



8250 - 165th Avenue NE  
Suite 100  
Redmond, WA 98052-6628  
T 425-883-4134  
F 425-867-0898  
www.tsinv.com

**REDMOND SQUARE  
LAND-2018-01089**

**Traffic Impact Analysis**

Redmond, WA

April 2020



Prepared for:  
MGRM LLC  
&  
City of Redmond

**Table of Contents**

**Executive Summary ..... 1**

**Introduction ..... 3**

    Project Location ..... 3

    Project Description ..... 4

    Study Area..... 5

**Existing Conditions ..... 6**

    Primary Study Area Roadways..... 6

    Traffic Volumes ..... 6

    Level-of-service Analysis ..... 8

    Transit Conditions ..... 8

    Non-Motorized Conditions ..... 9

    Safety ..... 11

**2024 Future Without-Development Traffic Conditions ..... 12**

    Transportation Facility Improvements ..... 12

    Non-Project Growth Forecast ..... 13

    Traffic Operations Analysis ..... 15

**Trip Generation, Distribution and Assignment ..... 16**

    Trip Generation – Proposed Development..... 16

    Trip Generation – Existing Uses ..... 18

    Development Trip Generation – Net New Trips ..... 18

    Trip Distribution and Peak Hour Travel Assignment..... 20

**2024 Future With-Development Traffic Conditions ..... 25**

    2024 Future With-Development Volumes..... 25

    Traffic Operations Analysis ..... 26

    Site Access ..... 26

**Parking Analysis..... 29**

**Link Light Rail Impacts..... 30**

**Mitigation Analysis ..... 31**

    Traffic Impact Fees..... 31

    Cleveland Street and 164th Ave NE..... 31

    Redmond Way and 166th Ave NE..... 31

**Appendices**

**List of Tables**

Table 1: Project Overview ..... 4

Table 2: Intersection Level-of-Service Categories..... 8

Table 3: Existing Intersection Level-of-Service..... 8

Table 4: Crash History ..... 11

Table 5: 2024 Without-Development Intersection Level-of-service..... 15

Table 6: Development Trip Generation - Unadjusted..... 16

Table 7: Development Trip Generation - Internal-Capture Adjustment..... 17

Table 8: Development Trip Generation - With Adjustments ..... 17

Table 9: Existing Commercial Center Trip Generation ..... 18

Table 10: Development Trip Generation - Net New Trips ..... 18

Table 11: Development Trip Generation Forecast By-Building..... 18

Table 12: 2024 With-Development Intersection Level-of-service ..... 26

Table 13: Redmond Parking Requirements (RZC Table 21.10.40C) ..... 29

Table 14: 2020 Traffic Impact Fee Estimate..... 31

Table 15: 2024 With-Development Redmond Way and 166th Ave NE Sensitivity..... 32

**List of Figures**

Figure 1: Vicinity Map ..... 3

Figure 2: Conceptual Site Plan ..... 4

Figure 3: Existing PM Peak Hour Traffic Volumes ..... 7

Figure 4: Existing Transit System..... 9

Figure 5: Existing Non-Motorized System ..... 10

Figure 6: Link Light Rail Downtown Redmond ..... 10

Figure 7: 2024 Without-Project PM Peak Hour Traffic Volumes ..... 14

Figure 8: Building A (West) PM Peak Hour Multifamily Trip Distribution and Assignment ..... 21

Figure 9: Building A (West) PM Peak Hour Commercial Trip Distribution and Assignment ..... 22

Figure 10: Building B (East) PM Peak Hour Trip Distribution and Assignment ..... 23

Figure 11: Building A (West) and Building B (East) PM Peak Hour Trip Distribution and Assignment ..... 24

Figure 12: 2024 With-Project PM Peak Hour Traffic Volumes..... 25

Figure 13: Stopping and Entering Sight Distance ..... 28

## **EXECUTIVE SUMMARY**

This Traffic Impact Analysis summarizes the traffic impacts associated with development of Redmond Square, a mixed-use site proposed with up to 615 multifamily units and up to 30,000 sq. ft. of commercial retail and food and beverage space.

The Applicant, MGRM LLC, is proposing to redevelop this existing Redmond Square Center into two buildings at 16563 Redmond Way (**Building A, West**) and 16425 Cleveland St (**Building B, East**) to be separated by a woonerf between Redmond Way and Cleveland Street. The site is just north of the future light rail station.

Full occupancy of the proposal is anticipated by 2024.

The development is forecast to generate up to:

- 723 new weekday daily vehicle trips split 362 in and 362 out
- 83 new PM peak hour vehicle trips split 80 in and 3 out, and 67 pass-by trips

With the development, study intersections are forecast to operate within the City of Redmond's LOS D standard, except Redmond Way and 166th Ave NE, which is forecast to operate at LOS E.

In an urban center, traffic congestion is typically accepted at higher level, compared to a more suburban setting. On overall conservative nature of the traffic study, a small development impact at the Redmond Way and 166th Ave NE intersection, the ability for drivers to use alternative routes, and presence of future link light rail (an alternative travel mode), intersection mitigation, by the Applicant, is not warranted.

The Applicant is able to partner with the City of Redmond to support a modification to the curbline at the southeast corner of Cleveland Street and 164th Ave NE. The curbline modification will mitigate a non-development deficiency for large vehicles and buses and the proposed West Access will be designed accordingly to also support right-in and right-out vehicle movements to not impede the northbound right turn at Cleveland Street and 164th Ave NE.

Site accesses are proposed off the woonerf south of Redmond Way, Cleveland Street and 166th Ave NE. Sight distance requirements are met at all building access points and there are not significant collision trends that would preclude access into the site or require mitigation.

The woonerf is proposed to be restricted to right-in, right-out and left-in movements only and is forecast to operate within the City of Redmond's level-of-service standards. To access the proposed woonerf drivers will need to wait for a gap in the peak hour eastbound vehicle queue on Redmond Way. The woonerf is proposed to facilitate access to the multifamily tenants of Building A. A deviation from the City of Redmond's access spacing requirements was approved through previous staff reviews.

The West Access off Cleveland Street is proposed at an existing curb cut and will provide shared access with the existing bank and for the commercial visitor parking of Building A. The driveway is within 50 feet of 164th Ave NE and would be restricted to right-in and right-out movements only. The driveway is forecast to operate with an acceptable level-of-service and vehicles exiting the site will wait off of the public right-of-way for the westbound queues to clear at 164th Ave NE. A deviation from the City of Redmond's access spacing requirements was approved through previous staff reviews.

The Applicant is recommended to post signs and coordinate with Key Bank to install a speed bump or speed hump to minimize cut-through traffic between Key Bank and the Project's West Block.

The proposed East Access off 166th Ave NE would serve **Building B**. The driveway is at an existing curb cut midblock on 166th Ave NE. The driveway is forecast to operate with an acceptable level-of-service. Egress to the north will require vehicle to wait onsite and off of the public right-of-way for the northbound queues to clear at 166th Ave NE. A deviation from the City of Redmond's access spacing requirements **was approved through previous staff reviews** due to its proximity to adjacent driveways on the east side of 166th Ave NE and its proximity to Redmond Way and Cleveland Street.

Onsite parking will be provided to support the needs of the site. A deviation from the City of Redmond's multifamily parking requirement has been requested.

The Applicant will be responsible for frontage improvements and payment of traffic impact fees.

## **INTRODUCTION**

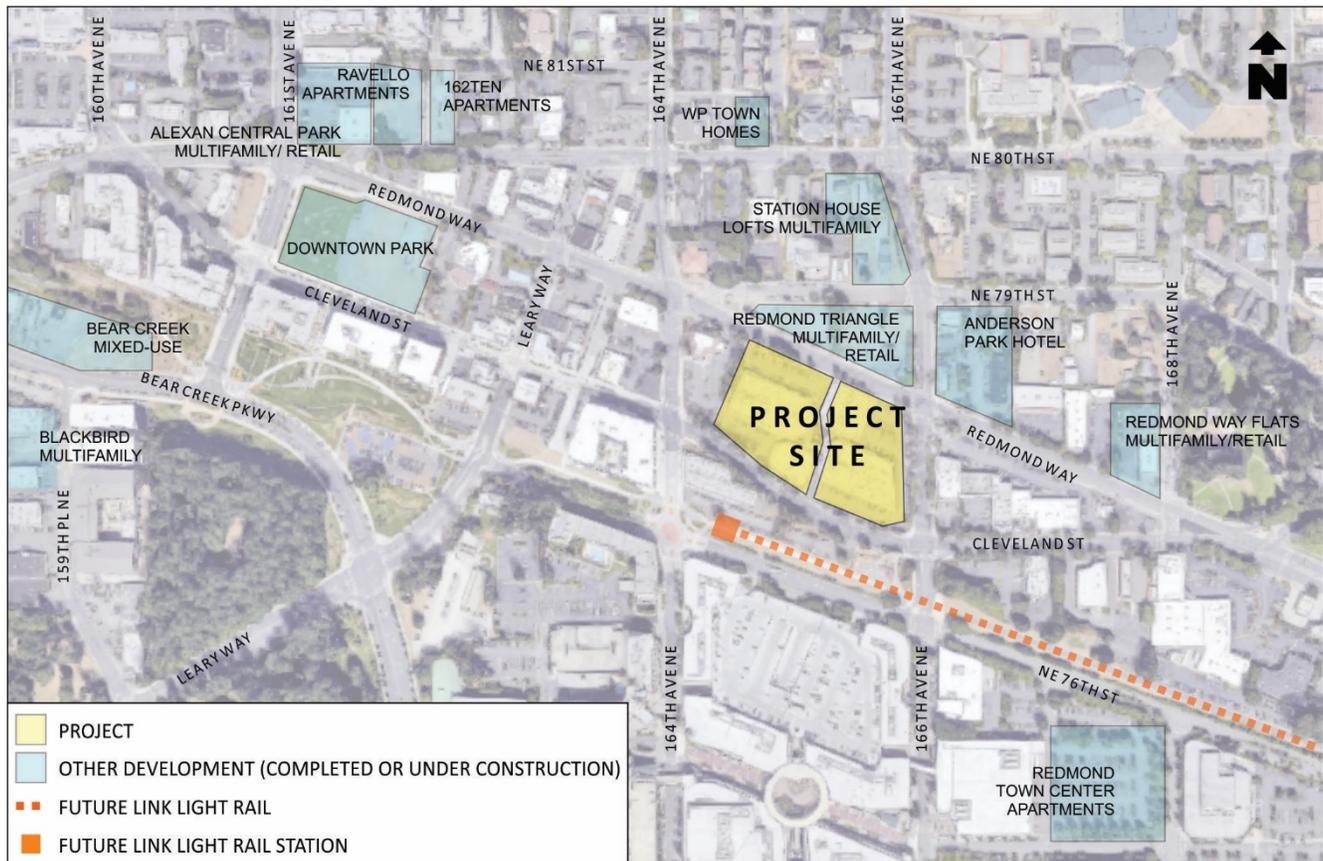
This Traffic Impact Analysis documents the traffic impacts associated with Redmond Square, a mixed-use development in the City of Redmond. The purpose of this report is to identify potentially significant and adverse traffic impacts resulting from the proposal and, where appropriate, outline programmatic and/or physical improvements to minimize or eliminate those impacts. The conclusions and recommendations from this analysis are intended to support the Applicant and their Site Plan Entitlement permits.

This report is organized to generally follow the traffic impact analysis outline from the City of Redmond.

This section provides an outline of the report, introduces the proposal, provides contextual characteristics associated with development of the site and defines the study area for analysis.

### **Project Location**

The Applicant is proposing to redevelop the existing Redmond Square Center in downtown Redmond. The site is in the Anderson Park subzone and the surrounding area is designated an Urban Center by the City of Redmond. Figure 1 shows a vicinity map highlighting the proposed development site.



**Figure 1: Vicinity Map**

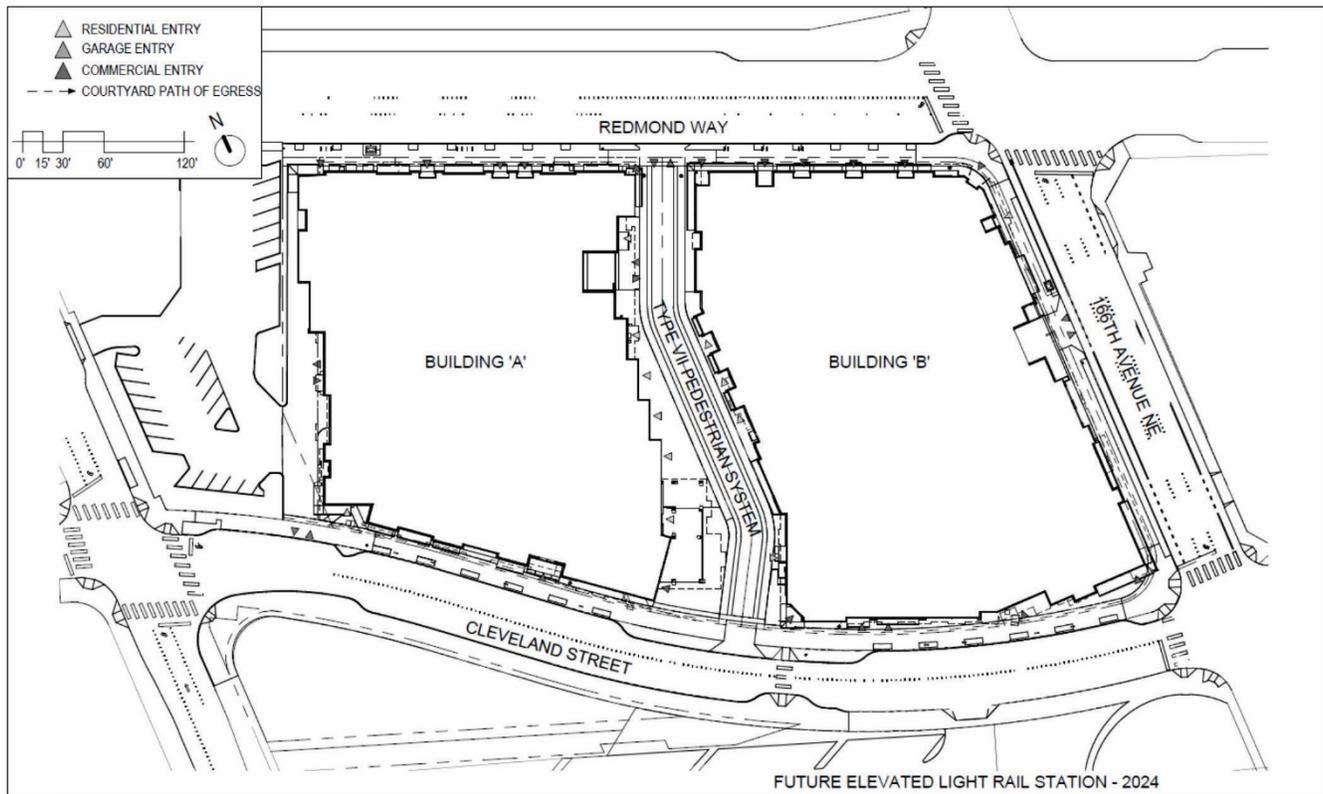
The proposed site encompasses 12 land parcels: 1225059133, 1225059030, 1225059142, 1225059031, 1225059055, 1225059263, 1225059157, 1225059156, 1225059080, 1225059090, 1225059221 and 1225059075. The Applicant is applying a boundary line adjustment to separate parcels north and south of Cleveland Street. The proposal only includes those parcels and portions of parcels north of Cleveland Street.

A future Link Light Rail station is planned within a block south of the development. The station is south of Cleveland Street and east of 164th Ave NE. The station location and rail alignment are generally shown in Figure 1. Sound Transit anticipates link light rail service to downtown Redmond to start in 2024.

King County property records show the existing site is made up to four buildings totaling 61,295 sq. ft. of commercial space including office, retail, restaurant, and fitness uses.

**Project Description**

Redmond Square is proposed as two buildings separated by a woonerf. The building addresses are 16563 Redmond Way and 16425 Cleveland Street. A conceptual site plan is included as Figure 2. Full build-out is anticipated by 2024.



**Figure 2: Conceptual Site Plan**

This mixed-use Project is proposed with up to 615 multifamily units and up to 30,000 sq. ft. of commercial retail and food and beverage space. Table 1 summarizes the current development proposal.

**Table 1: Project Overview**

Land Use	Building A (West)	Building B (East)	Full Build-Out
Multifamily (dwellings)	302	311	613
Commercial Retail (sq. ft.)	4,932	15,749	20,681
Food and Beverage (sq. ft.)	4,008	3,960	7,968
Parking (spaces)	283	302	585

Vehicular accesses to **Building A** are proposed off of the woonerf and Cleveland Street.

- The proposed woonerf intersects Redmond Way at approximately midblock between 164th Ave NE and 166th Ave NE. The City of Redmond has indicated that left turns from the proposed woonerf to Redmond Way would be prohibited. South of Redmond Way, the woonerf includes access to a parking garage for multifamily tenants.
- Access to Cleveland is proposed at the existing westernmost curb cut on Cleveland Street. The Cleveland Street access, or West Access, will provide access to commercial, guest and future resident parking, which will be separate from the residential parking garage. In the future with the development, the Cleveland Street access will be restricted to right-in and right-out movements only.

Vehicular access to **Building B** is proposed off 166th Ave NE at the existing midblock curb cut between Redmond Way and Cleveland Street, the East Access. No turn restrictions are proposed at this access, and all of **Building B's** tenants and guests would use 166th Ave NE for access to the site.

The Key Bank property, to the west of the site, is separate from Redmond Square. The bank has an easement to share access with Redmond Square and will continue to do so from the proposed West Access off Cleveland Street.

### **Study Area**

The study area includes the following public intersection and the site accesses:

- Redmond Way / Leary Way
- Redmond Way / 164th Ave NE
- Redmond Way / woonerf
- Redmond Way / 166th Ave NE
- Redmond Way / 168th Ave NE
- Cleveland Street / Leary Way
- Cleveland Street / 164th Ave NE
- Cleveland Street / 166th Ave NE
- Cleveland Street / West Access
- East Access / 166th Ave NE

## **EXISTING CONDITIONS**

This section describes the existing transportation system and the its operational characteristics.

### **Primary Study Area Roadways**

Major roadways in the study area are described below:

- Redmond Way is classified as a Minor Arterial. East of 164th Ave NE, Redmond Way is part of SR 202. Fronting the site, Redmond Way includes 1-lane eastbound, a center turn-lane, 2-lanes westbound, and on-street parallel parking.
- Cleveland St is classified as a Collector Arterial. Fronting the site, Cleveland St includes 1 travel lane in each direction and on-street parallel parking.
- 164th Ave NE is classified as a Minor Arterial. Near the site, 164th Ave NE includes a 3-lane wide cross-section and pockets of on-street parallel parking.
- 166th Ave NE is classified as a Collector Arterial. Fronting the site, 166th Ave NE includes a 3-lane wide cross-section **and striped bike lanes**.

In downtown Redmond, the posted speed is 30 mph and all existing roadways include sidewalk, curbs and gutters and segments of landscape buffers within the right-of-way.

### **Traffic Volumes**

Via the scoping analysis, with the City of Redmond, this traffic study focuses on weekday PM peak hour traffic conditions. The PM peak hour period is defined as the highest 4 consecutive 15-minute traffic volume intervals between 4:00 and 6:00 PM. This period represents the time interval when the combination of Project-generated traffic volumes and volumes on the local roadways adjacent to the site are highest.

Year 2018 existing PM peak hour study intersection traffic volumes were provided by the City of Redmond. Existing PM peak hour study intersection volumes are illustrated in Figure 3.

On Thursday, May 9, 2019, PM peak hour driveway volumes were collected at the existing western-most driveway on Cleveland Street, shared with Key Bank, and future site access. The peak hour was observed from 5:00 PM to 6:00 PM. With 17 vehicles inbound, split 50/50 lefts and rights, and 29 vehicles outbound, split 10/90 lefts and rights. The volumes on Cleveland Street passing the driveway were estimated from the volumes on the east leg of Cleveland Street approaching 164th Ave NE. Vehicle volumes at this existing driveway are illustrated in Figure 3.

Peak hour volumes were not collected at the existing commercial center driveway and future east Project driveway, off 164th Ave NE. The turning movement counts on 164th Ave NE at Redmond Way and at Cleveland Street were used to estimate the driveway volume at this driveway. Vehicle volumes at this existing driveway are illustrated in Figure 3.

Currently, Key Bank shares access with the existing commercial center. On July 18, 2019, PM peak hour trips were collected at the bank and driveways serving the bank off Redmond Way (right-out only), 164th Ave NE (right-out only), on Cleveland Street, and from other areas in Redmond Square. Key Bank closed at 5:00 PM, and the bank's parking area cleared out around 5:30 PM.

No vehicles were observed to or from the bank from or to the other existing driveways on Redmond Way or Cleveland Street.

Between 4:00 and 5:00 PM there were 30 vehicle trips generated by the bank as follows:

- Redmond Way Exit-Only
  - 1 right-in
  - 7 right-out
- 164th Ave Exit-Only
  - 6 right-out
- Cleveland Street shared access
  - 6 left-in
  - 9 right-in
  - 1 right-out

The volumes shown in Figure 3 include trips generated to and from the bank and also traffic observed cutting through the site: 1 trip from 164th Ave NE (left-in) to Cleveland Street (left-out), and 2 trips from 164th Ave NE (right-in) to Redmond Way (right-out).

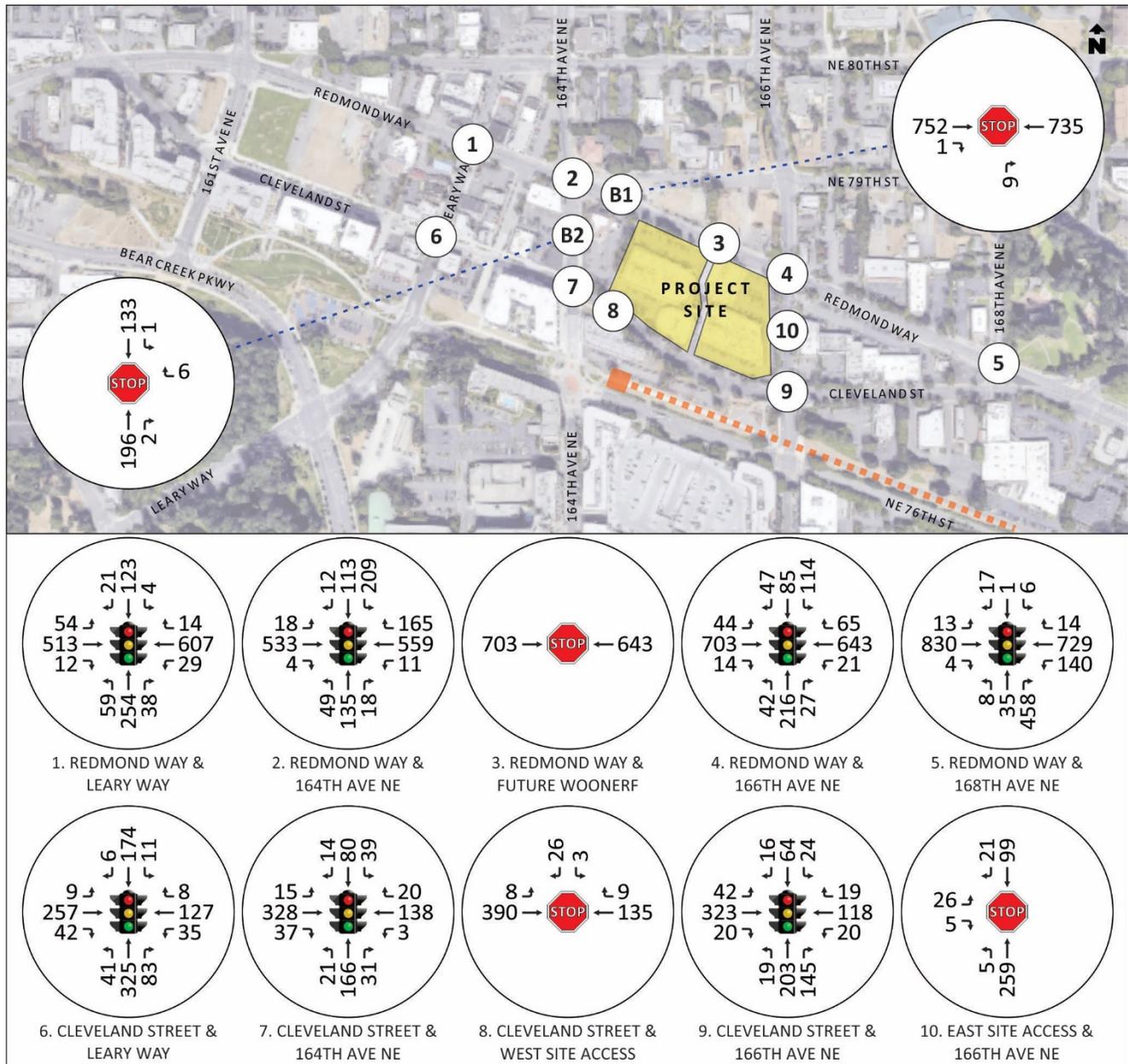


Figure 3: Existing PM Peak Hour Traffic Volumes

### Level-of-service Analysis

For this analysis, the study intersections were evaluated using HCM 2010 methodology and the Synchro (version 10) computer program. Existing signal timing information was provided by the City of Redmond for the signalized intersections and the left turn phasing and timings were adjusted based on field observations. Specifically, the cycle length and existing southbound left turn phasing at Redmond Way and Cleveland Street were adjusted – the left turn phase is currently *protected-permissive with flashing yellow arrow*. Table 2 summarizes HCM level-of-service (LOS) and delay categories for signalized and unsignalized intersections. The City of Redmond’s LOS D threshold.

**Table 2: Intersection Level-of-Service Categories**

LOS	Signalized Intersection Delay	Stop-Control Intersection Delay
A	≤ 10 seconds	≤ 10 seconds
B	10-20 seconds	10-15 seconds
C	20-35 seconds	15-25 seconds
D	35-55 seconds	25-35 seconds
E	55-80 seconds	35-50 seconds
F	> 80 seconds	> 50 seconds

Table 3 summarizes the existing intersection level-of-service at the study intersections.

**Table 3: Existing Intersection Level-of-Service**

Intersection	Control	LOS	Delay
Redmond Way / Leary Way	Signal	D	39.0
Redmond Way / 164th Ave	Signal	C	27.9
Redmond Way / 166th Ave	Signal	D	39.9
Redmond Way / 168th Ave	Signal	B	18.3
Cleveland St / Leary Way	Signal	B	18.5
Cleveland St / 164th Ave	Signal	B	13.3
Cleveland St / 166th Ave	Signal	B	10.0
Cleveland St / West Access	SB Stop	B	14.7
East Access / 166th Ave	EB Stop	B	11.0

The study intersections are computed to operate at LOS D or better and satisfy the level-of-service requirements.

### Transit Conditions

Figure 4 highlights the local transit routes near the Project site. The nearest transit stops to the Project site are located at Redmond Way / 166th Ave NE. Transit routes with service along Redmond Way include:

- King County Metro Transit DART Route 224 – Duvall to Redmond – weekday service
- King County Metro Transit Route 232 – Duvall to Redmond to Bellevue – weekday service
- King County Metro Transit Route 248 – Avondale to Kirkland – weekday and weekend service
- Sound Transit Route 545 – Redmond to Seattle with weekday and weekend service

King County Metro Transit DART Route 930, Kingsgate Park and Ride to Redmond Town Center also provides weekday service in the vicinity of the Project.

Redmond Transit Center is within a half-mile walk from the Project site. The transit center provides additional transit linkages.



Figure 4: Existing Transit System

**Non-Motorized Conditions**

Figure 5 is an excerpt from the City of Redmond’s Bike and Parks Map. The map shows the non-motorized transportation network in downtown Redmond. The area surrounding the development site is a Central Business District and the roadways include sidewalk, curb and gutter. The pedestrian facilities along major roadways are separate with sections of landscaping and street trees. Marked bicycle lanes are also provided on 166th Ave NE and on 164th Ave NE, north of Redmond Way.

The Redmond Central Connector Corridor is within a block south of the site and provides pedestrian and bicyclist linkages through downtown Redmond.

The future light rail extension to downtown Redmond will align with the Redmond Central Connector Corridor, see Figure 6. Two future stations are planned one in southeast Redmond near Marymoor Park and the other adjacent to the Project site and east of 164th Ave NE.



