, each sitting at around 27% compared to only 9% in the County. The County, on the other hand, has a much higher percentage of 18 – 64 year olds at approximately 70% of the total population. School-age children, or children under the age of 18, make up about 15% of the population in both Georgetown and along Williams Drive.

Figure 41 Age Breakdown by Area



*Note: The population taken into account for the Williams Drive area extends beyond the boundaries of the study area, as there are many residents living outside those boundaries that use Williams Drive on a daily basis.

The number of school-age children, who may walk or ride a bike to school in the study area, provides an indicator for areas that may need attention in order to meet the needs of this population. This may require things such as installation of safe crossings, speed management, improvement of sidewalks, or installation of shared use paths. Routes between high concentrations of school-age residents and school facilities should be the most critical for these considerations. As senior citizens also make up a significant portion of the population along the corridor, it is important to consider the needs of these residents as well. The map in Figure 42 illustrates the gaps in the current sidewalk network in relation to the percentage of seniors and children in the area. Areas shown in dark purple should be of highest concern where there are gaps in the sidewalk network.

Figure 42 Sidewalk Facilities with Total Percentage of Seniors and Children

Sidewalk Conditions

- Limited Failure
- Failing
- No Sidewalk

Pedestrian-Involved Crash Location

City Facility

School

Concentration of Seniors & Children

- < 1 per acre
- 1 - 2 per acre
- 2 - 4 per acre
- 4 + per acre

The Sidewalk Master Plan categorized planned sidewalk improvements as priority one, two, or three. Priority One projects are scheduled for completion within the first ten years of the adoption of the Master Plan (by 2025). Priority Two projects are anticipated to be completed within the subsequent ten-year period, and Priority Three projects will be addressed in a future update to the Master Plan. The map in Figure 43 illustrates the locations within the study area that were included in the Sidewalk Master Plan.

The Master Plan included funding for Citywide APS signal upgrades as well as curb ramp and crosswalk upgrades within the selection of Priority One projects. A number of intersections within the study area fall into this category and are currently in design, to be bid for construction in January 2017. Those intersections include:

- Lakeway Drive at Williams Drive
- Shell/DB Wood Road at Williams Drive
- Wildwood Drive at Williams Drive
- Lakewood Drive at Williams Drive
- Rivery Boulevard at Williams Drive

Two Priority Two projects within the Williams Drive study area were identified in the Sidewalk Master Plan. The first project will install new, and repair existing, sidewalks and curb ramps along the following road segments: Williams Drive between Lakeway Drive and Rivery Boulevard, Lakeway Drive between Williams Drive and Northwest Boulevard, Whisper Oaks Lane between Lakeway Drive and Northwest Boulevard, and Dawn Drive between Western Trail and Lakeway Drive. This project will add over 2 miles of new sidewalk. The second project will fill in sidewalk gaps along Shell / DB Wood Road by installing new facilities and repairing those in poor condition along the corridor between Lake Overlook Road and the city limit at approximately Westbury Lane. This project will add nearly 3 miles of new sidewalk. An additional portion of Williams Drive between Estrella Crossing and Lakeway Drive was identified in the Master Plan as a Priority Three project, but no other improvements along Williams Drive were included.

Figure 43 Sidewalk Master Plan Priorities

Sidewalk Conditions

- Limited Failure
- Failing
- No Sidewalk

Master Plan Priority Tiers

- Priority Two
- Priority Three

- Pedestrian-Involved Crash Location
- City Facility
- School

Bicycling

Current conditions on Williams Drive include moderate traffic volumes and high vehicle speeds. These conditions are a deterrent to most people who might otherwise be interested in using a bicycle for transportation. Without dedicated and protected bicycle facilities, this environment will not encourage many new bicyclists along the corridor. There currently are no bicycle facilities on Williams Drive, but there is a narrow bike lane along Rivery Boulevard that connects Williams Drive to the Randy Morrow Trail.

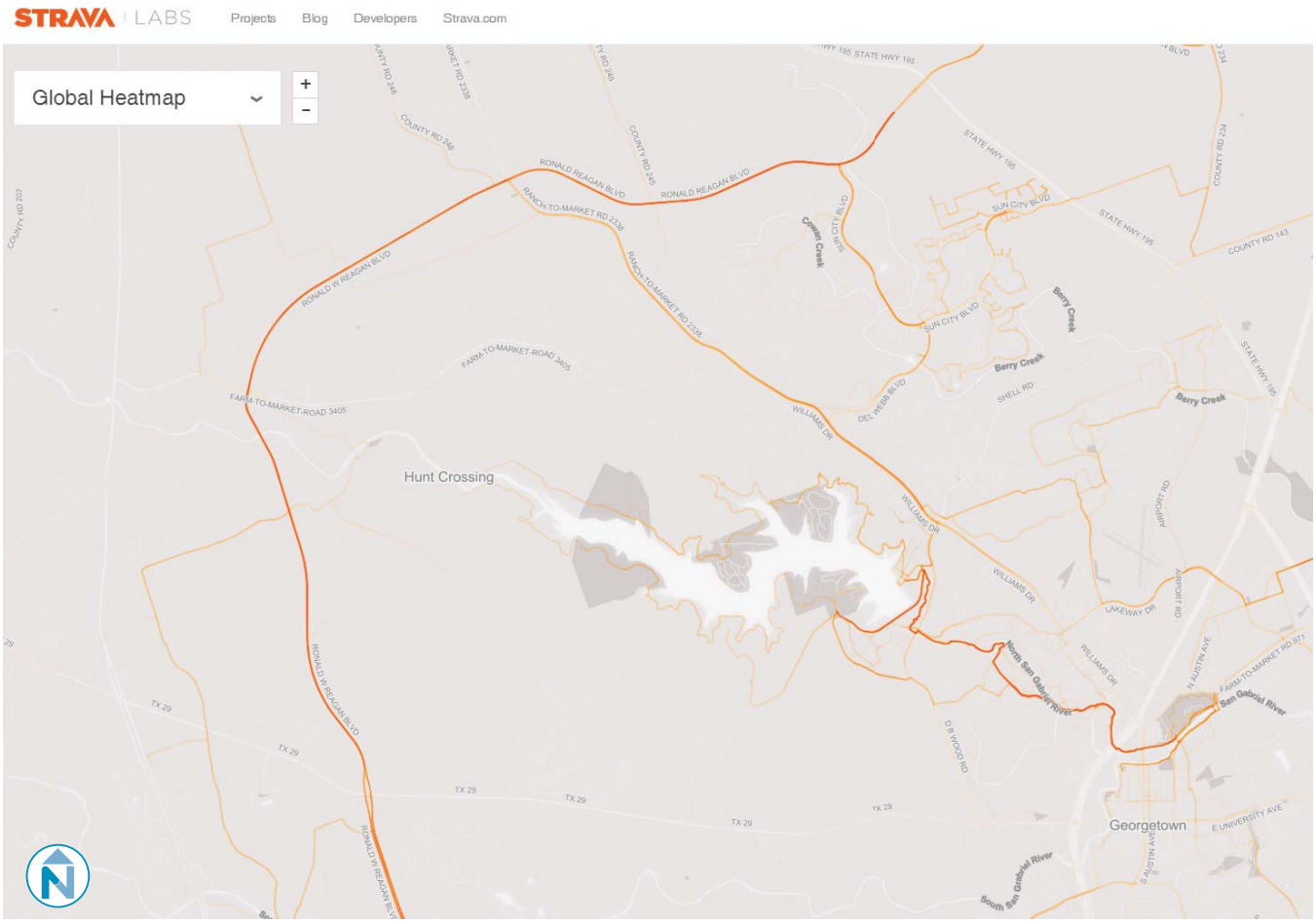
This trail is located to the southwest of Williams Drive. It provides a connection from Lake Georgetown to San Gabriel Park and into Downtown. Rivery Boulevard is the only direct bicycle facility connection from Williams Drive into the trail, but it is also possible to access it using local residential streets. Booty's Crossing Road connects to Williams Drive at the intersection with Lakeway Drive, and provides an access point to the trail. DB Wood Road also provides a connection to the trail within a short distance of Williams Drive, but without a designated bicycle facility.

Data was pulled from the Strava Global Heatmap lab to help understand where current bicyclists are riding, and what areas they may be avoiding. This data is limited to bicyclists who use the Strava mobile app and website, and the total number of bicyclists in the dataset is unknown. As shown in Figure 44, the data illustrate a significant number of bicyclists currently using the Randy Morrow Trail, while few are using Williams Drive as it approaches I-35 and Downtown. This portion of Williams Drive has higher traffic volumes and less right of way compared to the area of Williams Drive west of Shell Road. The area closer to I-35 also has a high number of driveways and intersections for motorists to make turning movements, which can create conflict with bicyclists.

Just west of Lakeway Drive, Williams Drive widens slightly to accommodate a shoulder on both sides of the street. In the area east of Serenada Drive, this shoulder sometimes transitions into a right-turn only lane and is often used as a deceleration lane for right-turning motorists. Further west along Williams Drive near Del Webb Boulevard, the street widens out even more while maintaining the same lane configuration (and total number of lanes). While wider lanes (and the lower traffic volumes) encourage higher speeds, this area also has wide shoulder lanes that are likely used by the bicyclists that the Strava data indicate as being more consistently along this portion of the corridor.

It is also worth noting that the Strava data indicates a high volume of bicyclists using Ronald Reagan Boulevard to travel between Williamson County and Travis County, and it appears that many are connecting to Ronald Reagan from Williams Drive. While much of the data from Strava may be coming from primarily recreational bicyclists, it can still be used as an indicator for the areas and types of conditions that may not be suitable for bicycling.

Figure 44 Strava Labs Bicycling Data for Williams Drive



Source: http://labs.strava.com/heatmap/#13/-97.72871/30.68826/orange/bike

Bicycle Ridership Levels (2015)

- High
- Moderate
- Low

Note: Ridership levels are a relative comparison.

Transit

Fixed-route transit services currently do not operate along the Williams Drive corridor, as Capital Area Rural Transportation System (CARTS) interurban services between Georgetown and Round Rock depart from downtown and points south. However, demand-response services are offered by CARTS that currently serve the Williams Drive study area, along with most of Georgetown. Non-emergency medical transportation services are also offered within the CARTS service area.

The demand-response services within Georgetown are most often used to and from the Madella Hilliard Center for senior citizens. Other top destinations in the community include retail destinations such as the Walmart Supercenter and the H-E-B off University, as well as medical or social service destinations including Davita Georgetown, The Caring Place, and Weslyann Nursing Home. On Williams Drive demand-response service is primarily used to make trips to and from age-restricted senior communities. The locations listed in Figure 45 are near or within the Williams Drive study area and are among the top 10 most frequented locations for the demand-response service. These locations are also identified on the map in Figure 46, illustrated with varying size points based on the number of transit users boarding or alighting at those locations.

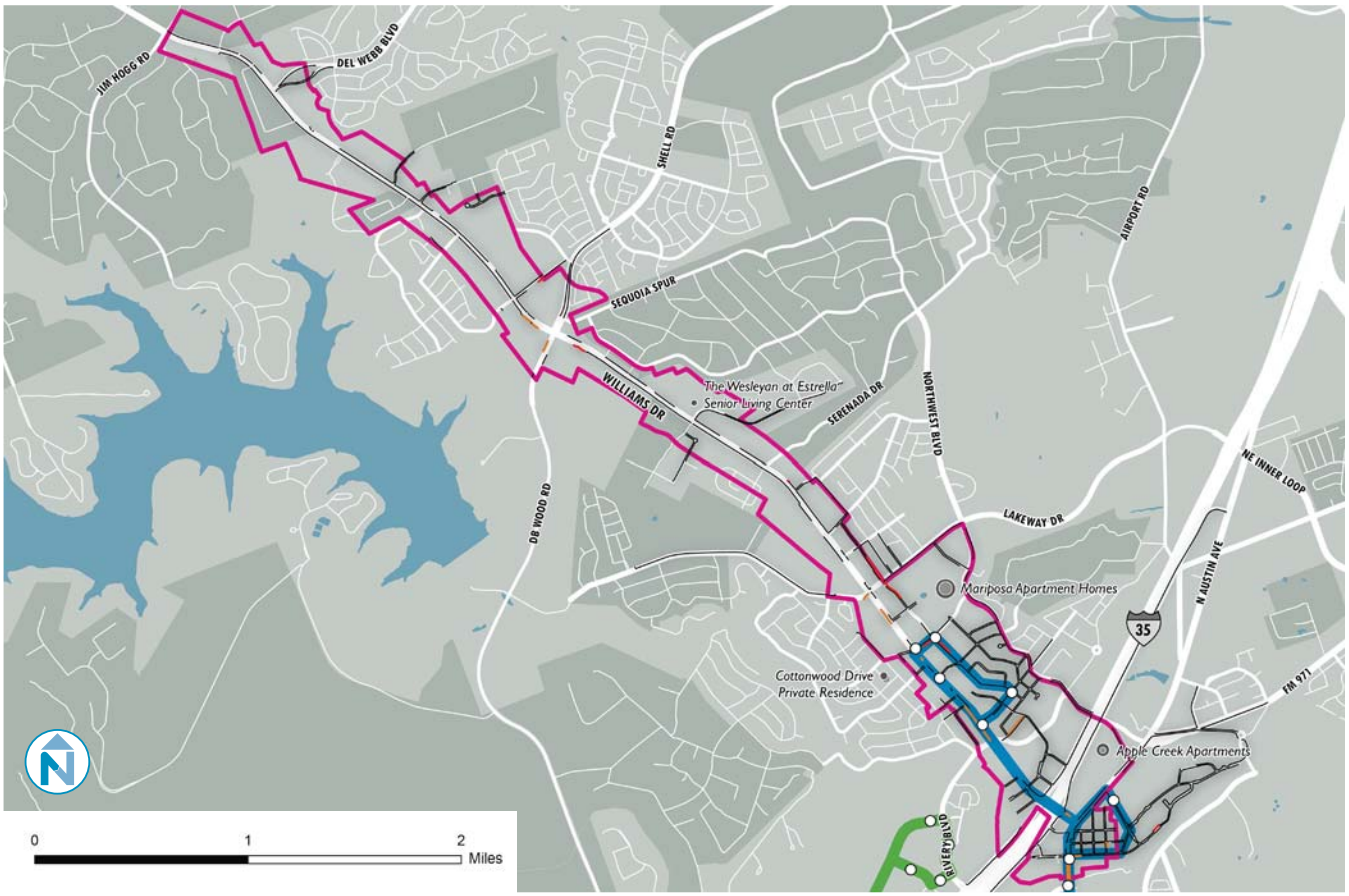
Figure 45 Top Demand-Response Trip Origins and Destinations along Williams Drive

Location	Number of Trips (Origin)	Number of Trips (Destination)
Apple Creek Apartments	55	59
Mariposa Apartment Homes	75	108
The Wesleyan at Estrella Senior Living Community	-	43
Cottonwood Drive Private Residence	58	57

Source: CARTS

In 2015 Capital Metro, the transportation authority for parts of Travis and Williamson County and Georgetown, commissioned a study to develop a local transit plan for the City of Georgetown. A 2016 update reduced the reach of this plan from a five-route system, which would have served the entirety of Williams Drive, to a four-route system whose reach extends only as far as River Bend Drive, and is shown in Figure 46. The routes, anticipated to begin operation in August 2017, will operate only every 60 minutes from 6:45 a.m. to 6:45 p.m. on weekdays, and 8:00 a.m. to 6:00 p.m. on Saturday. Complementary paratransit service for seniors and persons with disabilities will replace the existing CARTS services for Georgetown residents.

Figure 46 Planned Transit Routes and Stops - Capital Metro Transit Development Plan



Planned Transit

- Bus Stop
- Route 2
- Route 4

Existing Demand-Response Ridership (Origins & Destinations)

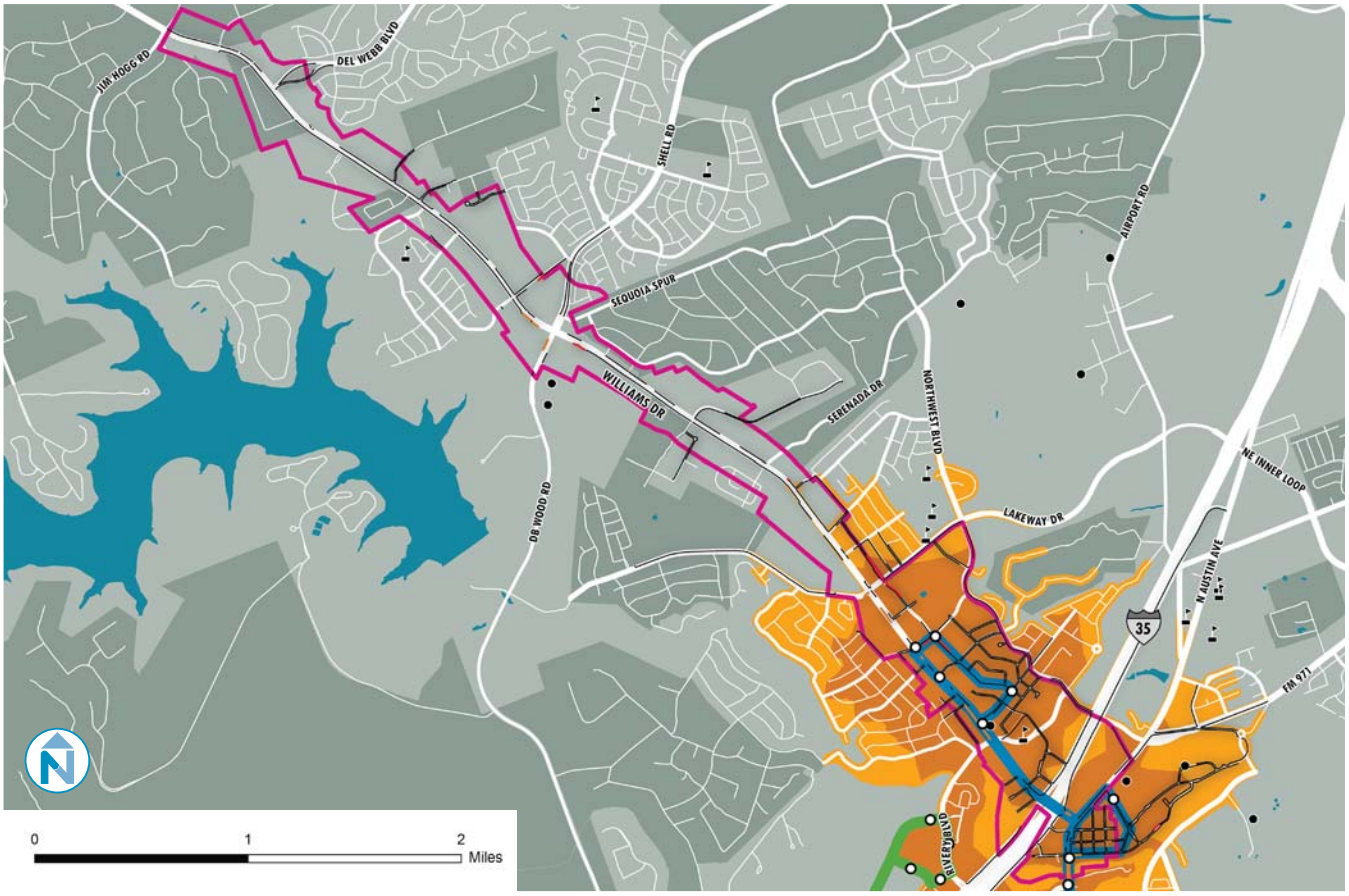
- 0 - 50
- 51 - 100
- 101 - 200
- 201 +

Sidewalk Conditions

- Limited Failure
- Failing
- No Sidewalk

The maps in both Figure 47 and Figure 48 illustrate how many of the planned bus stops are in locations where there are currently significant gaps in the sidewalk network. While these gaps will create a barrier for any potential transit users, they are not the only barrier that exists within the study area. The lack of street connectivity, both into and adjacent to Williams Drive, severely restricts not only vehicular traffic but pedestrian movement as well. As illustrated by the map in Figure 47, the distance a pedestrian can walk in 10 minutes from many of the planned bus stops is fairly limited. Nearly 20% of residents in the general study area live within a 10-minute walk of the transit stops shown on the map. That number increases to almost 30% within a 20-minute walk. Only about 3% of the residents within 10 minutes, or about 4.5% within 20 minutes, are seniors. Improving connectivity can help increase the number of residents with access to transit. This can include providing a pathway connection between neighborhood streets, cul-de-sacs, and major corridors, or establishing pedestrian pathways through major retail sites with expansive parking lots.

Figure 47 Walkable Distance from Planned Transit Stops



Walkable Distances

- 10-minute walk
- 20-minute walk

Planned Transit

- Bus Stop
- Route 2
- Route 4

Sidewalk Conditions

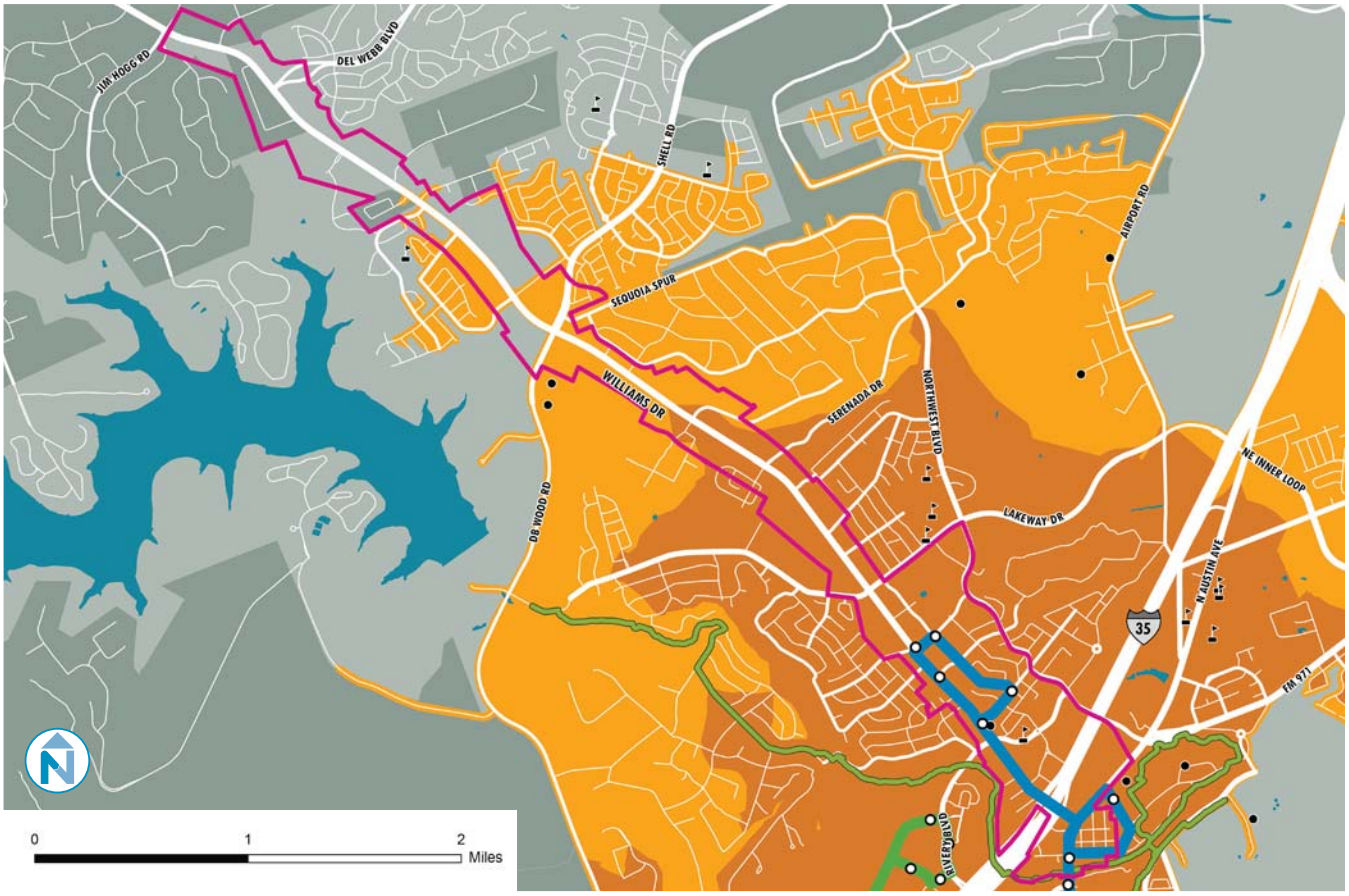
- Limited Failure
- Failing
- No Sidewalk

The map in Figure 48 illustrates the distances that can be traveled by bicycle from the planned transit stops within the same 10 or 20-minute periods. As shown, it's possible to travel a good distance along or away from Williams Drive by bicycle. An average person riding a bicycle can travel up to 2 miles within 10 minutes, which would allow potential transit users to travel from much farther away, dramatically expanding the reach of the planned transit system.

Approximately 45% of residents within the general study area live within a 10-minute bike ride of the planned transit stops, and more than 60% live within a 20-minute bike ride. Dedicated and safe accommodations for bicyclists could provide a convenient alternative for those wishing to use transit who might live too far away to walk.

It is important to note that the population taken into account for the Williams Drive area extends beyond the boundaries of the study area, as there are many residents living outside those boundaries that use Williams Drive on a daily basis.

Figure 48 Bikeable Distances from Planned Transit Stops



Bikeable Distances

- 10-minute ride
- 20-minute ride

Planned Transit

- Bus Stop
- Route 2
- Route 4

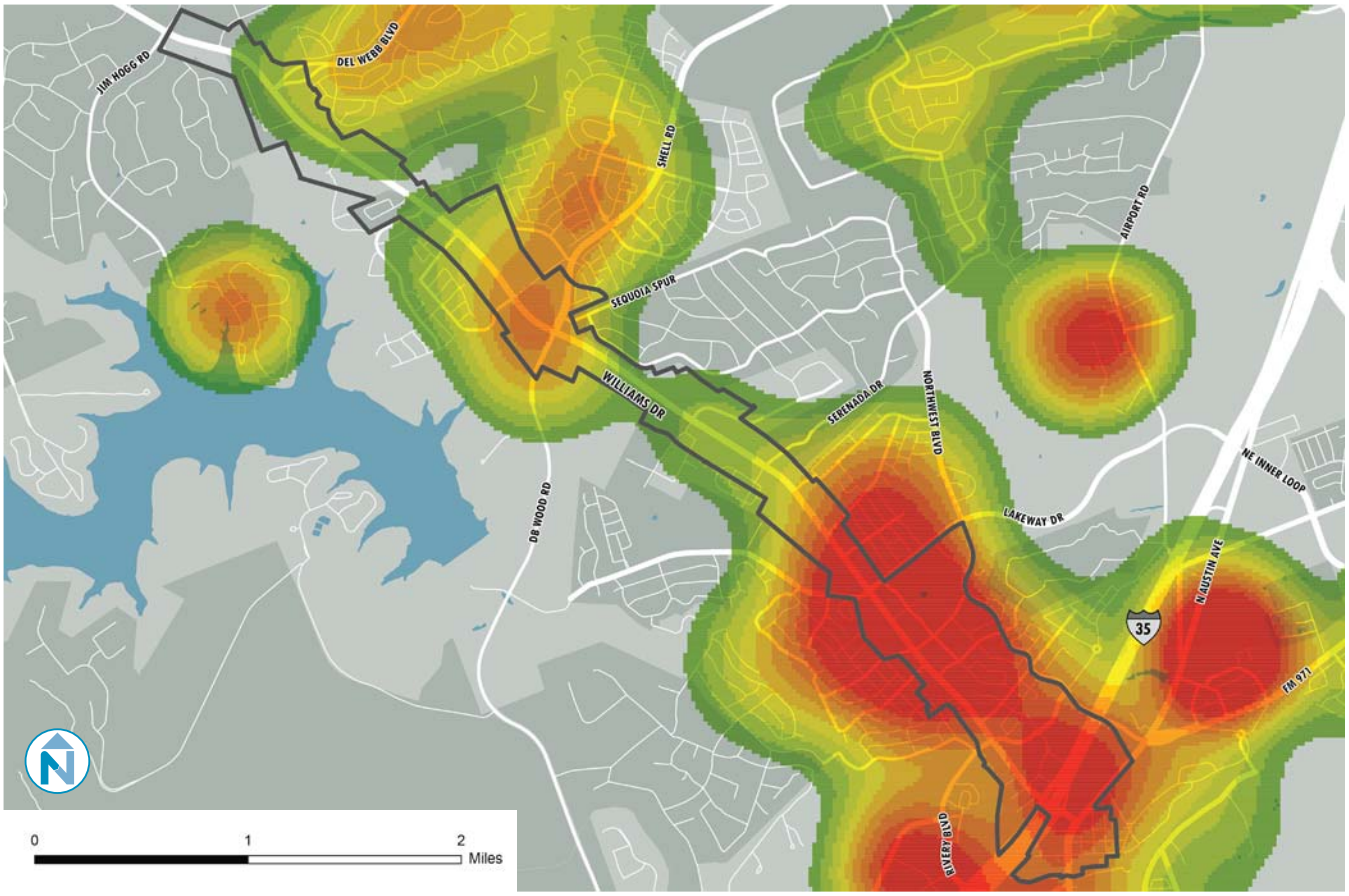
Bicycle Facilities

- Shared Use Trail

Impervious Surface

There are approximately 200 acres of surface parking lots, driveways, and building footprints within the project study area. These impervious surfaces make up around 21% of the total study area. This does not include the total land area covered by paved roads, which stretch over 22 miles within the study area. As shown on the map in Figure 49, these surfaces are more concentrated within the Centers area and at the airport. This map only shows the concentration of surfaces within the City's boundaries, as data for beyond the boundaries was not available. Impervious surfaces prevent rainwater from infiltrating the soil and recharging groundwater, which can cause flooding during heavy storm events and negatively impact the environment.

Figure 49 Impervious Surfaces



70
acres of building footprint within the study area

130
acres of driveways and parking lots within the study area

Concentration of Impervious Surfaces

Low

Medium

High

LAND USE ASSESSMENT

BACKGROUND

This assessment of land use issues for the Williams Drive Corridor and Centers Area relies on existing available information contained in a variety of prior plans and studies conducted on behalf of the City of Georgetown (see list at the end of this document), as well as data available from the Williamson Central Appraisal District, a recent windshield survey of the Williams Drive Corridor and Center Area and through the use of Google aerial and street-view photography. This assessment includes mapping of key concepts, including:

- Existing Land Use
- Future Land Use
- Existing Zoning
- Susceptibility to Change

A series of photographs of existing land uses in the Corridor and Centers Area are also included to display the variety of ways in which development has occurred in the past.

A simplified summary of the major dimensional requirements of the various existing zoning districts applied throughout the study area has also been included for comparison purposes.

EXISTING LAND USE

To understand change that may have occurred over time, the 2016 existing land use data was compared with the land use data prepared as part of the 2003 Williams Drive Corridor Study. The results of the comparison are shown in Figure 50 and Figure 51 below. This comparison is not truly accurate, since the 2003 study area boundary is different from the boundary used as part of this planning effort; however, it does provide a sense of the changes occurring in the study area over time.

Figure 50 Existing Land Use (2003)

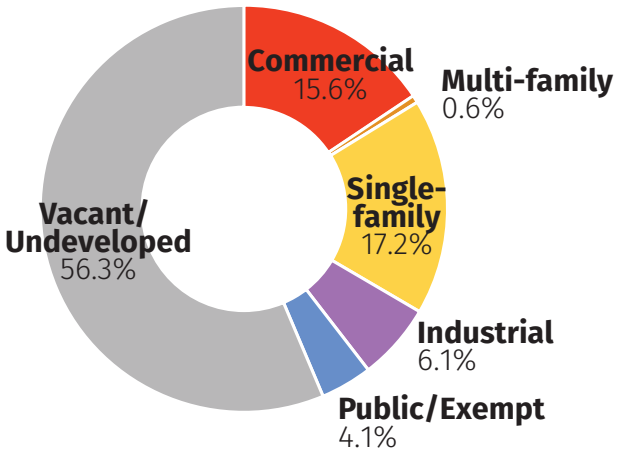
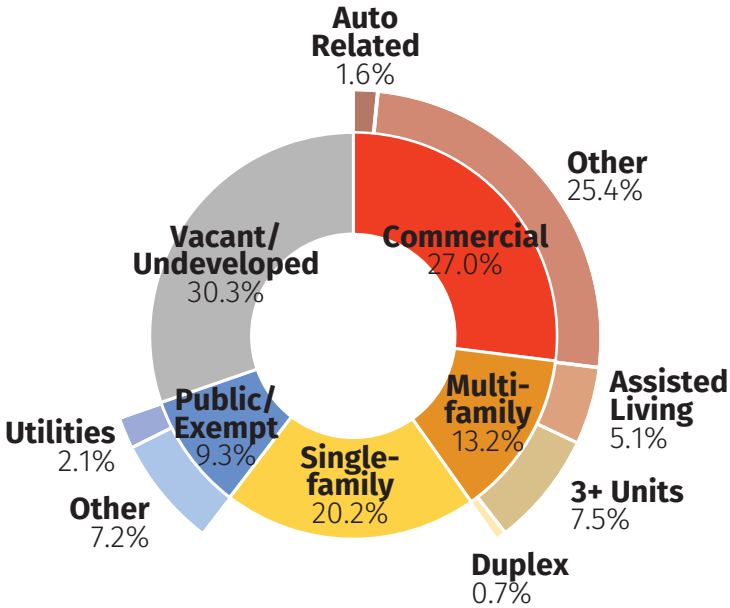


Figure 51 Existing Land Use (2016)



Land Use Descriptions

Multi-family includes two-family, triplexes, fourplexes, townhouses, apartments and condominiums. Multi-family also includes assisted living.

Commercial includes retail, office and self-storage.

Auto-related includes auto-repair, gas stations, car washes and drive up only ATMs.

Public/exempt includes uses that are exempt for the tax roll, primarily includes schools, places of worship and stormwater facilitates.

Vacant/undeveloped includes land that is built on but is currently not used, and land eligible for development but is currently not developed.

Figure 52 Existing Land Use Map

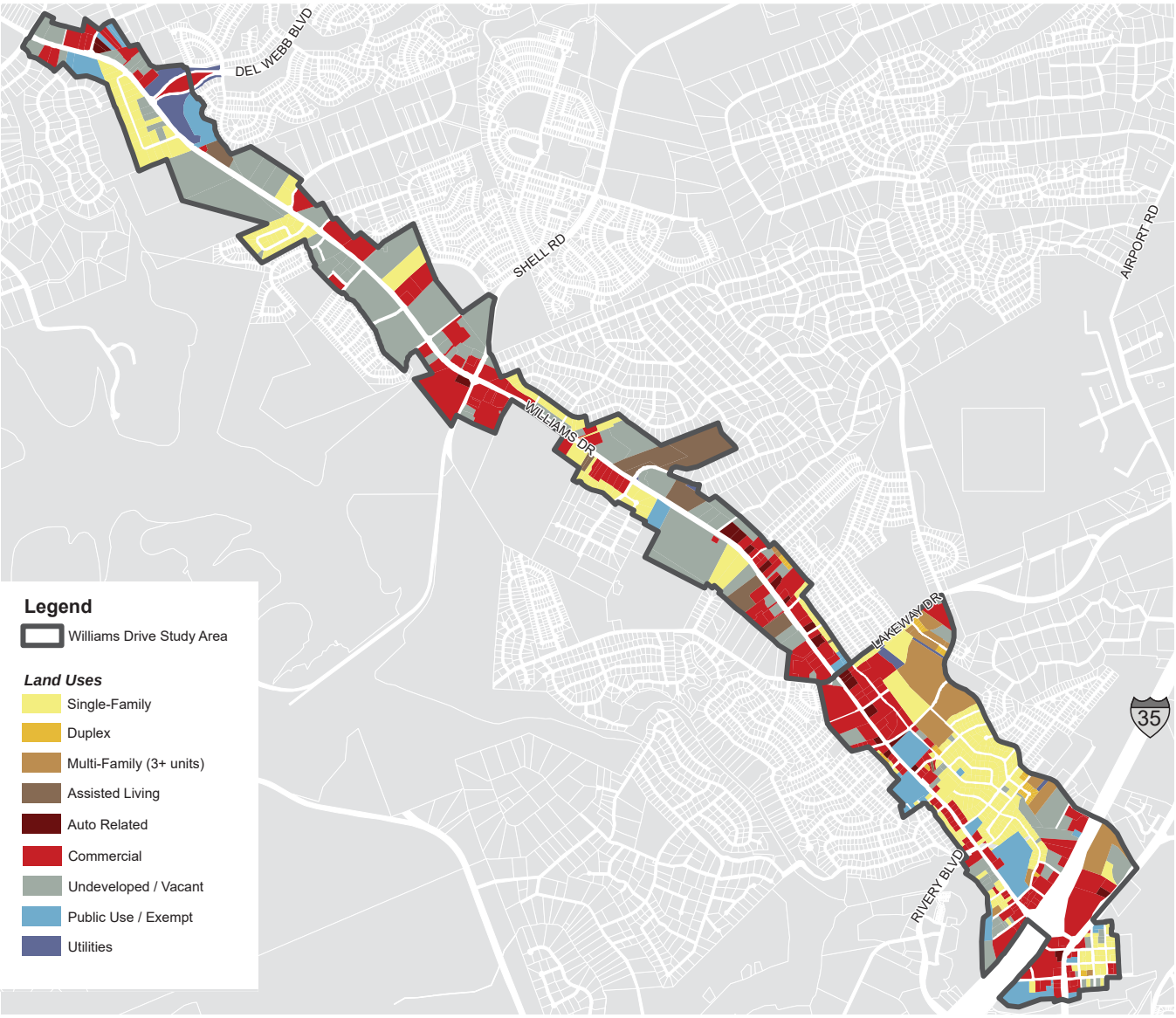
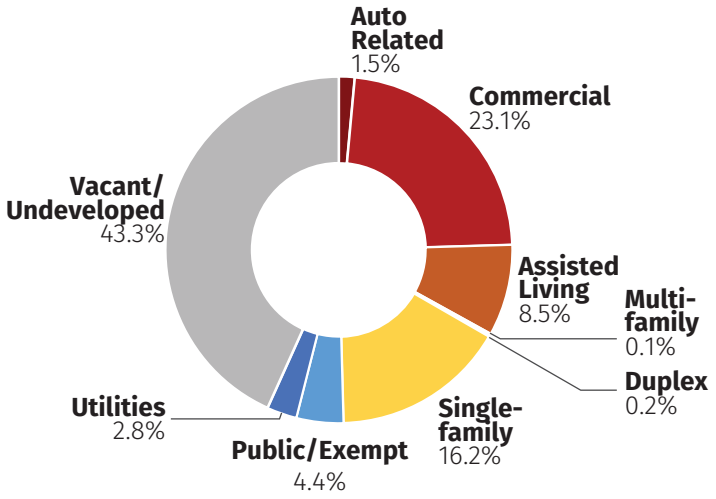
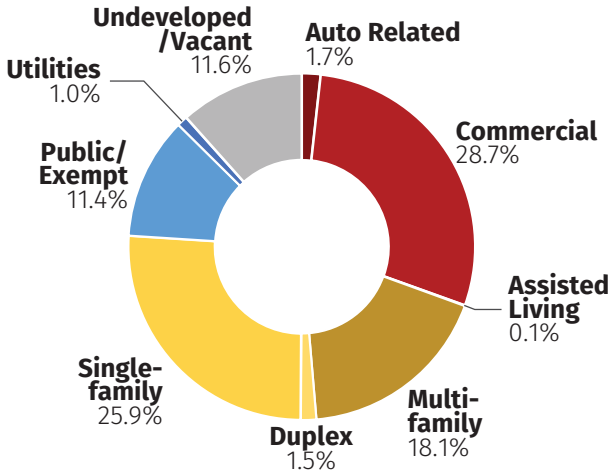


Figure 53 Corridor Land Use



SIZE: ≈650 NET Acres

Figure 54 Center Area Land Use



SIZE: ≈450 NET Acres

The following pages offer some insight into the various categories of land uses in the Williams Drive study area by providing photographic examples of each group of uses shown on the existing land use map. The photos were taken in October 2016.

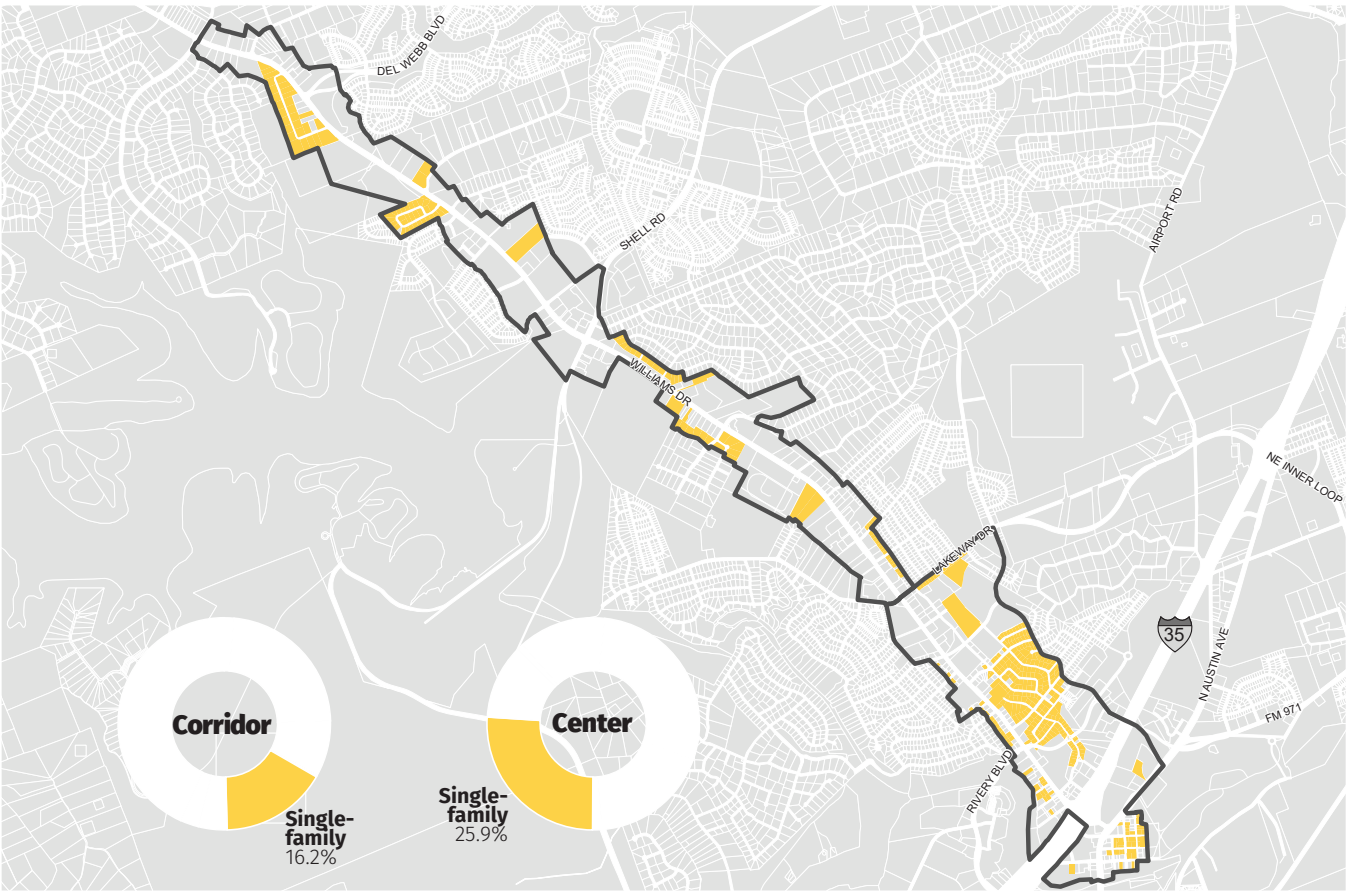
Key changes since 2003, include:

- Single-family uses are declining;
- Commercial and multi-family uses are increasing;
- Availability of undeveloped parcels is declining rapidly; and
- Industrial activity is all but gone.

Key observations comparing the land uses within the Corridor and Center Area, as illustrated by the charts in Figure 53 and Figure 54:

- The amount of land dedicated to commercial activity as a percentage of total net land area between the areas is very similar, including the amount of auto-related activity.
- The Center Area has more single-family;
- There is considerably more 3+ multi-family in the Center Area than the Corridor. However, there are more assisted living facilities in the Corridor.
- There are more opportunities for development on undeveloped/ vacant land in the Corridor than the Center Area.
- There are more public/exempt uses in the Center Area.

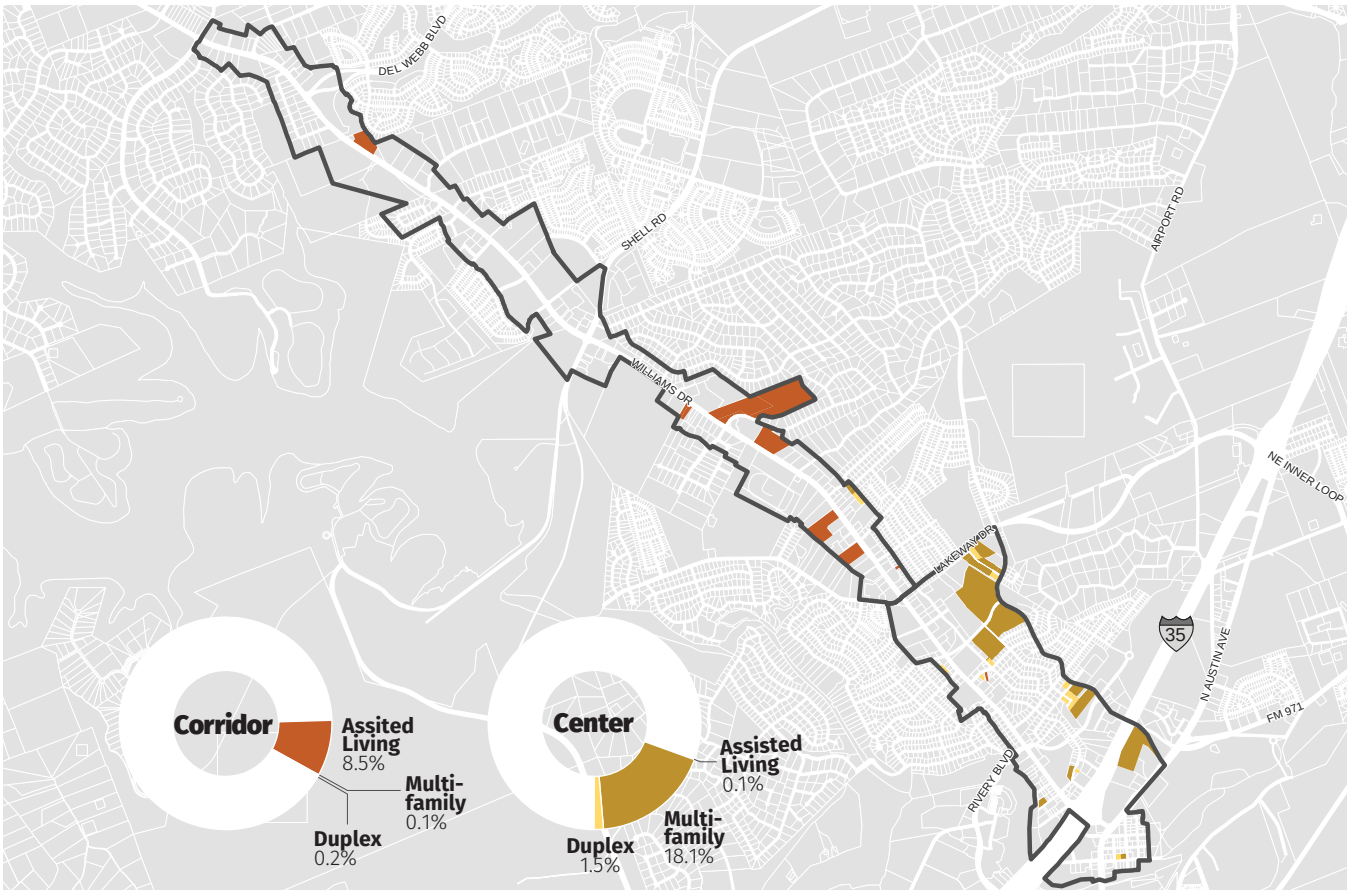
Figure 55 Single-Family Detached Land Use



Corridor: Single-Family

Center Area: Single-Family

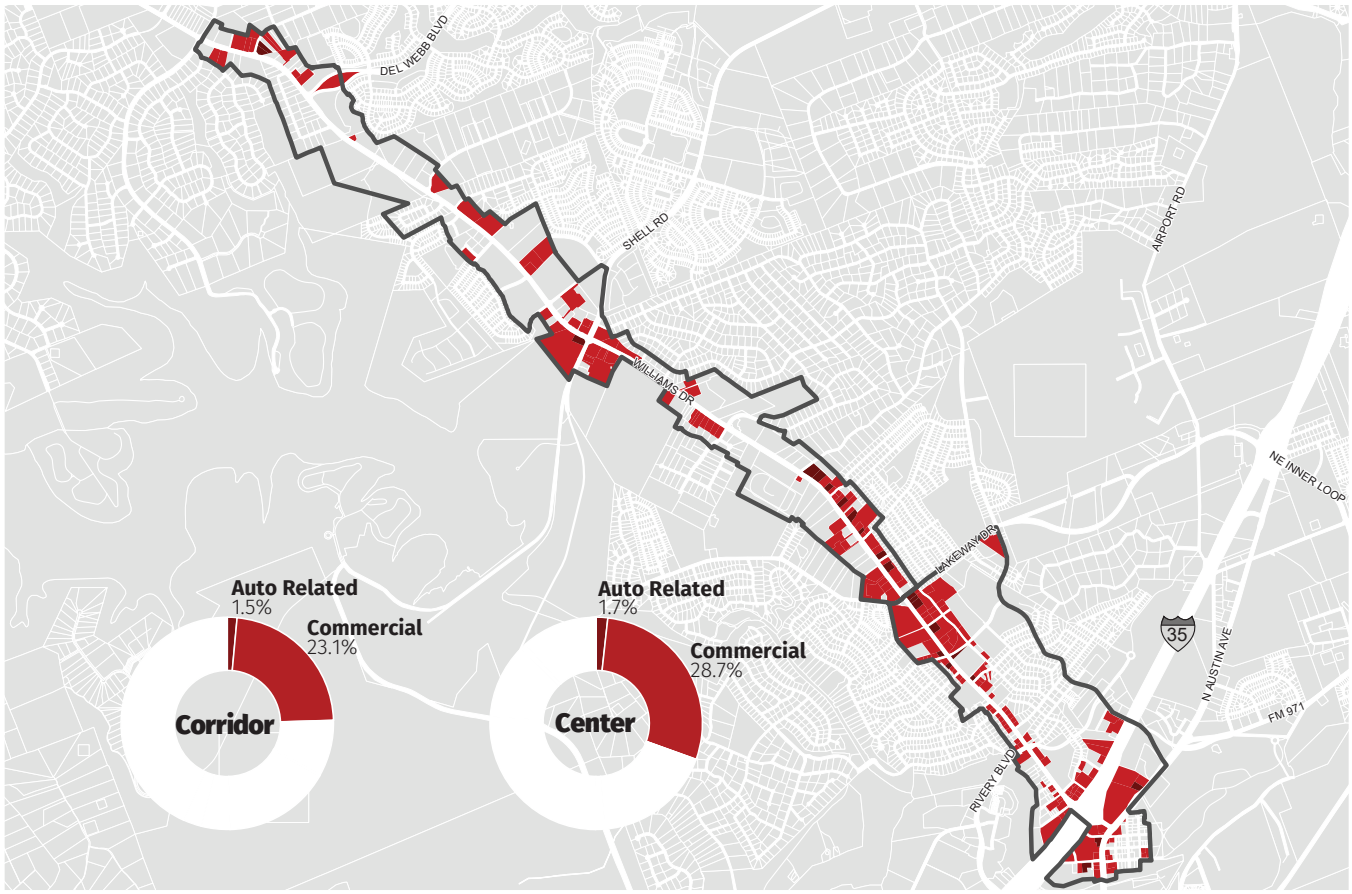
Figure 56 Multi-Family Land Use



Corridor: Multi-family

Center Area: Multi-family

Figure 57 Commercial Land Use



Corridor: Commercial

NEW SELF-STORAGE FACILITY

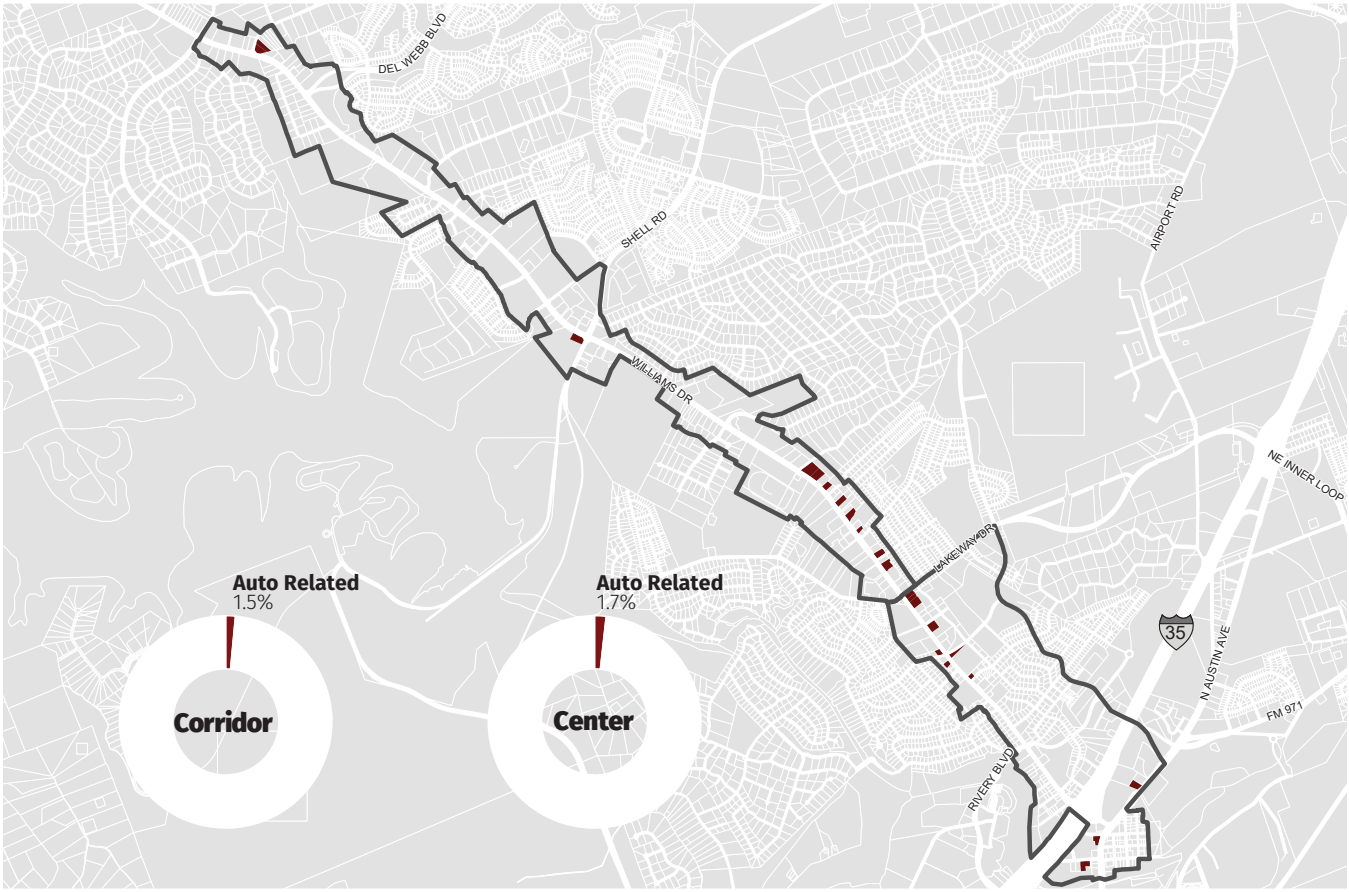
Center Area: Commercial

SMALL OFFICE

SHOPPING CENTER

STANDALONE RETAIL

Figure 58 Auto-Related Land Use

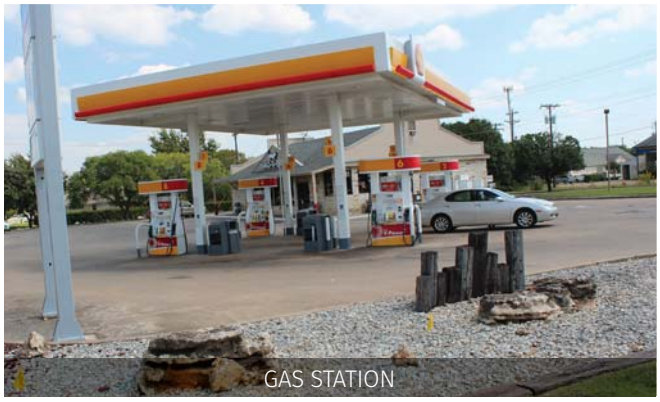


Corridor: Auto-Related

SELF-SERVICE CAR WASH

AUTO REPAIR

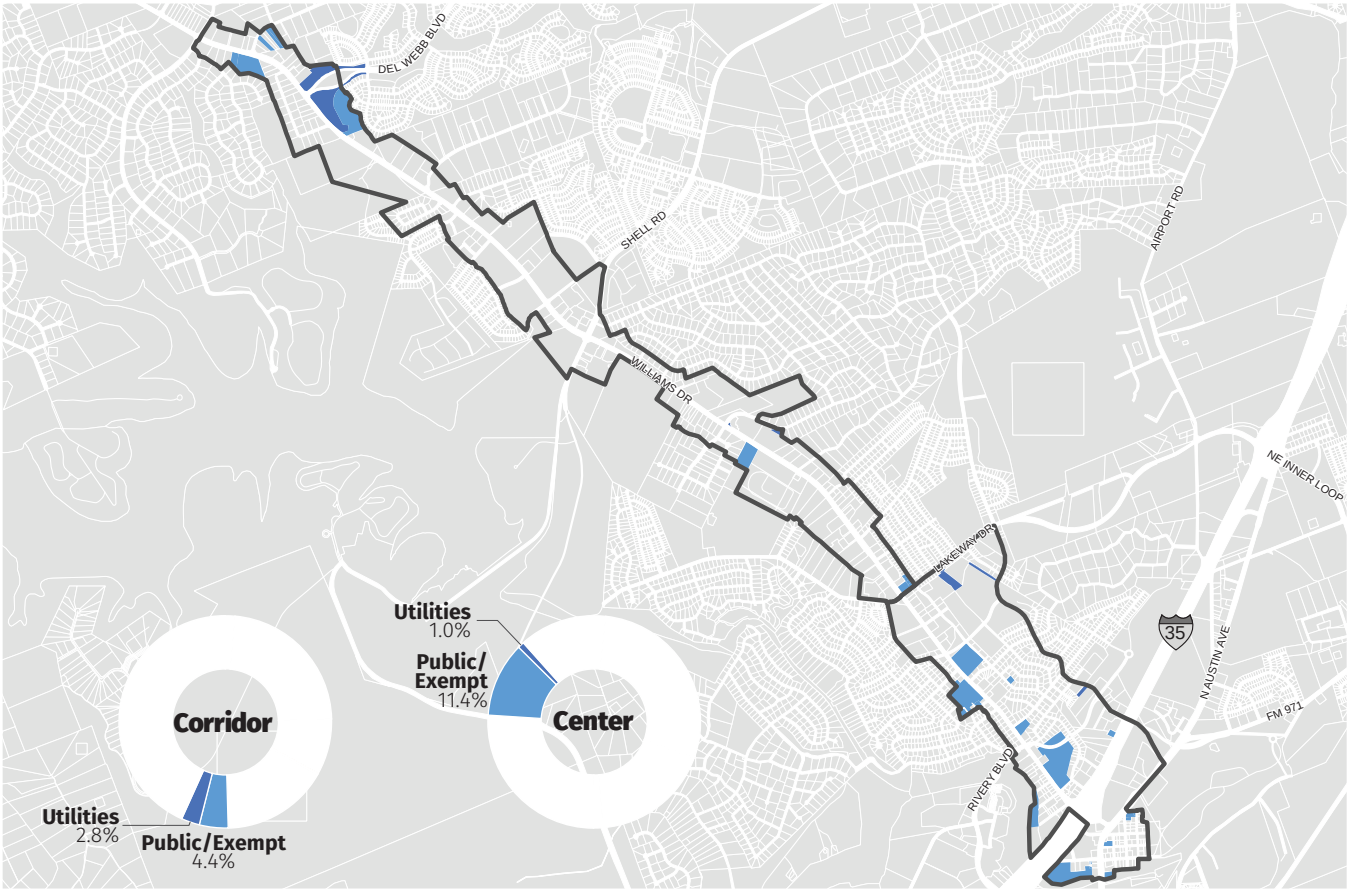
Center Area: Auto-Related



GAS STATION

AUTO REPAIR

Figure 59 Public/Exempt Land Use



Corridor: Public/Exempt

PLACE OF WORSHIP

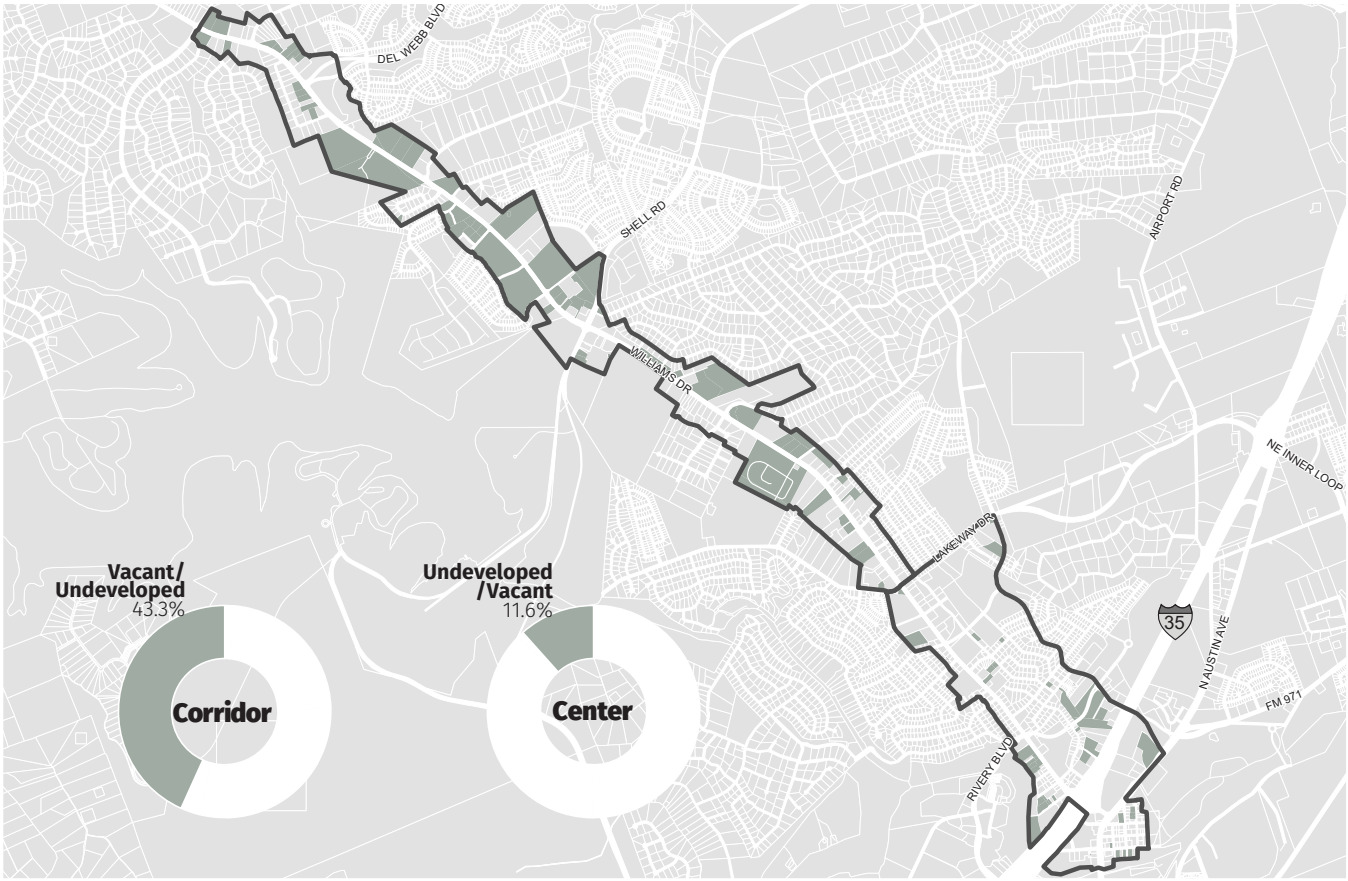
Center Area: Public/Exempt

GEORGETOWN ISD ADMINISTRATION BUILDING

WILLIAMS DRIVE SWIMMING POOL

FIRE STATION

Figure 60 Undeveloped/Vacant Land Use



Corridor: Undeveloped/Vacant

UNDEVELOPED LAND

UNDEVELOPED LAND

Center Area: Undeveloped/Vacant

UNDEVELOPED LAND

OLD/VACANT GAS STATION

FUTURE LAND USE

The City's 2030 Comprehensive Plan provides insight into the anticipated future land use pattern for the study area. The 2012 Future Land Use Map, shown in Figure 61, illustrates a pattern which emphasizes a series of nodes of community commercial activity. Between these nodes (along the corridor) lies a band of mixed use neighborhoods that serve the surrounding residential uses. The area near I-35 is designated a mixed use gateway area and encourages additional community commercial uses. The 2012 Future Land Use Map as it relates to the Williams study area is shown in Figure 61 on the following page. Descriptions for each of the future land use designations are provided below.