Figure 5: Existing Non-Motorized System

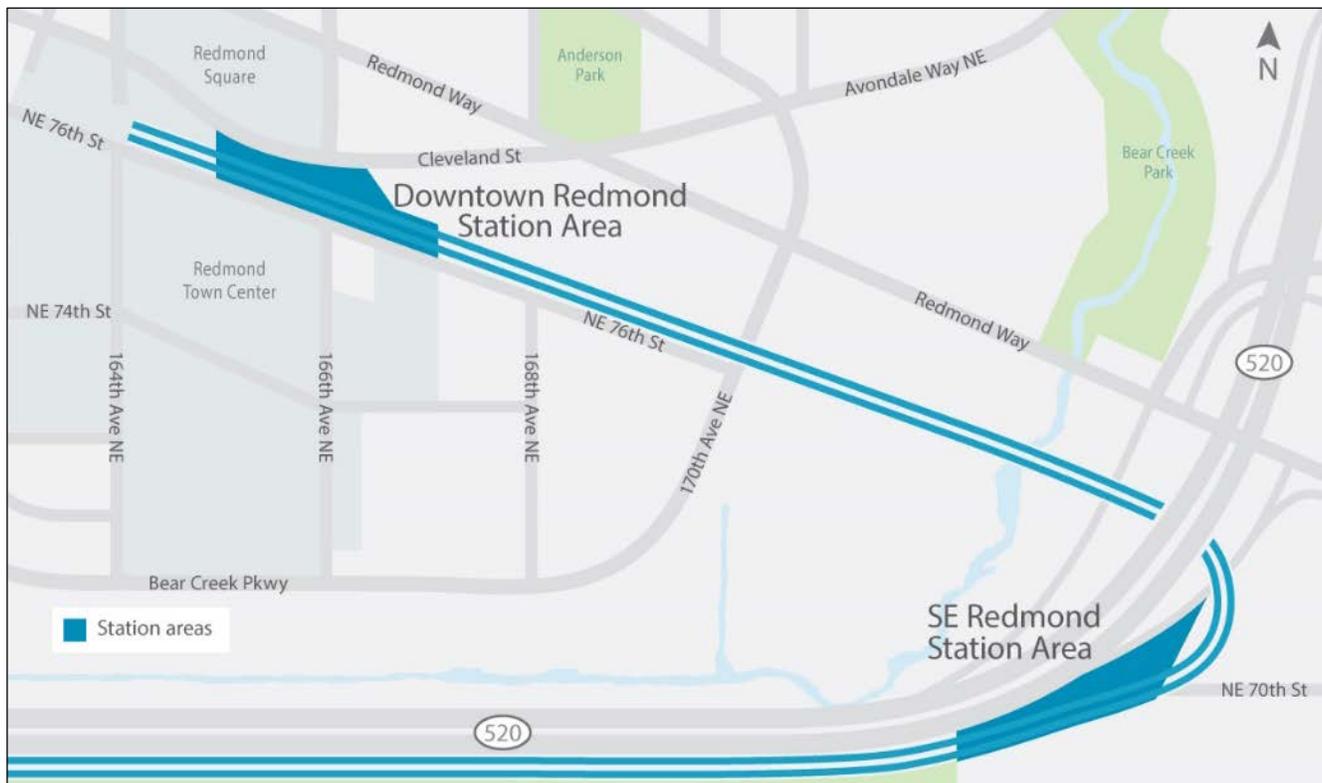


Figure 6: Link Light Rail Downtown Redmond

## Safety

A 5-year crash history, from January 1, 2013 through December 31, 2017, was obtained from WSDOT on Redmond Way, Cleveland St, 164th Ave NE and 166th Ave NE. During this time-period Redmond Way was oriented for one-way eastbound and Cleveland St was oriented for one-way westbound traffic flow. More recently, both roadways have been converted to two-way traffic flow. The crash data is skewed toward the former one-way traffic flow configurations on Redmond Way and Cleveland St.

Table 4 summarizes the crash history and between 2013 and 2017 there were 112 crashes reported.

**Table 4: Crash History**

Location	Number of Reported Crashes per Year						ADT Est. <sup>1</sup>	Crash Rate
	2013	2014	2015	2016	2017	Avg.		
<b>Intersections:</b>								<b>MEV<sup>2</sup></b>
Redmond Way / 164th Ave	5	5	6	0	4	4.00	17,500	0.63
Redmond Way / 166th Ave	5	4	5	5	3	4.40	18,250	0.66
Cleveland St / 164th Ave	2	2	2	3	1	2.00	15,000	0.37
Cleveland St / 166th Ave	5	7	3	6	1	4.40	17,500	0.69
<b>Segments:</b>								<b>MVM<sup>3</sup></b>
Redmond Way: 164th Ave to 166th Ave	0	3	4	0	1	1.60	12,500	2.70
Cleveland St: 164th Ave to 166th Ave	1	7	6	3	7	4.80	12,000	7.83
164th Ave: Redmond Way to Cleveland St	0	1	0	0	0	0.20	5,500	1.99
166th Ave: Redmond Way to Cleveland St	0	0	0	1	1	0.40	5,500	3.99

1. Estimated Average Daily Traffic (ADT) volumes based on year 2015 and 2018 volumes published by City of Redmond
2. Intersection Crash Rate expressed as crashes per million entering vehicles
3. Roadway Segment Crash Rate expressed as crashes per million vehicle miles traveled

Typically, intersections with crash rates of 1.00 or higher and roadway segments with crash rates of 10.00 or higher are considered high crash locations. There are no high crash locations near the Project site. Additionally, traffic patterns have changed since 2017 with Redmond Way and Cleveland St now converted from one-way to two-way traffic flow.

On Cleveland St, the crash records showed 24 reported incidents between 164th Ave NE and 166th Ave NE:

- 46% of the crashes were reported as “sideswipe”. Sideswipes are typical for multi-lanes of travel in a same direction. The current two-way traffic orientation on Cleveland St reduces the potential for same direction and sideswipe crashes.
- 33% of the reported crashes were related to left-turn movements, typically at driveways. There were 12 driveway crashes reported as related to the three driveways on the north side of Cleveland St: 3 at the West Access, 3 at the middle driveway and 6 at the east driveway. With the Project, only the west access would remain, and the other commercial driveways would be vacated. Lastly, the proposed driveway would be restricted to right-turns in and out.

On 166th Ave NE, crash records showed only one crash between Redmond Way and Cleveland St. In 2016, there was an incident involving a vehicle leaving the northern-most driveway on the east side of 166th Ave NE and a vehicle traveling southbound on 166th Ave NE. Only property damage was reported. There are no historical crash trends on 166th Ave NE that suggests that traffic generated to and from the proposed East Access would adversely contribute to.

## **2024 FUTURE WITHOUT-DEVELOPMENT TRAFFIC CONDITIONS**

This section describes the future traffic conditions without Redmond Square assuming steady local and regional traffic growth and planned improvements within the study between now and 2024. Future without-development conditions serve as the future baseline conditions used to evaluate Project-specific impacts.

### **Transportation Facility Improvements**

2019-2024 Redmond TIP lists the following funded transportation facility improvements within the study area:

- Bicycle and Pedestrian:
  - B47 159th Pl NE Sidewalk - Bear Creek to Leary Way. Construct sidewalk on east side of 159th Place NE from Leary Way to Bear Creek Pkwy where missing. Unfunded Cost: \$212,000. Completion: 2024.
  - B53 Redmond Central Connector Linkages. Create pedestrian connections between Redmond Central Connector trail and Willows Road at approximately the 8400 block, and between the RCC and 168th Ave NE. Add a pedestrian crossing across Willows Road between Redmond Central Connector and NE 87th St. Funded Cost: \$1,106,000. Completion: 2020.
  - B88 NE 80th St Bicycle Facilities - Redmond Way to 172nd Ave. Complete bicycle facilities on 80th Street with a combination of bicycle lanes and bicycle boulevard treatment as appropriate for each segment of corridor. Unfunded Cost: \$708,000. Completion: 2024.
- Streets:
  - B43 Cleveland St East Main St Improvements. Extend the streetscape improvements on Cleveland St east to 168th Ave. Unfunded Cost: \$6,500,000. Completion: 2024.
  - C64 Redmond Way Bridge Modifications and 76th St Widening. Reconfigure bridge to add a second east-bound left turn lane by removing the sidewalk on the south side of bridge adding a separate pedestrian-bicycle bridge over Bear Creek. In addition, widen NE 76th St to accept the dual left turns from Redmond Way. The pedestrian/bike bridge will provide a dual function to both replace the existing narrow walkway and accommodate a future connection between Bear Creek Trail and East Lake Sammamish Trail on the south side of SR 520. Funded Cost: \$766,000. Completion: 2022.
  - C67 Redmond Way Westbound Right Turn Lane. Construct second westbound lane on Redmond Way that transitions to right turn lane at 164th Ave NE where not completed by adjacent development. Unfunded Cost: \$2,500,000. Funded Cost: \$2,500,000. Completion: 2024.
- Preservation:
  - P28 Avondale Way Sidewalk Preservation - 170th Pl NE to Union Hill Rd. Replace existing sidewalk on southeast side that has been severely damaged by tree roots uplifting the sidewalk. Funded Cost: \$991,000. Completion: 2024.
  - P34 Cleveland St Sidewalk Rehabilitation - 164th Ave NE to 168th Ave NE. Replace broken and heaved sidewalk panels on Cleveland St between 164th Ave NE and 168th Ave NE. This project will not be necessary if B43--Cleveland St East Main St Improvements is constructed. Funded Cost: \$852,000. Completion: 2020.
  - P35 164th Ave NE Sidewalk Rehabilitation - Redmond Way to NE 90th St. Remove and replace sidewalk and street trees on both sides of 164th Ave NE between Redmond Way and NE 90th St. Funded Cost: \$2,085,000. Completion: 2023.

- Safety and System Management:
  - S55 161st Ave NE Pedestrian Crossing at NE 81st St. Provide rectangular rapid flashing beacon pedestrian crossing of 161st Ave NE at approximately 8100 block. Unfunded Cost: \$144,000. Completion: 2019.
- Transit and HOV:
  - L9 Sound Transit East Link - City ST3 Planning Staff oversight & participation in implementing East Link light rail. ST is currently designing and constructing the extension of light rail from Downtown Seattle to Redmond. Process requires substantial City involvement to ensure system will be consistent with Redmond's interests. It requires experienced City staff time & consultants -- light rail design and operation & how light rail fits with land use. City's key interest areas: station access (e.g. pedestrian and bike facilities, additional street and access connections, & transit), station design, integration w/future development & efforts to extend light rail to downtown Redmond. Funded Cost: \$100,000. Completion: 2020.

In addition to the City of Redmond TIP projects, Sound Transit plans to extend light rail service to downtown Redmond. Link light rail service is planned along the Redmond Central Corridor with the east-end station south of the site and to the east of 164th Ave NE. Service is planned by 2024.

A new midblock crossing of Cleveland Street is also planned at the south end of the proposed woonerf to provide a non-motorized linkage to the future light rail station.

Funded transportation facility improvements are included in the 2024 future traffic analysis without and with the proposed Project.

### **Non-Project Growth Forecast**

Background traffic growth between now and 2024 includes both regional and local increases in traffic volumes through the study area. For this analysis a 2.0% annual growth rate was applied to the existing traffic volume to forecast future volumes without the development. The growth rate assumes regional traffic growth in and through the City of Redmond.

In addition to the annual growth rate, peak hour trips generated by 15 major pipeline developments were added to the future traffic forecast. Pipeline developments include those recently completed, under-construction, approved or known. The pipeline development PM peak hour trip forecasts were provided by the City of Redmond and were added to the background traffic forecast. Pipeline developments are listed below:

- |                          |                            |
|--------------------------|----------------------------|
| 1. Heron Flats and Lofts | 9. Station House Lofts     |
| 2. Blackbird             | 10. Anderson Park Hotel    |
| 3. Bear Creek Mixed Use  | 11. Redmond Way Flats      |
| 4. Alexan Central Park   | 12. The Village            |
| 5. Ravello Apartments    | 13. Town Center Apartments |
| 6. Modera River Trail    | 14. Archer Hotel           |
| 7. Modera (RAC)          | 15. City Center            |
| 8. Redmond Triangle      |                            |

Figure 7 illustrates the without-development traffic volumes.

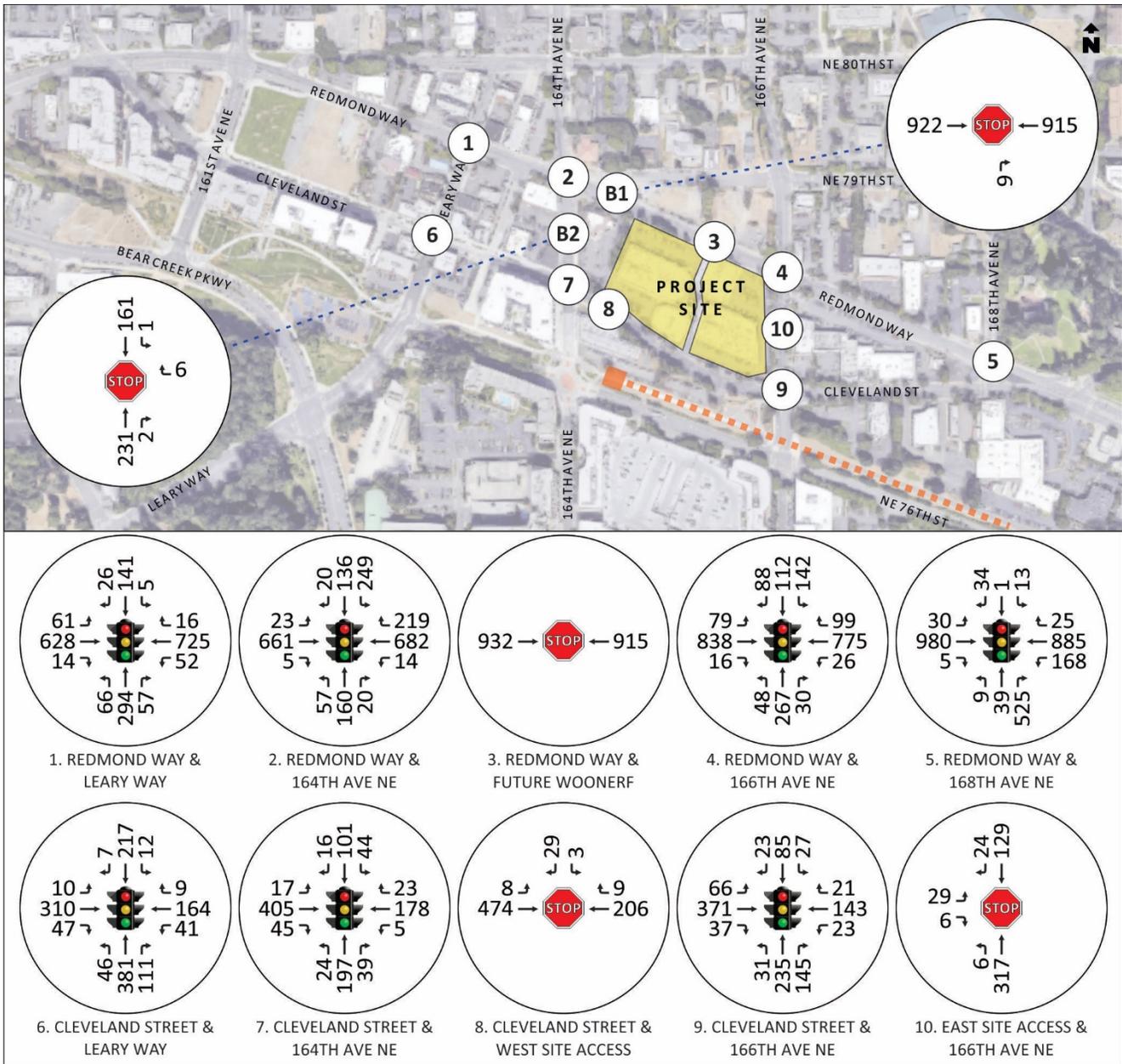


Figure 7: 2024 Without-Project PM Peak Hour Traffic Volumes

### **Traffic Operations Analysis**

Table 5 summarizes the 2024 without-development intersection operations and compares future operations without the development to existing conditions. Intersection capacity reports are included in the Appendix.

For this analysis the coordinated signal timings on Redmond Way and Cleveland Street were adjusted to account for an additional westbound lane on Redmond Way between 166th Ave NE and 168th Ave NE, signal phasing improvements assumed at Redmond Way and 166th Ave NE, which includes northbound left turn *protected-permissive with flashing yellow arrow* phasing, and the growth in traffic volumes projected between now and 2024. In general, the existing cycle lengths for the intersections on Redmond Way and Cleveland Street from 160th Ave NE to 168th Ave NE were adjusted to 108 second using the Synchro “Network Cycle Length Optimizer” function to maintain coordination between the signal controllers.

**Table 5: 2024 Without-Development Intersection Level-of-service**

Intersection	Control	Existing		Future Without Dev.	
		LOS	Delay	LOS	Delay
Redmond Way / Leary Way	Signal	D	39.0	B	16.5
Redmond Way / 164th Ave	Signal	C	27.9	B	19.2
Redmond Way / 166th Ave	Signal	D	39.9	D	52.8
Redmond Way / 168th Ave	Signal	B	18.3	B	17.2
Cleveland St / Leary Way	Signal	B	18.5	C	22.3
Cleveland St / 164th Ave	Signal	B	13.3	B	19.5
Cleveland St / West Access	SB Stop	B	10.0	B	10.2
Cleveland St / 166th Ave	Signal	B	14.7	B	14.4
East Access / 166th Ave	EB Stop	B	11.0	B	11.8

With proposed pipeline developments and programmed improvements, the future study intersections are calculated to operate generally better in the future without the development than they do currently. All study intersections are forecast at LOS D or better and are within the City of Redmond’s level-of-service standards.

The improved traffic operations and reduced delays are related to the longer cycle lengths applied to the coordinated signal system.

## **TRIP GENERATION, DISTRIBUTION AND ASSIGNMENT**

This section describes the trip generation and PM peak hour trip distribution and travel assignment forecasts for the proposed development. The trip generation methodology that follows is consistent with the Phase 1 Trip Generation Study reviewed and approved by the City of Redmond.

### **Trip Generation – Proposed Development**

#### *Land Uses*

Data from the ITE Trip Generation Manual, 10th Edition was used to forecast trip generation for Redmond Square. The land use data for this analysis includes: Land Use 221 “Multifamily Housing (Mid-Rise)”, 820 “Shopping Center”, and 932 “High-Turnover (Sit-Down) Restaurant”.

#### *Development Trip Generation Unadjusted*

Table 6 summarizes the unadjusted trip generation for the full build-out of the proposal. The unadjusted trip generation does not include adjustments for trip sharing, urban infill, the site’s proximity to light rail and transit, internal-captured trips, pass-by trips, or credits for trips generated by existing uses onsite being replaced by the proposed development.

**Table 6: Development Trip Generation - Unadjusted**

<b>Use (ITE Code)</b>	<b>Size</b>	<b>Trip Rate</b>	<b>%-in</b>	<b>%-out</b>	<b>Trips</b>
Multifamily (221)	613 dwelling units	$T = 5.45 (X) - 1.75$ per dwelling	50%	50%	3,339
Shopping Center (820)	20,681 sq. ft.	$\ln(T) = 0.68 \ln(X) + 5.57$ per 1,000 sq. ft.	50%	50%	2,059
Restaurant (932)	7,968 sq. ft.	112.18 per 1,000 sq. ft.	50%	50%	894
<b>Weekday Total</b>					<b>6,292</b>
Multifamily (221)	613 dwelling units	$\ln(T) = 0.98 \ln(X) - 0.98$ per dwelling	26%	74%	202
Shopping Center (820)	20,681 sq. ft.	$T = 0.50 (X) + 151.78$ per 1,000 sq. ft.	62%	38%	162
Restaurant (932)	7,968 sq. ft.	9.94 per 1,000 sq. ft.	55%	45%	79
<b>AM Peak Hour Total</b>					<b>443</b>
Multifamily (221)	613 dwelling units	$\ln(T) = 0.96 \ln(X) - 0.63$ per dwelling	61%	39%	253
Shopping Center (820)	20,681 sq. ft.	$\ln(T) = 0.74 \ln(X) + 2.89$ per 1,000 sq. ft.	48%	52%	169
Restaurant (932)	7,968 sq. ft.	9.77 per 1,000 sq. ft.	62%	38%	78
<b>PM Peak Hour Total</b>					<b>500</b>

1. Fitted Curve Equation, where T = number of trip ends and X = dwelling units or 1,000 sq. ft.
2. Average trip generation rate, no ITE equation provided

This analysis focuses on the PM peak hour trips generated by the proposed redevelopment of the site, since during the AM peak hour, the commercial uses onsite are likely to be closed.

#### *Internal Capture Adjustment*

Methodology from the ITE Trip Generation Handbook Chapter 6 Trip Generation for Mixed-Use Development was used to forecast vehicle trip generation for the proposed development. Internal trips are those trips shared between complementary land uses onsite and are not considered new to the external roadways surrounding the site.

In addition to the ITE methodology, Redmond staff requested review of the internal capture reductions applied to the trip generation forecasts for Redmond City Center and LMC Marymoor.

- Redmond City Center is located near Redmond Transit Center. Like this proposal both sites are in the City of Redmond’s Downtown Urban Center area.
- LMC Marymoor is located SE Redmond near the link light rail station that is planned southeast of Redmond Way and SR 520. LMC Marymoor is not in an Urban Center, per the Redmond Comprehensive Plan, but like this proposal is in the vicinity of a future link light rail station.

The NCHRP 684 and ITE Trip Generation Handbook internal-capture methodology was included to compare with the capture rates approved at Redmond City Center and LMC Marymoor.

Table 7 compares the internal capture rates from Redmond City Center, LMC Marymoor, and NCHRP 684 output and shows the rates proposed for this project.

**Table 7: Development Trip Generation - Internal-Capture Adjustment**

Time-Period	City Center	LMC Marymoor	Project NCHRP	Proposed
Weekday Daily	22.8%	20% <sup>1</sup>	N/A <sup>2</sup>	20%
AM Peak Hour	7.9%	20% <sup>1</sup>	12%	12%
PM Peak Hour	22.2%	20% <sup>1</sup>	29%	20%

1. LMC Marymoor applied a 50% internal-capture and TOD reduction to their daycare component

2. NCHRP 684 does not include internal-capture percentages for weekday daily trips.

#### *Pass-By Trip Adjustment*

Pass-by trips are trips attracted to the site from roadways adjacent to the site.

The ITE Trip Generation Handbook indicates that the average PM peak hour pass-by rate for a shopping center is 34%. For this analysis, the shopping center pass-by rate was applied to both the shopping center and restaurant land uses, per the City of Redmond. Also, no pass-by rate was applied to the daily trip forecast, since there is no daily pass-by rate quoted in the ITE handbook.

#### *Project Trip Generation Adjusted*

Table 8 shows the trip generation forecast for the full build-out of the development using weekday daily and PM peak hour adjustments for internal trips and pass-by trip.

**Table 8: Development Trip Generation - With Adjustments**

Land Use	Gross Trips <sup>1</sup>	Internal Capture		External Trips	Pass-By		Non-Pass-By Trips
		Rate <sup>2</sup>	Trips		Rate <sup>3</sup>	Trips	
Multifamily	3,339	20%	668	2,671	0%	0	2,671
Shopping Center	2,059	20%	412	1,647	0%	0	1,647
Restaurant	894	20%	179	715	0%	0	715
<b>Weekday Total</b>	<b>6,292</b>		<b>1,259</b>	<b>5,033</b>		<b>0</b>	<b>5,033</b>
Multifamily	202	12%	24	178	0%	0	178
Shopping Center	162	12%	19	143	0%	0	143
Restaurant	79	12%	9	70	0%	0	70
<b>AM Peak Hour Total</b>	<b>443</b>		<b>53</b>	<b>390</b>		<b>0</b>	<b>390</b>
Multifamily	253	20%	51	202	0%	0	202
Shopping Center	169	20%	34	137	34%	47	91
Restaurant	78	20%	15	60	34%	21	40
<b>PM Peak Hour Total</b>	<b>500</b>		<b>100</b>	<b>400</b>		<b>67</b>	<b>333</b>

1. See Table 6

2. Rates based on comparison of NCHRP methodology and rates from City Center and LMC Marymoor developments

3. ITE Pass-By Rates, no data is available for weekday and AM peak hour conditions

### Trip Generation – Existing Uses

Trips generated by existing uses being replaced with development are subtracted from the Project’s adjusted trip generation forecast. For this analysis, trip generation for the existing commercial center land use is based on the data from ITE.

Table 9 summarizes the trips generation forecast for the existing commercial center.

**Table 9: Existing Commercial Center Trip Generation**

Time-Period	Size	Trip Generation Equation <sup>1</sup>	Pass-By Trips		Non-Pass-By Trips
			Rate	Trips	
Weekday Daily	61,295 sq. ft.	$\ln(T) = 0.68 \ln(X) + 5.57$ per 1,000 sq. ft.	0%	0	4,310
AM Peak Hour	61,295 sq. ft.	$T = 0.5 (X) + 151.78$ per 1,000 sq. ft.	0%	0	182
PM Peak Hour	61,295 sq. ft.	$\ln(T) = 0.74 \ln(X) + 2.89$ per 1,000 sq. ft.	34%	129	250

1. Fitted curve equation, where T = vehicle trip ends and X = site of variable, the latter is given 1,000 square feet (k SF)

### Development Trip Generation – Net New Trips

Net new trips are computed by subtracted trips generated by the existing use from the adjusted trips generated by the Project. Table 10 summarizes the net new trips forecast.

**Table 10: Development Trip Generation - Net New Trips**

Time-Period	Project Trips <sup>1</sup>	Internal Trips <sup>2</sup>	External Trips <sup>2</sup>	Pass-By Trips <sup>2</sup>	Non-Pass-By Trips <sup>2</sup>	Existing Trips <sup>3</sup>	Net New Trips
Weekday Total	6,292	1,259	5,033	0	5,033	(4,310)	723
AM Peak Hour Total	443	53	390	0	390	(182)	208
PM Peak Hour Total	500	100	400	67	333	(250)	83

1. See Table 6
2. See Table 8
3. See Table 9

The trip breakdown by development is summarized in Table 11.

**Table 11: Development Trip Generation Forecast By-Building**

Weekday	Full-Build-Out Multifamily			Full-Build-Out Commercial			Full-Build-Out Total		
	In	Out	Total	In	Out	Total	In	Out	Total
Pass-By:	0	0	0	0	0	0	0	0	0
Non-Pass-By:	1,336	1,336	2,671	1,181	1,181	2,362	2,517	2,517	5,033
(Existing):	(1,144)	(1,144)	(2,287)	(1,011)	(1,011)	(2,023)	(2,155)	(2,155)	(4,310)
New Trips	192	192	384	170	170	340	362	362	723
<b>AM Peak Hour</b>	<b>In</b>	<b>Out</b>	<b>Total</b>	<b>In</b>	<b>Out</b>	<b>Total</b>	<b>In</b>	<b>Out</b>	<b>Total</b>
Pass-By:	0	0	0	0	0	0	0	0	0
Non-Pass-By:	40	138	178	130	83	212	170	220	390
(Existing):	(28)	(42)	(71)	(86)	(26)	(112)	(114)	(68)	(182)
New Trips	12	96	108	44	56	100	56	152	208
<b>PM Peak Hour</b>	<b>In</b>	<b>Out</b>	<b>Total</b>	<b>In</b>	<b>Out</b>	<b>Total</b>	<b>In</b>	<b>Out</b>	<b>Total</b>
Pass-By:	0	0	0	34	34	67	34	34	67
Non-Pass-By:	129	73	202	71	59	130	200	133	333
(Existing):	(66)	(58)	(124)	(54)	(72)	(125)	(120)	(130)	(250)
New Trips	63	15	78	17	(12)	5	80	3	83

**Table 11: Development Trip Generation Forecast By-Building**

Time-Period	Building A Multifamily			Building A Commercial			Building A Total		
	In	Out	Total	In	Out	Total	In	Out	Total
Pass-By:	0	0	0	0	0	0	0	0	0
Non-Pass-By:	658	658	1,316	376	376	752	1,034	1,034	2,068
(Existing):	(563)	(563)	(1,127)	(322)	(322)	(644)	(886)	(886)	(1,771)
New Trips	95	95	189	54	54	108	149	149	297
AM Peak Hour	In	Out	Total	In	Out	Total	In	Out	Total
Pass-By:	0	0	0	0	0	0	0	0	0
Non-Pass-By:	20	68	88	41	28	69	61	96	157
(Existing):	(15)	(20)	(35)	(31)	(8)	(39)	(46)	(28)	(73)
New Trips	5	48	53	11	20	30	16	68	84
PM Peak Hour	In	Out	Total	In	Out	Total	In	Out	Total
Pass-By:	0	0	0	11	11	22	11	11	22
Non-Pass-By:	63	36	100	25	17	42	88	53	142
(Existing):	(33)	(31)	(64)	(18)	(24)	(42)	(51)	(55)	(106)
New Trips	31	5	36	7	(7)	0	37	(2)	35
Time-Period	Building B Multifamily			Building B Commercial			Building B Total		
Weekday	In	Out	Total	In	Out	Total	In	Out	Total
Pass-By:	0	0	0	0	0	0	0	0	0
Non-Pass-By:	678	678	1,355	805	805	1,610	1,482	1,482	2,965
(Existing):	(580)	(580)	(1,160)	(689)	(689)	(1,378)	(1,269)	(1,269)	(2,539)
New Trips	97	97	195	116	116	231	213	213	426
AM Peak Hour	In	Out	Total	In	Out	Total	In	Out	Total
Pass-By:	0	0	0	0	0	0	0	0	0
Non-Pass-By:	21	70	90	88	55	143	109	125	234
(Existing):	(13)	(23)	(36)	(55)	(18)	(73)	(68)	(41)	(109)
New Trips	8	47	54	33	37	70	41	83	124
PM Peak Hour	In	Out	Total	In	Out	Total	In	Out	Total
Pass-By:	0	0	0	23	23	46	23	23	46
Non-Pass-By:	65	37	103	46	42	88	112	79	191
(Existing):	(33)	(27)	(61)	(35)	(47)	(83)	(69)	(75)	(143)
New Trips	32	10	42	11	(5)	6	43	5	48

\* Includes rounding

Building A (West) is forecast to generate:

- 297 new weekday daily vehicle trips, split: 149 in and 149 out
- 84 new AM peak hour vehicle trips, split: 16 in and 68 out
- 35 new PM peak hour vehicle trips, split: 35 in and 0 out, and 22 pass-by trips

Building B (East) is forecast to generate:

- 426 new weekday daily vehicle trips split 213 in and 213 out
- 124 new AM peak hour vehicle trips, split: 41 in and 83 out
- 48 new PM peak hour vehicle trips split 43 in and 5 out, and 46 pass-by trips

Full-Build-Out is forecast to generate:

- 723 new weekday daily vehicle trips split 362 in and 362 out
- 208 new AM peak hour vehicle trips, split: 56 in and 152 out
- 83 new PM peak hour vehicle trips split 80 in and 3 out, and 67 pass-by trips

### **Trip Distribution and Peak Hour Travel Assignment**

The City of Redmond’s Traffic Study Guidelines focus on analysis of PM peak hour traffic impacts generated by new development. As stated above, commercial-related activities at the proposed development are likely to be closed for business during the traditional AM peak hour (7-9 AM) period; and thus, are not part of this study.

Trips were assigned to the proposed site accesses off the woonerf, Cleveland Street and 166th Ave NE.

- The proposed woonerf provided access to **Building A**’s resident parking garage and at Redmond Way will be restricted to right-in, left-in and right-out movements only. Through access in the woonerf is restricted for emergency vehicles and pedestrian and bicyclists only.
- The West Access off Cleveland Street is proposed restricted to right-in and right-out movements only. The driveway will provide access to **Building A**’s commercial and guest parking area and will provide shared access between the **Building A** and the adjacent Key Bank property. No changes are proposed to the other exit-only bank driveways off Redmond Way and 164th Ave NE.
- The proposed East Access is for **Building B**. The access is at a current midblock location on 166th Ave NE and no turn restrictions are proposed.

Development-generated PM peak hour trips were distributed to the study area and the site accesses based on past traffic studies in downtown Redmond and from current travel patterns.

- Figure 8 shows the PM peak hour trip distribution and assignment of the multifamily trips for **Building A** to and from the woonerf access.
- Figure 9 shows the PM peak hour trip distribution and assignment of the commercial trips for **Building A** to and from the Cleveland Street driveway.
- Figure 10 shows the PM peak hour trip distribution and assignment of the multifamily and commercial trips for **Building B** to and from the 166th Ave NE driveway.
- Figure 11 shows the PM peak hour trip distribution and assignment of the multifamily and commercial trips for the full development.

For analysis purposes, the number of net new trips generated were used to develop the study area for evaluating traffic operations with the development.

With development traffic analyses, conservatively include the total number of trips forecast by the proposed development, without the full discount for credits for existing commercial center.

The analysis that follows is conservative and the traffic impacts generated by the current Project will be less.



Figure 8: Building A (West) PM Peak Hour Multifamily Trip Distribution and Assignment



Figure 9: Building A (West) PM Peak Hour Commercial Trip Distribution and Assignment



Figure 10: Building B (East) PM Peak Hour Trip Distribution and Assignment



Figure 11: Building A (West) and Building B (East) PM Peak Hour Trip Distribution and Assignment

## 2024 FUTURE WITH-DEVELOPMENT TRAFFIC CONDITIONS

This section describes the future traffic conditions with the Redmond Square occupied.

### 2024 Future With-Development Volumes

Figure 12 illustrates the year 2024 PM peak hour traffic volumes with the full development. With-development volumes include new PM peak hour trips generated by the proposal, inbound bank traffic shifted to the proposed West Access, and traffic reductions for trips generated by the former retail center documented earlier at the West Access and East Access. Note that other credits for the existing commercial center are not included, to maintain a conservative analysis.

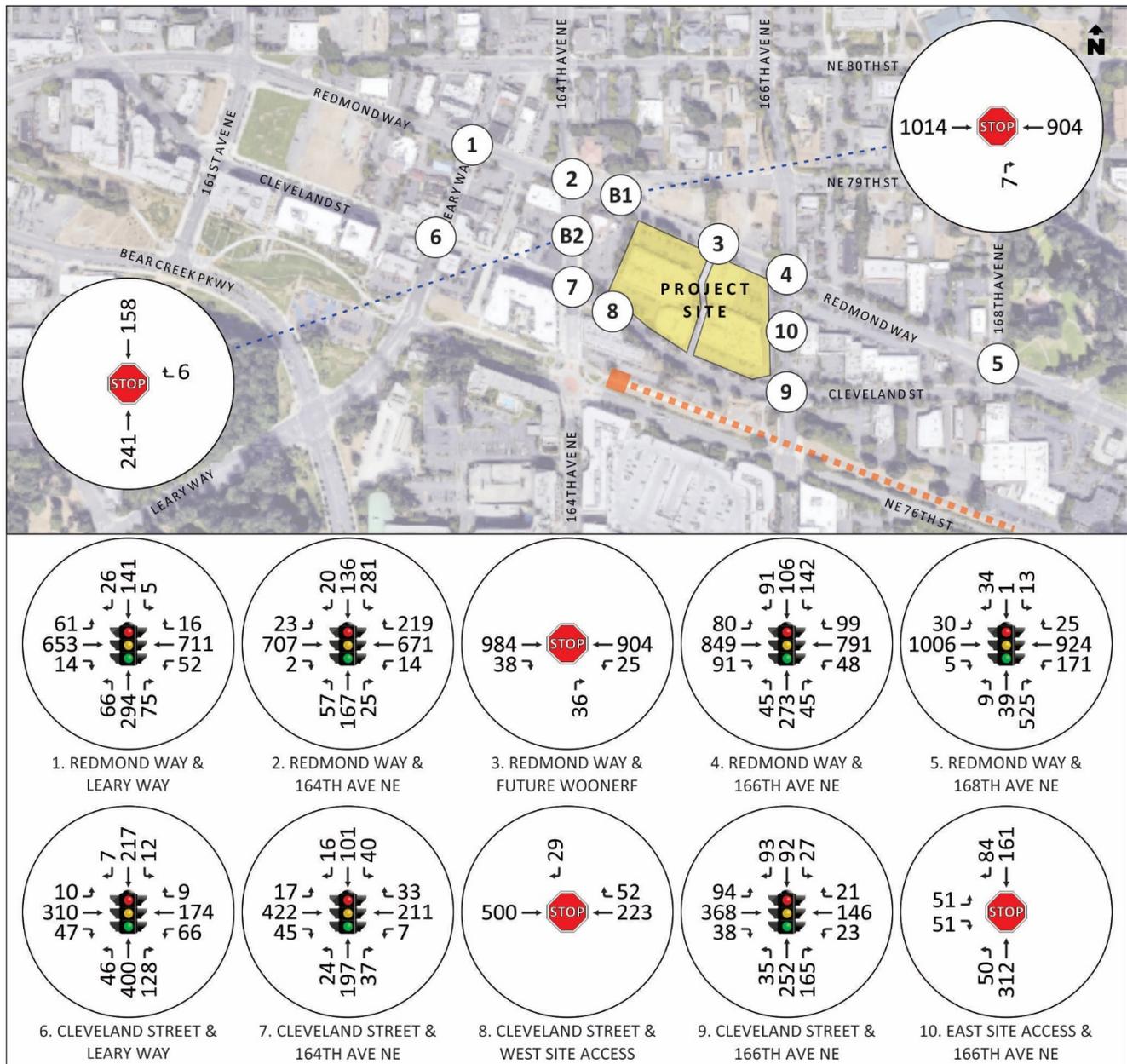


Figure 12: 2024 With-Project PM Peak Hour Traffic Volumes

### Traffic Operations Analysis

Table 12 summarizes the 2024 with-development intersection operations and compares future operations with the development to conditions without the development. Intersection capacity reports are included in the Appendix.

**Table 12: 2024 With-Development Intersection Level-of-service**

Intersection	Control	Future Without Dev.		Future With Dev.	
		LOS	Delay	LOS	Delay
Redmond Way / Leary Way	Signal	B	16.5	B	17.1
Redmond Way / 164th Ave	Signal	B	19.2	C	23.6
Redmond Way / woonerf	NB Stop	-	-	C	21.1
Redmond Way / 166th Ave	Signal	D	52.8	E	77.9
Redmond Way / 168th Ave	Signal	B	17.2	B	16.8
Cleveland St / Leary Way	Signal	C	22.3	C	23.2
Cleveland St / 164th Ave	Signal	B	19.5	B	18.4
Cleveland St / West Access	SB Stop	B	10.2	B	10.1
Cleveland St / 166th Ave	Signal	B	14.4	B	15.6
East Access / 164th Ave	EB Stop	B	11.8	B	13.0

The study intersections are forecast to operate at LOS D or better and satisfy the City of Redmond’s level-of-service standard, except for Redmond Way and 166th Ave NE. Redmond Way and 166th Ave NE is forecast to operate at LOS E with the proposed development.

With signal coordination, the traffic progression between intersections with the development can result in some improved intersection delays compared to without the development conditions. Redmond Way and 168th Ave NE and Cleveland Street and 164th Ave NE both show slight improvements in the intersection delay.

### Site Access

For the analysis that follows, vehicle queues were computed using the HCM 2010 equations in Synchro.

**Redmond Way / Woonerf.** The intersection of woonerf and Redmond Way is forecast to operate at LOS C. The 95th-percentile vehicle queue on the woonerf is computed to be less than a vehicle in length and may be longer depending on the number of vehicles stacked in the eastbound travel lane. The exiting queue occurs on the woonerf and does not impact Redmond Way, the major roadway.

The westbound 95th-percentile left-turn lane queue on Redmond Way approaching 164th Ave NE is computed to be less than one vehicle in length which is not forecast to extend back to the woonerf and does not impeded vehicles turning left from Redmond Way to the woonerf to **Building A**.

The eastbound queue on Redmond Way at 166th Ave NE is computed to extend past the woonerf and like current conditions, the queue can extend to 164th Ave NE. With the development drivers will need to wait for a gap in the single eastbound travel lane to enter and exit the site. As stated above, left turn access into the site is not impeded by westbound left-turn lane queues extending into the center-turn lane on Redmond Way from 164th Ave NE.

The proposed woonerf intersection is forecast to operate at an acceptable level-of-service and is proposed to be restricted to right-in, right-out and left-in movements only. The peak hour 95th-percentile queue impacts

on Redmond Way in the eastbound direction are present without the development and are not anticipated to adversely impede ingress and egress from the proposed wonerf and corresponding **Building A**.

**Cleveland Street / West Access.** The West Access is forecast to operate at LOS B and is within 50 feet of 164th Ave NE. The queue exiting the driveway is computed at less than one vehicle in length and may be longer depending on gaps in the westbound traffic flow on Cleveland Street. The queue occurs off of the public street and is limited to traffic exiting the bank, 1 vehicle (based on current counts), and the commercial and guest parking for **Building A**, 28 vehicles (based on the trip generation forecast).

The 95th-percentile vehicle queues on Cleveland Street approaching 164th Ave NE are computed to be less than one vehicle in length. These queues are anticipated to be longer in the future, particularly with link light rail operational across Cleveland Street from the development.

The proposed driveway will be restricted to right-in and right-out movements only. New vehicle trips make up about 2% of the driveway volume and adjusted without credits, the development volume makes up about 17% of the driveway volume. Traffic impacts are limited to vehicles exiting the site, and the amount of traffic impacted is relatively small.

Based on the analysis above, the proposed driveway is anticipated to operate reasonably well at its proposed location. Driveway impacts are generally restricted to areas off of the public right-of-way. The driveway will also be designed to accommodate service vehicles entering and exiting **Building A** and will include measures to limit cut-through traffic to the adjacent bank property.

**166th Ave NE / East Access.** The East Access is forecast to operate at LOS B. The 95th-percentile vehicle queue exiting the driveway is computed to be less than a vehicle in length and may be longer. The exiting queue occurs off of the public roadway.

The northbound left turn 95th-percentile queue on 166th Ave approaching Redmond Way is computed at 2 vehicles, or roughly 50 feet, and does not extend to the East Access. With eastbound queue impacts on Redmond Way, the northbound shared through and right-turn lane 95th-percentile queue on 166th Ave approaching Redmond Way is computed to extend past the East Access and further.

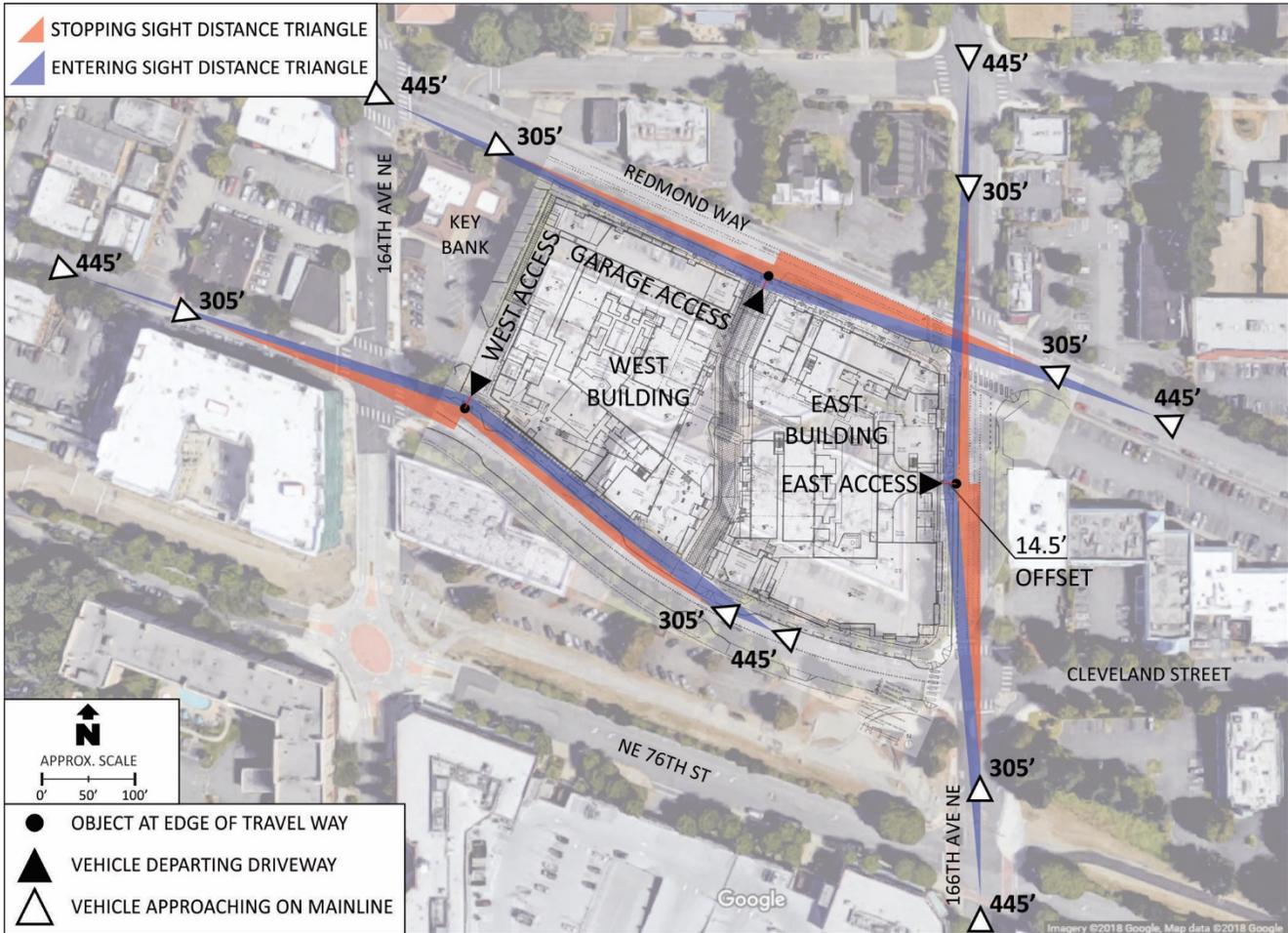
The southbound shared through and right-turn lane 95th-percentile queue on 166th Ave approaching Cleveland Street is computed at 5 vehicles, or roughly 125 feet and does not extend to the East Access. Site generated traffic would be able to make a right turn out from **Building B** if the queue in the northbound travel lane on 166th Ave is stacked past the proposed driveway.

Like current conditions, the queue on 166th Ave NE is not forecast to extend past the proposed site access for the entirety of the day. Outside of the peak hour, there would be negligible queues on 166th Ave NE that would impact left turn egress from the site. Based on the analysis above, the northbound left queue is not computed to extend past the proposed access to prevent vehicles from making a left out of the site and particularly with the three-lane wide cross-section on 166th Ave NE.

Traffic impacts are primarily limited to vehicles exiting the site and the access is computed to operate at an acceptable level-of-service. No future turn restrictions are recommended, if queuing becomes an issue for drivers in the peak hour, right-turns out to Cleveland Street are not forecast to adversely impact the driveway's or study area's traffic operations.

*Sight Distance*

Stopping and entering sight distance were evaluated at the site accesses based on recommendations from the AASHTO Green Book. A 40-mph design speeds was used for this analysis. The stopping sight distance standard is 305 feet and the entering sight distance standard is 445 feet. Figure 13 shows that the stopping and entering sight distance standards are met at the East and West Accesses.



**Figure 13: Stopping and Entering Sight Distance**

Pedestrian sight triangles are illustrated on the Civil Plans.

The proposed site accesses do not satisfy the RZC access spacing requirement of 150 feet. A copy of the driveway spacing deviation is attached.

The crash history presented above, does not suggest any recent negative collision trends that may impede access to the proposed development.

## **PARKING ANALYSIS**

The Applicant proposes to deviate from the City of Redmond’s multifamily parking requirements and maintain, through common-shared-use parking onsite, the parking requirements for the proposed commercial components of each building. A parking deviation request is included in the Appendix.

This parking analysis, and corresponding deviation, are based on the current Project plans.

Table 13 compares the Redmond Zoning Code (RZC) parking requirements to the proposed parking supply for each building.

**Table 13: Redmond Parking Requirements (RZC Table 21.10.40C)**

<b>Land Use</b>	<b>Size</b>	<b>RZC Parking Ratio</b>	<b>Parking Required</b>	<b>Parking Proposed</b>
Multifamily	302 dwelling units	1.25 / dwelling unit	378 spaces	253 spaces
Commercial Retail	4,932 sq. ft.	2.00 / 1,000 sq. ft.	10 spaces	10 spaces
Food and Beverage	4,008 sq. ft.	5.00 / 1,000 sq. ft.	20 spaces	20 spaces
<b>Building A (West) Total</b>			<b>408 spaces</b>	<b>283 spaces</b>
Multifamily	311 dwelling units	1.25 / dwelling unit	389 spaces	251 spaces
Commercial Retail	15,697 sq. ft.	2.00 / 1,000 sq. ft.	31 spaces	31 spaces
Food and Beverage	3,865 sq. ft.	5.00 / 1,000 sq. ft.	20 spaces	20 spaces
<b>Building B (East) Total</b>			<b>439 spaces</b>	<b>302 spaces</b>

A multifamily parking deviation is justified using output from the King County Right Size Parking Calculator and U.S. Census statistics from the local area. Both outputs were also found to fit within the range of peak parking demand rates published by ITE.

A deviation from the City of Redmond’s multifamily parking requirements is reasonable considering the Project’s location in an Urban Center, in downtown Redmond, within walking distance to Redmond Transit Center and adjacent to a link light rail station.

The total proposed parking supply is forecast to meet the needs of the Project.

## **LINK LIGHT RAIL IMPACTS**

Goal 27 (UC-27) from the City of Redmond Urban Center Plan states:

Strive to achieve by 2030 a non-single occupancy vehicle (transit, bicycling, walking, car/vanpooling, telecommuting, or other “virtual” commute) mode split of 40 percent for peak-period trips in the urban centers. Do this by providing a pedestrian- and transit-supportive environment, developing supportive land uses, working with regional transit agencies to provide expanded transit options, including light rail and bus rapid transit, enhancing transportation demand management strategies, and implementing a parking development and management plan.

Link light rail service to downtown Redmond is planned by 2024. Rail service is forecast to reduce SOV and HOV motorized trips in support of the City of Redmond Urban Center Plan.

A midblock crossing of Cleveland St is being planned on the east side of the pedestrian plaza to provide a non-motorized connection between the north side of Cleveland St and the future light rail station. The midblock crossing is approximately 255 feet west of 166th Ave NE and 390 feet east of 164th Ave NE.

Vehicles queues were modelled at the future midblock crossing with 250 pedestrians per hour each assumed crossing northbound and southbound. The queues from the above analysis are not computed queues with the proposal are not computed to extend into the midblock crossing.

It is acknowledged that future long-term analyses by Sound Transit, have shown queue projections that do extend into the midblock crossing.

The proposed woonerf is designed for emergency vehicle-only and non-motorized access to Cleveland Street to minimize vehicle impacts near the midblock crossing.

## **MITIGATION ANALYSIS**

Basic mitigation measures include frontage improvements and traffic impact fees. This section summarizes development-specific mitigation measures.

### **Traffic Impact Fees**

Table 14 estimates the traffic impact fee based on the 2020 fee schedule for new development in downtown Redmond. Traffic impact fees do not vest and the fee schedule in place at the time of building permit issuance will be applied to the proposed Project. This fee estimate is based on the current Project.

**Table 14: 2020 Traffic Impact Fee Estimate**

<b>Land Use</b>	<b>Size</b>	<b>2020 Fee Rate</b>	<b>2020 Fee Estimate</b>
Proposed Multifamily	613 dwelling units	\$4,221.18 / dwelling units	\$2,587,583.34
Proposed Commercial/Retail	20,681 sq. ft.	\$19.25 / sq. ft.	\$398,109.25
Proposed Food and Beverage	7,968 sq. ft.	\$35.00 / sq. ft.	\$278,880.00
Existing Commercial/Retail	61,295 sq. ft.	\$(19.25) / sq. ft.	\$(1,179,928.75)
<b>Total Estimate</b>			<b>\$2,084,643.84</b>

### **Cleveland Street and 164th Ave NE**

The southeast corner of Cleveland Street and 164th Ave NE will be modified to mitigate a non-development deficiency whereby large trucks and, in the future, buses are unable to complete the northbound to eastbound right turn from 164th Ave to Cleveland Street without encroaching into the opposing travel lane. The proposed curbline modification, which is incorporated in this Civil Plans, would be completed via a partnership between the Applicant and with the City of Redmond. The Applicant who controls the property at the southeast corner of the intersection can support the corner modification by providing the right-of-way.

The proposed curbline modification at the southeast corner of the intersection, would also support continue to be use of the proposed West Access for **Building A** and existing bank. As stated above, the proposed West Access will be restricted to right-in and right-out movements only and the access will be designed to support trucks into and out of the driveway.

Regarding access to the bank, the Applicant is recommended to post signs and coordinate with the bank to minimize the potential for cut-through traffic impacts between the bank and **Building A**. A raised feature is also being explored and tenants and guests will be provided information to minimize impacts of cross-access between both properties.

### **Redmond Way and 166th Ave NE**

Redmond Way and 166th Ave NE is forecast to operate at LOS E with the proposed development. The traffic analysis above is conservative, with very limited traffic volume credits, with redevelopment of the existing commercial retail center, applied to the volume and level-of-service analyses.

Net new development generated trips to this intersection make up 2% of the future intersection volume and, unadjusted for credit for the existing use, the development increases the future intersection volume by 7%. Overall, development trip impacts are small and without the development, future traffic operations are not likely to be significantly different.

In this urban setting link light rail is anticipated to reduce the need for vehicle use in downtown Redmond, consistent with the planning goals of the City of Redmond. This analysis, does not globally adjust the traffic volumes or traffic patterns on Redmond Way and Cleveland Street to account for link light rail.

A sensitivity analysis focused on the westbound volume on Redmond Way, and showed that if the westbound volume were reduced by 150 vehicles, then the intersection could operate at LOS D and satisfy the City of Redmond’s level-of-service standard. There are multiple alternative travel routes for traffic to reroute itself away from Redmond Way and this intersection, like NE 79th Street, Cleveland Street and Bear Creek Pkwy NE, and the SR 520 offramps to Avondale Way and to Redmond Way east of the site. It is reasonable to consider the alternative travel routes.

**Table 15: 2024 With-Development Redmond Way and 166th Ave NE Sensitivity**

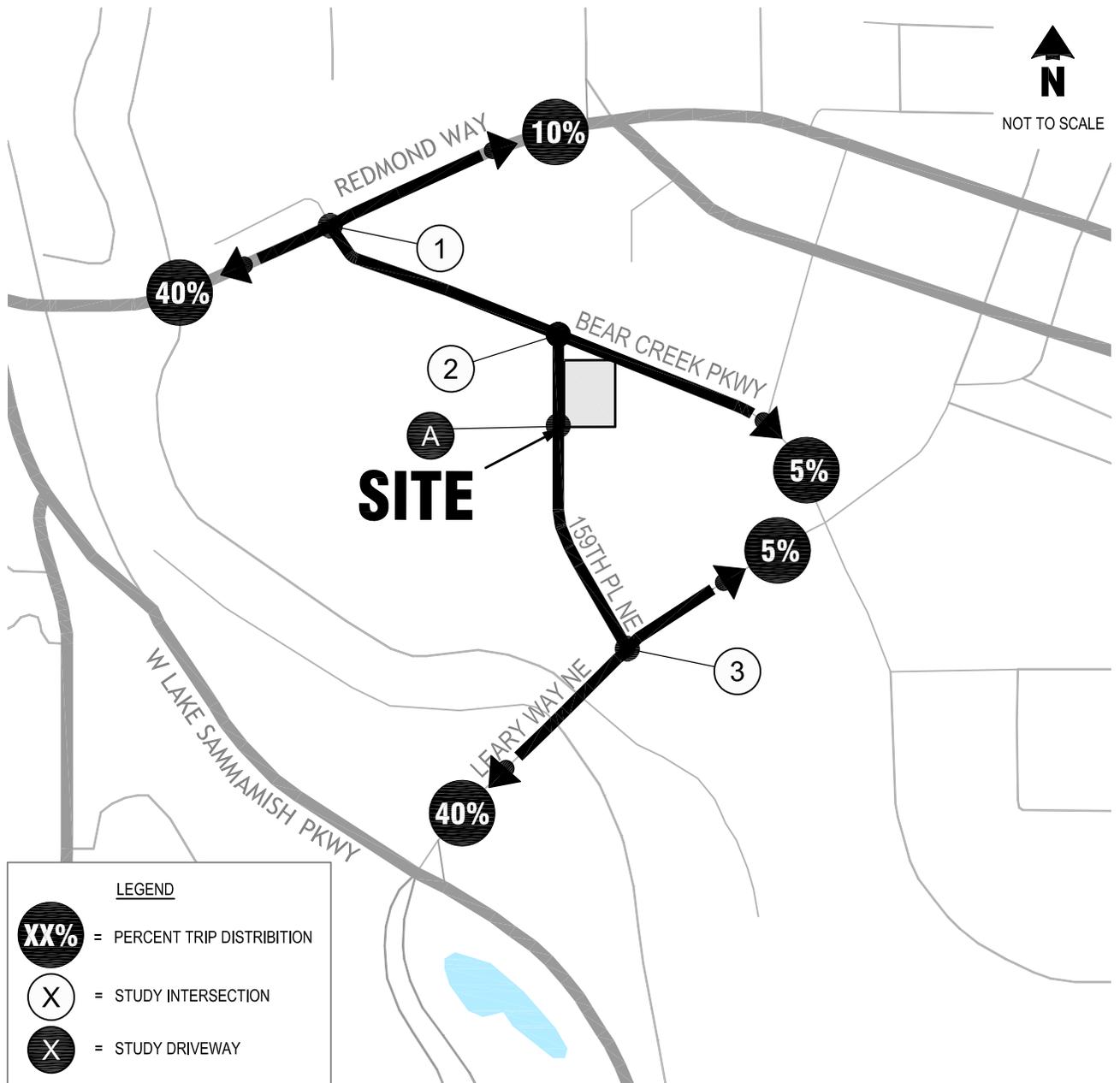
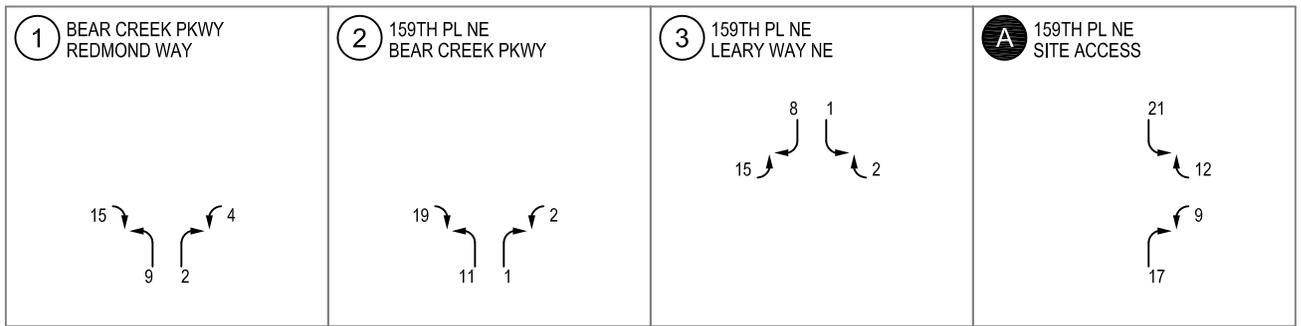
Intersection	Control	LOS	Delay	Improvement Options
Redmond Way / 166th Ave	Signal	E	77.9	No Improvement
Redmond Way / 166th Ave	Signal	D	52.3	Reduce westbound volume by 150 vehicle

In addition, to meet the City of Redmond’s Comprehensive Plan goals for reducing auto vehicle travel particularly in the downtown, it is also reasonable to assume that there will be some shift in travel modes near the site with operation of the future link light rail service.