Future Land Use Designations

Low-Density Residential

This category includes the city's predominantly single-family neighborhoods that can be accommodated at a density between 1.1 and 3 dwelling units per gross acre. Conservation subdivisions are also encouraged in this land use district. Modifications to development standards applicable to this category could address minimum open space requirements, public facility impacts, and greater roadway connectivity.

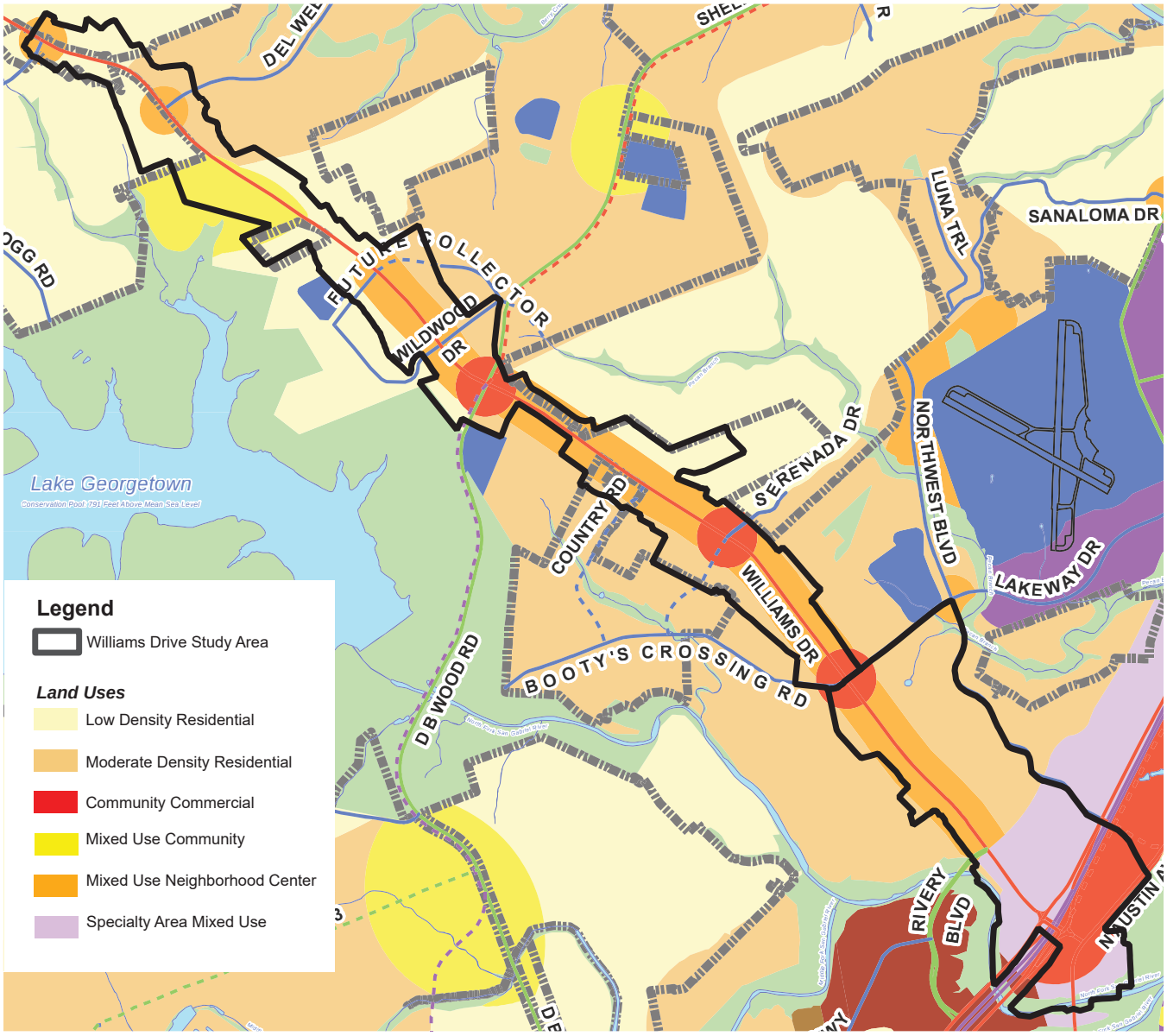
This category may also support complementary non-residential uses along arterial roadways such as neighborhood-serving retail, office, institutional, and civic uses, although such uses may not be depicted on the Future Land Use Map.

Moderate-Density Residential

This land use category comprises single family neighborhoods that can be accommodated at a density ranging between 3.1 and 6 dwelling units per gross acre, with housing types including small-lot detached and attached single-family dwellings (such as townhomes).

As in the preceding category, the Moderate-Density Residential category may also support complementary non-residential uses along arterial roadways such as neighborhood-serving retail, office, institutional, and civic uses, although such uses may not be depicted on the Future Land Use Map.

Figure 61 Future Land Use Map



Source: City of Georgetown 2030 Comprehensive Plan, Adopted Future Land Use Plan
https://2030.georgetown.org/files/2015/05/Adopted-Future-Land-Use-Plan-May-1-2012.pdf

Community Commercial

This category applies to areas that accommodate retail, professional office, and service-oriented business activities that serve more than one residential neighborhood. These areas are typically configured as "nodes" of varying scales at the intersection of arterial roads, or at the intersection of arterials and collectors. Community commercial areas typically will include some neighborhood-serving commercial uses, as well as larger retail uses including restaurants, specialty retail, mid-box stores, and smaller shopping centers. They may also include churches, governmental branch offices, schools, parks, and other civic facilities.

Mixed-Use Community

This category is intended for large tracts of undeveloped land, which are appropriate for larger scale, creatively planned communities, where a mix of residential types and densities are complemented by supporting retail, small to medium-scale office development, and integrated open spaces, where appropriate.

Instead of specifying a range of allowable residential densities, the residential mixed-use designation encourages a balanced mixture of residential types as the predominant use in this category, at densities consistent with those provided for each housing type in the base residential categories described previously.

Mixed-Use Neighborhood Center

This designation applies to smaller areas of mixed commercial use within existing and new neighborhoods. These areas are primarily proposed adjacent to, or as part of, larger residential neighborhoods. Neighborhood-serving mixed-use areas abut roadway corridors or are located at key intersections. They often function as gateways into the neighborhoods they serve.

These compact and often "walk-to" centers provide limited retail goods and services to a local customer base, while having minimal impact on the surrounding residential uses. They accommodate (but do not require) mixed-use buildings with neighborhood-serving retail, service, and other uses on the ground floor, and offices or residential units above. They may also include stand-alone high density residential development.

Uses in these areas might include a corner store, small grocery, coffee shops, hair salons, dry cleaners and other personal services, as well as small professional offices and upper story apartments. They may also include noncommercial uses such as churches, schools, or small parks.

In new neighborhoods, in particular, the exact size, location, and design of these areas should be subject to a more specific approval process, to ensure an appropriate fit with the surrounding residential pattern.

Specialty Mixed-Use Area

This designation accommodates large-scale mixed-use developments that are mostly commercial and usually near intense regional commercial uses and the I-35 corridor. This category encourages the creation of well planned "centers" designed to integrate a variety of complementary uses, with an emphasis on retail, offices, and entertainment activities. These centers may also include civic facilities and parks or other green spaces.

Housing, in the form of apartments, townhomes, condominiums, and live-work spaces, is also encouraged in these mixed-use areas, generally in higher densities. These areas should be designed in a pattern of pedestrian-oriented, storefront-style shopping streets, with shared parking and strong pedestrian linkages to the surrounding areas.

Figure 62 Study Area Zoning

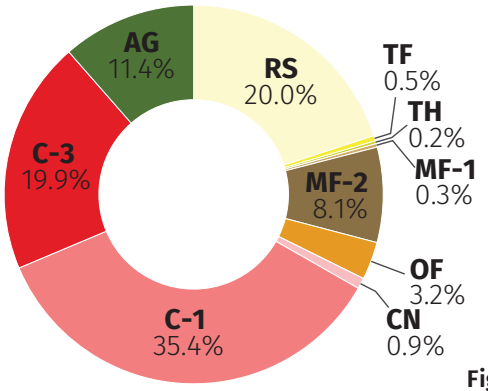


Figure 63 Corridor Zoning

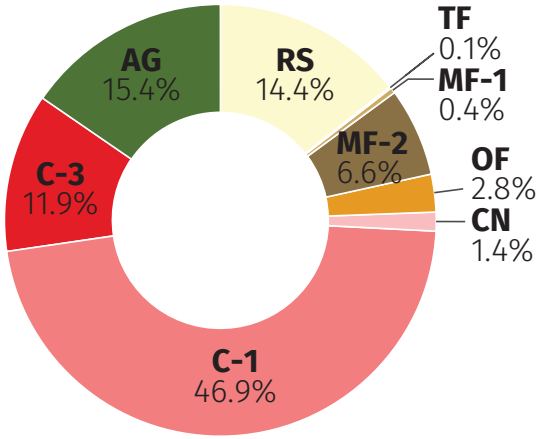
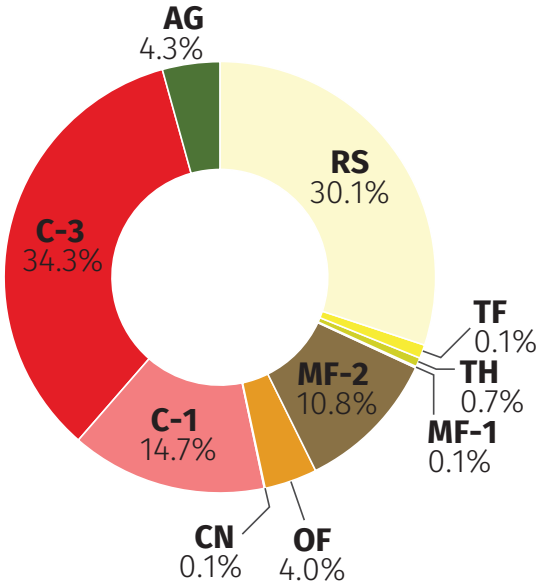


Figure 64 Center Area Zoning



EXISTING ZONING

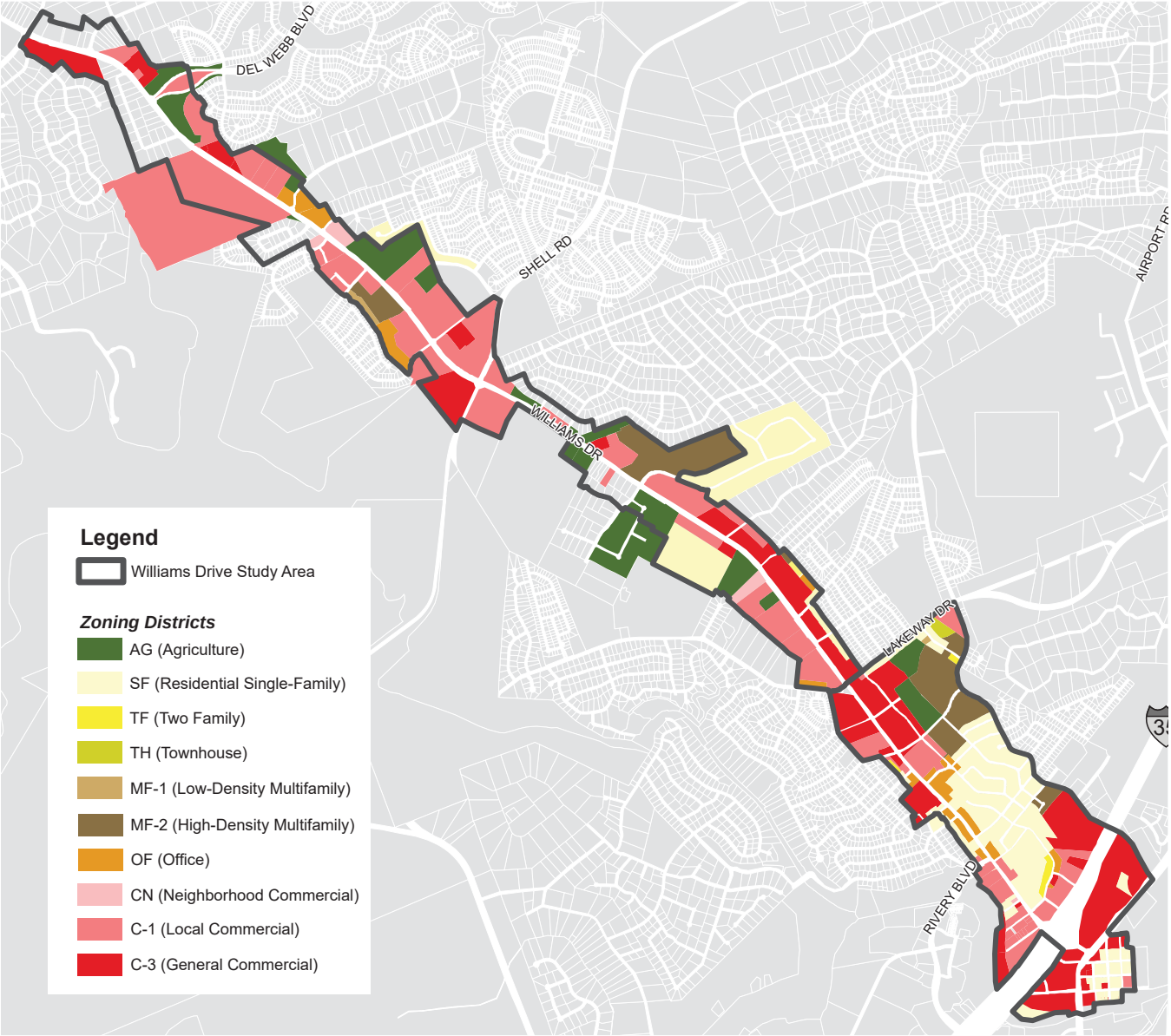
Shown in Figure 62, C-1 (Local Commercial) and C-3 (General Commercial) are the most predominant zoning districts, making up approximately 55% of land in both areas. Single-family (RS) zoning makes up about 20% of the land area, whereas multi-family (MF-1, M-2) zoning only makes up about 8% of the total land area. Agriculture (AG) zoning totals about 11% of the land in the study area.

A comparison of Figure 63 and Figure 64 show there is more single-family (RS) zoning in the Center Area. However, the distribution of multi-family (MF-1, MF-2) zoning is very similar in both areas.

There is more commercial zoning (C-1, C-3, CN and OF) in the Corridor than in the Center Area. However, there is considerably more C-3 zoning in the Center Area (likely due to the Center's proximity to I-35). There is substantially more C-1 zoning in the Corridor than the Center Area.

There is about 3 times more agriculture (AG) zoning in the Corridor than the Center Area.

Figure 65 Existing (2016) Zoning Map



Summary of Existing Zoning

Figure 66 summarizes the existing zoning districts applied in the project area, as illustrated in Figure 65. Note that additional details make the zoning districts much more complex than illustrated here, but for comparison purposes, the dimensional standards in the table have been simplified.

Figure 66 Existing Zoning Districts

	HEIGHT	LOT SIZE	LOT WIDTH	FRONT SETBACK	MAX IMPERVIOUS	UNITS/ ACRE
Agriculture (AG)	35'	2 acres	100'	25'	20%	--
Residential Single-family (RS)	35'	5,500 SF	45'	20'	45%	--
Two-family (TF)	35'	7,000 SF	70'	20'	45%	--
Townhouse (TH)	35'	2,000 SF	22'	15'	50%	--
Multi-family (MF-1	35'	12,000 SF	50'	20'	50%	14
Multi-family (MF-2)	45'	2 acres	50'	25'	50%	24
Neighborhood Commercial (CN)	30'	--	50'	25'	70%	--
Local Commercial (C-1)	35'	--	50'	25'	70%	--
General Commercial (C-3)	45'	--	50'	25'	70%	--
Office (OF)	45'	--	50'	25'	75%	--

Agriculture District (AG)

The Agriculture District (AG) is intended to allow large rural residential development, agricultural and farming uses and may include lands that are relatively undeveloped. The AG District is also the default district for land newly annexed into the City, but not yet placed in an appropriate zoning classification. For these reasons, the AG District may contain a wide variety of residential and non-residential uses. The AG District may take on characteristics of either a residential or a non-residential zoning district and certain design criteria may be required depending on the use.

Residential

Single-family District (RS)

The Residential Single-family District (RS) is intended for areas of medium density with a minimum lot size of 5,500 square feet. The RS District contains standards for development that maintain Single-family neighborhood characteristics. The District may be located within proximity of neighborhood-friendly commercial and public services and protected from incompatible uses. All housing types in the RS District must use the lot, dimensional and design standards of the District.

Two-family District (TF)

The Two-family District (TF) is intended for Two-family dwellings that are located on one lot. The TF District also includes Single-family attached and Single-family detached development and associated uses.

Townhouse District (TH)
The Townhouse District (TH) is intended for townhouse and attached single-family dwellings. The TH District is appropriate for infill development as well as a transition from residential areas to non-residential areas. In the TH District, townhomes must be located on individual lots.

Multi-family District (MF-1)
The Multi-family District (MF-1) is intended for attached and detached multi-family residential development, such as apartments, condominiums, triplexes, and fourplexes, at a density not to exceed 14 dwelling units per acre.

Multi-family District (MF-2)
The Multi-family District (MF-2) is intended for attached multi-family residential development at a density not to exceed 24 dwelling units per acre.

Neighborhood Commercial District (CN)
The Neighborhood Commercial District (CN) is intended to provide areas for small-scale office and commercial activities such as the sale of convenience goods and personal service businesses that primarily serve adjacent residential areas. There should not be any uses that adversely affect the health, safety, welfare, or residential character. Upper-story residential is allowed.

Local Commercial District (C-1)
The Local Commercial District (C-1) is intended to provide areas for commercial and retail activities that primarily serve residential areas. Uses should have pedestrian access to adjacent and nearby residential areas, but are not appropriate along residential streets or residential collectors. The District is more appropriate along major and minor thoroughfares and corridors. Upper-story residential is allowed.

General Commercial District (C-3)
The General Commercial District (C-3) is intended to provide a location for general commercial and retail activities that serve the entire community and its visitors. Uses may be large in scale and generate substantial traffic, making the C-3 District only appropriate along freeways and major arterials. Upper-story residential is allowed.

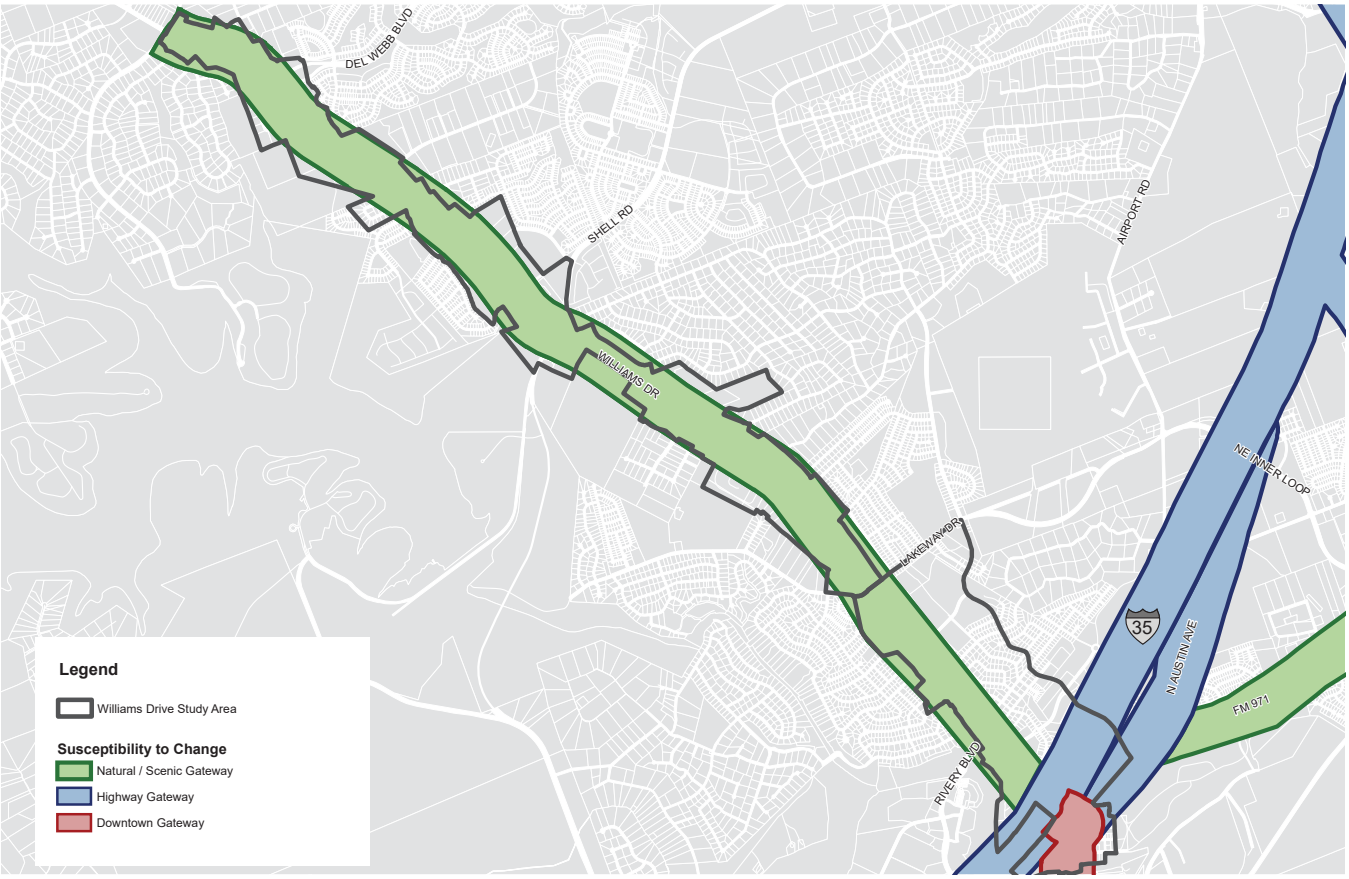
Office District (OF)
The Office District (OF) is intended to provide a location for offices and related uses. The uses allowed have relatively low traffic generation. Small areas of the OF District may be appropriate adjacent to most residential uses and as a transition between residential areas and commercial areas. Upper-story residential is allowed.

Gateway Overlay Districts

The existing zoning in the study area includes three Gateway Overlay Districts, the Scenic/Natural Gateway Overlay, the Highway Gateway Overlay and the Downtown Gateway. The extents of the Gateway Overlay Districts are shown on the map in Figure 67.

The most prominent of which is the Scenic/Natural Gateway Overlay District. Developments that occur within the Scenic/Natural Gateway Overlay must integrate the natural characteristics of the land into the landscape design of the project. Informal tree massings, planting of under story trees, incorporation of native stones and boulders and use of native grasses and wildflowers are examples of how to blend required plantings with native plantings. A 25-foot landscape buffer is required along Williams Drive for all new development in the Overlay.

Figure 67 Gateway Overlay Districts Map



DEVELOPMENT PROCESS AND BUILT FORM

The City of Georgetown's development review follows a typically standard process, moving from zoning through preliminary plat to final plat and site plan. The review is guided by both the City's Comprehensive Plan and the Unified Development Code (UDC), which is currently undergoing amendments.As part of the land use assessment of the corridor and centers area, a review of the UDC was performed as it relates to the study area and the built form it creates. The results of this review can be seen in Figure 68.

Figure 68 Review of the Unified Development Code

ISSUE	CAUSE	IMPACT
Corridor		
Corridor character inconsistent	Limited tools in Natural/Scenic Corridor Overlay, not all of the corridor is natural or scenic.	Inconsistent look to the corridor
	25-foot landscape buffer used everywhere for new development.	
	Single suburban road section adopted for Wms Drive (135' wide)	Predominantly wide 5-lane roadway section with shoulders
Inconsistent front lot lines along Williams Drive	Land dedication requirements for ultimate corridor require excessive ROW	Redevelopment on shallow sites loses the greatest percentage of land to dedication for Williams Drive
Zoning inconsistent with Future Land Use Map	Zoning districts do not match the adopted Future Land Use Map (Comprehensive Plan)	Difficult to implement concepts from Comprehensive Plan; case-by-case decision-making, no "planning first" philosophy
Bicycle facilities lacking	Requires both new UDC standards and major capital project	Unsafe conditions for cyclists
Improve corridor aesthetics	Many older centers and single-use sites not appropriately landscaped and lit	Poor aesthetics in older segments of corridor
Site		
Large blocks with no connections	No requirements for internal blocks on large development sites.	Difficult to move through the area in a vehicle, on a bike or on foot.
	Inconsistent treatment of subdivisions and site plans	Developers may avoid subdivision process dues to requirements
Unsafe sidewalks	Excessively wide driveway entrances, excessive curb cuts	Too much vehicular movement across sidewalks
	Residential garage doors facing the street, requiring curb cuts	Too many curb cuts, vehicles crossing the sidewalk

ISSUE	CAUSE	IMPACT
Signs do not match corridor character	Uniform sign code applied throughout, older (outsize) signs retained	Inconsistent sign size and type make wayfinding difficult.
Multifamily districts allow only moderate density	UDC limits MF-2 to 24 units/acre	Multifamily projects occur primarily in PUD and other special districts where density can be negotiated. These districts require substantial time and energy by both applicant and City to process.
Commercial districts restrict multi-family housing	UDC requires a Special Permit for multifamily projects that are not in mixed use buildings. Even where SP is issued, density is limited to 24 units/acre.	Multifamily projects occur primarily in PUD and other special districts where density can be negotiated. These districts require substantial time and energy by both applicant and City to process.
Vast expanses of parking in front of buildings	UDC provides only permissive setbacks in most districts	Crossing large parking lots is risky for pedestrians
No effective mixed use district	UDC includes only MU, a district not found on the ground in the City	MU district very complex to negotiate for the applicant; has not yet been used
Excessive parking required	UDC requirements do not vary by context (transect)	Limited redevelopment capacity on existing sites, vast expanses of empty parking
Building		
No mixed use buildings	While the market may have an impact, overly strict height limits are part of the issue	No redevelopment
Limited changes to existing buildings in some portions of the corridor	Regulations too restrictive to generate redevelopment	No redevelopment
C-1 and C-3 maximum height limits good mixed use buildings	UDC requires max height of 35' in C-1 and 45' in C-3	Variances often sought and granted for additional height

LAND USE AND DEVELOPMENT SUITABILITY

The land use pattern portrayed on the Future Land Use map shows the primary preferred land use for every area of the study area and provides a target range relating to density. However, the land use patterns on the land use map show only the "big picture" for preferred land uses. The land use map does not reflect development suitability.

Both existing and future sites within a given land use district will vary in their suitability to support the preferred land use, and the appropriate development density may also differ from the targeted density (to be either more or less dense than the target range).

When applying the future land use map in development review or administering land use regulations, the City enables flexibility in the density or type of development within certain land use districts and policy areas.

As a result of the Future Land Use map, changes to the Development Code and ultimately economic market conditions, parts of the corridor will continue to develop within different timeframes as they become more or less susceptible to change.

SUSCEPTIBILITY TO CHANGE

Various parts of the corridor can be anticipated to develop at different points in time in the future. Some parcels, including vacant land and under-utilized parcels of land with large expanses of unused parking can be expected to develop (or redevelop) first. These parcels are shown on the map in Figure 69.

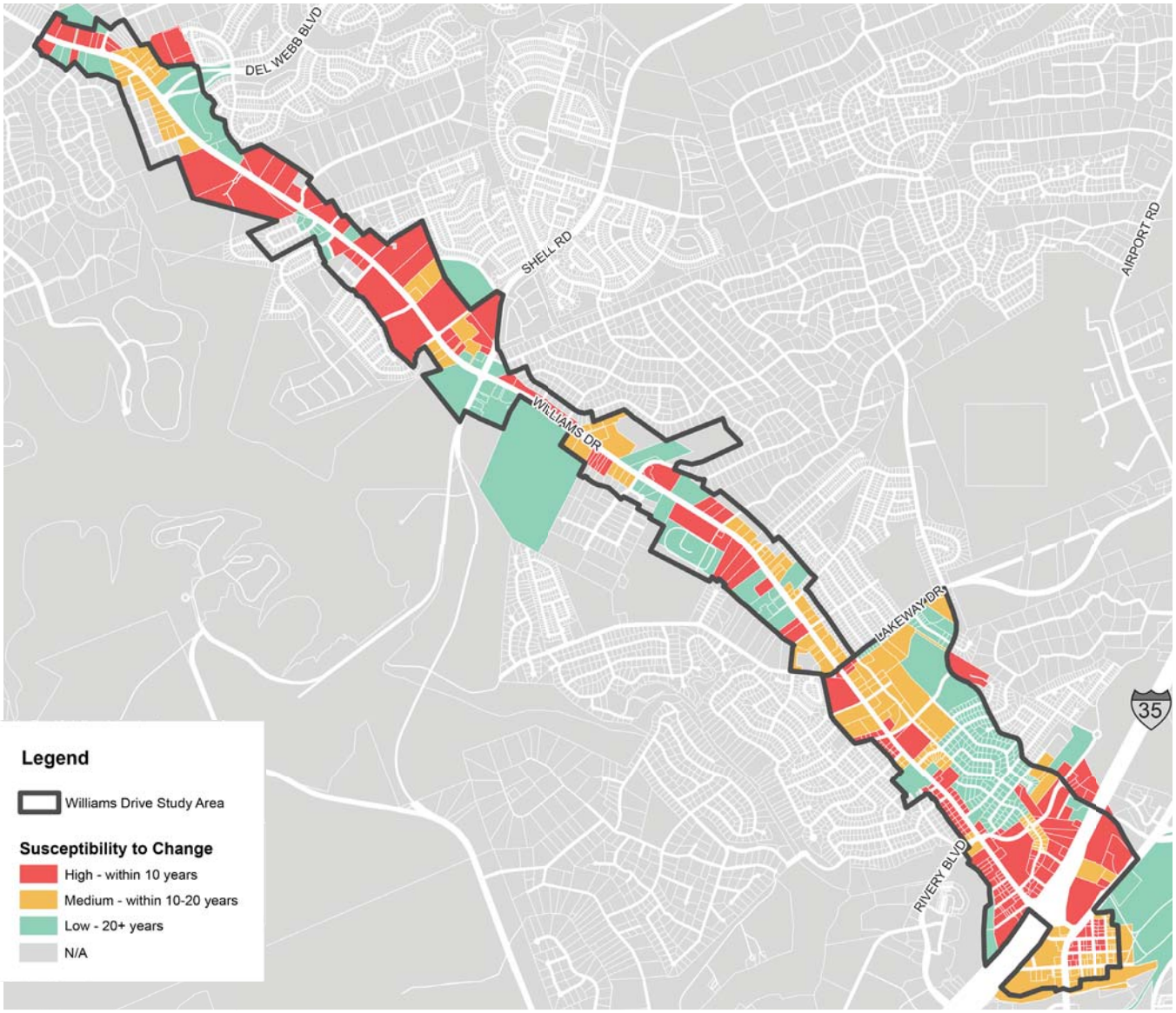
According to the 2030 Comprehensive Plan, areas susceptible to development are those that are or can be expected to experience substantial growth pressures. In some of them, development projects are already ongoing or in the approval stages, or certain catalysts such as new schools or new roadways may be present.

For the more detailed analysis of this corridor, the following additional factors were used to prepare the map:

- Age of property/buildings
- Existing use of land and/or vacancy
- Knowledge of property owner (and willingness to change)
- Current permit status (i.e, have permits been pulled recently)
- Potential impact of future roadway projects (i.e., Extension of Rivery and the Northwest Blvd bridge)

This map is simply an estimate of susceptibility -- many factors come into play, including ownership changes, and it is possible (but less likely) that parcels with medium or low susceptibility as perceived today will be developed as well.

Figure 69 Susceptibility to Change Map



CONCLUSION

This existing conditions analysis indicates that the Williams Drive Corridor presents a unique opportunity to develop this important part of Georgetown from its current pattern of auto-centric, relatively disconnected collection of individual development projects into a mature set of well-connected, sustainable neighborhoods.

Currently, more than two-thirds of the land in the corridor has been developed which is a significant increase from the 44% that was developed in 2003. The existing land use designations support a diverse mix of residential, commercial, and public uses along the corridor. One of the greatest opportunities is the remaining portion of vacant land and those parcels that are either underutilized or susceptible to change which creates the potential to make lasting change in mobility, health, and economic development. Of particular interest is the susceptibility to change and development potential of parcels within the Center area and on the GISD site.

The vacant properties include opportunities for infilling with a range of housing types and neighborhood-serving commercial and civic amenities. Such infill neighborhoods offer both the chance to provide housing and lifestyle options not currently available in this area, as well as

the possibility generating new centers of social, commercial and civic activity that are easily accessible by a range of travel modes to residents of the existing neighborhoods in the Corridor.

There are several challenges to improving mobility in the corridor. Establishing complete and multi-modal connections, particularly with the existing built environment, which is currently dominated by traditional suburban neighborhoods and large commercial parking lots will be a challenge for the corridor. Current bicycle and pedestrian infrastructure, including sidewalks and bicycle lanes, are inadequate. Sidewalks are nonexistent in several areas and lack uniformity in design, and bicycle facilities are absent with the solitary bicycle lane implemented on Rivery Boulevard as it approaches Williams Drive. However, the implementation of substantial improvements to pedestrian and bicycle infrastructure in the corridor in the future is certainly feasible based upon the existing right-of-way which provides opportunities outside of the existing paved roadway width. These facilities would enhance connections to adjoining neighborhoods and recreation facilities such as the San Gabriel River.

While active transportation networks are critical for the corridor and the adjoining communities, there are also daily traffic operational constraints and safety concerns along the corridor, specifically as it relates to existing traffic signal timing, access management through use of the center turn lane and proliferation of driveways and the high volume I-35 interchange area.

Currently, the transit service for the corridor is provided by the City's on-demand service provided by CARTS. The City's fixed route service serving the the eastern segment of the corridor was recently approved and will begin operations in August 2017.

Georgetown's strong economy and continued population growth will continue to impact development in the corridor. The corridor's proximity to employment centers will encourage continued demand multifamily residential development. Current retail development, which is supported by households in the market area, may not fully capture the community's fair share of spending; the corridor is poised to attract and support additional retail establishments. Moreover, the prominent role of medical facilities and health services should stimulate demand for growth of associated uses.

The Corridor Concept Plan will define patterns, strategies, conceptual designs, and recommendations that can inform updated development standards so as to coordinate further public and private improvements to deliver a more unified multimodal corridor, and more walkable, bikeable, sustainable neighborhoods and centers well-connected to it.

Most important of all is the opportunity to evolve the corridor toward a mature, complete set of neighborhoods and centers, where driving becomes a freedom of choice rather than a necessity, and where healthier, more active, outdoor oriented lifestyles for children and families are well-supported by the environment in which they live, work, shop and play.

Appendix C

TRAFFIC OPERATIONS STUDY

WILLIAMS DRIVE

TRAFFIC OPERATIONS STUDY

Georgetown, Texas

STATE OF TEXAS
BRIAN DAVID VAN DE WALLE
68525
REGISTERED
PROFESSIONAL ENGINEER

June 29, 2017

KHA # 069226612
F-#928

Kimley»Horn

10814 Jollyville Road,
Bldg IV, Suite 300
Austin, TX 78759

EST. 1848
GEORGETOWN
TEXAS

Kimley»Horn

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Executive Summary

Kimley-Horn and Associates performed a traffic operations analysis for Williams Drive in Georgetown, Texas. Limits of the study were from Austin Avenue to Jim Hogg Road. Within the study area, there are 12 signalized intersections.

This report documents the analysis methodology, signal timing concepts, and results of the study. Existing operations were analyzed to establish a benchmark against which potential improvements could be compared.

Three alternatives were studied, 1) install coordinated signal timing along the corridor, 2) install flashing yellow arrows for east-west left turns to maximize progression, and 3) geometric improvements at two intersections to remove inefficient “Split Phase” signal timing. Improvements to travel on the corridor were converted into annual dollar savings for drivers. These were then analyzed over the useful life of each improvement to calculate a benefit to cost ratio for each.

Results show that incorporating all of the improvements at a cost of $287,0220 can result in travel time savings between 7% and 31%, depending on direction of travel and whether it is the morning or afternoon peak period. Furthermore, reductions in fuel consumption and delay show an annual savings of over $2.68 million. Finally, the number of vehicles having to stop when travelling corridor are greatly reduced, with over 11,700 fewer stops per day during the morning and afternoon peaks.

Williams Drive Traffic Operations Analysis
Georgetown, Texas
June 29, 2017

1. Introduction / Project Overview

Kimley-Horn and Associates, Inc. performed a comprehensive traffic study along Williams Drive for the City of Georgetown, Texas. The purpose of the project is to study signal timings along the corridor and to suggest methods to reduce travel times and congestion. **Figure 1-**1 shows the location of the 12 signalized intersections included in the study. The first portion of this study focuses on developing a coordinated timing plan for the corridor using existing traffic signal hardware. This task required data collection, the development and analysis of baseline Synchro models, and optimization of the Synchro models. The final portion of the study reviews possible signal hardware and geometric improvements at individual intersections. For this task, a benefit-cost analysis was performed for each recommended improvement.

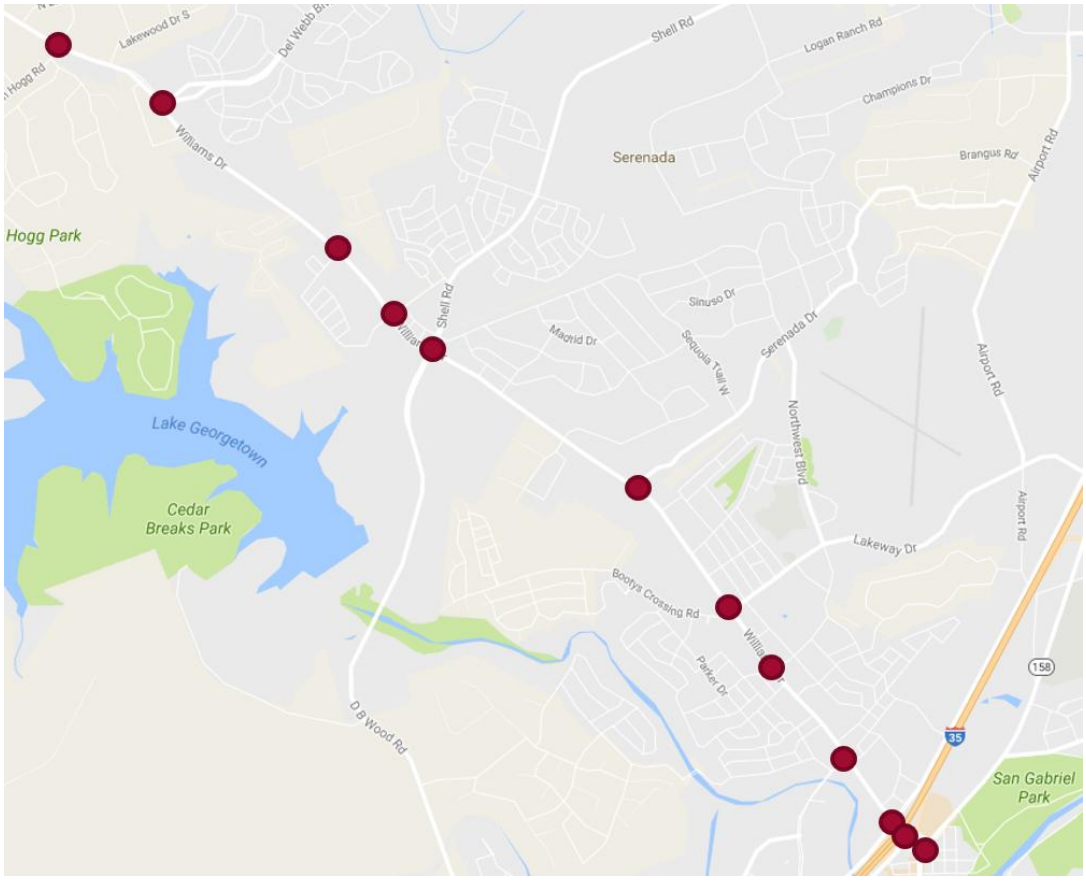


Figure 1- Signal Locations

The existing roadway conditions, measured with existing delays, travel times, and Level of Service (LOS), are presented in the report as the base condition. These measures lay the groundwork for improvement of the system through coordinated timing and intersection modifications.

Cycle lengths, timing patterns, and controller offsets were selected for the morning, afternoon and off peak periods to obtain progression in all study corridors. These updated timing plans will be entered into the signal controller at each of the intersections in the field, along with an updated clock setting.

Fine tuning of the signal network will be conducted over a two-week period, with offsets and phase splits being adjusted as needed.

2. Coordinated Signal Timing Overview

Providing smooth, continuous platoon progression by optimizing the timing of coordinated signal systems is regarded as one of the most cost-effective traffic management actions to reduce stops, delays, fuel consumption and exhaust emissions. Some of the advantages of traffic signal system coordination are as follows:

- Higher speed of progression and fewer stops alleviate spill-over queues.
- Smoother traffic operation increases capacity, decreases energy consumption, and reduces air pollution.
- By reducing stops at red lights, signal coordination encourages drivers to maintain a uniform speed, thereby reducing overall speed variations.
- A greater proportion of traffic will tend to remain on the arterial street system instead of using parallel minor streets; and
- Preventing the queue of vehicles at one intersection from extending back and interfering with upstream traffic.

In a progressive system, the green displays are staggered in relation to each other according to the desired road speed. This system works effectively with unequal block length and unequal splits. A time-space diagram for the intersections helps to visualize the progress in both directions.

The complexity of this system arises from allocating the splits for the best coordination. For unevenly spaced intersections, a compromise has to be made between the two directions. This system can be used to favor one direction over the other, e.g. inbound flow in the morning peak at the expense of the fewer vehicles traveling in the opposite direction, and vice versa in the evening peak. Adequate two-way progressions can be implemented for certain combinations of cycle length, block spacing and platoon (progressive) speed.

2.1 COORDINATION CONCEPTS

Intersection Spacing and Travel Speeds

Intersection spacing and travel speeds are critical when setting up coordinated signal timing plans. The amount of time it takes to travel from one intersection to the next has a direct bearing on the

calculation of signal offsets needed to obtain progression. For vehicle progression, it is desirable to have uniform spacing of signals along a corridor.

Flow Patterns and Directionality

Traffic flow patterns vary by time of day. Green band widths are typically adjusted to favor the heaviest direction of travel while not completely sacrificing progression for the other direction

Signal Timing Intervals (Splits)

In a coordinated system, all signals have the same cycle length. These cycles are made up of intervals, or splits. Some of these intervals are predetermined (e.g. minimum green, yellow change, all red, pedestrian clearance) and others are variable and may depend on traffic demand and time-of-day. The predetermined intervals may mandate how the rest of the signal cycle time is allocated.

The sum of the green, yellow, and all red intervals typically defines an individual phase split. A split is then the segment of the cycle length allocated to each phase that may occur (expressed in percent or seconds). **Figure 2-1** shows a standard 8-phase ring and barrier structure for signal timing. The primary considerations that must be given to vehicle split times are as follows:

- The phase duration must be no shorter than some absolute minimum time, such as five to seven seconds of green plus the required clearance interval. If pedestrians may be crossing with this phase, their crossing time should be considered and included in the maximum phase length to prevent signal from going out of coordination.
- A phase must be long enough to avoid over-saturating any approach associated with it. Too short a time will cause frequent cycle failures where traffic fails to clear completely during its phase, whereas too long a time will result in longer queues and side street delays.
- A phase length must not be so long that green time is wasted and vehicles on other approaches are delayed needlessly.
- Side street timing must receive enough of a split to serve the entire queue in each cycle.
- Main street timing should be maximized to allow for the widest progression green bands possible.
- Phase lengths should be properly designed to efficiently balance the cycle time available among the several phases, not just “equitably” between, say, north-south and east-west.
- Phase lengths must be long enough to accommodate the minimum green time, amber phase, and all red clearance, plus an additional 18% for adjustment when transitioning between different plans.

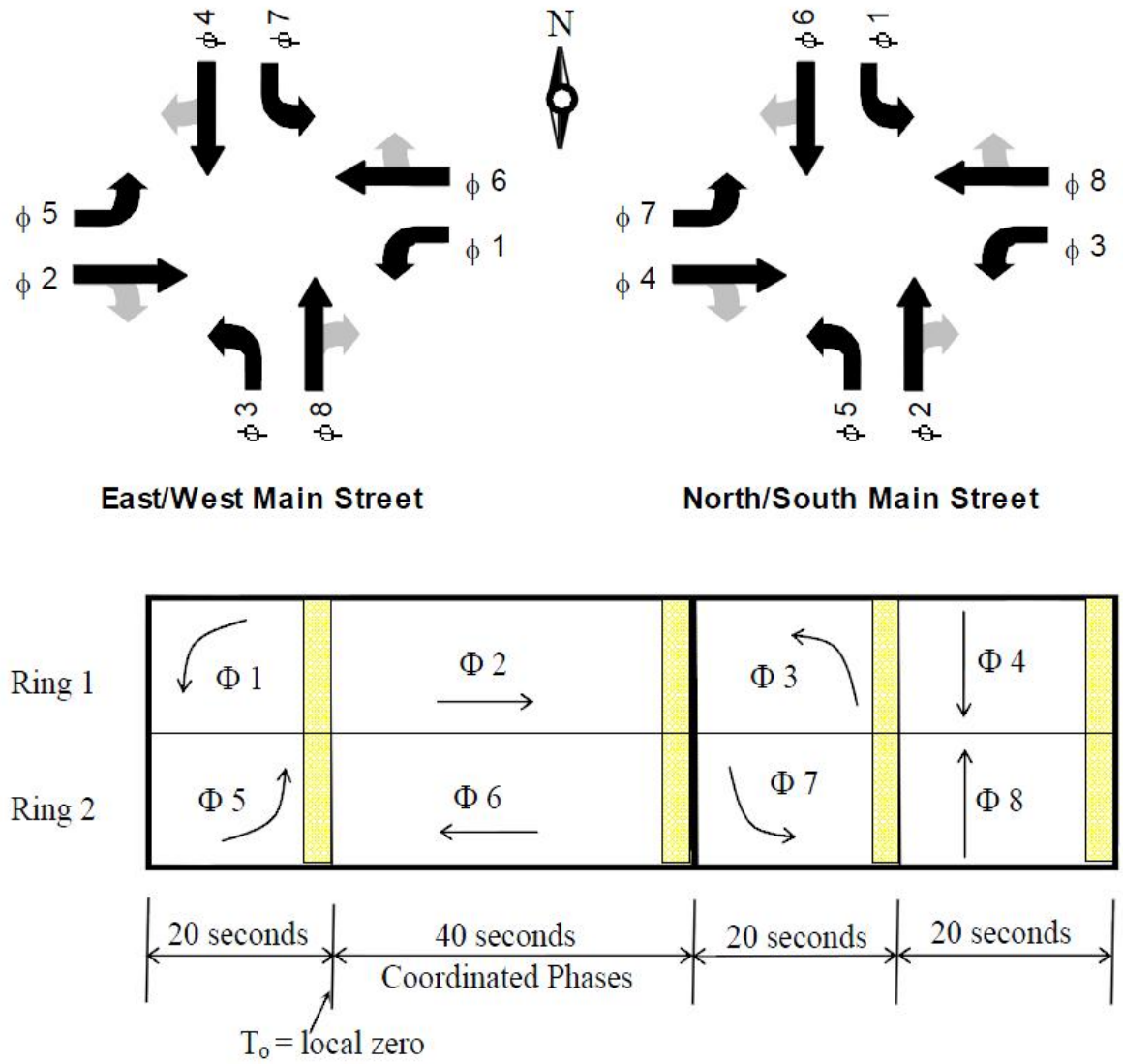


Figure 2 - Phase Splits

Cycle Lengths

The cycle length is the total time to complete one sequence of signalization around an intersection. A common cycle length is generally used at all intersections in a coordinated signal system. Short cycle lengths typically yield the best performance in terms of providing the lowest overall average delay provided the capacity of the cycle to pass vehicles is not exceeded. The cycle length, however, must allow adequate time for vehicular and pedestrian movements. Longer cycles are used during peak periods to provide more green time for the major street, to permit larger platoons in the peak direction, and/or to reduce the number of starting delays. For progressive signal spacing, it is

typically best to have a cycle length that is a direct multiple of the travel time between signalized intersections. **Figure 2-2** shows the breakdown of a signal cycle length between different phases and their associated green, amber, and red splits.

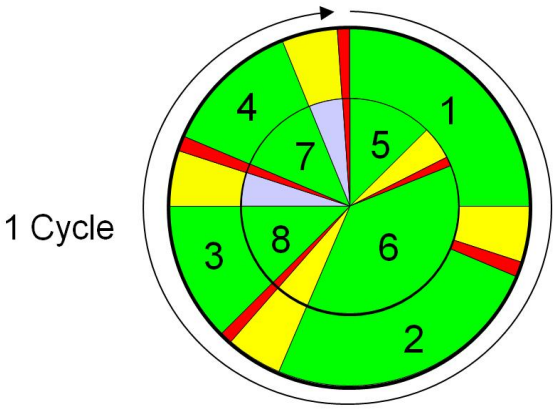


Figure 3 - Cycle Length

Left Turn Phases

The order in which traffic movements are served can greatly affect the progression of vehicles through a corridor. By changing the order in which a protected left turn phase comes up, it is possible to adjust the start of green for the through movement. In addition, whether a left turn is permissive, protected, or both can reduce the number of phases required in a given cycle. This can provide additional green time to the main street phase, possibly creating a larger green band on the arterial (**Figure 2-3)**.

Certain situations exist where safety considerations may preclude the use of permissive left turns. In these cases, left turns should be restricted to the exclusive left turn phases. Such situations include:

- Intersection approaches where accident experience or traffic conflict criteria is used as the basis for installing separate left turn phasing.
- Intersections where the horizontal or vertical alignment of the road does not allow the left turning driver adequate sight distance to judge whether or not a gap in on-coming traffic is long enough to safely complete his turn.
- High-speed and/or multilane approaches may make it difficult for left turning drivers to judge gaps in oncoming traffic. Such locations should be evaluated on an individual basis.
- Unusual geometric or traffic conditions may complicate the driver's task and necessitate the prohibition of permissive left turns. An example of such conditions is an approach where dual left turns are provided.

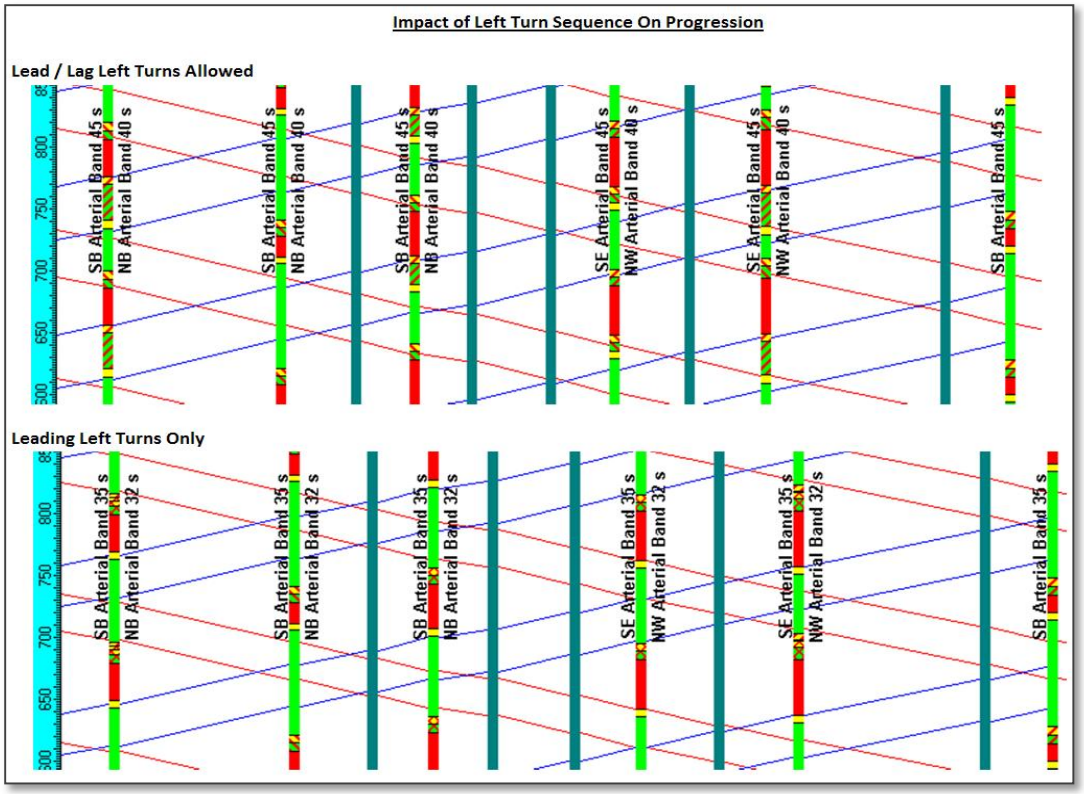


Figure 4 - Impacts of Left Turn Phase Sequence

Amber Trap and FYA

Lead/lag operation should not be used unless the leading left turn is protected-only. Otherwise, motorists turning left during the permissive period could encounter a phenomenon called the left-turn amber trap. This occurs when a motorist turning left during the permissive green period sees all the thru-movement signals on their approach turn yellow and thinks that the opposing thru-traffic is also stopping. However, in reality, the opposing thru-traffic still has the green ball that is running concurrently with the lagging left phase. This set of circumstances could trick the motorist into turning left into an oncoming vehicle. For this reason, lead/lag phasing cannot safely be used if the lead left-turn phase has a permissive interval unless Dallas Phasing or the Flashing Yellow Arrow is used.

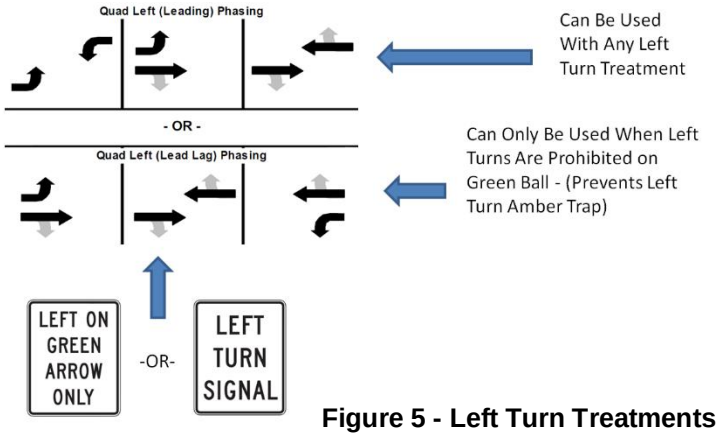


Figure 5 - Left Turn Treatments

One option that allows protected and permissive left turns for leading left turns is commonly called "Dallas Phasing". Section 4D.06.C.2.(c) of the 2006 Texas MUTCD said that

"*If the CIRCULAR GREEN and CIRCULAR YELLOW signal indications in the left-turn signal face are visibility-limited from the adjacent through movement, the left-turn signal face shall not be required to simultaneously display the same color of circular signal indication as the signal faces for the adjacent through movement.*"

This allowed a louvered green ball for the left turn phase to be wired to an overlap that mirrors the opposing through movement indications. When the adjacent through lane goes to a red ball indication, the left turn continues to see a green ball. This alerts the left turning drive that the opposing green is still on and they need to yield to opposing drivers. It is important to use an overlap phase, instead of wiring directly to the opposing green ball, in order to maintain proper operations of the conflict monitoring device within the signal controller cabinet.

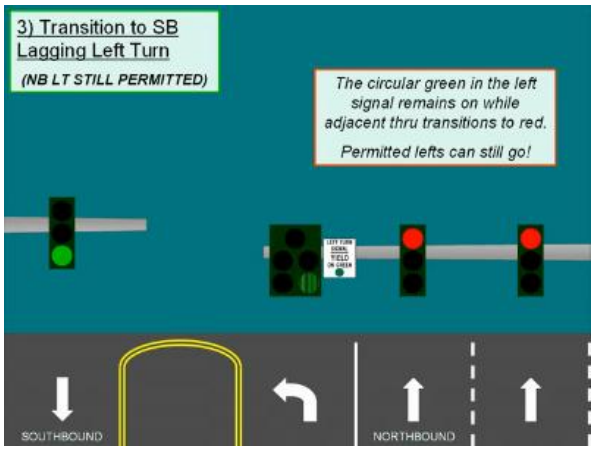


Figure 6 - Dallas Phasing

The FHWA studied the Dallas Phasing and decided that the louvered green ball was being interpreted differently by drivers. Some understood the meaning, while others simply saw it as an indication to "Go". After a long experimentation period and several studies, it was decided that the flashing yellow arrow is superior for protected / permissive left turn movements. The 2011 Texas MUTCD replaced Dallas Phasing for exclusive left turn lanes with the Flashing Yellow Arrow. Instead of a louvered green ball, left turn drivers see a flashing yellow arrow during the time they can turn after yielding.

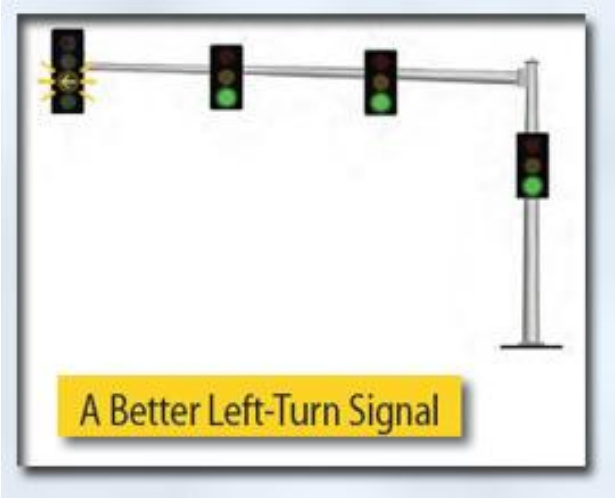


Figure 7 - Flashing Yellow Arrow

Flashing yellow arrows were installed at the intersection of Jim Hogg and Williams Drive in 2016.

Offsets

Offset is a key parameter for signal system coordination, as it is the time relationship of green-start for the major street at each of the intersections. Offsets usually are referenced to one intersection (e.g. the first intersection in the system). Proper determination and application of intersection offsets

provide for the efficient movement of platoons through multiple intersections during the green indication. Properly timed offsets can significantly reduce delay and improve driver satisfaction with the system timing.

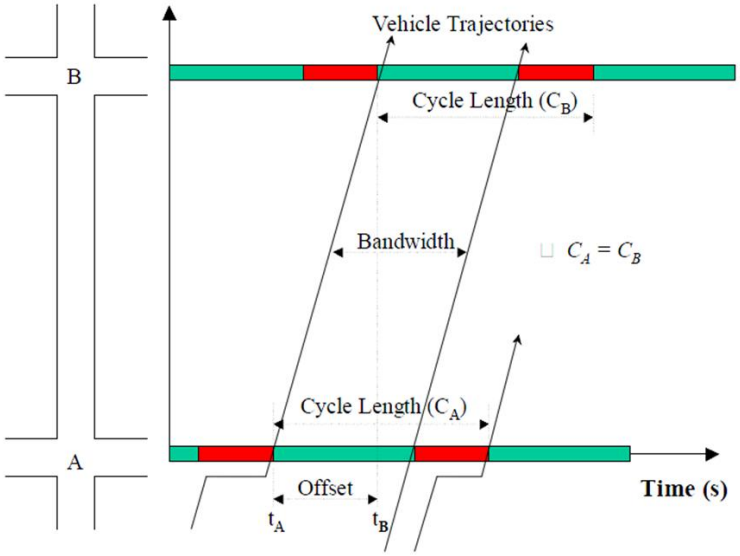


Figure 8 - Signal Timing Offsets

Communications

Since coordinated timing plans are based on travel times and speeds, it is critical that all of the intersections in the corridor use the same universal time reference. The clocks in a traffic signal tend to “drift” over time. To overcome this, signal clocks can either be manually reset on a weekly basis or get an automatic time update from a central signal management software. The City of Georgetown has a Tactics server that is linked to all of the signals along the corridor. This software sends a clock update every night to keep the signals “in step” with each other. The software also sends out alerts whenever a signal malfunction is detected for quicker response times to make repairs.

Platooning

A traffic signal compresses random vehicle flow into a series of well-defined platoons. After a platoon leaves the signal, it gradually disperses until the flow becomes random again. Fewer vehicles benefit from the available green once the platoon has dispersed because where no more green time can be added to allow for the expansion, the last vehicles are left behind. In this situation, an offset that cuts off the stragglers and leaves them to wait for the next green is more detrimental than an offset that stops the leading vehicles, allows the stragglers to catch up, and compresses the platoon into its original length. The more rapidly platoons disperse, the sooner and more often they have to be stopped and compressed.

2.2 METHODOLOGY

This section of the report describes the process that was adopted in coordinating the traffic signals on Williams Drive. Peak period traffic models of the entire network were created using the traffic modeling software Synchro 9™. As the traffic volumes and the direction of the traffic flow during the morning peak-period differs from the evening peak-period, different base models were developed and calibrated for the two rush-hour periods. City staff was regularly consulted throughout the process. They provided valuable input on cycle lengths, corridor priorities, and left turn treatments.

Cycle Length Determination

The first step was to determine the best common cycle length for the entire network. As a preliminary step cycles from 80 to 150 at 5-second intervals were tested on several of the corridors in the network to determine the cycle length that yielded the best results. The analysis showed ideal cycle lengths to be 100 seconds during the morning peak travel demand period and 120 seconds during the afternoon peak.

Green Bands

After a common cycle length was adopted for all the intersections, we started adjusting green splits and their offsets to widen the green bands. A green band is the window of time available for vehicles to travel through several intersections, without having to stop at the intersection. For Williams Drive, the widest possible green bands were obtained in both directions (east and west).

In a coordinated progression, green bands are obtained by adjusting the offsets of successive intersections such that the downstream intersection turns green in the time the platoon arrives. While it is desirable to have progression through as many intersections as possible, a green band over a long distance may not be very effective due to platoon dispersal. Therefore, in order to regroup and compress the platoon, the vehicles need to be stopped at some of the intersections. Some of the guiding philosophies adopted in this study for obtaining progression are as follows:

- Breaks in progression and stopping of the traffic, where necessary, was done at a major arterial rather than a minor collector street.
- The breaks in progression are not necessarily at the same intersections for both directions. For instance, the northbound traffic on Williams Drive starting at Austin Avenue have to make a stop at DB Wood / Shell, whereas the southbound traffic does not stop.
- At several intersections, an increase in green band for one direction came at the expense of decreasing green band for the opposite direction. In such cases the directional nature of traffic volumes was observed and the direction with a higher traffic volume was allocated extra green time, with small decrease to the opposite direction.
- In cases where the minor street at an intersection carried very little traffic, their green times were reduced and added to the major street if the overall corridor's green band improved.

Left Turn Treatments

Currently, all the intersections allow only leading left-turns. However, it was observed at several intersections that staggering (lead-lagging) the left-turn movements yielded better progression on the major arterials. As many travelers may be unfamiliar with the concept of lagging left-turns, we have

proposed lead-lags at several intersections. Some of the factors that were considered while deciding lead-lag left turns are as follows:

- An intersection was considered for lead-lag only when it increased the green band considerably.
- Flashing Yellow Arrow phasing was used at intersections where left turns are staggered.
- In order to employ Flashing Yellow Arrow phasing, the flashing arrow is wired to the opposing movements via an "overlap phase". This can be done only if the controller has additional free load switches. A list of intersections was made listing the number of free available load switches.
- Only intersections with a left-turn bay for the left movements were considered for lead-lag.

Pedestrian Clearance

The intersections were checked to ensure that the pedestrian walk and clearance time, amber time and all-red time combined were not greater than the maximum split for the phase that allowed pedestrian movement. However, at some of the intersections adjusting the splits to accommodate pedestrian movement across the major arterial led to an increase in the splits for the minor arterial, thereby, worsening the progression along the main corridor. Where pedestrian volumes were not high enough to warrant a high split time and, therefore, the split time was given to the major arterial. These intersections are likely to go out of coordination for some cycle lengths when a pedestrian call is made.

Measures of Effectiveness

To evaluate the proposed timings, measures of effectiveness (MOEs) were compared to those from the existing conditions. The MOEs that were compared include signal delay, travel time, arterial speed and level of service. These are presented in the following section.

3. Analysis Results

A summary of the results is presented in this section. For the short-term improvements, the morning and evening peak-period models were developed independently while maintaining the order of lead-lag left turns. For the medium-term improvements, the first set of models assumed that Flashing Yellow Arrow was installed and left turn sequences could be modified to maximize the green band widths. Finally, geometric improvements were assumed at a few of the intersections that would allow for more efficient movement of vehicles through those intersections.

For some of the intersections it was not possible to have adequate progression in both directions due to intersection spacing. Therefore, instead of trying to have some progression in each direction, the direction with heavier traffic flow was chosen and enough green time was allocated to that phase to ensure acceptable progression in one direction only. It was observed that lead-lagging the left turn movements had the biggest impact on improved progression and wider green bands.

3.1 EXISTING CONDITIONS

There is coordinated signal timing on Williams Drive from DB Wood / Shell to Jim Hogg. This timing runs AM, PM and off peak plans, which maintain consistent green bands for this segment of roadway.

The signals between DB Wood / Shell and Austin Avenue are all running “free”. The signal at IH 35 is not controlled by the City, as it is a TxDOT facility.

3.2 SHORT TERM IMPROVEMENTS – RETIMING ONLY

Re-timing the corridor without making any changes to the traffic signal hardware results in substantial improvement to travel times along the corridor. Consistent green bands were obtained in the morning period of 31 seconds eastbound and 24 seconds westbound using a 100 second signal cycle. Green bands in the afternoon peak were much narrower, because a 120 second cycle was needed to handle the heavier traffic volumes. These bands were 9 seconds eastbound and 11 seconds westbound. However, several “choke points” exist that can be alleviated by adding flashing yellow arrow and lead-lag left turns.

3.3 MEDIUM TERM IMPROVEMENTS

Add Flashing Yellow Arrow

As discussed in the previous sections, having the ability to lead-lag left turn phases can have dramatic impacts on the progression green bands along a corridor. For Williams Drive, this is definitely the case. By using lead-lag left turn phases during the afternoon peak period, the green bands are increased to 24 seconds eastbound and 27 seconds westbound. There is adequate wiring and cabinet load switches at each of the intersections. Estimated cost of implementation for material and labor is $3,500 per intersection if done by city forces with assistance from the equipment representative. The intersections at Austin Avenue and IH 35 do not use flashing yellow arrows and the intersection at Jim Hogg already has flashing yellow arrow installed. For the remaining eight intersections, the estimated cost is $28,000 to install flashing yellow arrows.

Geometric Improvements

Wildwood and Lakeway / Booty’s Crossing

The intersection geometries at Wildwood and Lakeway / Bootys Crossing require the side streets to have “split” signal phasing, which can be very inefficient. Installing a separate left turn storage bay on the north leg of Wildwood and the south Leg of Lakeway would allow the more traditional signal phasing where through movements and left turns don’t have to run together at all times. Exhibits showing the proposed improvements are provided in **Figures 9 and 10**. Estimated costs for making these improvements are as follows:

- Williams Drive at Wildwood $ 97,294
- Williams Drive at Lakeway $ 110,044

Itemized cost estimates are provided in the Appendix.

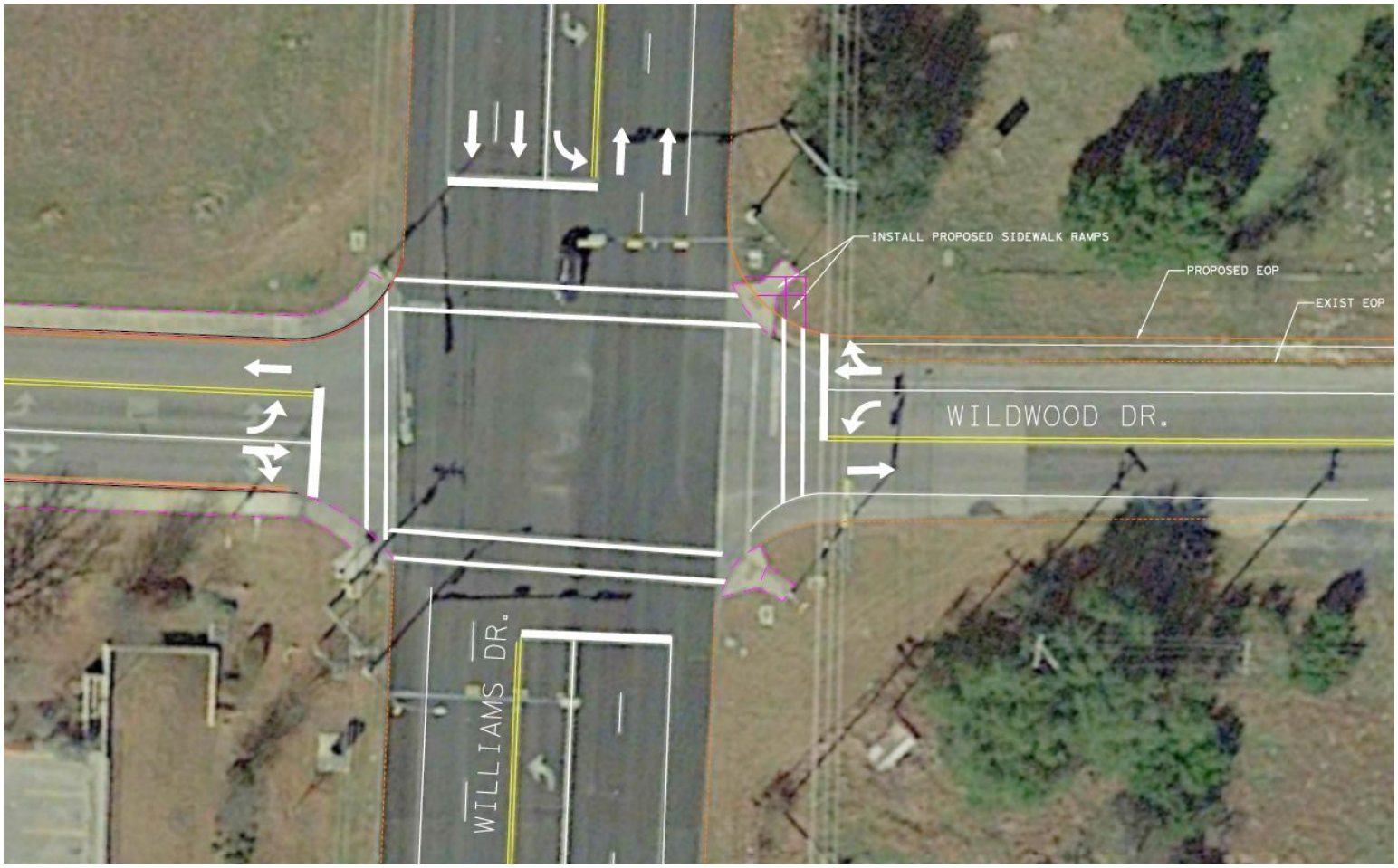


Figure 9 - Proposed Improvements at Wildwood Drive

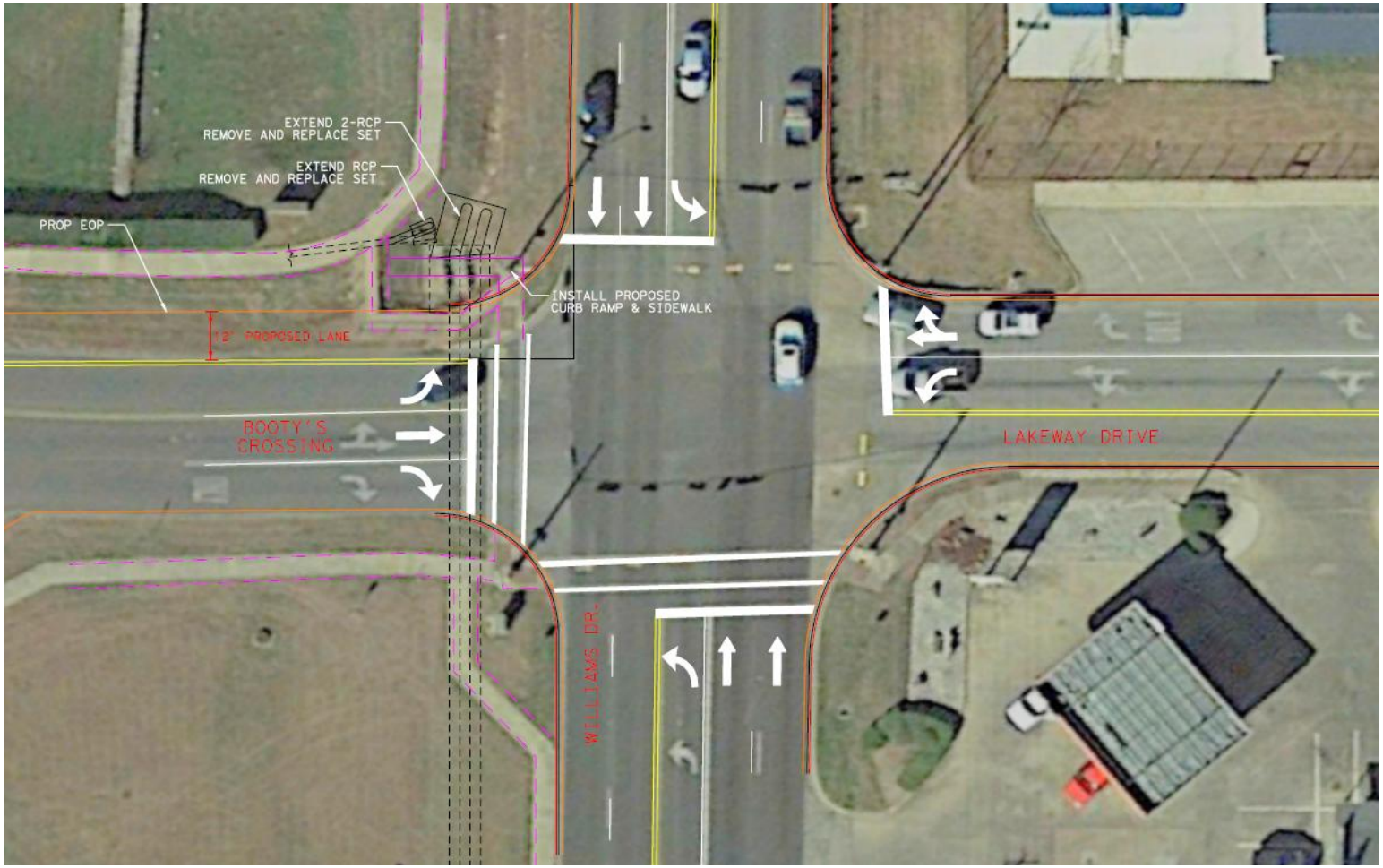


Figure 10 - Proposed Improvements at Lakeway / Booty's Crossing

IH 35 Interchange with Williams Drive

In addition to the roadway improvements at Wildwood and Lakeway / Booty's Crossing, another project is currently under design that will improve greatly capacity along the corridor. TxDOT is working on upgrading the interchange of IH 35 and Williams Drive to a directional diamond. They are currently finalizing schematics and environmental documentation and expect to be complete in summer 2017. Following this, design plans will be prepared for construction. It is expected that this interchange will begin construction in the winter of 2019 and be fully constructed in the summer of 2022 (pending funding).

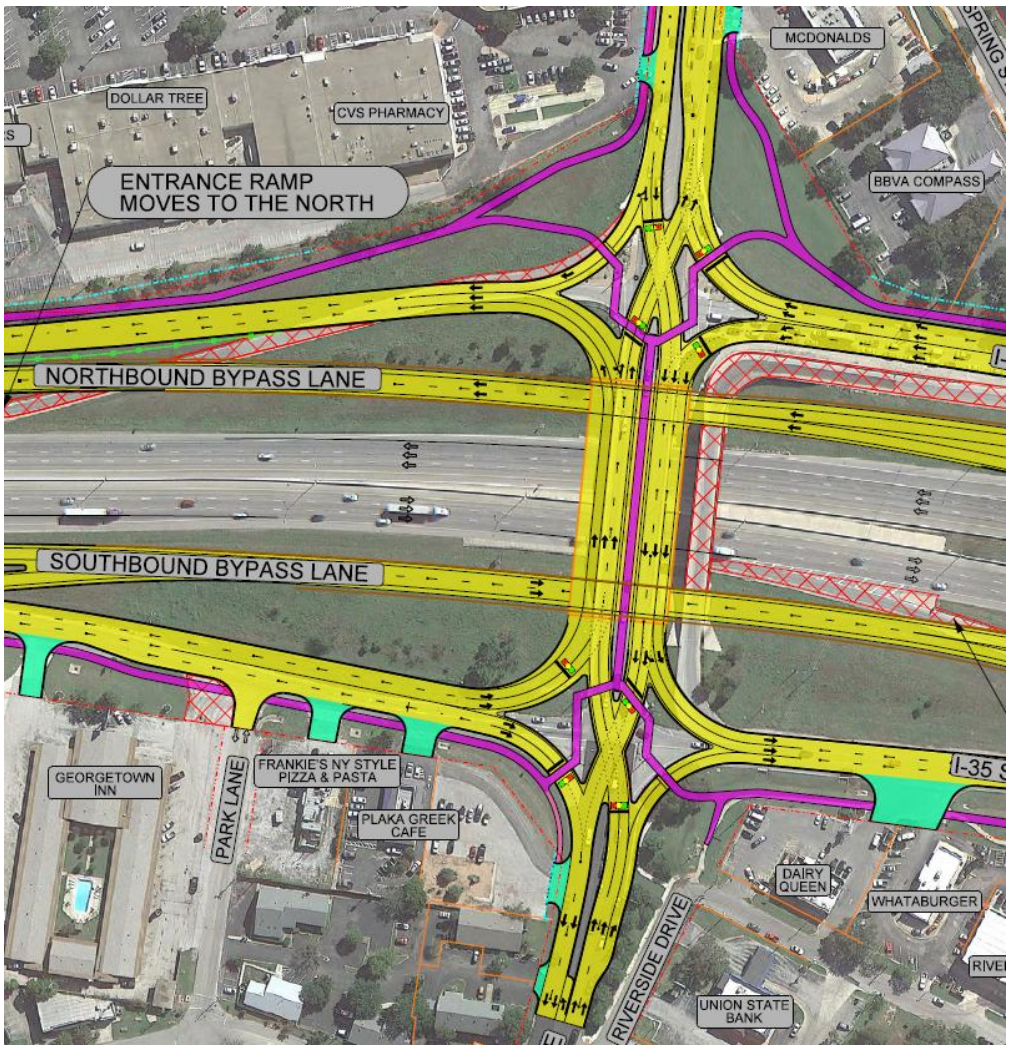


Figure 11 - IH 35 Directional Diamond

The diverging diamond intersection, or DDI, is a new design that relocates conflicting vehicular movements and allows vehicles to move more quickly through the intersection. A FHWA study

suggests that, with the same number of lanes, a traditional interchange that is at 95 percent capacity would only be at 60 percent capacity if converted to a DDI. Furthermore, the interchange is expected to operate more safely. The number of crashes at a DDI can be expected to be approximately half of those of a traditional interchange. With lower operating speeds, any crashes that do occur are expected to have a lesser degree of severity. A similar type of interchange was recently opened at RM 1431 / IH 35 in Round Rock, Texas.

Rivery Drive Extension

The City of Georgetown is planning to extend Rivery Boulevard from Williams Drive and Northwest Boulevard, providing an alternate route from Williams Drive to the future Northwest Boulevard Bridge over IH 35. These new roadways will provide connectivity between the hotels in the Gateway area and a proposed conference center near Rivery Boulevard and Wolf Ranch Parkway.

Figure 12 - Rivery Boulevard Extension

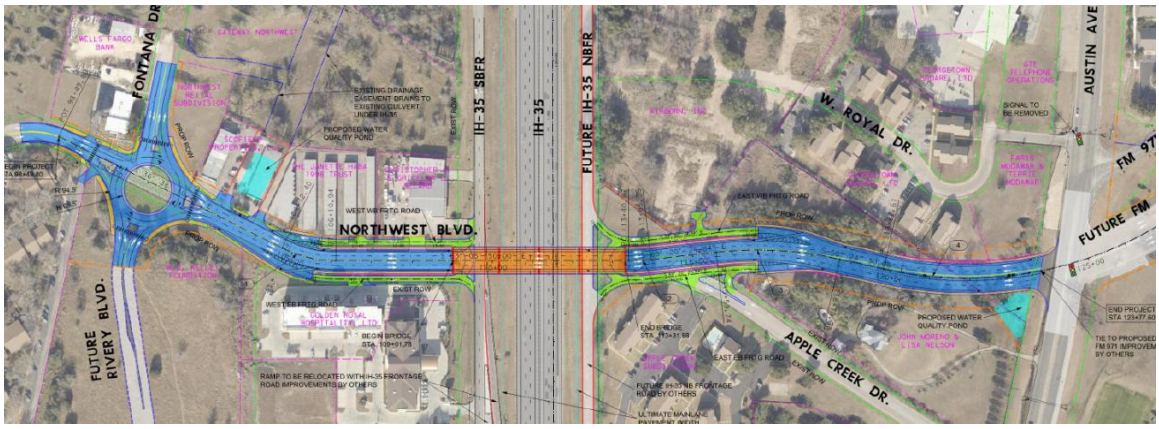


Figure 13 - Northwest Boulevard Bridge

TxDOT Signals and the Traffic Management Center

Under the Texas Administrative Code, Title 43, Section 25.5, once a city's census population is greater than 50,000, that city must take over the cost of installation, operation, and maintenance of traffic signals on state roadways, including roadside beacons and school zone flashers. For signals at an interchange or divided highway on the Federal Highway System (i.e. IH 35), TxDOT provides a small reimbursement to the City.

The City of Georgetown currently has a single technician operating 20 traffic signals. As noted earlier, most of the city signals have a fiber optic connection to a Siemens TACTICS central software system. This software sends a clock update every night to keep the signals "in step" with each other. It also sends automatic messages and alarms if a signal is malfunctioning.

There are an additional 26 intersections in the city limits that are operated by the TxDOT Austin District. Of these, 12 of them are connected via broadband radio to the Georgetown Area Office. The remaining TxDOT signals do not have communications.

One of the issues with establishing a coordinated traffic signal system is that the various brands of signal controllers each have their own communication protocol. The City of Georgetown currently utilizes Siemens signal equipment. Most, if not all, of the equipment running the TxDOT signals are the Econolite brand, which cannot communicate with the Siemens TACTICS server.

In order for a seamless transition of responsibility for the TxDOT traffic signals, the City should be proactive in working with TxDOT to install upgrades prior to the future takeover. As a minimum, it is recommended that the City conduct a signal inventory and assessment to identify any improvements or upgrades that can be done now. These might include:

- Establishing signal communications to the city server,
- Installing controllers that are compatible with the city server,
- Adding GPS clocks to signals that have no communication,
- Installing battery backup systems to critical intersections, and
- Conversion to flashing yellow operations,

Consideration should also be given to the number of personnel that will be needed when the number of intersections increases from 20 to 46. Staffing levels at two comparable cities are provided below for comparison:

City	Number of Signals	Staffing Levels
Georgetown	46 (future)	1 signal technician
Cedar Park	49	1 traffic engineer, 3 signal technicians
San Marcos	60	2 traffic engineers, 3 signal technicians

As Georgetown continues to grow, the number of signals will continue to increase, as will the effort needed to maintain them. Having additional staff will also allow for more rapid response times when a signal malfunctions, particularly after normal working hours.

3.4 SUMMARY OF RESULTS

This section provides a summary of the modelling results. **Table 3-1** shows a comparison of travel times along the corridor. Reports showing current and improved operating levels of service (LOS), traffic volumes, and travel times can be found in the Appendices.

Table 3- 1 Travel Time Results

Scenario	Williams Drive Travel Time - Austin Avenue to Jim Hogg							
	AM				PM			
	Eastbound		Westbound		Eastbound		Westbound	
	Minutes	%	Minutes	%	Minutes	%	Minutes	%
Existing Timing	12.9	n/a	11.2	n/a	14.0	n/a	11.8	n/a
Improved Signal Timing	11.2	-13.7%	10.6	-4.5%	12.8	-8.5%	11.6	-1.5%
Add FYA	10.8	-16.5%	10.8	-4.5%	11.8	-15.2%	11.6	-1.8%
Add Geometric Improvements	10.7	-17.3%	10.3	-7.6%	11.6	-16.9%	11.4	-3.5%

From the table, you can see that the greatest improvements occur during the afternoon peak period. This is to be expected, since the heaviest travel demand is during the afternoon. Re-timing the corridor has the biggest impact, with a 27.5% reduction in travel times. Adding the Flashing Yellow Arrow and making geometric improvements at Wildwood and Lakeway / Bootys Crossing provide additional benefit, reducing travel times by 31.6% when compared to existing timings.

Based on the *Synchro 9™* traffic models, the new timing plans and other improvements will reduce stops delays, and travel times in the morning and afternoon peak periods as shown in **Table 3-2.**

Table 3- 2 Annual Benefit of Improvements

Measure of Effectiveness	AM Peak		PM Peak		Total Annual Savings	
	Daily Benefit	Annual Benefit	Daily Benefit	Annual Benefit	Hours / Stops / Fuel	$ Savings
Short Term Benefits - Optimize Timing Plans w/o Any Signal Modifications						
Total Delay (hr)	$ 1,636.88	$409,220	$ 1,061.76	$ 265,440.00	397,220	$ 674,660.00
Stops (#)	-6,084	-1,521,000	-3,354	-838,500	-2,359,500	
Fuel Consumed (gal)	$ 264.60	$66,150	$ 6,339.06	$ 1,584,765.00	-772,350	$ 1,650,915.00
SubTotal		$ 475,370.00		$ 1,850,205.00		$ 2,325,575.00
Medium Term Benefits - Optimize Timing Plans w/ Lead Lag						
Total Delay (hr)	$ 221.20	$55,300	$ 88.48	$ 22,120.00	-3,500	$ 77,420.00
Stops (#)	-520	-130,000	-594	-148,500	-278,500	
Fuel Consumed (gal)	$ (15.12)	-$3,780	$ 30.24	$ 7,560.00	-2,000	$ 3,780.00
SubTotal		$ 51,520.00		$ 29,680.00		$ 81,200.00
Medium Term Benefits - Optimize Timing Plans w/ Lead Lag + FYA + Geometric Improvements						
Total Delay (hr)	$ 486.64	$121,660	$ 575.12	$ 143,780.00	-12,000	$ 265,440.00
Stops (#)	-1,014	-253,500	-232	-58,000	-311,500	
Fuel Consumed (gal)	$ 15.12	$3,780	$ 26.46	$ 6,615.00	-5,500	$ 10,395.00
SubTotal		$ 125,440.00		$ 150,395.00		$ 275,835.00
Total Annual Benefits						
Delay / Fuel Savings		$ 652,330.00		$ 2,030,280.00		$ 2,682,610.00
Stop Totals		-1,904,500		-1,045,000		

Each of the improvements listed has a useful design life. The Institute of Transportation Engineers recommends re-timing traffic signals every three years. So, the improvement involving signal timing is assumed to have a useful life of 3 years. However, flashing yellow arrow equipment and geometric improvements are designed to last at least 20 years. Taking these values and the annual benefit, it is possible to calculate the Benefit to Cost ratio for each improvement, as shown in **Table 3-3**.

Table 3- 3 Benefit to Cost Ratio For Improvements

Improvements	Improvement Cost	Annual Benefit	Improvement Life (years)	Benefit	Benefit to Cost Ratio
Optimize Timing	$ 48,000	$ 2,325,575.00	3	$ 6,976,725	145.35
Add Flashing Yellow Arrow	$ 31,482	$ 81,200.00	20	$ 1,624,000	51.59
Geometric Improvements	$ 207,538	$ 275,835.00	20	$ 5,516,700	26.58
Total	$ 287,020	$ 2,682,610		$ 14,117,425	49.19

From this table, it can be seen that optimized signal timing provides the largest value for the cost of the investment. However, each has a substantial benefit to cost ratio and is justified as a value investment.

4. Conclusion / Recommendations

Traffic operations on Williams drive can be greatly improved through traffic signal timings, adding flashing yellow arrows for east-west left turns, and geometric improvements at Lakeway Drive and Wildwood Drive.

In order to maintain the benefit of the new traffic signal timings, it is important that each location routinely receive a time clock update. This can be done either by manually resetting each controller clock or remotely through a communication link to the City's central signal software server. All of the intersections on Williams Drive are connected to the City's server.

Priority should be given to adding these intersections to the signal communication network. The cost of installing these links is relatively low compared to the labor costs of manual clock resets. All of the existing communications infrastructure to date has been provided by the City of Georgetown's Information Systems staff.

Short and medium term improvements were studied and determined to have significant benefits for traffic operations. These are:

- Installing updated signal timing plans for all intersections along Williams Drive.
- Modifying east-west left turn displays to include the flashing yellow arrow at seven of the intersections.
- Adding additional pavement to southbound Wildwood and northbound Lakeway to create separate left turn storage and removing the existing split phased signal timings.

The Institute of Transportation Engineers recommends that traffic signal timings be re-evaluated every three to four years. Most cities establish a regular timing program for major corridors. In

Georgetown, that currently includes Williams Drive, the Inner Loop and Austin Avenue, With the new development that is rapidly occurring on Westinghouse Road, it is expected that this roadway would also soon become a corridor that will require new traffic signals and a coordination plan. Once the City takes over operations of TxDOT signals, the list of corridors would expand to include SH 29, SH 195, RM 2243, and FM 1460.

Finally, as discussed earlier, the City is encouraged to work with TxDOT to conduct a signal inventory and assessment in preparation of taking over the operations and maintenance of traffic signals on state roadways.

Appendix A – Existing Conditions Model Outputs

Network Totals

Number of Intersections	25
Total Delay (hr)	192
Stops (#)	18325
Average Speed (mph)	28
Total Travel Time (hr)	522
Distance Traveled (mi)	14558
Fuel Consumed (gal)	852
Fuel Economy (mpg)	17.1
Unserved Vehicles (#)	109
Vehicles in dilemma zone (#)	1001
Performance Index	242.7

Network Totals

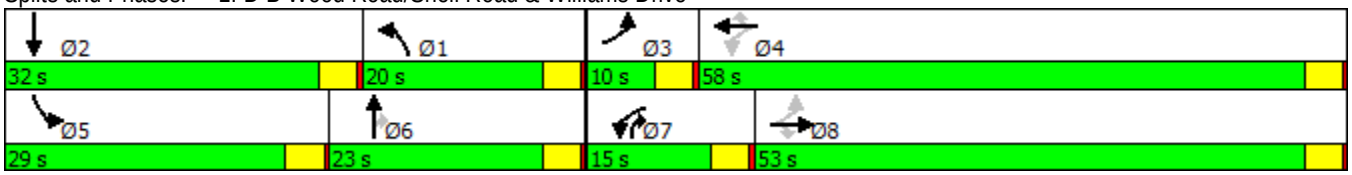
Number of Intersections	25
Total Delay (hr)	267
Stops (#)	21262
Average Speed (mph)	25
Total Travel Time (hr)	632
Distance Traveled (mi)	15848
Fuel Consumed (gal)	962
Fuel Economy (mpg)	16.5
Unserved Vehicles (#)	108
Vehicles in dilemma zone (#)	925
Performance Index	326.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	85	898	277	153	609	307	195	102	59	364	261
Future Volume (vph)	85	898	277	153	609	307	195	102	59	364	261
Lane Group Flow (vph)	92	976	301	166	662	334	212	111	64	396	293
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA
Protected Phases	3	8		7	4		1	6	7	5	2
Permitted Phases	8		8	4		4			6		
Detector Phase	3	8	8	7	4	4	1	6	7	5	2
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	8.0	20.0	20.0	20.0	20.0	8.0	20.0	20.0
Total Split (s)	10.0	53.0	53.0	15.0	58.0	58.0	20.0	23.0	15.0	29.0	32.0
Total Split (%)	8.3%	44.2%	44.2%	12.5%	48.3%	48.3%	16.7%	19.2%	12.5%	24.2%	26.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None
v/c Ratio	0.23	0.72	0.38	0.51	0.40	0.36	0.46	0.31	0.15	0.52	0.53
Control Delay	11.0	25.1	3.7	15.8	16.2	3.0	39.3	41.0	10.2	34.4	37.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.0	25.1	3.7	15.8	16.2	3.0	39.3	41.0	10.2	34.4	37.9
Queue Length 50th (ft)	20	219	0	38	117	0	52	28	2	96	73
Queue Length 95th (ft)	50	336	48	90	190	46	107	66	37	176	140
Internal Link Dist (ft)		305			466			485			323
Turn Bay Length (ft)	150		250	150		193	270		200	180	
Base Capacity (vph)	409	2184	1092	348	2406	1183	691	847	450	1081	1243
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.45	0.28	0.48	0.28	0.28	0.31	0.13	0.14	0.37	0.24

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 82.6
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: D B Wood Road/Shell Road & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	898	277	153	609	307	195	102	59	364	261	8
Future Volume (vph)	85	898	277	153	609	307	195	102	59	364	261	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	3433	3523	
Flt Permitted	0.39	1.00	1.00	0.13	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	718	3539	1583	244	3539	1583	3433	3539	1583	3433	3523	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	976	301	166	662	334	212	111	64	396	284	9
RTOR Reduction (vph)	0	0	183	0	0	181	0	0	47	0	2	0
Lane Group Flow (vph)	92	976	118	166	662	153	212	111	17	396	291	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		1	6	7	5	2	
Permitted Phases	8		8	4		4			6			
Actuated Green, G (s)	37.5	32.9	32.9	47.2	38.6	38.6	12.1	6.7	17.0	18.2	12.8	
Effective Green, g (s)	37.5	32.9	32.9	47.2	38.6	38.6	12.1	6.7	17.0	18.2	12.8	
Actuated g/C Ratio	0.45	0.39	0.39	0.56	0.46	0.46	0.14	0.08	0.20	0.22	0.15	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	377	1384	619	323	1624	726	493	281	395	742	536	
v/s Ratio Prot	0.01	c0.28		c0.06	0.19		c0.06	0.03	0.01	c0.12	0.08	
v/s Ratio Perm	0.10		0.07	0.23		0.10			0.01			
v/c Ratio	0.24	0.71	0.19	0.51	0.41	0.21	0.43	0.40	0.04	0.53	0.54	
Uniform Delay, d1	13.6	21.5	16.8	12.5	15.1	13.6	32.9	36.8	27.0	29.2	32.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	1.7	0.2	1.4	0.2	0.1	0.6	0.9	0.0	0.7	1.1	
Delay (s)	14.0	23.2	17.0	13.9	15.3	13.8	33.5	37.7	27.0	29.9	34.1	
Level of Service	B	C	B	B	B	B	C	D	C	C	C	
Approach Delay (s)		21.2			14.7			33.6			31.7	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	84.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWT
Lane Configurations							
Traffic Volume (vph)	35	1402	37	766	22	4	6
Future Volume (vph)	35	1402	37	766	22	4	6
Lane Group Flow (vph)	61	1508	64	833	30	82	112
Turn Type	pm+pt	NA	pm+pt	NA	Split	NA	NA
Protected Phases	5	2	1	6	4	4	3
Permitted Phases	2		6				
Detector Phase	5	2	1	6	4	4	3
Switch Phase							
Minimum Initial (s)	7.0	30.0	7.0	30.0	7.0	7.0	7.0
Minimum Split (s)	14.0	37.0	14.0	37.0	14.0	14.0	14.0
Total Split (s)	14.0	54.0	14.0	54.0	16.0	16.0	16.0
Total Split (%)	14.0%	54.0%	14.0%	54.0%	16.0%	16.0%	16.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Min	None	C-Min	None	None	None
v/c Ratio	0.13	0.72	0.24	0.40	0.17	0.37	0.46
Control Delay	2.8	16.5	8.2	13.4	43.3	17.9	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.8	16.5	8.2	13.4	43.3	17.9	19.3
Queue Length 50th (ft)	2	463	11	151	18	7	13
Queue Length 95th (ft)	5	576	18	225	36	0	3
Internal Link Dist (ft)		2052		391		287	1154
Turn Bay Length (ft)	300		300				
Base Capacity (vph)	477	2103	265	2108	212	257	277
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.72	0.24	0.40	0.14	0.32	0.40

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SETL and 6:NWTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 2: Wildwood Dr & Williams Drive

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	35	1402	23	37	766	0	22	4	56	2	6	66
Future Volume (vph)	35	1402	23	37	766	0	22	4	56	2	6	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87			0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	3528		1770	3539		1770	1621			1655	
Flt Permitted	0.28	1.00		0.08	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	521	3528		152	3539		1770	1621			1655	
Peak-hour factor, PHF	0.57	0.95	0.73	0.58	0.92	0.50	0.73	0.38	0.79	0.25	0.44	0.73
Adj. Flow (vph)	61	1476	32	64	833	0	30	11	71	8	14	90
RTOR Reduction (vph)	0	1	0	0	0	0	0	65	0	0	81	0
Lane Group Flow (vph)	61	1507	0	64	833	0	30	17	0	0	31	0
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								
Actuated Green, G (s)	59.6	54.0		59.6	54.0		6.4	6.4			8.0	
Effective Green, g (s)	65.6	57.0		65.6	57.0		8.4	8.4			10.0	
Actuated g/C Ratio	0.66	0.57		0.66	0.57		0.08	0.08			0.10	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	449	2010		238	2017		148	136			165	
v/s Ratio Prot	0.01	c0.43		c0.02	0.24		c0.02	0.01			c0.02	
v/s Ratio Perm	0.08			0.15								
v/c Ratio	0.14	0.75		0.27	0.41		0.20	0.12			0.19	
Uniform Delay, d1	6.7	16.1		11.7	12.1		42.7	42.4			41.3	
Progression Factor	0.40	0.86		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.1	2.0		0.6	0.6		0.7	0.4			0.6	
Delay (s)	2.8	15.8		12.3	12.7		43.4	42.8			41.8	
Level of Service	A	B		B	B		D	D			D	
Approach Delay (s)		15.3			12.7			43.0			41.8	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1277	173	60	794	81	183
Future Volume (vph)	1277	173	60	794	81	183
Lane Group Flow (vph)	1388	339	98	913	156	366
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	15.0	15.0	7.0	15.0	7.0	7.0
Minimum Split (s)	24.0	24.0	13.0	24.0	12.5	12.5
Total Split (s)	52.6	52.6	13.0	65.6	34.4	34.4
Total Split (%)	52.6%	52.6%	13.0%	65.6%	34.4%	34.4%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-1.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						
Recall Mode	C-Min	C-Min	None	C-Min	None	None
v/c Ratio	0.66	0.31	0.34	0.37	0.42	0.80
Control Delay	10.9	1.1	6.9	7.3	36.0	33.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.9	1.1	6.9	7.3	36.0	33.2
Queue Length 50th (ft)	200	0	15	190	86	126
Queue Length 95th (ft)	317	1	29	276	70	55
Internal Link Dist (ft)	1127			2052	664	
Turn Bay Length (ft)		300	300			
Base Capacity (vph)	2114	1080	285	2488	532	589
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.31	0.34	0.37	0.29	0.62

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 57 (57%), Referenced to phase 2:SET and 6:NWTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 3: Woodlake Dr & Williams Drive

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1277	173	60	794	81	183
Future Volume (vph)	1277	173	60	794	81	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3505	1568	1752	3505	1752	1568
Flt Permitted	1.00	1.00	0.11	1.00	0.95	1.00
Satd. Flow (perm)	3505	1568	200	3505	1752	1568
Peak-hour factor, PHF	0.92	0.51	0.61	0.87	0.52	0.50
Adj. Flow (vph)	1388	339	98	913	156	366
RTOR Reduction (vph)	0	139	0	0	0	128
Lane Group Flow (vph)	1388	200	98	913	156	238
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	57.1	57.1	69.0	69.0	19.5	19.5
Effective Green, g (s)	59.1	59.1	71.0	71.0	21.0	21.0
Actuated g/C Ratio	0.59	0.59	0.71	0.71	0.21	0.21
Clearance Time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2071	926	264	2488	367	329
v/s Ratio Prot	c0.40		0.03	c0.26	0.09	
v/s Ratio Perm		0.13	0.23			c0.15
v/c Ratio	0.67	0.22	0.37	0.37	0.43	0.72
Uniform Delay, d1	13.8	9.6	9.8	5.7	34.3	36.8
Progression Factor	0.59	0.22	0.65	1.03	1.00	1.00
Incremental Delay, d2	1.6	0.5	0.8	0.4	0.8	7.7
Delay (s)	9.8	2.6	7.2	6.3	35.1	44.5
Level of Service	A	A	A	A	D	D
Approach Delay (s)	8.4			6.4	41.6	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Configurations								
Traffic Volume (vph)	70	20	100	20	100	1275	70	854
Future Volume (vph)	70	20	100	20	100	1275	70	854
Lane Group Flow (vph)	76	76	109	109	109	1440	76	1015
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	1	6	5	2
Permitted Phases	4		8		6		2	
Detector Phase	7	4	3	8	1	6	5	2
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	10.0	7.0	10.0
Minimum Split (s)	12.5	20.0	12.5	20.0	12.5	23.5	12.5	23.5
Total Split (s)	15.0	20.0	15.0	20.0	15.0	45.0	15.0	45.0
Total Split (%)	15.8%	21.1%	15.8%	21.1%	15.8%	47.4%	15.8%	47.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.30	0.39	0.42	0.48	0.29	0.68	0.32	0.49
Control Delay	31.6	22.8	34.5	20.3	8.9	20.1	11.0	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.6	22.8	34.5	20.3	8.9	20.1	11.0	16.1
Queue Length 50th (ft)	37	13	54	13	22	351	15	206
Queue Length 95th (ft)	70	54	95	62	48	#560	36	312
Internal Link Dist (ft)		1195		1212		1599		2931
Turn Bay Length (ft)					175		175	
Base Capacity (vph)	269	299	272	323	403	2112	277	2081
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.25	0.40	0.34	0.27	0.68	0.27	0.49

Intersection Summary

Cycle Length: 95
Actuated Cycle Length: 95
Offset: 0 (0%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Williams Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	70	20	50	100	20	80	100	1275	50	70	854	80
Future Volume (vph)	70	20	50	100	20	80	100	1275	50	70	854	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1664		1770	1640		1770	3519		1770	3494	
Flt Permitted	0.69	1.00		0.67	1.00		0.21	1.00		0.10	1.00	
Satd. Flow (perm)	1279	1664		1246	1640		395	3519		180	3494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	22	54	109	22	87	109	1386	54	76	928	87
RTOR Reduction (vph)	0	50	0	0	80	0	0	2	0	0	6	0
Lane Group Flow (vph)	76	26	0	109	29	0	109	1438	0	76	1009	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	13.9	6.9		14.7	7.3		59.2	52.6		58.2	52.1	
Effective Green, g (s)	13.9	6.9		14.7	7.3		59.2	52.6		58.2	52.1	
Actuated g/C Ratio	0.15	0.07		0.15	0.08		0.62	0.55		0.61	0.55	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	223	120		233	126		341	1948		212	1916	
v/s Ratio Prot	0.03	0.02		c0.04	0.02		0.02	c0.41		c0.02	0.29	
v/s Ratio Perm	0.02			c0.04			0.18			0.20		
v/c Ratio	0.34	0.22		0.47	0.23		0.32	0.74		0.36	0.53	
Uniform Delay, d1	36.2	41.5		36.2	41.2		8.3	16.0		11.6	13.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.9		1.5	0.9		0.5	2.5		1.0	1.0	
Delay (s)	37.1	42.4		37.7	42.1		8.9	18.5		12.7	14.7	
Level of Service	D	D		D	D		A	B		B	B	
Approach Delay (s)		39.7			39.9			17.9			14.5	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		

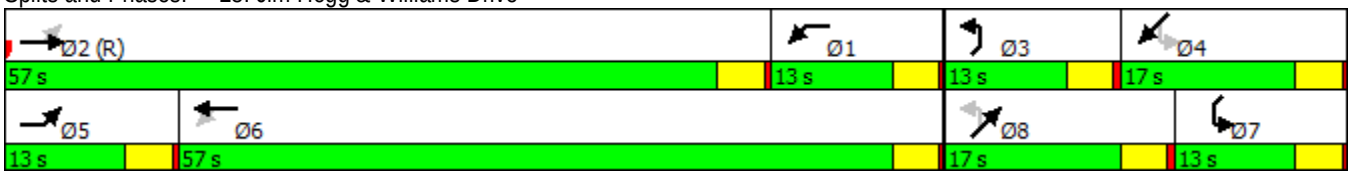
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	2	792	148	606	49	1	13	4
Future Volume (vph)	2	792	148	606	49	1	13	4
Lane Group Flow (vph)	2	883	161	668	53	505	14	6
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	8.0	10.0	8.0	10.0
Total Split (s)	13.0	57.0	13.0	57.0	13.0	17.0	13.0	17.0
Total Split (%)	13.0%	57.0%	13.0%	57.0%	13.0%	17.0%	13.0%	17.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	Min	None	None	None	None
v/c Ratio	0.00	0.43	0.39	0.28	0.17	0.81	0.08	0.02
Control Delay	13.5	13.8	9.3	4.6	30.5	20.8	35.8	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	13.8	9.3	4.6	30.5	20.8	35.8	29.0
Queue Length 50th (ft)	1	142	21	45	27	82	9	2
Queue Length 95th (ft)	5	282	50	86	55	199	21	11
Internal Link Dist (ft)		695		535		259		291
Turn Bay Length (ft)								
Base Capacity (vph)	459	2148	471	2420	320	625	234	306
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.41	0.34	0.28	0.17	0.81	0.06	0.02

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 48 (48%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 28: Jim Hogg & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	2	792	20	148	606	8	49	1	464	13	4	2
Future Volume (vph)	2	792	20	148	606	8	49	1	464	13	4	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.85		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3526		1770	3532		1770	1584		1770	1770	
Flt Permitted	0.32	1.00		0.28	1.00		0.47	1.00		0.37	1.00	
Satd. Flow (perm)	601	3526		513	3532		884	1584		690	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	861	22	161	659	9	53	1	504	14	4	2
RTOR Reduction (vph)	0	2	0	0	1	0	0	286	0	0	2	0
Lane Group Flow (vph)	2	881	0	161	667	0	53	219	0	14	4	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	52.4	52.4		60.2	60.2		21.4	21.4		12.0	12.0	
Effective Green, g (s)	52.4	52.4		60.2	60.2		21.4	21.4		12.0	12.0	
Actuated g/C Ratio	0.52	0.52		0.60	0.60		0.21	0.21		0.12	0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	328	1847		421	2126		283	338		95	212	
v/s Ratio Prot	0.00	c0.25		c0.03	0.19		0.02	c0.14		c0.00	0.00	
v/s Ratio Perm	0.00			0.20			0.02			0.02		
v/c Ratio	0.01	0.48		0.38	0.31		0.19	0.65		0.15	0.02	
Uniform Delay, d1	11.8	15.1		15.2	9.8		31.9	35.9		45.3	38.8	
Progression Factor	1.00	1.00		0.46	0.47		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.9		0.6	0.1		0.3	4.2		0.7	0.0	
Delay (s)	11.8	16.0		7.6	4.6		32.2	40.1		46.0	38.9	
Level of Service	B	B		A	A		C	D		D	D	
Approach Delay (s)		16.0			5.2			39.3			43.9	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	50	1219	709	166	231	53
Future Volume (vph)	50	1219	709	166	231	53
Lane Group Flow (vph)	54	1325	771	180	257	52
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		8	
Permitted Phases	6			2		8
Detector Phase	1	6	2	2	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	12.0	71.0	59.0	59.0	29.0	29.0
Total Split (%)	12.0%	71.0%	59.0%	59.0%	29.0%	29.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?						
Recall Mode	None	C-Max	C-Max	C-Max	None	None
v/c Ratio	0.10	0.47	0.31	0.15	0.59	0.23
Control Delay	3.8	6.1	2.5	0.4	46.1	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	6.1	2.5	0.4	46.1	13.2
Queue Length 50th (ft)	12	243	20	0	80	0
Queue Length 95th (ft)	m10	91	44	1	115	36
Internal Link Dist (ft)		706	847		395	
Turn Bay Length (ft)	120			500		200
Base Capacity (vph)	562	2805	2511	1175	859	399
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.47	0.31	0.15	0.30	0.13

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 5 (5%), Referenced to phase 2:NWT and 6:SETL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 37: Williams Drive & Del Webb

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	50	1219	709	166	231	53
Future Volume (vph)	50	1219	709	166	231	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1441
Flt Permitted	0.32	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	591	3539	3539	1583	3433	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1325	771	180	251	58
RTOR Reduction (vph)	0	0	0	54	2	45
Lane Group Flow (vph)	54	1325	771	126	255	7
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		8	
Permitted Phases	6			2		8
Actuated Green, G (s)	79.3	79.3	70.2	70.2	12.7	12.7
Effective Green, g (s)	79.3	79.3	70.2	70.2	12.7	12.7
Actuated g/C Ratio	0.79	0.79	0.70	0.70	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	528	2806	2484	1111	435	183
v/s Ratio Prot	0.01	c0.37	0.22		c0.07	
v/s Ratio Perm	0.08			0.08		0.00
v/c Ratio	0.10	0.47	0.31	0.11	0.59	0.04
Uniform Delay, d1	2.6	3.4	5.7	4.8	41.2	38.3
Progression Factor	1.31	1.51	0.35	0.11	1.00	1.00
Incremental Delay, d2	0.1	0.5	0.3	0.2	2.0	0.1
Delay (s)	3.5	5.7	2.3	0.7	43.2	38.4
Level of Service	A	A	A	A	D	D
Approach Delay (s)		5.6	2.0		42.4	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

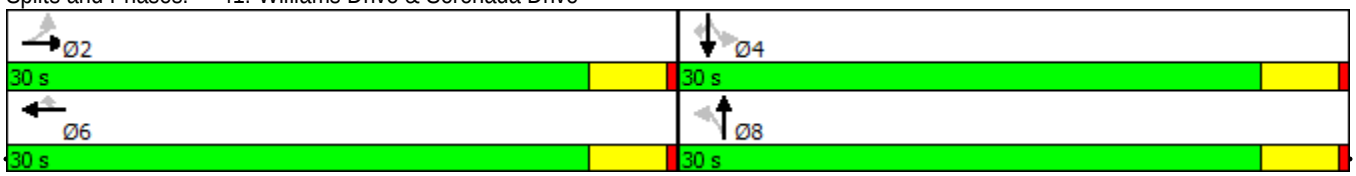
c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBT	SBR	Ø8
Lane Configurations								
Traffic Volume (vph)	130	1304	931	53	119	0	138	
Future Volume (vph)	130	1304	931	53	119	0	138	
Lane Group Flow (vph)	141	1417	1012	58	0	129	150	
Turn Type	Perm	NA	NA	Perm	Perm	NA	Perm	
Protected Phases		2	6			4		8
Permitted Phases	2			6	4		4	
Detector Phase	2	2	6	6	4	4	4	
Switch Phase								
Minimum Initial (s)	1.0	1.0	4.0	4.0	4.0	4.0	4.0	1.0
Minimum Split (s)	5.0	5.0	20.0	20.0	20.0	20.0	20.0	5.0
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Min	Min	Max	Max	Max	Max	Max	Min
v/c Ratio	1.02	0.92	0.66	0.08		0.21	0.21	
Control Delay	108.9	28.6	16.1	3.7		11.8	8.4	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	108.9	28.6	16.1	3.7		11.8	8.4	
Queue Length 50th (ft)	~51	242	145	0		28	21	
Queue Length 95th (ft)	#151	#385	204	17		58	52	
Internal Link Dist (ft)		3232	291			759		
Turn Bay Length (ft)	100			138			54	
Base Capacity (vph)	138	1533	1533	718		611	712	
Starvation Cap Reductn	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0		0	0	
Reduced v/c Ratio	1.02	0.92	0.66	0.08		0.21	0.21	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 60
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 41: Williams Drive & Serenada Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1304	0	0	931	53	0	0	0	119	0	138
Future Volume (vph)	130	1304	0	0	931	53	0	0	0	119	0	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00					1.00	1.00
Frt	1.00	1.00			1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00					0.95	1.00
Satd. Flow (prot)	1770	3539			3539	1583					1770	1583
Flt Permitted	0.17	1.00			1.00	1.00					0.76	1.00
Satd. Flow (perm)	319	3539			3539	1583					1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1417	0	0	1012	58	0	0	0	129	0	150
RTOR Reduction (vph)	0	0	0	0	0	33	0	0	0	0	0	27
Lane Group Flow (vph)	141	1417	0	0	1012	25	0	0	0	0	129	123
Turn Type	Perm	NA			NA	Perm				Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		4
Actuated Green, G (s)	26.0	26.0			26.0	26.0					26.0	26.0
Effective Green, g (s)	26.0	26.0			26.0	26.0					26.0	26.0
Actuated g/C Ratio	0.43	0.43			0.43	0.43					0.43	0.43
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0					3.0	3.0
Lane Grp Cap (vph)	138	1533			1533	685					611	685
v/s Ratio Prot		0.40			0.29							
v/s Ratio Perm	c0.44					0.02					c0.09	0.08
v/c Ratio	1.02	0.92			0.66	0.04					0.21	0.18
Uniform Delay, d1	17.0	16.1			13.5	9.8					10.6	10.4
Progression Factor	1.00	1.00			1.00	1.00					1.00	1.00
Incremental Delay, d2	82.5	9.7			2.2	0.1					0.8	0.6
Delay (s)	99.5	25.8			15.7	9.9					11.4	11.0
Level of Service	F	C			B	A					B	B
Approach Delay (s)		32.5			15.4			0.0			11.2	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

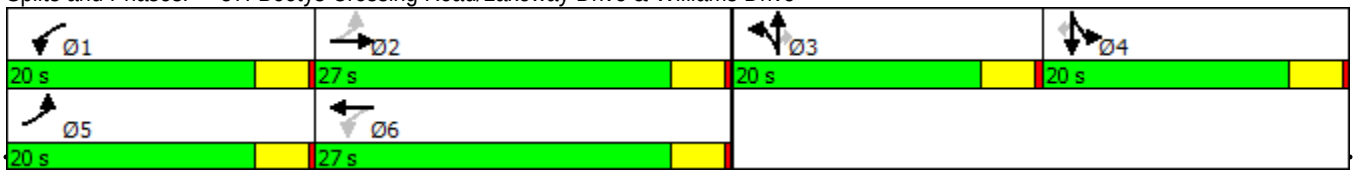
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	191	1202	157	695	37	119	40	186
Future Volume (vph)	191	1202	157	695	37	119	40	186
Lane Group Flow (vph)	208	1340	171	920	152	129	154	202
Turn Type	pm+pt	NA	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	1	6	3		4	
Permitted Phases	2		6			3		4
Detector Phase	5	2	1	6	3	3	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	27.0	20.0	27.0	20.0	20.0	20.0	20.0
Total Split (%)	23.0%	31.0%	23.0%	31.0%	23.0%	23.0%	23.0%	23.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Max	Max	None	None	Max	Max	None	None
v/c Ratio	0.48	1.09	0.56	0.94	0.44	0.32	0.59	0.50
Control Delay	17.3	82.6	20.6	48.4	35.1	8.3	42.9	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.3	82.6	20.6	48.4	35.1	8.3	42.9	9.6
Queue Length 50th (ft)	56	~419	45	240	71	0	76	0
Queue Length 95th (ft)	122	#648	91	#391	133	46	135	56
Internal Link Dist (ft)		3581		1599	968		626	
Turn Bay Length (ft)	180		190			108		250
Base Capacity (vph)	429	1230	430	975	346	409	346	468
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	1.09	0.40	0.94	0.44	0.32	0.45	0.43

Intersection Summary

Cycle Length: 87
Actuated Cycle Length: 83.1
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 57: Bootys Crossing Road/Lakeway Drive & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	1202	30	157	695	152	103	37	119	102	40	186
Future Volume (vph)	191	1202	30	157	695	152	103	37	119	102	40	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	3526		1770	3444			1797	1583		1798	1583
Flt Permitted	0.15	1.00		0.17	1.00			0.96	1.00		0.97	1.00
Satd. Flow (perm)	275	3526		323	3444			1797	1583		1798	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	1307	33	171	755	165	112	40	129	111	43	202
RTOR Reduction (vph)	0	2	0	0	21	0	0	0	104	0	0	173
Lane Group Flow (vph)	208	1338	0	171	899	0	0	152	25	0	154	29
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2			6					3			4
Actuated Green, G (s)	43.1	29.0		33.2	23.1			16.0	16.0		12.0	12.0
Effective Green, g (s)	43.1	29.0		33.2	23.1			16.0	16.0		12.0	12.0
Actuated g/C Ratio	0.52	0.35		0.40	0.28			0.19	0.19		0.14	0.14
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	430	1230		304	957			345	304		259	228
v/s Ratio Prot	0.09	c0.38		c0.07	0.26			c0.08			c0.09	
v/s Ratio Perm	0.16			0.16					0.02			0.02
v/c Ratio	0.48	1.09		0.56	0.94			0.44	0.08		0.59	0.13
Uniform Delay, d1	14.3	27.0		19.0	29.3			29.6	27.5		33.3	31.0
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	3.9	53.0		2.4	16.2			4.0	0.5		3.6	0.3
Delay (s)	18.2	80.1		21.4	45.6			33.6	28.0		36.9	31.2
Level of Service	B	F		C	D			C	C		D	C
Approach Delay (s)		71.8			41.8			31.1			33.7	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	54.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

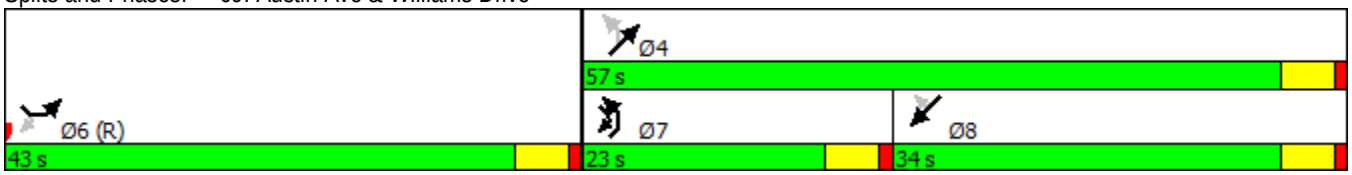
c Critical Lane Group

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	512	652	256	84	199	415
Future Volume (vph)	512	652	256	84	199	415
Lane Group Flow (vph)	862	404	139	230	216	451
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	6	7	7	4	8	
Permitted Phases		6	4			8
Detector Phase	6	7	7	4	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	9.0	9.0	21.0	21.0	21.0
Total Split (s)	43.0	23.0	23.0	57.0	34.0	34.0
Total Split (%)	43.0%	23.0%	23.0%	57.0%	34.0%	34.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Recall Mode	C-Max	None	None	None	None	None
v/c Ratio	0.47	0.35	0.40	0.26	0.62	0.68
Control Delay	15.0	1.6	23.1	20.4	44.7	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	1.6	23.1	20.4	44.7	8.9
Queue Length 50th (ft)	143	0	65	53	128	0
Queue Length 95th (ft)	247	35	92	65	186	79
Internal Link Dist (ft)	439			647	500	
Turn Bay Length (ft)	210		425			
Base Capacity (vph)	1817	1192	395	1195	540	779
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.34	0.35	0.19	0.40	0.58

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 69: Austin Ave & Williams Drive



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	512	652	256	84	199	415
Future Volume (vph)	512	652	256	84	199	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.91	0.91	1.00	1.00
Frt	0.95	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	0.97	1.00	1.00
Satd. Flow (prot)	3315	1441	1610	3291	1863	1583
Flt Permitted	0.97	1.00	0.33	0.58	1.00	1.00
Satd. Flow (perm)	3315	1441	559	1951	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	557	709	278	91	216	451
RTOR Reduction (vph)	60	136	0	0	0	367
Lane Group Flow (vph)	802	268	139	230	216	84
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	6	7	7	4	8	
Permitted Phases		6	4			8
Actuated Green, G (s)	53.0	66.4	37.0	37.0	18.6	18.6
Effective Green, g (s)	53.0	66.4	37.0	37.0	18.6	18.6
Actuated g/C Ratio	0.53	0.66	0.37	0.37	0.19	0.19
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1756	1028	347	901	346	294
v/s Ratio Prot	c0.24	0.03	c0.05	0.03	c0.12	
v/s Ratio Perm		0.15	0.09	0.06		0.05
v/c Ratio	0.46	0.26	0.40	0.26	0.62	0.29
Uniform Delay, d1	14.6	6.8	22.4	21.9	37.5	35.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1	0.8	0.2	3.5	0.5
Delay (s)	15.4	7.0	23.2	22.1	41.0	35.5
Level of Service	B	A	C	C	D	D
Approach Delay (s)	12.7			22.5	37.3	
Approach LOS	B			C	D	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	SET	NWL	NWT
Lane Configurations				
Traffic Volume (vph)	118	1147	51	1006
Future Volume (vph)	118	1147	51	1006
Lane Group Flow (vph)	233	1443	64	1105
Turn Type	Prot	NA	pm+pt	NA
Protected Phases	8	2	1	6
Permitted Phases			6	
Minimum Split (s)	8.0	20.0	10.0	20.0
Total Split (s)	11.0	39.0	10.0	39.0
Total Split (%)	18.3%	65.0%	16.7%	65.0%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag		Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	
v/c Ratio	0.49	0.71	0.21	0.42
Control Delay	18.4	10.9	3.6	3.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.4	10.9	3.6	3.3
Queue Length 50th (ft)	23	164	4	53
Queue Length 95th (ft)	51	232	9	74
Internal Link Dist (ft)	904	2931		1755
Turn Bay Length (ft)			175	
Base Capacity (vph)	471	2044	301	2654
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.71	0.21	0.42

Intersection Summary
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 10 (17%), Referenced to phase 2:SET and 6:NWTL, Start of Green
Natural Cycle: 50
Control Type: Pretimed

Splits and Phases: 102: Williams Drive & Rivery Blvd

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	118	76	1147	128	51	1006
Future Volume (vph)	118	76	1147	128	51	1006
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.94		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	3287		3472		1770	3539
Flt Permitted	0.97		1.00		0.10	1.00
Satd. Flow (perm)	3287		3472		191	3539
Peak-hour factor, PHF	0.89	0.76	0.91	0.70	0.80	0.91
Adj. Flow (vph)	133	100	1260	183	64	1105
RTOR Reduction (vph)	88	0	19	0	0	0
Lane Group Flow (vph)	145	0	1424	0	64	1105
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Actuated Green, G (s)	7.0		35.0		45.0	45.0
Effective Green, g (s)	7.0		35.0		45.0	45.0
Actuated g/C Ratio	0.12		0.58		0.75	0.75
Clearance Time (s)	4.0		4.0		4.0	4.0
Lane Grp Cap (vph)	383		2025		301	2654
v/s Ratio Prot	c0.04		c0.41		0.02	c0.31
v/s Ratio Perm					0.14	
v/c Ratio	0.38		0.70		0.21	0.42
Uniform Delay, d1	24.5		8.8		5.3	2.7
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	2.8		2.1		1.6	0.5
Delay (s)	27.3		10.9		6.9	3.2
Level of Service	C		B		A	A
Approach Delay (s)	27.3		10.9			3.4
Approach LOS	C		B			A

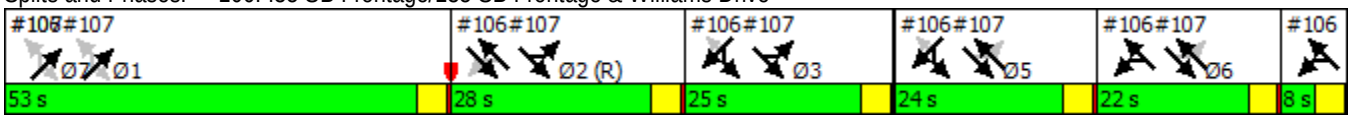
Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SET	SER	NWL	NWT	SWL	SWT	SWR	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	647	599	284	1099	313	103	83					
Future Volume (vph)	647	599	284	1099	313	103	83					
Lane Group Flow (vph)	703	631	309	1263	271	275	104					
Turn Type	NA	Free	pm+pt	NA	Split	NA	Perm					
Protected Phases	1 2		6 7	1 2 6 7	3 5	3 5		1	2	3	5	6
Permitted Phases		Free	1 2 6 7				3 5					
Detector Phase	1 2		6 7	1 2 6 7	3 5	3 5	3 5					
Switch Phase												
Minimum Initial (s)								4.0	4.0	4.0	4.0	4.0
Minimum Split (s)								20.0	20.0	20.0	8.0	20.0
Total Split (s)								53.0	28.0	25.0	24.0	22.0
Total Split (%)								33%	18%	16%	15%	14%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.41	0.40	0.56	0.53	0.57	0.57	0.20					
Control Delay	27.8	0.8	7.7	4.0	55.0	54.6	11.8					
Queue Delay	0.0	0.0	0.0	0.4	0.0	0.0	0.0					
Total Delay	27.8	0.8	7.7	4.4	55.0	54.6	11.8					
Queue Length 50th (ft)	246	0	41	231	257	261	12					
Queue Length 95th (ft)	300	0	60	145	289	316	46					
Internal Link Dist (ft)	1755			1		1077						
Turn Bay Length (ft)		200	100				100					
Base Capacity (vph)	1703	1583	553	2366	472	484	509					
Starvation Cap Reductn	0	0	0	556	0	0	0					
Spillback Cap Reductn	0	0	0	0	0	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.41	0.40	0.56	0.70	0.57	0.57	0.20					

Intersection Summary

Cycle Length: 160
Actuated Cycle Length: 160
Offset: 0 (0%), Referenced to phase 2:NWSE, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Splits and Phases: 106: I35 SB Frontage/135 SB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	8.0
Total Split (%)	5%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	647	599	284	1099	0	0	0	0	313	103	83
Future Volume (vph)	0	647	599	284	1099	0	0	0	0	313	103	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (prot)		3539	1583	1770	3539					1681	1724	1583
Flt Permitted		1.00	1.00	0.30	1.00					0.95	0.97	1.00
Satd. Flow (perm)		3539	1583	553	3539					1681	1724	1583
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.87	0.92	0.92	0.92	0.92	0.75	0.80	0.80
Adj. Flow (vph)	0	703	631	309	1263	0	0	0	0	417	129	104
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	64
Lane Group Flow (vph)	0	703	631	309	1263	0	0	0	0	271	275	40
Turn Type		NA	Free	pm+pt	NA					Split	NA	Perm
Protected Phases		1 2		6 7	1 2 6 7					3 5	3 5	
Permitted Phases			Free	1 2 6 7								3 5
Actuated Green, G (s)		77.0	160.0	103.0	107.0					45.0	45.0	45.0
Effective Green, g (s)		77.0	160.0	103.0	107.0					45.0	45.0	45.0
Actuated g/C Ratio		0.48	1.00	0.64	0.67					0.28	0.28	0.28
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)		1703	1583	553	2366					472	484	445
v/s Ratio Prot		0.20		c0.09	c0.36					c0.16	0.16	
v/s Ratio Perm			0.40	c0.27								0.03
v/c Ratio		0.41	0.40	0.56	0.53					0.57	0.57	0.09
Uniform Delay, d1		26.9	0.0	14.0	13.7					49.3	49.2	42.4
Progression Factor		1.00	1.00	0.44	0.24					1.00	1.00	1.00
Incremental Delay, d2		0.7	0.8	0.9	0.2					1.7	1.5	0.1
Delay (s)		27.6	0.8	7.0	3.5					51.0	50.7	42.5
Level of Service		C	A	A	A					D	D	D
Approach Delay (s)		14.9			4.2			0.0			49.5	
Approach LOS		B			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

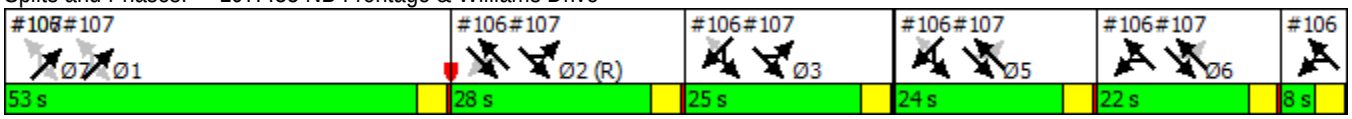
c Critical Lane Group

Lane Group	SEL	SET	NWT	NEL	NET	NER	Ø1	Ø2	Ø3	Ø5	Ø6	Ø7
Lane Configurations												
Traffic Volume (vph)	112	848	580	803	27	370						
Future Volume (vph)	112	848	580	803	27	370						
Lane Group Flow (vph)	149	1087	668	873	40	430						
Turn Type	pm+pt	NA	NA	Perm	NA	Perm						
Protected Phases	2 3	2 3 5 6	5 6		1 7		1	2	3	5	6	7
Permitted Phases	2 3 5 6			1 7		1 7						
Detector Phase	2 3	2 3 5 6	5 6	1 7	1 7	1 7						
Switch Phase												
Minimum Initial (s)							4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)							20.0	20.0	20.0	8.0	20.0	8.0
Total Split (s)							53.0	28.0	25.0	24.0	22.0	8.0
Total Split (%)							33%	18%	16%	15%	14%	5%
Yellow Time (s)							3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)							0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode							Max	C-Max	None	None	Max	None
v/c Ratio	0.24	0.52	0.72	0.71	0.06	0.69						
Control Delay	16.3	20.6	58.7	48.4	34.4	40.1						
Queue Delay	0.0	0.5	1.8	0.0	0.0	0.0						
Total Delay	16.3	21.1	60.5	48.4	34.4	40.1						
Queue Length 50th (ft)	79	358	335	406	28	304						
Queue Length 95th (ft)	98	342	410	486	42	404						
Internal Link Dist (ft)		465	439		826							
Turn Bay Length (ft)	100					100						
Base Capacity (vph)	622	2101	922	1223	663	625						
Starvation Cap Reductn	0	551	123	0	0	0						
Spillback Cap Reductn	0	0	0	0	0	0						
Storage Cap Reductn	0	0	0	0	0	0						
Reduced v/c Ratio	0.24	0.70	0.84	0.71	0.06	0.69						