Based on conservative nature of the traffic study, small development impact at the intersection, the ability for drivers to use alternative routes, and presence of future link light rail (an alternative travel mode), intersection mitigation, by the Applicant, is not warranted.

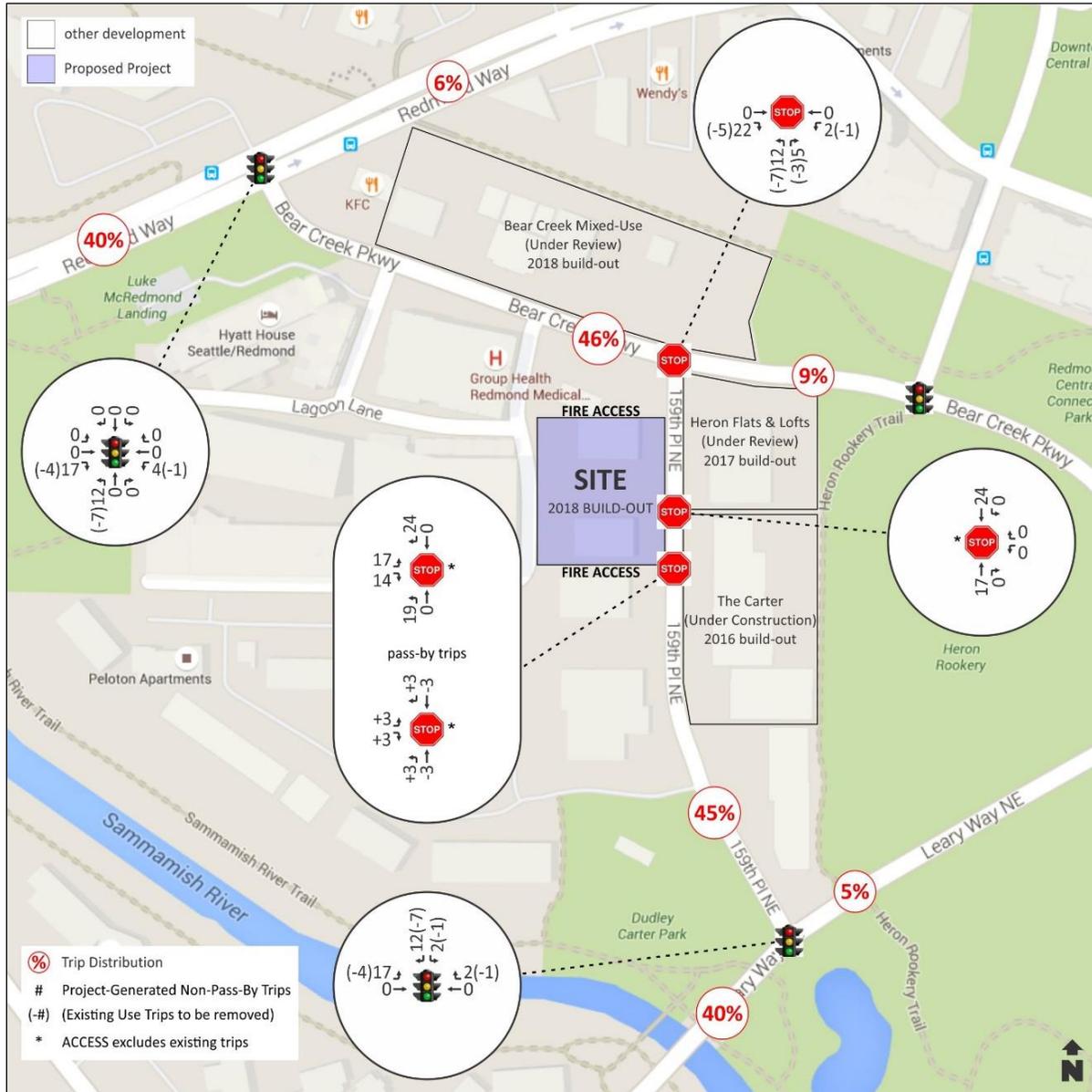
## Appendix

## Pipeline Projects



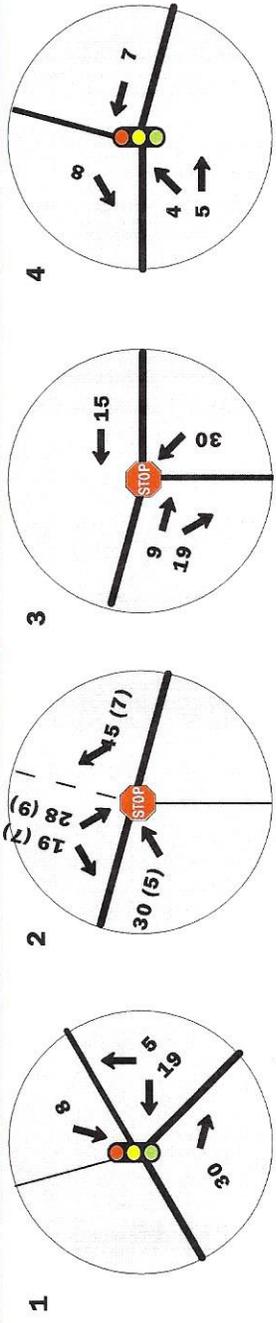
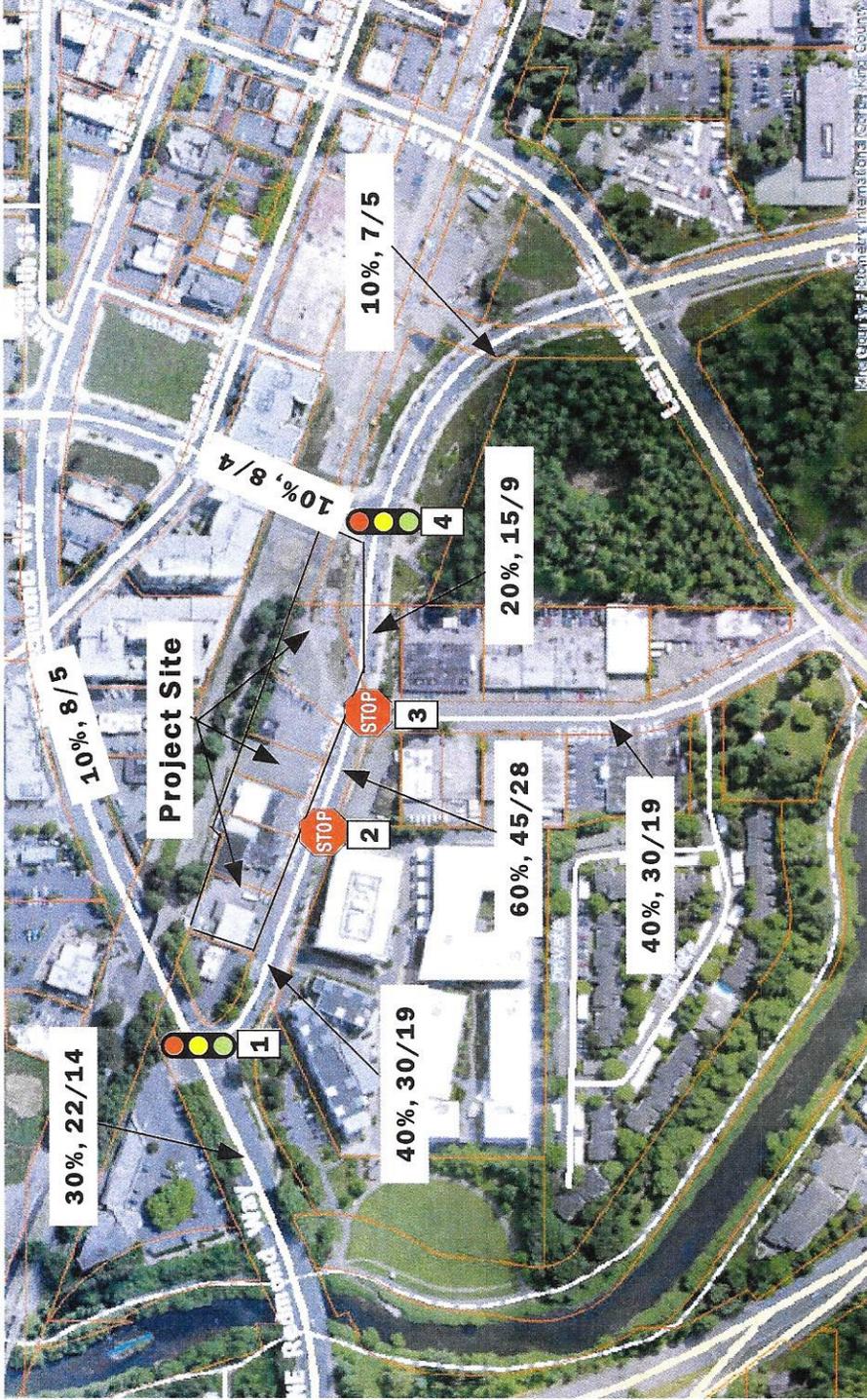
Weekday PM Peak Hour Trip Distribution & Assignment

FIGURE



**Figure 6: PM Peak Hour Distribution and Assignment**

New PM peak hour trips were superimposed onto the year 2018 without-Project volumes to project future 2018 with-Project traffic conditions. The future with-Project volumes are illustrated in **Figure 7**.



1 Redmond Way at Bear Creek Parkway  
 2 Alley - Site Access at Bear Creek Parkway  
 3 159th Pl. NE at Bear Creek Parkway  
 4 161st Ave. NE at Bear Creek Parkway

**NORTH**  
 ↑

**LEGEND**

- PM Peak Hour Trip & Direction
- STOP Stop Sign
- Traffic Signal
- I/S #

PM Peak Hour Trips : 122  
 Enter 75  
 Exit 47  
 (Existing PMPHT's (28))\*  
 Enter (12)  
 Exit (16)

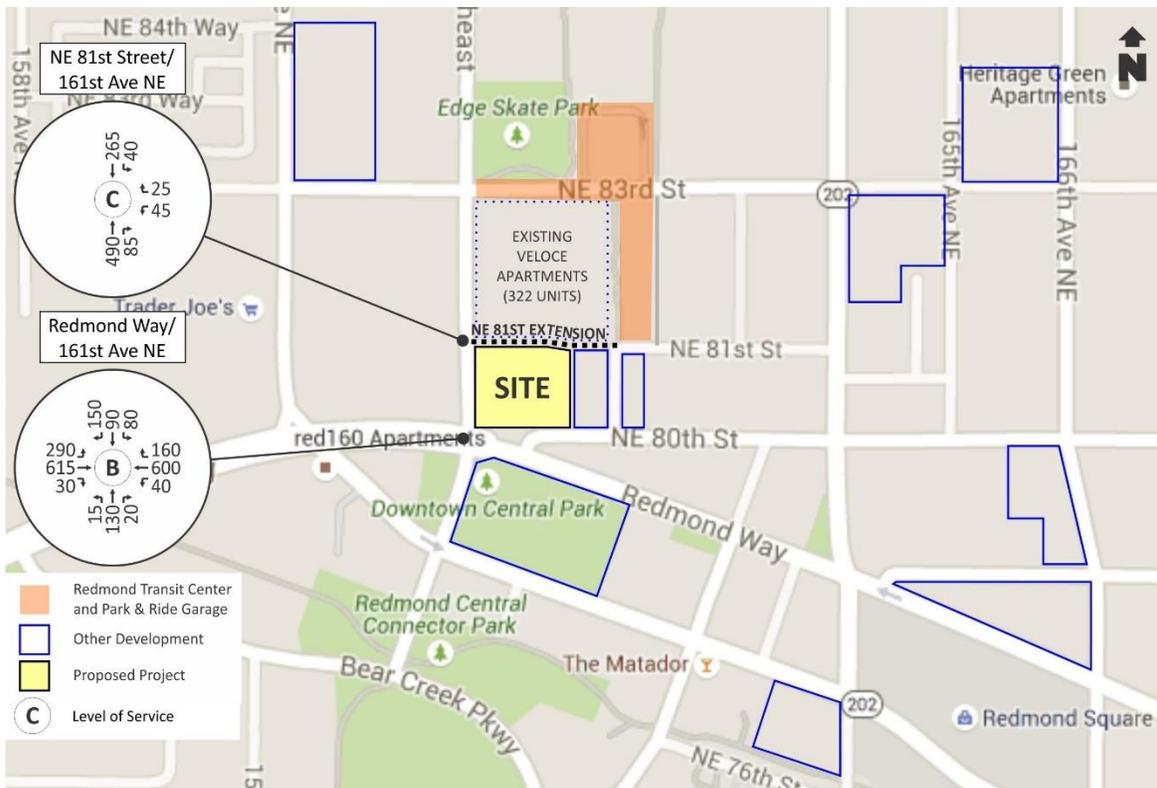
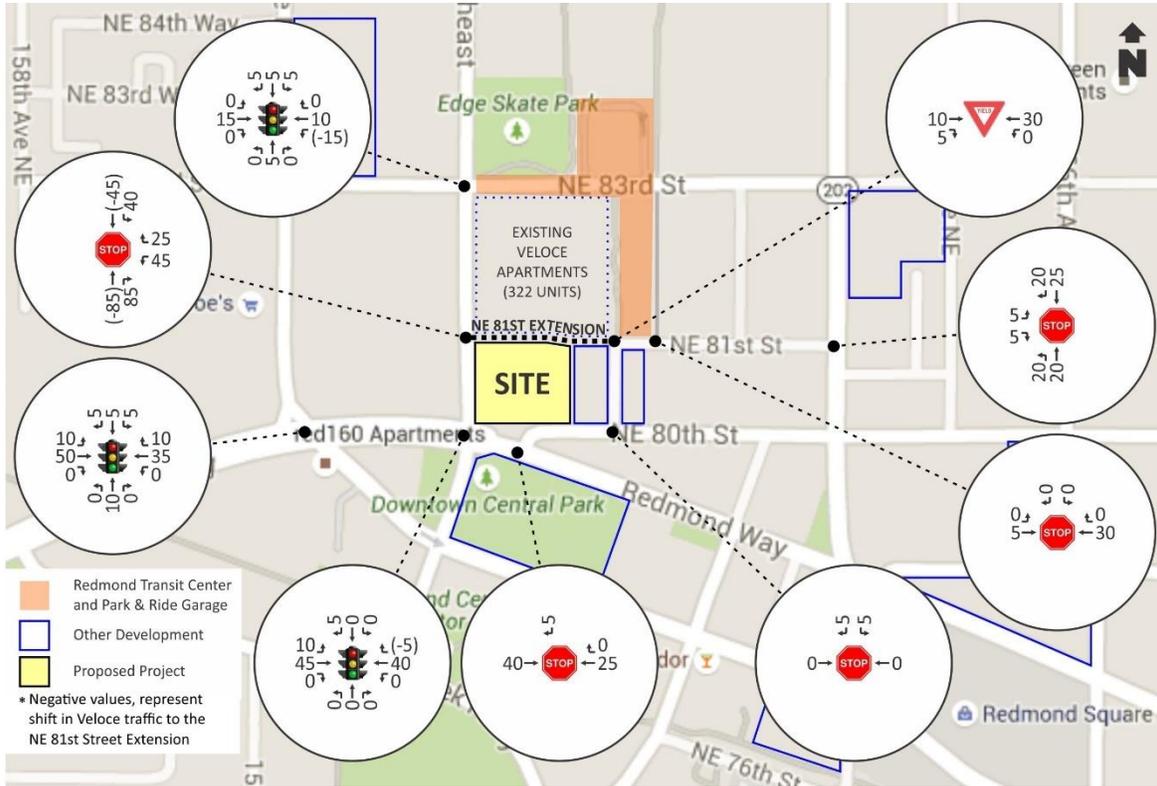
\* - Existing site traffic incorporated into site traffic at driveway.

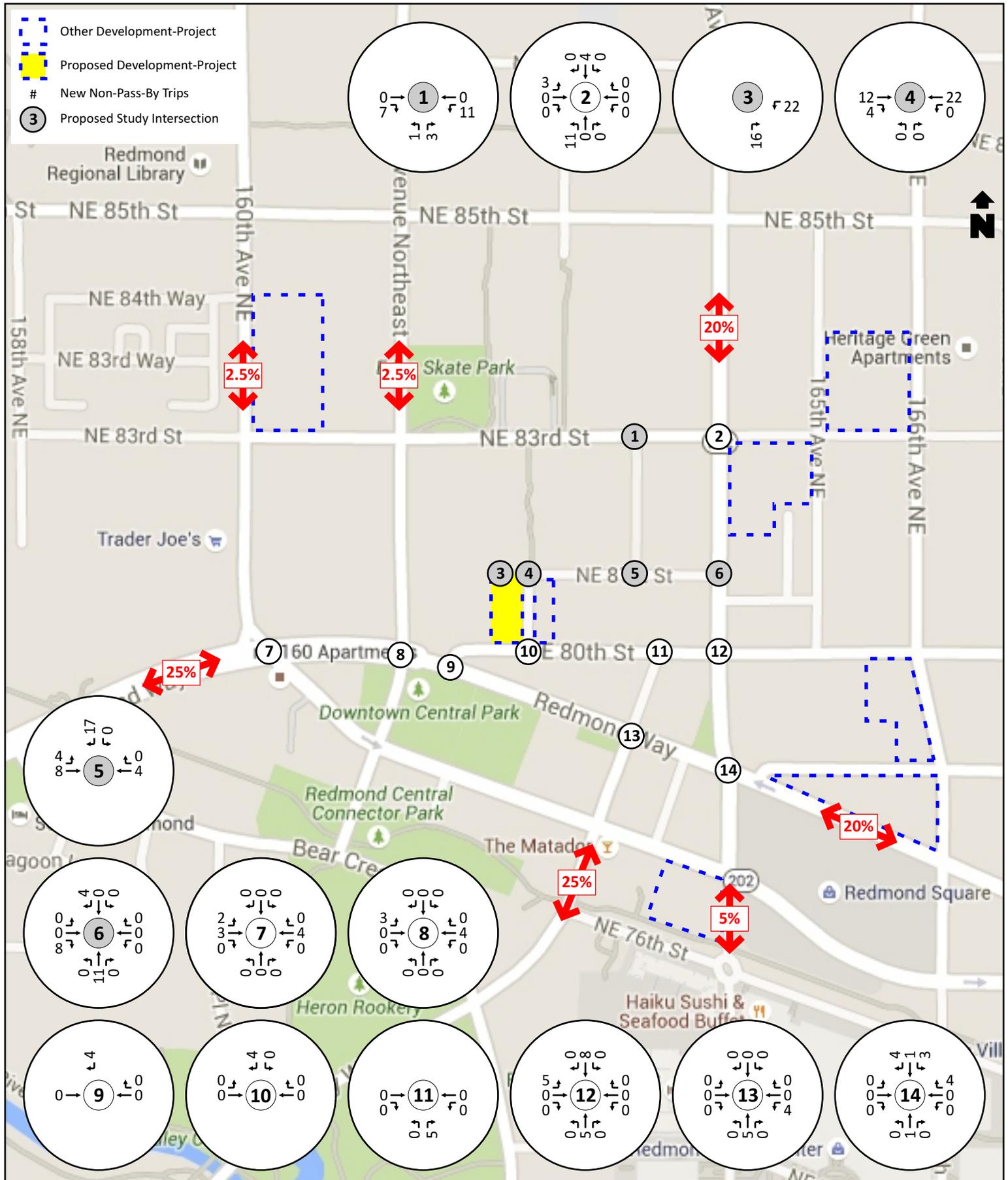
XX% distribution, Enter/Exit PMPHT's  
 Image obtained from King County IMap

**BEAR CREEK MIXED USE - REDMOND LEVEL II TRAFFIC IMPACT ANALYSIS**

**PROJECT GENERATED PM PEAK HOUR TRAFFIC VOLUMES AND DISTRIBUTION**

**JTE, Inc.**  
**FIGURE 6R**  
 Reprint in Color Only





**Figure 3:**  
Distribution and Assignment - PM Peak Hour

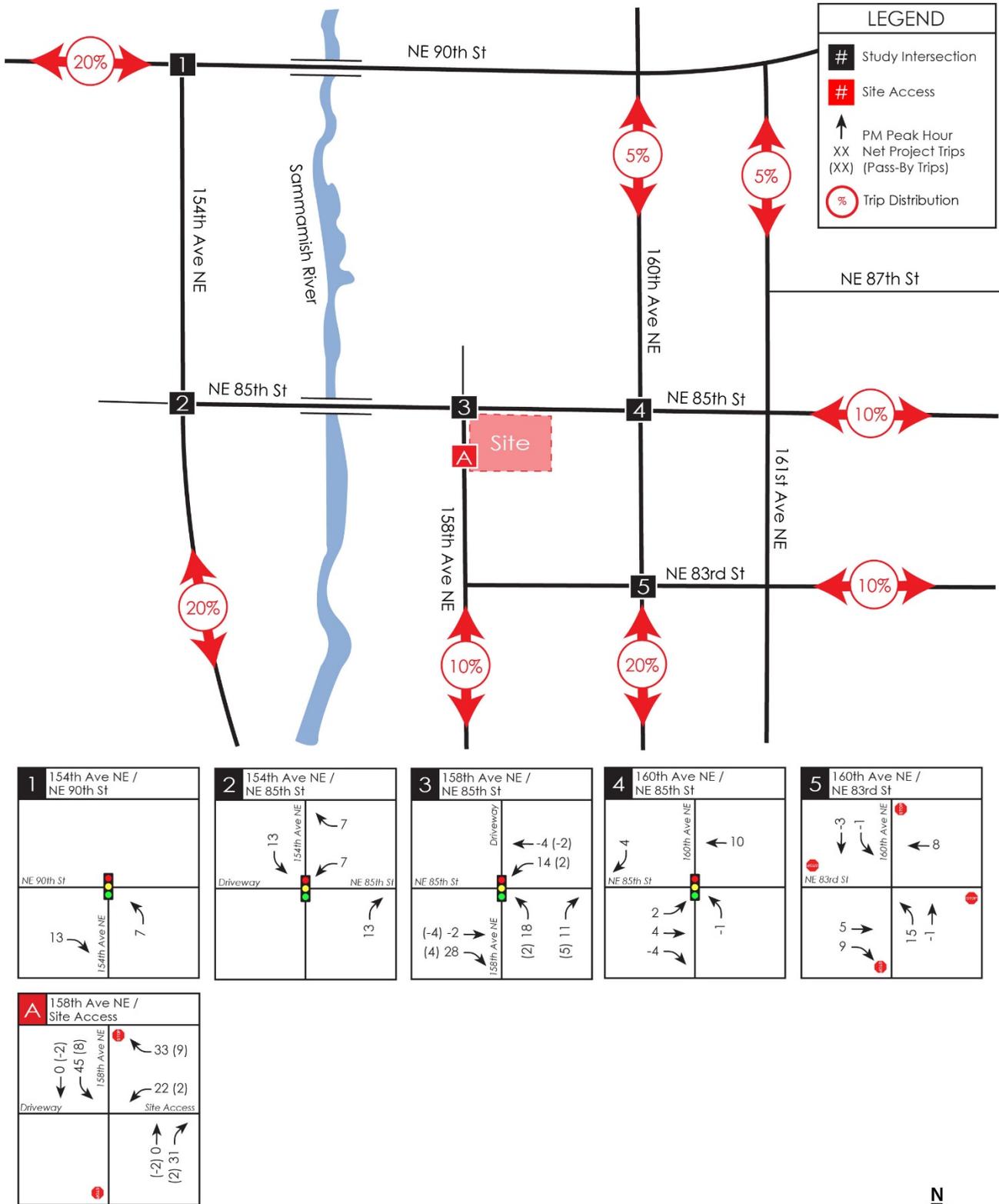


Figure 4: Weekday PM Peak Hour Project Trip Assignment



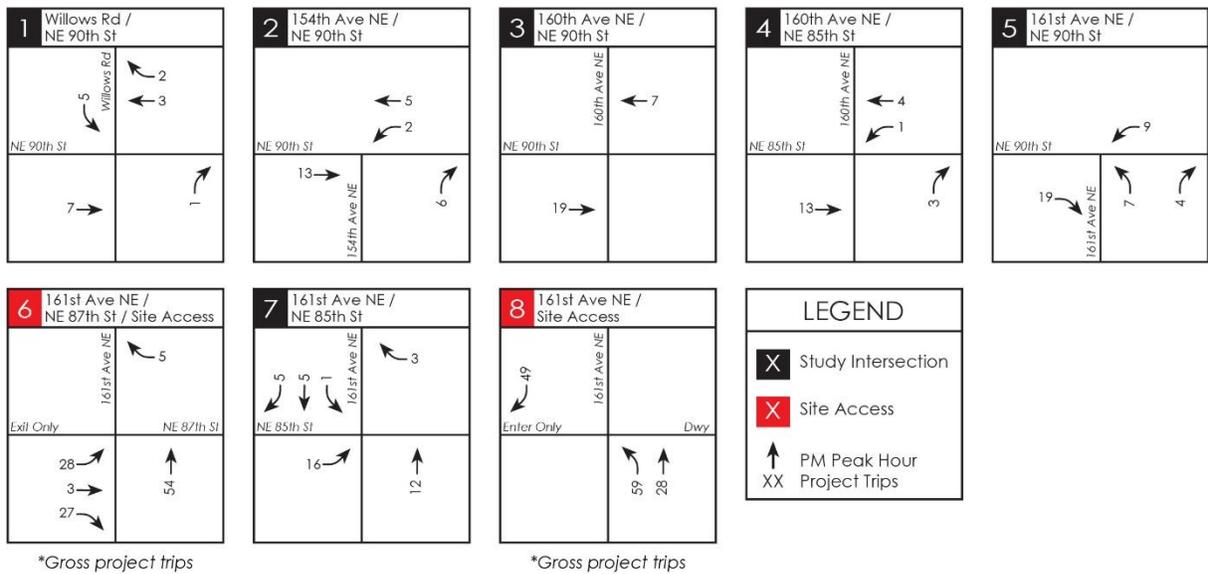
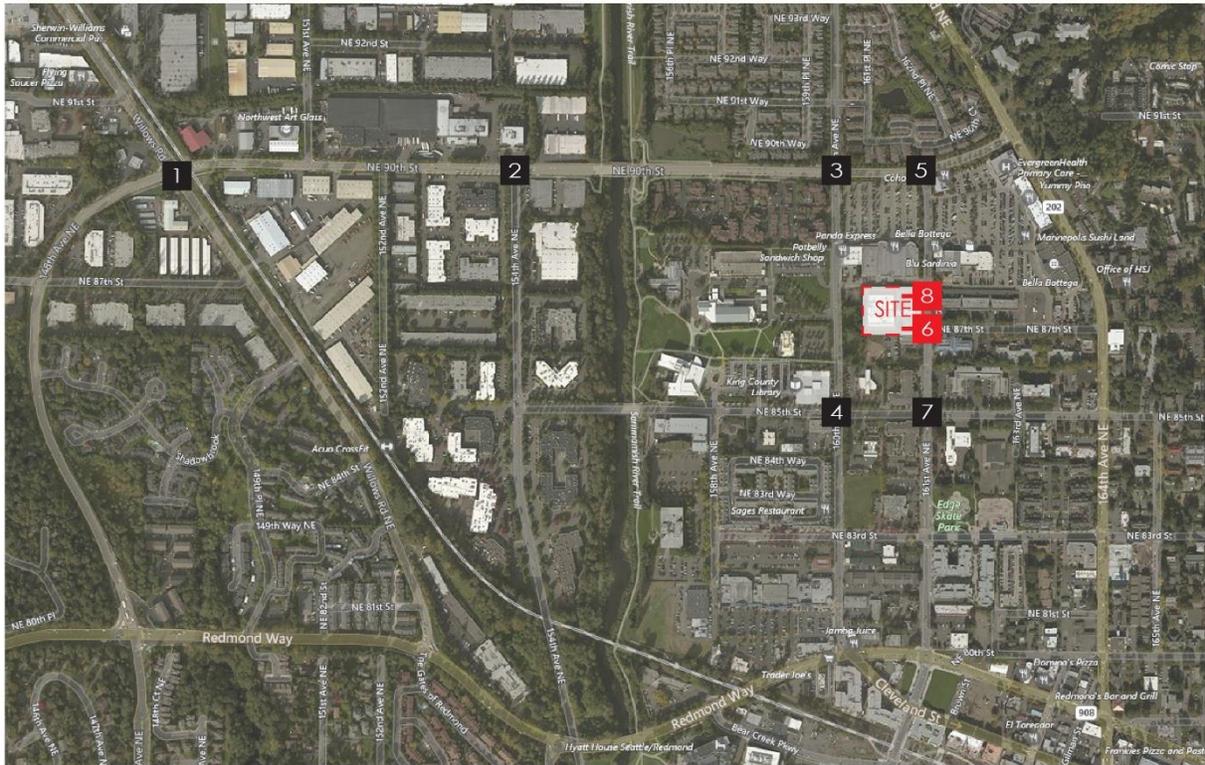