Intersection Summary

Cycle Length: 160
Actuated Cycle Length: 160
Offset: 0 (0%), Referenced to phase 2:NWSE, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated

Splits and Phases: 107: I35 NB Frontage & Williams Drive



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	112	848	0	0	580	32	803	27	370	0	0	0
Future Volume (vph)	112	848	0	0	580	32	803	27	370	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			0.95		0.97	1.00	1.00			
Frt	1.00	1.00			0.99		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			3504		3433	1863	1583			
Flt Permitted	0.16	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	306	3539			3504		3433	1863	1583			
Peak-hour factor, PHF	0.75	0.78	0.92	0.92	0.93	0.73	0.92	0.68	0.86	0.92	0.92	0.92
Adj. Flow (vph)	149	1087	0	0	624	44	873	40	430	0	0	0
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	62	0	0	0
Lane Group Flow (vph)	149	1087	0	0	665	0	873	40	368	0	0	0
Turn Type	pm+pt	NA			NA		Perm	NA	Perm			
Protected Phases	2 3	2 3 5 6			5 6			1 7				
Permitted Phases	2 3 5 6						1 7		1 7			
Actuated Green, G (s)	91.0	95.0			42.0		57.0	57.0	57.0			
Effective Green, g (s)	91.0	95.0			42.0		57.0	57.0	57.0			
Actuated g/C Ratio	0.57	0.59			0.26		0.36	0.36	0.36			
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)	622	2101			919		1223	663	563			
v/s Ratio Prot	0.07	c0.31			c0.19			0.02				
v/s Ratio Perm	0.06						c0.25		0.23			
v/c Ratio	0.24	0.52			0.72		0.71	0.06	0.65			
Uniform Delay, d1	18.6	19.1			53.7		44.5	33.9	43.2			
Progression Factor	1.05	1.03			1.00		1.00	1.00	1.00			
Incremental Delay, d2	0.2	0.2			2.8		2.0	0.0	2.7			
Delay (s)	19.8	19.7			56.6		46.5	33.9	46.0			
Level of Service	B	B			E		D	C	D			
Approach Delay (s)		19.7			56.6			45.9			0.0	
Approach LOS		B			E			D			A	

Intersection Summary			
HCM 2000 Control Delay	38.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

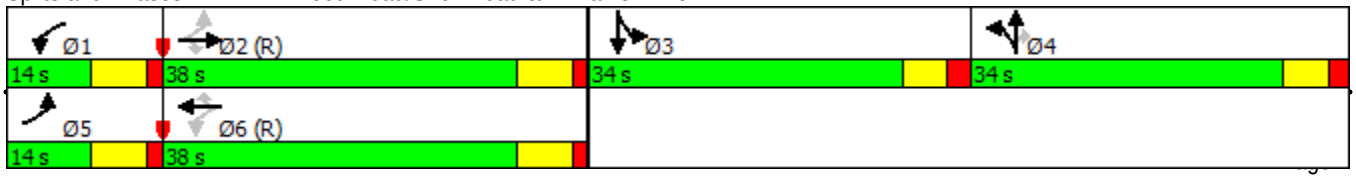
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	134	910	219	345	764	265	391	171	113	207	179
Future Volume (vph)	134	910	219	345	764	265	391	171	113	207	179
Lane Group Flow (vph)	144	1034	270	371	868	335	465	231	131	262	236
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	Perm	Split	NA
Protected Phases	5	2		1	6		4	4		3	3
Permitted Phases	2		2	6		6			4		
Detector Phase	5	2	2	1	6	6	4	4	4	3	3
Switch Phase											
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0	15.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	13.5	37.5	37.5	13.5	34.5	34.5	34.0	34.0	34.0	34.0	34.0
Total Split (s)	14.0	38.0	38.0	14.0	38.0	38.0	34.0	34.0	34.0	34.0	34.0
Total Split (%)	11.7%	31.7%	31.7%	11.7%	31.7%	31.7%	28.3%	28.3%	28.3%	28.3%	28.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?											
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.48	1.14	0.47	0.89	0.67	0.45	0.71	0.34	0.31	0.62	0.53
Control Delay	30.0	111.9	17.1	57.3	36.9	10.5	50.9	42.1	6.6	55.6	49.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.0	111.9	17.1	57.3	36.9	10.5	50.9	42.1	6.6	55.6	49.1
Queue Length 50th (ft)	59	~474	47	226	294	38	174	82	0	101	84
Queue Length 95th (ft)	m105	#586	m102	#563	#459	89	199	90	34	119	120
Internal Link Dist (ft)		305			466			485			323
Turn Bay Length (ft)	150		250	150		193	270		200	180	
Base Capacity (vph)	297	911	571	419	1290	740	796	821	478	785	803
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	1.14	0.47	0.89	0.67	0.45	0.58	0.28	0.27	0.33	0.29

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 119 (99%), Referenced to phase 2:EBTL and 6:WBTL, Start of 1st Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: D B Wood Road/Shell Road & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	910	219	345	764	265	391	171	113	207	179	32
Future Volume (vph)	134	910	219	345	764	265	391	171	113	207	179	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1736	3471	1553	1736	3471	1553	3367	3471	1553	3367	3385	
Flt Permitted	0.26	1.00	1.00	0.11	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	482	3471	1553	192	3471	1553	3367	3471	1553	3367	3385	
Peak-hour factor, PHF	0.93	0.88	0.81	0.93	0.88	0.79	0.84	0.74	0.86	0.79	0.91	0.83
Adj. Flow (vph)	144	1034	270	371	868	335	465	231	131	262	197	39
RTOR Reduction (vph)	0	0	164	0	0	163	0	0	105	0	16	0
Lane Group Flow (vph)	144	1034	106	371	868	172	465	231	26	262	220	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2		2	6		6			4			
Actuated Green, G (s)	43.3	31.5	31.5	62.9	44.6	44.6	23.4	23.4	23.4	15.2	15.2	
Effective Green, g (s)	43.3	31.5	31.5	62.9	44.6	44.6	23.4	23.4	23.4	15.2	15.2	
Actuated g/C Ratio	0.36	0.26	0.26	0.52	0.37	0.37	0.19	0.19	0.19	0.13	0.13	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	297	911	407	421	1290	577	656	676	302	426	428	
v/s Ratio Prot	0.05	c0.30		c0.18	0.25		c0.14	0.07		c0.08	0.07	
v/s Ratio Perm	0.13		0.07	0.28		0.11			0.02			
v/c Ratio	0.48	1.14	0.26	0.88	0.67	0.30	0.71	0.34	0.08	0.62	0.51	
Uniform Delay, d1	26.9	44.2	35.0	34.4	31.6	26.6	45.1	41.7	39.5	49.6	49.0	
Progression Factor	1.33	0.96	1.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	72.6	1.3	18.9	2.8	1.3	3.5	0.3	0.1	2.6	1.0	
Delay (s)	36.9	115.0	64.2	53.4	34.4	27.9	48.6	42.0	39.7	52.3	50.0	
Level of Service	D	F	E	D	C	C	D	D	D	D	D	
Approach Delay (s)		97.8			37.5			45.3			51.2	
Approach LOS		F			D			D			D	

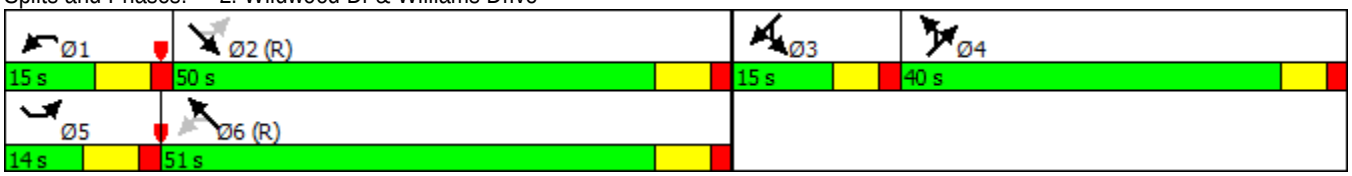
Intersection Summary			
HCM 2000 Control Delay	60.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWT
Lane Configurations							
Traffic Volume (vph)	35	1087	59	1167	238	19	14
Future Volume (vph)	35	1087	59	1167	238	19	14
Lane Group Flow (vph)	61	1199	102	1274	326	93	126
Turn Type	pm+pt	NA	pm+pt	NA	Split	NA	NA
Protected Phases	5	2	1	6	4	4	3
Permitted Phases	2		6				
Detector Phase	5	2	1	6	4	4	3
Switch Phase							
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	30.0	14.0	30.0	14.0	14.0	14.0
Total Split (s)	14.0	50.0	15.0	51.0	40.0	40.0	15.0
Total Split (%)	11.7%	41.7%	12.5%	42.5%	33.3%	33.3%	12.5%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Min	None	C-Min	None	None	None
v/c Ratio	0.35	0.81	0.53	0.80	0.81	0.22	0.70
Control Delay	29.5	43.9	32.1	26.1	60.0	23.4	46.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.5	43.9	32.1	26.1	60.0	23.4	46.1
Queue Length 50th (ft)	33	484	38	282	241	35	42
Queue Length 95th (ft)	34	#594	60	#646	249	18	22
Internal Link Dist (ft)		2052		391		287	1154
Turn Bay Length (ft)	300		300				
Base Capacity (vph)	174	1474	198	1592	501	517	191
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.81	0.52	0.80	0.65	0.18	0.66

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:SETL and 6:NWTL, Start of 1st Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Wildwood Dr & Williams Drive



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	35	1087	40	59	1167	3	238	19	34	2	14	63
Future Volume (vph)	35	1087	40	59	1167	3	238	19	34	2	14	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.93			0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	3515		1770	3537		1770	1734			1686	
Flt Permitted	0.08	1.00		0.09	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	158	3515		164	3537		1770	1734			1686	
Peak-hour factor, PHF	0.57	0.95	0.73	0.58	0.92	0.50	0.73	0.38	0.79	0.25	0.44	0.73
Adj. Flow (vph)	61	1144	55	102	1268	6	326	50	43	8	32	86
RTOR Reduction (vph)	0	2	0	0	0	0	0	28	0	0	65	0
Lane Group Flow (vph)	61	1197	0	102	1274	0	326	65	0	0	61	0
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								
Actuated Green, G (s)	56.3	50.3		60.9	52.6		27.1	27.1			8.3	
Effective Green, g (s)	56.3	50.3		60.9	52.6		27.1	27.1			8.3	
Actuated g/C Ratio	0.47	0.42		0.51	0.44		0.23	0.23			0.07	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	154	1473		194	1550		399	391			116	
v/s Ratio Prot	0.02	0.34		c0.04	c0.36		c0.18	0.04			c0.04	
v/s Ratio Perm	0.17			0.23								
v/c Ratio	0.40	0.81		0.53	0.82		0.82	0.17			0.52	
Uniform Delay, d1	22.1	30.7		21.3	29.6		44.1	37.4			53.9	
Progression Factor	1.57	1.23		1.33	0.69		1.00	1.00			1.00	
Incremental Delay, d2	1.5	4.6		2.2	4.4		12.2	0.2			4.2	
Delay (s)	36.4	42.3		30.6	24.9		56.3	37.6			58.2	
Level of Service	D	D		C	C		E	D			E	
Approach Delay (s)		42.0			25.3			52.1			58.2	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1129	18	34	1434	22	33
Future Volume (vph)	1129	18	34	1434	22	33
Lane Group Flow (vph)	1227	35	56	1648	42	66
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	15.0	15.0	7.0	15.0	7.0	7.0
Minimum Split (s)	34.0	34.0	13.0	34.0	13.0	13.0
Total Split (s)	83.0	83.0	17.0	100.0	20.0	20.0
Total Split (%)	69.2%	69.2%	14.2%	83.3%	16.7%	16.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						
Recall Mode	C-Min	C-Min	None	C-Min	None	None
v/c Ratio	0.45	0.03	0.15	0.54	0.34	0.38
Control Delay	4.9	1.8	1.1	1.7	59.6	18.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	1.8	1.1	1.7	59.6	18.7
Queue Length 50th (ft)	98	0	2	25	32	0
Queue Length 95th (ft)	203	1	m3	70	38	3
Internal Link Dist (ft)	1127			2052	664	
Turn Bay Length (ft)		300	300			
Base Capacity (vph)	2721	1225	424	3025	211	247
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.03	0.13	0.54	0.20	0.27

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 22 (18%), Referenced to phase 2:SET and 6:NWTL, Start of 1st Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Woodlake Dr & Williams Drive

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1129	18	34	1434	22	33
Future Volume (vph)	1129	18	34	1434	22	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3505	1568	1752	3505	1752	1568
Flt Permitted	1.00	1.00	0.19	1.00	0.95	1.00
Satd. Flow (perm)	3505	1568	347	3505	1752	1568
Peak-hour factor, PHF	0.92	0.51	0.61	0.87	0.52	0.50
Adj. Flow (vph)	1227	35	56	1648	42	66
RTOR Reduction (vph)	0	9	0	0	0	62
Lane Group Flow (vph)	1227	26	56	1648	42	4
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	89.7	89.7	101.3	101.3	7.2	7.2
Effective Green, g (s)	89.7	89.7	101.3	101.3	7.2	7.2
Actuated g/C Ratio	0.75	0.75	0.84	0.84	0.06	0.06
Clearance Time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2619	1172	358	2958	105	94
v/s Ratio Prot	0.35		0.01	c0.47	c0.02	
v/s Ratio Perm		0.02	0.12			0.00
v/c Ratio	0.47	0.02	0.16	0.56	0.40	0.04
Uniform Delay, d1	5.9	3.9	2.9	2.8	54.3	53.2
Progression Factor	0.70	1.03	0.32	0.42	1.00	1.00
Incremental Delay, d2	0.6	0.0	0.1	0.5	2.5	0.2
Delay (s)	4.7	4.0	1.1	1.6	56.8	53.3
Level of Service	A	A	A	A	E	D
Approach Delay (s)	4.6			1.6	54.7	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Configurations								
Traffic Volume (vph)	100	35	80	35	80	1020	100	1186
Future Volume (vph)	100	35	80	35	80	1020	100	1186
Lane Group Flow (vph)	109	114	87	147	87	1185	109	1398
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	1	6	5	2
Permitted Phases	4		8		6		2	
Detector Phase	7	4	3	8	1	6	5	2
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	10.0	7.0	10.0
Minimum Split (s)	12.5	20.0	12.5	20.0	12.5	27.5	12.5	27.5
Total Split (s)	15.0	20.0	15.0	20.0	15.0	45.0	15.0	45.0
Total Split (%)	15.8%	21.1%	15.8%	21.1%	15.8%	47.4%	15.8%	47.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.45	0.49	0.33	0.58	0.37	0.62	0.36	0.72
Control Delay	34.8	23.5	31.3	22.5	13.1	19.3	10.9	21.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.8	23.5	31.3	22.5	13.1	19.3	10.9	21.9
Queue Length 50th (ft)	53	22	42	22	18	265	22	341
Queue Length 95th (ft)	92	70	76	77	45	409	51	#565
Internal Link Dist (ft)		1195		1212		1599		2931
Turn Bay Length (ft)					175		175	
Base Capacity (vph)	252	320	279	345	270	1919	327	1932
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.36	0.31	0.43	0.32	0.62	0.33	0.72

Intersection Summary

Cycle Length: 95
Actuated Cycle Length: 95
Offset: 0 (0%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Williams Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	100	35	70	80	35	100	80	1020	70	100	1186	100
Future Volume (vph)	100	35	70	80	35	100	80	1020	70	100	1186	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1676		1770	1656		1770	3505		1770	3498	
Flt Permitted	0.49	1.00		0.68	1.00		0.09	1.00		0.15	1.00	
Satd. Flow (perm)	910	1676		1273	1656		177	3505		276	3498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	38	76	87	38	109	87	1109	76	109	1289	109
RTOR Reduction (vph)	0	69	0	0	99	0	0	4	0	0	5	0
Lane Group Flow (vph)	109	45	0	87	48	0	87	1181	0	109	1393	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	16.8	9.3		16.2	9.0		56.1	49.7		56.9	50.1	
Effective Green, g (s)	16.8	9.3		16.2	9.0		56.1	49.7		56.9	50.1	
Actuated g/C Ratio	0.18	0.10		0.17	0.09		0.59	0.52		0.60	0.53	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	228	164		254	156		211	1833		272	1844	
v/s Ratio Prot	c0.04	0.03		0.03	0.03		0.03	0.34		c0.03	c0.40	
v/s Ratio Perm	c0.05			0.03			0.21			0.21		
v/c Ratio	0.48	0.28		0.34	0.31		0.41	0.64		0.40	0.76	
Uniform Delay, d1	34.3	39.7		34.4	40.1		12.8	16.3		10.6	17.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.9		0.8	1.1		1.3	1.8		1.0	2.9	
Delay (s)	35.9	40.7		35.2	41.2		14.1	18.0		11.6	20.6	
Level of Service	D	D		D	D		B	B		B	C	
Approach Delay (s)		38.3			39.0			17.8			19.9	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

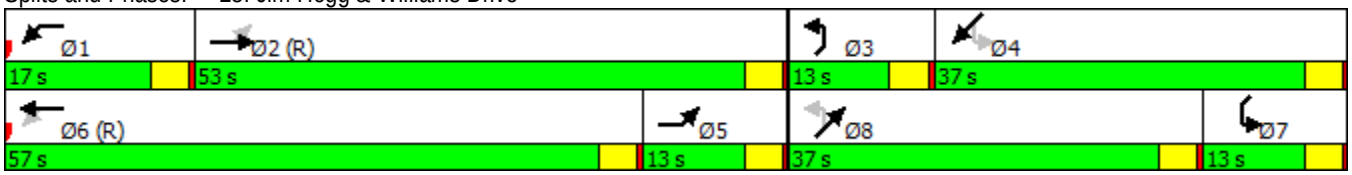
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	1	647	151	682	22	1	4	1
Future Volume (vph)	1	647	151	682	22	1	4	1
Lane Group Flow (vph)	1	731	164	742	24	150	4	3
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	8.0	10.0	8.0	10.0
Total Split (s)	13.0	53.0	17.0	57.0	13.0	37.0	13.0	37.0
Total Split (%)	10.8%	44.2%	14.2%	47.5%	10.8%	30.8%	10.8%	30.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None
v/c Ratio	0.00	0.29	0.27	0.25	0.20	0.62	0.03	0.03
Control Delay	9.0	7.3	3.0	2.7	55.4	20.1	53.2	41.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.0	7.3	3.0	2.7	55.4	20.1	53.2	41.0
Queue Length 50th (ft)	0	78	1	2	18	1	3	1
Queue Length 95th (ft)	3	196	89	217	44	63	15	11
Internal Link Dist (ft)		695		535		259		291
Turn Bay Length (ft)								
Base Capacity (vph)	587	2559	641	2925	149	543	179	462
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.29	0.26	0.25	0.16	0.28	0.02	0.01

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 90 (75%), Referenced to phase 2:EBTL and 6:WBTL, Start of 1st Green
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 28: Jim Hogg & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	1	647	26	151	682	1	22	1	137	4	1	2
Future Volume (vph)	1	647	26	151	682	1	22	1	137	4	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3519		1770	3539		1770	1585		1770	1676	
Flt Permitted	0.37	1.00		0.33	1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)	689	3519		613	3539		1863	1585		1863	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	703	28	164	741	1	24	1	149	4	1	2
RTOR Reduction (vph)	0	1	0	0	0	0	0	139	0	0	2	0
Lane Group Flow (vph)	1	730	0	164	742	0	24	11	0	4	1	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	84.0	84.0		92.8	92.8		7.8	7.8		4.1	4.1	
Effective Green, g (s)	84.0	84.0		92.8	92.8		7.8	7.8		4.1	4.1	
Actuated g/C Ratio	0.70	0.70		0.77	0.77		0.06	0.06		0.03	0.03	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	503	2463		581	2736		121	103		63	57	
v/s Ratio Prot	0.00	c0.21		0.03	c0.21		0.01	0.01		0.00	0.00	
v/s Ratio Perm	0.00			0.19			c0.01			c0.00		
v/c Ratio	0.00	0.30		0.28	0.27		0.20	0.10		0.06	0.02	
Uniform Delay, d1	5.4	6.8		3.9	3.9		53.2	52.8		55.2	56.0	
Progression Factor	1.00	1.00		0.50	0.66		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.3	0.2		0.8	0.4		0.4	0.1	
Delay (s)	5.4	7.1		2.2	2.8		54.0	53.3		55.6	56.1	
Level of Service	A	A		A	A		D	D		E	E	
Approach Delay (s)		7.1			2.7			53.4			55.8	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	72	716	764	692	431	70
Future Volume (vph)	72	716	764	692	431	70
Lane Group Flow (vph)	78	778	830	752	476	68
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		8	
Permitted Phases	6			2		8
Detector Phase	1	6	2	2	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	32.0	32.0	14.0	14.0
Total Split (s)	12.0	90.0	78.0	78.0	30.0	30.0
Total Split (%)	10.0%	75.0%	65.0%	65.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?						
Recall Mode	None	C-Max	C-Max	C-Max	None	None
v/c Ratio	0.16	0.29	0.35	0.57	0.77	0.22
Control Delay	3.0	3.6	6.3	2.6	55.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.0	3.6	6.3	2.6	55.5	10.9
Queue Length 50th (ft)	11	112	57	3	181	0
Queue Length 95th (ft)	13	44	97	61	231	41
Internal Link Dist (ft)		706	847		395	
Turn Bay Length (ft)	120			500		200
Base Capacity (vph)	487	2667	2404	1316	744	365
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.29	0.35	0.57	0.64	0.19

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 91 (76%), Referenced to phase 2:NWT and 6:SETL, Start of 1st Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 37: Williams Drive & Del Webb

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	72	716	764	692	431	70
Future Volume (vph)	72	716	764	692	431	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3436	1441
Flt Permitted	0.29	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	538	3539	3539	1583	3436	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	778	830	752	468	76
RTOR Reduction (vph)	0	0	0	246	1	56
Lane Group Flow (vph)	78	778	830	506	475	12
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		8	
Permitted Phases	6			2		8
Actuated Green, G (s)	90.4	90.4	80.7	80.7	21.6	21.6
Effective Green, g (s)	90.4	90.4	80.7	80.7	21.6	21.6
Actuated g/C Ratio	0.75	0.75	0.67	0.67	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	463	2666	2379	1064	618	259
v/s Ratio Prot	0.01	c0.22	0.23		c0.14	
v/s Ratio Perm	0.12			c0.32		0.01
v/c Ratio	0.17	0.29	0.35	0.48	0.77	0.05
Uniform Delay, d1	4.6	4.7	8.4	9.5	46.8	40.7
Progression Factor	0.52	0.66	0.67	1.42	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.3	1.3	5.7	0.1
Delay (s)	2.6	3.4	5.9	14.7	52.6	40.8
Level of Service	A	A	A	B	D	D
Approach Delay (s)		3.3	10.1		51.1	
Approach LOS		A	B		D	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBT	SBR	Ø2
Lane Configurations								
Traffic Volume (vph)	79	1151	1284	61	79	0	90	
Future Volume (vph)	79	1151	1284	61	79	0	90	
Lane Group Flow (vph)	86	1251	1396	66	0	86	98	
Turn Type	Perm	NA	NA	Perm	Perm	NA	Perm	
Protected Phases		4	8			6		2
Permitted Phases	4			8	6		6	
Detector Phase	4	4	8	8	6	6	6	
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	5.0
Total Split (s)	95.0	95.0	95.0	95.0	25.0	25.0	25.0	25.0
Total Split (%)	79.2%	79.2%	79.2%	79.2%	20.8%	20.8%	20.8%	21%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Min
v/c Ratio	0.73	0.66	0.74	0.08		0.18	0.16	
Control Delay	48.8	12.2	13.8	2.0		18.9	6.0	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	48.8	12.2	13.8	2.0		18.9	6.0	
Queue Length 50th (ft)	23	163	194	0		22	1	
Queue Length 95th (ft)	#104	215	256	13		67	34	
Internal Link Dist (ft)		3232	291			759		
Turn Bay Length (ft)	100			138			54	
Base Capacity (vph)	222	3539	3539	1583		477	598	
Starvation Cap Reductn	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0		0	0	
Reduced v/c Ratio	0.39	0.35	0.39	0.04		0.18	0.16	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 63
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 41: William Drive/Serenada Drive & Williams Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	1151	0	0	1284	61	0	0	0	79	0	90
Future Volume (vph)	79	1151	0	0	1284	61	0	0	0	79	0	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00					1.00	1.00
Frt	1.00	1.00			1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00					0.95	1.00
Satd. Flow (prot)	1770	3539			3539	1583					1770	1583
Flt Permitted	0.12	1.00			1.00	1.00					0.76	1.00
Satd. Flow (perm)	222	3539			3539	1583					1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	1251	0	0	1396	66	0	0	0	86	0	98
RTOR Reduction (vph)	0	0	0	0	0	31	0	0	0	0	0	63
Lane Group Flow (vph)	86	1251	0	0	1396	35	0	0	0	0	86	35
Turn Type	Perm	NA			NA	Perm				Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4					8	2			6		6
Actuated Green, G (s)	33.5	33.5			33.5	33.5					21.3	21.3
Effective Green, g (s)	33.5	33.5			33.5	33.5					21.3	21.3
Actuated g/C Ratio	0.53	0.53			0.53	0.53					0.34	0.34
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0					3.0	3.0
Lane Grp Cap (vph)	118	1887			1887	844					478	536
v/s Ratio Prot		0.35			c0.39							
v/s Ratio Perm	0.39					0.02					c0.06	0.02
v/c Ratio	0.73	0.66			0.74	0.04					0.18	0.07
Uniform Delay, d1	11.2	10.6			11.3	7.0					14.6	14.0
Progression Factor	1.00	1.00			1.00	1.00					1.00	1.00
Incremental Delay, d2	20.0	0.9			1.6	0.0					0.8	0.2
Delay (s)	31.2	11.5			12.8	7.0					15.4	14.3
Level of Service	C	B			B	A					B	B
Approach Delay (s)		12.7			12.6			0.0			14.8	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	62.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

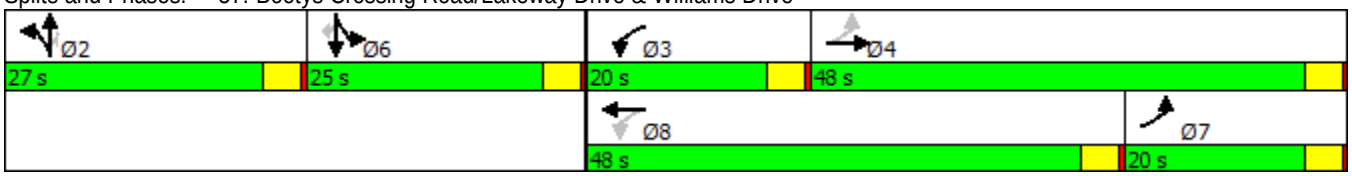
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	176	894	236	999	64	148	85	220
Future Volume (vph)	176	894	236	999	64	148	85	220
Lane Group Flow (vph)	191	1008	257	1250	207	161	231	239
Turn Type	pm+pt	NA	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	7	4	3	8	2		6	
Permitted Phases	4		8			2		6
Detector Phase	7	4	3	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	48.0	20.0	48.0	27.0	27.0	25.0	25.0
Total Split (%)	16.7%	40.0%	16.7%	40.0%	22.5%	22.5%	20.8%	20.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	None	None	None	Max	Max	None	None
v/c Ratio	0.74	0.80	0.84	0.94	0.56	0.36	0.79	0.52
Control Delay	60.4	38.9	53.4	48.0	49.0	9.9	65.6	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.4	38.9	53.4	48.0	49.0	9.9	65.6	9.9
Queue Length 50th (ft)	104	360	141	475	144	4	166	0
Queue Length 95th (ft)	169	444	#292	#651	230	63	#278	71
Internal Link Dist (ft)		3581		1599	968		626	
Turn Bay Length (ft)	180		190			108		250
Base Capacity (vph)	317	1378	315	1365	368	445	337	489
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.73	0.82	0.92	0.56	0.36	0.69	0.49

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 113.2
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 57: Bootys Crossing Road/Lakeway Drive & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	894	33	236	999	151	126	64	148	128	85	220
Future Volume (vph)	176	894	33	236	999	151	126	64	148	128	85	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	0.98			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1770	3520		1770	3470			1803	1583		1808	1583
Flt Permitted	0.14	1.00		0.14	1.00			0.97	1.00		0.97	1.00
Satd. Flow (perm)	266	3520		266	3470			1803	1583		1808	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	972	36	257	1086	164	137	70	161	139	92	239
RTOR Reduction (vph)	0	2	0	0	10	0	0	0	123	0	0	200
Lane Group Flow (vph)	191	1006	0	257	1240	0	0	207	38	0	231	39
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	40.3	40.3		43.3	43.3			23.1	23.1		18.4	18.4
Effective Green, g (s)	40.3	40.3		43.3	43.3			23.1	23.1		18.4	18.4
Actuated g/C Ratio	0.36	0.36		0.38	0.38			0.20	0.20		0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	258	1254		305	1328			368	323		294	257
v/s Ratio Prot	0.08	c0.29		0.11	c0.36			c0.11			c0.13	
v/s Ratio Perm	0.18			0.21					0.02			0.02
v/c Ratio	0.74	0.80		0.84	0.93			0.56	0.12		0.79	0.15
Uniform Delay, d1	42.1	32.8		28.2	33.5			40.5	36.7		45.5	40.6
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	10.8	3.8		18.6	12.1			6.1	0.8		12.9	0.3
Delay (s)	52.9	36.6		46.8	45.6			46.6	37.5		58.4	40.9
Level of Service	D	D		D	D			D	D		E	D
Approach Delay (s)		39.2			45.8			42.6			49.5	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	43.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	113.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

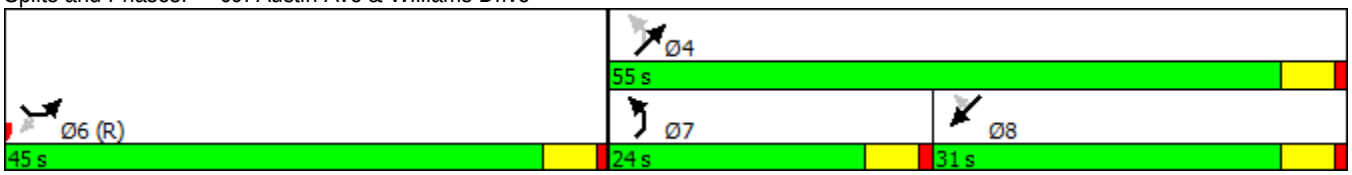
c Critical Lane Group

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	732	508	534	251	211	415
Future Volume (vph)	732	508	534	251	211	415
Lane Group Flow (vph)	928	420	290	563	229	451
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	6		7	4	8	
Permitted Phases		6	4			8
Detector Phase	6	6	7	4	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	9.0	21.0	21.0	21.0
Total Split (s)	45.0	45.0	24.0	55.0	31.0	31.0
Total Split (%)	45.0%	45.0%	24.0%	55.0%	31.0%	31.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	C-Max	C-Max	None	None	None	None
v/c Ratio	0.56	0.46	0.70	0.54	0.65	0.68
Control Delay	20.9	3.8	29.3	21.6	45.2	8.7
Queue Delay	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	21.2	3.8	29.3	21.6	45.2	8.7
Queue Length 50th (ft)	210	0	137	131	136	0
Queue Length 95th (ft)	309	63	185	153	197	79
Internal Link Dist (ft)	439			647	500	
Turn Bay Length (ft)	210		425			
Base Capacity (vph)	1647	912	426	1209	484	745
Starvation Cap Reductn	203	28	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.48	0.68	0.47	0.47	0.61

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 69: Austin Ave & Williams Drive



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	732	508	534	251	211	415
Future Volume (vph)	732	508	534	251	211	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.91	0.91	1.00	1.00
Frt	0.98	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.95	0.97	1.00	1.00
Satd. Flow (prot)	3391	1441	1610	3305	1863	1583
Flt Permitted	0.96	1.00	0.31	0.57	1.00	1.00
Satd. Flow (perm)	3391	1441	530	1932	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	796	552	580	273	229	451
RTOR Reduction (vph)	12	218	0	0	0	365
Lane Group Flow (vph)	916	202	290	563	229	86
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	6		7	4	8	
Permitted Phases		6	4			8
Actuated Green, G (s)	48.2	48.2	41.8	41.8	19.0	19.0
Effective Green, g (s)	48.2	48.2	41.8	41.8	19.0	19.0
Actuated g/C Ratio	0.48	0.48	0.42	0.42	0.19	0.19
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1634	694	413	1051	353	300
v/s Ratio Prot	c0.27		c0.12	0.10	0.12	
v/s Ratio Perm		0.14	c0.17	0.13		0.05
v/c Ratio	0.56	0.29	0.70	0.54	0.65	0.29
Uniform Delay, d1	18.4	15.6	21.6	21.8	37.4	34.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	1.1	5.3	0.5	4.1	0.5
Delay (s)	19.8	16.7	27.0	22.4	41.5	35.2
Level of Service	B	B	C	C	D	D
Approach Delay (s)	18.8			23.9	37.3	
Approach LOS	B			C	D	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	SET	NWL	NWT
Lane Configurations				
Traffic Volume (vph)	318	1165	186	1168
Future Volume (vph)	318	1165	186	1168
Lane Group Flow (vph)	560	1432	207	1243
Turn Type	Prot	NA	pm+pt	NA
Protected Phases	7	6	5	2
Permitted Phases			2	
Minimum Split (s)	8.0	20.0	10.0	20.0
Total Split (s)	15.0	35.0	10.0	45.0
Total Split (%)	25.0%	58.3%	16.7%	75.0%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag		Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	
v/c Ratio	0.80	0.79	0.69	0.51
Control Delay	29.6	15.5	21.8	5.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	29.6	15.5	21.8	5.6
Queue Length 50th (ft)	80	197	21	91
Queue Length 95th (ft)	#115	278	#106	127
Internal Link Dist (ft)	904	2931		1755
Turn Bay Length (ft)			175	
Base Capacity (vph)	699	1812	300	2418
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.80	0.79	0.69	0.51

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 60
Offset: 0 (0%), Referenced to phase 2:NWTL and 6:SET, Start of Green
Natural Cycle: 55
Control Type: Pretimed
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 102: Williams Drive & Rivery Blvd

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	318	148	1165	160	186	1168
Future Volume (vph)	318	148	1165	160	186	1168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.95		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	3332		3468		1770	3539
Flt Permitted	0.97		1.00		0.11	1.00
Satd. Flow (perm)	3332		3468		213	3539
Peak-hour factor, PHF	0.82	0.86	0.94	0.83	0.90	0.94
Adj. Flow (vph)	388	172	1239	193	207	1243
RTOR Reduction (vph)	88	0	21	0	0	0
Lane Group Flow (vph)	472	0	1411	0	207	1243
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	7		6		5	2
Permitted Phases					2	
Actuated Green, G (s)	11.0		31.0		41.0	41.0
Effective Green, g (s)	11.0		31.0		41.0	41.0
Actuated g/C Ratio	0.18		0.52		0.68	0.68
Clearance Time (s)	4.0		4.0		4.0	4.0
Lane Grp Cap (vph)	610		1791		301	2418
v/s Ratio Prot	c0.14		c0.41		c0.07	0.35
v/s Ratio Perm					0.40	
v/c Ratio	0.77		0.79		0.69	0.51
Uniform Delay, d1	23.3		11.8		9.4	4.6
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	9.2		3.6		12.1	0.8
Delay (s)	32.6		15.4		21.5	5.4
Level of Service	C		B		C	A
Approach Delay (s)	32.6		15.4			7.7
Approach LOS	C		B			A

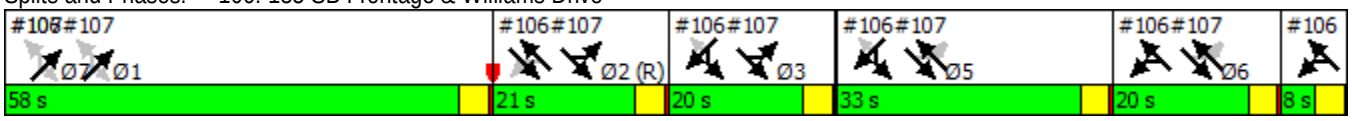
Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SET	SER	NWL	NWT	SWL	SWT	SWR	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	601	706	366	1446	203	136	97					
Future Volume (vph)	601	706	366	1446	203	136	97					
Lane Group Flow (vph)	646	759	416	1589	192	199	124					
Turn Type	NA	Free	pm+pt	NA	Split	NA	Perm					
Protected Phases	1 2		6 7	1 2 6 7	3 5	3 5		1	2	3	5	6
Permitted Phases		Free	1 2 6 7				3 5					
Detector Phase	1 2		6 7	1 2 6 7	3 5	3 5	3 5					
Switch Phase												
Minimum Initial (s)								4.0	4.0	4.0	4.0	4.0
Minimum Split (s)								20.0	20.0	20.0	8.0	20.0
Total Split (s)								58.0	21.0	20.0	33.0	20.0
Total Split (%)								36%	13%	13%	21%	13%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.39	0.48	0.76	0.70	0.37	0.37	0.23					
Control Delay	28.5	1.0	12.2	7.6	46.1	45.9	14.6					
Queue Delay	0.0	0.0	0.0	1.8	0.0	0.0	0.0					
Total Delay	28.5	1.0	12.2	9.4	46.1	45.9	14.6					
Queue Length 50th (ft)	228	0	111	422	166	172	26					
Queue Length 95th (ft)	279	0	m121	462	240	237	58					
Internal Link Dist (ft)	1755			1		1077						
Turn Bay Length (ft)		200	100				100					
Base Capacity (vph)	1658	1583	545	2278	514	536	546					
Starvation Cap Reductn	0	0	0	492	0	0	0					
Spillback Cap Reductn	0	0	0	0	0	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.39	0.48	0.76	0.89	0.37	0.37	0.23					

Intersection Summary

Cycle Length: 160
Actuated Cycle Length: 160
Offset: 0 (0%), Referenced to phase 2:NWSE, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 106: 135 SB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	8.0
Total Split (%)	5%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	601	706	366	1446	0	0	0	0	203	136	97
Future Volume (vph)	0	601	706	366	1446	0	0	0	0	203	136	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.99	1.00
Satd. Flow (prot)		3539	1583	1770	3539					1681	1752	1583
Flt Permitted		1.00	1.00	0.32	1.00					0.95	0.99	1.00
Satd. Flow (perm)		3539	1583	598	3539					1681	1752	1583
Peak-hour factor, PHF	0.92	0.93	0.93	0.88	0.91	0.92	0.92	0.92	0.92	0.88	0.85	0.78
Adj. Flow (vph)	0	646	759	416	1589	0	0	0	0	231	160	124
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	62
Lane Group Flow (vph)	0	646	759	416	1589	0	0	0	0	192	199	62
Turn Type		NA	Free	pm+pt	NA					Split	NA	Perm
Protected Phases		1 2		6 7	1 2 6 7					3 5	3 5	
Permitted Phases			Free	1 2 6 7								3 5
Actuated Green, G (s)		75.0	160.0	99.0	103.0					49.0	49.0	49.0
Effective Green, g (s)		75.0	160.0	99.0	103.0					49.0	49.0	49.0
Actuated g/C Ratio		0.47	1.00	0.62	0.64					0.31	0.31	0.31
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)		1658	1583	545	2278					514	536	484
v/s Ratio Prot		0.18		c0.11	c0.45					0.11	0.11	
v/s Ratio Perm			c0.48	c0.36								0.04
v/c Ratio		0.39	0.48	0.76	0.70					0.37	0.37	0.13
Uniform Delay, d1		27.6	0.0	16.9	18.4					43.5	43.4	40.1
Progression Factor		1.00	1.00	0.53	0.36					1.00	1.00	1.00
Incremental Delay, d2		0.7	1.0	3.1	0.4					0.5	0.4	0.1
Delay (s)		28.3	1.0	12.1	7.1					43.9	43.9	40.2
Level of Service		C	A	B	A					D	D	D
Approach Delay (s)		13.6			8.1			0.0			43.0	
Approach LOS		B			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

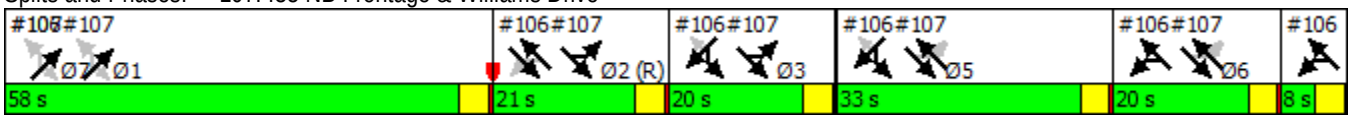
c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	NEL	NET	NER	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	118	650	801	73	1011	60	525					
Future Volume (vph)	118	650	801	73	1011	60	525					
Lane Group Flow (vph)	169	714	965	84	1123	80	640					
Turn Type	pm+pt	NA	NA	Perm	Perm	NA	Perm					
Protected Phases	2 3	2 3 5 6	5 6			1 7		1	2	3	5	6
Permitted Phases	2 3 5 6			5 6	1 7		1 7					
Detector Phase	2 3	2 3 5 6	5 6	5 6	1 7	1 7	1 7					
Switch Phase												
Minimum Initial (s)								4.0	4.0	4.0	4.0	4.0
Minimum Split (s)								20.0	20.0	20.0	8.0	20.0
Total Split (s)								58.0	21.0	20.0	33.0	20.0
Total Split (%)								36%	13%	13%	21%	13%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.37	0.36	0.89	0.15	0.84	0.11	0.86					
Control Delay	28.0	25.6	64.2	7.1	51.8	31.9	43.2					
Queue Delay	0.0	0.5	47.3	0.0	0.4	0.0	0.0					
Total Delay	28.0	26.1	111.5	7.1	52.1	31.9	43.2					
Queue Length 50th (ft)	115	279	509	0	550	53	450					
Queue Length 95th (ft)	129	334	536	35	644	77	525					
Internal Link Dist (ft)		465	439			826						
Turn Bay Length (ft)	100			100			100					
Base Capacity (vph)	456	1990	1083	546	1330	721	740					
Starvation Cap Reductn	0	779	226	0	0	0	0					
Spillback Cap Reductn	0	0	0	0	28	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.37	0.59	1.13	0.15	0.86	0.11	0.86					

Intersection Summary

Cycle Length: 160
Actuated Cycle Length: 160
Offset: 0 (0%), Referenced to phase 2:NWSE, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated

Splits and Phases: 107: I35 NB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	8.0
Total Split (%)	5%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	118	650	0	0	801	73	1011	60	525	0	0	0
Future Volume (vph)	118	650	0	0	801	73	1011	60	525	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.97	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			3539	1583	3433	1863	1583			
Flt Permitted	0.08	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	152	3539			3539	1583	3433	1863	1583			
Peak-hour factor, PHF	0.70	0.91	0.92	0.92	0.83	0.87	0.90	0.75	0.82	0.92	0.92	0.92
Adj. Flow (vph)	169	714	0	0	965	84	1123	80	640	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	58	0	0	127	0	0	0
Lane Group Flow (vph)	169	714	0	0	965	26	1123	80	513	0	0	0
Turn Type	pm+pt	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	2 3	2 3 5 6			5 6			1 7				
Permitted Phases	2 3 5 6					5 6	1 7		1 7			
Actuated Green, G (s)	86.0	90.0			49.0	49.0	62.0	62.0	62.0			
Effective Green, g (s)	86.0	90.0			49.0	49.0	62.0	62.0	62.0			
Actuated g/C Ratio	0.54	0.56			0.31	0.31	0.39	0.39	0.39			
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)	455	1990			1083	484	1330	721	613			
v/s Ratio Prot	c0.09	c0.20			c0.27			0.04				
v/s Ratio Perm	0.11					0.02	c0.33		0.32			
v/c Ratio	0.37	0.36			0.89	0.05	0.84	0.11	0.84			
Uniform Delay, d1	27.7	19.2			53.0	39.1	44.6	31.4	44.4			
Progression Factor	1.00	1.30			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	0.5	0.1			9.4	0.0	5.1	0.1	9.7			
Delay (s)	28.2	25.1			62.4	39.2	49.7	31.4	54.1			
Level of Service	C	C			E	D	D	C	D			
Approach Delay (s)		25.7			60.5			50.4			0.0	
Approach LOS		C			E			D			A	

Intersection Summary			
HCM 2000 Control Delay	47.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Appendix B – Improved Signal Timing Model Outputs

Network Totals

Number of Intersections	25
Total Delay (hr)	155
Stops (#)	15283
Average Speed (mph)	30
Total Travel Time (hr)	486
Distance Traveled (mi)	14558
Fuel Consumed (gal)	782
Fuel Economy (mpg)	18.6
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	1199
Performance Index	197.8

Network Totals

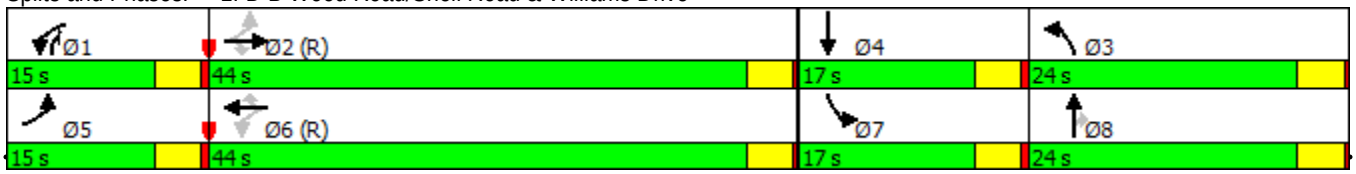
Number of Intersections	25
Total Delay (hr)	243
Stops (#)	19585
Average Speed (mph)	26
Total Travel Time (hr)	608
Distance Traveled (mi)	15848
Fuel Consumed (gal)	931
Fuel Economy (mpg)	17.0
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	723
Performance Index	297.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	85	898	277	153	609	307	195	102	59	364	261
Future Volume (vph)	85	898	277	153	609	307	195	102	59	364	261
Lane Group Flow (vph)	92	976	301	166	662	334	212	111	64	396	293
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2		1	6		3	8	1	7	4
Permitted Phases	2		2	6		6			8		
Detector Phase	5	2	2	1	6	6	3	8	1	7	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	15.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0
Total Split (s)	15.0	44.0	44.0	15.0	44.0	44.0	24.0	24.0	15.0	17.0	17.0
Total Split (%)	15.0%	44.0%	44.0%	15.0%	44.0%	44.0%	24.0%	24.0%	15.0%	17.0%	17.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None
v/c Ratio	0.19	0.55	0.32	0.46	0.34	0.33	0.53	0.29	0.15	0.89	0.68
Control Delay	8.3	12.6	3.1	10.3	6.0	1.6	46.1	41.8	9.7	66.3	50.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.3	12.6	3.1	10.3	6.0	1.6	46.1	41.8	9.7	66.3	50.1
Queue Length 50th (ft)	9	58	0	14	39	0	67	34	4	129	93
Queue Length 95th (ft)	m33	170	m64	50	121	0	100	59	33	#212	138
Internal Link Dist (ft)		305			466			485			323
Turn Bay Length (ft)	150		250	150		193	270		200	180	
Base Capacity (vph)	541	1787	948	389	1930	1015	686	707	458	446	460
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.55	0.32	0.43	0.34	0.33	0.31	0.16	0.14	0.89	0.64

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 18 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: D B Wood Road/Shell Road & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	898	277	153	609	307	195	102	59	364	261	8
Future Volume (vph)	85	898	277	153	609	307	195	102	59	364	261	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	3433	3523	
Flt Permitted	0.37	1.00	1.00	0.19	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	688	3539	1583	354	3539	1583	3433	3539	1583	3433	3523	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	976	301	166	662	334	212	111	64	396	284	9
RTOR Reduction (vph)	0	0	149	0	0	155	0	0	44	0	3	0
Lane Group Flow (vph)	92	976	152	166	662	179	212	111	20	396	290	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	56.9	50.5	50.5	63.3	53.7	53.7	11.7	10.9	20.5	13.0	12.2	
Effective Green, g (s)	56.9	50.5	50.5	63.3	53.7	53.7	11.7	10.9	20.5	13.0	12.2	
Actuated g/C Ratio	0.57	0.50	0.50	0.63	0.54	0.54	0.12	0.11	0.20	0.13	0.12	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	460	1787	799	360	1900	850	401	385	387	446	429	
v/s Ratio Prot	0.01	c0.28		c0.04	0.19		c0.06	0.03	0.01	c0.12	0.08	
v/s Ratio Perm	0.10		0.10	0.25		0.11			0.01			
v/c Ratio	0.20	0.55	0.19	0.46	0.35	0.21	0.53	0.29	0.05	0.89	0.68	
Uniform Delay, d1	9.9	16.9	13.6	10.0	13.2	12.1	41.6	41.0	31.9	42.8	42.0	
Progression Factor	0.98	0.64	1.14	0.81	0.39	0.43	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.9	0.4	0.9	0.5	0.5	1.3	0.4	0.1	18.8	4.2	
Delay (s)	9.8	11.7	15.8	9.0	5.6	5.7	42.8	41.4	32.0	61.6	46.2	
Level of Service	A	B	B	A	A	A	D	D	C	E	D	
Approach Delay (s)		12.5			6.1			40.6			55.1	
Approach LOS		B			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWT
Lane Configurations							
Traffic Volume (vph)	35	1402	37	766	22	4	6
Future Volume (vph)	35	1402	37	766	22	4	6
Lane Group Flow (vph)	61	1508	64	833	30	82	112
Turn Type	pm+pt	NA	pm+pt	NA	Split	NA	NA
Protected Phases	5	2	1	6	4	4	3
Permitted Phases	2		6				
Detector Phase	5	2	1	6	4	4	3
Switch Phase							
Minimum Initial (s)	7.0	30.0	7.0	30.0	7.0	7.0	7.0
Minimum Split (s)	14.0	37.0	14.0	37.0	14.0	14.0	14.0
Total Split (s)	15.0	55.0	15.0	55.0	15.0	15.0	15.0
Total Split (%)	15.0%	55.0%	15.0%	55.0%	15.0%	15.0%	15.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Min	None	C-Min	None	None	None
v/c Ratio	0.13	0.71	0.24	0.39	0.18	0.37	0.46
Control Delay	2.7	15.7	13.8	6.0	43.8	18.2	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.7	15.7	13.8	6.0	43.8	18.2	19.7
Queue Length 50th (ft)	2	462	5	103	18	7	13
Queue Length 95th (ft)	5	576	12	119	36	0	3
Internal Link Dist (ft)		2052		391		287	1154
Turn Bay Length (ft)	300		300				
Base Capacity (vph)	495	2110	283	2116	194	241	262
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.71	0.23	0.39	0.15	0.34	0.43

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 8 (8%), Referenced to phase 2:SETL and 6:NWTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 2: Wildwood Dr & Williams Drive

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	35	1402	23	37	766	0	22	4	56	2	6	66
Future Volume (vph)	35	1402	23	37	766	0	22	4	56	2	6	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87			0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	3528		1770	3539		1770	1621			1655	
Flt Permitted	0.28	1.00		0.08	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	522	3528		154	3539		1770	1621			1655	
Peak-hour factor, PHF	0.57	0.95	0.73	0.58	0.92	0.50	0.73	0.38	0.79	0.25	0.44	0.73
Adj. Flow (vph)	61	1476	32	64	833	0	30	11	71	8	14	90
RTOR Reduction (vph)	0	1	0	0	0	0	0	65	0	0	81	0
Lane Group Flow (vph)	61	1507	0	64	833	0	30	17	0	0	31	0
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								
Actuated Green, G (s)	60.0	54.2		60.0	54.2		6.2	6.2			7.8	
Effective Green, g (s)	66.0	57.2		66.0	57.2		8.2	8.2			9.8	
Actuated g/C Ratio	0.66	0.57		0.66	0.57		0.08	0.08			0.10	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	454	2018		243	2024		145	132			162	
v/s Ratio Prot	0.01	c0.43		c0.02	0.24		c0.02	0.01			c0.02	
v/s Ratio Perm	0.08			0.15								
v/c Ratio	0.13	0.75		0.26	0.41		0.21	0.13			0.19	
Uniform Delay, d1	6.5	16.0		11.5	12.0		42.9	42.6			41.5	
Progression Factor	0.40	0.83		2.05	0.44		1.00	1.00			1.00	
Incremental Delay, d2	0.1	2.0		0.6	0.6		0.7	0.4			0.6	
Delay (s)	2.7	15.2		24.2	5.8		43.6	43.0			42.0	
Level of Service	A	B		C	A		D	D			D	
Approach Delay (s)		14.8			7.1			43.2			42.0	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1277	173	60	794	81	183
Future Volume (vph)	1277	173	60	794	81	183
Lane Group Flow (vph)	1388	339	98	913	156	366
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	15.0	15.0	7.0	15.0	7.0	7.0
Minimum Split (s)	24.0	24.0	13.0	24.0	12.5	12.5
Total Split (s)	52.6	52.6	13.0	65.6	34.4	34.4
Total Split (%)	52.6%	52.6%	13.0%	65.6%	34.4%	34.4%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-1.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						
Recall Mode	C-Min	C-Min	None	C-Min	None	None
v/c Ratio	0.66	0.31	0.34	0.37	0.42	0.80
Control Delay	10.2	1.0	9.3	4.5	36.0	33.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	1.0	9.3	4.5	36.0	33.2
Queue Length 50th (ft)	262	9	15	110	86	126
Queue Length 95th (ft)	228	0	25	118	70	55
Internal Link Dist (ft)	1127			2052	664	
Turn Bay Length (ft)		300	300			
Base Capacity (vph)	2114	1080	285	2488	532	589
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.31	0.34	0.37	0.29	0.62

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 66 (66%), Referenced to phase 2:SET and 6:NWTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 3: Woodlake Dr & Williams Drive

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1277	173	60	794	81	183
Future Volume (vph)	1277	173	60	794	81	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3505	1568	1752	3505	1752	1568
Flt Permitted	1.00	1.00	0.11	1.00	0.95	1.00
Satd. Flow (perm)	3505	1568	200	3505	1752	1568
Peak-hour factor, PHF	0.92	0.51	0.61	0.87	0.52	0.50
Adj. Flow (vph)	1388	339	98	913	156	366
RTOR Reduction (vph)	0	139	0	0	0	128
Lane Group Flow (vph)	1388	200	98	913	156	238
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	57.1	57.1	69.0	69.0	19.5	19.5
Effective Green, g (s)	59.1	59.1	71.0	71.0	21.0	21.0
Actuated g/C Ratio	0.59	0.59	0.71	0.71	0.21	0.21
Clearance Time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2071	926	264	2488	367	329
v/s Ratio Prot	c0.40		0.03	c0.26	0.09	
v/s Ratio Perm		0.13	0.23			c0.15
v/c Ratio	0.67	0.22	0.37	0.37	0.43	0.72
Uniform Delay, d1	13.8	9.6	9.8	5.7	34.3	36.8
Progression Factor	0.55	0.16	1.04	0.61	1.00	1.00
Incremental Delay, d2	1.6	0.5	0.8	0.4	0.8	7.7
Delay (s)	9.2	2.1	11.1	3.9	35.1	44.5
Level of Service	A	A	B	A	D	D
Approach Delay (s)	7.8			4.6	41.6	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Configurations								
Traffic Volume (vph)	70	20	100	20	100	1275	70	854
Future Volume (vph)	70	20	100	20	100	1275	70	854
Lane Group Flow (vph)	76	76	109	109	109	1440	76	1015
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	1	6	5	2
Permitted Phases	4		8		6		2	
Detector Phase	4	4	8	8	1	6	5	2
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	10.0	7.0	10.0
Minimum Split (s)	20.0	20.0	20.0	20.0	12.5	27.5	12.5	27.5
Total Split (s)	20.0	20.0	20.0	20.0	15.0	65.0	15.0	65.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	15.0%	65.0%	15.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.47	0.29	0.64	0.38	0.27	0.62	0.27	0.46
Control Delay	48.9	18.4	58.1	16.1	9.8	23.2	7.5	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	18.4	58.1	16.1	9.8	23.2	7.5	7.2
Queue Length 50th (ft)	45	12	66	13	38	384	14	101
Queue Length 95th (ft)	89	53	121	60	m37	328	19	16
Internal Link Dist (ft)		1195		1212		1599		2931
Turn Bay Length (ft)					175		175	
Base Capacity (vph)	192	297	199	322	443	2322	322	2217
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.26	0.55	0.34	0.25	0.62	0.24	0.46

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 56 (56%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Williams Drive & River Bend

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	70	20	50	100	20	80	100	1275	50	70	854	80
Future Volume (vph)	70	20	50	100	20	80	100	1275	50	70	854	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1664		1770	1640		1770	3519		1770	3494	
Flt Permitted	0.68	1.00		0.71	1.00		0.23	1.00		0.13	1.00	
Satd. Flow (perm)	1268	1664		1318	1640		430	3519		243	3494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	22	54	109	22	87	109	1386	54	76	928	87
RTOR Reduction (vph)	0	47	0	0	76	0	0	2	0	0	6	0
Lane Group Flow (vph)	76	29	0	109	33	0	109	1438	0	76	1009	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	12.9	12.9		12.9	12.9		72.3	64.8		68.9	63.1	
Effective Green, g (s)	12.9	12.9		12.9	12.9		72.3	64.8		68.9	63.1	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.72	0.65		0.69	0.63	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	163	214		170	211		411	2280		255	2204	
v/s Ratio Prot		0.02			0.02		c0.02	c0.41		0.02	0.29	
v/s Ratio Perm	0.06			c0.08			0.17			0.19		
v/c Ratio	0.47	0.14		0.64	0.16		0.27	0.63		0.30	0.46	
Uniform Delay, d1	40.4	38.6		41.4	38.7		5.0	10.5		7.2	9.6	
Progression Factor	1.00	1.00		1.00	1.00		2.40	1.98		1.35	0.65	
Incremental Delay, d2	2.1	0.3		8.0	0.4		0.2	0.8		0.6	0.6	
Delay (s)	42.5	38.9		49.4	39.1		12.1	21.5		10.4	6.9	
Level of Service	D	D		D	D		B	C		B	A	
Approach Delay (s)		40.7			44.2			20.9			7.1	
Approach LOS		D			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		

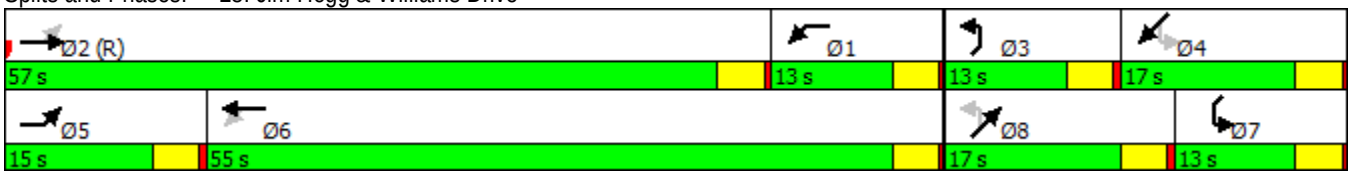
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	2	792	148	606	49	1	13	4
Future Volume (vph)	2	792	148	606	49	1	13	4
Lane Group Flow (vph)	2	883	161	668	53	505	14	6
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	8.0	10.0	8.0	10.0
Total Split (s)	15.0	57.0	13.0	55.0	13.0	17.0	13.0	17.0
Total Split (%)	15.0%	57.0%	13.0%	55.0%	13.0%	17.0%	13.0%	17.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	Min	None	None	None	None
v/c Ratio	0.00	0.43	0.39	0.28	0.17	0.81	0.08	0.02
Control Delay	13.5	13.8	8.6	3.4	30.5	20.7	35.7	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	13.8	8.6	3.4	30.5	20.7	35.7	29.0
Queue Length 50th (ft)	1	142	17	41	27	82	9	2
Queue Length 95th (ft)	5	282	30	28	55	198	21	11
Internal Link Dist (ft)		695		535		259		291
Turn Bay Length (ft)								
Base Capacity (vph)	480	2145	470	2406	321	625	233	307
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.41	0.34	0.28	0.17	0.81	0.06	0.02

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 57 (57%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 28: Jim Hogg & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	2	792	20	148	606	8	49	1	464	13	4	2
Future Volume (vph)	2	792	20	148	606	8	49	1	464	13	4	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.85		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3526		1770	3532		1770	1584		1770	1770	
Flt Permitted	0.32	1.00		0.28	1.00		0.48	1.00		0.37	1.00	
Satd. Flow (perm)	600	3526		513	3532		889	1584		684	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	861	22	161	659	9	53	1	504	14	4	2
RTOR Reduction (vph)	0	2	0	0	1	0	0	286	0	0	2	0
Lane Group Flow (vph)	2	881	0	161	667	0	53	219	0	14	4	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	52.3	52.3		60.1	60.1		21.5	21.5		12.1	12.1	
Effective Green, g (s)	52.3	52.3		60.1	60.1		21.5	21.5		12.1	12.1	
Actuated g/C Ratio	0.52	0.52		0.60	0.60		0.22	0.22		0.12	0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	327	1844		421	2122		284	340		95	214	
v/s Ratio Prot	0.00	c0.25		c0.03	0.19		0.02	c0.14		c0.00	0.00	
v/s Ratio Perm	0.00			0.20			0.02			0.02		
v/c Ratio	0.01	0.48		0.38	0.31		0.19	0.64		0.15	0.02	
Uniform Delay, d1	11.9	15.2		15.3	9.8		31.8	35.8		45.3	38.7	
Progression Factor	1.00	1.00		0.42	0.34		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.9		0.5	0.1		0.3	4.2		0.7	0.0	
Delay (s)	11.9	16.1		7.0	3.4		32.2	39.9		46.0	38.8	
Level of Service	B	B		A	A		C	D		D	D	
Approach Delay (s)		16.0			4.1			39.2			43.8	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	50	1219	709	166	231	53
Future Volume (vph)	50	1219	709	166	231	53
Lane Group Flow (vph)	54	1325	771	180	257	52
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	15.0	71.0	56.0	56.0	29.0	29.0
Total Split (%)	15.0%	71.0%	56.0%	56.0%	29.0%	29.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Max	C-Max	C-Max	None	None
v/c Ratio	0.08	0.47	0.42	0.20	0.59	0.23
Control Delay	3.7	6.3	8.7	1.2	46.1	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	6.3	8.7	1.2	46.1	13.2
Queue Length 50th (ft)	8	168	56	1	80	0
Queue Length 95th (ft)	m7	62	70	4	115	36
Internal Link Dist (ft)		706	847		395	
Turn Bay Length (ft)	120			500		200
Base Capacity (vph)	693	2805	1840	909	859	399
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.47	0.42	0.20	0.30	0.13

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 23 (23%), Referenced to phase 6:NWT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 37: Williams Drive & Del Webb

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	50	1219	709	166	231	53
Future Volume (vph)	50	1219	709	166	231	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1441
Flt Permitted	0.27	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	503	3539	3539	1583	3433	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1325	771	180	251	58
RTOR Reduction (vph)	0	0	0	86	2	45
Lane Group Flow (vph)	54	1325	771	94	255	7
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	79.3	79.3	52.0	52.0	12.7	12.7
Effective Green, g (s)	79.3	79.3	52.0	52.0	12.7	12.7
Actuated g/C Ratio	0.79	0.79	0.52	0.52	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	694	2806	1840	823	435	183
v/s Ratio Prot	0.02	c0.37	0.22		c0.07	
v/s Ratio Perm	0.04			0.06		0.00
v/c Ratio	0.08	0.47	0.42	0.11	0.59	0.04
Uniform Delay, d1	3.3	3.4	14.7	12.2	41.2	38.3
Progression Factor	1.33	1.54	0.54	0.36	1.00	1.00
Incremental Delay, d2	0.2	0.5	0.7	0.3	2.0	0.1
Delay (s)	4.5	5.8	8.6	4.7	43.2	38.4
Level of Service	A	A	A	A	D	D
Approach Delay (s)		5.7	7.9		42.4	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBT	SBR	Ø8
Lane Configurations								
Traffic Volume (vph)	130	1304	931	53	119	0	138	
Future Volume (vph)	130	1304	931	53	119	0	138	
Lane Group Flow (vph)	141	1417	1012	58	0	129	150	
Turn Type	Perm	NA	NA	Perm	Perm	NA	Perm	
Protected Phases		2	6			4		8
Permitted Phases	2			6	4		4	
Detector Phase	2	2	6	6	4	4	4	
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	5.0
Total Split (s)	75.0	75.0	75.0	75.0	25.0	25.0	25.0	25.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%	25.0%	25%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min
v/c Ratio	0.42	0.56	0.40	0.05		0.44	0.33	
Control Delay	4.6	3.0	2.3	0.3		39.7	7.8	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	4.6	3.0	2.3	0.3		39.7	7.8	
Queue Length 50th (ft)	13	72	26	0		72	0	
Queue Length 95th (ft)	m4	m17	68	m1		130	51	
Internal Link Dist (ft)		3232	291			759		
Turn Bay Length (ft)	100			138			54	
Base Capacity (vph)	332	2512	2512	1140		296	450	
Starvation Cap Reductn	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0		0	0	
Reduced v/c Ratio	0.42	0.56	0.40	0.05		0.44	0.33	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 99 (99%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 41: Williams Drive & Serenada Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1304	0	0	931	53	0	0	0	119	0	138
Future Volume (vph)	130	1304	0	0	931	53	0	0	0	119	0	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00					1.00	1.00
Frt	1.00	1.00			1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00					0.95	1.00
Satd. Flow (prot)	1770	3539			3539	1583					1770	1583
Flt Permitted	0.25	1.00			1.00	1.00					0.76	1.00
Satd. Flow (perm)	467	3539			3539	1583					1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1417	0	0	1012	58	0	0	0	129	0	150
RTOR Reduction (vph)	0	0	0	0	0	17	0	0	0	0	0	119
Lane Group Flow (vph)	141	1417	0	0	1012	41	0	0	0	0	129	32
Turn Type	Perm	NA			NA	Perm				Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		4
Actuated Green, G (s)	71.0	71.0			71.0	71.0					21.0	21.0
Effective Green, g (s)	71.0	71.0			71.0	71.0					21.0	21.0
Actuated g/C Ratio	0.71	0.71			0.71	0.71					0.21	0.21
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0					3.0	3.0
Lane Grp Cap (vph)	331	2512			2512	1123					296	332
v/s Ratio Prot		c0.40			0.29							
v/s Ratio Perm	0.30					0.03					c0.09	0.02
v/c Ratio	0.43	0.56			0.40	0.04					0.44	0.09
Uniform Delay, d1	6.0	7.0			5.9	4.3					34.3	31.8
Progression Factor	0.20	0.31			0.33	0.21					1.00	1.00
Incremental Delay, d2	3.3	0.8			0.3	0.0					4.6	0.6
Delay (s)	4.5	2.9			2.3	1.0					39.0	32.4
Level of Service	A	A			A	A					D	C
Approach Delay (s)		3.0			2.2			0.0			35.4	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

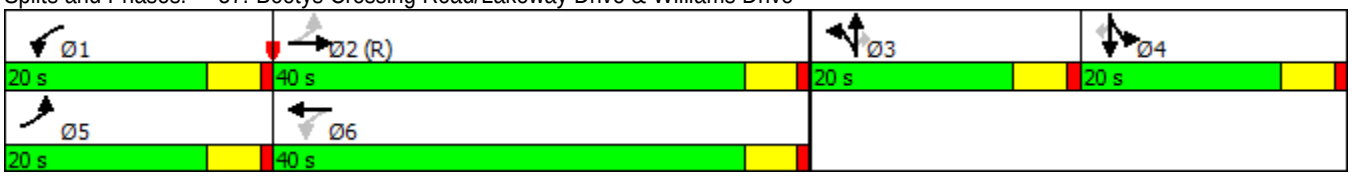
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	191	1202	157	695	37	119	40	186
Future Volume (vph)	191	1202	157	695	37	119	40	186
Lane Group Flow (vph)	208	1340	171	920	152	129	154	202
Turn Type	pm+pt	NA	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	1	6	3		4	
Permitted Phases	2		6			3		4
Detector Phase	5	2	1	6	3	3	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	20.0%	40.0%	20.0%	40.0%	20.0%	20.0%	20.0%	20.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								
Recall Mode	Max	C-Max	None	None	None	None	None	None
v/c Ratio	0.48	0.87	0.65	0.75	0.66	0.41	0.67	0.53
Control Delay	23.6	31.4	39.0	20.5	55.6	10.9	55.8	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.6	31.4	39.0	20.5	55.6	10.9	55.8	11.2
Queue Length 50th (ft)	54	228	66	145	93	0	94	0
Queue Length 95th (ft)	124	#609	151	180	157	50	158	62
Internal Link Dist (ft)		3581		1599	968		626	
Turn Bay Length (ft)	180		190			108		250
Base Capacity (vph)	433	1539	339	1224	269	348	269	409
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.87	0.50	0.75	0.57	0.37	0.57	0.49

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 68 (68%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 57: Bootys Crossing Road/Lakeway Drive & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	1202	30	157	695	152	103	37	119	102	40	186
Future Volume (vph)	191	1202	30	157	695	152	103	37	119	102	40	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	3526		1770	3444			1797	1583		1798	1583
Flt Permitted	0.12	1.00		0.11	1.00			0.96	1.00		0.97	1.00
Satd. Flow (perm)	232	3526		213	3444			1797	1583		1798	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	1307	33	171	755	165	112	40	129	111	43	202
RTOR Reduction (vph)	0	2	0	0	19	0	0	0	112	0	0	176
Lane Group Flow (vph)	208	1338	0	171	901	0	0	152	17	0	154	26
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2			6					3			4
Actuated Green, G (s)	59.4	43.6		45.8	35.0			12.8	12.8		12.8	12.8
Effective Green, g (s)	59.4	43.6		45.8	35.0			12.8	12.8		12.8	12.8
Actuated g/C Ratio	0.59	0.44		0.46	0.35			0.13	0.13		0.13	0.13
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	436	1537		265	1205			230	202		230	202
v/s Ratio Prot	0.09	c0.38		c0.07	0.26			c0.08			c0.09	
v/s Ratio Perm	0.19			0.23					0.01			0.02
v/c Ratio	0.48	0.87		0.65	0.75			0.66	0.08		0.67	0.13
Uniform Delay, d1	13.8	25.6		19.9	28.6			41.5	38.4		41.6	38.7
Progression Factor	1.34	0.88		1.65	0.59			1.00	1.00		1.00	1.00
Incremental Delay, d2	3.1	6.0		4.9	2.4			6.9	0.2		7.2	0.3
Delay (s)	21.7	28.6		37.7	19.3			48.5	38.6		48.8	38.9
Level of Service	C	C		D	B			D	D		D	D
Approach Delay (s)		27.7			22.2			43.9			43.2	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

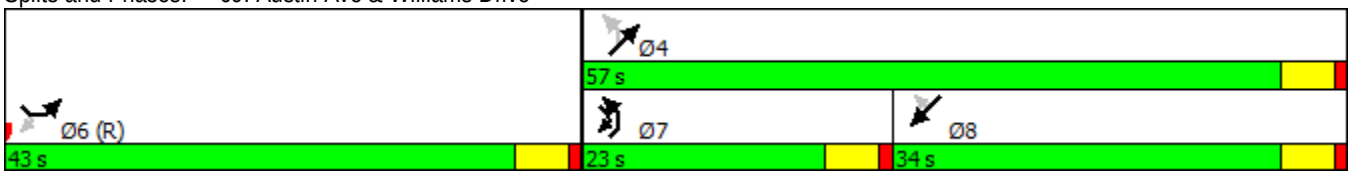
c Critical Lane Group

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	512	652	256	84	199	415
Future Volume (vph)	512	652	256	84	199	415
Lane Group Flow (vph)	862	404	139	230	216	451
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	6	7	7	4	8	
Permitted Phases		6	4			8
Detector Phase	6	7	7	4	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	9.0	9.0	21.0	21.0	21.0
Total Split (s)	43.0	23.0	23.0	57.0	34.0	34.0
Total Split (%)	43.0%	23.0%	23.0%	57.0%	34.0%	34.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Recall Mode	C-Max	None	None	None	None	None
v/c Ratio	0.47	0.35	0.40	0.26	0.62	0.68
Control Delay	8.9	0.7	23.1	20.4	44.7	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.9	0.7	23.1	20.4	44.7	8.9
Queue Length 50th (ft)	75	1	65	53	128	0
Queue Length 95th (ft)	123	1	92	65	186	79
Internal Link Dist (ft)	439			647	500	
Turn Bay Length (ft)	210		425			
Base Capacity (vph)	1817	1192	395	1195	540	779
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.34	0.35	0.19	0.40	0.58

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 13 (13%), Referenced to phase 2: and 6:SEL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 69: Austin Ave & Williams Drive



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	512	652	256	84	199	415
Future Volume (vph)	512	652	256	84	199	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.91	0.91	1.00	1.00
Frt	0.95	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	0.97	1.00	1.00
Satd. Flow (prot)	3315	1441	1610	3291	1863	1583
Flt Permitted	0.97	1.00	0.33	0.58	1.00	1.00
Satd. Flow (perm)	3315	1441	559	1951	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	557	709	278	91	216	451
RTOR Reduction (vph)	60	136	0	0	0	367
Lane Group Flow (vph)	802	268	139	230	216	84
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	6	7	7	4	8	
Permitted Phases		6	4			8
Actuated Green, G (s)	53.0	66.4	37.0	37.0	18.6	18.6
Effective Green, g (s)	53.0	66.4	37.0	37.0	18.6	18.6
Actuated g/C Ratio	0.53	0.66	0.37	0.37	0.19	0.19
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1756	1028	347	901	346	294
v/s Ratio Prot	c0.24	0.03	c0.05	0.03	c0.12	
v/s Ratio Perm		0.15	0.09	0.06		0.05
v/c Ratio	0.46	0.26	0.40	0.26	0.62	0.29
Uniform Delay, d1	14.6	6.8	22.4	21.9	37.5	35.0
Progression Factor	0.58	0.10	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.8	0.2	3.5	0.5
Delay (s)	9.2	0.8	23.2	22.1	41.0	35.5
Level of Service	A	A	C	C	D	D
Approach Delay (s)	6.5			22.5	37.3	
Approach LOS	A			C	D	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	SET	NWL	NWT
Lane Configurations				
Traffic Volume (vph)	118	1147	51	1006
Future Volume (vph)	118	1147	51	1006
Lane Group Flow (vph)	233	1443	64	1105
Turn Type	Prot	NA	pm+pt	NA
Protected Phases	8	2	1	6
Permitted Phases			6	
Detector Phase	8	2	1	6
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	10.0	20.0
Total Split (s)	16.0	69.0	15.0	84.0
Total Split (%)	16.0%	69.0%	15.0%	84.0%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag		Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	
Recall Mode	None	C-Max	None	C-Max
v/c Ratio	0.59	0.56	0.21	0.38
Control Delay	30.5	8.9	6.3	5.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	30.5	8.9	6.3	5.2
Queue Length 50th (ft)	41	53	12	112
Queue Length 95th (ft)	76	498	m16	m140
Internal Link Dist (ft)	904	2931		1755
Turn Bay Length (ft)			175	
Base Capacity (vph)	482	2592	379	2927
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.56	0.17	0.38

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 54 (54%), Referenced to phase 2:SET and 6:NWTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 102: Williams Drive & Rivery Blvd

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	118	76	1147	128	51	1006
Future Volume (vph)	118	76	1147	128	51	1006
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.94		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	3287		3472		1770	3539
Flt Permitted	0.97		1.00		0.14	1.00
Satd. Flow (perm)	3287		3472		257	3539
Peak-hour factor, PHF	0.89	0.76	0.91	0.70	0.80	0.91
Adj. Flow (vph)	133	100	1260	183	64	1105
RTOR Reduction (vph)	91	0	9	0	0	0
Lane Group Flow (vph)	142	0	1434	0	64	1105
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Actuated Green, G (s)	9.3		73.6		82.7	82.7
Effective Green, g (s)	9.3		73.6		82.7	82.7
Actuated g/C Ratio	0.09		0.74		0.83	0.83
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	305		2555		289	2926
v/s Ratio Prot	c0.04		c0.41		0.01	c0.31
v/s Ratio Perm					0.17	
v/c Ratio	0.47		0.56		0.22	0.38
Uniform Delay, d1	43.0		5.9		3.8	2.2
Progression Factor	1.00		1.30		2.96	2.14
Incremental Delay, d2	1.1		0.7		0.2	0.2
Delay (s)	44.1		8.4		11.5	4.8
Level of Service	D		A		B	A
Approach Delay (s)	44.1		8.4			5.2
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

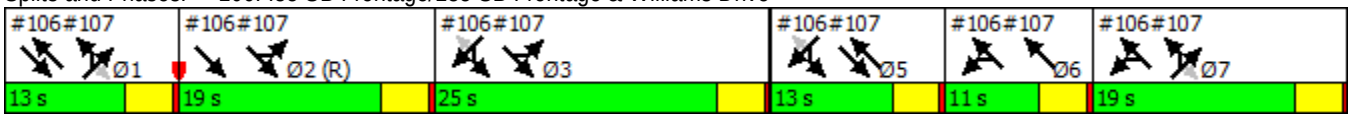
c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	SWL	SWT	SWR	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	647	599	284	1099	313	103	83					
Future Volume (vph)	647	599	284	1099	313	103	83					
Lane Group Flow (vph)	703	631	309	1263	271	275	104					
Turn Type	NA	Free	custom	NA	Split	NA	Perm					
Protected Phases	1 2		6 7	1 6 7	3 5	3 5		1	2	3	5	6
Permitted Phases		Free	6 7				3 5					
Detector Phase	1 2		6 7	1 6 7	3 5	3 5	3 5					
Switch Phase												
Minimum Initial (s)								9.0	4.0	4.0	9.0	4.0
Minimum Split (s)								13.0	20.0	20.0	13.0	20.0
Total Split (s)								13.0	19.0	25.0	13.0	11.0
Total Split (%)								13%	19%	25%	13%	11%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.71	0.40	0.67	0.92	0.47	0.47	0.16					
Control Delay	33.1	0.6	42.4	24.4	29.4	29.2	2.3					
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Total Delay	33.1	0.6	42.4	24.4	29.4	29.2	2.3					
Queue Length 50th (ft)	247	0	144	254	142	144	0					
Queue Length 95th (ft)	213	0	m170	m#354	176	193	9					
Internal Link Dist (ft)	1755			1		1077						
Turn Bay Length (ft)		200	100				100					
Base Capacity (vph)	990	1583	460	1380	566	580	626					
Starvation Cap Reductn	0	0	0	0	0	0	0					
Spillback Cap Reductn	0	0	0	0	0	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.71	0.40	0.67	0.92	0.48	0.47	0.17					

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SET, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 106: I35 SB Frontage/135 SB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	19.0
Total Split (%)	19%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	647	599	284	1099	0	0	0	0	313	103	83
Future Volume (vph)	0	647	599	284	1099	0	0	0	0	313	103	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (prot)		3539	1583	1770	3539					1681	1724	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (perm)		3539	1583	1770	3539					1681	1724	1583
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.87	0.92	0.92	0.92	0.92	0.75	0.80	0.80
Adj. Flow (vph)	0	703	631	309	1263	0	0	0	0	417	129	104
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	69
Lane Group Flow (vph)	0	703	631	309	1263	0	0	0	0	271	275	35
Turn Type		NA	Free	custom	NA					Split	NA	Perm
Protected Phases		1 2		6 7	1 6 7					3 5	3 5	
Permitted Phases			Free	6 7								3 5
Actuated Green, G (s)		28.0	100.0	26.0	39.0					34.0	34.0	34.0
Effective Green, g (s)		28.0	100.0	26.0	39.0					34.0	34.0	34.0
Actuated g/C Ratio		0.28	1.00	0.26	0.39					0.34	0.34	0.34
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)		990	1583	460	1380					571	586	538
v/s Ratio Prot		c0.20		0.17	c0.36					c0.16	0.16	
v/s Ratio Perm			0.40									0.02
v/c Ratio		0.71	0.40	0.67	0.92					0.47	0.47	0.07
Uniform Delay, d1		32.4	0.0	33.2	28.9					26.0	25.9	22.3
Progression Factor		0.90	1.00	1.14	0.61					1.00	1.00	1.00
Incremental Delay, d2		3.7	0.6	1.8	4.9					0.6	0.6	0.1
Delay (s)		32.8	0.6	39.7	22.7					26.6	26.5	22.3
Level of Service		C	A	D	C					C	C	C
Approach Delay (s)		17.6			26.0			0.0			25.9	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NEL	NET	NER	Ø1	Ø2	Ø3	Ø5	Ø6	Ø7
Lane Configurations												
Traffic Volume (vph)	112	848	580	803	27	370						
Future Volume (vph)	112	848	580	803	27	370						
Lane Group Flow (vph)	149	1087	668	873	40	430						
Turn Type	custom	NA	NA	Split	NA	Perm						
Protected Phases	2 3	2 3 5	5 6	1 7	1 7		1	2	3	5	6	7
Permitted Phases	2 3					1 7						
Detector Phase	2 3	2 3 5	5 6	1 7	1 7	1 7						
Switch Phase												
Minimum Initial (s)							9.0	4.0	4.0	9.0	4.0	4.0
Minimum Split (s)							13.0	20.0	20.0	13.0	20.0	8.0
Total Split (s)							13.0	19.0	25.0	13.0	11.0	19.0
Total Split (%)							13%	19%	25%	13%	11%	19%
Yellow Time (s)							3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)							0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode							Max	C-Max	None	None	Max	None
v/c Ratio	0.21	0.58	0.93	0.91	0.08	0.73						
Control Delay	12.5	4.9	72.0	49.4	27.1	24.4						
Queue Delay	0.0	0.0	0.0	5.3	0.0	0.0						
Total Delay	12.5	4.9	72.0	54.7	27.1	24.4						
Queue Length 50th (ft)	24	34	230	276	19	128						
Queue Length 95th (ft)	39	34	#342	#390	33	223						
Internal Link Dist (ft)		465	439		826							
Turn Bay Length (ft)	100					100						
Base Capacity (vph)	708	1864	722	961	521	593						
Starvation Cap Reductn	0	0	0	0	0	0						
Spillback Cap Reductn	0	0	0	58	0	0						
Storage Cap Reductn	0	0	0	0	0	0						
Reduced v/c Ratio	0.21	0.58	0.93	0.97	0.08	0.73						

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SET, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 107: I35 NB Frontage & Williams Drive

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	112	848	0	0	580	32	803	27	370	0	0	0
Future Volume (vph)	112	848	0	0	580	32	803	27	370	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			0.95		0.97	1.00	1.00			
Frt	1.00	1.00			0.99		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			3504		3433	1863	1583			
Flt Permitted	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539			3504		3433	1863	1583			
Peak-hour factor, PHF	0.75	0.78	0.92	0.92	0.93	0.73	0.92	0.68	0.86	0.92	0.92	0.92
Adj. Flow (vph)	149	1087	0	0	624	44	873	40	430	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	150	0	0	0
Lane Group Flow (vph)	149	1087	0	0	663	0	873	40	280	0	0	0
Turn Type	custom	NA			NA		Split	NA	Perm			
Protected Phases	2 3	2 3 5			5 6		1 7	1 7				
Permitted Phases	2 3								1 7			
Actuated Green, G (s)	39.5	53.0			20.5		28.0	28.0	28.0			
Effective Green, g (s)	39.5	53.0			20.5		28.0	28.0	28.0			
Actuated g/C Ratio	0.40	0.53			0.20		0.28	0.28	0.28			
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)	699	1875			718		961	521	443			
v/s Ratio Prot	0.08	c0.31			c0.19		c0.25	0.02				
v/s Ratio Perm									0.18			
v/c Ratio	0.21	0.58			0.92		0.91	0.08	0.63			
Uniform Delay, d1	20.0	15.9			39.0		34.8	26.5	31.5			
Progression Factor	0.59	0.24			1.39		1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.4			16.2		12.1	0.1	2.9			
Delay (s)	12.0	4.1			70.5		46.8	26.6	34.4			
Level of Service	B	A			E		D	C	C			
Approach Delay (s)		5.1			70.5			42.3			0.0	
Approach LOS		A			E			D			A	

Intersection Summary			
HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	144	1034	270	371	868	335	465	231	131	262	236
Act Effct Green (s)	45.4	36.5	36.5	67.0	51.6	51.6	21.4	19.9	49.9	14.6	13.1
Actuated g/C Ratio	0.38	0.30	0.30	0.56	0.43	0.43	0.18	0.17	0.42	0.12	0.11
v/c Ratio	0.48	0.98	0.43	0.91	0.58	0.40	0.78	0.40	0.19	0.64	0.61
Control Delay	17.8	47.6	5.3	50.2	37.0	13.7	56.1	46.3	9.9	57.3	54.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	47.6	5.3	50.2	37.0	13.7	56.1	46.3	9.9	57.3	54.0
LOS	B	D	A	D	D	B	E	D	A	E	D
Approach Delay		36.8			35.2			46.1			55.7
Approach LOS		D			D			D			E
Queue Length 50th (ft)	31	279	2	257	368	129	178	84	21	101	86
Queue Length 95th (ft)	m59	#515	m29	#495	410	150	210	97	59	121	125
Internal Link Dist (ft)		305			466			485			323
Turn Bay Length (ft)	150		250	150		193	270		200	180	
Base Capacity (vph)	303	1055	635	407	1491	843	633	628	696	589	606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.98	0.43	0.91	0.58	0.40	0.73	0.37	0.19	0.44	0.39

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 2 (2%), Referenced to phase 2:EBTL and 6:WBTL, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 40.1 Intersection LOS: D
Intersection Capacity Utilization 82.2% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	910	219	345	764	265	391	171	113	207	179	32
Future Volume (vph)	134	910	219	345	764	265	391	171	113	207	179	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1736	3471	1553	1736	3471	1553	3367	3471	1553	3367	3385	
Flt Permitted	0.31	1.00	1.00	0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	570	3471	1553	170	3471	1553	3367	3471	1553	3367	3385	
Peak-hour factor, PHF	0.93	0.88	0.81	0.93	0.88	0.79	0.84	0.74	0.86	0.79	0.91	0.83
Adj. Flow (vph)	144	1034	270	371	868	335	465	231	131	262	197	39
RTOR Reduction (vph)	0	0	164	0	0	176	0	0	55	0	15	0
Lane Group Flow (vph)	144	1034	106	371	868	159	465	231	76	262	221	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	45.4	36.5	36.5	67.0	51.6	51.6	21.4	19.9	43.9	14.6	13.1	
Effective Green, g (s)	45.4	36.5	36.5	67.0	51.6	51.6	21.4	19.9	43.9	14.6	13.1	
Actuated g/C Ratio	0.38	0.30	0.30	0.56	0.43	0.43	0.18	0.17	0.37	0.12	0.11	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.5	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	302	1055	472	408	1492	667	600	575	568	409	369	
v/s Ratio Prot	0.04	c0.30		c0.18	0.25		c0.14	0.07	0.03	c0.08	0.07	
v/s Ratio Perm	0.15		0.07	0.33		0.10			0.02			
v/c Ratio	0.48	0.98	0.23	0.91	0.58	0.24	0.78	0.40	0.13	0.64	0.60	
Uniform Delay, d1	25.3	41.4	31.2	35.7	26.0	21.7	47.0	44.7	25.4	50.2	50.9	
Progression Factor	0.77	0.62	0.56	0.63	1.29	3.17	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	20.7	0.9	21.9	1.5	0.8	6.2	0.5	0.1	3.4	2.6	
Delay (s)	20.6	46.3	18.5	44.5	35.1	69.5	53.2	45.2	25.5	53.6	53.6	
Level of Service	C	D	B	D	D	E	D	D	C	D	D	
Approach Delay (s)		38.5			44.6			46.6			53.6	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	44.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWT
Lane Group Flow (vph)	61	1199	102	1274	326	93	126
Act Effct Green (s)	8.7	46.3	11.6	52.0	27.3	27.3	8.7
Actuated g/C Ratio	0.07	0.39	0.10	0.43	0.23	0.23	0.07
v/c Ratio	0.48	0.88	0.60	0.83	0.81	0.22	0.67
Control Delay	49.5	47.5	62.2	29.4	59.1	23.2	43.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.5	47.5	62.2	29.4	59.1	23.2	43.7
LOS	D	D	E	C	E	C	D
Approach Delay		47.6		31.8		51.1	43.7
Approach LOS		D		C		D	D
Queue Length 50th (ft)	45	513	67	300	241	35	42
Queue Length 95th (ft)	51	#730	78	#692	245	18	22
Internal Link Dist (ft)		2052		391		287	1154
Turn Bay Length (ft)	300		300				
Base Capacity (vph)	131	1358	206	1533	516	531	204
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.88	0.50	0.83	0.63	0.18	0.62

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 119 (99%), Referenced to phase 2:SET and 6:NWT, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 41.1 Intersection LOS: D
Intersection Capacity Utilization 74.7% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	35	1087	40	59	1167	3	238	19	34	2	14	63
Future Volume (vph)	35	1087	40	59	1167	3	238	19	34	2	14	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0			6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.93			0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	3515		1770	3537		1770	1734			1686	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	1770	3515		1770	3537		1770	1734			1686	
Peak-hour factor, PHF	0.57	0.95	0.73	0.58	0.92	0.50	0.73	0.38	0.79	0.25	0.44	0.73
Adj. Flow (vph)	61	1144	55	102	1268	6	326	50	43	8	32	86
RTOR Reduction (vph)	0	2	0	0	0	0	0	28	0	0	65	0
Lane Group Flow (vph)	61	1197	0	102	1274	0	326	65	0	0	61	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	7.3	46.4		11.6	50.7		27.3	27.3			8.7	
Effective Green, g (s)	7.3	46.4		11.6	50.7		27.3	27.3			8.7	
Actuated g/C Ratio	0.06	0.39		0.10	0.42		0.23	0.23			0.07	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	107	1359		171	1494		402	394			122	
v/s Ratio Prot	0.03	0.34		c0.06	c0.36		c0.18	0.04			c0.04	
v/s Ratio Perm												
v/c Ratio	0.57	0.88		0.60	0.85		0.81	0.17			0.50	
Uniform Delay, d1	54.8	34.2		52.0	31.3		43.9	37.2			53.6	
Progression Factor	0.71	1.11		0.96	0.71		1.00	1.00			1.00	
Incremental Delay, d2	6.6	7.8		4.8	5.6		11.7	0.2			3.2	
Delay (s)	45.6	45.9		54.6	27.7		55.7	37.4			56.8	
Level of Service	D	D		D	C		E	D			E	
Approach Delay (s)		45.9			29.7			51.6			56.8	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	40.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Group Flow (vph)	1227	35	56	1648	42	66
Act Effct Green (s)	93.2	93.2	102.4	103.6	8.6	8.6
Actuated g/C Ratio	0.78	0.78	0.85	0.86	0.07	0.07
v/c Ratio	0.45	0.03	0.15	0.54	0.33	0.38
Control Delay	6.0	1.8	1.0	4.1	59.5	18.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.0	1.8	1.0	4.1	59.5	18.7
LOS	A	A	A	A	E	B
Approach Delay	5.8			4.0	34.6	
Approach LOS	A			A	C	
Queue Length 50th (ft)	215	0	0	3	32	0
Queue Length 95th (ft)	281	6	m5	588	38	3
Internal Link Dist (ft)	1127			2052	664	
Turn Bay Length (ft)		300	300			
Base Capacity (vph)	2720	1225	424	3024	284	310
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.03	0.13	0.54	0.15	0.21

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 77 (64%), Referenced to phase 2:SET and 6:NWTL, Start of 1st Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 5.8	Intersection LOS: A
Intersection Capacity Utilization 55.1%	ICU Level of Service B
Analysis Period (min) 15	

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

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1129	18	34	1434	22	33
Future Volume (vph)	1129	18	34	1434	22	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3505	1568	1752	3505	1752	1568
Flt Permitted	1.00	1.00	0.19	1.00	0.95	1.00
Satd. Flow (perm)	3505	1568	347	3505	1752	1568
Peak-hour factor, PHF	0.92	0.51	0.61	0.87	0.52	0.50
Adj. Flow (vph)	1227	35	56	1648	42	66
RTOR Reduction (vph)	0	9	0	0	0	62
Lane Group Flow (vph)	1227	26	56	1648	42	4
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	89.7	89.7	101.3	101.3	7.2	7.2
Effective Green, g (s)	89.7	89.7	101.3	101.3	7.2	7.2
Actuated g/C Ratio	0.75	0.75	0.84	0.84	0.06	0.06
Clearance Time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2619	1172	358	2958	105	94
v/s Ratio Prot	0.35		0.01	c0.47	c0.02	
v/s Ratio Perm		0.02	0.12			0.00
v/c Ratio	0.47	0.02	0.16	0.56	0.40	0.04
Uniform Delay, d1	5.9	3.9	2.9	2.8	54.3	53.2
Progression Factor	0.85	1.00	0.25	1.22	1.00	1.00
Incremental Delay, d2	0.6	0.0	0.1	0.5	2.5	0.2
Delay (s)	5.6	3.9	0.8	3.8	56.8	53.3
Level of Service	A	A	A	A	E	D
Approach Delay (s)	5.5			3.7	54.7	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Group Flow (vph)	109	114	87	147	87	1185	109	1398
Act Effct Green (s)	20.8	10.1	18.9	9.2	77.8	70.1	78.5	70.4
Actuated g/C Ratio	0.17	0.08	0.16	0.08	0.65	0.58	0.65	0.59
v/c Ratio	0.50	0.57	0.38	0.69	0.37	0.58	0.36	0.68
Control Delay	47.4	36.1	43.5	39.1	21.9	29.2	9.9	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.4	36.1	43.5	39.1	21.9	29.2	9.9	21.2
LOS	D	D	D	D	C	C	A	C
Approach Delay		41.7		40.7		28.7		20.4
Approach LOS		D		D		C		C
Queue Length 50th (ft)	70	36	55	40	49	398	29	460
Queue Length 95th (ft)	125	98	103	#125	m53	265	m43	407
Internal Link Dist (ft)		1195		1212		1599		2931
Turn Bay Length (ft)					175		175	
Base Capacity (vph)	224	208	240	224	263	2098	321	2095
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.55	0.36	0.66	0.33	0.56	0.34	0.67

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 50 (42%), Referenced to phase 2:NWTL and 6:SETL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 26.6	Intersection LOS: C
Intersection Capacity Utilization 74.0%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	100	35	70	80	35	100	80	1020	70	100	1186	100
Future Volume (vph)	100	35	70	80	35	100	80	1020	70	100	1186	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1676		1770	1656		1770	3505		1770	3498	
Flt Permitted	0.39	1.00		0.61	1.00		0.11	1.00		0.17	1.00	
Satd. Flow (perm)	730	1676		1145	1656		213	3505		309	3498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	38	76	87	38	109	87	1109	76	109	1289	109
RTOR Reduction (vph)	0	59	0	0	86	0	0	4	0	0	5	0
Lane Group Flow (vph)	109	55	0	87	61	0	87	1181	0	109	1393	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	20.9	10.2		18.9	9.2		77.7	70.0		78.5	70.4	
Effective Green, g (s)	20.9	10.2		18.9	9.2		77.7	70.0		78.5	70.4	
Actuated g/C Ratio	0.17	0.08		0.16	0.08		0.65	0.58		0.65	0.59	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	219	142		230	126		237	2044		300	2052	
v/s Ratio Prot	c0.04	0.03		0.03	0.04		0.02	0.34		c0.02	c0.40	
v/s Ratio Perm	c0.04			0.03			0.21			0.21		
v/c Ratio	0.50	0.38		0.38	0.49		0.37	0.58		0.36	0.68	
Uniform Delay, d1	43.7	51.9		44.8	53.1		12.3	15.7		10.2	17.0	
Progression Factor	1.00	1.00		1.00	1.00		2.77	1.73		1.06	1.11	
Incremental Delay, d2	1.8	1.7		1.0	2.9		0.7	0.9		0.6	1.6	
Delay (s)	45.5	53.7		45.8	56.1		34.7	28.2		11.5	20.4	
Level of Service	D	D		D	E		C	C		B	C	
Approach Delay (s)		49.7			52.3			28.6			19.8	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	1	731	164	742	24	150	4	3
Act Effct Green (s)	87.3	87.3	99.2	99.2	7.9	7.8	8.6	6.3
Actuated g/C Ratio	0.73	0.73	0.83	0.83	0.07	0.06	0.07	0.05
v/c Ratio	0.00	0.29	0.27	0.25	0.20	0.62	0.03	0.03
Control Delay	9.0	7.3	1.7	0.9	55.4	20.1	53.2	41.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.0	7.3	1.7	0.9	55.4	20.1	53.2	41.0
LOS	A	A	A	A	E	C	D	D
Approach Delay		7.3		1.0		24.9		48.0
Approach LOS		A		A		C		D
Queue Length 50th (ft)	0	78	1	2	18	1	3	1
Queue Length 95th (ft)	3	196	20	62	44	63	15	11
Internal Link Dist (ft)		695		535		259		291
Turn Bay Length (ft)								
Base Capacity (vph)	587	2559	641	2925	149	543	179	462
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.29	0.26	0.25	0.16	0.28	0.02	0.01

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 90 (75%), Referenced to phase 2:EBTL and 6:WBTL, Start of 1st Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 6.0	Intersection LOS: A
Intersection Capacity Utilization 45.6%	ICU Level of Service A
Analysis Period (min) 15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	1	647	26	151	682	1	22	1	137	4	1	2
Future Volume (vph)	1	647	26	151	682	1	22	1	137	4	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3519		1770	3539		1770	1585		1770	1676	
Flt Permitted	0.37	1.00		0.33	1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)	689	3519		613	3539		1863	1585		1863	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	703	28	164	741	1	24	1	149	4	1	2
RTOR Reduction (vph)	0	1	0	0	0	0	0	139	0	0	2	0
Lane Group Flow (vph)	1	730	0	164	742	0	24	11	0	4	1	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	84.0	84.0		92.8	92.8		7.8	7.8		4.1	4.1	
Effective Green, g (s)	84.0	84.0		92.8	92.8		7.8	7.8		4.1	4.1	
Actuated g/C Ratio	0.70	0.70		0.77	0.77		0.06	0.06		0.03	0.03	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	503	2463		581	2736		121	103		63	57	
v/s Ratio Prot	0.00	c0.21		0.03	c0.21		0.01	0.01		0.00	0.00	
v/s Ratio Perm	0.00			0.19			c0.01			c0.00		
v/c Ratio	0.00	0.30		0.28	0.27		0.20	0.10		0.06	0.02	
Uniform Delay, d1	5.4	6.8		3.9	3.9		53.2	52.8		55.2	56.0	
Progression Factor	1.00	1.00		0.18	0.17		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.3	0.2		0.8	0.4		0.4	0.1	
Delay (s)	5.4	7.1		1.0	0.9		54.0	53.3		55.6	56.1	
Level of Service	A	A		A	A		D	D		E	E	
Approach Delay (s)		7.1			0.9			53.4			55.8	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Group Flow (vph)	78	778	830	752	476	68
Act Effct Green (s)	90.4	90.4	81.5	81.5	21.6	21.6
Actuated g/C Ratio	0.75	0.75	0.68	0.68	0.18	0.18
v/c Ratio	0.16	0.29	0.35	0.57	0.77	0.22
Control Delay	4.3	5.6	4.2	2.5	55.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.3	5.6	4.2	2.5	55.5	10.9
LOS	A	A	A	A	E	B
Approach Delay		5.5	3.4		49.9	
Approach LOS		A	A		D	
Queue Length 50th (ft)	22	138	42	1	181	0
Queue Length 95th (ft)	8	27	58	0	231	41
Internal Link Dist (ft)		706	847		395	
Turn Bay Length (ft)	120			500		200
Base Capacity (vph)	487	2667	2404	1316	744	365
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.29	0.35	0.57	0.64	0.19

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 100 (83%), Referenced to phase 2:SETL and 6:NWT, Start of 1st Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 53.5%	ICU Level of Service A
Analysis Period (min) 15	

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	72	716	764	692	431	70
Future Volume (vph)	72	716	764	692	431	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3436	1441
Flt Permitted	0.29	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	538	3539	3539	1583	3436	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	778	830	752	468	76
RTOR Reduction (vph)	0	0	0	246	1	56
Lane Group Flow (vph)	78	778	830	506	475	12
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	90.4	90.4	80.7	80.7	21.6	21.6
Effective Green, g (s)	90.4	90.4	80.7	80.7	21.6	21.6
Actuated g/C Ratio	0.75	0.75	0.67	0.67	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	463	2666	2379	1064	618	259
v/s Ratio Prot	0.01	c0.22	0.23		c0.14	
v/s Ratio Perm	0.12			c0.32		0.01
v/c Ratio	0.17	0.29	0.35	0.48	0.77	0.05
Uniform Delay, d1	4.6	4.7	8.4	9.5	46.8	40.7
Progression Factor	0.82	1.07	0.43	1.28	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.3	1.3	5.7	0.1
Delay (s)	3.9	5.3	3.9	13.4	52.6	40.8
Level of Service	A	A	A	B	D	D
Approach Delay (s)		5.2	8.4		51.1	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBT	SBR
Lane Group Flow (vph)	86	1251	1396	66	86	98
Act Effct Green (s)	72.2	72.2	72.2	72.2	39.8	39.8
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.33	0.33
v/c Ratio	0.67	0.59	0.66	0.07	0.18	0.17
Control Delay	24.2	2.7	7.2	0.1	35.4	8.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	2.7	7.2	0.1	35.4	8.8
LOS	C	A	A	A	D	A
Approach Delay		4.1	6.9		21.3	
Approach LOS		A	A		C	
Queue Length 50th (ft)	3	24	102	0	47	1
Queue Length 95th (ft)	m14	m13	53	m0	112	49
Internal Link Dist (ft)		3232	291		759	
Turn Bay Length (ft)	100			138		54
Base Capacity (vph)	164	2713	2713	1229	467	589
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.46	0.51	0.05	0.18	0.17

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 96 (80%), Referenced to phase 2:EBTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 6.5	Intersection LOS: A
Intersection Capacity Utilization 54.2%	ICU Level of Service A
Analysis Period (min) 15	

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	1151	0	0	1284	61	0	0	0	79	0	90
Future Volume (vph)	79	1151	0	0	1284	61	0	0	0	79	0	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00					1.00	1.00
Frt	1.00	1.00			1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00					0.95	1.00
Satd. Flow (prot)	1770	3539			3539	1583					1770	1583
Flt Permitted	0.12	1.00			1.00	1.00					0.76	1.00
Satd. Flow (perm)	215	3539			3539	1583					1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	1251	0	0	1396	66	0	0	0	86	0	98
RTOR Reduction (vph)	0	0	0	0	0	26	0	0	0	0	0	65
Lane Group Flow (vph)	86	1251	0	0	1396	40	0	0	0	0	86	33
Turn Type	Perm	NA			NA	Perm				Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2					6	4			8		8
Actuated Green, G (s)	72.2	72.2			72.2	72.2					39.8	39.8
Effective Green, g (s)	72.2	72.2			72.2	72.2					39.8	39.8
Actuated g/C Ratio	0.60	0.60			0.60	0.60					0.33	0.33
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0					3.0	3.0
Lane Grp Cap (vph)	129	2129			2129	952					467	525
v/s Ratio Prot		0.35			0.39							
v/s Ratio Perm	c0.40					0.03					c0.06	0.02
v/c Ratio	0.67	0.59			0.66	0.04					0.18	0.06
Uniform Delay, d1	15.9	14.7			15.7	9.8					28.5	27.4
Progression Factor	0.59	0.14			0.40	0.05					1.00	1.00
Incremental Delay, d2	15.2	0.7			0.5	0.0					0.9	0.2
Delay (s)	24.5	2.8			6.8	0.5					29.4	27.6
Level of Service	C	A			A	A					C	C
Approach Delay (s)		4.2			6.5			0.0			28.4	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	191	1008	257	1250	207	161	231	239
Act Effct Green (s)	64.6	51.7	67.4	53.1	19.0	19.0	19.0	19.0
Actuated g/C Ratio	0.54	0.43	0.56	0.44	0.16	0.16	0.16	0.16
v/c Ratio	0.75	0.66	0.78	0.81	0.73	0.43	0.81	0.53
Control Delay	45.6	20.8	45.2	27.3	63.7	12.9	70.1	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.6	20.8	45.2	27.3	63.7	12.9	70.1	10.0
LOS	D	C	D	C	E	B	E	B
Approach Delay		24.8		30.4	41.5		39.5	
Approach LOS		C		C	D		D	
Queue Length 50th (ft)	56	424	112	503	154	9	171	0
Queue Length 95th (ft)	141	487	#250	#442	#258	72	#278	71
Internal Link Dist (ft)		3581		1599	968		626	
Turn Bay Length (ft)	180		190			108		250
Base Capacity (vph)	299	1519	353	1544	285	374	316	474
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.66	0.73	0.81	0.73	0.43	0.73	0.50

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 62 (52%), Referenced to phase 2:EBTL, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 30.8 Intersection LOS: C
Intersection Capacity Utilization 70.4% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	894	33	236	999	151	126	64	148	128	85	220
Future Volume (vph)	176	894	33	236	999	151	126	64	148	128	85	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	0.98			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1770	3520		1770	3470			1803	1583		1808	1583
Flt Permitted	0.08	1.00		0.15	1.00			0.97	1.00		0.97	1.00
Satd. Flow (perm)	149	3520		271	3470			1803	1583		1808	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	972	36	257	1086	164	137	70	161	139	92	239
RTOR Reduction (vph)	0	2	0	0	9	0	0	0	124	0	0	201
Lane Group Flow (vph)	191	1006	0	257	1241	0	0	207	37	0	231	38
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2			6					3			4
Actuated Green, G (s)	64.6	51.7		67.4	53.1			19.0	19.0		19.0	19.0
Effective Green, g (s)	64.6	51.7		67.4	53.1			19.0	19.0		19.0	19.0
Actuated g/C Ratio	0.54	0.43		0.56	0.44			0.16	0.16		0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	254	1516		330	1535			285	250		286	250
v/s Ratio Prot	0.08	0.29		c0.09	c0.36			c0.11			c0.13	
v/s Ratio Perm	0.32			0.34					0.02			0.02
v/c Ratio	0.75	0.66		0.78	0.81			0.73	0.15		0.81	0.15
Uniform Delay, d1	28.3	27.2		18.9	29.0			48.0	43.5		48.7	43.5
Progression Factor	1.10	0.66		1.79	0.78			1.00	1.00		1.00	1.00
Incremental Delay, d2	10.9	2.1		8.5	2.5			14.9	1.3		15.3	0.3
Delay (s)	41.9	20.1		42.4	25.1			63.0	44.8		64.0	43.8
Level of Service	D	C		D	C			E	D		E	D
Approach Delay (s)		23.6			28.0			55.0			53.8	
Approach LOS		C			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	32.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Group Flow (vph)	928	420	290	563	229	451
Act Effct Green (s)	62.0	62.0	48.0	48.0	21.7	21.7
Actuated g/C Ratio	0.52	0.52	0.40	0.40	0.18	0.18
v/c Ratio	0.53	0.44	0.74	0.56	0.68	0.69
Control Delay	12.7	2.6	36.8	27.4	55.4	9.5
Queue Delay	0.3	0.2	0.0	0.0	0.0	0.4
Total Delay	13.0	2.8	36.8	27.4	55.4	9.8
LOS	B	A	D	C	E	A
Approach Delay	9.8			30.6	25.2	
Approach LOS	A			C	C	
Queue Length 50th (ft)	159	15	174	168	167	0
Queue Length 95th (ft)	m301	m36	223	186	233	87
Internal Link Dist (ft)	439			647	500	
Turn Bay Length (ft)	210		425			
Base Capacity (vph)	1761	947	418	1226	512	762
Starvation Cap Reductn	289	91	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	63
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.49	0.69	0.46	0.45	0.65

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 68 (57%), Referenced to phase 2:SEL and 6:, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 19.6	Intersection LOS: B
Intersection Capacity Utilization 64.8%	ICU Level of Service C
Analysis Period (min) 15	

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

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	732	508	534	251	211	415
Future Volume (vph)	732	508	534	251	211	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.91	0.91	1.00	1.00
Frt	0.98	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.95	0.97	1.00	1.00
Satd. Flow (prot)	3391	1441	1610	3305	1863	1583
Flt Permitted	0.96	1.00	0.29	0.56	1.00	1.00
Satd. Flow (perm)	3391	1441	484	1889	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	796	552	580	273	229	451
RTOR Reduction (vph)	9	203	0	0	0	369
Lane Group Flow (vph)	919	217	290	563	229	82
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	2		3	8	4	
Permitted Phases		2	8			4
Actuated Green, G (s)	62.0	62.0	48.0	48.0	21.7	21.7
Effective Green, g (s)	62.0	62.0	48.0	48.0	21.7	21.7
Actuated g/C Ratio	0.52	0.52	0.40	0.40	0.18	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1752	744	393	1006	336	286
v/s Ratio Prot	c0.27		c0.13	0.10	0.12	
v/s Ratio Perm		0.15	c0.16	0.12		0.05
v/c Ratio	0.52	0.29	0.74	0.56	0.68	0.29
Uniform Delay, d1	19.2	16.5	27.5	27.8	45.9	42.5
Progression Factor	0.57	0.68	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.8	7.1	0.7	5.6	0.6
Delay (s)	11.9	12.1	34.6	28.5	51.5	43.0
Level of Service	B	B	C	C	D	D
Approach Delay (s)	11.9			30.6	45.9	
Approach LOS	B			C	D	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	SET	NWL	NWT
Lane Group Flow (vph)	560	1432	207	1243
Act Effct Green (s)	23.0	71.2	89.0	89.0
Actuated g/C Ratio	0.19	0.59	0.74	0.74
v/c Ratio	0.82	0.69	0.65	0.47
Control Delay	51.7	26.5	37.1	6.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	51.7	26.5	37.1	6.2
LOS	D	C	D	A
Approach Delay	51.7	26.5		10.6
Approach LOS	D	C		B
Queue Length 50th (ft)	194	581	92	118
Queue Length 95th (ft)	220	653	173	148
Internal Link Dist (ft)	904	2931		1755
Turn Bay Length (ft)			175	
Base Capacity (vph)	794	2065	400	2624
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.71	0.69	0.52	0.47

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 23 (19%), Referenced to phase 2:SET and 6:NWTL, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 23.9	Intersection LOS: C
Intersection Capacity Utilization 71.3%	ICU Level of Service C
Analysis Period (min) 15	

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	318	148	1165	160	186	1168
Future Volume (vph)	318	148	1165	160	186	1168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.95		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	3332		3468		1770	3539
Flt Permitted	0.97		1.00		0.10	1.00
Satd. Flow (perm)	3332		3468		184	3539
Peak-hour factor, PHF	0.82	0.86	0.94	0.83	0.90	0.94
Adj. Flow (vph)	388	172	1239	193	207	1243
RTOR Reduction (vph)	46	0	9	0	0	0
Lane Group Flow (vph)	514	0	1423	0	207	1243
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Actuated Green, G (s)	23.0		71.2		89.0	89.0
Effective Green, g (s)	23.0		71.2		89.0	89.0
Actuated g/C Ratio	0.19		0.59		0.74	0.74
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	638		2057		318	2624
v/s Ratio Prot	c0.15		c0.41		c0.07	0.35
v/s Ratio Perm					0.41	
v/c Ratio	0.81		0.69		0.65	0.47
Uniform Delay, d1	46.4		16.8		19.4	6.2
Progression Factor	1.00		1.34		2.13	0.86
Incremental Delay, d2	7.3		1.7		3.7	0.5
Delay (s)	53.7		24.2		45.0	5.8
Level of Service	D		C		D	A
Approach Delay (s)	53.7		24.2			11.4
Approach LOS	D		C			B

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	SWL	SWT	SWR
Lane Group Flow (vph)	646	759	416	1589	192	199	124
Act Effct Green (s)	28.0	120.0	79.0	83.0	29.0	29.0	29.0
Actuated g/C Ratio	0.23	1.00	0.66	0.69	0.24	0.24	0.24
v/c Ratio	0.78	0.48	0.51	0.65	0.47	0.47	0.26
Control Delay	55.2	1.6	12.9	0.4	43.5	43.3	8.8
Queue Delay	0.0	0.0	0.0	0.7	0.0	0.0	0.0
Total Delay	55.2	1.6	12.9	1.0	43.5	43.3	8.8
LOS	E	A	B	A	D	D	A
Approach Delay	26.2			3.5		35.1	
Approach LOS	C			A		D	
Queue Length 50th (ft)	183	12	78	0	134	138	4
Queue Length 95th (ft)	287	19	m81	m0	208	204	35
Internal Link Dist (ft)	1755			1		1077	
Turn Bay Length (ft)		200	100				100
Base Capacity (vph)	825	1583	819	2447	400	417	467
Starvation Cap Reductn	0	0	0	456	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.48	0.51	0.80	0.48	0.48	0.27

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 55 (46%), Referenced to phase 2:NWSE, Start of Green	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 15.8	Intersection LOS: B
Intersection Capacity Utilization 81.3%	ICU Level of Service D
Analysis Period (min) 15	

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

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	601	706	366	1446	0	0	0	0	203	136	97
Future Volume (vph)	0	601	706	366	1446	0	0	0	0	203	136	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.99	1.00
Satd. Flow (prot)		3539	1583	1770	3539					1681	1752	1583
Flt Permitted		1.00	1.00	0.15	1.00					0.95	0.99	1.00
Satd. Flow (perm)		3539	1583	286	3539					1681	1752	1583
Peak-hour factor, PHF	0.92	0.93	0.93	0.88	0.91	0.92	0.92	0.92	0.92	0.88	0.85	0.78
Adj. Flow (vph)	0	646	759	416	1589	0	0	0	0	231	160	124
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	89
Lane Group Flow (vph)	0	646	759	416	1589	0	0	0	0	192	199	35
Turn Type		NA	Free	pm+pt	NA					Split	NA	Perm
Protected Phases		1 2		6 7	1 2 6 7					3 5	3 5	
Permitted Phases			Free	1 2 6 7								3 5
Actuated Green, G (s)		28.0	120.0	79.0	83.0					29.0	29.0	29.0
Effective Green, g (s)		28.0	120.0	79.0	83.0					29.0	29.0	29.0
Actuated g/C Ratio		0.23	1.00	0.66	0.69					0.24	0.24	0.24
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)		825	1583	818	2447					406	423	382
v/s Ratio Prot		c0.18		0.22	c0.45					0.11	0.11	
v/s Ratio Perm			c0.48	0.12								0.02
v/c Ratio		0.78	0.48	0.51	0.65					0.47	0.47	0.09
Uniform Delay, d1		43.2	0.0	15.6	10.4					39.0	38.9	35.3
Progression Factor		1.15	1.00	0.81	0.00					1.00	1.00	1.00
Incremental Delay, d2		5.3	0.7	0.1	0.2					0.9	0.8	0.1
Delay (s)		54.7	0.7	12.7	0.2					39.8	39.8	35.4
Level of Service		D	A	B	A					D	D	D
Approach Delay (s)		25.6			2.8			0.0			38.7	
Approach LOS		C			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	NEL	NET	NER
Lane Group Flow (vph)	169	714	965	84	1123	80	640
Act Effct Green (s)	68.0	72.0	33.4	33.4	40.0	40.0	40.0
Actuated g/C Ratio	0.57	0.60	0.28	0.28	0.33	0.33	0.33
v/c Ratio	0.30	0.34	0.98	0.16	0.98	0.13	0.94
Control Delay	2.7	0.4	86.1	18.2	62.5	28.6	47.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.7	0.4	86.1	18.2	62.5	28.6	47.9
LOS	A	A	F	B	E	C	D
Approach Delay		0.8	80.7			55.9	
Approach LOS		A	F			E	
Queue Length 50th (ft)	10	1	412	14	442	43	337
Queue Length 95th (ft)	13	1	#476	m46	#590	67	#471
Internal Link Dist (ft)		465	439			826	
Turn Bay Length (ft)	100			100			100
Base Capacity (vph)	578	2111	985	525	1144	621	681
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.34	0.98	0.16	0.98	0.13	0.94

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 55 (46%), Referenced to phase 2:NWSE, Start of Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 49.9 Intersection LOS: D
Intersection Capacity Utilization 81.3% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	118	650	0	0	801	73	1011	60	525	0	0	0
Future Volume (vph)	118	650	0	0	801	73	1011	60	525	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.97	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			3539	1583	3433	1863	1583			
Flt Permitted	0.12	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	223	3539			3539	1583	3433	1863	1583			
Peak-hour factor, PHF	0.70	0.91	0.92	0.92	0.83	0.87	0.90	0.75	0.82	0.92	0.92	0.92
Adj. Flow (vph)	169	714	0	0	965	84	1123	80	640	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	61	0	0	154	0	0	0
Lane Group Flow (vph)	169	714	0	0	965	23	1123	80	486	0	0	0
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	2 3	2 3 5 6			5 6		1 7	1 7				
Permitted Phases	2 3 5 6					5 6			1 7			
Actuated Green, G (s)	68.0	72.0			33.4	33.4	40.0	40.0	40.0			
Effective Green, g (s)	68.0	72.0			33.4	33.4	40.0	40.0	40.0			
Actuated g/C Ratio	0.57	0.60			0.28	0.28	0.33	0.33	0.33			
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)	572	2123			985	440	1144	621	527			
v/s Ratio Prot	0.09	c0.20			c0.27		c0.33	0.04				
v/s Ratio Perm	0.08					0.01			0.31			
v/c Ratio	0.30	0.34			0.98	0.05	0.98	0.13	0.92			
Uniform Delay, d1	16.4	12.0			43.0	31.7	39.6	27.9	38.5			
Progression Factor	0.14	0.01			1.53	7.67	1.00	1.00	1.00			
Incremental Delay, d2	0.2	0.1			21.0	0.0	22.1	0.1	21.8			
Delay (s)	2.5	0.1			86.8	243.4	61.8	28.0	60.3			
Level of Service	A	A			F	F	E	C	E			
Approach Delay (s)		0.6			99.4			59.8			0.0	
Approach LOS		A			F			E			A	

Intersection Summary			
HCM 2000 Control Delay	56.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Appendix C – Flashing Yellow Arrow Model Outputs

Network Totals

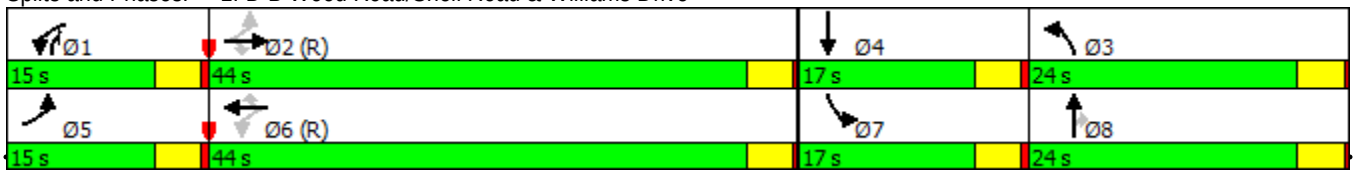
Number of Intersections	25
Total Delay (hr)	150
Stops (#)	15023
Average Speed (mph)	30
Total Travel Time (hr)	480
Distance Traveled (mi)	14558
Fuel Consumed (gal)	778
Fuel Economy (mpg)	18.7
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	1004
Performance Index	191.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	85	898	277	153	609	307	195	102	59	364	261
Future Volume (vph)	85	898	277	153	609	307	195	102	59	364	261
Lane Group Flow (vph)	92	976	301	166	662	334	212	111	64	396	293
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2		1	6		3	8	1	7	4
Permitted Phases	2		2	6		6			8		
Detector Phase	5	2	2	1	6	6	3	8	1	7	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	15.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0
Total Split (s)	15.0	44.0	44.0	15.0	44.0	44.0	24.0	24.0	15.0	17.0	17.0
Total Split (%)	15.0%	44.0%	44.0%	15.0%	44.0%	44.0%	24.0%	24.0%	15.0%	17.0%	17.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None
v/c Ratio	0.19	0.55	0.32	0.46	0.34	0.33	0.53	0.29	0.15	0.89	0.68
Control Delay	8.3	12.6	3.1	10.4	6.0	1.6	46.1	41.8	9.7	66.3	50.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.3	12.6	3.1	10.4	6.0	1.6	46.1	41.8	9.7	66.3	50.1
Queue Length 50th (ft)	9	58	0	14	39	0	67	34	4	129	93
Queue Length 95th (ft)	m33	170	m64	50	121	0	100	59	33	#212	138
Internal Link Dist (ft)		305			466			485			323
Turn Bay Length (ft)	150		250	150		193	270		200	180	
Base Capacity (vph)	541	1787	948	389	1930	1015	686	707	458	446	460
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.55	0.32	0.43	0.34	0.33	0.31	0.16	0.14	0.89	0.64

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 18 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: D B Wood Road/Shell Road & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	898	277	153	609	307	195	102	59	364	261	8
Future Volume (vph)	85	898	277	153	609	307	195	102	59	364	261	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	3433	3523	
Flt Permitted	0.37	1.00	1.00	0.19	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	688	3539	1583	354	3539	1583	3433	3539	1583	3433	3523	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	976	301	166	662	334	212	111	64	396	284	9
RTOR Reduction (vph)	0	0	149	0	0	155	0	0	44	0	3	0
Lane Group Flow (vph)	92	976	152	166	662	179	212	111	20	396	290	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	56.9	50.5	50.5	63.3	53.7	53.7	11.7	10.9	20.5	13.0	12.2	
Effective Green, g (s)	56.9	50.5	50.5	63.3	53.7	53.7	11.7	10.9	20.5	13.0	12.2	
Actuated g/C Ratio	0.57	0.50	0.50	0.63	0.54	0.54	0.12	0.11	0.20	0.13	0.12	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	460	1787	799	360	1900	850	401	385	387	446	429	
v/s Ratio Prot	0.01	c0.28		c0.04	0.19		c0.06	0.03	0.01	c0.12	0.08	
v/s Ratio Perm	0.10		0.10	0.25		0.11			0.01			
v/c Ratio	0.20	0.55	0.19	0.46	0.35	0.21	0.53	0.29	0.05	0.89	0.68	
Uniform Delay, d1	9.9	16.9	13.6	10.0	13.2	12.1	41.6	41.0	31.9	42.8	42.0	
Progression Factor	0.98	0.64	1.14	0.82	0.39	0.43	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.9	0.4	0.9	0.5	0.5	1.3	0.4	0.1	18.8	4.2	
Delay (s)	9.8	11.7	15.8	9.1	5.6	5.7	42.8	41.4	32.0	61.6	46.2	
Level of Service	A	B	B	A	A	A	D	D	C	E	D	
Approach Delay (s)		12.5			6.1			40.6			55.1	
Approach LOS		B			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWT
Lane Configurations							
Traffic Volume (vph)	35	1402	37	766	22	4	6
Future Volume (vph)	35	1402	37	766	22	4	6
Lane Group Flow (vph)	61	1508	64	833	30	82	112
Turn Type	pm+pt	NA	pm+pt	NA	Split	NA	NA
Protected Phases	5	2	1	6	4	4	3
Permitted Phases	2		6				
Detector Phase	5	2	1	6	4	4	3
Switch Phase							
Minimum Initial (s)	7.0	30.0	7.0	30.0	7.0	7.0	7.0
Minimum Split (s)	14.0	37.0	14.0	37.0	14.0	14.0	14.0
Total Split (s)	15.0	55.0	15.0	55.0	15.0	15.0	15.0
Total Split (%)	15.0%	55.0%	15.0%	55.0%	15.0%	15.0%	15.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Min	None	C-Min	None	None	None
v/c Ratio	0.13	0.71	0.24	0.39	0.18	0.37	0.46
Control Delay	2.7	15.8	13.9	5.7	43.8	18.2	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	2.7	15.8	13.9	5.7	43.8	18.2	19.7
Queue Length 50th (ft)	2	462	5	103	18	7	13
Queue Length 95th (ft)	5	577	11	114	36	0	3
Internal Link Dist (ft)		2052		391		287	1154
Turn Bay Length (ft)	300		300				
Base Capacity (vph)	495	2110	283	2116	194	241	262
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.71	0.23	0.39	0.15	0.34	0.43

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 8 (8%), Referenced to phase 2:SETL and 6:NWTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 2: Wildwood Dr & Williams Drive

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	35	1402	23	37	766	0	22	4	56	2	6	66
Future Volume (vph)	35	1402	23	37	766	0	22	4	56	2	6	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87			0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1770	3528		1770	3539		1770	1621			1655	
Flt Permitted	0.28	1.00		0.08	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	522	3528		154	3539		1770	1621			1655	
Peak-hour factor, PHF	0.57	0.95	0.73	0.58	0.92	0.50	0.73	0.38	0.79	0.25	0.44	0.73
Adj. Flow (vph)	61	1476	32	64	833	0	30	11	71	8	14	90
RTOR Reduction (vph)	0	1	0	0	0	0	0	65	0	0	81	0
Lane Group Flow (vph)	61	1507	0	64	833	0	30	17	0	0	31	0
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases	2			6								
Actuated Green, G (s)	60.0	54.2		60.0	54.2		6.2	6.2			7.8	
Effective Green, g (s)	66.0	57.2		66.0	57.2		8.2	8.2			9.8	
Actuated g/C Ratio	0.66	0.57		0.66	0.57		0.08	0.08			0.10	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	454	2018		243	2024		145	132			162	
v/s Ratio Prot	0.01	c0.43		c0.02	0.24		c0.02	0.01			c0.02	
v/s Ratio Perm	0.08			0.15								
v/c Ratio	0.13	0.75		0.26	0.41		0.21	0.13			0.19	
Uniform Delay, d1	6.5	16.0		11.5	12.0		42.9	42.6			41.5	
Progression Factor	0.40	0.83		2.06	0.41		1.00	1.00			1.00	
Incremental Delay, d2	0.1	2.0		0.6	0.6		0.7	0.4			0.6	
Delay (s)	2.7	15.3		24.3	5.5		43.6	43.0			42.0	
Level of Service	A	B		C	A		D	D			D	
Approach Delay (s)		14.8			6.8			43.2			42.0	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1277	173	60	794	81	183
Future Volume (vph)	1277	173	60	794	81	183
Lane Group Flow (vph)	1388	339	98	913	156	366
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	15.0	15.0	7.0	15.0	7.0	7.0
Minimum Split (s)	24.0	24.0	13.0	24.0	12.5	12.5
Total Split (s)	53.0	53.0	13.0	66.0	34.0	34.0
Total Split (%)	53.0%	53.0%	13.0%	66.0%	34.0%	34.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-1.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?						
Recall Mode	C-Min	C-Min	None	C-Min	None	None
v/c Ratio	0.66	0.31	0.34	0.37	0.43	0.80
Control Delay	10.1	1.0	9.1	4.5	36.1	33.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	1.0	9.1	4.5	36.1	33.4
Queue Length 50th (ft)	262	9	15	110	86	126
Queue Length 95th (ft)	227	0	25	118	70	56
Internal Link Dist (ft)	1127			2052	664	
Turn Bay Length (ft)		300	300			
Base Capacity (vph)	2117	1081	286	2490	525	583
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.31	0.34	0.37	0.30	0.63

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 66 (66%), Referenced to phase 2:SET and 6:NWTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 3: Woodlake Dr & Williams Drive

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1277	173	60	794	81	183
Future Volume (vph)	1277	173	60	794	81	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3505	1568	1752	3505	1752	1568
Flt Permitted	1.00	1.00	0.11	1.00	0.95	1.00
Satd. Flow (perm)	3505	1568	200	3505	1752	1568
Peak-hour factor, PHF	0.92	0.51	0.61	0.87	0.52	0.50
Adj. Flow (vph)	1388	339	98	913	156	366
RTOR Reduction (vph)	0	138	0	0	0	128
Lane Group Flow (vph)	1388	201	98	913	156	238
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	57.2	57.2	69.1	69.1	19.4	19.4
Effective Green, g (s)	59.2	59.2	71.1	71.1	20.9	20.9
Actuated g/C Ratio	0.59	0.59	0.71	0.71	0.21	0.21
Clearance Time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2074	928	264	2492	366	327
v/s Ratio Prot	c0.40		0.03	c0.26	0.09	
v/s Ratio Perm		0.13	0.23			c0.15
v/c Ratio	0.67	0.22	0.37	0.37	0.43	0.73
Uniform Delay, d1	13.8	9.5	9.8	5.6	34.3	36.9
Progression Factor	0.55	0.17	1.03	0.62	1.00	1.00
Incremental Delay, d2	1.6	0.5	0.8	0.4	0.8	7.8
Delay (s)	9.2	2.1	10.9	3.9	35.1	44.7
Level of Service	A	A	B	A	D	D
Approach Delay (s)	7.8			4.6	41.9	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Configurations								
Traffic Volume (vph)	70	20	100	20	100	1275	70	854
Future Volume (vph)	70	20	100	20	100	1275	70	854
Lane Group Flow (vph)	76	76	109	109	109	1440	76	1015
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	1	6	5	2
Permitted Phases	4		8		6		2	
Detector Phase	4	4	8	8	1	6	5	2
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	10.0	7.0	10.0
Minimum Split (s)	20.0	20.0	20.0	20.0	12.5	27.5	12.5	27.5
Total Split (s)	20.0	20.0	20.0	20.0	15.0	65.0	15.0	65.0
Total Split (%)	20.0%	20.0%	20.0%	20.0%	15.0%	65.0%	15.0%	65.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag					Lead	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max
v/c Ratio	0.49	0.30	0.68	0.39	0.30	0.63	0.24	0.46
Control Delay	51.4	19.2	62.2	16.8	4.8	12.4	19.1	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	19.2	62.2	16.8	4.8	12.4	19.1	15.7
Queue Length 50th (ft)	45	12	66	13	12	491	24	173
Queue Length 95th (ft)	91	54	123	61	m7	565	51	229
Internal Link Dist (ft)		1195		1212		1599		2931
Turn Bay Length (ft)					175		175	
Base Capacity (vph)	183	287	191	312	377	2280	328	2211
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.26	0.57	0.35	0.29	0.63	0.23	0.46

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 12 (12%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Williams Drive & River Bend