Figure 4: Net PM Peak Hour Project Trip Assignment







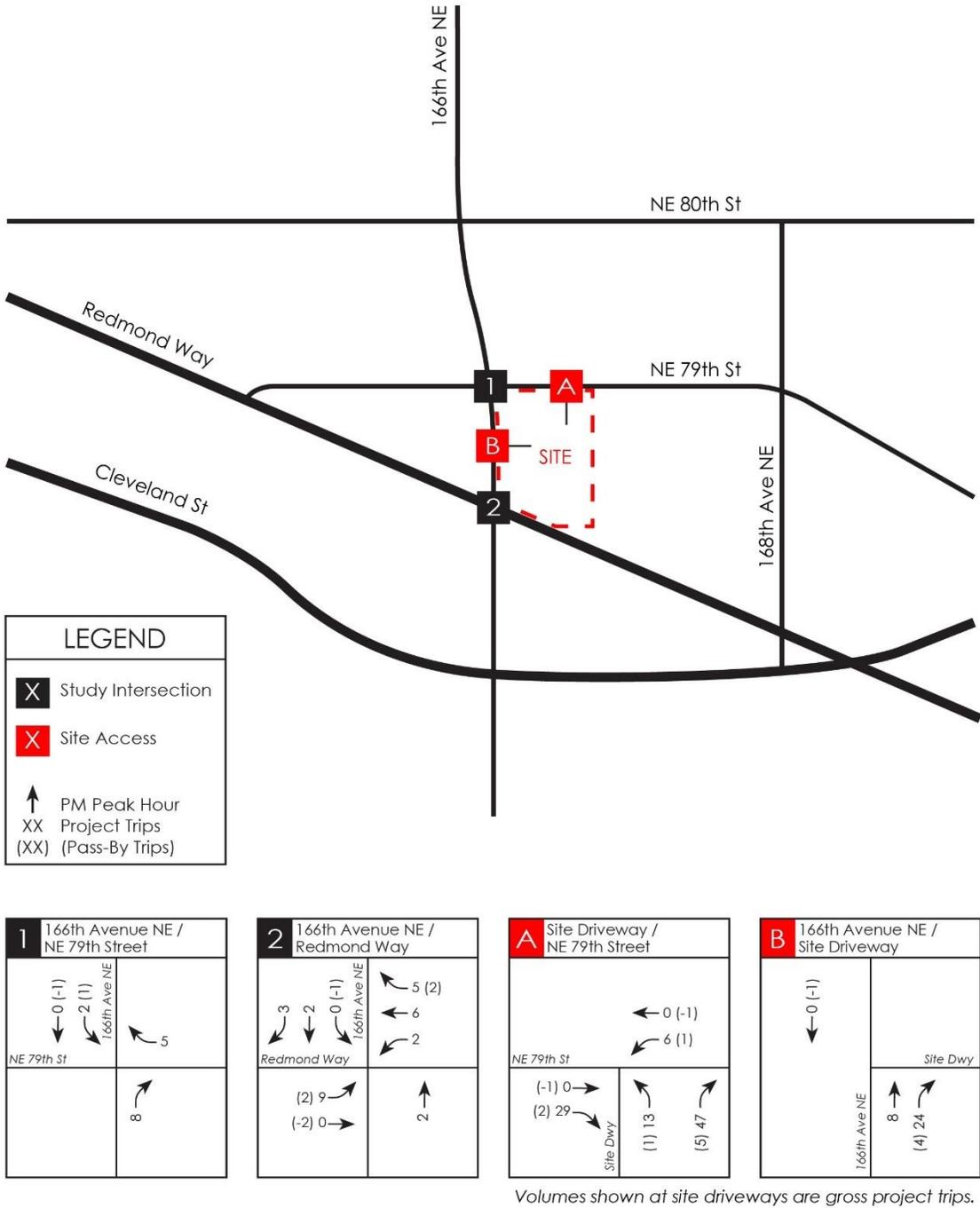
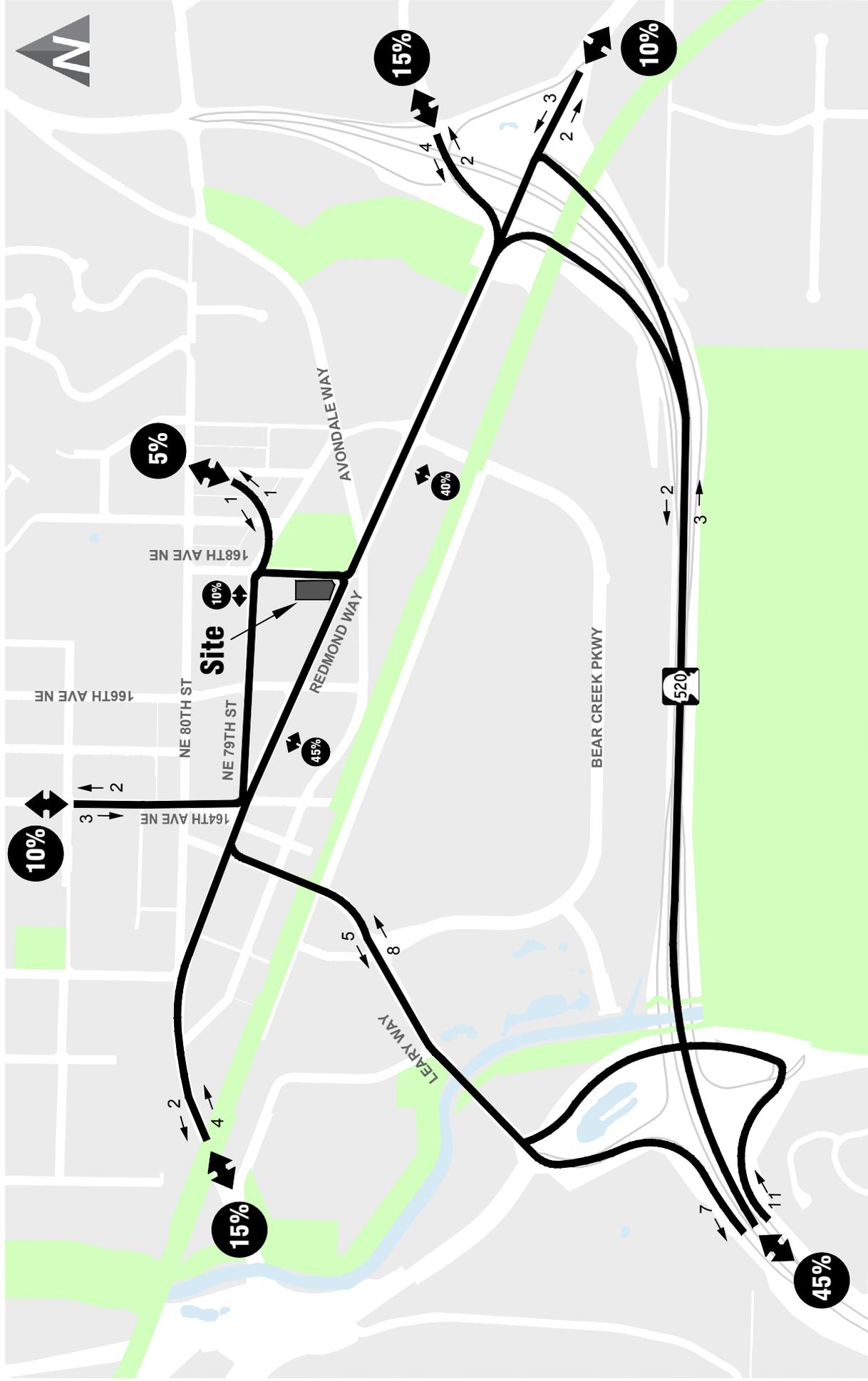


Figure 4: PM Peak Hour Project Trip Assignment





Weekday PM Peak Hour Trip Distribution & Assignment

Redmond Way Flats

FIGURE

NORTHWEST PACIFIC DEVELOPMENT, LLC  
 Attn: Gary Noyes, Managing Member  
 August 21, 2014  
 Page -5-

included in the ITE data base. Based on prior **JTE, Inc.** research, review the site I would project that the PM peak hour pass-by rate of 25% for the Specialty Retail.

The net traffic associated with the Village Square re-development is 30 PM peak hour trips on 165<sup>th</sup> Avenue NE dispersed to the north and south of the site driveway. Twenty nine net new PM peak hour trips on the City grid (18 entering and 11 exiting).

**SITE ACCESS REVIEW**

I have reviewed the site, the site access and the streets in the site vicinity. Access to the site is proposed on 165<sup>th</sup> Ave. NE a low speed 2-lane level strait street with parking on both sides. Good sight lines exist at the proposed access.

Table 1 – F and 1 – I in the City of Redmond Exhibit E Appendix: Construction Specifications and Design Standards for Streets and Access – v4 provide sight line criteria for the stopping and entering sight distance, respectively. The City’s design criterion uses the posted speed limit + 10 MPH. The City’s Tables are noted below:

**Table 1-F**

Design Speed (mph)	Stopping Sight Distance (ft)*
25	155
30	200
35	250
40	305
45	360
50	425
55	495

**Table 1-I**

Design Speed (mph)	Entering Sight Distance (ft)*
25	280
30	335
35	390
40	445
45	500
50	555
55	610

By inspection the City sight lines are met. Street parking is allowed on 165<sup>th</sup> Avenue Northeast. Parked vehicles affect sight lines. No parking should be allowed in the near vicinity of the proposed driveway. A 30 feet no parking to the north and south of the proposed driveway is suggested. The 30’ dimension is consistent with field data I have observed over the years.

**PARKING ANALYSIS**

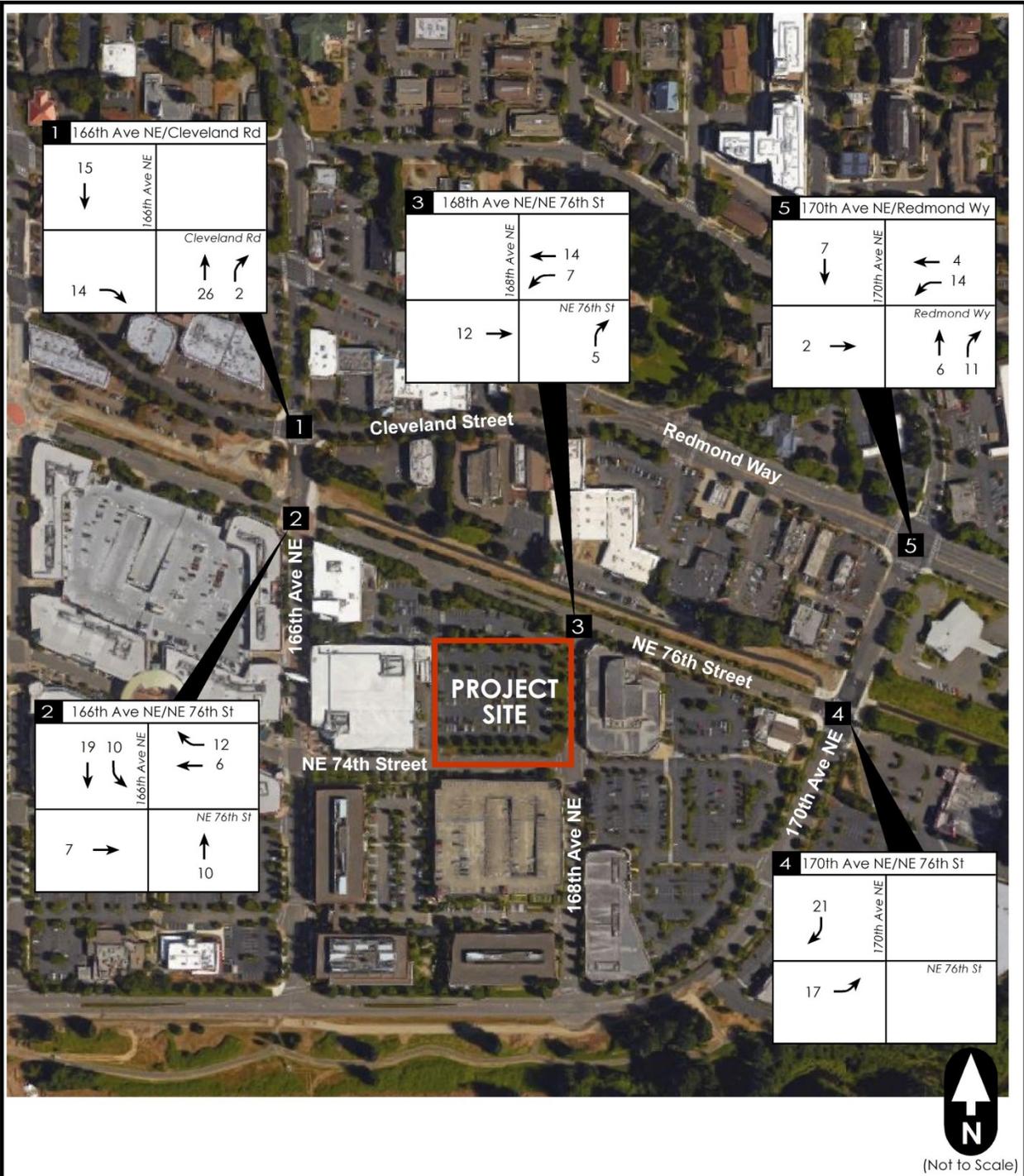
Redmond Code Parking

The City of Redmond Ordinance No. 2302, Exhibit C identifies parking requirements. The site is located in East Hill Downtown District. The minimum parking required is 1 stall per unit plus one guest space per four units. Thus the minimum required parking for the 96 unit



**Figure 5**  
**Project Trip Distribution**

RTC  
Apartments  
Redmond, WA



**Figure 6**  
**PM Peak Hour Project**  
**Trip Assignments**

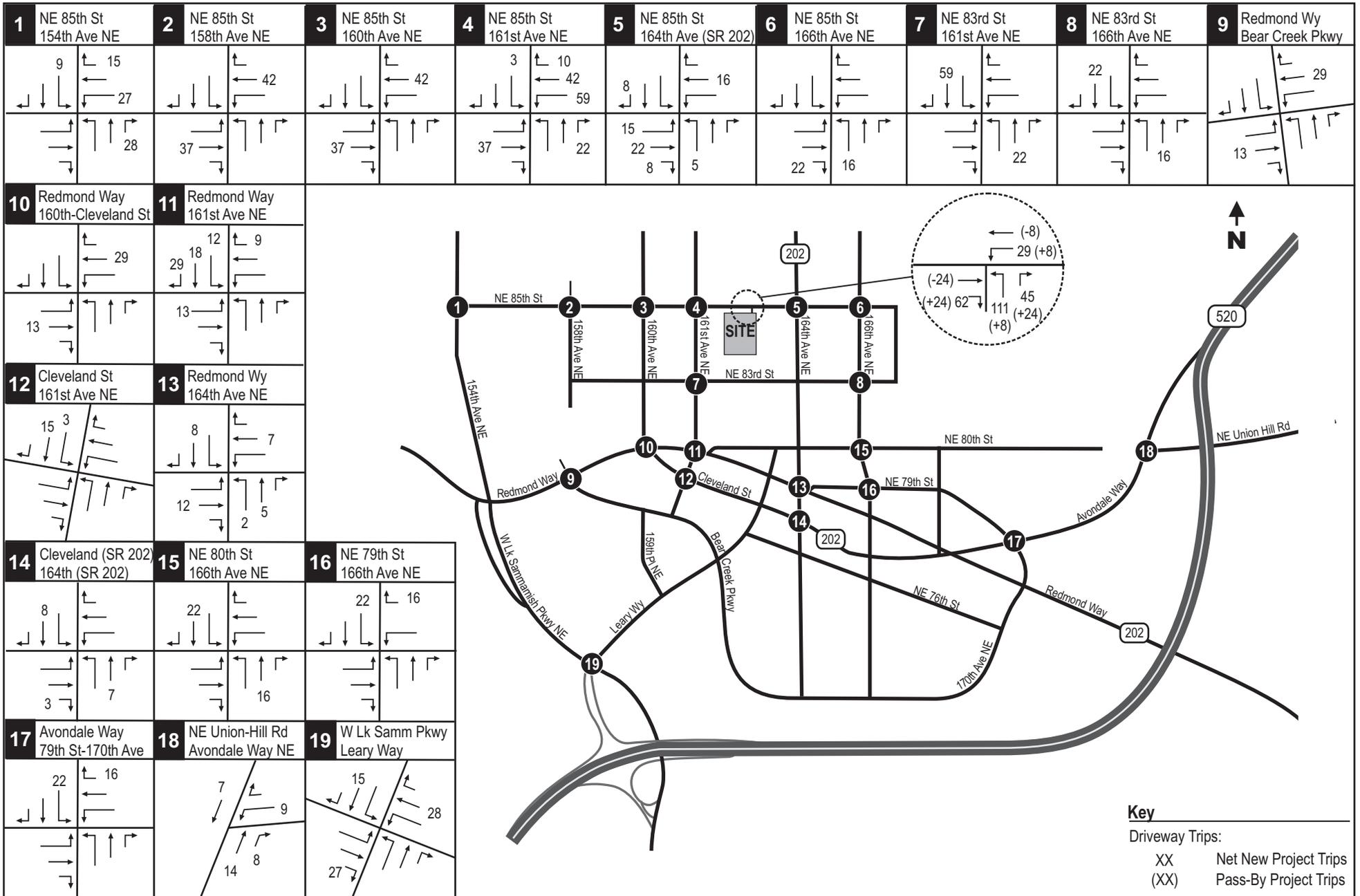
RTC  
 Apartments  
 Redmond, WA

**Table 1**  
**Archer Hotel Trip Generation Summary**

Time Period	Trips Generated		
	In	Out	Total
<u>Weekday Daily</u>			
Proposed Hotel	555	556	1,111
Less Existing Restaurant	-556	-556	-1,112
<b>Net Daily Trips =</b>	<b>-1</b>	<b>0</b>	<b>-1</b>
<u>Weekday PM Peak Hour</u>			
Proposed Hotel	42	40	82
Less Existing Restaurant	-52	-34	-86
<b>Net PM Peak Hour Trips =</b>	<b>-10</b>	<b>6</b>	<b>-4</b>

As shown in Table 1, the proposed 160-room Archer Hotel project is estimated to generate fewer trips than the existing restaurant, and as a result is not expected to create any additional demand on the transportation system.

Attachments



# REDMOND CITY CENTER

Figure 5  
Net New Project Trips  
PM Peak Hour



**Key**  
 Driveway Trips:  
 XX Net New Project Trips  
 (XX) Pass-By Project Trips

## Volume Forecast

FIG 3  
COR Turning  
Movement Counts

6		Redmond Way Leary Way	
54	21	123	4
513	1728		14
12	0.96		29
59	254	38	

7		Redmond Way 164th Ave NE	
18	12	113	209
533	1826		165
4	0.99		559
49	135	18	

8		Redmond Way Key Bank Exit/Drive-Through	
752	1497		735
1	9		

11		Redmond Way WOONERF	
761	1496		735

14		Redmond Way 166th Ave NE	
44	47	85	114
703	2021		65
14	0.99		21
42	216	27	

15		Redmond Way 168th Ave NE	
13	17	1	6
830	2255		14
4	0.98		729
8	35	458	

Apply  
Growth Rate  
2%

6		Redmond Way Leary Way	
7	3	16	1
65	214		2
2	73		4
7	32	4	

7		Redmond Way 164th Ave NE	
2	2	14	26
66	229		21
1	70		1
6	17	2	

8		Redmond Way Key Bank Exit/Drive-Through	
95	187		92
0	0		0

11		Redmond Way WOONERF	
96	188		92
0	0		0

14		Redmond Way 166th Ave NE	
6	6	9	14
89	249		8
2	81		2
5	24	3	

15		Redmond Way 168th Ave NE	
2	2	0	1
105	284		2
1	92		18
1	4	58	

PIPELINE  
TRIPS

6		Redmond Way Leary Way	
2	2	14	
50	136		41
8	19		

7		Redmond Way 164th Ave NE	
3	6	9	14
61	190		33
2	8		2

8		Redmond Way Key Bank Exit/Drive-Through	
75	162		87

11		Redmond Way WOONERF	
75	162		87

14		Redmond Way 166th Ave NE	
29	35	16	14
46	244		26
1	24		2

15		Redmond Way 168th Ave NE	
15	15	6	9
45	173		64
9	10		

FIG 4  
Future  
Without-Project

6		Redmond Way Leary Way	
61	26	141	5
623	2078		16
14	721		52
66	294	56	

7		Redmond Way 164th Ave NE	
23	20	136	249
660	2245		219
5	681		14
57	160	20	

8		Redmond Way Key Bank Exit/Drive-Through	
0	0	0	0
922	1846		914
1	0		0

11		Redmond Way WOONERF	
0	0	0	0
932	1846		914
0	0		0

14		Redmond Way 166th Ave NE	
79	88	110	142
838	2514		99
16	775		25
48	264	30	

15		Redmond Way 168th Ave NE	
30	34	1	13
980	2712		25
5	885		168
9	39	525	

Future Without-Project  
ADJUST

6		Redmond Way Leary Way	
61	26	141	5
623	2066		16
14	711		52
66	294	59	

7		Redmond Way 164th Ave NE	
23	20	136	241
661	2219		219
2	671		14
57	155	20	

8		Redmond Way Key Bank Exit/Drive-Through	
0	0	0	0
924	1835		904
0	0		0

11		Redmond Way WOONERF	
0	0	0	0
932	1836		904
0	0		0

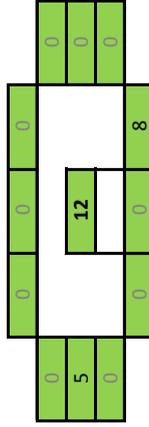
14		Redmond Way 166th Ave NE	
79	88	99	142
836	2472		99
18	775		20
38	253	25	

15		Redmond Way 168th Ave NE	
30	34	1	13
973	2697		25
5	880		165
9	39	525	

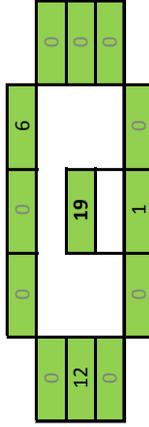
**FIG 8**  
WEST - MULTIFAMILY  
NEW  
TRIPS

36

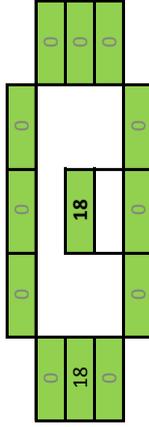
6	Redmond Way Leary Way
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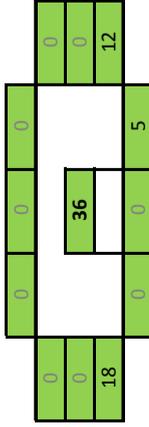
7	Redmond Way 164th Ave NE
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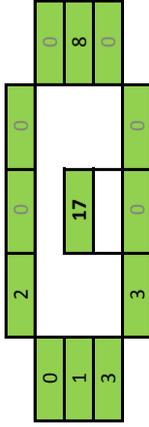
8	Redmond Way Key Bank Exit/Drive-Through
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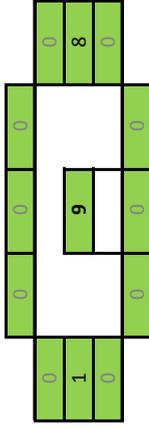
11	Redmond Way WOONERF
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14	Redmond Way 166th Ave NE
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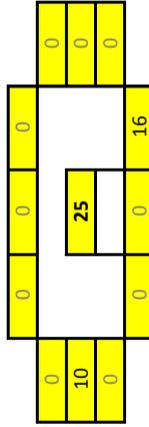
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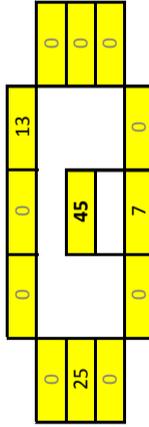
**FIG 8**  
WEST - MULTIFAMILY  
TOTAL  
TRIPS

100

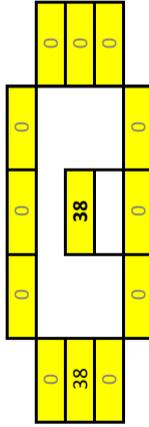
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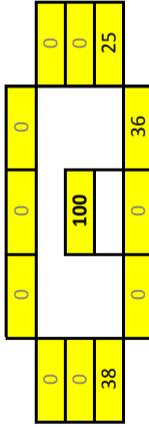
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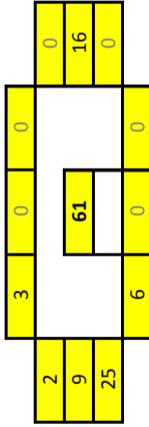
8	Redmond Way Key Bank Exit/Drive-Through
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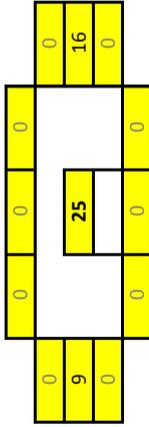
11	Redmond Way WOONERF
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14	Redmond Way 166th Ave NE
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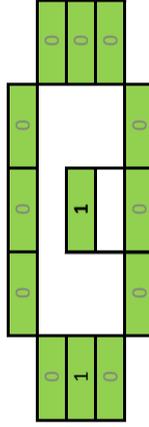
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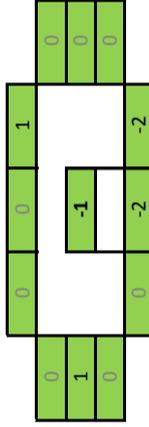
**FIG 9**  
WEST - COMMERCIAL  
NEW  
TRIPS