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	70	20	50	100	20	80	100	1275	50	70	854	80
Future Volume (vph)	70	20	50	100	20	80	100	1275	50	70	854	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1664		1770	1640		1770	3519		1770	3494	
Flt Permitted	0.68	1.00		0.71	1.00		0.20	1.00		0.16	1.00	
Satd. Flow (perm)	1262	1664		1318	1640		379	3519		298	3494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	22	54	109	22	87	109	1386	54	76	928	87
RTOR Reduction (vph)	0	47	0	0	76	0	0	3	0	0	6	0
Lane Group Flow (vph)	76	29	0	109	33	0	109	1437	0	76	1009	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	12.2	12.2		12.2	12.2		63.7	63.7		63.2	63.2	
Effective Green, g (s)	12.2	12.2		12.2	12.2		63.7	63.7		63.2	63.2	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.64	0.64		0.63	0.63	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	153	203		160	200		354	2241		300	2208	
v/s Ratio Prot		0.02			0.02		0.02	c0.41		0.02	c0.29	
v/s Ratio Perm	0.06			c0.08			0.17			0.14		
v/c Ratio	0.50	0.14		0.68	0.16		0.31	0.64		0.25	0.46	
Uniform Delay, d1	41.0	39.2		42.0	39.3		8.5	11.1		12.5	9.5	
Progression Factor	1.00	1.00		1.00	1.00		0.43	0.97		1.43	1.50	
Incremental Delay, d2	2.5	0.3		11.3	0.4		0.3	0.8		0.4	0.6	
Delay (s)	43.6	39.5		53.4	39.7		4.0	11.6		18.2	14.9	
Level of Service	D	D		D	D		A	B		B	B	
Approach Delay (s)		41.5			46.5			11.0			15.2	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		

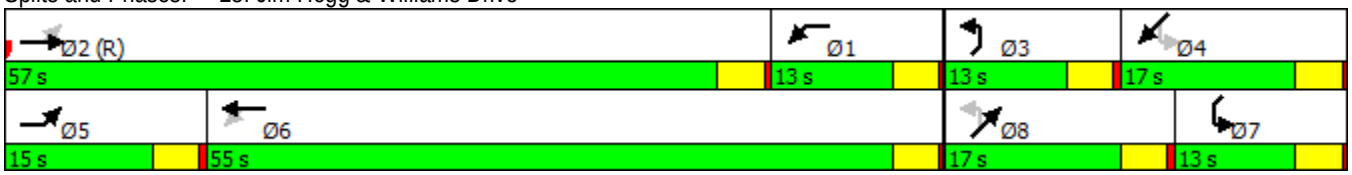
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	2	792	148	606	49	1	13	4
Future Volume (vph)	2	792	148	606	49	1	13	4
Lane Group Flow (vph)	2	883	161	668	53	505	14	6
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	8.0	10.0	8.0	10.0
Total Split (s)	15.0	57.0	13.0	55.0	13.0	17.0	13.0	17.0
Total Split (%)	15.0%	57.0%	13.0%	55.0%	13.0%	17.0%	13.0%	17.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	Min	None	None	None	None
v/c Ratio	0.00	0.43	0.39	0.28	0.17	0.81	0.08	0.02
Control Delay	13.5	13.8	8.6	3.5	30.5	20.7	35.7	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	13.8	8.6	3.5	30.5	20.7	35.7	29.0
Queue Length 50th (ft)	1	142	17	41	27	82	9	2
Queue Length 95th (ft)	5	282	30	28	55	198	21	11
Internal Link Dist (ft)		695		535		259		291
Turn Bay Length (ft)								
Base Capacity (vph)	480	2145	470	2406	321	625	233	307
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.41	0.34	0.28	0.17	0.81	0.06	0.02

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 57 (57%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 28: Jim Hogg & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	2	792	20	148	606	8	49	1	464	13	4	2
Future Volume (vph)	2	792	20	148	606	8	49	1	464	13	4	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.85		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3526		1770	3532		1770	1584		1770	1770	
Flt Permitted	0.32	1.00		0.28	1.00		0.48	1.00		0.37	1.00	
Satd. Flow (perm)	600	3526		513	3532		889	1584		684	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	861	22	161	659	9	53	1	504	14	4	2
RTOR Reduction (vph)	0	2	0	0	1	0	0	286	0	0	2	0
Lane Group Flow (vph)	2	881	0	161	667	0	53	219	0	14	4	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	52.3	52.3		60.1	60.1		21.5	21.5		12.1	12.1	
Effective Green, g (s)	52.3	52.3		60.1	60.1		21.5	21.5		12.1	12.1	
Actuated g/C Ratio	0.52	0.52		0.60	0.60		0.22	0.22		0.12	0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	327	1844		421	2122		284	340		95	214	
v/s Ratio Prot	0.00	c0.25		c0.03	0.19		0.02	c0.14		c0.00	0.00	
v/s Ratio Perm	0.00			0.20			0.02			0.02		
v/c Ratio	0.01	0.48		0.38	0.31		0.19	0.64		0.15	0.02	
Uniform Delay, d1	11.9	15.2		15.3	9.8		31.8	35.8		45.3	38.7	
Progression Factor	1.00	1.00		0.42	0.34		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.9		0.5	0.1		0.3	4.2		0.7	0.0	
Delay (s)	11.9	16.1		7.0	3.4		32.2	39.9		46.0	38.8	
Level of Service	B	B		A	A		C	D		D	D	
Approach Delay (s)		16.0			4.1			39.2			43.8	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	50	1219	709	166	231	53
Future Volume (vph)	50	1219	709	166	231	53
Lane Group Flow (vph)	54	1325	771	180	257	52
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	15.0	71.0	56.0	56.0	29.0	29.0
Total Split (%)	15.0%	71.0%	56.0%	56.0%	29.0%	29.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Max	C-Max	C-Max	None	None
v/c Ratio	0.08	0.47	0.42	0.20	0.59	0.23
Control Delay	3.7	6.3	8.7	1.2	46.1	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	6.3	8.7	1.2	46.1	13.2
Queue Length 50th (ft)	8	168	56	1	80	0
Queue Length 95th (ft)	m7	62	70	5	115	36
Internal Link Dist (ft)		706	847		395	
Turn Bay Length (ft)	120			500		200
Base Capacity (vph)	693	2805	1840	909	859	399
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.47	0.42	0.20	0.30	0.13

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 23 (23%), Referenced to phase 6:NWT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 37: Williams Drive & Del Webb

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	50	1219	709	166	231	53
Future Volume (vph)	50	1219	709	166	231	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1441
Flt Permitted	0.27	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	503	3539	3539	1583	3433	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1325	771	180	251	58
RTOR Reduction (vph)	0	0	0	86	2	45
Lane Group Flow (vph)	54	1325	771	94	255	7
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	79.3	79.3	52.0	52.0	12.7	12.7
Effective Green, g (s)	79.3	79.3	52.0	52.0	12.7	12.7
Actuated g/C Ratio	0.79	0.79	0.52	0.52	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	694	2806	1840	823	435	183
v/s Ratio Prot	0.02	c0.37	0.22		c0.07	
v/s Ratio Perm	0.04			0.06		0.00
v/c Ratio	0.08	0.47	0.42	0.11	0.59	0.04
Uniform Delay, d1	3.3	3.4	14.7	12.2	41.2	38.3
Progression Factor	1.33	1.54	0.54	0.36	1.00	1.00
Incremental Delay, d2	0.2	0.5	0.7	0.3	2.0	0.1
Delay (s)	4.5	5.8	8.6	4.7	43.2	38.4
Level of Service	A	A	A	A	D	D
Approach Delay (s)		5.7	7.9		42.4	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBT	SBR	Ø8
Lane Configurations								
Traffic Volume (vph)	130	1304	931	53	119	0	138	
Future Volume (vph)	130	1304	931	53	119	0	138	
Lane Group Flow (vph)	141	1417	1012	58	0	129	150	
Turn Type	Perm	NA	NA	Perm	Perm	NA	Perm	
Protected Phases		2	6			4		8
Permitted Phases	2			6	4		4	
Detector Phase	2	2	6	6	4	4	4	
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	5.0
Total Split (s)	75.0	75.0	75.0	75.0	25.0	25.0	25.0	25.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%	25.0%	25%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min
v/c Ratio	0.42	0.56	0.40	0.05		0.44	0.33	
Control Delay	4.6	3.0	2.3	0.3		39.7	7.8	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	4.6	3.0	2.3	0.3		39.7	7.8	
Queue Length 50th (ft)	13	72	26	0		72	0	
Queue Length 95th (ft)	m4	m17	68	m1		130	51	
Internal Link Dist (ft)		3232	291			759		
Turn Bay Length (ft)	100			138			54	
Base Capacity (vph)	332	2512	2512	1140		296	450	
Starvation Cap Reductn	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0		0	0	
Reduced v/c Ratio	0.42	0.56	0.40	0.05		0.44	0.33	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 99 (99%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 41: Williams Drive & Serenada Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1304	0	0	931	53	0	0	0	119	0	138
Future Volume (vph)	130	1304	0	0	931	53	0	0	0	119	0	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00					1.00	1.00
Frt	1.00	1.00			1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00					0.95	1.00
Satd. Flow (prot)	1770	3539			3539	1583					1770	1583
Flt Permitted	0.25	1.00			1.00	1.00					0.76	1.00
Satd. Flow (perm)	467	3539			3539	1583					1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1417	0	0	1012	58	0	0	0	129	0	150
RTOR Reduction (vph)	0	0	0	0	0	17	0	0	0	0	0	119
Lane Group Flow (vph)	141	1417	0	0	1012	41	0	0	0	0	129	32
Turn Type	Perm	NA			NA	Perm				Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		4
Actuated Green, G (s)	71.0	71.0			71.0	71.0					21.0	21.0
Effective Green, g (s)	71.0	71.0			71.0	71.0					21.0	21.0
Actuated g/C Ratio	0.71	0.71			0.71	0.71					0.21	0.21
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0					3.0	3.0
Lane Grp Cap (vph)	331	2512			2512	1123					296	332
v/s Ratio Prot		c0.40			0.29							
v/s Ratio Perm	0.30					0.03					c0.09	0.02
v/c Ratio	0.43	0.56			0.40	0.04					0.44	0.09
Uniform Delay, d1	6.0	7.0			5.9	4.3					34.3	31.8
Progression Factor	0.20	0.31			0.33	0.21					1.00	1.00
Incremental Delay, d2	3.3	0.8			0.3	0.0					4.6	0.6
Delay (s)	4.5	2.9			2.3	1.0					39.0	32.4
Level of Service	A	A			A	A					D	C
Approach Delay (s)		3.0			2.2			0.0			35.4	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

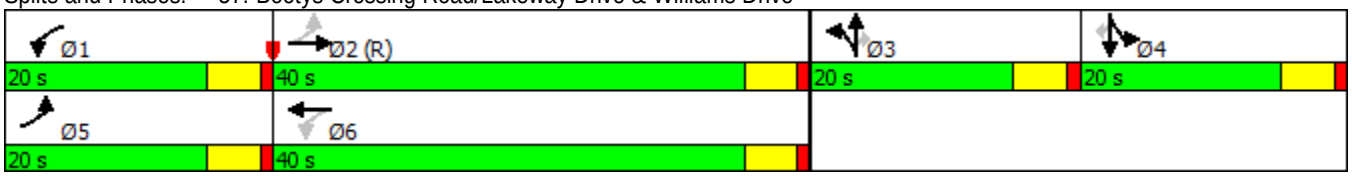
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	191	1202	157	695	37	119	40	186
Future Volume (vph)	191	1202	157	695	37	119	40	186
Lane Group Flow (vph)	208	1340	171	920	152	129	154	202
Turn Type	pm+pt	NA	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	1	6	3		4	
Permitted Phases	2		6			3		4
Detector Phase	5	2	1	6	3	3	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Total Split (s)	20.0	40.0	20.0	40.0	20.0	20.0	20.0	20.0
Total Split (%)	20.0%	40.0%	20.0%	40.0%	20.0%	20.0%	20.0%	20.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?								
Recall Mode	Max	C-Max	None	None	None	None	None	None
v/c Ratio	0.48	0.87	0.65	0.75	0.66	0.41	0.67	0.53
Control Delay	23.6	31.4	27.0	25.7	55.6	10.9	55.8	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.6	31.4	27.0	25.7	55.6	10.9	55.8	11.2
Queue Length 50th (ft)	54	228	60	178	93	0	94	0
Queue Length 95th (ft)	124	#609	125	312	157	50	158	62
Internal Link Dist (ft)		3581		1599	968		626	
Turn Bay Length (ft)	180		190			108		250
Base Capacity (vph)	433	1539	339	1224	269	348	269	409
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.87	0.50	0.75	0.57	0.37	0.57	0.49

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 68 (68%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 57: Bootys Crossing Road/Lakeway Drive & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	1202	30	157	695	152	103	37	119	102	40	186
Future Volume (vph)	191	1202	30	157	695	152	103	37	119	102	40	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.97			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	3526		1770	3444			1797	1583		1798	1583
Flt Permitted	0.12	1.00		0.11	1.00			0.96	1.00		0.97	1.00
Satd. Flow (perm)	232	3526		213	3444			1797	1583		1798	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	1307	33	171	755	165	112	40	129	111	43	202
RTOR Reduction (vph)	0	2	0	0	19	0	0	0	112	0	0	176
Lane Group Flow (vph)	208	1338	0	171	901	0	0	152	17	0	154	26
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2			6					3			4
Actuated Green, G (s)	59.4	43.6		45.8	35.0			12.8	12.8		12.8	12.8
Effective Green, g (s)	59.4	43.6		45.8	35.0			12.8	12.8		12.8	12.8
Actuated g/C Ratio	0.59	0.44		0.46	0.35			0.13	0.13		0.13	0.13
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	436	1537		265	1205			230	202		230	202
v/s Ratio Prot	0.09	c0.38		c0.07	0.26			c0.08			c0.09	
v/s Ratio Perm	0.19			0.23					0.01			0.02
v/c Ratio	0.48	0.87		0.65	0.75			0.66	0.08		0.67	0.13
Uniform Delay, d1	13.8	25.6		19.9	28.6			41.5	38.4		41.6	38.7
Progression Factor	1.34	0.88		0.95	0.78			1.00	1.00		1.00	1.00
Incremental Delay, d2	3.1	6.0		4.8	2.4			6.9	0.2		7.2	0.3
Delay (s)	21.7	28.6		23.8	24.6			48.5	38.6		48.8	38.9
Level of Service	C	C		C	C			D	D		D	D
Approach Delay (s)		27.7			24.4			43.9			43.2	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

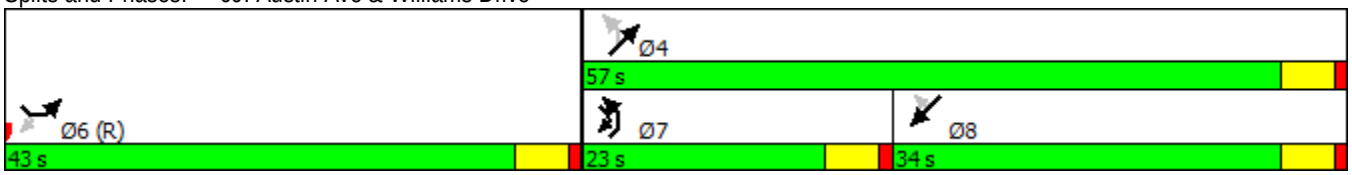
c Critical Lane Group

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	512	652	256	84	199	415
Future Volume (vph)	512	652	256	84	199	415
Lane Group Flow (vph)	862	404	139	230	216	451
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	6	7	7	4	8	
Permitted Phases		6	4			8
Detector Phase	6	7	7	4	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	9.0	9.0	21.0	21.0	21.0
Total Split (s)	43.0	23.0	23.0	57.0	34.0	34.0
Total Split (%)	43.0%	23.0%	23.0%	57.0%	34.0%	34.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Recall Mode	C-Max	None	None	None	None	None
v/c Ratio	0.47	0.35	0.40	0.26	0.62	0.68
Control Delay	8.9	0.7	23.1	20.4	44.7	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.9	0.7	23.1	20.4	44.7	8.9
Queue Length 50th (ft)	75	1	65	53	128	0
Queue Length 95th (ft)	122	1	92	65	186	79
Internal Link Dist (ft)	439			647	500	
Turn Bay Length (ft)	210		425			
Base Capacity (vph)	1817	1192	395	1195	540	779
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.34	0.35	0.19	0.40	0.58

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 13 (13%), Referenced to phase 2: and 6:SEL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 69: Austin Ave & Williams Drive



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	512	652	256	84	199	415
Future Volume (vph)	512	652	256	84	199	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.91	0.91	1.00	1.00
Frt	0.95	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	0.97	1.00	1.00
Satd. Flow (prot)	3315	1441	1610	3291	1863	1583
Flt Permitted	0.97	1.00	0.33	0.58	1.00	1.00
Satd. Flow (perm)	3315	1441	559	1951	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	557	709	278	91	216	451
RTOR Reduction (vph)	60	136	0	0	0	367
Lane Group Flow (vph)	802	268	139	230	216	84
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	6	7	7	4	8	
Permitted Phases		6	4			8
Actuated Green, G (s)	53.0	66.4	37.0	37.0	18.6	18.6
Effective Green, g (s)	53.0	66.4	37.0	37.0	18.6	18.6
Actuated g/C Ratio	0.53	0.66	0.37	0.37	0.19	0.19
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1756	1028	347	901	346	294
v/s Ratio Prot	c0.24	0.03	c0.05	0.03	c0.12	
v/s Ratio Perm		0.15	0.09	0.06		0.05
v/c Ratio	0.46	0.26	0.40	0.26	0.62	0.29
Uniform Delay, d1	14.6	6.8	22.4	21.9	37.5	35.0
Progression Factor	0.58	0.10	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.8	0.2	3.5	0.5
Delay (s)	9.2	0.8	23.2	22.1	41.0	35.5
Level of Service	A	A	C	C	D	D
Approach Delay (s)	6.5			22.5	37.3	
Approach LOS	A			C	D	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	SET	NWL	NWT
Lane Configurations				
Traffic Volume (vph)	118	1147	51	1006
Future Volume (vph)	118	1147	51	1006
Lane Group Flow (vph)	233	1443	64	1105
Turn Type	Prot	NA	pm+pt	NA
Protected Phases	8	2	1	6
Permitted Phases			6	
Detector Phase	8	2	1	6
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	10.0	20.0
Total Split (s)	16.0	69.0	15.0	84.0
Total Split (%)	16.0%	69.0%	15.0%	84.0%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag		Lead	Lag	
Lead-Lag Optimize?		Yes	Yes	
Recall Mode	None	C-Max	None	C-Max
v/c Ratio	0.59	0.59	0.18	0.38
Control Delay	30.5	1.8	1.3	0.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	30.5	1.8	1.3	0.3
Queue Length 50th (ft)	41	42	1	3
Queue Length 95th (ft)	76	48	m1	m3
Internal Link Dist (ft)	904	2931		1755
Turn Bay Length (ft)			175	
Base Capacity (vph)	482	2464	380	2927
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.59	0.17	0.38

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 52 (52%), Referenced to phase 2:SET and 6:NWTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 102: Williams Drive & Rivery Blvd

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	118	76	1147	128	51	1006
Future Volume (vph)	118	76	1147	128	51	1006
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.94		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	3287		3472		1770	3539
Flt Permitted	0.97		1.00		0.14	1.00
Satd. Flow (perm)	3287		3472		259	3539
Peak-hour factor, PHF	0.89	0.76	0.91	0.70	0.80	0.91
Adj. Flow (vph)	133	100	1260	183	64	1105
RTOR Reduction (vph)	91	0	10	0	0	0
Lane Group Flow (vph)	142	0	1433	0	64	1105
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Actuated Green, G (s)	9.3		69.9		82.7	82.7
Effective Green, g (s)	9.3		69.9		82.7	82.7
Actuated g/C Ratio	0.09		0.70		0.83	0.83
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	305		2426		347	2926
v/s Ratio Prot	c0.04		c0.41		0.02	c0.31
v/s Ratio Perm					0.14	
v/c Ratio	0.47		0.59		0.18	0.38
Uniform Delay, d1	43.0		7.7		7.7	2.2
Progression Factor	1.00		0.12		0.26	0.05
Incremental Delay, d2	1.1		0.8		0.1	0.2
Delay (s)	44.1		1.8		2.1	0.3
Level of Service	D		A		A	A
Approach Delay (s)	44.1		1.8			0.4
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

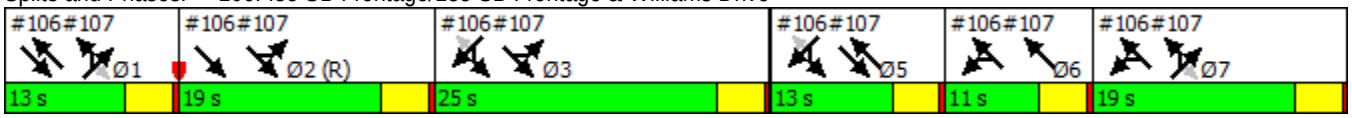
c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	SWL	SWT	SWR	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	647	599	284	1099	313	103	83					
Future Volume (vph)	647	599	284	1099	313	103	83					
Lane Group Flow (vph)	703	631	309	1263	271	275	104					
Turn Type	NA	Free	custom	NA	Split	NA	Perm					
Protected Phases	1 2		6 7	1 6 7	3 5	3 5		1	2	3	5	6
Permitted Phases		Free	6 7				3 5					
Detector Phase	1 2		6 7	1 6 7	3 5	3 5	3 5					
Switch Phase												
Minimum Initial (s)								9.0	4.0	4.0	9.0	4.0
Minimum Split (s)								13.0	20.0	20.0	13.0	20.0
Total Split (s)								13.0	19.0	25.0	13.0	11.0
Total Split (%)								13%	19%	25%	13%	11%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.71	0.40	0.67	0.92	0.47	0.47	0.16					
Control Delay	28.6	0.6	42.4	24.4	29.4	29.2	2.3					
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Total Delay	28.6	0.6	42.4	24.4	29.4	29.2	2.3					
Queue Length 50th (ft)	127	0	144	254	142	144	0					
Queue Length 95th (ft)	225	0	m170	m#354	176	193	9					
Internal Link Dist (ft)	1755			1		1077						
Turn Bay Length (ft)		200	100				100					
Base Capacity (vph)	990	1583	460	1380	566	580	626					
Starvation Cap Reductn	0	0	0	0	0	0	0					
Spillback Cap Reductn	0	0	0	0	0	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.71	0.40	0.67	0.92	0.48	0.47	0.17					

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SET, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 106: I35 SB Frontage/135 SB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	19.0
Total Split (%)	19%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	647	599	284	1099	0	0	0	0	313	103	83
Future Volume (vph)	0	647	599	284	1099	0	0	0	0	313	103	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (prot)		3539	1583	1770	3539					1681	1724	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (perm)		3539	1583	1770	3539					1681	1724	1583
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.87	0.92	0.92	0.92	0.92	0.75	0.80	0.80
Adj. Flow (vph)	0	703	631	309	1263	0	0	0	0	417	129	104
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	69
Lane Group Flow (vph)	0	703	631	309	1263	0	0	0	0	271	275	35
Turn Type		NA	Free	custom	NA					Split	NA	Perm
Protected Phases		1 2		6 7	1 6 7					3 5	3 5	
Permitted Phases			Free	6 7								3 5
Actuated Green, G (s)		28.0	100.0	26.0	39.0					34.0	34.0	34.0
Effective Green, g (s)		28.0	100.0	26.0	39.0					34.0	34.0	34.0
Actuated g/C Ratio		0.28	1.00	0.26	0.39					0.34	0.34	0.34
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)		990	1583	460	1380					571	586	538
v/s Ratio Prot		c0.20		0.17	c0.36					c0.16	0.16	
v/s Ratio Perm			0.40									0.02
v/c Ratio		0.71	0.40	0.67	0.92					0.47	0.47	0.07
Uniform Delay, d1		32.4	0.0	33.2	28.9					26.0	25.9	22.3
Progression Factor		0.77	1.00	1.14	0.61					1.00	1.00	1.00
Incremental Delay, d2		3.6	0.6	1.8	4.9					0.6	0.6	0.1
Delay (s)		28.3	0.6	39.7	22.7					26.6	26.5	22.3
Level of Service		C	A	D	C					C	C	C
Approach Delay (s)		15.2			26.0			0.0			25.9	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NEL	NET	NER	Ø1	Ø2	Ø3	Ø5	Ø6	Ø7
Lane Configurations												
Traffic Volume (vph)	112	848	580	803	27	370						
Future Volume (vph)	112	848	580	803	27	370						
Lane Group Flow (vph)	149	1087	668	873	40	430						
Turn Type	custom	NA	NA	Split	NA	Perm						
Protected Phases	2 3	2 3 5	5 6	1 7	1 7		1	2	3	5	6	7
Permitted Phases	2 3					1 7						
Detector Phase	2 3	2 3 5	5 6	1 7	1 7	1 7						
Switch Phase												
Minimum Initial (s)							9.0	4.0	4.0	9.0	4.0	4.0
Minimum Split (s)							13.0	20.0	20.0	13.0	20.0	8.0
Total Split (s)							13.0	19.0	25.0	13.0	11.0	19.0
Total Split (%)							13%	19%	25%	13%	11%	19%
Yellow Time (s)							3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)							0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode							Max	C-Max	None	None	Max	None
v/c Ratio	0.21	0.58	0.93	0.91	0.08	0.73						
Control Delay	12.5	4.9	72.0	49.4	27.1	24.4						
Queue Delay	0.0	0.0	0.0	5.3	0.0	0.0						
Total Delay	12.5	4.9	72.0	54.7	27.1	24.4						
Queue Length 50th (ft)	24	34	230	276	19	128						
Queue Length 95th (ft)	39	34	#342	#390	33	223						
Internal Link Dist (ft)		465	439		826							
Turn Bay Length (ft)	100					100						
Base Capacity (vph)	708	1864	722	961	521	593						
Starvation Cap Reductn	0	0	0	0	0	0						
Spillback Cap Reductn	0	0	0	58	0	0						
Storage Cap Reductn	0	0	0	0	0	0						
Reduced v/c Ratio	0.21	0.58	0.93	0.97	0.08	0.73						

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SET, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 107: I35 NB Frontage & Williams Drive

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	112	848	0	0	580	32	803	27	370	0	0	0
Future Volume (vph)	112	848	0	0	580	32	803	27	370	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			0.95		0.97	1.00	1.00			
Frt	1.00	1.00			0.99		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			3504		3433	1863	1583			
Flt Permitted	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539			3504		3433	1863	1583			
Peak-hour factor, PHF	0.75	0.78	0.92	0.92	0.93	0.73	0.92	0.68	0.86	0.92	0.92	0.92
Adj. Flow (vph)	149	1087	0	0	624	44	873	40	430	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	150	0	0	0
Lane Group Flow (vph)	149	1087	0	0	663	0	873	40	280	0	0	0
Turn Type	custom	NA			NA		Split	NA	Perm			
Protected Phases	2 3	2 3 5			5 6		1 7	1 7				
Permitted Phases	2 3								1 7			
Actuated Green, G (s)	39.5	53.0			20.5		28.0	28.0	28.0			
Effective Green, g (s)	39.5	53.0			20.5		28.0	28.0	28.0			
Actuated g/C Ratio	0.40	0.53			0.20		0.28	0.28	0.28			
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)	699	1875			718		961	521	443			
v/s Ratio Prot	0.08	c0.31			c0.19		c0.25	0.02				
v/s Ratio Perm									0.18			
v/c Ratio	0.21	0.58			0.92		0.91	0.08	0.63			
Uniform Delay, d1	20.0	15.9			39.0		34.8	26.5	31.5			
Progression Factor	0.59	0.23			1.39		1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.4			16.2		12.1	0.1	2.9			
Delay (s)	12.0	4.1			70.5		46.8	26.6	34.4			
Level of Service	B	A			E		D	C	C			
Approach Delay (s)		5.0			70.5			42.3			0.0	
Approach LOS		A			E			D			A	

Intersection Summary			
HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Network Totals

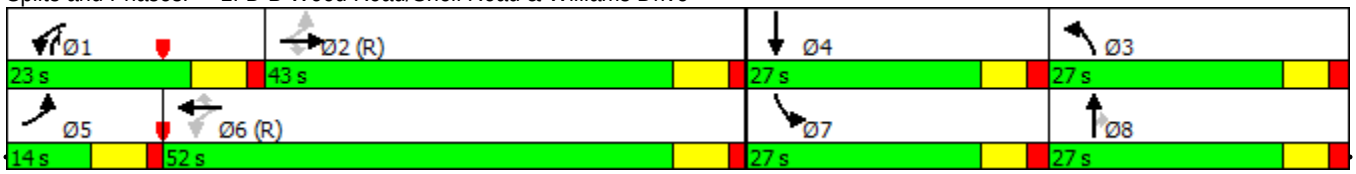
Number of Intersections	25
Total Delay (hr)	241
Stops (#)	19288
Average Speed (mph)	26
Total Travel Time (hr)	606
Distance Traveled (mi)	15848
Fuel Consumed (gal)	923
Fuel Economy (mpg)	17.2
Unserved Vehicles (#)	40
Vehicles in dilemma zone (#)	650
Performance Index	294.7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	134	910	219	345	764	265	391	171	113	207	179
Future Volume (vph)	134	910	219	345	764	265	391	171	113	207	179
Lane Group Flow (vph)	144	1034	270	371	868	335	465	231	131	262	236
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2		1	6		3	8	1	7	4
Permitted Phases	2		2	6		6			8		
Detector Phase	5	2	2	1	6	6	3	8	1	7	4
Switch Phase											
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0	15.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	13.5	37.5	37.5	13.5	34.5	34.5	34.0	34.0	13.5	15.0	15.0
Total Split (s)	14.0	43.0	43.0	23.0	52.0	52.0	27.0	27.0	23.0	27.0	27.0
Total Split (%)	11.7%	35.8%	35.8%	19.2%	43.3%	43.3%	22.5%	22.5%	19.2%	22.5%	22.5%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.48	0.98	0.43	0.91	0.58	0.40	0.78	0.40	0.19	0.64	0.61
Control Delay	13.4	43.2	2.4	77.0	16.7	2.1	56.1	46.3	9.9	57.3	54.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.4	43.2	2.4	77.0	16.7	2.1	56.1	46.3	9.9	57.3	54.0
Queue Length 50th (ft)	23	282	0	247	125	1	178	84	21	101	86
Queue Length 95th (ft)	m38	m#514	m0	#517	198	15	210	97	59	121	125
Internal Link Dist (ft)		305			466			485			323
Turn Bay Length (ft)	150		250	150		193	270		200	180	
Base Capacity (vph)	303	1055	635	407	1491	843	633	628	696	589	606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.98	0.43	0.91	0.58	0.40	0.73	0.37	0.19	0.44	0.39

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of 1st Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: D B Wood Road/Shell Road & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	910	219	345	764	265	391	171	113	207	179	32
Future Volume (vph)	134	910	219	345	764	265	391	171	113	207	179	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1736	3471	1553	1736	3471	1553	3367	3471	1553	3367	3385	
Flt Permitted	0.31	1.00	1.00	0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	570	3471	1553	170	3471	1553	3367	3471	1553	3367	3385	
Peak-hour factor, PHF	0.93	0.88	0.81	0.93	0.88	0.79	0.84	0.74	0.86	0.79	0.91	0.83
Adj. Flow (vph)	144	1034	270	371	868	335	465	231	131	262	197	39
RTOR Reduction (vph)	0	0	164	0	0	176	0	0	55	0	15	0
Lane Group Flow (vph)	144	1034	106	371	868	159	465	231	76	262	221	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	45.4	36.5	36.5	67.0	51.6	51.6	21.4	19.9	43.9	14.6	13.1	
Effective Green, g (s)	45.4	36.5	36.5	67.0	51.6	51.6	21.4	19.9	43.9	14.6	13.1	
Actuated g/C Ratio	0.38	0.30	0.30	0.56	0.43	0.43	0.18	0.17	0.37	0.12	0.11	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.5	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	302	1055	472	408	1492	667	600	575	568	409	369	
v/s Ratio Prot	0.04	c0.30		c0.18	0.25		c0.14	0.07	0.03	c0.08	0.07	
v/s Ratio Perm	0.15		0.07	0.33		0.10			0.02			
v/c Ratio	0.48	0.98	0.23	0.91	0.58	0.24	0.78	0.40	0.13	0.64	0.60	
Uniform Delay, d1	25.3	41.4	31.2	35.7	26.0	21.7	47.0	44.7	25.4	50.2	50.9	
Progression Factor	0.53	0.51	0.13	1.68	0.55	0.21	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	20.4	0.9	22.2	1.5	0.8	6.2	0.5	0.1	3.4	2.6	
Delay (s)	14.3	41.5	4.8	82.4	15.9	5.3	53.2	45.2	25.5	53.6	53.6	
Level of Service	B	D	A	F	B	A	D	D	C	D	D	
Approach Delay (s)		31.9			29.3			46.6			53.6	
Approach LOS		C			C			D			D	

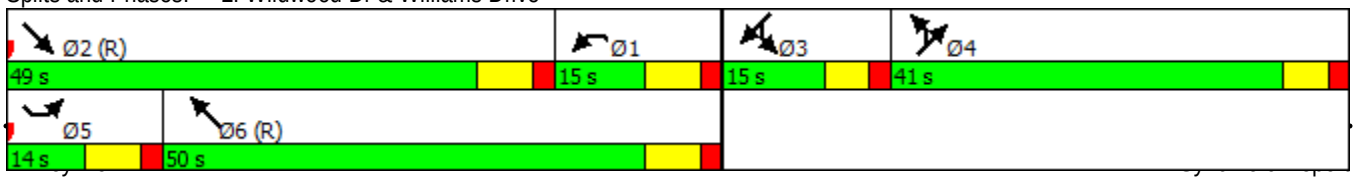
Intersection Summary			
HCM 2000 Control Delay	36.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWL	NWT	NET	SWT
Lane Configurations						
Traffic Volume (vph)	35	1087	59	1167	19	14
Future Volume (vph)	35	1087	59	1167	19	14
Lane Group Flow (vph)	61	1199	102	1274	419	126
Turn Type	Prot	NA	Prot	NA	NA	NA
Protected Phases	5	2	1	6	4	3
Permitted Phases						
Detector Phase	5	2	1	6	4	3
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	30.0	14.0	30.0	14.0	14.0
Total Split (s)	14.0	49.0	15.0	50.0	41.0	15.0
Total Split (%)	11.7%	40.8%	12.5%	41.7%	34.2%	12.5%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.0	6.0
Lead/Lag	Lead	Lead	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None
v/c Ratio	0.55	0.90	0.81	0.88	0.89	0.70
Control Delay	58.3	46.6	86.9	36.0	63.6	46.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.3	46.6	86.9	36.0	63.6	46.1
Queue Length 50th (ft)	48	509	78	~504	302	42
Queue Length 95th (ft)	55	#641	86	#678	141	22
Internal Link Dist (ft)		2052		391	287	1154
Turn Bay Length (ft)	300		300			
Base Capacity (vph)	110	1334	126	1454	519	191
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.90	0.81	0.88	0.81	0.66

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:SET and 6:NWT, Start of 1st Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Wildwood Dr & Williams Drive



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	35	1087	40	59	1167	3	238	19	34	2	14	63
Future Volume (vph)	35	1087	40	59	1167	3	238	19	34	2	14	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0			6.0			6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	1.00			0.99			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			1.00	
Satd. Flow (prot)	1770	3515		1770	3537			1768			1686	
Flt Permitted	0.95	1.00		0.95	1.00			0.96			1.00	
Satd. Flow (perm)	1770	3515		1770	3537			1768			1686	
Peak-hour factor, PHF	0.57	0.95	0.73	0.58	0.92	0.50	0.73	0.38	0.79	0.25	0.44	0.73
Adj. Flow (vph)	61	1144	55	102	1268	6	326	50	43	8	32	86
RTOR Reduction (vph)	0	3	0	0	0	0	0	4	0	0	65	0
Lane Group Flow (vph)	61	1196	0	102	1274	0	0	415	0	0	61	0
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	6.1	44.0		10.0	47.9			31.7			8.3	
Effective Green, g (s)	6.1	44.0		10.0	47.9			31.7			8.3	
Actuated g/C Ratio	0.05	0.37		0.08	0.40			0.26			0.07	
Clearance Time (s)	7.0	7.0		7.0	7.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	89	1288		147	1411			467			116	
v/s Ratio Prot	0.03	c0.34		0.06	c0.36			c0.23			c0.04	
v/s Ratio Perm												
v/c Ratio	0.69	0.93		0.69	0.90			0.89			0.52	
Uniform Delay, d1	56.0	36.5		53.5	33.9			42.5			53.9	
Progression Factor	0.73	1.04		0.88	0.82			1.00			1.00	
Incremental Delay, d2	18.1	12.1		11.7	8.6			18.3			4.2	
Delay (s)	59.0	50.1		58.9	36.5			60.8			58.2	
Level of Service	E	D		E	D			E			E	
Approach Delay (s)		50.5			38.2			60.8			58.2	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1129	18	34	1434	22	33
Future Volume (vph)	1129	18	34	1434	22	33
Lane Group Flow (vph)	1227	35	56	1648	42	66
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	15.0	15.0	7.0	15.0	7.0	7.0
Minimum Split (s)	34.0	34.0	13.0	34.0	13.0	13.0
Total Split (s)	83.0	83.0	17.0	100.0	20.0	20.0
Total Split (%)	69.2%	69.2%	14.2%	83.3%	16.7%	16.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Recall Mode	C-Min	C-Min	None	C-Min	None	None
v/c Ratio	0.45	0.03	0.15	0.54	0.34	0.38
Control Delay	6.8	2.2	1.1	2.2	59.6	18.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.8	2.2	1.1	2.2	59.6	18.7
Queue Length 50th (ft)	223	1	3	42	32	0
Queue Length 95th (ft)	286	6	m1	16	38	3
Internal Link Dist (ft)	1127			2052	664	
Turn Bay Length (ft)		300	300			
Base Capacity (vph)	2721	1225	424	3025	211	247
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.03	0.13	0.54	0.20	0.27

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 79 (66%), Referenced to phase 2:SET and 6:NWTL, Start of 1st Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Woodlake Dr & Williams Drive

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1129	18	34	1434	22	33
Future Volume (vph)	1129	18	34	1434	22	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3505	1568	1752	3505	1752	1568
Flt Permitted	1.00	1.00	0.19	1.00	0.95	1.00
Satd. Flow (perm)	3505	1568	347	3505	1752	1568
Peak-hour factor, PHF	0.92	0.51	0.61	0.87	0.52	0.50
Adj. Flow (vph)	1227	35	56	1648	42	66
RTOR Reduction (vph)	0	9	0	0	0	62
Lane Group Flow (vph)	1227	26	56	1648	42	4
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4
Actuated Green, G (s)	89.7	89.7	101.3	101.3	7.2	7.2
Effective Green, g (s)	89.7	89.7	101.3	101.3	7.2	7.2
Actuated g/C Ratio	0.75	0.75	0.84	0.84	0.06	0.06
Clearance Time (s)	6.0	6.0	6.0	6.0	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2619	1172	358	2958	105	94
v/s Ratio Prot	0.35		0.01	c0.47	c0.02	
v/s Ratio Perm		0.02	0.12			0.00
v/c Ratio	0.47	0.02	0.16	0.56	0.40	0.04
Uniform Delay, d1	5.9	3.9	2.9	2.8	54.3	53.2
Progression Factor	0.99	1.24	0.35	0.59	1.00	1.00
Incremental Delay, d2	0.6	0.0	0.1	0.4	2.5	0.2
Delay (s)	6.4	4.9	1.1	2.0	56.8	53.3
Level of Service	A	A	A	A	E	D
Approach Delay (s)	6.3			2.0	54.7	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Configurations								
Traffic Volume (vph)	100	35	80	35	80	1020	100	1186
Future Volume (vph)	100	35	80	35	80	1020	100	1186
Lane Group Flow (vph)	109	114	87	147	87	1185	109	1398
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	1	6	5	2
Permitted Phases	4		8		6		2	
Detector Phase	7	4	3	8	1	6	5	2
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	10.0	7.0	10.0
Minimum Split (s)	12.5	20.0	12.5	20.0	12.5	27.5	12.5	27.5
Total Split (s)	15.0	15.0	15.0	15.0	15.0	75.0	15.0	75.0
Total Split (%)	12.5%	12.5%	12.5%	12.5%	12.5%	62.5%	12.5%	62.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	None	C-Max
v/c Ratio	0.56	0.63	0.43	0.72	0.42	0.57	0.32	0.66
Control Delay	53.0	40.9	47.7	42.1	17.4	8.2	22.1	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.0	40.9	47.7	42.1	17.4	8.2	22.1	22.4
Queue Length 50th (ft)	72	37	57	41	11	82	51	351
Queue Length 95th (ft)	127	98	105	#125	m20	83	m85	467
Internal Link Dist (ft)		1195		1212		1599		2931
Turn Bay Length (ft)					175		175	
Base Capacity (vph)	202	192	211	216	227	2073	346	2109
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.59	0.41	0.68	0.38	0.57	0.32	0.66

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 56 (47%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Williams Drive & River Bend

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	100	35	70	80	35	100	80	1020	70	100	1186	100
Future Volume (vph)	100	35	70	80	35	100	80	1020	70	100	1186	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1676		1770	1656		1770	3505		1770	3498	
Flt Permitted	0.45	1.00		0.54	1.00		0.09	1.00		0.21	1.00	
Satd. Flow (perm)	847	1676		1004	1656		169	3505		394	3498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	38	76	87	38	109	87	1109	76	109	1289	109
RTOR Reduction (vph)	0	60	0	0	86	0	0	4	0	0	5	0
Lane Group Flow (vph)	109	54	0	87	61	0	87	1181	0	109	1393	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	17.9	8.8		17.5	8.6		70.8	70.8		72.2	72.2	
Effective Green, g (s)	17.9	8.8		17.5	8.6		70.8	70.8		72.2	72.2	
Actuated g/C Ratio	0.15	0.07		0.15	0.07		0.59	0.59		0.60	0.60	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	196	122		203	118		207	2067		345	2104	
v/s Ratio Prot	c0.04	0.03		0.03	0.04		0.03	c0.34		0.02	c0.40	
v/s Ratio Perm	c0.04			0.03			0.22			0.16		
v/c Ratio	0.56	0.44		0.43	0.51		0.42	0.57		0.32	0.66	
Uniform Delay, d1	46.4	53.2		46.1	53.7		16.6	15.2		16.6	15.8	
Progression Factor	1.00	1.00		1.00	1.00		1.15	0.47		1.29	1.29	
Incremental Delay, d2	3.4	2.5		1.5	3.7		1.0	0.9		0.5	1.4	
Delay (s)	49.8	55.8		47.5	57.4		20.2	8.1		21.8	21.8	
Level of Service	D	E		D	E		C	A		C	C	
Approach Delay (s)		52.8			53.7			8.9			21.8	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

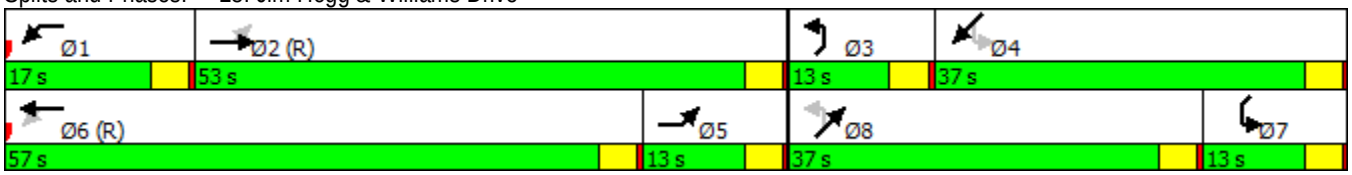
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	1	647	151	682	22	1	4	1
Future Volume (vph)	1	647	151	682	22	1	4	1
Lane Group Flow (vph)	1	731	164	742	24	150	4	3
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	8.0	10.0	8.0	10.0
Total Split (s)	13.0	53.0	17.0	57.0	13.0	37.0	13.0	37.0
Total Split (%)	10.8%	44.2%	14.2%	47.5%	10.8%	30.8%	10.8%	30.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None
v/c Ratio	0.00	0.29	0.27	0.25	0.20	0.62	0.03	0.03
Control Delay	9.0	7.3	1.9	1.3	55.4	20.1	53.2	41.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.0	7.3	1.9	1.3	55.4	20.1	53.2	41.0
Queue Length 50th (ft)	0	78	1	2	18	1	3	1
Queue Length 95th (ft)	3	196	46	112	44	63	15	11
Internal Link Dist (ft)		695		535		259		291
Turn Bay Length (ft)								
Base Capacity (vph)	587	2559	641	2925	149	543	179	462
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.29	0.26	0.25	0.16	0.28	0.02	0.01

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 94 (78%), Referenced to phase 2:EBTL and 6:WBTL, Start of 1st Green
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 28: Jim Hogg & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	1	647	26	151	682	1	22	1	137	4	1	2
Future Volume (vph)	1	647	26	151	682	1	22	1	137	4	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3519		1770	3539		1770	1585		1770	1676	
Flt Permitted	0.37	1.00		0.33	1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)	689	3519		613	3539		1863	1585		1863	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	703	28	164	741	1	24	1	149	4	1	2
RTOR Reduction (vph)	0	1	0	0	0	0	0	139	0	0	2	0
Lane Group Flow (vph)	1	730	0	164	742	0	24	11	0	4	1	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	84.0	84.0		92.8	92.8		7.8	7.8		4.1	4.1	
Effective Green, g (s)	84.0	84.0		92.8	92.8		7.8	7.8		4.1	4.1	
Actuated g/C Ratio	0.70	0.70		0.77	0.77		0.06	0.06		0.03	0.03	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	503	2463		581	2736		121	103		63	57	
v/s Ratio Prot	0.00	c0.21		0.03	c0.21		0.01	0.01		0.00	0.00	
v/s Ratio Perm	0.00			0.19			c0.01			c0.00		
v/c Ratio	0.00	0.30		0.28	0.27		0.20	0.10		0.06	0.02	
Uniform Delay, d1	5.4	6.8		3.9	3.9		53.2	52.8		55.2	56.0	
Progression Factor	1.00	1.00		0.24	0.28		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.3	0.2		0.8	0.4		0.4	0.1	
Delay (s)	5.4	7.1		1.2	1.3		54.0	53.3		55.6	56.1	
Level of Service	A	A		A	A		D	D		E	E	
Approach Delay (s)		7.1			1.3			53.4			55.8	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	72	716	764	692	431	70
Future Volume (vph)	72	716	764	692	431	70
Lane Group Flow (vph)	78	778	830	752	476	68
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		8	
Permitted Phases	6			2		8
Detector Phase	1	6	2	2	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	32.0	32.0	14.0	14.0
Total Split (s)	12.0	90.0	78.0	78.0	30.0	30.0
Total Split (%)	10.0%	75.0%	65.0%	65.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
v/c Ratio	0.16	0.29	0.35	0.57	0.77	0.22
Control Delay	3.8	4.7	5.4	1.9	55.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	4.7	5.4	1.9	55.5	10.9
Queue Length 50th (ft)	20	127	60	1	181	0
Queue Length 95th (ft)	11	38	85	0	231	41
Internal Link Dist (ft)		706	847		395	
Turn Bay Length (ft)	120			500		200
Base Capacity (vph)	487	2667	2404	1316	744	365
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.29	0.35	0.57	0.64	0.19

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 100 (83%), Referenced to phase 2:NWT and 6:SETL, Start of 1st Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 37: Williams Drive & Del Webb

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	72	716	764	692	431	70
Future Volume (vph)	72	716	764	692	431	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3436	1441
Flt Permitted	0.29	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	538	3539	3539	1583	3436	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	778	830	752	468	76
RTOR Reduction (vph)	0	0	0	246	1	56
Lane Group Flow (vph)	78	778	830	506	475	12
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	1	6	2		8	
Permitted Phases	6			2		8
Actuated Green, G (s)	90.4	90.4	80.7	80.7	21.6	21.6
Effective Green, g (s)	90.4	90.4	80.7	80.7	21.6	21.6
Actuated g/C Ratio	0.75	0.75	0.67	0.67	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	463	2666	2379	1064	618	259
v/s Ratio Prot	0.01	c0.22	0.23		c0.14	
v/s Ratio Perm	0.12			c0.32		0.01
v/c Ratio	0.17	0.29	0.35	0.48	0.77	0.05
Uniform Delay, d1	4.6	4.7	8.4	9.5	46.8	40.7
Progression Factor	0.69	0.89	0.56	0.42	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.3	1.3	5.7	0.1
Delay (s)	3.3	4.4	5.1	5.3	52.6	40.8
Level of Service	A	A	A	A	D	D
Approach Delay (s)		4.3	5.2		51.1	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBT	SBR	Ø4
Lane Configurations								
Traffic Volume (vph)	79	1151	1284	61	79	0	90	
Future Volume (vph)	79	1151	1284	61	79	0	90	
Lane Group Flow (vph)	86	1251	1396	66	0	86	98	
Turn Type	Perm	NA	NA	Perm	Perm	NA	Perm	
Protected Phases		2	6			8		4
Permitted Phases	2			6	8		8	
Detector Phase	2	2	6	6	8	8	8	
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	1.0	1.0	1.0	1.0
Minimum Split (s)	20.0	20.0	20.0	20.0	5.0	5.0	5.0	5.0
Total Split (s)	96.0	96.0	96.0	96.0	24.0	24.0	24.0	24.0
Total Split (%)	80.0%	80.0%	80.0%	80.0%	20.0%	20.0%	20.0%	20%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	Min	Min	Min	Min
v/c Ratio	0.32	0.43	0.48	0.05		0.58	0.39	
Control Delay	6.3	3.6	1.0	0.1		65.8	13.9	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	6.3	3.6	1.0	0.1		65.8	13.9	
Queue Length 50th (ft)	14	107	14	0		65	1	
Queue Length 95th (ft)	m18	m114	54	m0		115	50	
Internal Link Dist (ft)		3232	291			759		
Turn Bay Length (ft)	100			138			54	
Base Capacity (vph)	266	2930	2930	1322		235	344	
Starvation Cap Reductn	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0		0	0	
Reduced v/c Ratio	0.32	0.43	0.48	0.05		0.37	0.28	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 47 (39%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 41: William Drive/Serenada Drive & Williams Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	1151	0	0	1284	61	0	0	0	79	0	90
Future Volume (vph)	79	1151	0	0	1284	61	0	0	0	79	0	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00					1.00	1.00
Frt	1.00	1.00			1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00					0.95	1.00
Satd. Flow (prot)	1770	3539			3539	1583					1770	1583
Flt Permitted	0.17	1.00			1.00	1.00					0.76	1.00
Satd. Flow (perm)	322	3539			3539	1583					1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	1251	0	0	1396	66	0	0	0	86	0	98
RTOR Reduction (vph)	0	0	0	0	0	11	0	0	0	0	0	87
Lane Group Flow (vph)	86	1251	0	0	1396	55	0	0	0	0	86	11
Turn Type	Perm	NA			NA	Perm				Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2					6	4			8		8
Actuated Green, G (s)	99.4	99.4			99.4	99.4					12.6	12.6
Effective Green, g (s)	99.4	99.4			99.4	99.4					12.6	12.6
Actuated g/C Ratio	0.83	0.83			0.83	0.83					0.10	0.10
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0					3.0	3.0
Lane Grp Cap (vph)	266	2931			2931	1311					148	166
v/s Ratio Prot		0.35			c0.39							
v/s Ratio Perm	0.27					0.03					c0.06	0.01
v/c Ratio	0.32	0.43			0.48	0.04					0.58	0.07
Uniform Delay, d1	2.4	2.7			2.9	1.8					51.2	48.4
Progression Factor	1.23	1.09			0.21	0.07					1.00	1.00
Incremental Delay, d2	1.9	0.3			0.3	0.0					5.7	0.2
Delay (s)	4.9	3.3			0.9	0.2					56.9	48.6
Level of Service	A	A			A	A					E	D
Approach Delay (s)		3.4			0.9			0.0			52.5	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	5.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

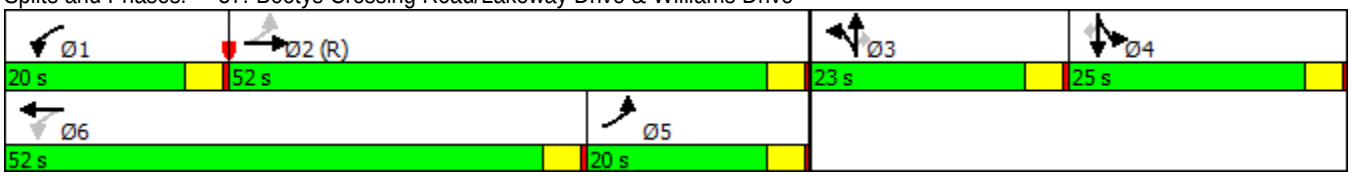
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	176	894	236	999	64	148	85	220
Future Volume (vph)	176	894	236	999	64	148	85	220
Lane Group Flow (vph)	191	1008	257	1250	207	161	231	239
Turn Type	pm+pt	NA	pm+pt	NA	NA	Perm	NA	Perm
Protected Phases	5	2	1	6	3		4	
Permitted Phases	2		6			3		4
Detector Phase	5	2	1	6	3	3	4	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	52.0	20.0	52.0	23.0	23.0	25.0	25.0
Total Split (%)	16.7%	43.3%	16.7%	43.3%	19.2%	19.2%	20.8%	20.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	Max	Max	None	None
v/c Ratio	0.59	0.68	0.87	0.89	0.73	0.43	0.81	0.53
Control Delay	46.9	32.0	44.7	36.0	63.7	12.9	70.1	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.9	32.0	44.7	36.0	63.7	12.9	70.1	10.0
Queue Length 50th (ft)	89	252	157	498	154	9	171	0
Queue Length 95th (ft)	139	301	#284	#612	#258	72	#278	71
Internal Link Dist (ft)		3581		1599	968		626	
Turn Bay Length (ft)	180		190			108		250
Base Capacity (vph)	326	1477	300	1405	285	374	316	474
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.68	0.86	0.89	0.73	0.43	0.73	0.50

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 14 (12%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 57: Bootys Crossing Road/Lakeway Drive & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	894	33	236	999	151	126	64	148	128	85	220
Future Volume (vph)	176	894	33	236	999	151	126	64	148	128	85	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	0.98			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1770	3520		1770	3470			1803	1583		1808	1583
Flt Permitted	0.12	1.00		0.12	1.00			0.97	1.00		0.97	1.00
Satd. Flow (perm)	231	3520		231	3470			1803	1583		1808	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	972	36	257	1086	164	137	70	161	139	92	239
RTOR Reduction (vph)	0	2	0	0	10	0	0	0	124	0	0	201
Lane Group Flow (vph)	191	1006	0	257	1240	0	0	207	37	0	231	38
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases	2			6					3			4
Actuated Green, G (s)	50.2	50.2		48.0	48.0			19.0	19.0		19.0	19.0
Effective Green, g (s)	50.2	50.2		48.0	48.0			19.0	19.0		19.0	19.0
Actuated g/C Ratio	0.42	0.42		0.40	0.40			0.16	0.16		0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	327	1472		295	1388			285	250		286	250
v/s Ratio Prot	0.09	c0.29		0.11	c0.36			c0.11			c0.13	
v/s Ratio Perm	0.16			0.23					0.02			0.02
v/c Ratio	0.58	0.68		0.87	0.89			0.73	0.15		0.81	0.15
Uniform Delay, d1	39.2	28.4		31.4	33.6			48.0	43.5		48.7	43.5
Progression Factor	0.96	1.02		0.68	0.86			1.00	1.00		1.00	1.00
Incremental Delay, d2	2.5	2.4		18.6	6.0			14.9	1.3		15.3	0.3
Delay (s)	40.0	31.3		39.9	34.8			63.0	44.8		64.0	43.8
Level of Service	D	C		D	C			E	D		E	D
Approach Delay (s)		32.7			35.7			55.0			53.8	
Approach LOS		C			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	39.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

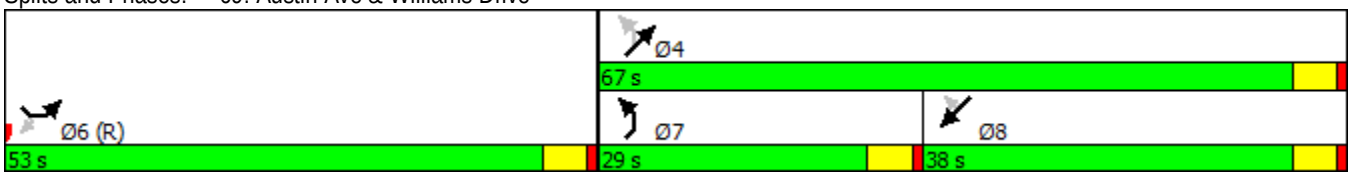
c Critical Lane Group

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	732	508	534	251	211	415
Future Volume (vph)	732	508	534	251	211	415
Lane Group Flow (vph)	928	420	290	563	229	451
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	6		7	4	8	
Permitted Phases		6	4			8
Detector Phase	6	6	7	4	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	9.0	21.0	21.0	21.0
Total Split (s)	53.0	53.0	29.0	67.0	38.0	38.0
Total Split (%)	44.2%	44.2%	24.2%	55.8%	31.7%	31.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	C-Max	C-Max	None	None	None	None
v/c Ratio	0.53	0.45	0.73	0.55	0.68	0.69
Control Delay	12.2	2.4	35.8	27.0	55.4	9.5
Queue Delay	0.3	0.1	0.0	0.0	0.0	0.4
Total Delay	12.5	2.5	35.8	27.0	55.4	9.8
Queue Length 50th (ft)	159	14	171	164	167	0
Queue Length 95th (ft)	m273	m34	223	186	233	87
Internal Link Dist (ft)	439			647	500	
Turn Bay Length (ft)	210		425			
Base Capacity (vph)	1748	943	420	1232	512	762
Starvation Cap Reductn	277	85	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	63
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.49	0.69	0.46	0.45	0.65

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 68 (57%), Referenced to phase 2: and 6:SEL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 69: Austin Ave & Williams Drive



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	732	508	534	251	211	415
Future Volume (vph)	732	508	534	251	211	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.91	0.91	1.00	1.00
Frt	0.98	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.95	0.97	1.00	1.00
Satd. Flow (prot)	3391	1441	1610	3305	1863	1583
Flt Permitted	0.96	1.00	0.29	0.56	1.00	1.00
Satd. Flow (perm)	3391	1441	484	1889	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	796	552	580	273	229	451
RTOR Reduction (vph)	9	205	0	0	0	369
Lane Group Flow (vph)	919	215	290	563	229	82
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	6		7	4	8	
Permitted Phases		6	4			8
Actuated Green, G (s)	61.5	61.5	48.5	48.5	21.7	21.7
Effective Green, g (s)	61.5	61.5	48.5	48.5	21.7	21.7
Actuated g/C Ratio	0.51	0.51	0.40	0.40	0.18	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1737	738	400	1020	336	286
v/s Ratio Prot	c0.27		c0.13	0.10	0.12	
v/s Ratio Perm		0.15	c0.16	0.12		0.05
v/c Ratio	0.53	0.29	0.72	0.55	0.68	0.29
Uniform Delay, d1	19.6	16.8	27.2	27.4	45.9	42.5
Progression Factor	0.54	0.56	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.8	6.4	0.7	5.6	0.6
Delay (s)	11.5	10.2	33.6	28.1	51.5	43.0
Level of Service	B	B	C	C	D	D
Approach Delay (s)	11.1			29.9	45.9	
Approach LOS	B			C	D	

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	SET	NWL	NWT
Lane Configurations				
Traffic Volume (vph)	318	1165	186	1168
Future Volume (vph)	318	1165	186	1168
Lane Group Flow (vph)	560	1432	207	1243
Turn Type	Prot	NA	Prot	NA
Protected Phases	4	2	1	6
Permitted Phases				
Detector Phase	4	2	1	6
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	20.0
Total Split (s)	29.0	76.0	15.0	91.0
Total Split (%)	24.2%	63.3%	12.5%	75.8%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag		Lead	Lag	
Lead-Lag Optimize?		Yes	Yes	
Recall Mode	None	C-Max	Max	C-Max
v/c Ratio	0.84	0.66	1.28	0.47
Control Delay	54.0	7.2	202.7	12.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	54.0	7.2	202.7	12.3
Queue Length 50th (ft)	194	84	~207	280
Queue Length 95th (ft)	225	178	#367	320
Internal Link Dist (ft)	904	2931		1755
Turn Bay Length (ft)			175	
Base Capacity (vph)	738	2164	162	2641
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.76	0.66	1.28	0.47

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 98 (82%), Referenced to phase 2:SET and 6:NWT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 102: Williams Drive & Rivery Blvd

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	318	148	1165	160	186	1168
Future Volume (vph)	318	148	1165	160	186	1168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.95		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	3332		3468		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	3332		3468		1770	3539
Peak-hour factor, PHF	0.82	0.86	0.94	0.83	0.90	0.94
Adj. Flow (vph)	388	172	1239	193	207	1243
RTOR Reduction (vph)	46	0	10	0	0	0
Lane Group Flow (vph)	514	0	1422	0	207	1243
Turn Type	Prot		NA		Prot	NA
Protected Phases	4		2		1	6
Permitted Phases						
Actuated Green, G (s)	22.4		74.6		11.0	89.6
Effective Green, g (s)	22.4		74.6		11.0	89.6
Actuated g/C Ratio	0.19		0.62		0.09	0.75
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	621		2155		162	2642
v/s Ratio Prot	c0.15		c0.41		c0.12	0.35
v/s Ratio Perm						
v/c Ratio	0.83		0.66		1.28	0.47
Uniform Delay, d1	47.0		14.6		54.5	5.9
Progression Factor	1.00		0.38		1.07	1.88
Incremental Delay, d2	8.9		1.4		156.9	0.5
Delay (s)	55.9		7.0		215.1	11.6
Level of Service	E		A		F	B
Approach Delay (s)	55.9		7.0			40.7
Approach LOS	E		A			D

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

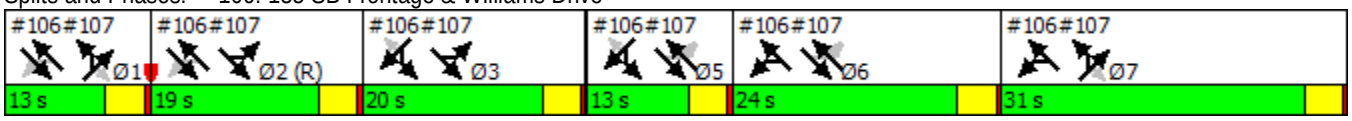
c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	SWL	SWT	SWR	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	601	706	366	1446	203	136	97					
Future Volume (vph)	601	706	366	1446	203	136	97					
Lane Group Flow (vph)	646	759	416	1589	192	199	124					
Turn Type	NA	Free	pm+pt	NA	Split	NA	Perm					
Protected Phases	1 2		6 7	1 2 6 7	3 5	3 5		1	2	3	5	6
Permitted Phases		Free	1 2 6 7				3 5					
Detector Phase	1 2		6 7	1 2 6 7	3 5	3 5	3 5					
Switch Phase												
Minimum Initial (s)								9.0	4.0	4.0	9.0	4.0
Minimum Split (s)								13.0	20.0	20.0	13.0	20.0
Total Split (s)								13.0	19.0	20.0	13.0	24.0
Total Split (%)								11%	16%	17%	11%	20%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.78	0.48	0.51	0.65	0.47	0.47	0.26					
Control Delay	33.0	1.6	12.9	0.4	43.5	43.3	8.8					
Queue Delay	0.0	0.0	0.0	0.7	0.0	0.0	0.0					
Total Delay	33.0	1.6	12.9	1.0	43.5	43.3	8.8					
Queue Length 50th (ft)	270	11	78	0	134	138	4					
Queue Length 95th (ft)	316	18	m81	m0	208	204	35					
Internal Link Dist (ft)	1755			1		1077						
Turn Bay Length (ft)		200	100				100					
Base Capacity (vph)	825	1583	819	2447	400	417	467					
Starvation Cap Reductn	0	0	0	456	0	0	0					
Spillback Cap Reductn	0	0	0	0	0	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.78	0.48	0.51	0.80	0.48	0.48	0.27					

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 59 (49%), Referenced to phase 2:NWSE, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 106: 135 SB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	31.0
Total Split (%)	26%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	601	706	366	1446	0	0	0	0	203	136	97
Future Volume (vph)	0	601	706	366	1446	0	0	0	0	203	136	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.99	1.00
Satd. Flow (prot)		3539	1583	1770	3539					1681	1752	1583
Flt Permitted		1.00	1.00	0.15	1.00					0.95	0.99	1.00
Satd. Flow (perm)		3539	1583	286	3539					1681	1752	1583
Peak-hour factor, PHF	0.92	0.93	0.93	0.88	0.91	0.92	0.92	0.92	0.92	0.88	0.85	0.78
Adj. Flow (vph)	0	646	759	416	1589	0	0	0	0	231	160	124
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	89
Lane Group Flow (vph)	0	646	759	416	1589	0	0	0	0	192	199	35
Turn Type		NA	Free	pm+pt	NA					Split	NA	Perm
Protected Phases		1 2		6 7	1 2 6 7					3 5	3 5	
Permitted Phases			Free	1 2 6 7								3 5
Actuated Green, G (s)		28.0	120.0	79.0	83.0					29.0	29.0	29.0
Effective Green, g (s)		28.0	120.0	79.0	83.0					29.0	29.0	29.0
Actuated g/C Ratio		0.23	1.00	0.66	0.69					0.24	0.24	0.24
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)		825	1583	818	2447					406	423	382
v/s Ratio Prot		c0.18		0.22	c0.45					0.11	0.11	
v/s Ratio Perm			c0.48	0.12								0.02
v/c Ratio		0.78	0.48	0.51	0.65					0.47	0.47	0.09
Uniform Delay, d1		43.2	0.0	15.6	10.4					39.0	38.9	35.3
Progression Factor		0.63	1.00	0.81	0.00					1.00	1.00	1.00
Incremental Delay, d2		5.5	0.8	0.1	0.2					0.9	0.8	0.1
Delay (s)		32.8	0.8	12.7	0.2					39.8	39.8	35.4
Level of Service		C	A	B	A					D	D	D
Approach Delay (s)		15.5			2.8			0.0			38.7	
Approach LOS		B			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

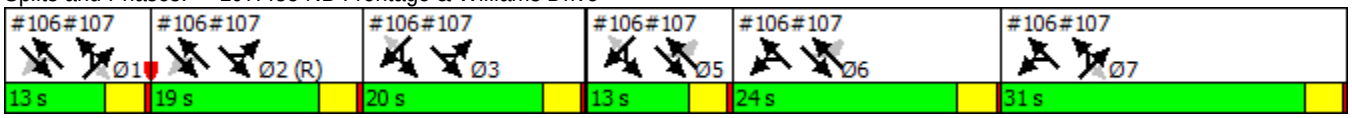
c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	NEL	NET	NER	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	118	650	801	73	1011	60	525					
Future Volume (vph)	118	650	801	73	1011	60	525					
Lane Group Flow (vph)	169	714	965	84	1123	80	640					
Turn Type	pm+pt	NA	NA	Perm	Split	NA	Perm					
Protected Phases	2 3	2 3 5 6	5 6		1 7	1 7		1	2	3	5	6
Permitted Phases	2 3 5 6			5 6			1 7					
Detector Phase	2 3	2 3 5 6	5 6	5 6	1 7	1 7	1 7					
Switch Phase												
Minimum Initial (s)								9.0	4.0	4.0	9.0	4.0
Minimum Split (s)								13.0	20.0	20.0	13.0	20.0
Total Split (s)								13.0	19.0	20.0	13.0	24.0
Total Split (%)								11%	16%	17%	11%	20%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.30	0.34	0.98	0.16	0.98	0.13	0.94					
Control Delay	2.7	0.4	88.3	18.7	62.5	28.6	47.9					
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Total Delay	2.7	0.4	88.3	18.7	62.5	28.6	47.9					
Queue Length 50th (ft)	10	1	412	13	442	43	337					
Queue Length 95th (ft)	13	1	#476	m46	#590	67	#471					
Internal Link Dist (ft)		465	439			826						
Turn Bay Length (ft)	100			100			100					
Base Capacity (vph)	578	2111	985	525	1144	621	681					
Starvation Cap Reductn	0	0	0	0	0	0	0					
Spillback Cap Reductn	0	0	0	0	0	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.29	0.34	0.98	0.16	0.98	0.13	0.94					

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 59 (49%), Referenced to phase 2:NWSE, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 107: I35 NB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	31.0
Total Split (%)	26%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	118	650	0	0	801	73	1011	60	525	0	0	0
Future Volume (vph)	118	650	0	0	801	73	1011	60	525	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.97	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			3539	1583	3433	1863	1583			
Flt Permitted	0.12	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	223	3539			3539	1583	3433	1863	1583			
Peak-hour factor, PHF	0.70	0.91	0.92	0.92	0.83	0.87	0.90	0.75	0.82	0.92	0.92	0.92
Adj. Flow (vph)	169	714	0	0	965	84	1123	80	640	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	61	0	0	154	0	0	0
Lane Group Flow (vph)	169	714	0	0	965	23	1123	80	486	0	0	0
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	2 3	2 3 5 6			5 6		1 7	1 7				
Permitted Phases	2 3 5 6					5 6			1 7			
Actuated Green, G (s)	68.0	72.0			33.4	33.4	40.0	40.0	40.0			
Effective Green, g (s)	68.0	72.0			33.4	33.4	40.0	40.0	40.0			
Actuated g/C Ratio	0.57	0.60			0.28	0.28	0.33	0.33	0.33			
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)	572	2123			985	440	1144	621	527			
v/s Ratio Prot	0.09	c0.20			c0.27		c0.33	0.04				
v/s Ratio Perm	0.08					0.01			0.31			
v/c Ratio	0.30	0.34			0.98	0.05	0.98	0.13	0.92			
Uniform Delay, d1	16.4	12.0			43.0	31.7	39.6	27.9	38.5			
Progression Factor	0.14	0.01			1.59	7.91	1.00	1.00	1.00			
Incremental Delay, d2	0.2	0.1			21.0	0.0	22.1	0.1	21.8			
Delay (s)	2.5	0.1			89.2	250.9	61.8	28.0	60.3			
Level of Service	A	A			F	F	E	C	E			
Approach Delay (s)		0.6			102.1			59.8			0.0	
Approach LOS		A			F			E			A	

Intersection Summary			
HCM 2000 Control Delay	57.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Appendix D – Lakeway / Wildwood Geometric Improvements - Model Outputs

Network Totals

Number of Intersections	25
Total Delay (hr)	139
Stops (#)	15530
Average Speed (mph)	31
Total Travel Time (hr)	469
Distance Traveled (mi)	14558
Fuel Consumed (gal)	774
Fuel Economy (mpg)	18.8
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	931
Performance Index	181.7

Network Totals

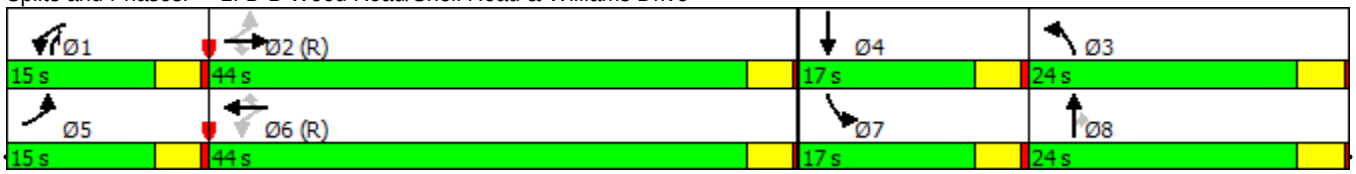
Number of Intersections	25
Total Delay (hr)	228
Stops (#)	19404
Average Speed (mph)	27
Total Travel Time (hr)	593
Distance Traveled (mi)	15848
Fuel Consumed (gal)	916
Fuel Economy (mpg)	17.3
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	658
Performance Index	282.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	85	898	277	153	609	307	195	102	59	364	261
Future Volume (vph)	85	898	277	153	609	307	195	102	59	364	261
Lane Group Flow (vph)	92	976	301	166	662	334	212	111	64	396	293
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2		1	6		3	8	1	7	4
Permitted Phases	2		2	6		6			8		
Detector Phase	5	2	2	1	6	6	3	8	1	7	4
Switch Phase											
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	15.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0
Total Split (s)	15.0	44.0	44.0	15.0	44.0	44.0	24.0	24.0	15.0	17.0	17.0
Total Split (%)	15.0%	44.0%	44.0%	15.0%	44.0%	44.0%	24.0%	24.0%	15.0%	17.0%	17.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None
v/c Ratio	0.19	0.55	0.32	0.46	0.34	0.33	0.53	0.29	0.15	0.89	0.68
Control Delay	9.3	14.5	3.5	9.6	8.6	3.2	46.1	41.8	9.7	66.3	50.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.3	14.5	3.5	9.6	8.6	3.2	46.1	41.8	9.7	66.3	50.1
Queue Length 50th (ft)	16	96	0	29	71	8	67	34	4	129	93
Queue Length 95th (ft)	m38	171	54	57	163	42	100	59	33	#212	138
Internal Link Dist (ft)		305			466			485			323
Turn Bay Length (ft)	150		250	150		193	270		200	180	
Base Capacity (vph)	541	1787	948	389	1930	1015	686	707	458	446	460
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.55	0.32	0.43	0.34	0.33	0.31	0.16	0.14	0.89	0.64

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 18 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: D B Wood Road/Shell Road & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	898	277	153	609	307	195	102	59	364	261	8
Future Volume (vph)	85	898	277	153	609	307	195	102	59	364	261	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	3539	1583	3433	3523	
Flt Permitted	0.37	1.00	1.00	0.19	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	688	3539	1583	354	3539	1583	3433	3539	1583	3433	3523	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	976	301	166	662	334	212	111	64	396	284	9
RTOR Reduction (vph)	0	0	149	0	0	155	0	0	44	0	3	0
Lane Group Flow (vph)	92	976	152	166	662	179	212	111	20	396	290	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	56.9	50.5	50.5	63.3	53.7	53.7	11.7	10.9	20.5	13.0	12.2	
Effective Green, g (s)	56.9	50.5	50.5	63.3	53.7	53.7	11.7	10.9	20.5	13.0	12.2	
Actuated g/C Ratio	0.57	0.50	0.50	0.63	0.54	0.54	0.12	0.11	0.20	0.13	0.12	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	460	1787	799	360	1900	850	401	385	387	446	429	
v/s Ratio Prot	0.01	c0.28		c0.04	0.19		c0.06	0.03	0.01	c0.12	0.08	
v/s Ratio Perm	0.10		0.10	0.25		0.11			0.01			
v/c Ratio	0.20	0.55	0.19	0.46	0.35	0.21	0.53	0.29	0.05	0.89	0.68	
Uniform Delay, d1	9.9	16.9	13.6	10.0	13.2	12.1	41.6	41.0	31.9	42.8	42.0	
Progression Factor	1.09	0.75	1.29	0.72	0.58	1.35	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.0	0.4	0.9	0.5	0.5	1.3	0.4	0.1	18.8	4.2	
Delay (s)	10.9	13.6	18.0	8.1	8.1	16.8	42.8	41.4	32.0	61.6	46.2	
Level of Service	B	B	B	A	A	B	D	D	C	E	D	
Approach Delay (s)		14.4			10.6			40.6			55.1	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	35	1402	37	766	22	4	2	6
Future Volume (vph)	35	1402	37	766	22	4	2	6
Lane Group Flow (vph)	61	1508	64	833	30	82	8	104
Turn Type	Prot	NA	Prot	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases					8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	7.0	30.0	7.0	30.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	37.0	14.0	37.0	14.0	14.0	14.0	14.0
Total Split (s)	15.0	60.0	15.0	60.0	13.0	12.0	13.0	12.0
Total Split (%)	15.0%	60.0%	15.0%	60.0%	13.0%	12.0%	13.0%	12.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	C-Min	None	C-Min	None	None	None	None
v/c Ratio	0.32	0.64	0.33	0.35	0.14	0.29	0.04	0.47
Control Delay	52.1	13.4	48.0	4.7	34.2	15.3	32.0	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.1	13.4	48.0	4.7	34.2	15.3	32.0	20.0
Queue Length 50th (ft)	30	455	34	96	15	6	4	8
Queue Length 95th (ft)	47	558	47	108	32	0	5	0
Internal Link Dist (ft)		2052		391		287		1154
Turn Bay Length (ft)	300		300					
Base Capacity (vph)	197	2375	198	2382	214	285	225	221
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.63	0.32	0.35	0.14	0.29	0.04	0.47

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 8 (8%), Referenced to phase 2:SET and 6:NWT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 2: Wildwood Dr & Williams Drive

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	35	1402	23	37	766	0	22	4	56	2	6	66
Future Volume (vph)	35	1402	23	37	766	0	22	4	56	2	6	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3528		1770	3539		1770	1621		1770	1621	
Flt Permitted	0.95	1.00		0.95	1.00		0.45	1.00		0.70	1.00	
Satd. Flow (perm)	1770	3528		1770	3539		835	1621		1311	1621	
Peak-hour factor, PHF	0.57	0.95	0.73	0.58	0.92	0.50	0.73	0.38	0.79	0.25	0.44	0.73
Adj. Flow (vph)	61	1476	32	64	833	0	30	11	71	8	14	90
RTOR Reduction (vph)	0	1	0	0	0	0	0	62	0	0	81	0
Lane Group Flow (vph)	61	1507	0	64	833	0	30	20	0	8	23	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases							8			4		
Actuated Green, G (s)	6.4	55.7		6.5	55.8		14.6	10.4		9.0	7.6	
Effective Green, g (s)	9.4	58.7		9.5	58.8		18.6	12.4		13.0	9.6	
Actuated g/C Ratio	0.09	0.59		0.10	0.59		0.19	0.12		0.13	0.10	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	166	2070		168	2080		213	201		186	155	
v/s Ratio Prot	0.03	c0.43		c0.04	0.24		c0.01	0.01		0.00	0.01	
v/s Ratio Perm							c0.02			0.00		
v/c Ratio	0.37	0.73		0.38	0.40		0.14	0.10		0.04	0.15	
Uniform Delay, d1	42.5	14.9		42.5	11.1		33.8	38.8		38.0	41.4	
Progression Factor	1.18	0.90		1.05	0.42		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	1.7		1.4	0.6		0.3	0.2		0.1	0.4	
Delay (s)	51.1	15.1		45.9	5.2		34.1	39.1		38.1	41.9	
Level of Service	D	B		D	A		C	D		D	D	
Approach Delay (s)		16.5			8.1			37.7			41.6	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1277	173	60	794	81	183
Future Volume (vph)	1277	173	60	794	81	183
Lane Group Flow (vph)	1388	339	98	913	156	366
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	1
Switch Phase						
Minimum Initial (s)	15.0	15.0	7.0	15.0	7.0	7.0
Minimum Split (s)	24.0	24.0	13.0	24.0	12.5	13.0
Total Split (s)	53.0	53.0	13.0	66.0	34.0	13.0
Total Split (%)	53.0%	53.0%	13.0%	66.0%	34.0%	13.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.5	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	2.0	1.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-1.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.5
Lead/Lag	Lag	Lag	Lead			Lead
Lead-Lag Optimize?						
Recall Mode	C-Min	C-Min	None	C-Min	None	None
v/c Ratio	0.68	0.32	0.27	0.34	0.57	0.68
Control Delay	10.2	1.0	7.2	2.3	46.4	32.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	1.0	7.2	2.3	46.4	32.4
Queue Length 50th (ft)	263	2	4	9	93	184
Queue Length 95th (ft)	227	0	9	111	80	110
Internal Link Dist (ft)	1127			2052	664	
Turn Bay Length (ft)		300	300			
Base Capacity (vph)	2032	1051	369	2673	525	540
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.32	0.27	0.34	0.30	0.68

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 66 (66%), Referenced to phase 2:SET and 6:NWTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 3: Woodlake Dr & Williams Drive

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1277	173	60	794	81	183
Future Volume (vph)	1277	173	60	794	81	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.5
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3505	1568	1752	3505	1752	1568
Flt Permitted	1.00	1.00	0.10	1.00	0.95	1.00
Satd. Flow (perm)	3505	1568	192	3505	1752	1568
Peak-hour factor, PHF	0.92	0.51	0.61	0.87	0.52	0.50
Adj. Flow (vph)	1388	339	98	913	156	366
RTOR Reduction (vph)	0	142	0	0	0	16
Lane Group Flow (vph)	1388	197	98	913	156	350
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases		2	6			4
Actuated Green, G (s)	56.0	56.0	74.3	74.3	14.2	26.5
Effective Green, g (s)	58.0	58.0	76.3	76.3	15.7	29.5
Actuated g/C Ratio	0.58	0.58	0.76	0.76	0.16	0.29
Clearance Time (s)	6.0	6.0	6.0	6.0	5.5	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2032	909	369	2674	275	462
v/s Ratio Prot	c0.40		0.04	0.26	0.09	c0.10
v/s Ratio Perm		0.13	0.16			0.12
v/c Ratio	0.68	0.22	0.27	0.34	0.57	0.76
Uniform Delay, d1	14.6	10.1	8.6	3.8	39.0	32.0
Progression Factor	0.51	0.12	1.53	0.45	1.00	1.00
Incremental Delay, d2	1.8	0.5	0.4	0.3	2.7	7.0
Delay (s)	9.3	1.8	13.6	2.1	41.7	39.0
Level of Service	A	A	B	A	D	D
Approach Delay (s)	7.8			3.2	39.8	
Approach LOS	A			A	D	

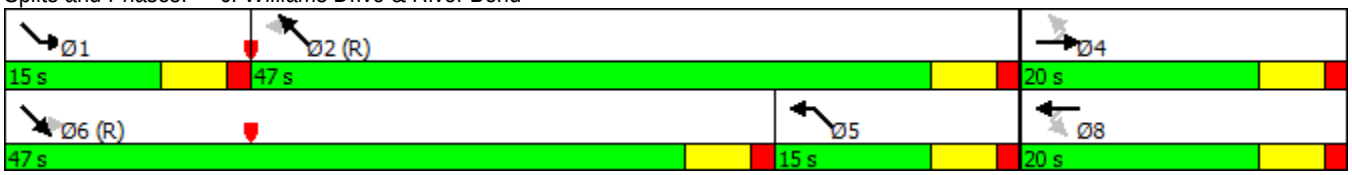
Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Configurations								
Traffic Volume (vph)	70	20	100	20	100	1275	70	854
Future Volume (vph)	70	20	100	20	100	1275	70	854
Lane Group Flow (vph)	76	76	109	109	109	1440	76	1015
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	1	6	5	2
Permitted Phases	4		8		6		2	
Detector Phase	4	4	8	8	1	6	5	2
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	10.0	7.0	10.0
Minimum Split (s)	20.0	20.0	20.0	20.0	12.5	20.0	12.5	20.0
Total Split (s)	20.0	20.0	20.0	20.0	15.0	47.0	15.0	47.0
Total Split (%)	24.4%	24.4%	24.4%	24.4%	18.3%	57.3%	18.3%	57.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag					Lead	Lead	Lag	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.41	0.27	0.57	0.35	0.32	0.68	0.26	0.49
Control Delay	37.4	15.0	43.9	13.2	11.7	15.0	18.2	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	15.0	43.9	13.2	11.7	15.0	18.2	12.4
Queue Length 50th (ft)	36	10	53	10	24	261	17	155
Queue Length 95th (ft)	73	44	98	51	54	399	43	247
Internal Link Dist (ft)		1195		1212		1599		2931
Turn Bay Length (ft)					175		175	
Base Capacity (vph)	232	345	239	368	367	2105	348	2072
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.22	0.46	0.30	0.30	0.68	0.22	0.49

Intersection Summary

Cycle Length: 82
Actuated Cycle Length: 82
Offset: 12 (15%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated

Splits and Phases: 6: Williams Drive & River Bend



Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	70	20	50	100	20	80	100	1275	50	70	854	80
Future Volume (vph)	70	20	50	100	20	80	100	1275	50	70	854	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.89		1.00	0.88		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1664		1770	1640		1770	3519		1770	3494	
Flt Permitted	0.69	1.00		0.71	1.00		0.18	1.00		0.15	1.00	
Satd. Flow (perm)	1279	1664		1318	1640		338	3519		283	3494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	22	54	109	22	87	109	1386	54	76	928	87
RTOR Reduction (vph)	0	46	0	0	74	0	0	3	0	0	7	0
Lane Group Flow (vph)	76	30	0	109	35	0	109	1437	0	76	1008	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	11.9	11.9		11.9	11.9		47.9	47.9		47.0	47.0	
Effective Green, g (s)	11.9	11.9		11.9	11.9		47.9	47.9		47.0	47.0	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.58	0.58		0.57	0.57	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	185	241		191	238		312	2055		265	2002	
v/s Ratio Prot		0.02			0.02		0.03	c0.41		0.02	c0.29	
v/s Ratio Perm	0.06			c0.08			0.18			0.14		
v/c Ratio	0.41	0.12		0.57	0.15		0.35	0.70		0.29	0.50	
Uniform Delay, d1	31.9	30.5		32.7	30.6		9.2	12.0		13.9	10.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.2		4.1	0.3		0.7	2.0		0.6	0.9	
Delay (s)	33.3	30.7		36.7	30.9		9.9	14.0		14.5	11.4	
Level of Service	C	C		D	C		A	B		B	B	
Approach Delay (s)		32.0			33.8			13.7			11.6	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	82.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		

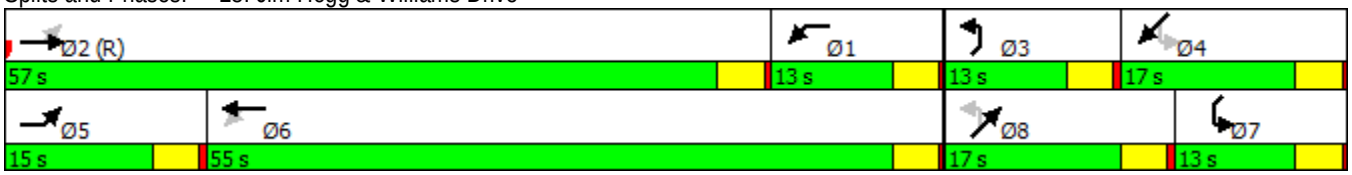
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	2	792	148	606	49	1	13	4
Future Volume (vph)	2	792	148	606	49	1	13	4
Lane Group Flow (vph)	2	883	161	668	53	505	14	6
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	8.0	10.0	8.0	10.0
Total Split (s)	15.0	57.0	13.0	55.0	13.0	17.0	13.0	17.0
Total Split (%)	15.0%	57.0%	13.0%	55.0%	13.0%	17.0%	13.0%	17.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	Min	None	None	None	None
v/c Ratio	0.00	0.43	0.39	0.28	0.17	0.81	0.08	0.02
Control Delay	13.5	13.8	10.1	3.6	30.5	20.7	35.7	29.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.5	13.8	10.1	3.6	30.5	20.7	35.7	29.0
Queue Length 50th (ft)	1	142	19	42	27	82	9	2
Queue Length 95th (ft)	5	282	41	30	55	198	21	11
Internal Link Dist (ft)		695		535		259		291
Turn Bay Length (ft)								
Base Capacity (vph)	480	2145	470	2406	321	625	233	307
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.41	0.34	0.28	0.17	0.81	0.06	0.02

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 57 (57%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 28: Jim Hogg & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	2	792	20	148	606	8	49	1	464	13	4	2
Future Volume (vph)	2	792	20	148	606	8	49	1	464	13	4	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.85		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3526		1770	3532		1770	1584		1770	1770	
Flt Permitted	0.32	1.00		0.28	1.00		0.48	1.00		0.37	1.00	
Satd. Flow (perm)	600	3526		513	3532		889	1584		684	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	861	22	161	659	9	53	1	504	14	4	2
RTOR Reduction (vph)	0	2	0	0	1	0	0	286	0	0	2	0
Lane Group Flow (vph)	2	881	0	161	667	0	53	219	0	14	4	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	52.3	52.3		60.1	60.1		21.5	21.5		12.1	12.1	
Effective Green, g (s)	52.3	52.3		60.1	60.1		21.5	21.5		12.1	12.1	
Actuated g/C Ratio	0.52	0.52		0.60	0.60		0.22	0.22		0.12	0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	327	1844		421	2122		284	340		95	214	
v/s Ratio Prot	0.00	c0.25		c0.03	0.19		0.02	c0.14		c0.00	0.00	
v/s Ratio Perm	0.00			0.20			0.02			0.02		
v/c Ratio	0.01	0.48		0.38	0.31		0.19	0.64		0.15	0.02	
Uniform Delay, d1	11.9	15.2		15.3	9.8		31.8	35.8		45.3	38.7	
Progression Factor	1.00	1.00		0.53	0.36		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.9		0.5	0.1		0.3	4.2		0.7	0.0	
Delay (s)	11.9	16.1		8.6	3.6		32.2	39.9		46.0	38.8	
Level of Service	B	B		A	A		C	D		D	D	
Approach Delay (s)		16.0			4.6			39.2			43.8	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	50	1219	709	166	231	53
Future Volume (vph)	50	1219	709	166	231	53
Lane Group Flow (vph)	54	1325	771	180	257	52
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	15.0	71.0	56.0	56.0	29.0	29.0
Total Split (%)	15.0%	71.0%	56.0%	56.0%	29.0%	29.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	Max	Max	C-Max	C-Max	None	None
v/c Ratio	0.08	0.47	0.42	0.20	0.59	0.23
Control Delay	3.7	6.3	10.7	1.5	46.1	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.7	6.3	10.7	1.5	46.1	13.2
Queue Length 50th (ft)	8	168	131	2	80	0
Queue Length 95th (ft)	m7	62	77	6	115	36
Internal Link Dist (ft)		706	847		395	
Turn Bay Length (ft)	120			500		200
Base Capacity (vph)	693	2805	1840	909	859	399
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.47	0.42	0.20	0.30	0.13

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 23 (23%), Referenced to phase 6:NWT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 37: Williams Drive & Del Webb

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	50	1219	709	166	231	53
Future Volume (vph)	50	1219	709	166	231	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3433	1441
Flt Permitted	0.27	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	503	3539	3539	1583	3433	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1325	771	180	251	58
RTOR Reduction (vph)	0	0	0	86	2	45
Lane Group Flow (vph)	54	1325	771	94	255	7
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	79.3	79.3	52.0	52.0	12.7	12.7
Effective Green, g (s)	79.3	79.3	52.0	52.0	12.7	12.7
Actuated g/C Ratio	0.79	0.79	0.52	0.52	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	694	2806	1840	823	435	183
v/s Ratio Prot	0.02	c0.37	0.22		c0.07	
v/s Ratio Perm	0.04			0.06		0.00
v/c Ratio	0.08	0.47	0.42	0.11	0.59	0.04
Uniform Delay, d1	3.3	3.4	14.7	12.2	41.2	38.3
Progression Factor	1.33	1.54	0.67	0.54	1.00	1.00
Incremental Delay, d2	0.2	0.5	0.7	0.3	2.0	0.1
Delay (s)	4.5	5.8	10.6	6.9	43.2	38.4
Level of Service	A	A	B	A	D	D
Approach Delay (s)		5.7	9.9		42.4	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBT	SBR	Ø8
Lane Configurations								
Traffic Volume (vph)	130	1304	931	53	119	0	138	
Future Volume (vph)	130	1304	931	53	119	0	138	
Lane Group Flow (vph)	141	1417	1012	58	0	129	150	
Turn Type	Perm	NA	NA	Perm	Perm	NA	Perm	
Protected Phases		2	6			4		8
Permitted Phases	2			6	4		4	
Detector Phase	2	2	6	6	4	4	4	
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	5.0
Total Split (s)	75.0	75.0	75.0	75.0	25.0	25.0	25.0	25.0
Total Split (%)	75.0%	75.0%	75.0%	75.0%	25.0%	25.0%	25.0%	25%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	Max	Max	Max	Min
v/c Ratio	0.42	0.56	0.40	0.05		0.44	0.33	
Control Delay	4.8	3.6	4.4	0.6		39.7	7.8	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	4.8	3.6	4.4	0.6		39.7	7.8	
Queue Length 50th (ft)	8	107	81	1		72	0	
Queue Length 95th (ft)	m4	m17	96	m1		130	51	
Internal Link Dist (ft)		3232	291			759		
Turn Bay Length (ft)	100			138			54	
Base Capacity (vph)	332	2512	2512	1140		296	450	
Starvation Cap Reductn	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0		0	0	
Reduced v/c Ratio	0.42	0.56	0.40	0.05		0.44	0.33	

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 98 (98%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 41: Williams Drive & Serenada Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	1304	0	0	931	53	0	0	0	119	0	138
Future Volume (vph)	130	1304	0	0	931	53	0	0	0	119	0	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00					1.00	1.00
Frt	1.00	1.00			1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00					0.95	1.00
Satd. Flow (prot)	1770	3539			3539	1583					1770	1583
Flt Permitted	0.25	1.00			1.00	1.00					0.76	1.00
Satd. Flow (perm)	467	3539			3539	1583					1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	1417	0	0	1012	58	0	0	0	129	0	150
RTOR Reduction (vph)	0	0	0	0	0	17	0	0	0	0	0	119
Lane Group Flow (vph)	141	1417	0	0	1012	41	0	0	0	0	129	32
Turn Type	Perm	NA			NA	Perm				Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		4
Actuated Green, G (s)	71.0	71.0			71.0	71.0					21.0	21.0
Effective Green, g (s)	71.0	71.0			71.0	71.0					21.0	21.0
Actuated g/C Ratio	0.71	0.71			0.71	0.71					0.21	0.21
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0					3.0	3.0
Lane Grp Cap (vph)	331	2512			2512	1123					296	332
v/s Ratio Prot		c0.40			0.29							
v/s Ratio Perm	0.30					0.03					c0.09	0.02
v/c Ratio	0.43	0.56			0.40	0.04					0.44	0.09
Uniform Delay, d1	6.0	7.0			5.9	4.3					34.3	31.8
Progression Factor	0.23	0.39			0.66	0.46					1.00	1.00
Incremental Delay, d2	3.3	0.8			0.4	0.1					4.6	0.6
Delay (s)	4.7	3.5			4.3	2.0					39.0	32.4
Level of Service	A	A			A	A					D	C
Approach Delay (s)		3.6			4.2			0.0			35.4	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

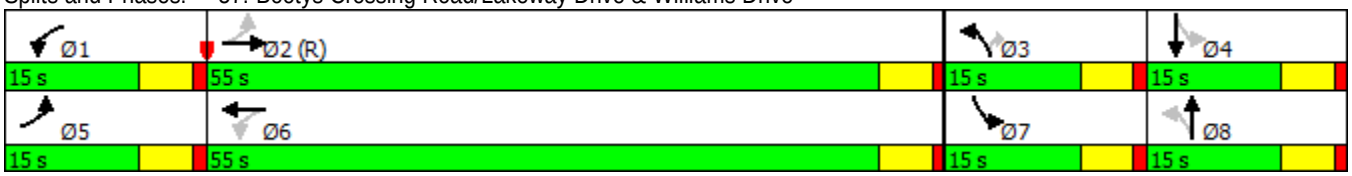
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	191	1202	157	695	103	37	119	102	40
Future Volume (vph)	191	1202	157	695	103	37	119	102	40
Lane Group Flow (vph)	208	1340	171	920	112	40	129	111	245
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	custom	pm+pt	NA
Protected Phases	5	2	1	6	3	8		7	4
Permitted Phases	2		6		8		3	4	
Detector Phase	5	2	1	6	3	8	3	7	4
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Total Split (s)	15.0	55.0	15.0	55.0	15.0	15.0	15.0	15.0	15.0
Total Split (%)	15.0%	55.0%	15.0%	55.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?									
Recall Mode	Max	C-Max	None	None	None	None	None	None	None
v/c Ratio	0.50	0.72	0.67	0.53	0.49	0.20	0.48	0.38	0.79
Control Delay	9.4	12.4	26.7	17.6	40.1	44.4	14.0	35.0	31.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	12.4	26.7	17.6	40.1	44.4	14.0	35.0	31.2
Queue Length 50th (ft)	13	260	38	192	57	24	0	57	35
Queue Length 95th (ft)	46	380	106	248	104	56	53	104	#140
Internal Link Dist (ft)		3581		1599		968			626
Turn Bay Length (ft)	180		190				108		
Base Capacity (vph)	413	1874	274	1740	236	217	276	306	332
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.72	0.62	0.53	0.47	0.18	0.47	0.36	0.74

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 68 (68%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 57: Bootys Crossing Road/Lakeway Drive & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	1202	30	157	695	152	103	37	119	102	40	186
Future Volume (vph)	191	1202	30	157	695	152	103	37	119	102	40	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.97		1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3526		1770	3444		1770	1863	1583	1770	1632	
Flt Permitted	0.21	1.00		0.10	1.00		0.42	1.00	1.00	0.67	1.00	
Satd. Flow (perm)	383	3526		195	3444		776	1863	1583	1245	1632	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	1307	33	171	755	165	112	40	129	111	43	202
RTOR Reduction (vph)	0	2	0	0	19	0	0	0	117	0	168	0
Lane Group Flow (vph)	208	1338	0	171	901	0	112	40	12	111	77	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	custom	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		3	4		
Actuated Green, G (s)	63.2	51.1		57.0	48.0		19.0	9.6	9.4	20.8	10.5	
Effective Green, g (s)	63.2	51.1		57.0	48.0		19.0	9.6	9.4	20.8	10.5	
Actuated g/C Ratio	0.63	0.51		0.57	0.48		0.19	0.10	0.09	0.21	0.10	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	409	1801		252	1653		240	178	148	313	171	
v/s Ratio Prot	0.06	c0.38		c0.06	0.26		c0.04	0.02		0.04	c0.05	
v/s Ratio Perm	0.26			0.33			0.04		0.01	0.04		
v/c Ratio	0.51	0.74		0.68	0.54		0.47	0.22	0.08	0.35	0.45	
Uniform Delay, d1	10.0	19.3		15.2	18.3		35.2	41.8	41.4	33.5	42.0	
Progression Factor	0.82	0.55		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.8	2.4		7.1	0.4		1.4	0.6	0.2	0.7	1.9	
Delay (s)	11.9	13.1		22.3	18.7		36.6	42.4	41.6	34.2	43.9	
Level of Service	B	B		C	B		D	D	D	C	D	
Approach Delay (s)		12.9			19.2			39.7			40.9	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

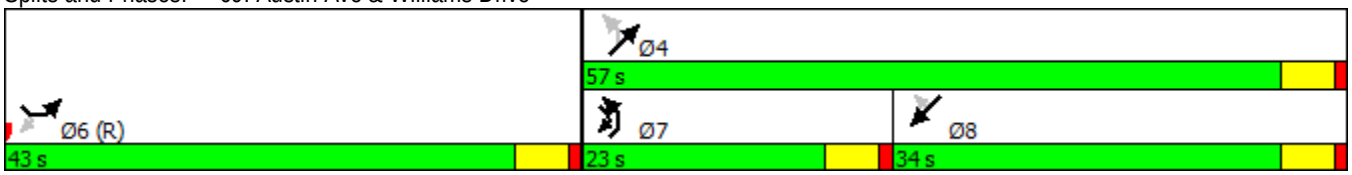
c Critical Lane Group

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	512	652	256	84	199	415
Future Volume (vph)	512	652	256	84	199	415
Lane Group Flow (vph)	862	404	139	230	216	451
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	6	7	7	4	8	
Permitted Phases		6	4			8
Detector Phase	6	7	7	4	8	8
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	9.0	9.0	21.0	21.0	21.0
Total Split (s)	43.0	23.0	23.0	57.0	34.0	34.0
Total Split (%)	43.0%	23.0%	23.0%	57.0%	34.0%	34.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lead	Lead		Lag	Lag
Lead-Lag Optimize?		Yes	Yes		Yes	Yes
Recall Mode	C-Max	None	None	None	None	None
v/c Ratio	0.47	0.35	0.40	0.26	0.62	0.68
Control Delay	8.4	0.7	23.1	20.4	44.7	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	0.7	23.1	20.4	44.7	8.9
Queue Length 50th (ft)	71	0	65	53	128	0
Queue Length 95th (ft)	98	1	92	65	186	79
Internal Link Dist (ft)	439			647	500	
Turn Bay Length (ft)	210		425			
Base Capacity (vph)	1817	1192	395	1195	540	779
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.34	0.35	0.19	0.40	0.58

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 13 (13%), Referenced to phase 2: and 6:SEL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 69: Austin Ave & Williams Drive



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	512	652	256	84	199	415
Future Volume (vph)	512	652	256	84	199	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.91	0.91	1.00	1.00
Frt	0.95	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	0.97	1.00	1.00
Satd. Flow (prot)	3315	1441	1610	3291	1863	1583
Flt Permitted	0.97	1.00	0.33	0.58	1.00	1.00
Satd. Flow (perm)	3315	1441	559	1951	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	557	709	278	91	216	451
RTOR Reduction (vph)	60	136	0	0	0	367
Lane Group Flow (vph)	802	268	139	230	216	84
Turn Type	Prot	pm+ov	pm+pt	NA	NA	Perm
Protected Phases	6	7	7	4	8	
Permitted Phases		6	4			8
Actuated Green, G (s)	53.0	66.4	37.0	37.0	18.6	18.6
Effective Green, g (s)	53.0	66.4	37.0	37.0	18.6	18.6
Actuated g/C Ratio	0.53	0.66	0.37	0.37	0.19	0.19
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1756	1028	347	901	346	294
v/s Ratio Prot	c0.24	0.03	c0.05	0.03	c0.12	
v/s Ratio Perm		0.15	0.09	0.06		0.05
v/c Ratio	0.46	0.26	0.40	0.26	0.62	0.29
Uniform Delay, d1	14.6	6.8	22.4	21.9	37.5	35.0
Progression Factor	0.55	0.06	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.8	0.2	3.5	0.5
Delay (s)	8.6	0.5	23.2	22.1	41.0	35.5
Level of Service	A	A	C	C	D	D
Approach Delay (s)	6.0			22.5	37.3	
Approach LOS	A			C	D	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	SET	NWL	NWT
Lane Configurations				
Traffic Volume (vph)	118	1147	51	1006
Future Volume (vph)	118	1147	51	1006
Lane Group Flow (vph)	233	1443	64	1105
Turn Type	Prot	NA	pm+pt	NA
Protected Phases	8	2	1	6
Permitted Phases			6	
Detector Phase	8	2	1	6
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	10.0	20.0
Total Split (s)	16.0	69.0	15.0	84.0
Total Split (%)	16.0%	69.0%	15.0%	84.0%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag		Lead	Lag	
Lead-Lag Optimize?		Yes	Yes	
Recall Mode	None	C-Max	None	C-Max
v/c Ratio	0.59	0.59	0.18	0.38
Control Delay	30.5	9.4	1.3	0.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	30.5	9.4	1.3	0.6
Queue Length 50th (ft)	41	232	1	9
Queue Length 95th (ft)	76	320	m1	10
Internal Link Dist (ft)	904	2931		1755
Turn Bay Length (ft)			175	
Base Capacity (vph)	482	2464	380	2927
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.59	0.17	0.38

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 52 (52%), Referenced to phase 2:SET and 6:NWTL, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 102: Williams Drive & Rivery Blvd

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	118	76	1147	128	51	1006
Future Volume (vph)	118	76	1147	128	51	1006
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.94		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	3287		3472		1770	3539
Flt Permitted	0.97		1.00		0.14	1.00
Satd. Flow (perm)	3287		3472		259	3539
Peak-hour factor, PHF	0.89	0.76	0.91	0.70	0.80	0.91
Adj. Flow (vph)	133	100	1260	183	64	1105
RTOR Reduction (vph)	91	0	10	0	0	0
Lane Group Flow (vph)	142	0	1433	0	64	1105
Turn Type	Prot		NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases					6	
Actuated Green, G (s)	9.3		69.9		82.7	82.7
Effective Green, g (s)	9.3		69.9		82.7	82.7
Actuated g/C Ratio	0.09		0.70		0.83	0.83
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	305		2426		347	2926
v/s Ratio Prot	c0.04		c0.41		0.02	c0.31
v/s Ratio Perm					0.14	
v/c Ratio	0.47		0.59		0.18	0.38
Uniform Delay, d1	43.0		7.7		7.7	2.2
Progression Factor	1.00		1.00		0.23	0.16
Incremental Delay, d2	1.1		1.1		0.2	0.2
Delay (s)	44.1		8.8		1.9	0.6
Level of Service	D		A		A	A
Approach Delay (s)	44.1		8.8			0.7
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

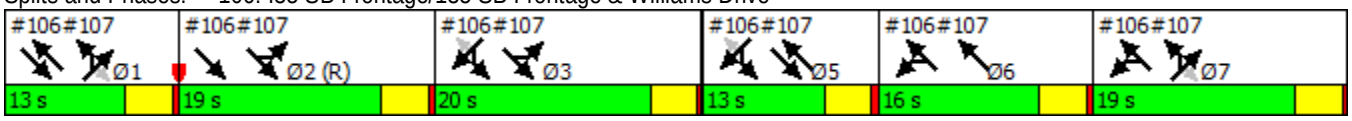
106: I35 SB Frontage/135 SB Frontage & Williams Drive

Lane Group	SET	SER	NWL	NWT	SWL	SWT	SWR	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	647	599	284	1099	313	103	83					
Future Volume (vph)	647	599	284	1099	313	103	83					
Lane Group Flow (vph)	703	631	309	1263	271	275	104					
Turn Type	NA	Free	custom	NA	Split	NA	Perm					
Protected Phases	1 2		6 7	1 6 7	3 5	3 5		1	2	3	5	6
Permitted Phases		Free	6 7				3 5					
Detector Phase	1 2		6 7	1 6 7	3 5	3 5	3 5					
Switch Phase												
Minimum Initial (s)								9.0	4.0	4.0	9.0	4.0
Minimum Split (s)								13.0	20.0	20.0	13.0	20.0
Total Split (s)								13.0	19.0	20.0	13.0	16.0
Total Split (%)								13%	19%	20%	13%	16%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.71	0.40	0.56	0.81	0.56	0.55	0.19					
Control Delay	29.5	0.6	37.9	18.8	35.3	35.0	2.7					
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0	0.0					
Total Delay	29.5	0.6	37.9	18.9	35.3	35.0	2.7					
Queue Length 50th (ft)	158	0	144	250	153	155	0					
Queue Length 95th (ft)	212	0	m180	m276	191	209	10					
Internal Link Dist (ft)	1755			1		1077						
Turn Bay Length (ft)		200	100				100					
Base Capacity (vph)	990	1583	548	1557	487	499	559					
Starvation Cap Reductn	0	0	0	24	0	0	0					
Spillback Cap Reductn	0	0	0	0	0	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.71	0.40	0.56	0.82	0.56	0.55	0.19					

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 1 (1%), Referenced to phase 2:SET, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 106: I35 SB Frontage/135 SB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	19.0
Total Split (%)	19%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	647	599	284	1099	0	0	0	0	313	103	83
Future Volume (vph)	0	647	599	284	1099	0	0	0	0	313	103	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (prot)		3539	1583	1770	3539					1681	1724	1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (perm)		3539	1583	1770	3539					1681	1724	1583
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.87	0.92	0.92	0.92	0.92	0.75	0.80	0.80
Adj. Flow (vph)	0	703	631	309	1263	0	0	0	0	417	129	104
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	74
Lane Group Flow (vph)	0	703	631	309	1263	0	0	0	0	271	275	30
Turn Type		NA	Free	custom	NA					Split	NA	Perm
Protected Phases		1 2		6 7	1 6 7					3 5	3 5	
Permitted Phases			Free	6 7								3 5
Actuated Green, G (s)		28.0	100.0	31.0	44.0					29.0	29.0	29.0
Effective Green, g (s)		28.0	100.0	31.0	44.0					29.0	29.0	29.0
Actuated g/C Ratio		0.28	1.00	0.31	0.44					0.29	0.29	0.29
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)		990	1583	548	1557					487	499	459
v/s Ratio Prot		c0.20		0.17	c0.36					c0.16	0.16	
v/s Ratio Perm			0.40									0.02
v/c Ratio		0.71	0.40	0.56	0.81					0.56	0.55	0.07
Uniform Delay, d1		32.4	0.0	28.8	24.4					30.1	30.0	25.7
Progression Factor		0.79	1.00	1.21	0.65					1.00	1.00	1.00
Incremental Delay, d2		3.6	0.6	0.8	1.9					1.4	1.3	0.1
Delay (s)		29.2	0.6	35.5	17.7					31.4	31.3	25.8
Level of Service		C	A	D	B					C	C	C
Approach Delay (s)		15.7			21.2			0.0			30.5	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

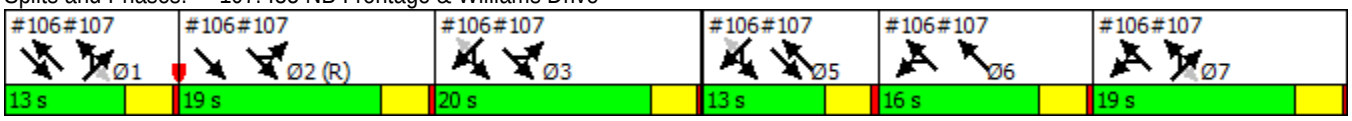
c Critical Lane Group

Lane Group	SEL	SET	NWT	NEL	NET	NER	Ø1	Ø2	Ø3	Ø5	Ø6	Ø7
Lane Configurations												
Traffic Volume (vph)	112	848	580	803	27	370						
Future Volume (vph)	112	848	580	803	27	370						
Lane Group Flow (vph)	149	1087	668	873	40	430						
Turn Type	custom	NA	NA	Split	NA	Perm						
Protected Phases	2 3	2 3 5	5 6	1 7	1 7		1	2	3	5	6	7
Permitted Phases	2 3					1 7						
Detector Phase	2 3	2 3 5	5 6	1 7	1 7	1 7						
Switch Phase												
Minimum Initial (s)							9.0	4.0	4.0	9.0	4.0	4.0
Minimum Split (s)							13.0	20.0	20.0	13.0	20.0	8.0
Total Split (s)							13.0	19.0	20.0	13.0	16.0	19.0
Total Split (%)							13%	19%	20%	13%	16%	19%
Yellow Time (s)							3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)							0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode							Max	C-Max	None	None	Max	None
v/c Ratio	0.24	0.64	0.76	0.91	0.08	0.66						
Control Delay	19.5	7.4	55.7	49.4	27.1	15.5						
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0						
Total Delay	19.5	7.4	55.7	49.4	27.1	15.5						
Queue Length 50th (ft)	35	36	222	276	19	70						
Queue Length 95th (ft)	50	64	290	#390	33	159						
Internal Link Dist (ft)		465	439		826							
Turn Bay Length (ft)	100					100						
Base Capacity (vph)	619	1698	881	961	521	653						
Starvation Cap Reductn	0	0	0	0	0	0						
Spillback Cap Reductn	0	0	0	0	0	0						
Storage Cap Reductn	0	0	0	0	0	0						
Reduced v/c Ratio	0.24	0.64	0.76	0.91	0.08	0.66						

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 1 (1%), Referenced to phase 2:SET, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 107: I35 NB Frontage & Williams Drive



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	112	848	0	0	580	32	803	27	370	0	0	0
Future Volume (vph)	112	848	0	0	580	32	803	27	370	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			0.95		0.97	1.00	1.00			
Frt	1.00	1.00			0.99		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			3504		3433	1863	1583			
Flt Permitted	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539			3504		3433	1863	1583			
Peak-hour factor, PHF	0.75	0.78	0.92	0.92	0.93	0.73	0.92	0.68	0.86	0.92	0.92	0.92
Adj. Flow (vph)	149	1087	0	0	624	44	873	40	430	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	210	0	0	0
Lane Group Flow (vph)	149	1087	0	0	663	0	873	40	220	0	0	0
Turn Type	custom	NA			NA		Split	NA	Perm			
Protected Phases	2 3	2 3 5			5 6		1 7	1 7				
Permitted Phases	2 3								1 7			
Actuated Green, G (s)	35.0	48.0			25.0		28.0	28.0	28.0			
Effective Green, g (s)	35.0	48.0			25.0		28.0	28.0	28.0			
Actuated g/C Ratio	0.35	0.48			0.25		0.28	0.28	0.28			
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)	619	1698			876		961	521	443			
v/s Ratio Prot	0.08	c0.31			c0.19		c0.25	0.02				
v/s Ratio Perm									0.14			
v/c Ratio	0.24	0.64			0.76		0.91	0.08	0.50			
Uniform Delay, d1	23.1	19.5			34.7		34.8	26.5	30.1			
Progression Factor	0.80	0.30			1.44		1.00	1.00	1.00			
Incremental Delay, d2	0.2	0.7			3.4		12.1	0.1	0.9			
Delay (s)	18.6	6.5			53.5		46.8	26.6	31.0			
Level of Service	B	A			D		D	C	C			
Approach Delay (s)		7.9			53.5			41.2			0.0	
Approach LOS		A			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations											
Traffic Volume (vph)	134	910	219	345	764	265	391	171	113	207	179
Future Volume (vph)	134	910	219	345	764	265	391	171	113	207	179
Lane Group Flow (vph)	144	1034	270	371	868	335	465	231	131	262	236
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA
Protected Phases	5	2		1	6		3	8	1	7	4
Permitted Phases	2		2	6		6			8		
Detector Phase	5	2	2	1	6	6	3	8	1	7	4
Switch Phase											
Minimum Initial (s)	7.0	15.0	15.0	7.0	15.0	15.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	13.5	37.5	37.5	13.5	34.5	34.5	34.0	34.0	13.5	15.0	15.0
Total Split (s)	15.0	42.0	42.0	35.0	62.0	62.0	24.0	15.0	35.0	28.0	19.0
Total Split (%)	12.5%	35.0%	35.0%	29.2%	51.7%	51.7%	20.0%	12.5%	29.2%	23.3%	15.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	5.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.5	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None	None	None	None
v/c Ratio	0.45	0.89	0.39	0.90	0.53	0.37	0.91	0.51	0.19	0.64	0.67
Control Delay	14.4	34.5	4.3	82.3	12.8	2.3	72.7	53.6	3.9	57.2	58.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.4	34.5	4.3	82.3	12.8	2.3	72.7	53.6	3.9	57.2	58.6
Queue Length 50th (ft)	23	253	0	260	83	3	185	88	0	101	87
Queue Length 95th (ft)	m63	#540	37	#383	154	22	#250	109	29	121	131
Internal Link Dist (ft)		305			466			485			323
Turn Bay Length (ft)	150		250	150		193	270		200	180	
Base Capacity (vph)	323	1165	690	467	1634	908	513	452	730	617	379
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.89	0.39	0.79	0.53	0.37	0.91	0.51	0.18	0.42	0.62

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 109 (91%), Referenced to phase 2:EBTL and 6:WBTL, Start of 1st Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: D B Wood Road/Shell Road & Williams Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	910	219	345	764	265	391	171	113	207	179	32
Future Volume (vph)	134	910	219	345	764	265	391	171	113	207	179	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.5	6.0	6.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.97	0.95	1.00	0.97	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1736	3471	1553	1736	3471	1553	3367	3471	1553	3367	3385	
Flt Permitted	0.33	1.00	1.00	0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	597	3471	1553	156	3471	1553	3367	3471	1553	3367	3385	
Peak-hour factor, PHF	0.93	0.88	0.81	0.93	0.88	0.79	0.84	0.74	0.86	0.79	0.91	0.83
Adj. Flow (vph)	144	1034	270	371	868	335	465	231	131	262	197	39
RTOR Reduction (vph)	0	0	169	0	0	177	0	0	87	0	14	0
Lane Group Flow (vph)	144	1034	101	371	868	158	465	231	44	262	223	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6			8			
Actuated Green, G (s)	48.5	40.3	40.3	71.2	56.5	56.5	18.3	15.7	40.1	14.6	12.0	
Effective Green, g (s)	48.5	40.3	40.3	71.2	56.5	56.5	18.3	15.7	40.1	14.6	12.0	
Actuated g/C Ratio	0.40	0.34	0.34	0.59	0.47	0.47	0.15	0.13	0.33	0.12	0.10	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.5	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	319	1165	521	413	1634	731	513	454	518	409	338	
v/s Ratio Prot	0.03	0.30		c0.18	0.25		c0.14	0.07	0.02	c0.08	0.07	
v/s Ratio Perm	0.15		0.06	c0.35		0.10			0.01			
v/c Ratio	0.45	0.89	0.19	0.90	0.53	0.22	0.91	0.51	0.08	0.64	0.66	
Uniform Delay, d1	23.2	37.7	28.3	35.6	22.4	18.7	50.0	48.6	27.4	50.2	52.0	
Progression Factor	0.70	0.61	0.56	1.85	0.51	0.61	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	9.2	0.7	20.0	1.1	0.6	19.5	0.9	0.1	3.4	4.6	
Delay (s)	17.2	32.1	16.7	85.8	12.5	11.9	69.5	49.5	27.4	53.6	56.6	
Level of Service	B	C	B	F	B	B	E	D	C	D	E	
Approach Delay (s)		27.7			29.7			57.3			55.0	
Approach LOS		C			C			E			E	

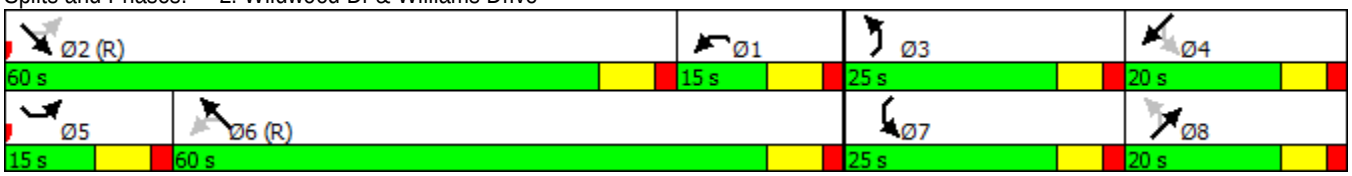
Intersection Summary			
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	35	1087	59	1167	238	19	2	14
Future Volume (vph)	35	1087	59	1167	238	19	2	14
Lane Group Flow (vph)	61	1199	102	1274	326	93	8	118
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	14.0	30.0	14.0	30.0	14.0	14.0	14.0	14.0
Total Split (s)	15.0	60.0	15.0	60.0	25.0	20.0	25.0	20.0
Total Split (%)	12.5%	50.0%	12.5%	50.0%	20.8%	16.7%	20.8%	16.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None
v/c Ratio	0.33	0.73	0.42	0.72	0.82	0.19	0.04	0.58
Control Delay	20.9	31.9	30.8	23.5	54.5	25.0	30.5	29.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	31.9	30.8	23.5	54.5	25.0	30.5	29.2
Queue Length 50th (ft)	37	483	37	351	211	35	4	24
Queue Length 95th (ft)	35	546	37	m521	235	25	4	6
Internal Link Dist (ft)		2052		391		287		1154
Turn Bay Length (ft)	300		300					
Base Capacity (vph)	190	1640	244	1759	400	493	378	269
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.73	0.42	0.72	0.81	0.19	0.02	0.44

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 115 (96%), Referenced to phase 2:SETL and 6:NWTL, Start of 1st Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Wildwood Dr & Williams Drive



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	35	1087	40	59	1167	3	238	19	34	2	14	63
Future Volume (vph)	35	1087	40	59	1167	3	238	19	34	2	14	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.93		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3515		1770	3537		1770	1734		1770	1659	
Flt Permitted	0.09	1.00		0.14	1.00		0.43	1.00		0.70	1.00	
Satd. Flow (perm)	172	3515		259	3537		794	1734		1298	1659	
Peak-hour factor, PHF	0.57	0.95	0.73	0.58	0.92	0.50	0.73	0.38	0.79	0.25	0.44	0.73
Adj. Flow (vph)	61	1144	55	102	1268	6	326	50	43	8	32	86
RTOR Reduction (vph)	0	3	0	0	0	0	0	21	0	0	76	0
Lane Group Flow (vph)	61	1196	0	102	1274	0	326	72	0	8	42	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	49.6	49.6		53.5	53.5		40.1	32.7		15.3	13.9	
Effective Green, g (s)	49.6	49.6		53.5	53.5		40.1	32.7		15.3	13.9	
Actuated g/C Ratio	0.41	0.41		0.45	0.45		0.33	0.27		0.13	0.12	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	156	1452		245	1576		429	472		171	192	
v/s Ratio Prot	0.02	c0.34		0.04	c0.36		c0.13	0.04		0.00	0.03	
v/s Ratio Perm	0.14			0.15			c0.13			0.01		
v/c Ratio	0.39	0.82		0.42	0.81		0.76	0.15		0.05	0.22	
Uniform Delay, d1	28.0	31.3		38.4	28.8		32.9	33.1		45.9	48.1	
Progression Factor	0.87	1.09		0.82	0.83		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	5.0		1.0	3.9		7.6	0.2		0.1	0.6	
Delay (s)	25.7	39.0		32.7	27.9		40.5	33.3		46.0	48.7	
Level of Service	C	D		C	C		D	C		D	D	
Approach Delay (s)		38.3			28.2			38.9			48.5	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	26.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1129	18	34	1434	22	33
Future Volume (vph)	1129	18	34	1434	22	33
Lane Group Flow (vph)	1227	35	56	1648	42	66
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases		2	6			4
Detector Phase	2	2	1	6	4	1
Switch Phase						
Minimum Initial (s)	15.0	15.0	7.0	15.0	7.0	7.0
Minimum Split (s)	34.0	34.0	13.0	34.0	13.0	13.0
Total Split (s)	78.0	78.0	17.0	95.0	25.0	17.0
Total Split (%)	65.0%	65.0%	14.2%	79.2%	20.8%	14.2%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.5	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	2.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	5.5	6.0
Lead/Lag	Lag	Lag	Lead			Lead
Lead-Lag Optimize?	Yes	Yes	Yes			Yes
Recall Mode	C-Min	C-Min	None	C-Min	None	None
v/c Ratio	0.45	0.03	0.15	0.54	0.33	0.22
Control Delay	6.7	2.3	0.8	1.1	59.5	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.7	2.3	0.8	1.1	59.5	11.4
Queue Length 50th (ft)	223	1	1	17	32	0
Queue Length 95th (ft)	282	6	m0	4	38	3
Internal Link Dist (ft)	1127			2052	664	
Turn Bay Length (ft)		300	300			
Base Capacity (vph)	2720	1225	424	3024	284	349
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.03	0.13	0.54	0.15	0.19

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 79 (66%), Referenced to phase 2:SET and 6:NWTL, Start of 1st Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Woodlake Dr & Williams Drive

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	1129	18	34	1434	22	33
Future Volume (vph)	1129	18	34	1434	22	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	5.5	6.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3505	1568	1752	3505	1752	1568
Flt Permitted	1.00	1.00	0.19	1.00	0.95	1.00
Satd. Flow (perm)	3505	1568	347	3505	1752	1568
Peak-hour factor, PHF	0.92	0.51	0.61	0.87	0.52	0.50
Adj. Flow (vph)	1227	35	56	1648	42	66
RTOR Reduction (vph)	0	9	0	0	0	59
Lane Group Flow (vph)	1227	26	56	1648	42	7
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Turn Type	NA	Perm	pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	4	1
Permitted Phases		2	6			4
Actuated Green, G (s)	89.7	89.7	101.3	101.3	7.2	12.8
Effective Green, g (s)	89.7	89.7	101.3	101.3	7.2	12.8
Actuated g/C Ratio	0.75	0.75	0.84	0.84	0.06	0.11
Clearance Time (s)	6.0	6.0	6.0	6.0	5.5	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2619	1172	358	2958	105	167
v/s Ratio Prot	0.35		0.01	c0.47	c0.02	0.00
v/s Ratio Perm		0.02	0.12			0.00
v/c Ratio	0.47	0.02	0.16	0.56	0.40	0.04
Uniform Delay, d1	5.9	3.9	2.9	2.8	54.3	48.1
Progression Factor	0.97	1.33	0.13	0.20	1.00	1.00
Incremental Delay, d2	0.6	0.0	0.1	0.5	2.5	0.1
Delay (s)	6.3	5.2	0.5	1.1	56.8	48.2
Level of Service	A	A	A	A	E	D
Approach Delay (s)	6.3			1.0	51.6	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	SEL	SET	NWL	NWT
Lane Configurations								
Traffic Volume (vph)	100	35	80	35	80	1020	100	1186
Future Volume (vph)	100	35	80	35	80	1020	100	1186
Lane Group Flow (vph)	109	114	87	147	87	1185	109	1398
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	1	6	5	2
Permitted Phases	4		8		6		2	
Detector Phase	7	4	3	8	1	6	5	2
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	10.0	7.0	10.0
Minimum Split (s)	12.5	20.0	12.5	20.0	12.5	20.0	12.5	20.0
Total Split (s)	15.0	15.0	15.0	15.0	15.0	75.0	15.0	75.0
Total Split (%)	12.5%	12.5%	12.5%	12.5%	12.5%	62.5%	12.5%	62.5%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Min	None	C-Min
v/c Ratio	0.50	0.57	0.38	0.69	0.37	0.58	0.36	0.68
Control Delay	47.4	36.1	43.5	39.1	10.8	7.4	10.1	20.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.4	36.1	43.5	39.1	10.8	7.4	10.1	20.9
Queue Length 50th (ft)	70	36	55	40	8	65	25	460
Queue Length 95th (ft)	125	98	103	#125	m17	295	m41	407
Internal Link Dist (ft)		1195		1212		1599		2931
Turn Bay Length (ft)					175		175	
Base Capacity (vph)	224	208	240	224	263	2098	321	2095
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.55	0.36	0.66	0.33	0.56	0.34	0.67

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 56 (47%), Referenced to phase 2:NWTL and 6:SETL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Williams Drive & River Bend

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	100	35	70	80	35	100	80	1020	70	100	1186	100
Future Volume (vph)	100	35	70	80	35	100	80	1020	70	100	1186	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90		1.00	0.89		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1676		1770	1656		1770	3505		1770	3498	
Flt Permitted	0.39	1.00		0.61	1.00		0.11	1.00		0.17	1.00	
Satd. Flow (perm)	730	1676		1145	1656		213	3505		309	3498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	38	76	87	38	109	87	1109	76	109	1289	109
RTOR Reduction (vph)	0	59	0	0	86	0	0	4	0	0	5	0
Lane Group Flow (vph)	109	55	0	87	61	0	87	1181	0	109	1393	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8			6			2		
Actuated Green, G (s)	20.9	10.2		18.9	9.2		77.7	70.0		78.5	70.4	
Effective Green, g (s)	20.9	10.2		18.9	9.2		77.7	70.0		78.5	70.4	
Actuated g/C Ratio	0.17	0.08		0.16	0.08		0.65	0.58		0.65	0.59	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	219	142		230	126		237	2044		300	2052	
v/s Ratio Prot	c0.04	0.03		0.03	0.04		0.02	0.34		c0.02	c0.40	
v/s Ratio Perm	c0.04			0.03			0.21			0.21		
v/c Ratio	0.50	0.38		0.38	0.49		0.37	0.58		0.36	0.68	
Uniform Delay, d1	43.7	51.9		44.8	53.1		12.3	15.7		10.2	17.0	
Progression Factor	1.00	1.00		1.00	1.00		1.08	0.40		1.09	1.09	
Incremental Delay, d2	1.8	1.7		1.0	2.9		0.8	1.0		0.6	1.6	
Delay (s)	45.5	53.7		45.8	56.1		14.1	7.2		11.8	20.1	
Level of Service	D	D		D	E		B	A		B	C	
Approach Delay (s)		49.7			52.3			7.7			19.5	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

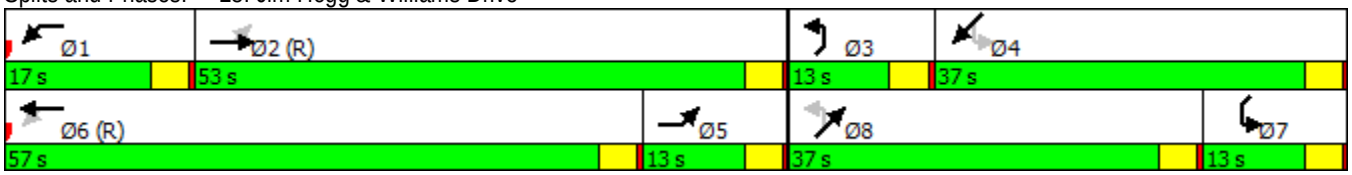
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWL	SWT
Lane Configurations								
Traffic Volume (vph)	1	647	151	682	22	1	4	1
Future Volume (vph)	1	647	151	682	22	1	4	1
Lane Group Flow (vph)	1	731	164	742	24	150	4	3
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	5	2	1	6	3	8	7	4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	1	6	3	8	7	4
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	8.0	20.0	8.0	10.0	8.0	10.0
Total Split (s)	13.0	53.0	17.0	57.0	13.0	37.0	13.0	37.0
Total Split (%)	10.8%	44.2%	14.2%	47.5%	10.8%	30.8%	10.8%	30.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Min	None	None	None	None
v/c Ratio	0.00	0.29	0.27	0.25	0.20	0.62	0.03	0.03
Control Delay	9.0	7.3	1.9	1.2	55.4	20.1	53.2	41.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.0	7.3	1.9	1.2	55.4	20.1	53.2	41.0
Queue Length 50th (ft)	0	78	1	2	18	1	3	1
Queue Length 95th (ft)	3	196	43	101	44	63	15	11
Internal Link Dist (ft)		695		535		259		291
Turn Bay Length (ft)								
Base Capacity (vph)	587	2559	641	2925	149	543	179	462
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.29	0.26	0.25	0.16	0.28	0.02	0.01

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 94 (78%), Referenced to phase 2:EBTL and 6:WBTL, Start of 1st Green
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 28: Jim Hogg & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	1	647	26	151	682	1	22	1	137	4	1	2
Future Volume (vph)	1	647	26	151	682	1	22	1	137	4	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3519		1770	3539		1770	1585		1770	1676	
Flt Permitted	0.37	1.00		0.33	1.00		1.00	1.00		1.00	1.00	
Satd. Flow (perm)	689	3519		613	3539		1863	1585		1863	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	703	28	164	741	1	24	1	149	4	1	2
RTOR Reduction (vph)	0	1	0	0	0	0	0	139	0	0	2	0
Lane Group Flow (vph)	1	730	0	164	742	0	24	11	0	4	1	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	84.0	84.0		92.8	92.8		7.8	7.8		4.1	4.1	
Effective Green, g (s)	84.0	84.0		92.8	92.8		7.8	7.8		4.1	4.1	
Actuated g/C Ratio	0.70	0.70		0.77	0.77		0.06	0.06		0.03	0.03	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	503	2463		581	2736		121	103		63	57	
v/s Ratio Prot	0.00	c0.21		0.03	c0.21		0.01	0.01		0.00	0.00	
v/s Ratio Perm	0.00			0.19			c0.01			c0.00		
v/c Ratio	0.00	0.30		0.28	0.27		0.20	0.10		0.06	0.02	
Uniform Delay, d1	5.4	6.8		3.9	3.9		53.2	52.8		55.2	56.0	
Progression Factor	1.00	1.00		0.23	0.26		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.3	0.2		0.8	0.4		0.4	0.1	
Delay (s)	5.4	7.1		1.1	1.3		54.0	53.3		55.6	56.1	
Level of Service	A	A		A	A		D	D		E	E	
Approach Delay (s)		7.1			1.2			53.4			55.8	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	72	716	764	692	431	70
Future Volume (vph)	72	716	764	692	431	70
Lane Group Flow (vph)	78	778	830	752	476	68
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	32.0	32.0	32.0	14.0	14.0
Total Split (s)	12.0	90.0	78.0	78.0	30.0	30.0
Total Split (%)	10.0%	75.0%	65.0%	65.0%	25.0%	25.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	None	None
v/c Ratio	0.16	0.29	0.35	0.57	0.77	0.22
Control Delay	3.8	4.7	5.2	2.3	55.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	4.7	5.2	2.3	55.5	10.9
Queue Length 50th (ft)	20	127	41	1	181	0
Queue Length 95th (ft)	11	38	86	1	231	41
Internal Link Dist (ft)		706	847		395	
Turn Bay Length (ft)	120			500		200
Base Capacity (vph)	487	2667	2404	1316	744	365
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.29	0.35	0.57	0.64	0.19