0

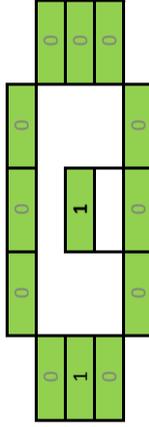
6	Redmond Way Leary Way
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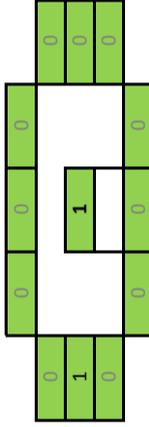
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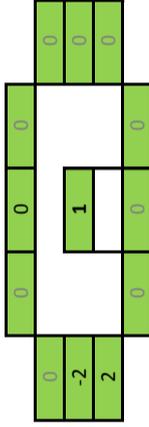
8	Redmond Way Key Bank Exit/Drive-Through
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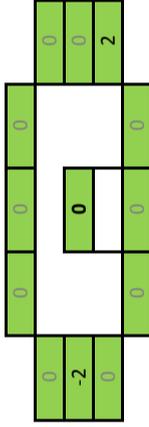
11	Redmond Way WOONERF
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14	Redmond Way 166th Ave NE
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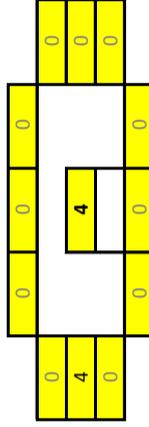
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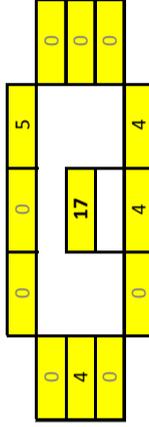
**FIG 9**  
WEST - COMMERCIAL  
TOTAL  
TRIPS

42

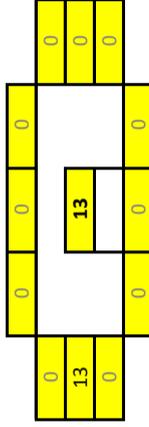
6	Redmond Way Leary Way
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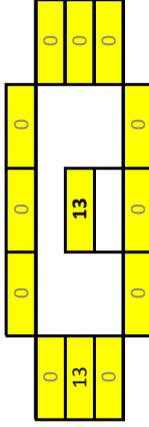
7	Redmond Way 164th Ave NE
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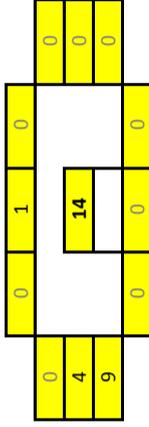
8	Redmond Way Key Bank Exit/Drive-Through
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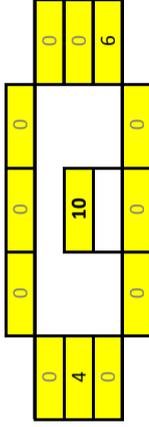
11	Redmond Way WOONERF
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14	Redmond Way 166th Ave NE
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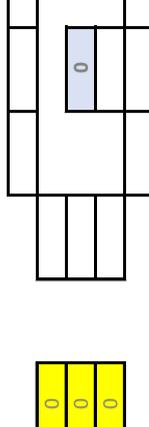
15	Redmond Way 168th Ave NE
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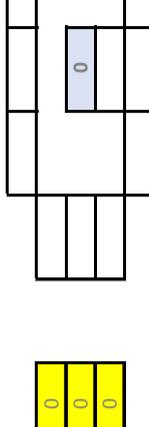
**FIG 9**  
WEST - COMMERCIAL  
PASS-BY  
TRIPS

22

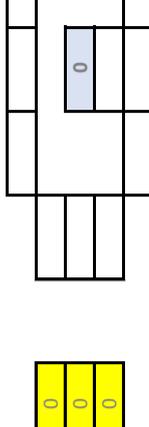
6	Redmond Way Leary Way
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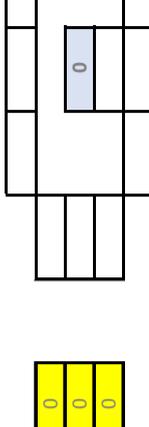
7	Redmond Way 164th Ave NE
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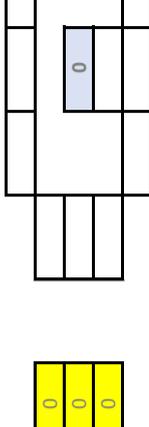
8	Redmond Way Key Bank Exit/Drive-Through
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11	Redmond Way WOONERF
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14	Redmond Way 166th Ave NE
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15	Redmond Way 168th Ave NE
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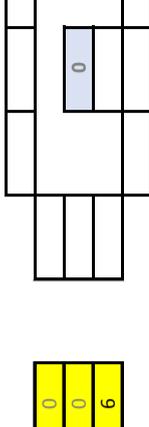
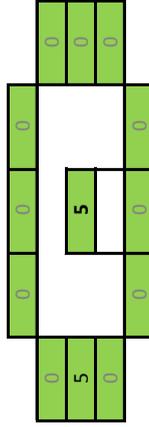
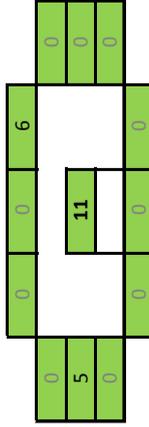


FIG 10  
EAST - MULTIFAMILY  
NEW  
TRIPS 42

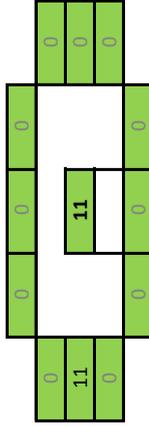
6	Redmond Way Leary Way
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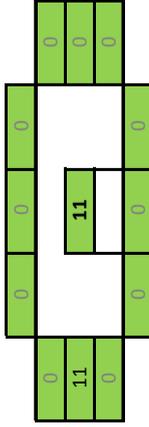
7	Redmond Way 164th Ave NE
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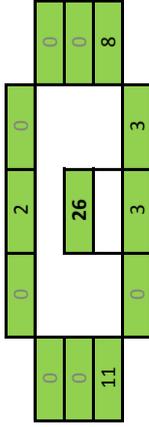
8	Redmond Way Key Bank Exit/Drive-Through
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11	Redmond Way WOONERF
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14	Redmond Way 166th Ave NE
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15	Redmond Way 168th Ave NE
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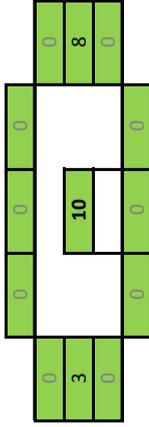
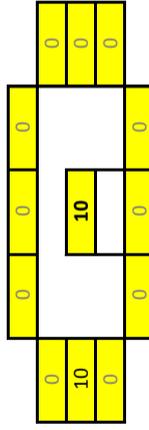
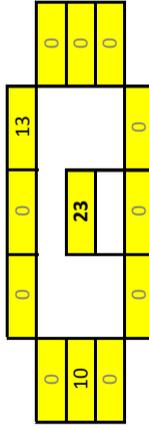


FIG 10  
EAST - MULTIFAMILY  
TOTAL  
TRIPS 103

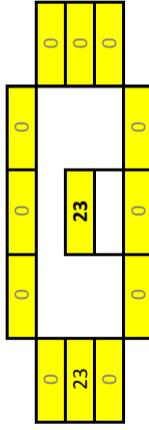
6	Redmond Way Leary Way
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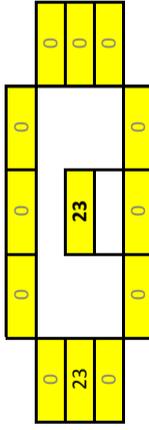
7	Redmond Way 164th Ave NE
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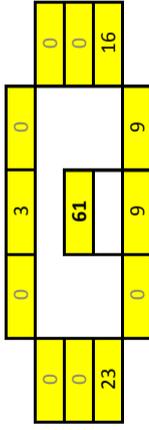
8	Redmond Way Key Bank Exit/Drive-Through
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11	Redmond Way WOONERF
----	------------------------



14	Redmond Way 166th Ave NE
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15	Redmond Way 168th Ave NE
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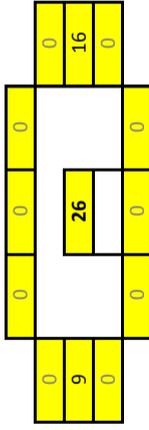
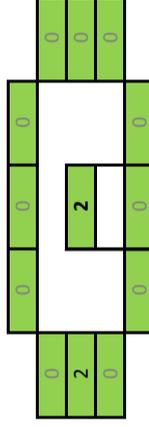
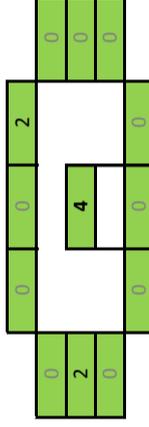


FIG 10  
EAST - COMMERCIAL  
NEW  
TRIPS 6

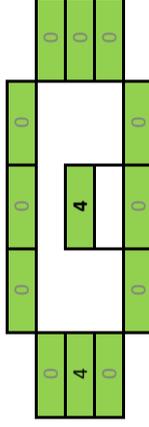
6	Redmond Way Leary Way
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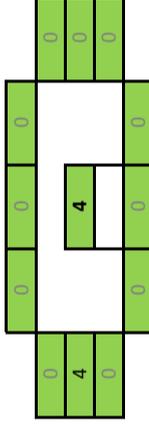
7	Redmond Way 164th Ave NE
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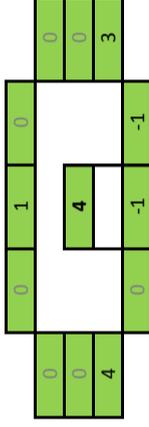
8	Redmond Way Key Bank Exit/Drive-Through
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11	Redmond Way WOONERF
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14	Redmond Way 166th Ave NE
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15	Redmond Way 168th Ave NE
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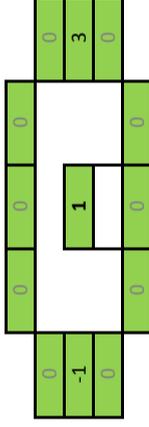
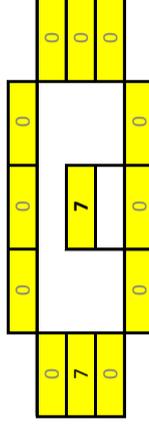
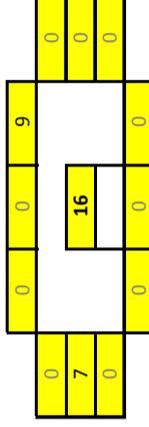


FIG 10  
EAST - COMMERCIAL  
TOTAL  
TRIPS 88

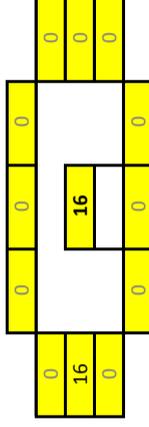
6	Redmond Way Leary Way
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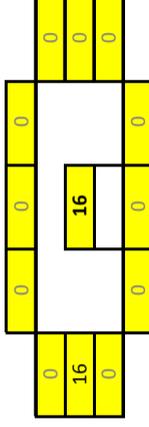
7	Redmond Way 164th Ave NE
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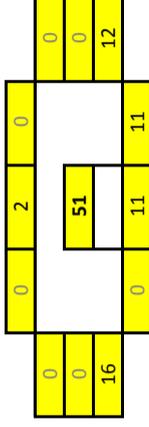
8	Redmond Way Key Bank Exit/Drive-Through
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11	Redmond Way WOONERF
----	------------------------



14	Redmond Way 166th Ave NE
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15	Redmond Way 168th Ave NE
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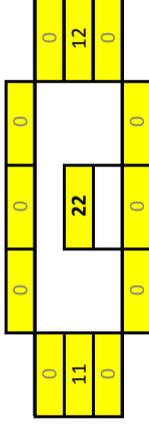
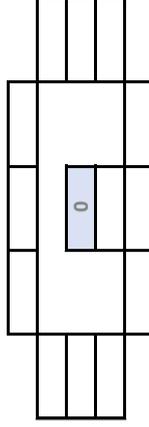
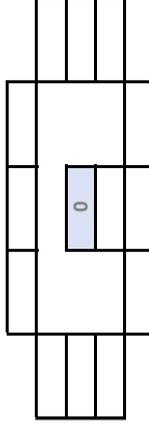


FIG 10  
EAST - COMMERCIAL  
PASS-BY  
TRIPS 46

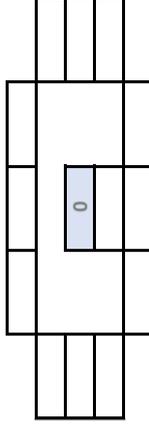
6	Redmond Way Leary Way
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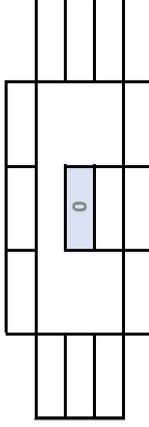
7	Redmond Way 164th Ave NE
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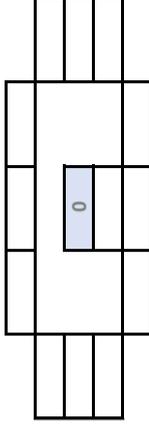
8	Redmond Way Key Bank Exit/Drive-Through
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11	Redmond Way WOONERF
----	------------------------



14	Redmond Way 166th Ave NE
----	-----------------------------



15	Redmond Way 168th Ave NE
----	-----------------------------

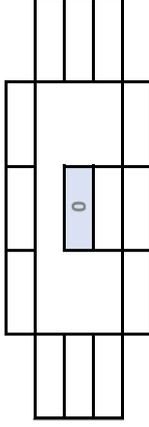


FIG 12  
 Future  
 With-Project  
 ADD TOTAL + PASS-BY

6		Redmond Way			
		Leary Way			
61	26	141	5	16	
653	2111			711	
14				52	
	66	294	75		
7		Redmond Way			
		164th Ave NE			
23	20	136	281	219	
707	2321			671	
2				14	
	57	167	25		
8		Redmond Way			
		Key Bank Exit/Drive-Through			
0	0	0	0	0	
1014	1925			904	
0				0	
	0	0	7		
11		Redmond Way			
		WOONERF			
0	0	0	0	0	
984	1988			904	
38				25	
	0	0	36		
14		Redmond Way			
		166th Ave NE			
80	91	106	142	99	
849	2660			791	
91				48	
	45	273	45		
15		Redmond Way			
		168th Ave NE			
30	34	1	13	25	
1006	2781			924	
5				171	
	9	39	525		

FIG 3

COR Turning  
Movement Counts

19	Cleveland St Leary Way		6	174	11	8
9	257	1118	127	35		
42	41	0.90	325	83		
21	Cleveland St 164th Ave NE		14	80	39	20
15	328	892	138	3		
37	21	0.94	166	31		
22	Cleveland St WEST Driveway		26	3	9	135
8	390	571				
25	Cleveland St Retail Center EAST		385		144	
26	EAST Driveway 166th Ave NE		21	99		
26	415					
5	5	259				
27	Cleveland St 166th Ave NE		16	64	24	19
42	323	1013	118	20		
20	19	0.91	203	145		

Apply  
Growth Rate

2%

19	Cleveland St Leary Way		1	22	1	1
1	32	141	16	4		
5	5	41	10			
21	Cleveland St 164th Ave NE		2	10	5	3
41	5	113	17	0		
5	3	21	4			
22	Cleveland St WEST Driveway		0	0	0	0
50	0	71	20	0		
0	0	0	0	0		
25	Cleveland St Retail Center EAST		50		20	
71						
26	EAST Driveway 166th Ave NE		0	13	0	0
0	0	46	0	0		
0	0	33	0			
27	Cleveland St 166th Ave NE		2	8	3	2
41	4	129	15	3		
4	2	26	18			

PIPELINE  
TRIPS

19	Cleveland St Leary Way		21		18	
21	98		21	2		
15	15					
21	Cleveland St 164th Ave NE		11		4	
36	89		23	2		
3	10					
22	Cleveland St WEST Driveway		40		25	
65						
25	Cleveland St Retail Center EAST		40		25	
65						
26	EAST Driveway 166th Ave NE		18			
43						
25	25					
27	Cleveland St 166th Ave NE		5	13	2	
19	7	86	10			
14	10	6				

FIG 4

Future  
Without-Project

19	Cleveland St Leary Way		7	217	12	9
10	310	1357	164	41		
47	46	381	111			
21	Cleveland St 164th Ave NE		16	101	44	23
17	405	1094	178	5		
45	24	197	39			
22	Cleveland St WEST Driveway		26	0	3	9
8	480	707	180	0		
0	0	0	0	0		
25	Cleveland St Retail Center EAST		0	0	0	0
665						
475	0	189	0			
0	0	0	0			
26	EAST Driveway 166th Ave NE		21	130	0	0
26	0	504	0	0		
0	5	317	0			
27	Cleveland St 166th Ave NE		23	85	27	21
66	371	1228	143	23		
38	31	235	165			

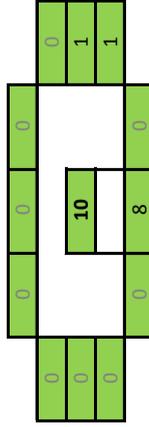
Future Without-Project  
ADJUST

19	Cleveland St Leary Way		7	217	12	9
10	310	1329	154	31		
47	46	384	100			
21	Cleveland St 164th Ave NE		16	101	40	18
17	394	1052	158	5		
45	24	197	37			
22	Cleveland St WEST Driveway		1	0	0	16
0	472	670	180	0		
0	0	0	0			
25	Cleveland St Retail Center EAST		0	0	0	0
669						
472	0	196	0			
0	0	0	0			
26	EAST Driveway 166th Ave NE		0	137	0	0
0	0	454	0	0		
0	0	317	0			
27	Cleveland St 166th Ave NE		30	80	27	21
66	368	1219	140	23		
38	26	235	165			

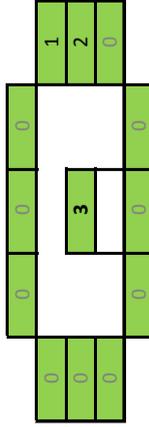
FIG 8  
WEST - MULTIFAMILY  
NEW  
TRIPS

36

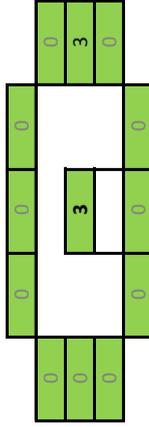
19	Cleveland St Leary Way
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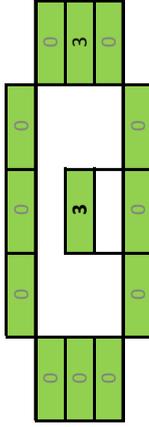
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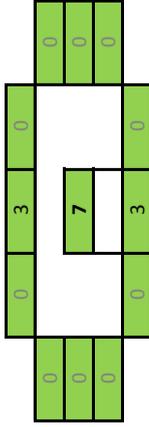
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
----	-------------------------------



27	Cleveland St 166th Ave NE
----	------------------------------

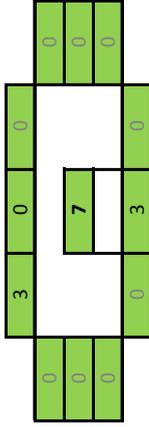
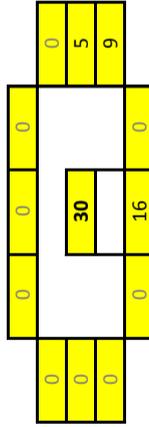


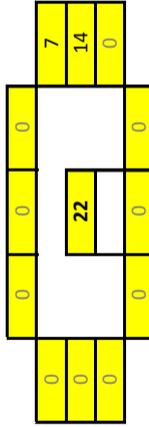
FIG 8  
WEST - MULTIFAMILY  
TOTAL  
TRIPS

100

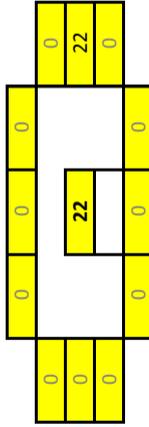
19	Cleveland St Leary Way
----	---------------------------



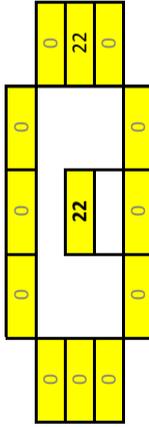
21	Cleveland St 164th Ave NE
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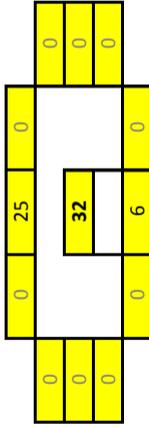
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
----	-------------------------------



27	Cleveland St 166th Ave NE
----	------------------------------

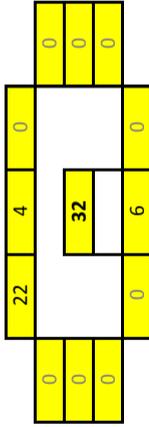
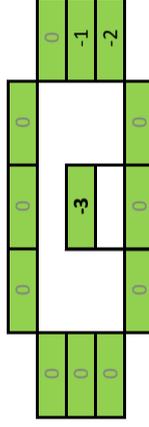


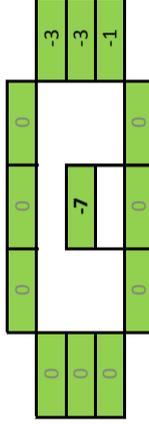
FIG 9  
WEST - COMMERCIAL  
NEW  
TRIPS

0

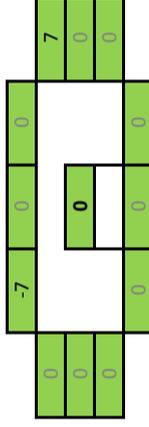
19	Cleveland St Leary Way
----	---------------------------



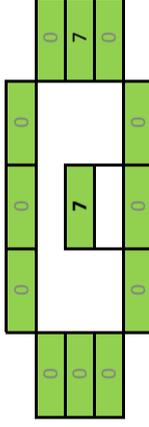
21	Cleveland St 164th Ave NE
----	------------------------------



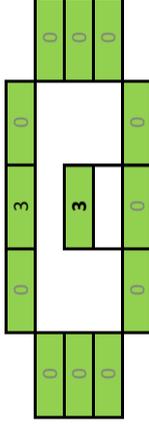
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
----	-------------------------------



27	Cleveland St 166th Ave NE
----	------------------------------

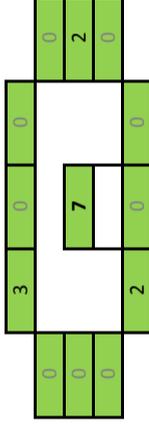
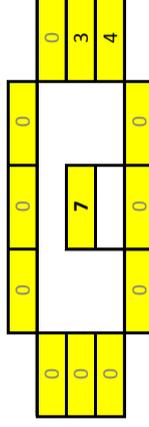


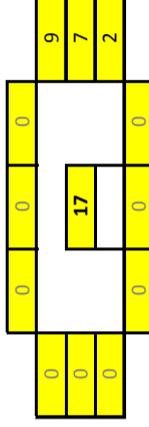
FIG 9  
WEST - COMMERCIAL  
TOTAL  
TRIPS

42

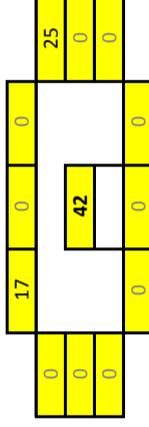
19	Cleveland St Leary Way
----	---------------------------



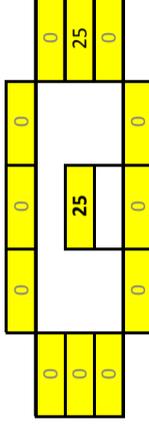
21	Cleveland St 164th Ave NE
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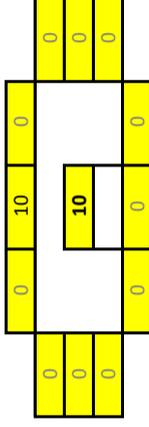
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
----	-------------------------------



27	Cleveland St 166th Ave NE
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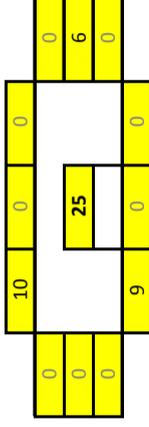
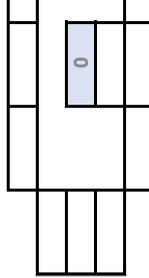


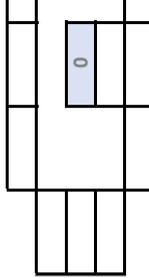
FIG 9  
WEST - COMMERCIAL  
PASS-BY  
TRIPS

22

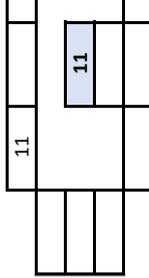
19	Cleveland St Leary Way
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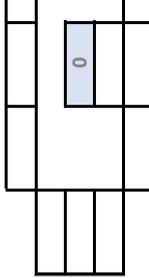
21	Cleveland St 164th Ave NE
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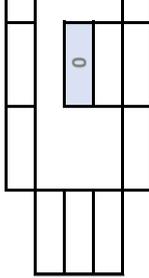
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
----	-------------------------------



27	Cleveland St 166th Ave NE
----	------------------------------

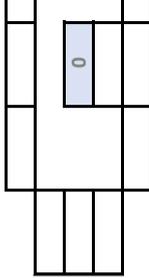
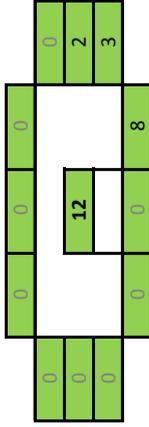


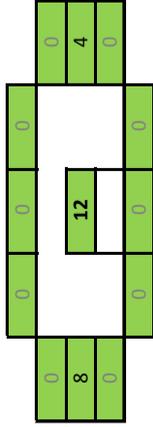
FIG 10  
EAST - MULTIFAMILY  
NEW  
TRIPS

42

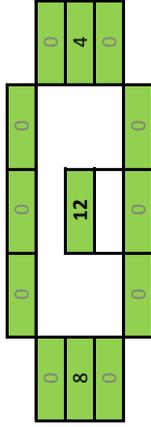
19	Cleveland St Leary Way
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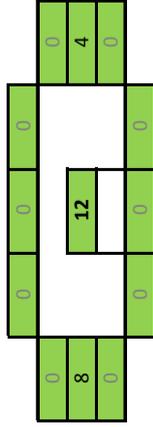
21	Cleveland St 164th Ave NE
----	------------------------------



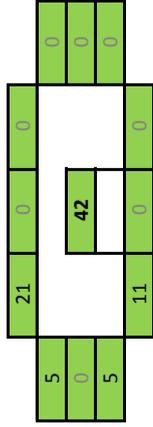
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
----	-------------------------------



27	Cleveland St 166th Ave NE
----	------------------------------

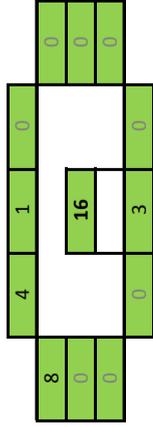
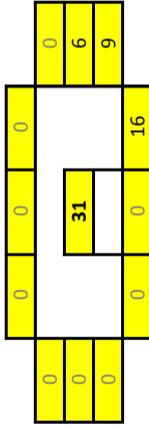


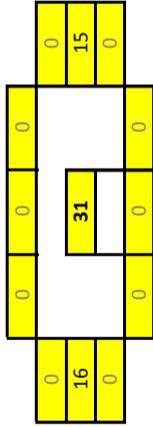
FIG 10  
EAST - MULTIFAMILY  
TOTAL  
TRIPS

103

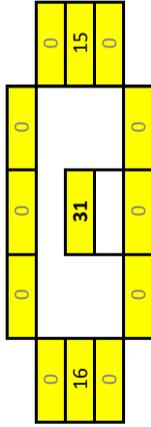
19	Cleveland St Leary Way
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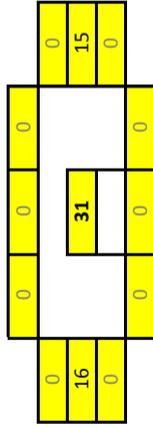
21	Cleveland St 164th Ave NE
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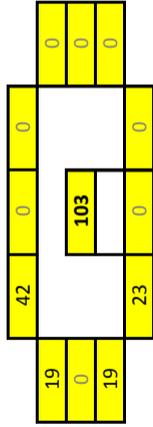
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
----	-------------------------------