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 100 (83%), Referenced to phase 2:SETL and 6:NWT, Start of 1st Green
Natural Cycle: 55
Control Type: Actuated-Coordinated

Splits and Phases: 37: Williams Drive & Del Webb

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	72	716	764	692	431	70
Future Volume (vph)	72	716	764	692	431	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3539	3539	1583	3436	1441
Flt Permitted	0.29	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	538	3539	3539	1583	3436	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	778	830	752	468	76
RTOR Reduction (vph)	0	0	0	246	1	56
Lane Group Flow (vph)	78	778	830	506	475	12
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	90.4	90.4	80.7	80.7	21.6	21.6
Effective Green, g (s)	90.4	90.4	80.7	80.7	21.6	21.6
Actuated g/C Ratio	0.75	0.75	0.67	0.67	0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	463	2666	2379	1064	618	259
v/s Ratio Prot	0.01	c0.22	0.23		c0.14	
v/s Ratio Perm	0.12			c0.32		0.01
v/c Ratio	0.17	0.29	0.35	0.48	0.77	0.05
Uniform Delay, d1	4.6	4.7	8.4	9.5	46.8	40.7
Progression Factor	0.69	0.89	0.53	0.99	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.3	1.3	5.7	0.1
Delay (s)	3.3	4.4	4.8	10.7	52.6	40.8
Level of Service	A	A	A	B	D	D
Approach Delay (s)		4.3	7.6		51.1	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBT	SBR	Ø4
Lane Configurations								
Traffic Volume (vph)	79	1151	1284	61	79	0	90	
Future Volume (vph)	79	1151	1284	61	79	0	90	
Lane Group Flow (vph)	86	1251	1396	66	0	86	98	
Turn Type	Perm	NA	NA	Perm	Perm	NA	Perm	
Protected Phases		2	6			8		4
Permitted Phases	2			6	8		8	
Detector Phase	2	2	6	6	8	8	8	
Switch Phase								
Minimum Initial (s)	1.0	1.0	1.0	1.0	4.0	4.0	4.0	4.0
Minimum Split (s)	5.0	5.0	5.0	5.0	20.0	20.0	20.0	20.0
Total Split (s)	96.0	96.0	96.0	96.0	24.0	24.0	24.0	24.0
Total Split (%)	80.0%	80.0%	80.0%	80.0%	20.0%	20.0%	20.0%	20%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	C-Min	C-Min	Min	Min	Max	Max	Max	Max
v/c Ratio	0.67	0.59	0.66	0.07		0.18	0.17	
Control Delay	46.0	20.2	7.4	0.4		35.4	8.8	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	46.0	20.2	7.4	0.4		35.4	8.8	
Queue Length 50th (ft)	42	317	145	1		47	1	
Queue Length 95th (ft)	m36	m136	m135	m2		112	49	
Internal Link Dist (ft)		3232	291			759		
Turn Bay Length (ft)	100			138			54	
Base Capacity (vph)	164	2713	2713	1229		467	589	
Starvation Cap Reductn	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0		0	0	
Reduced v/c Ratio	0.52	0.46	0.51	0.05		0.18	0.17	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 39 (33%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 41: William Drive/Serenada Drive & Williams Drive

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	1151	0	0	1284	61	0	0	0	79	0	90
Future Volume (vph)	79	1151	0	0	1284	61	0	0	0	79	0	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95			0.95	1.00					1.00	1.00
Frt	1.00	1.00			1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00			1.00	1.00					0.95	1.00
Satd. Flow (prot)	1770	3539			3539	1583					1770	1583
Flt Permitted	0.12	1.00			1.00	1.00					0.76	1.00
Satd. Flow (perm)	215	3539			3539	1583					1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	1251	0	0	1396	66	0	0	0	86	0	98
RTOR Reduction (vph)	0	0	0	0	0	26	0	0	0	0	0	65
Lane Group Flow (vph)	86	1251	0	0	1396	40	0	0	0	0	86	33
Turn Type	Perm	NA			NA	Perm				Perm	NA	Perm
Protected Phases		2			6			4			8	
Permitted Phases	2					6	4			8		8
Actuated Green, G (s)	72.2	72.2			72.2	72.2					39.8	39.8
Effective Green, g (s)	72.2	72.2			72.2	72.2					39.8	39.8
Actuated g/C Ratio	0.60	0.60			0.60	0.60					0.33	0.33
Clearance Time (s)	4.0	4.0			4.0	4.0					4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0					3.0	3.0
Lane Grp Cap (vph)	129	2129			2129	952					467	525
v/s Ratio Prot		0.35			0.39							
v/s Ratio Perm	c0.40					0.03					c0.06	0.02
v/c Ratio	0.67	0.59			0.66	0.04					0.18	0.06
Uniform Delay, d1	15.9	14.7			15.7	9.8					28.5	27.4
Progression Factor	1.92	1.35			0.41	0.29					1.00	1.00
Incremental Delay, d2	17.2	0.8			0.5	0.0					0.9	0.2
Delay (s)	47.7	20.7			7.0	2.9					29.4	27.6
Level of Service	D	C			A	A					C	C
Approach Delay (s)		22.4			6.8			0.0			28.4	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

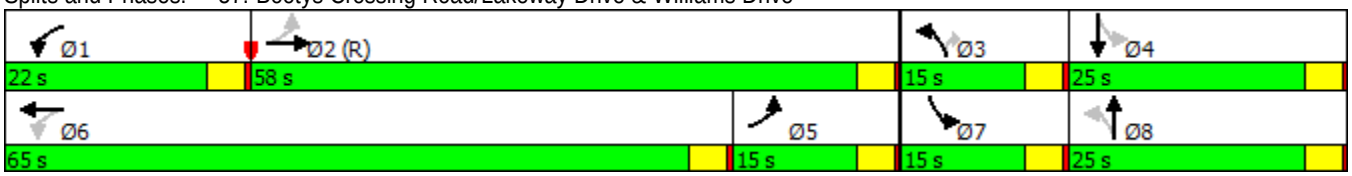
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	176	894	236	999	126	64	148	128	85
Future Volume (vph)	176	894	236	999	126	64	148	128	85
Lane Group Flow (vph)	191	1008	257	1250	137	70	161	139	331
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	custom	pm+pt	NA
Protected Phases	5	2	1	6	3	8		7	4
Permitted Phases	2		6		8		3	4	
Detector Phase	5	2	1	6	3	8	3	7	4
Switch Phase									
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	15.0	58.0	22.0	65.0	15.0	25.0	15.0	15.0	25.0
Total Split (%)	12.5%	48.3%	18.3%	54.2%	12.5%	20.8%	12.5%	12.5%	20.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	Max	None	Max	None	None
v/c Ratio	0.53	0.61	0.84	0.80	0.61	0.25	0.55	0.38	0.93
Control Delay	34.8	17.9	45.3	40.0	46.2	45.5	15.5	35.8	68.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.8	17.9	45.3	40.0	46.2	45.5	15.5	35.8	68.5
Queue Length 50th (ft)	91	257	164	518	80	47	0	82	186
Queue Length 95th (ft)	#167	195	#241	547	135	91	66	137	#359
Internal Link Dist (ft)		3581		1599		968			626
Turn Bay Length (ft)	180		190				108		
Base Capacity (vph)	360	1657	326	1772	224	327	291	370	368
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.61	0.79	0.71	0.61	0.21	0.55	0.38	0.90

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 13 (11%), Referenced to phase 2:EBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 57: Bootys Crossing Road/Lakeway Drive & Williams Drive



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	894	33	236	999	151	126	64	148	128	85	220
Future Volume (vph)	176	894	33	236	999	151	126	64	148	128	85	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3520		1770	3470		1770	1863	1583	1770	1661	
Flt Permitted	0.14	1.00		0.11	1.00		0.24	1.00	1.00	0.57	1.00	
Satd. Flow (perm)	256	3520		204	3470		441	1863	1583	1061	1661	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	972	36	257	1086	164	137	70	161	139	92	239
RTOR Reduction (vph)	0	2	0	0	11	0	0	0	146	0	78	0
Lane Group Flow (vph)	191	1006	0	257	1239	0	137	70	15	139	253	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	custom	pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8		3	4		
Actuated Green, G (s)	55.6	55.6		53.1	53.1		27.9	16.9	11.0	35.9	20.9	
Effective Green, g (s)	55.6	55.6		53.1	53.1		27.9	16.9	11.0	35.9	20.9	
Actuated g/C Ratio	0.46	0.46		0.44	0.44		0.23	0.14	0.09	0.30	0.17	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	358	1630		305	1535		224	262	145	406	289	
v/s Ratio Prot	0.08	c0.29		0.12	c0.36		c0.06	0.04		0.04	c0.15	
v/s Ratio Perm	0.16			c0.26			0.09		0.01	0.06		
v/c Ratio	0.53	0.62		0.84	0.81		0.61	0.27	0.10	0.34	0.88	
Uniform Delay, d1	34.5	24.2		31.2	29.0		39.1	46.0	50.0	32.1	48.3	
Progression Factor	0.76	0.67		0.92	1.33		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	1.6		14.7	2.4		4.9	0.6	1.4	0.5	24.4	
Delay (s)	27.5	17.9		43.5	41.1		43.9	46.6	51.4	32.6	72.7	
Level of Service	C	B		D	D		D	D	D	C	E	
Approach Delay (s)		19.4			41.5			47.7			60.8	
Approach LOS		B			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

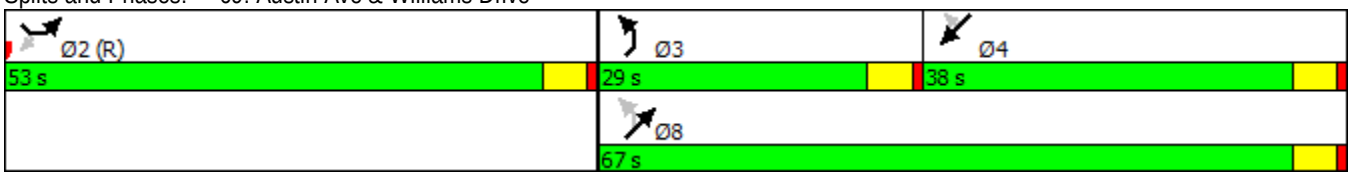
c Critical Lane Group

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	732	508	534	251	211	415
Future Volume (vph)	732	508	534	251	211	415
Lane Group Flow (vph)	928	420	290	563	229	451
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	2		3	8	4	
Permitted Phases		2	8			4
Detector Phase	2	2	3	8	4	4
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	9.0	21.0	21.0	21.0
Total Split (s)	53.0	53.0	29.0	67.0	38.0	38.0
Total Split (%)	44.2%	44.2%	24.2%	55.8%	31.7%	31.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	C-Max	C-Max	None	None	None	None
v/c Ratio	0.53	0.44	0.74	0.56	0.68	0.69
Control Delay	12.1	2.4	36.8	27.4	55.4	9.5
Queue Delay	0.3	0.1	0.0	0.0	0.0	0.4
Total Delay	12.4	2.5	36.8	27.4	55.4	9.8
Queue Length 50th (ft)	157	13	174	168	167	0
Queue Length 95th (ft)	m280	m35	223	186	233	87
Internal Link Dist (ft)	439			647	500	
Turn Bay Length (ft)	210		425			
Base Capacity (vph)	1761	947	418	1226	512	762
Starvation Cap Reductn	289	89	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	63
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.49	0.69	0.46	0.45	0.65

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 71 (59%), Referenced to phase 2:SEL and 6:, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 69: Austin Ave & Williams Drive



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	732	508	534	251	211	415
Future Volume (vph)	732	508	534	251	211	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91	0.91	0.91	1.00	1.00
Frt	0.98	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.95	0.97	1.00	1.00
Satd. Flow (prot)	3391	1441	1610	3305	1863	1583
Flt Permitted	0.96	1.00	0.29	0.56	1.00	1.00
Satd. Flow (perm)	3391	1441	484	1889	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	796	552	580	273	229	451
RTOR Reduction (vph)	9	203	0	0	0	369
Lane Group Flow (vph)	919	217	290	563	229	82
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	2		3	8	4	
Permitted Phases		2	8			4
Actuated Green, G (s)	62.0	62.0	48.0	48.0	21.7	21.7
Effective Green, g (s)	62.0	62.0	48.0	48.0	21.7	21.7
Actuated g/C Ratio	0.52	0.52	0.40	0.40	0.18	0.18
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1752	744	393	1006	336	286
v/s Ratio Prot	c0.27		c0.13	0.10	0.12	
v/s Ratio Perm		0.15	c0.16	0.12		0.05
v/c Ratio	0.52	0.29	0.74	0.56	0.68	0.29
Uniform Delay, d1	19.2	16.5	27.5	27.8	45.9	42.5
Progression Factor	0.54	0.58	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.8	7.1	0.7	5.6	0.6
Delay (s)	11.3	10.3	34.6	28.5	51.5	43.0
Level of Service	B	B	C	C	D	D
Approach Delay (s)	11.0			30.6	45.9	
Approach LOS	B			C	D	

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

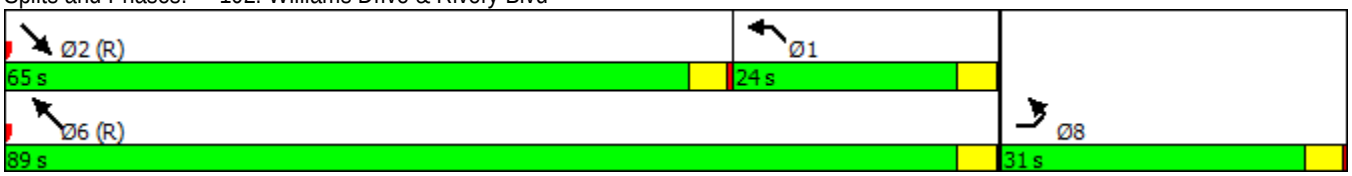
c Critical Lane Group

Lane Group	EBL	SET	NWL	NWT
Lane Configurations				
Traffic Volume (vph)	318	1165	186	1168
Future Volume (vph)	318	1165	186	1168
Lane Group Flow (vph)	560	1432	207	1243
Turn Type	Prot	NA	Prot	NA
Protected Phases	8	2	1	6
Permitted Phases				
Detector Phase	8	2	1	6
Switch Phase				
Minimum Initial (s)	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	10.0	20.0
Total Split (s)	31.0	65.0	24.0	89.0
Total Split (%)	25.8%	54.2%	20.0%	74.2%
Yellow Time (s)	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0
Lead/Lag		Lead	Lag	
Lead-Lag Optimize?		Yes	Yes	
Recall Mode	None	C-Max	None	C-Max
v/c Ratio	0.82	0.76	0.70	0.47
Control Delay	51.7	19.2	54.4	9.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	51.7	19.2	54.4	9.7
Queue Length 50th (ft)	194	546	142	196
Queue Length 95th (ft)	220	602	#238	234
Internal Link Dist (ft)	904	2931		1755
Turn Bay Length (ft)			175	
Base Capacity (vph)	794	1887	295	2624
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.71	0.76	0.70	0.47

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 114 (95%), Referenced to phase 2:SET and 6:NWT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 102: Williams Drive & Rivery Blvd



Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	318	148	1165	160	186	1168
Future Volume (vph)	318	148	1165	160	186	1168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	0.97		0.95		1.00	0.95
Frt	0.95		0.98		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	3332		3468		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	3332		3468		1770	3539
Peak-hour factor, PHF	0.82	0.86	0.94	0.83	0.90	0.94
Adj. Flow (vph)	388	172	1239	193	207	1243
RTOR Reduction (vph)	46	0	10	0	0	0
Lane Group Flow (vph)	514	0	1422	0	207	1243
Turn Type	Prot		NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases						
Actuated Green, G (s)	23.0		65.0		20.0	89.0
Effective Green, g (s)	23.0		65.0		20.0	89.0
Actuated g/C Ratio	0.19		0.54		0.17	0.74
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	638		1878		295	2624
v/s Ratio Prot	c0.15		c0.41		c0.12	0.35
v/s Ratio Perm						
v/c Ratio	0.81		0.76		0.70	0.47
Uniform Delay, d1	46.4		21.4		47.2	6.2
Progression Factor	1.00		0.75		0.91	1.39
Incremental Delay, d2	7.3		2.6		5.8	0.5
Delay (s)	53.7		18.6		49.0	9.1
Level of Service	D		B		D	A
Approach Delay (s)	53.7		18.6			14.8
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

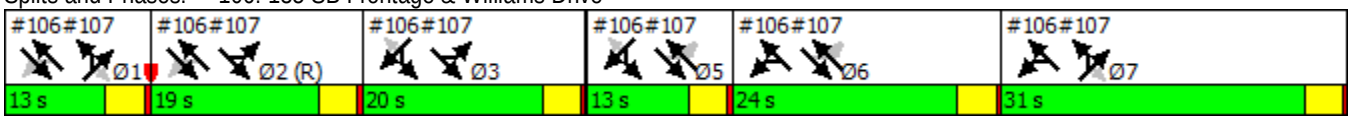
c Critical Lane Group

Lane Group	SET	SER	NWL	NWT	SWL	SWT	SWR	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	601	706	366	1446	203	136	97					
Future Volume (vph)	601	706	366	1446	203	136	97					
Lane Group Flow (vph)	646	759	416	1589	192	199	124					
Turn Type	NA	Free	pm+pt	NA	Split	NA	Perm					
Protected Phases	1 2		6 7	1 2 6 7	3 5	3 5		1	2	3	5	6
Permitted Phases		Free	1 2 6 7				3 5					
Detector Phase	1 2		6 7	1 2 6 7	3 5	3 5	3 5					
Switch Phase												
Minimum Initial (s)								9.0	4.0	4.0	9.0	4.0
Minimum Split (s)								13.0	20.0	20.0	13.0	20.0
Total Split (s)								13.0	19.0	20.0	13.0	24.0
Total Split (%)								11%	16%	17%	11%	20%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.78	0.48	0.51	0.65	0.47	0.47	0.26					
Control Delay	28.9	1.5	12.9	0.4	43.5	43.3	8.8					
Queue Delay	0.0	0.0	0.0	0.7	0.0	0.0	0.0					
Total Delay	28.9	1.5	12.9	1.0	43.5	43.3	8.8					
Queue Length 50th (ft)	220	11	78	0	134	138	4					
Queue Length 95th (ft)	283	19	m81	m0	208	204	35					
Internal Link Dist (ft)	1755			1		1077						
Turn Bay Length (ft)		200	100				100					
Base Capacity (vph)	825	1583	819	2447	400	417	467					
Starvation Cap Reductn	0	0	0	456	0	0	0					
Spillback Cap Reductn	0	0	0	0	0	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.78	0.48	0.51	0.80	0.48	0.48	0.27					

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 61 (51%), Referenced to phase 2:NWSE, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 106: 135 SB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	31.0
Total Split (%)	26%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	601	706	366	1446	0	0	0	0	203	136	97
Future Volume (vph)	0	601	706	366	1446	0	0	0	0	203	136	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.95					0.95	0.95	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.99	1.00
Satd. Flow (prot)		3539	1583	1770	3539					1681	1752	1583
Flt Permitted		1.00	1.00	0.15	1.00					0.95	0.99	1.00
Satd. Flow (perm)		3539	1583	286	3539					1681	1752	1583
Peak-hour factor, PHF	0.92	0.93	0.93	0.88	0.91	0.92	0.92	0.92	0.92	0.88	0.85	0.78
Adj. Flow (vph)	0	646	759	416	1589	0	0	0	0	231	160	124
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	89
Lane Group Flow (vph)	0	646	759	416	1589	0	0	0	0	192	199	35
Turn Type		NA	Free	pm+pt	NA					Split	NA	Perm
Protected Phases		1 2		6 7	1 2 6 7					3 5	3 5	
Permitted Phases			Free	1 2 6 7								3 5
Actuated Green, G (s)		28.0	120.0	79.0	83.0					29.0	29.0	29.0
Effective Green, g (s)		28.0	120.0	79.0	83.0					29.0	29.0	29.0
Actuated g/C Ratio		0.23	1.00	0.66	0.69					0.24	0.24	0.24
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)		825	1583	818	2447					406	423	382
v/s Ratio Prot		c0.18		0.22	c0.45					0.11	0.11	
v/s Ratio Perm			c0.48	0.12								0.02
v/c Ratio		0.78	0.48	0.51	0.65					0.47	0.47	0.09
Uniform Delay, d1		43.2	0.0	15.6	10.4					39.0	38.9	35.3
Progression Factor		0.55	1.00	0.81	0.00					1.00	1.00	1.00
Incremental Delay, d2		4.8	0.7	0.1	0.2					0.9	0.8	0.1
Delay (s)		28.7	0.7	12.7	0.2					39.8	39.8	35.4
Level of Service		C	A	B	A					D	D	D
Approach Delay (s)		13.6			2.8			0.0			38.7	
Approach LOS		B			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

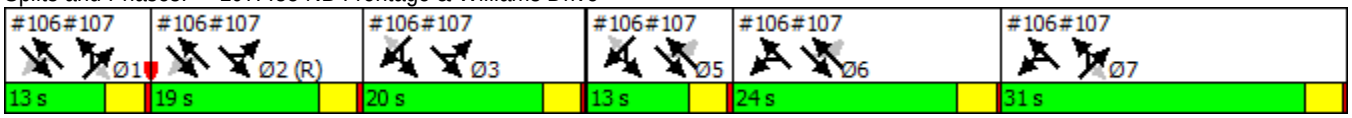
c Critical Lane Group

Lane Group	SEL	SET	NWT	NWR	NEL	NET	NER	Ø1	Ø2	Ø3	Ø5	Ø6
Lane Configurations												
Traffic Volume (vph)	118	650	801	73	1011	60	525					
Future Volume (vph)	118	650	801	73	1011	60	525					
Lane Group Flow (vph)	169	714	965	84	1123	80	640					
Turn Type	pm+pt	NA	NA	Perm	Split	NA	Perm					
Protected Phases	2 3	2 3 5 6	5 6		1 7	1 7		1	2	3	5	6
Permitted Phases	2 3 5 6			5 6			1 7					
Detector Phase	2 3	2 3 5 6	5 6	5 6	1 7	1 7	1 7					
Switch Phase												
Minimum Initial (s)								9.0	4.0	4.0	9.0	4.0
Minimum Split (s)								13.0	20.0	20.0	13.0	20.0
Total Split (s)								13.0	19.0	20.0	13.0	24.0
Total Split (%)								11%	16%	17%	11%	20%
Yellow Time (s)								3.5	3.5	3.5	3.5	3.5
All-Red Time (s)								0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag		Lead	Lag
Lead-Lag Optimize?								Yes	Yes		Yes	Yes
Recall Mode								Max	C-Max	None	None	Max
v/c Ratio	0.30	0.34	0.98	0.16	0.98	0.13	0.94					
Control Delay	2.7	0.4	87.8	18.6	62.5	28.6	47.9					
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Total Delay	2.7	0.4	87.8	18.6	62.5	28.6	47.9					
Queue Length 50th (ft)	10	1	412	14	442	43	337					
Queue Length 95th (ft)	13	1	#476	m46	#590	67	#471					
Internal Link Dist (ft)		465	439			826						
Turn Bay Length (ft)	100			100			100					
Base Capacity (vph)	578	2111	985	525	1144	621	681					
Starvation Cap Reductn	0	0	0	0	0	0	0					
Spillback Cap Reductn	0	0	0	0	0	0	0					
Storage Cap Reductn	0	0	0	0	0	0	0					
Reduced v/c Ratio	0.29	0.34	0.98	0.16	0.98	0.13	0.94					

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 61 (51%), Referenced to phase 2:NWSE, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 107: I35 NB Frontage & Williams Drive



Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	8.0
Total Split (s)	31.0
Total Split (%)	26%
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	118	650	0	0	801	73	1011	60	525	0	0	0
Future Volume (vph)	118	650	0	0	801	73	1011	60	525	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.95			0.95	1.00	0.97	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539			3539	1583	3433	1863	1583			
Flt Permitted	0.12	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	223	3539			3539	1583	3433	1863	1583			
Peak-hour factor, PHF	0.70	0.91	0.92	0.92	0.83	0.87	0.90	0.75	0.82	0.92	0.92	0.92
Adj. Flow (vph)	169	714	0	0	965	84	1123	80	640	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	61	0	0	154	0	0	0
Lane Group Flow (vph)	169	714	0	0	965	23	1123	80	486	0	0	0
Turn Type	pm+pt	NA			NA	Perm	Split	NA	Perm			
Protected Phases	2 3	2 3 5 6			5 6		1 7	1 7				
Permitted Phases	2 3 5 6					5 6			1 7			
Actuated Green, G (s)	68.0	72.0			33.4	33.4	40.0	40.0	40.0			
Effective Green, g (s)	68.0	72.0			33.4	33.4	40.0	40.0	40.0			
Actuated g/C Ratio	0.57	0.60			0.28	0.28	0.33	0.33	0.33			
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)	572	2123			985	440	1144	621	527			
v/s Ratio Prot	0.09	c0.20			c0.27		c0.33	0.04				
v/s Ratio Perm	0.08					0.01			0.31			
v/c Ratio	0.30	0.34			0.98	0.05	0.98	0.13	0.92			
Uniform Delay, d1	16.4	12.0			43.0	31.7	39.6	27.9	38.5			
Progression Factor	0.14	0.01			1.57	7.87	1.00	1.00	1.00			
Incremental Delay, d2	0.2	0.1			21.0	0.0	22.1	0.1	21.8			
Delay (s)	2.5	0.1			88.6	249.7	61.8	28.0	60.3			
Level of Service	A	A			F	F	E	C	E			
Approach Delay (s)		0.6			101.5			59.8			0.0	
Approach LOS		A			F			E			A	

Intersection Summary			
HCM 2000 Control Delay	57.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Appendix E – Level of Service Summary By Intersection

Table 1 – LOS – Existing Peak Hours

Intersection	Existing AM Peak Hour		Existing PM Peak Hour	
	Volume	LOS	Volume	LOS
1: Austin Avenue	2118	C	2651	C
2: Interstate 35 NB Frontage	2772	D	3238	D
3: Interstate 35 SB Frontage	3128	B	3555	B
4: Rivery Blvd	2526	A	3145	B
5: River Bend Dr	2769	D	2976	D
6: Lakeway Dr / Bootys Crossing Rd	3014	D	3260	D
7: Serenada Dr	2675	C	2744	B
8: D B Wood Rd / Shell Rd	3318	C	3698	E
9: Wildwood Dr	2419	B	2761	D
10: Woodlake Dr	2568	B	2670	A
11: Dell Webb Blvd	2428	A	2745	B
12: Jim Hogg Rd	2109	B	1675	A

Table 2 – LOS – Alternative Scenarios AM Peak Hour

Intersection	Optimized Signal Timing		Incorporate Flashing Yellow Arrow Displays		Geometric Improvements at Wildwood and Lakeway	
	Volume	LOS	Volume	LOS	Volume	LOS
1: Austin Avenue	2118	B	2118	B	2118	B
2: Interstate 35 NB Frontage	2772	C	2772	C	2772	C
3: Interstate 35 SB Frontage	3128	C	3128	C	3128	C
4: Rivery Blvd	2526	B	2526	A	2526	A
5: River Bend Dr	2769	B	2769	B	2769	B
6: Lakeway Dr / Bootys Crossing Rd	3014	C	3014	C	3014	C
7: Serenada Dr	2675	A	2675	A	2675	A
8: D B Wood Rd / Shell Rd	3318	C	3318	C	3318	C
9: Wildwood Dr	2419	B	2419	B	2419	B
10: Woodlake Dr	2568	B	2568	B	2568	B
11: Dell Webb Blvd	2428	B	2428	B	2428	B
12: Jim Hogg Rd	2109	B	2109	B	2109	B

Table 3 – LOS – Alternative Scenarios PM Peak Hour

Intersection	Optimized Signal Timing		Incorporate Flashing Yellow Arrow Displays		Geometric Improvements at Wildwood and Lakeway	
	Volume	LOS	Volume	LOS	Volume	LOS
1: Austin Avenue	2651	C	2651	C	2651	C
2: Interstate 35 NB Frontage	3238	E	3238	E	3238	E
3: Interstate 35 SB Frontage	3555	B	3555	B	3555	B
4: Rivery Blvd	3145	C	3145	C	3145	C
5: River Bend Dr	2976	C	2976	C	2976	B
6: Lakeway Dr / Bootys Crossing Rd	3260	C	3260	D	3260	D
7: Serenada Dr	2744	A	2744	A	2744	B
8: D B Wood Rd / Shell Rd	3698	D	3698	D	3698	D
9: Wildwood Dr	2761	D	2761	D	2761	C
10: Woodlake Dr	2670	A	2670	A	2670	A
11: Dell Webb Blvd	2745	B	2745	B	2745	B
12: Jim Hogg Rd	1675	A	1675	A	1675	A

Appendix F –Road User Cost Calculations

Texas Department of Transportation

MEMO

March 7, 2016

To: District Engineers

From: Tracy D. Cain, P.E., Director, Construction Division Tracy D Cain, P.E.

René García, P.E., Director, Design Division René García, P.E.

Subject: Value of Time and Road User Costs

Road user costs are the values used in A + B bidding and incentive/disincentives for milestones, final substantial completion and lane rentals.

Each year we adjust the value of time used in calculations for determining road user costs. The adjustment is based on the annual Consumer Price Index for the previous year. The value of time to be used in the calculations this year is $22.12 per passenger car hour and $32.30 per truck hour.

If you have any questions concerning the calculation for the value of time, please call Juan F. Urrutia, P.E., at 512/416-2455.

cc: Darren G. Hazlett, P.E., CST
Carol T. Rawson, P.E., TRF
Michael Lee, P.E., MNT
District Directors of Transportation Planning and Development
District Directors of Construction

Short Term Benefits - Optimize Timing Plans w/o Any Signal Modifications														
Measure of Effectiveness	AM Peak						PM Peak						Annual Savings	
	Delta	Price	Period Length (hrs)	Work Days Per Year	Hours / Stops / Gas	Annual Benefit (AM Peak)	Delta	Price	Period Length (hrs)	Work Days Per Year	Hours / Stops / Gas	Annual Benefit (AM Peak)	Hours / Stops / Fuel	$ Savings
Total Delay (hr)	(37)	$ 22.12	2	250	-18500	$409,220	(24)	$ 22.12	2	250	-12000	$ 265,440.00	397,220	$ 674,660.00
Stops (#)	(3042)		2	250	-1521000		(1,677)		2	250	-838500	-838,500	(2,359,500)	-838,500
Fuel Consumed (gal)	(70)	$ 1.89	2	250	-35000	$66,150	(1,677)	$ 1.89	2	250	-838500	$ 1,584,765.00	(772,350)	$ 1,650,915.00
					Totals	$ 475,370.00						$ 1,850,205.00		$ 2,325,575.00

Medium Term Benefits - Optimize Timing Plans w/ Lead Lag														
Measure of Effectiveness	AM Peak						PM Peak						Annual Savings	
	Delta	Price	Period Length (hrs)	Work Days Per Year	Hours / Stops / Gas	Annual Benefit (AM Peak)	Delta	Price	Period Length (hrs)	Work Days Per Year	Hours / Stops / Gas	Annual Benefit (AM Peak)	Hours / Stops / Fuel	$ Savings
Total Delay (hr)	(5)	$ 22.12	2	250	-2500	$55,300	(2)	$ 22.12	2	250	-1000	$ 22,120.00	(3,500)	$ 77,420.00
Stops (#)	(260)		2	250	-130000		(297)		2	250	-148500	-148,500	(278,500)	-148,500
Fuel Consumed (gal)	4	$ 1.89	2	250	2000	-$3,780	(8)	$ 1.89	2	250	-4000	$ 7,560.00	(2,000)	$ 3,780.00
					Totals	$ 51,520.00						$ 29,680.00		$ 81,200.00

Medium Term Benefits - Optimize Timing Plans w/ Lead Lag + FYA + Geometric Improvements														
Measure of Effectiveness	AM Peak						PM Peak						Annual Savings	
	Delta	Price	Period Length (hrs)	Work Days Per Year	Hours / Stops / Gas	Annual Benefit (AM Peak)	Delta	Price	Period Length (hrs)	Work Days Per Year	Hours / Gallons of Gas	Annual Benefit (AM Peak)	Hours / Stops / Fuel	$ Savings
Total Delay (hr)	(11)	$ 22.12	2	250	-5500	$121,660	(13)	$ 22.12	2	250	-6500	$ 143,780.00	(12,000)	$ 265,440.00
Stops (#)	(507)		2	250	-253500		116	0	2	250	58000	58,000	(195,500)	58,000
Fuel Consumed (gal)	(4)	$ 1.89	2	250	-2000	$3,780	(7)	$ 1.89	2	250	-3500	$ 6,615.00	(5,500)	$ 10,395.00
					Totals	$ 125,440.00						$ 150,395.00		$ 275,835.00
Total annual benefit for all improvements						$ 652,330.00						$ 2,030,280.00		$ 2,682,610.00

Signal Mods (FYA)
Woodlake - Install NB Right Turn Overlap Phase
Wildwood - Install SB LT to remove split phases
Lakeway - Install NB LT to remove split phases
IH 35 - DDI

Appendix G – Cost Estimates

Williams Drive Signal Timing OPCC

Signal Re-Timing - Cost Per Intersection

Task	Hrly Rate	Hours		
Develop Plans	$ 250	$ 12	$ 3,000	
Input Timings	$ 250	0.5	$ 125	
Fine Tune	$ 250	2	$ 500	
Travel Time	$ 250	1.5	$ 375	
			$ 4,000	per intersection
		x	12	intersections
			$ 48,000	total cost

Note: Fine Tuning is for AM and PM Peak Hour

Install E/W FYA on Williams - Cost per Intersection

Item	Quantity	Unit Price		
4 Section Head	2 ea	$ 1,200.00	$ 2,400.00	
Load Switch	2 ea	$ 40.00	$ 80.00	
Equipment	2.5 hr	$ 150.00	$ 375.00	
Labor (City Crew)	2.5 hr	$ 50.00	$ 125.00	
Siemens Rep	1 hr	$ 200.00	$ 200.00	
Contingency		10%	$ 318.00	
			$ 3,498.00	per intersection
		x	8	intersections
			$ 27,984	total cost

Williams Drive at Lakeway Drive OPCC					
Item #	Description	UNIT	QUANTITY	COST/UNIT	$COST
104 6015	REMOVING CONC (SIDWALK)	SY	34	$ 20	$ 680
104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	10	$ 35	$ 350
105 6037	REMOVING STAB BASE AND ASPH PAV (0-16")	SY	145	$ 12	$ 1,740
247 6264	FL BS (CMP IN PLC)(TY A OR B GR4)(10")	SY	480	$ 20	$ 9,600
260 6012	LIME	TON	5.8	$ 175	$ 1,021
260 6027	LIME TRT (EXST MATL)(8")	SY	480	$ 3	$ 1,440
340 6034	D-GR HMA(SQ) TY-C PG64-22	TON	51.5	$ 135	$ 6,953
360 6027	CURB (TY II)	LF	50	$ 12	$ 600
416 6001	DRILL SHAFT (STREET LIGHT) (18 IN)	LF	6	$ 250	$ 1,500
416 6004	DRILL SHAFT (36 IN)	LF	16	$ 450	$ 7,200
464 6001	RC PIPE (CL III)(12 IN)	LF	12	$ 50	$ 600
464 6005	RC PIPE (CL III)(24 IN)	LF	25	$ 75	$ 1,875
467 6006	SET (TY I) (24 IN) (4: 1) (C)	EA	1	$ 1,250	$ 1,250
500 6001	MOBILIZATION	LS	1	$ 15,312	$ 15,312
502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	3	$ 5,000	$ 15,000
531 6001	CONC SIDEWALKS (4")	SY	15	$ 50	$ 750
531 6010	CURB RAMP (TY 7)	EA	1	$ 2,000	$ 2,000
666 XXXX	STRIPING	LS	1	$ 2,500	$ 2,500
680 6011	INSTALL HWY TRF SIG (UPGRADE)	EA	1	$ 10,000	$ 10,000
684 XXXX	TRAFFIC SIGNAL CABLING	LF	500	$ 3	$ 1,500
686 6020	INS TRF SIG PL AM (S)STR(TY D)LUM	EA	1	$ 5,000	$ 5,000
687 6001	PED POLE ASSEMBLY	EA	1	$ 4,500	$ 4,500
690 6033	REMOVAL OF TRAFFIC SIGNAL POLE FND	LF	2	$ 250	$ 500
			20% Contingency		$ 18,374
				Total	$ 110,244

Williams Drive at Wildwood Drive OPCC					
Item #	Description	UNIT	QUANTITY	COST/UNIT	$COST
104 6032	REMOVING CONC (WHEELCHAIR RAMP)	SY	16	$ 35	$ 560
105 6037	REMOVING STAB BASE AND ASPH PAV (0-16")	SY	110	$ 12	$ 1,320
247 6264	FL BS (CMP IN PLC)(TY A OR B GR4)(10")	SY	435	$ 20	$ 8,700
260 6012	LIME	TON	5.3	$ 175	$ 925
260 6027	LIME TRT (EXST MATL)(8")	SY	435	$ 3	$ 1,305
340 6034	D-GR HMA(SQ) TY-C PG64-22	TON	45	$ 135	$ 6,075
416 6004	DRILL SHAFT (36 IN)	LF	16	$ 450	$ 7,200
500 6001	MOBILIZATION	LS	1	$ 13,077	$ 13,077
502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	3	$ 5,000	$ 15,000
531 2010	CURB RAMP (TY 7)	EA	2	$ 2,000	$ 4,000
666 XXXX	STRIPING	LS	1	$ 2,500	$ 2,500
680 6011	INSTALL HWY TRF SIG (UPGRADE)	EA	1	$ 10,000	$ 10,000
684 XXXX	TRAFFIC SIGNAL CABLING	LF	500	$ 3	$ 1,500
686 6051	INS TRF SIG PL AM(S)1 ARM(48')LUM	EA	1	$ 8,500	$ 8,500
687 6001	PED POLE ASSEMBLY	EA	1	$ 4,500	$ 4,500
690 6033	REMOVAL OF TRAFFIC SIGNAL POLE FND	LF	2	$ 250	$ 500
			20% Contingency		$ 11,632
				Total	$ 97,294

Appendix D

COST ESTIMATE METHODOLOGY

COST ESTIMATE METHODOLOGY

This appendix gives details on the parameters used to develop the cost estimate for the recommended infrastructure improvements along the Williams Drive corridor. The estimates provided as part of the Implementation Plan were broken down into the categories of Traffic Operations and Bicycle & Pedestrian Facilities.

The first step for this cost estimate required determining the length of proposed improvement for the facility types and is included as part of the Implementation Plan.

The second step was to assign unit costs to the components of the network. Unit costs are based on experience implementing these facility types in the Capital Metro area and nationwide. When implementing an on-street facility, the street resurfacing required to remove previously existing striping is a significant cost associated with implementation. The cost estimates as part of the Implementation Plan and do not include the cost of resurfacing. However, coordination and prioritization of the street resurfacing program represents a significant opportunity to reduce the overall cost of this network investment.

Network Element	Quantity	Unit	Cost	Comment
Sidewalk	1	LF	$113.06	Includes subbase; 4" stone base; 5" t concrete; 6' wide sidewalk
APS Signal Upgrades	1	n/a	$106,000	Assume pedestrian signal only
Protected Bike Lane	1	LF	$220.00	Assume 1 way at 5-ft width
Cycle Track/Sidepath	1	LF	$522.00	Assume 2 way. Assume cycle track/sidepath at 12-ft width
Bike Lane	1	LF	$13.36	Assumes 2 way, includes bike lane symbol; pavement striping only, no new pavement
Signed Bike Route	1	LF	$11.36	Assumes bike pavement marking, and lane lines
Traffic Signal Coordination	1	Signal	$16,000.00	As per Kimley Horn & Associates
New Roadway	1	LF	$2,000.00	Two 12' traffic lanes, two 5' bike lanes, two curbs, landscaping, trees, lighting, sidewalks, both sides.
Road Diet	1	LF	$646.00	Reconstruct roadway; 2 - 10' lanes, center lane, two 5' bike lanes

Network Element	Quantity	Unit	Cost	Comment
Center Planted Island	1	LF	$360.00	12’ width with planted trees every 30’
Pavement Marking	1	LF	$1.04	Based on 6" Waterborne pavement markings
Pavement Marking Removal	1	LF	$2.39	Based of 6" pavement marking removal from

The cost estimates included as part of the implementation plan are provided for planning purposes only and to provide a level of scale to the proposed recommendations. Further review should be undertaken as projects are developed beyond the recommendation stage.

Appendix E

FINANCIAL ANALYSIS

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Williams Drive Build-Out Financial Analysis

Results of the Build-Out Financial Analysis

HR&A estimates that full build-out of the potential 1.1 million square feet of development shown in the plans for Williams Boulevard would result in *increased annual tax revenues for the City of Georgetown of $610,000, and an annual increase of revenues of $1,970,000 for the Georgetown Independent School District.*[1] The development would increase assessed improvement and land values by $140 million, of which most of the increase in value, $130 million, would be the result of improvement due to new construction of denser and more valuable uses. The remaining $10 million in increased values would be due to higher assessed real estate value. Of that $10 million in increased land value, the majority would result from the transition of the GISD site from public ownership to private ownership.

As a portion of the development sites shown in the plans are in the Williams Gateway TIRZ and a portion are not, some of the increased municipal taxes would increase the TIRZ revenues and a portion would increase the general fund. HR&A estimates that the TIRZ would gain approximately $450,000 in revenue annually as a result of the development and that the general fund would increase by approximately $150,000 annually. Approximately $250,000 of the increase in revenue to the TIRZ would come from the first three phases of the GISD site build-out anticipated begin construction in years 1, 6 and 11 respectively. The remaining $200,000 in increased annual revenue to the TIRZ would be the result of the fourth phase consisting mostly of development of the land across Williams Drive, for which there is no estimated start date at this time.

While this analysis calculated the impacts to real estate values and taxes from the developed properties, the City of Georgetown may also benefit from increased property values in nearby properties that were not in the plan area, as well as from sales tax associated with the increase in retail space. The increase in retail space may spur an increase in retail sales, increasing revenues through the City of Georgetown's 2% sales tax.[2] The specific amount that sales taxes would increase depend upon the type and volume of the retail stores that occupy the available spaces, and are unforeseeable at this time. In addition, it is likely that development of the scale and scope anticipated would affect the value of surrounding properties, further increasing the annual property taxes to an unknown degree.

Methodology

HR&A conducted a high-level estimate of the anticipated increase to the City of Georgetown's annual property tax revenues resulting from the build-out of the Georgetown Independent School District (GISD)

[1] Analysis uses consistent 2016 tax rates and assessment values.
[2] Total sales taxes in Georgetown are 8.25%.

site with the development shown in the Williams Drive Study Area conceptual build-out plan. This analysis applied the 2015/2016 City of Georgetown tax rate, $0.434 per $100 of value, to the net increase in assessed value of improvements (constructed buildings) and land. HR&A applied the 2016 GISD property tax rate of 1.409 per $100 of valuation to estimate the increased tax revenues for the Georgetown Independent School District as a result of full build-out.

To estimate the net increase in assessed value of the improvements to the GISD site and subject parcels, HR&A took the following steps:

- Reviewed the assessed value per square feet of improvements on comparable, recently constructed properties in Georgetown
- Applied the resulting estimated improvement value per square foot to the total anticipated development of the GISD site and surrounding parcels
- Subtracted the value of the current improvements on the privately owned parcels

To identify all multi-story office or multi-family developments in Georgetown constructed between 2010 and 2016, HR&A first used the CoStar real estate database, yielding seven comparable properties. HR&A then looked up the assessed improvement value of these seven comparable properties using the Williamson County Tax Assessor Collector website property search function. The assessed value of improvements on these seven properties ranged from $80 to $215 per square foot of improvement area, with a mean value of $128 and a median of approximately $120 per square foot. HR&A applied the median estimate of $120 per square foot to calculate the value of the single-use improvements anticipated under plan build-out, such as townhouses, apartments, and retail. HR&A assumes that these single-use buildings will be wood-frame construction, and therefore similar to the median assessed improvement value of the comparable properties. For mixed-use buildings anticipated in the plan, HR&A assumes they will combine a concrete retail podium with a wood frame residential component above. To account for the higher cost of this form of construction, HR&A used a value 25% higher than the median ($150 per square foot) to estimate the improvement value of these mixed-use buildings.

HR&A then applied these two assessment values to the total square footage of development anticipated for full build-out in the plan, depending on the type of construction of each building. HR&A converted the listed rentable square feet shown on the plan build-out graphics to total building square footage by increasing the size of the mixed-use buildings by a factor of 1.25, consistent with the assumption that 80% of the building space is rentable. No similar adjustment was made to the size of single-use buildings such as townhomes and retail as these buildings do not typically have common areas and thus rentable area is equal to the total building size.

To estimate the net value of future improvements, HR&A reduced the total assessed improvement estimate by the value of the current improvements on the subject properties as reported on the Williamson County Tax Assessor Collector website.[3]

To estimate the increase in land values, HR&A first calculated the current assessed value per square foot of property for each parcel in the plan area, finding that the assessed land values ranged from a low of $3 to a high of $13 per square foot. In contrast, the assessed value of land for the seven recently constructed comparable office and multi-family properties was generally between $7 and $8.5 per square foot. Based on the assessed land value of these comparable properties and the properties within the plan area valued at $13 per square foot, HR&A assumed that under full build-out assessed land value in the plan area would average to $10 per square foot. From this resulting total future estimate, HR&A subtracted the current assessed land values as reported by the Williamson County Tax Assessor Collector website to arrive at the potential net increase. The exception to this approach is the GISD site which is currently owned by a public agency. Under public ownership this property produces no property tax revenues, but HR&A assumes that development of this site will involve ownership changing through some manner from the public to the private sector, enabling the City to collect taxes on the future assessed land value.

[3] HR&A did not include the current assessed value of improvements on the GISD site itself when calculating the net improvement as public agencies are not subject to local property taxes.

Table 1: Estimated Increase in City of Georgetown Property Tax Revenues following Build-Out of the Conceptual Plan

Phase	Total SF of Development	Increase in Improvement Valuation	Increase in Land Valuation	Estimated Increase in Annual Taxes
GISD Site Phase I	139,200	$ 16,700,000	$ 2,610,000	$ 80,000
GISD Site Phase II	33,225	$ 3,990,000	$ 620,000	$ 20,000
GISD Site Phase III	203,500	$ 30,530,000	$ 3,810,000	$ 150,000
Non-School Build-Out TIRZ Area	510,378	$ 43,990,000	$ 1,580,000	$ 200,000
Total TIRZ Area	*886,303*	*$ 95,200,000*	*$ 8,620,000*	*$ 450,000*
GISD Site Phase IV (Acquisition)	72,000	$ 9,650,000	$ 90,000	$ 40,000
Non-School build-Out Non-TIRZ Area	177,444	$ 24,790,000	$ 1,260,000	$ 110,000
Total	**1,135,746**	**$ 129,650,000**	**$ 9,970,000**	**$ 610,000**

Note: All calculations assume 2016 tax rates. May not sum to total due to rounding.

Table 2: Estimated Increase in Georgetown Independent School District Property Tax Revenues following Build-Out of the Conceptual Plan[4]

Phase	Total SF of Development	Increase in Improvement Valuation	Increase in Land Valuation	Estimated Increase in Annual Taxes
ISD Site Phase I	139,200	$16,700,000	$2,610,000	$270,000
ISD Site Phase II	33,225	$3,990,000	$620,000	$60,000
ISD Site Phase III	203,500	$30,530,000	$3,810,000	$480,000
ISD Site Phase IV	72,000	$9,650,000	$90,000	$140,000
Non-School Area Build-Out	687,822	68,780,000	2,840,000	1,010,000
Total	**1,135,746**	**$129,650,000**	**$9,970,000**	**$1,970,000**

[4] Numbers may not add up due to rounding

Appendix F

PROFORMA

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MEMORANDUM

To:	**Capital Area Metropolitan Planning Organization**
From:	HR&A Advisors, Inc.
Date:	March 29, 2017; Revised May 16, 2017
Re:	Georgetown Independent School District (GISD) Site Financial Analysis

CAMPO requested that HR&A Advisors evaluate the feasibility of the conceptual development proposed for the GISD Site in the Center Study Area of the overall Williams Drive Study Area. HR&A analyzed the financial returns of the conceptual site development to assess overall project feasibility and to calculate the residual land value, the amount developers might be willing to pay for the underlying property.

Summary of Findings

The feasibility analysis finds that none of the three phases creates residual value under current market conditions. However, this finding is expected as the conceptual development is an attempt to change market perception of the area and catalyze investment, and thus is more ambitious than the existing low-density automobile-dependent development style that current market conditions support. Additionally, phase I and II are very close to being feasible and generating some level of residual value. HR&A believes that a developer with deep local knowledge may be able to creatively close the gap and make the proposed development style viable.

While the feasibility analysis evaluates current market conditions, the conceptual development is anticipated to occur in phases with the second and third phases in years 6 and 11 respectively. As a result, this feasibility analysis reveals the degree to which the market must evolve before the projected construction year to make phase III in particular attractive to private developers. It should be noted that the first phase of the conceptual development which offers more urban style townhouses and apartments may help catalyze this market transformation by introducing products that align with the ultimate corridor vision. Success of this initial phase may help increase the achievable rents for subsequent phases, beginning the desired market transformation.

In the interim, the City of Georgetown could take low-cost steps to facilitate the transformation of the Center Study Area market and increase achievable rents in order to make higher density projects like the conceptual development feasible. Sample actions include:

- Partnering with GISD to release a Request-for-Expressions-of-Interest for the project site to invite private developers to submit development ideas, helping reveal and generate market interest.

- Preparing the site for development by demolishing and clearing the existing school building.
- Activating the site through interim uses such as farmers markets, food truck stalls, and by holding public events on the property.

Findings Details

HR&A developed a financial pro forma model to assess overall project viability. This analysis assumes that demand is sufficient to warrant the levels of density proposed in phases II and III which will occur beyond the time horizon a market analysis can forecast. The key assumptions are detailed in the following section. This model is predicated on a developer requiring returns from the project of 15%. The table below summarizes the findings of the analysis for each phase of development.

Figure 1: GISD Site Development Returns by Phase

Phase	Retail (SF)	Multi-Family (Units/SF)	Townhouses (units/SF)	Developer Returns[1]	Residual Land Value[2]
Phase 1	0 SF	119 units/ 101,160 SF	15 units/ 12,000 SF	13%	($770,000)
Phase 2	33,225 SF	0 SF	0	8%	($760,000)
Phase 3	47,760 SF	140 units (approximately)/ 115,040 SF	0	-5%	($9,630,000)

Based on the current levels of rents and construction costs, Phase I appears close to feasible but does not yet generate residual value that could be captured through sale/transfer of the property. At current market rents, Phases II and III would require subsidies or improvements in market conditions before they attract developer interest. However, it should be noted that market conditions are likely to evolve before Phase II is anticipated to start in year 6 and Phase III starts in year 11.

Details of the feasibility for each phase are as follows:

- Phase I, anticipated to include lower cost wood-frame construction for townhouses and apartments is close to market feasible with returns of 13% and -$770,000 residual land value in 2017. However, within Phase I the townhouse product produces an approximately $250,000 return on investment of $1,000,000 and may potentially attract developer interest. The rental apartment units do not generate positive returns at the current $1.50 per SF per month rents and likely require

[1] Developer returns are calculated without incorporating the cost of the land as the model is designed to solve for or reveal the amount private sector partners might be willing to pay for the property to construct this project.

[2] Residual land value is reported for the year construction starts (Phase I = year 1, Phase II = year 6, Phase III = year 11) and is not discounted to 2017 values.

market conditions improve before developers pursue this product typology. HR&A estimates that the required increase in general market rents within the corridor to make this multi-family feasible is low, around 10 cents per square foot per month (see Figure 2).

- Phase II achieves an 8% return, and would require commercial rents to increase to $16.00 per leasable square foot per year from the current $13.00 (measured in 2017 values) to deliver a 15% return with zero residual land value to become feasible. The construction of this phase is assumed to be concrete-block with costs per SF similar to wood-frame construction.
- Phase III performs less well despite a slight rent premium, due to the higher cost of wood frame construction on a concrete podium necessary to achieve higher-density mixed-use. Phase III achieves a -5% return and would require a subsidy of $9.6 million provided in the year construction starts to generate a 15% return and attract developer interest. Importantly, to ensure that the cash flow generated covers the annual debt coverage the model assumes that the equity investment will be 50% of the project costs. As explained more fully in the key assumption section below, this level of equity investment would not be attractive to developers. To make this phase feasible, rent levels would need to rise considerably to generate a larger cash flow enabling the developer to secure a loan for a greater percentage of the project costs.

The analysis indicates that at current construction costs, attainable rents for multi-family products will need to increase before new construction on the GISD site becomes attractive to private sector partners and to create residual value that could be captured through sale of the land. This analysis assumes that all units will be market-rate. Adding affordable housing to this mix reduces revenues, reducing the developer returns and in this scenario might require additional subsidy to make the project attractive.

The key challenge to feasibility in 2017 is the ratio of attainable rents to construction costs. Figure 2 below illustrates this critical link between construction costs per gross SF of building, current rental levels, the feasibility of each phase, and the levels required to achieve a 15% return on investment. Rents would need to increase beyond the levels shown below to then produce residual value that GISD and the City of Georgetown could capture through sale of the land.

Figure 2: Relationship between Feasibility and Construction Costs & Rent Levels

Phase	Construction costs per Gross SF	Percent of Multi-family SF that is Leasable	Current Multi-Family Rents	Developer Returns	Required Multi-Family Rents to Achieve 15% Returns
Phase 1	$140	80%	$1.50	13%	$1.61
Phase 3	$165	80%	$1.60	-5%	$2.45

Key Assumptions

This pro forma was developed based on a series of assumptions, summarized here.

Rents & Sales -- HR&A set rent levels for the multi-family units based on the previously completed market study and the rents of comparable products within Georgetown, notably the nearby Rivery Park apartment complex. Other items of note affecting rent and sales levels include:

- For the sale price of the townhouse products in Phase I, HR&A assumed a final sale of $240,000 per unit for each of the fifteen 1,200-SF units, again based on the price per SF of comparable nearby developments such as the Brownstones at the Summit.
- Commercial rents for Phase II were assumed to be $13.00 per net SF per year, a discount from the $15.00 per net SF forecasted for Phase III. This discount was applied due to the presence of an anchor grocery store in Phase II which would likely demand discounted rent in exchange for committing to a long-term lease. The $15.00 per SF commercial rent levels was based on the findings from the market study regarding the rents for commercial space along Williams Drive.
- Rents and sales levels are listed here in 2017 terms, and are assumed to increase at the 2% general rate of inflation.
- Per the notation by the architect on the site designs, 80% of the space within the buildings with residential rental apartments is leasable.

Vacancy: Vacancy for the multi-family residential rental component is assumed to be 8% once a building stabilizes (See the Timing & Disposition note below for this lease-up period). The vacancy of the commercial component of Phase II is projected to be 0%, assuming a long-term lease for the grocery anchor. The vacancy of the commercial space in Phase III is assumed to be 5% upon stabilization. HR&A estimated the vacancy rates for the commercial and residential space based on the recent vacancy trends from the market study.

Building Construction Costs -- HR&A used 2016 data from Marshall & Swift to estimate the cost per square foot of the buildings shown on the GISD site design. HR&A made assumptions about the type of construction materials used based on the size and density of each building. Wood frame construction, suitable for town-houses and multi-family residential is assumed to cost $140 per gross square foot including associated horizontal infrastructure. Concrete-block construction, used for single story retail stores and the grocery store was also assumed to cost $140 per gross square foot, including horizontal infrastructure. The mixed-use buildings are assumed to be wood frame apartments on a retail concrete podium, and is estimated to cost $165 per gross square foot including the horizontal infrastructure. Construction costs are listed in 2017 terms, and are assumed to increase at the 2% annual general rate of inflation.

Other Infrastructure Costs -- The pro forma assumes that the existing school building will be demolished at a cost of $500,000 during the construction of Phase II.

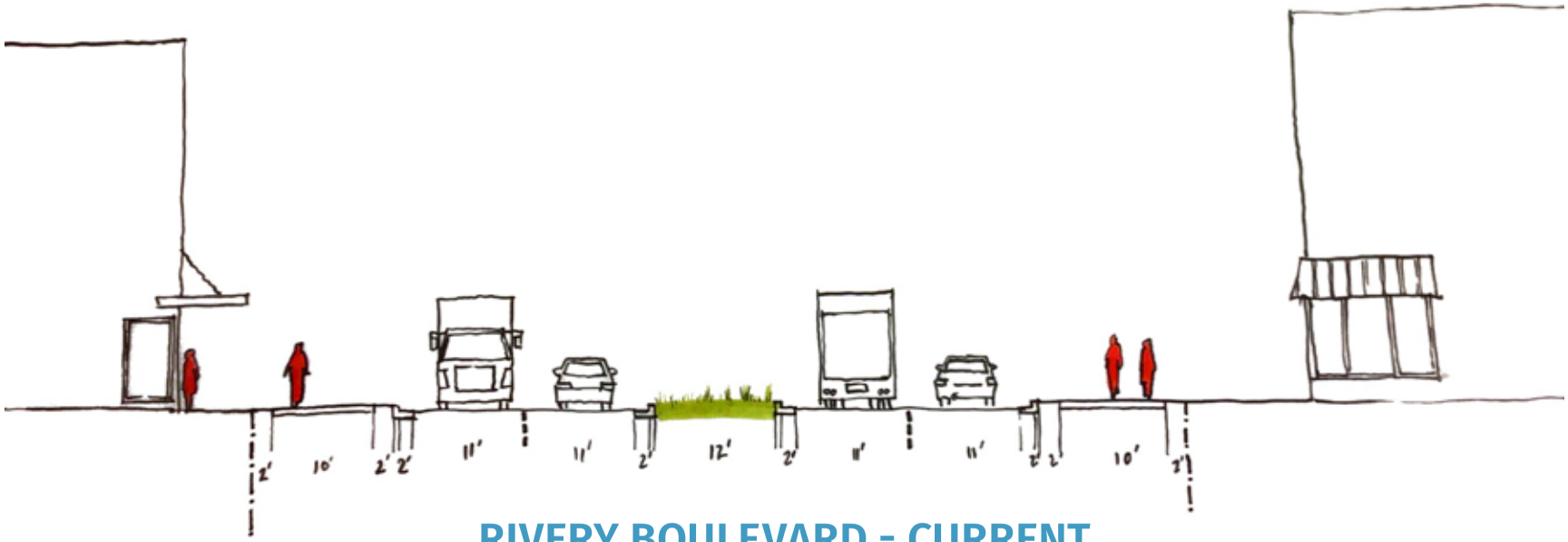
Operating Costs -- HR&A assumed that the operating costs for both the rental residential products and the commercial components is 10% of the gross revenues generated.

Timeline and Disposition -- HR&A modelled the project with Phase I starting construction in year 1, Phase II starting construction in year 6, and Phase III starting construction in year 11. All phases are disposed of together in year 15, with the sale price based on the year 16 anticipated revenues divided by a blended capitalization rate of 7% for the entire project. The construction period for phases I and II is 1 year. The

lease-up period for the residential element of Phase I is two years with average occupancy of 60% during this period. The sale of all 15 townhomes from Phase I is assumed to occur in the two years after construction completes, with 50% of the units sold in each year. The construction period for Phase III is assumed to be 2 years, while lease-up of both the residential and commercial components takes another 2 years with average occupancy at 60%.

Project Financing -- The debt-to-cost ratio is set at 70% of project costs for phases I and II, and 50% of project cost for Phase III. The industry standard debt ratio is generally 70%, but the lower ratio assumed for Phase III is required to ensure that annual project revenues are sufficient to cover the annual debt payments. The remaining project costs are financed through equity. The actual debt-to-cost ratio used when financing the project will likely vary depending on market conditions and the financial standing of the developer.

Appendix G
RIVERY BOULEVARD



RIVERY BOULEVARD - CURRENT

RIVERY BOULEVARD - DRAFT DESIGN

Appendix H

UNIFIED DEVELOPMENT CODE REVIEW

Williams Drive Corridor and Centers Plan

Unified Development Code Review

ISSUE	CAUSE	IMPACT	SOLUTION
Corridor			
Traffic congestion	Limited alternative parallel routes for travel	Increased travel times	Plan for and implement alternate parallel routes and a network of roads.
Corridor character inconsistent	Limited tools in Natural/Scenic Corridor Overlay, not all of the corridor is natural or scenic. 25-foot landscape buffer used everywhere for new development.	Inconsistent look to the corridor	Divide the corridor into separate character areas based on existing context (transect)
	Single suburban road section adopted for Wms Drive (135' wide)	Suburbanization, inappropriate road widening	Adopt distinct corridor cross-sections based on context (transect)
Inconsistent front lot lines along Wms Drive	Land dedication requirements for ultimate corridor require excessive ROW	Redevelopment on shallow sites loses the greatest percentage of land to dedication for Wms Drive	Determine appropriate corridor dedication for various segments. Allow some elements (back of curb) to be provided in an easement instead of dedication.
Zoning inconsistent with Future Land Use Map	Zoning districts do not match the adopted Future Land Use Map (Comprehensive Plan)	Difficult to implement concepts from Comprehensive Plan; case-by-case decision-making, no "planning first" philosophy	Revise the Future Land Use Map based on the character descriptions in the Centers Plan; rezone land to match the revised map.
Bike facilities lacking	Requires both new UDC standards and major capital project	Unsafe conditions for cyclists	Program a capital improvement project to construct a shared path or other bike facilities the entire length of the corridor. Require new cross-section appropriate to context (transect)
Improve corridor aesthetics	Many older centers and single-use sites not appropriately landscaped and lit	Poor aesthetics in older segments of corridor	Review UDC triggers requiring landscaping and lighting (consider applying requirements at time of major change in use)

ISSUE	CAUSE	IMPACT	SOLUTION
Site			
Large blocks with no connections	No requirements for internal blocks on large development sites.	Difficult to move through the area in a vehicle, on a bike or on foot.	Block standards for block face, block perimeter, set based on context (transect).
	Inconsistent treatment of subdivisions and site plans	Developers may avoid subdivision process dues to requirements	Revise UDC to ensure placement of material and triggers for public improvements are clearly applied to both subdivision and sites.
Unsafe sidewalks	Excessively wide driveway entrances, excessive curb cuts	Too much vehicular movement across sidewalks	Require side or rear access, parking
	Residential garage doors facing the street, requiring curb cuts	Too many curb cuts, vehicles crossing the sidewalk	Manage access on lots under 50 feet in width to require access from rear.
Signs do not match corridor character	Uniform sign code applied throughout, older (outsize) signs retained	Inconsistent sign size and type make wayfinding difficult.	Set sign standards based on context (transect).
Multifamily districts allow only moderate density	UDC limits MF-2 to 24 units/acre	Multifamily projects occur primarily in PUD and other special districts where density can be negotiated. These districts require substantial time and energy by both applicant and City to process.	Add a new, more dense MF-district to the UDC.
Commercial districts restrict multi-family housing	UDC requires a Special Permit for multifamily projects that are not in mixed use buildings. Even where SP is issued, density is limited to 24 units/acre.	Multifamily projects occur primarily in PUD and other special districts where density can be negotiated. These districts require substantial time and energy by both applicant and City to process.	Allow greater residential density in C-3 districts.
Vast expanses of parking in front of buildings	UDC provides only permissive setbacks in most districts	Crossing large parking lots is risky for pedestrians	Require buildings pulled closer to the street.
No effective mixed use district	UDC includes only MU, a district not found on the ground in the City	MU district very complex to negotiate for the applicant; has not yet been used	Prepare new mixed use zones appropriate, at minimum, for the catalytic development site
Excessive parking required	UDC requirements do not vary by context (transect)	Limited redevelopment capacity on existing sites, vast expanses of empty parking	Right-size parking for various uses and contexts (transects)

ISSUE	CAUSE	IMPACT	SOLUTION
Building			
No mixed use buildings	While the market may have an impact, overly strict height limits are part of the issue	No redevelopment	Increase building height for mixed use buildings
Limited changes to existing buildings in some portions of the corridor	Regulations too restrictive to generate redevelopment	No redevelopment	Revise development standards, nonconforming provisions, to make sites attractive for redevelopment
C-1 and C-3 maximum height limits good mixed use buildings	UDC requires max height of 35’ in C-1 and 45’ in C-3	Variances often sought and granted for additional height	Revise heights in UDC for mixed-use buildings