27	Cleveland St 166th Ave NE
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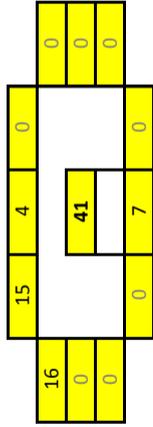
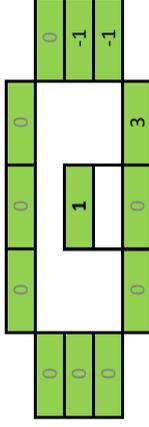


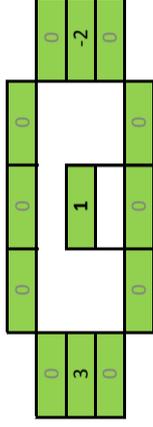
FIG 10  
EAST - COMMERCIAL  
NEW  
TRIPS

6

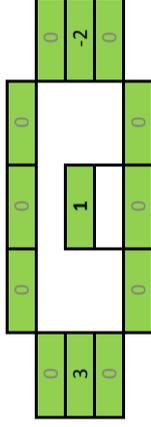
19	Cleveland St Leary Way
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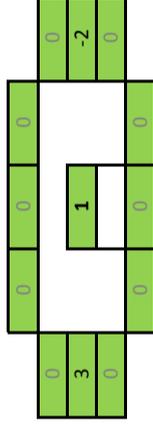
21	Cleveland St 164th Ave NE
----	------------------------------



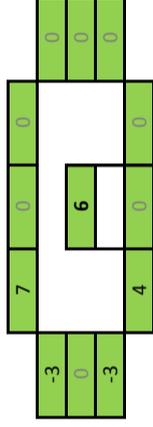
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
----	-------------------------------



27	Cleveland St 166th Ave NE
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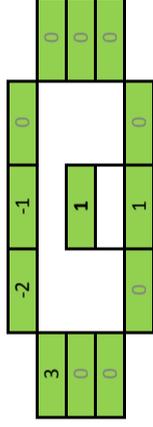
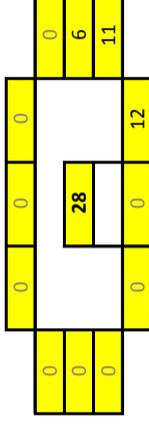


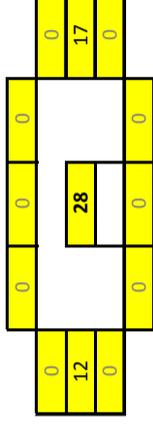
FIG 10  
EAST - COMMERCIAL  
TOTAL  
TRIPS

88

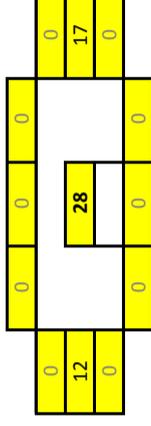
19	Cleveland St Leary Way
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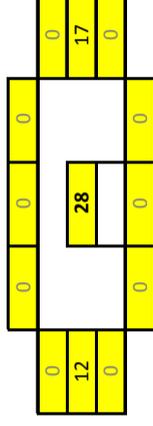
21	Cleveland St 164th Ave NE
----	------------------------------



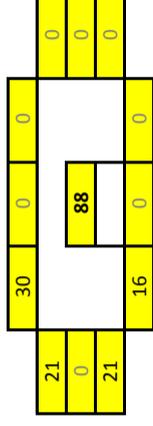
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
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27	Cleveland St 166th Ave NE
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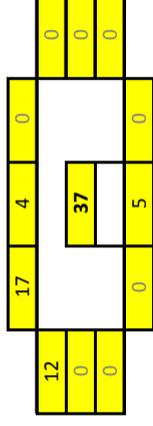
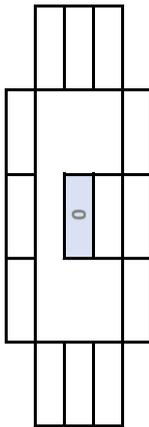


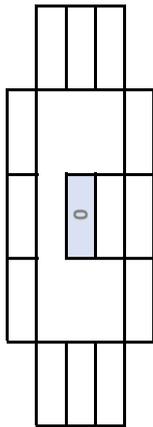
FIG 10  
EAST - COMMERCIAL  
PASS-BY  
TRIPS

46

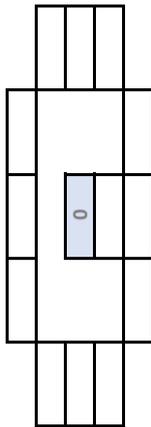
19	Cleveland St Leary Way
----	---------------------------



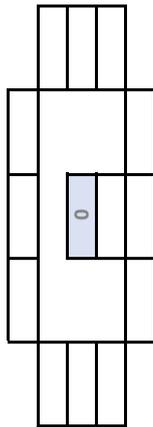
21	Cleveland St 164th Ave NE
----	------------------------------



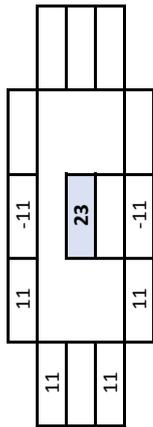
22	Cleveland St WEST Driveway
----	-------------------------------



25	Cleveland St Retail Center EAST
----	------------------------------------



26	EAST Driveway 166th Ave NE
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27	Cleveland St 166th Ave NE
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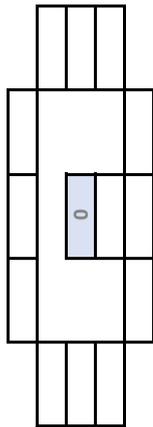


FIG 12  
 Future  
 With-Project  
 ADD TOTAL + PASS-BY

19	Cleveland St Leary Way	
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7	217	12	9
10			174
310		<b>1426</b>	65
47	46	400	128

21	Cleveland St 164th Ave NE	
----	------------------------------	--

16	101	40	33
17			211
422		<b>1150</b>	7
45	24	197	37

22	Cleveland St WEST Driveway	
----	-------------------------------	--

29	0	0	52
0			223
500		<b>804</b>	0
0	0	0	0

25	Cleveland St Retail Center EAST	
----	------------------------------------	--

0	0	0	0
500			275
0		<b>775</b>	0
0	0	0	0

26	EAST Driveway 166th Ave NE	
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84	161	0	0
51			0
0		<b>709</b>	0
51	50	312	0

27	Cleveland St 166th Ave NE	
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93	92	27	21
94			146
368		<b>1355</b>	23
38	35	252	165

Level-of-service

Timings  
1: Leary Way & Redmond Way

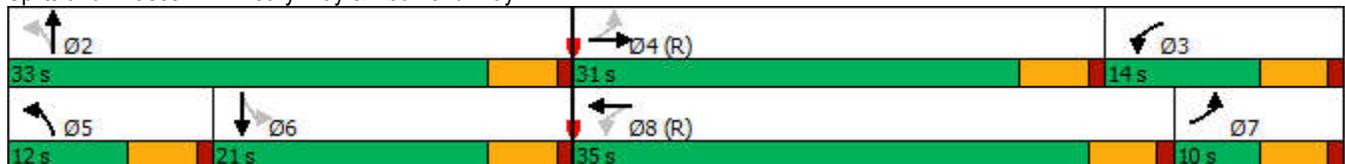


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗		↕
Traffic Volume (vph)	54	513	29	607	59	254	4	123
Future Volume (vph)	54	513	29	607	59	254	4	123
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4	3	8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	8.0	5.0	8.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	21.0	14.0	19.0	12.0	21.0	21.0	21.0
Total Split (s)	10.0	31.0	14.0	35.0	12.0	33.0	21.0	21.0
Total Split (%)	12.8%	39.7%	17.9%	44.9%	15.4%	42.3%	26.9%	26.9%
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
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Lead/Lag	Lag	Lead	Lag	Lead	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	45.0	41.0	47.2	40.6	21.4	21.4		14.2
Actuated g/C Ratio	0.58	0.53	0.61	0.52	0.27	0.27		0.18
v/c Ratio	0.20	0.62	0.08	0.74	0.23	0.66		0.56
Control Delay	10.3	22.6	3.4	18.4	9.8	15.9		35.5
Queue Delay	0.0	0.1	0.0	0.0	0.0	3.2		0.0
Total Delay	10.3	22.7	3.4	18.4	9.8	19.1		35.5
LOS	B	C	A	B	A	B		D
Approach Delay		21.5		17.8		17.5		35.5
Approach LOS		C		B		B		D

Intersection Summary

Cycle Length: 78  
 Actuated Cycle Length: 78  
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.74  
 Intersection Signal Delay: 20.5  
 Intersection Capacity Utilization 85.7%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service E

Splits and Phases: 1: Leary Way & Redmond Way



HCM 2010 Signalized Intersection Summary  
1: Leary Way & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	513	12	29	607	14	59	254	38	4	123	21
Future Volume (veh/h)	54	513	12	29	607	14	59	254	38	4	123	21
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	0.99		0.97	0.97		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90
Adj Sat Flow, veh/h/ln	1693	1693	1710	1693	1693	1710	1693	1693	1710	1710	1693	1710
Adj Flow Rate, veh/h	56	534	12	30	632	15	61	265	40	4	128	22
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	353	549	12	447	633	15	303	374	56	49	187	31
Arrive On Green	0.32	0.67	0.67	0.28	0.51	0.51	0.09	0.52	0.52	0.15	0.15	0.15
Sat Flow, veh/h	1612	1648	37	1612	1646	39	1612	1431	216	13	1246	210
Grp Volume(v), veh/h	56	0	546	30	0	647	61	0	305	154	0	0
Grp Sat Flow(s),veh/h/ln	1612	0	1686	1612	0	1685	1612	0	1647	1469	0	0
Q Serve(g_s), s	0.0	0.0	23.9	0.0	0.0	29.9	2.4	0.0	11.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	23.9	0.0	0.0	29.9	2.4	0.0	11.0	7.7	0.0	0.0
Prop In Lane	1.00		0.02	1.00		0.02	1.00		0.13	0.03		0.14
Lane Grp Cap(c), veh/h	353	0	562	447	0	648	303	0	430	268	0	0
V/C Ratio(X)	0.16	0.00	0.97	0.07	0.00	1.00	0.20	0.00	0.71	0.58	0.00	0.00
Avail Cap(c_a), veh/h	353	0	562	447	0	648	372	0	591	348	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.33	1.33	1.33	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.79	0.00	0.79	0.44	0.00	0.44	1.00	0.00	0.00
Uniform Delay (d), s/veh	22.1	0.0	12.7	21.8	0.0	19.0	23.3	0.0	16.4	31.5	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.0	31.6	0.0	0.0	30.9	0.1	0.0	0.8	1.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	0.0	22.0	0.8	0.0	25.5	1.9	0.0	7.4	5.8	0.0	0.0
LnGrp Delay(d),s/veh	22.2	0.0	44.3	21.8	0.0	50.0	23.4	0.0	17.2	32.9	0.0	0.0
LnGrp LOS	C		D	C		D	C		B	C		
Approach Vol, veh/h		602			677			366			154	
Approach Delay, s/veh		42.2			48.7			18.2			32.9	
Approach LOS		D			D			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s		25.4	21.6	31.0	8.7	16.7	17.6	35.0				
Change Period (Y+Rc), s		5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s		28.0	9.0	26.0	7.0	16.0	5.0	30.0				
Max Q Clear Time (g_c+I1), s		13.0	2.0	25.9	4.4	9.7	2.0	31.9				
Green Ext Time (p_c), s		1.3	0.0	0.0	0.0	0.3	0.0	0.0				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			39.0									
HCM 2010 LOS			D									

Timings  
2: 164 Ave NE & Redmond Way

Redmond Square  
04/03/2020

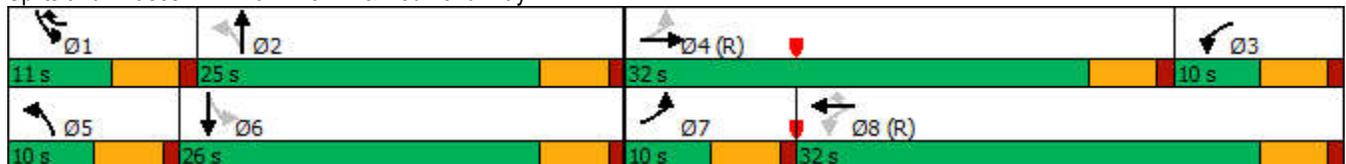


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	18	533	11	559	165	49	135	209	113
Future Volume (vph)	18	533	11	559	165	49	135	209	113
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	1	5	2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	7	4	3	8	1	5	2	1	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	24.0	10.0	26.0	10.0	10.0	25.0	10.0	26.0
Total Split (s)	10.0	32.0	10.0	32.0	11.0	10.0	25.0	11.0	26.0
Total Split (%)	12.8%	41.0%	12.8%	41.0%	14.1%	12.8%	32.1%	14.1%	33.3%
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	Lead	Lag	Lag	Lead	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes								
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	42.3	42.3	42.3	42.3	48.3	17.7	12.7	21.3	17.7
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.62	0.23	0.16	0.27	0.23
v/c Ratio	0.06	0.59	0.03	0.62	0.18	0.17	0.56	0.78	0.34
Control Delay	17.7	18.7	13.5	19.7	2.2	23.6	38.6	43.6	27.0
Queue Delay	0.0	0.2	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	18.9	13.5	20.3	2.2	23.6	38.6	43.6	27.0
LOS	B	B	B	C	A	C	D	D	C
Approach Delay		18.9		16.1			35.0		37.4
Approach LOS		B		B			D		D

Intersection Summary

Cycle Length: 78  
 Actuated Cycle Length: 78  
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 22.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 72.8%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 2: 164 Ave NE & Redmond Way



HCM 2010 Signalized Intersection Summary  
2: 164 Ave NE & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	533	4	11	559	165	49	135	18	209	113	12
Future Volume (veh/h)	18	533	4	11	559	165	49	135	18	209	113	12
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	0.95		0.88	0.93		0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1693	1693	1710	1693	1693	1693	1710	1710	1710	1613	1613	1710
Adj Flow Rate, veh/h	18	538	4	11	565	167	49	136	18	211	114	12
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	6	6	6
Cap, veh/h	126	581	4	351	807	790	308	246	33	288	291	31
Arrive On Green	0.03	0.46	0.46	0.15	0.48	0.48	0.01	0.06	0.06	0.08	0.20	0.20
Sat Flow, veh/h	1612	1678	12	1612	1693	1424	1629	1453	192	1536	1426	150
Grp Volume(v), veh/h	18	0	542	11	565	167	49	0	154	211	0	126
Grp Sat Flow(s),veh/h/ln	1612	0	1691	1612	1693	1424	1629	0	1646	1536	0	1576
Q Serve(g_s), s	0.6	0.0	23.5	0.0	20.4	4.6	1.9	0.0	7.1	6.0	0.0	5.4
Cycle Q Clear(g_c), s	0.6	0.0	23.5	0.0	20.4	4.6	1.9	0.0	7.1	6.0	0.0	5.4
Prop In Lane	1.00		0.01	1.00		1.00	1.00		0.12	1.00		0.10
Lane Grp Cap(c), veh/h	126	0	585	351	807	790	308	0	278	288	0	322
V/C Ratio(X)	0.14	0.00	0.93	0.03	0.70	0.21	0.16	0.00	0.55	0.73	0.00	0.39
Avail Cap(c_a), veh/h	196	0	585	351	807	790	344	0	422	288	0	424
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	0.75	0.00	0.75	0.42	0.42	0.42	0.68	0.00	0.68	0.90	0.00	0.90
Uniform Delay (d), s/veh	22.0	0.0	20.1	27.2	16.0	8.8	25.8	0.0	34.0	28.8	0.0	26.8
Incr Delay (d2), s/veh	0.4	0.0	18.6	0.0	2.2	0.3	0.2	0.0	1.2	8.5	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	0.0	19.0	0.4	13.2	3.3	1.6	0.0	5.8	7.6	0.0	4.3
LnGrp Delay(d),s/veh	22.3	0.0	38.7	27.2	18.2	9.1	26.0	0.0	35.1	37.3	0.0	27.5
LnGrp LOS	C		D	C	B	A	C		D	D		C
Approach Vol, veh/h		560			743			203			337	
Approach Delay, s/veh		38.2			16.3			32.9			33.6	
Approach LOS		D			B			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.0	18.2	16.8	32.0	8.3	20.9	6.6	42.2				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	6.0	20.0	5.0	27.0	5.0	21.0	5.0	27.0				
Max Q Clear Time (g_c+I1), s	8.0	9.1	2.0	25.5	3.9	7.4	2.6	22.4				
Green Ext Time (p_c), s	0.0	0.6	0.0	0.7	0.0	0.6	0.0	1.4				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			27.9									
HCM 2010 LOS			C									

Timings  
4: 166 Ave NE & Redmond Way

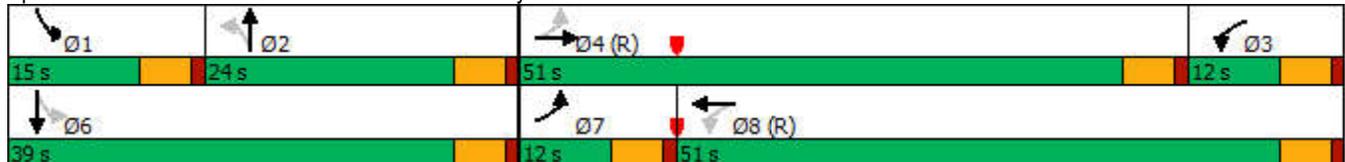


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	44	703	21	643	42	216	114	85
Future Volume (vph)	44	703	21	643	42	216	114	85
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	pm+pt	NA
Protected Phases	7	4	3	8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	2	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	12.0	23.0	12.0	23.0	24.0	24.0	15.0	24.0
Total Split (s)	12.0	51.0	12.0	51.0	24.0	24.0	15.0	39.0
Total Split (%)	11.8%	50.0%	11.8%	50.0%	23.5%	23.5%	14.7%	38.2%
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	Lead	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	55.1	55.1	52.8	52.8	17.7	17.7	32.1	32.1
Actuated g/C Ratio	0.54	0.54	0.52	0.52	0.17	0.17	0.31	0.31
v/c Ratio	0.26	0.82	0.10	0.88	0.23	0.87	0.52	0.27
Control Delay	17.6	31.1	19.3	34.1	38.8	68.0	33.5	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	31.1	19.3	34.1	38.8	68.0	33.5	21.3
LOS	B	C	B	C	D	E	C	C
Approach Delay		30.3		33.7		63.7		27.0
Approach LOS		C		C		E		C

Intersection Summary

Cycle Length: 102  
 Actuated Cycle Length: 102  
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.88  
 Intersection Signal Delay: 35.8  
 Intersection Capacity Utilization 76.7%  
 Analysis Period (min) 15  
 Intersection LOS: D  
 ICU Level of Service D

Splits and Phases: 4: 166 Ave NE & Redmond Way



HCM 2010 Signalized Intersection Summary  
4: 166 Ave NE & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	703	14	21	643	65	42	216	27	114	85	47
Future Volume (veh/h)	44	703	14	21	643	65	42	216	27	114	85	47
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	0.98		0.96	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1710	1710	1660	1660	1710	1710	1710	1710	1676	1676	1710
Adj Flow Rate, veh/h	46	740	15	22	677	68	44	227	28	120	89	49
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	3	3	3	0	0	0	2	2	2
Cap, veh/h	129	753	15	227	763	77	269	263	32	222	306	169
Arrive On Green	0.04	0.45	0.45	0.13	0.68	0.68	0.18	0.18	0.18	0.08	0.30	0.30
Sat Flow, veh/h	1629	1670	34	1581	1482	149	1120	1485	183	1597	1011	557
Grp Volume(v), veh/h	46	0	755	22	0	745	44	0	255	120	0	138
Grp Sat Flow(s),veh/h/ln	1629	0	1703	1581	0	1631	1120	0	1668	1597	0	1568
Q Serve(g_s), s	1.7	0.0	44.6	0.0	0.0	37.5	3.4	0.0	15.1	6.0	0.0	6.9
Cycle Q Clear(g_c), s	1.7	0.0	44.6	0.0	0.0	37.5	3.4	0.0	15.1	6.0	0.0	6.9
Prop In Lane	1.00		0.02	1.00		0.09	1.00		0.11	1.00		0.36
Lane Grp Cap(c), veh/h	129	0	768	227	0	839	269	0	295	222	0	475
V/C Ratio(X)	0.36	0.00	0.98	0.10	0.00	0.89	0.16	0.00	0.86	0.54	0.00	0.29
Avail Cap(c_a), veh/h	182	0	768	227	0	839	279	0	311	256	0	523
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.72	0.00	0.72	0.86	0.00	0.86	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.2	0.0	27.6	39.9	0.0	13.7	35.9	0.0	40.8	30.8	0.0	27.2
Incr Delay (d2), s/veh	1.2	0.0	23.7	0.2	0.0	11.8	0.2	0.0	20.2	2.1	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	0.0	32.9	1.0	0.0	25.8	1.9	0.0	13.4	5.0	0.0	5.4
LnGrp Delay(d),s/veh	26.4	0.0	51.3	40.0	0.0	25.6	36.2	0.0	61.0	32.8	0.0	27.4
LnGrp LOS	C		D	D		C	D		E	C		C
Approach Vol, veh/h		801			767			299				258
Approach Delay, s/veh		49.9			26.0			57.3				29.9
Approach LOS		D			C			E				C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s	12.8	23.1	15.1	51.0		35.9	8.6	57.5				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0		5.0	5.0	5.0				
Max Green Setting (Gmax), s	10.0	19.0	7.0	46.0		34.0	7.0	46.0				
Max Q Clear Time (g_c+I1), s	8.0	17.1	2.0	46.6		8.9	3.7	39.5				
Green Ext Time (p_c), s	0.1	0.4	0.0	0.0		0.4	0.0	5.1				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				39.9								
HCM 2010 LOS				D								

Timings  
5: Cleveland St/168 Ave NE & Redmond Way

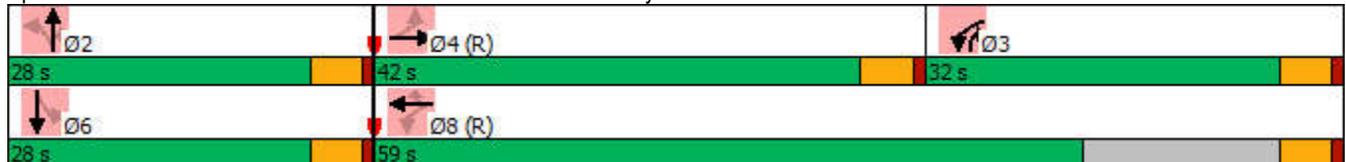


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↖	↖↗	↖	↖	↖		↖	↖		↖↗
Traffic Volume (vph)	13	830	140	729	14	8	35	458	6	1
Future Volume (vph)	13	830	140	729	14	8	35	458	6	1
Turn Type	Perm	NA	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA
Protected Phases		4	3	8			2	3		6
Permitted Phases	4		8		8	2		2	6	
Detector Phase	4	4	4 3	8	8	2	2	3	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	12.0	12.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	14.0	21.0	21.0	28.0	28.0	14.0	28.0	28.0
Total Split (s)	42.0	42.0	32.0	59.0	59.0	28.0	28.0	32.0	28.0	28.0
Total Split (%)	41.2%	41.2%	31.4%	57.8%	57.8%	27.5%	27.5%	31.4%	27.5%	27.5%
Yellow Time (s)	4.0	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	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	Lead	Lag					Lag		
Lead-Lag Optimize?	Yes	Yes	Yes					Yes		
Recall Mode	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effct Green (s)	56.6	56.6	88.3	90.3	90.3		8.2	32.4		7.9
Actuated g/C Ratio	0.55	0.55	0.87	0.89	0.89		0.08	0.32		0.08
v/c Ratio	0.04	0.48	0.21	0.50	0.01		0.35	0.96		0.20
Control Delay	22.5	22.8	3.5	6.0	1.1		51.1	60.1		27.0
Queue Delay	0.0	0.0	0.0	0.1	0.0		0.0	1.1		0.0
Total Delay	22.5	22.8	3.5	6.1	1.1		51.1	61.2		27.0
LOS	C	C	A	A	A		D	E		C
Approach Delay		22.8		5.6			60.3			27.0
Approach LOS		C		A			E			C

Intersection Summary

Cycle Length: 102  
 Actuated Cycle Length: 102  
 Offset: 82 (80%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.96  
 Intersection Signal Delay: 24.5  
 Intersection Capacity Utilization 81.2%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 5: Cleveland St/168 Ave NE & Redmond Way



HCM 2010 Signalized Intersection Summary  
5: Cleveland St/168 Ave NE & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	830	4	140	729	14	8	35	458	6	1	17
Future Volume (veh/h)	13	830	4	140	729	14	8	35	458	6	1	17
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	1.00		0.99	0.94		0.96	0.98		0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1676	1710	1693	1693	1693	1710	1710	1710	1710	1710	1710
Adj Flow Rate, veh/h	13	847	4	143	744	14	8	36	467	6	1	17
Adj No. of Lanes	1	2	0	1	1	1	0	1	1	0	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	299	1179	6	741	1328	1118	58	178	706	64	24	107
Arrive On Green	0.36	0.36	0.36	0.75	1.00	1.00	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	629	3251	15	1612	1693	1425	137	1515	1398	172	202	909
Grp Volume(v), veh/h	13	415	436	143	744	14	44	0	467	24	0	0
Grp Sat Flow(s),veh/h/ln	629	1593	1673	1612	1693	1425	1652	0	1398	1283	0	0
Q Serve(g_s), s	1.4	22.9	22.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.4	22.9	22.9	0.0	0.0	0.0	2.4	0.0	0.0	1.5	0.0	0.0
Prop In Lane	1.00		0.01	1.00		1.00	0.18		1.00	0.25		0.71
Lane Grp Cap(c), veh/h	299	578	607	741	1328	1118	236	0	706	195	0	0
V/C Ratio(X)	0.04	0.72	0.72	0.19	0.56	0.01	0.19	0.00	0.66	0.12	0.00	0.00
Avail Cap(c_a), veh/h	299	578	607	741	1328	1118	407	0	857	321	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.53	0.53	0.53	0.94	0.94	0.94	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.1	28.0	28.0	6.0	0.0	0.0	40.8	0.0	19.5	40.4	0.0	0.0
Incr Delay (d2), s/veh	0.1	4.1	3.9	0.1	1.6	0.0	0.4	0.0	1.4	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	14.6	15.2	1.7	1.1	0.0	2.1	0.0	15.2	1.1	0.0	0.0
LnGrp Delay(d),s/veh	21.3	32.1	31.9	6.1	1.6	0.0	41.1	0.0	20.9	40.7	0.0	0.0
LnGrp LOS	C	C	C	A	A	A	D		C	D		
Approach Vol, veh/h		864			901			511			24	
Approach Delay, s/veh		31.9			2.3			22.7			40.7	
Approach LOS		C			A			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		17.0	43.0	42.0		17.0		85.0				
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0		5.0				
Max Green Setting (Gmax), s		23.0	27.0	37.0		23.0		54.0				
Max Q Clear Time (g_c+I1), s		4.4	2.0	24.9		3.5		2.0				
Green Ext Time (p_c), s		1.7	0.5	3.1		0.0		4.0				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			18.3									
HCM 2010 LOS			B									

Timings  
6: Leary Way & Cleveland St

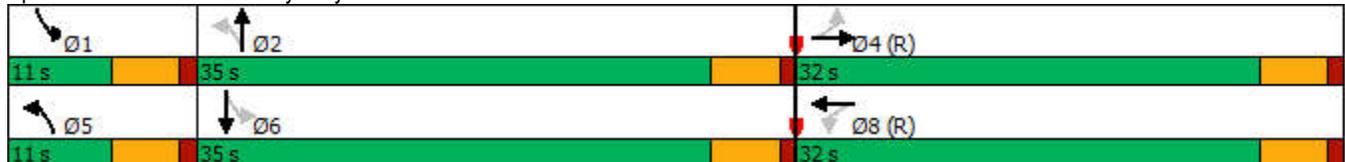


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔	↖	↗	↖	↗
Traffic Volume (vph)	9	275	35	127	41	325	11	174
Future Volume (vph)	9	275	35	127	41	325	11	174
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	5.0	5.0	5.0	4.0	5.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	11.0	22.0	11.0	22.0
Total Split (s)	32.0	32.0	32.0	32.0	11.0	35.0	11.0	35.0
Total Split (%)	41.0%	41.0%	41.0%	41.0%	14.1%	44.9%	14.1%	44.9%
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
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	Ped	None	Ped
Act Effct Green (s)		40.3		40.3	26.7	25.5	24.7	21.1
Actuated g/C Ratio		0.52		0.52	0.34	0.33	0.32	0.27
v/c Ratio		0.43		0.25	0.13	0.83	0.06	0.49
Control Delay		18.2		14.2	14.4	36.9	21.0	32.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		18.2		14.2	14.4	36.9	21.0	32.9
LOS		B		B	B	D	C	C
Approach Delay		18.2		14.2		34.8		32.3
Approach LOS		B		B		C		C

Intersection Summary

Cycle Length: 78  
 Actuated Cycle Length: 78  
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 26.5  
 Intersection Capacity Utilization 69.9%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service C

Splits and Phases: 6: Leary Way & Cleveland St



HCM 2010 Signalized Intersection Summary  
6: Leary Way & Cleveland St

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	275	42	35	127	8	41	325	83	11	174	6
Future Volume (veh/h)	9	275	42	35	127	8	41	325	83	11	174	6
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.97	0.98		0.94	0.96		0.93	1.00		0.92
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90
Adj Sat Flow, veh/h/ln	1710	1710	1710	1710	1710	1710	1693	1693	1710	1693	1693	1710
Adj Flow Rate, veh/h	10	306	47	39	141	9	46	361	92	12	193	7
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	55	687	103	170	569	34	371	398	102	150	416	15
Arrive On Green	0.96	0.96	0.96	0.96	0.96	0.96	0.04	0.31	0.31	0.03	0.57	0.57
Sat Flow, veh/h	15	1425	214	237	1182	71	1612	1280	326	1612	1456	53
Grp Volume(v), veh/h	363	0	0	189	0	0	46	0	453	12	0	200
Grp Sat Flow(s),veh/h/ln	1655	0	0	1490	0	0	1612	0	1606	1612	0	1509
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	21.1	0.4	0.0	6.0
Cycle Q Clear(g_c), s	1.1	0.0	0.0	0.4	0.0	0.0	1.5	0.0	21.1	0.4	0.0	6.0
Prop In Lane	0.03		0.13	0.21		0.05	1.00		0.20	1.00		0.04
Lane Grp Cap(c), veh/h	845	0	0	773	0	0	371	0	500	150	0	431
V/C Ratio(X)	0.43	0.00	0.00	0.24	0.00	0.00	0.12	0.00	0.91	0.08	0.00	0.46
Avail Cap(c_a), veh/h	845	0	0	773	0	0	429	0	618	251	0	580
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.83	0.00	0.00	0.99	0.00	0.00	1.00	0.00	1.00	0.87	0.00	0.87
Uniform Delay (d), s/veh	0.8	0.0	0.0	0.7	0.0	0.0	18.5	0.0	25.8	21.3	0.0	13.2
Incr Delay (d2), s/veh	1.3	0.0	0.0	0.7	0.0	0.0	0.1	0.0	15.0	0.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.3	0.0	0.0	0.6	0.0	0.0	1.2	0.0	16.9	0.3	0.0	4.5
LnGrp Delay(d),s/veh	2.1	0.0	0.0	1.5	0.0	0.0	18.6	0.0	40.7	21.5	0.0	13.9
LnGrp LOS	A			A			B		D	C		B
Approach Vol, veh/h		363			189			499			212	
Approach Delay, s/veh		2.1			1.5			38.7			14.4	
Approach LOS		A			A			D			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.1	29.3		42.6	8.2	27.3		42.6				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	30.0		27.0	6.0	30.0		27.0				
Max Q Clear Time (g_c+I1), s	2.4	23.1		3.1	3.5	8.0		2.4				
Green Ext Time (p_c), s	0.0	1.2		1.5	0.0	0.7		0.8				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				18.5								
HCM 2010 LOS				B								

Timings  
7: 164 Ave NE & Cleveland St

Redmond Square  
04/03/2020

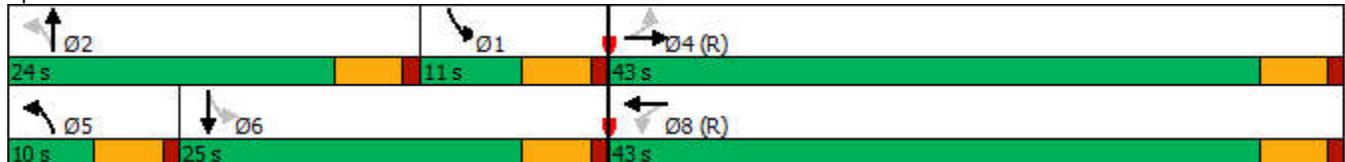


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↖	↗	↖	↗
Traffic Volume (vph)	15	328	3	168	21	166	39	80
Future Volume (vph)	15	328	3	168	21	166	39	80
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	6.0	6.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.0	22.0	22.0	22.0	10.0	20.0	11.0	20.0
Total Split (s)	43.0	43.0	43.0	43.0	10.0	24.0	11.0	25.0
Total Split (%)	55.1%	55.1%	55.1%	55.1%	12.8%	30.8%	14.1%	32.1%
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
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?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		47.3		47.3	14.4	14.4	17.1	16.0
Actuated g/C Ratio		0.61		0.61	0.18	0.18	0.22	0.21
v/c Ratio		0.45		0.22	0.12	0.68	0.16	0.29
Control Delay		6.6		8.1	25.5	38.7	8.9	8.5
Queue Delay		0.1		0.0	0.0	0.0	0.0	0.0
Total Delay		6.7		8.1	25.5	38.7	8.9	8.5
LOS		A		A	C	D	A	A
Approach Delay		6.7		8.1		37.4		8.6
Approach LOS		A		A		D		A

Intersection Summary

Cycle Length: 78  
 Actuated Cycle Length: 78  
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.68  
 Intersection Signal Delay: 14.5  
 Intersection Capacity Utilization 60.3%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service B

Splits and Phases: 7: 164 Ave NE & Cleveland St



HCM 2010 Signalized Intersection Summary  
7: 164 Ave NE & Cleveland St

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	328	37	3	168	20	21	166	31	39	80	14
Future Volume (veh/h)	15	328	37	3	168	20	21	166	31	39	80	14
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	0.99		0.98	0.94		0.94	0.90		0.94
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1710	1710	1710	1710	1710	1693	1693	1710	1676	1676	1710
Adj Flow Rate, veh/h	16	349	39	3	179	21	22	177	33	41	85	15
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	2	2	2
Cap, veh/h	62	808	88	49	818	95	162	222	41	164	240	42
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.02	0.16	0.16	0.08	0.35	0.35
Sat Flow, veh/h	23	1328	144	4	1345	156	1612	1372	256	1597	1374	242
Grp Volume(v), veh/h	404	0	0	203	0	0	22	0	210	41	0	100
Grp Sat Flow(s),veh/h/ln	1496	0	0	1504	0	0	1612	0	1628	1597	0	1616
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	9.7	0.0	0.0	3.6
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	9.7	0.0	0.0	3.6
Prop In Lane	0.04		0.10	0.01		0.10	1.00		0.16	1.00		0.15
Lane Grp Cap(c), veh/h	958	0	0	962	0	0	162	0	263	164	0	283
V/C Ratio(X)	0.42	0.00	0.00	0.21	0.00	0.00	0.14	0.00	0.80	0.25	0.00	0.35
Avail Cap(c_a), veh/h	958	0	0	962	0	0	226	0	397	226	0	414
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.91	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.96	0.00	0.96
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	30.6	0.0	31.5	34.6	0.0	22.1
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.5	0.0	0.0	0.4	0.0	6.6	0.8	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	0.0	0.0	0.2	0.0	0.0	0.8	0.0	8.5	1.5	0.0	2.9
LnGrp Delay(d),s/veh	1.2	0.0	0.0	0.5	0.0	0.0	31.0	0.0	38.1	35.3	0.0	22.8
LnGrp LOS	A			A			C		D	D		C
Approach Vol, veh/h		404			203			232				141
Approach Delay, s/veh		1.2			0.5			37.4				26.4
Approach LOS		A			A			D				C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.9	17.6		52.5	6.9	18.6		52.5				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	19.0		38.0	5.0	20.0		38.0				
Max Q Clear Time (g_c+I1), s	2.0	11.7		2.0	2.9	5.6		2.0				
Green Ext Time (p_c), s	0.0	0.4		1.8	0.0	0.3		0.8				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				13.3								
HCM 2010 LOS				B								

**Intersection**

Int Delay, s/veh 0.6

**Movement** EBL EBT WBT WBR SBL SBR

Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	9	389	165	8	3	26
Future Vol, veh/h	9	389	165	8	3	26
Conflicting Peds, #/hr	23	0	0	23	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	10	414	176	9	3	28

**Major/Minor** Major1 Major2 Minor2

Conflicting Flow All	208	0	-	0	638	204
Stage 1	-	-	-	-	204	-
Stage 2	-	-	-	-	434	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1375	-	-	-	444	842
Stage 1	-	-	-	-	835	-
Stage 2	-	-	-	-	658	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1349	-	-	-	423	826
Mov Cap-2 Maneuver	-	-	-	-	423	-
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	645	-

**Approach** EB WB SB

HCM Control Delay, s 0.2 0 10  
HCM LOS B

**Minor Lane/Major Mvmt** EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1349	-	-	-	752
HCM Lane V/C Ratio	0.007	-	-	-	0.041
HCM Control Delay (s)	7.7	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Timings  
9: 166 Ave NE & Cleveland St

Redmond Square  
04/03/2020

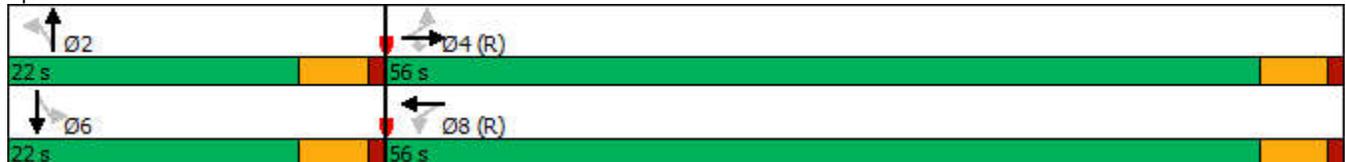


Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↕	↗		↔	↖	↕	↗	↖	↗
Traffic Volume (vph)	42	323	20	20	118	19	203	145	24	64
Future Volume (vph)	42	323	20	20	118	19	203	145	24	64
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Free	Perm	NA
Protected Phases		4			8		2			6
Permitted Phases	4		4	8		2		Free	6	
Detector Phase	4	4	4	8	8	2	2		6	6
Switch Phase										
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0		22.0	22.0
Total Split (s)	56.0	56.0	56.0	56.0	56.0	22.0	22.0		22.0	22.0
Total Split (%)	71.8%	71.8%	71.8%	71.8%	71.8%	28.2%	28.2%		28.2%	28.2%
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
Total Lost Time (s)		5.0	5.0		5.0	5.0	5.0		5.0	5.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	Ped	Ped		Ped	Ped
Act Effct Green (s)		51.0	51.0		51.0	17.0	17.0	78.0	17.0	17.0
Actuated g/C Ratio		0.65	0.65		0.65	0.22	0.22	1.00	0.22	0.22
v/c Ratio		0.37	0.02		0.16	0.08	0.58	0.11	0.14	0.23
Control Delay		4.5	0.4		5.1	25.4	34.6	0.2	27.0	23.2
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		4.5	0.4		5.1	25.4	34.6	0.2	27.0	23.2
LOS		A	A		A	C	C	A	C	C
Approach Delay		4.3			5.1		20.5			24.1
Approach LOS		A			A		C			C

Intersection Summary

Cycle Length: 78  
 Actuated Cycle Length: 78  
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 45  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.58  
 Intersection Signal Delay: 12.3  
 Intersection Capacity Utilization 58.3%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service B

Splits and Phases: 9: 166 Ave NE & Cleveland St



HCM 2010 Signalized Intersection Summary  
 9: 166 Ave NE & Cleveland St

Redmond Square  
 04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	323	20	20	118	19	19	203	145	24	64	16
Future Volume (veh/h)	42	323	20	20	118	19	19	203	145	24	64	16
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	0.97		1.00	0.98		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1676	1676	1710	1710	1710	1693	1693	1693	1660	1660	1710
Adj Flow Rate, veh/h	44	340	21	21	124	20	20	214	0	25	67	17
Adj No. of Lanes	0	1	1	0	1	0	1	1	1	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	0	0	0	1	1	1	3	3	3
Cap, veh/h	142	1016	969	151	839	129	252	312	265	159	233	59
Arrive On Green	1.00	1.00	1.00	0.69	0.69	0.69	0.18	0.18	0.00	0.18	0.18	0.18
Sat Flow, veh/h	131	1478	1409	145	1219	188	1152	1693	1439	1015	1266	321
Grp Volume(v), veh/h	384	0	21	165	0	0	20	214	0	25	0	84
Grp Sat Flow(s),veh/h/ln	1609	0	1409	1552	0	0	1152	1693	1439	1015	0	1587
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	1.2	9.2	0.0	1.8	0.0	3.6
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.7	0.0	0.0	4.7	9.2	0.0	11.0	0.0	3.6
Prop In Lane	0.11		1.00	0.13		0.12	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	1158	0	969	1120	0	0	252	312	265	159	0	292
V/C Ratio(X)	0.33	0.00	0.02	0.15	0.00	0.00	0.08	0.69	0.00	0.16	0.00	0.29
Avail Cap(c_a), veh/h	1158	0	969	1120	0	0	291	369	314	194	0	346
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	4.2	0.0	0.0	29.5	29.7	0.0	34.9	0.0	27.4
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.3	0.0	0.0	0.5	9.7	0.0	1.6	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.4	0.0	0.0	2.3	0.0	0.0	0.7	8.8	0.0	1.1	0.0	3.1
LnGrp Delay(d),s/veh	0.8	0.0	0.0	4.5	0.0	0.0	29.9	39.4	0.0	36.5	0.0	29.4
LnGrp LOS	A		A	A			C	D		D		C
Approach Vol, veh/h		405			165			234			109	
Approach Delay, s/veh		0.7			4.5			38.6			31.0	
Approach LOS		A			A			D			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		19.4		58.6		19.4		58.6				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		17.0		51.0		17.0		51.0				
Max Q Clear Time (g_c+I1), s		11.2		2.0		13.0		4.7				
Green Ext Time (p_c), s		1.0		5.9		0.3		2.1				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			14.7									
HCM 2010 LOS			B									

Intersection						
Int Delay, s/veh	0.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	26	5	5	259	99	21
Future Vol, veh/h	26	5	5	259	99	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	5	5	282	108	23

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	412	120	131	0	0
Stage 1	120	-	-	-	-
Stage 2	292	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	596	931	1454	-	-
Stage 1	905	-	-	-	-
Stage 2	758	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	594	931	1454	-	-
Mov Cap-2 Maneuver	594	-	-	-	-
Stage 1	902	-	-	-	-
Stage 2	758	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1454	-	631	-	-
HCM Lane V/C Ratio	0.004	-	0.053	-	-
HCM Control Delay (s)	7.5	-	11	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Timings  
1: Leary Way & Redmond Way

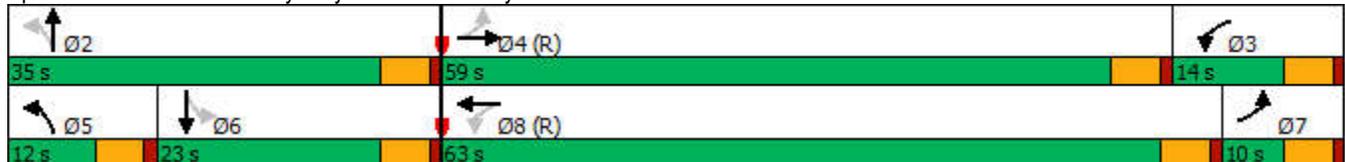


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗		↕
Traffic Volume (vph)	61	628	52	721	66	294	5	141
Future Volume (vph)	61	628	52	721	66	294	5	141
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4	3	8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	8.0	5.0	8.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	21.0	14.0	19.0	12.0	21.0	21.0	21.0
Total Split (s)	10.0	59.0	14.0	63.0	12.0	35.0	23.0	23.0
Total Split (%)	9.3%	54.6%	13.0%	58.3%	11.1%	32.4%	21.3%	21.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Lead/Lag	Lag	Lead	Lag	Lead	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	64.4	59.4	70.8	62.6	27.4	27.4		17.8
Actuated g/C Ratio	0.60	0.55	0.66	0.58	0.25	0.25		0.16
v/c Ratio	0.27	0.72	0.15	0.79	0.34	0.87		0.73
Control Delay	12.8	24.9	2.6	10.4	21.7	35.7		59.5
Queue Delay	0.0	0.3	0.0	0.2	0.0	8.8		0.0
Total Delay	12.8	25.3	2.6	10.6	21.7	44.5		59.5
LOS	B	C	A	B	C	D		E
Approach Delay		24.2		10.1		40.9		59.5
Approach LOS		C		B		D		E

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 76 (70%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 25.1  
 Intersection Capacity Utilization 97.0%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service F

Splits and Phases: 1: Leary Way & Redmond Way



HCM 2010 Signalized Intersection Summary  
 1: Leary Way & Redmond Way

Redmond Square  
 04/03/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	628	14	52	721	16	66	294	56	5	141	26
Future Volume (veh/h)	61	628	14	52	721	16	66	294	56	5	141	26
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.97	0.98		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90
Adj Sat Flow, veh/h/ln	1693	1693	1710	1693	1693	1710	1693	1693	1710	1710	1693	1710
Adj Flow Rate, veh/h	64	654	15	54	751	17	69	306	58	5	147	27
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	510	824	19	593	885	20	223	337	64	36	171	31
Arrive On Green	0.16	1.00	1.00	0.23	1.00	1.00	0.09	0.49	0.49	0.15	0.15	0.15
Sat Flow, veh/h	1612	1648	38	1612	1649	37	1612	1376	261	11	1129	203
Grp Volume(v), veh/h	64	0	669	54	0	768	69	0	364	179	0	0
Grp Sat Flow(s),veh/h/ln	1612	0	1686	1612	0	1686	1612	0	1637	1343	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	22.1	2.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	22.1	14.3	0.0	0.0
Prop In Lane	1.00		0.02	1.00		0.02	1.00		0.16	0.03		0.15
Lane Grp Cap(c), veh/h	510	0	843	593	0	905	223	0	401	238	0	0
V/C Ratio(X)	0.13	0.00	0.79	0.09	0.00	0.85	0.31	0.00	0.91	0.75	0.00	0.00
Avail Cap(c_a), veh/h	510	0	843	593	0	905	252	0	455	260	0	0
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.62	0.00	0.62	0.37	0.00	0.37	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.6	0.0	0.0	7.8	0.0	0.0	32.9	0.0	26.4	44.4	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	7.6	0.0	0.0	6.3	0.2	0.0	8.9	10.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	0.0	3.2	1.1	0.0	2.8	2.9	0.0	14.0	9.9	0.0	0.0
LnGrp Delay(d),s/veh	9.7	0.0	7.6	7.8	0.0	6.3	33.1	0.0	35.4	54.5	0.0	0.0
LnGrp LOS	A		A	A		A	C		D	D		
Approach Vol, veh/h		733			822			433			179	
Approach Delay, s/veh		7.8			6.4			35.0			54.5	
Approach LOS		A			A			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s		31.4	17.6	59.0	10.0	21.4	13.6	63.0				
Change Period (Y+Rc), s		5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s		30.0	9.0	54.0	7.0	18.0	5.0	58.0				
Max Q Clear Time (g_c+I1), s		24.1	2.0	2.0	5.8	16.3	2.0	2.0				
Green Ext Time (p_c), s		0.9	0.1	2.5	0.0	0.1	0.0	8.6				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				16.5								
HCM 2010 LOS				B								

Timings  
2: 164 Ave NE & Redmond Way

Redmond Square  
04/03/2020

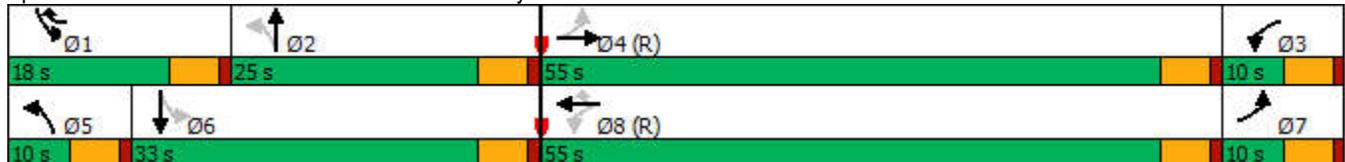


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↖	↗	↖	↗
Traffic Volume (vph)	23	660	14	681	219	57	160	249	136
Future Volume (vph)	23	660	14	681	219	57	160	249	136
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	1	5	2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	7	4	3	8	1	5	2	1	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	24.0	10.0	26.0	10.0	10.0	25.0	10.0	26.0
Total Split (s)	10.0	55.0	10.0	55.0	18.0	10.0	25.0	18.0	33.0
Total Split (%)	9.3%	50.9%	9.3%	50.9%	16.7%	9.3%	23.1%	16.7%	30.6%
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	Lag	Lead	Lag	Lead	Lead	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes								
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	62.3	57.3	62.3	57.3	72.9	22.2	16.1	36.7	27.7
Actuated g/C Ratio	0.58	0.53	0.58	0.53	0.68	0.21	0.15	0.34	0.26
v/c Ratio	0.10	0.75	0.06	0.77	0.22	0.23	0.73	0.78	0.38
Control Delay	2.1	13.6	3.8	14.1	0.4	9.0	26.7	36.1	24.1
Queue Delay	0.0	6.5	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	2.1	20.1	3.8	14.2	0.4	9.0	26.7	36.1	24.1
LOS	A	C	A	B	A	A	C	D	C
Approach Delay		19.5		10.8			22.4		31.5
Approach LOS		B		B			C		C

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 80 (74%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 18.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 82.8%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 2: 164 Ave NE & Redmond Way



HCM 2010 Signalized Intersection Summary  
2: 164 Ave NE & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	660	5	14	681	219	57	160	20	249	136	20
Future Volume (veh/h)	23	660	5	14	681	219	57	160	20	249	136	20
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	0.94		0.87	0.94		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1693	1693	1710	1693	1693	1693	1710	1710	1710	1613	1613	1710
Adj Flow Rate, veh/h	23	667	5	14	688	221	58	162	20	252	137	20
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	6	6	6
Cap, veh/h	364	777	6	417	784	832	291	222	27	303	317	46
Arrive On Green	0.16	0.93	0.93	0.16	0.93	0.93	0.08	0.30	0.30	0.20	0.39	0.39
Sat Flow, veh/h	1612	1678	13	1612	1693	1424	1629	1465	181	1536	1366	199
Grp Volume(v), veh/h	23	0	672	14	688	221	58	0	182	252	0	157
Grp Sat Flow(s),veh/h/ln	1612	0	1691	1612	1693	1424	1629	0	1646	1536	0	1565
Q Serve(g_s), s	0.0	0.0	15.5	0.0	17.4	0.7	3.2	0.0	10.7	13.0	0.0	8.0
Cycle Q Clear(g_c), s	0.0	0.0	15.5	0.0	17.4	0.7	3.2	0.0	10.7	13.0	0.0	8.0
Prop In Lane	1.00		0.01	1.00		1.00	1.00		0.11	1.00		0.13
Lane Grp Cap(c), veh/h	364	0	783	417	784	832	291	0	249	303	0	363
V/C Ratio(X)	0.06	0.00	0.86	0.03	0.88	0.27	0.20	0.00	0.73	0.83	0.00	0.43
Avail Cap(c_a), veh/h	364	0	783	417	784	832	301	0	305	303	0	406
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.67	1.67	1.67
Upstream Filter(I)	0.62	0.00	0.62	0.80	0.80	0.80	0.53	0.00	0.53	0.89	0.00	0.89
Uniform Delay (d), s/veh	19.5	0.0	2.7	18.1	2.8	0.4	35.1	0.0	35.7	32.5	0.0	27.9
Incr Delay (d2), s/veh	0.0	0.0	7.7	0.0	11.0	0.6	0.2	0.0	3.7	16.1	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.7	0.0	10.8	0.4	13.3	0.7	2.6	0.0	7.8	11.9	0.0	6.2
LnGrp Delay(d),s/veh	19.6	0.0	10.5	18.1	13.8	1.0	35.3	0.0	39.4	48.6	0.0	28.6
LnGrp LOS	B		B	B	B	A	D		D	D		C
Approach Vol, veh/h		695			923			240				409
Approach Delay, s/veh		10.8			10.8			38.4				40.9
Approach LOS		B			B			D				D
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.0	21.3	13.7	55.0	9.3	30.0	13.7	55.0				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	13.0	20.0	5.0	50.0	5.0	28.0	5.0	50.0				
Max Q Clear Time (g_c+I1), s	15.0	12.7	2.0	17.5	5.2	10.0	2.0	19.4				
Green Ext Time (p_c), s	0.0	0.6	0.0	7.9	0.0	0.9	0.0	4.3				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			19.2									
HCM 2010 LOS			B									

Timings  
4: 166 Ave NE & Redmond Way

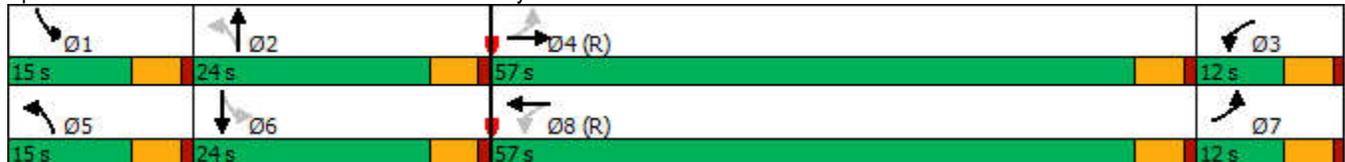


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	79	838	25	775	48	264	142	110
Future Volume (vph)	79	838	25	775	48	264	142	110
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	12.0	23.0	12.0	23.0	15.0	24.0	15.0	24.0
Total Split (s)	12.0	57.0	12.0	57.0	15.0	24.0	15.0	24.0
Total Split (%)	11.1%	52.8%	11.1%	52.8%	13.9%	22.2%	13.9%	22.2%
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	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	61.3	56.7	60.3	54.6	26.9	19.0	33.0	24.0
Actuated g/C Ratio	0.57	0.52	0.56	0.51	0.25	0.18	0.31	0.22
v/c Ratio	0.30	1.00	0.19	0.59	0.18	1.04	0.69	0.57
Control Delay	15.3	53.9	15.8	16.3	21.4	97.8	45.8	40.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.3	53.9	15.8	16.3	21.4	97.8	45.8	40.1
LOS	B	D	B	B	C	F	D	D
Approach Delay		50.6		16.3		87.0		42.5
Approach LOS		D		B		F		D

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 64 (59%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 120  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.04  
 Intersection Signal Delay: 42.2  
 Intersection LOS: D  
 Intersection Capacity Utilization 97.3%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 4: 166 Ave NE & Redmond Way



HCM 2010 Signalized Intersection Summary  
4: 166 Ave NE & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	838	16	25	775	99	48	264	30	142	110	88
Future Volume (veh/h)	79	838	16	25	775	99	48	264	30	142	110	88
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	0.98		0.96	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1710	1710	1660	1660	1710	1710	1710	1710	1676	1676	1710
Adj Flow Rate, veh/h	83	882	17	26	816	104	51	278	32	149	116	93
Adj No. of Lanes	1	1	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	3	3	3	0	0	0	2	2	2
Cap, veh/h	324	805	16	172	1353	172	242	264	30	212	197	158
Arrive On Green	0.09	0.64	0.64	0.07	0.48	0.48	0.07	0.35	0.35	0.09	0.23	0.23
Sat Flow, veh/h	1629	1671	32	1581	2809	358	1629	1498	172	1597	854	685
Grp Volume(v), veh/h	83	0	899	26	458	462	51	0	310	149	0	209
Grp Sat Flow(s),veh/h/ln	1629	0	1704	1581	1577	1590	1629	0	1671	1597	0	1540
Q Serve(g_s), s	0.0	0.0	52.0	0.0	22.9	22.9	2.7	0.0	19.0	7.9	0.0	13.1
Cycle Q Clear(g_c), s	0.0	0.0	52.0	0.0	22.9	22.9	2.7	0.0	19.0	7.9	0.0	13.1
Prop In Lane	1.00		0.02	1.00		0.23	1.00		0.10	1.00		0.44
Lane Grp Cap(c), veh/h	324	0	820	172	759	766	242	0	294	212	0	355
V/C Ratio(X)	0.26	0.00	1.10	0.15	0.60	0.60	0.21	0.00	1.05	0.70	0.00	0.59
Avail Cap(c_a), veh/h	324	0	820	172	759	766	333	0	294	215	0	355
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.57	0.00	0.57	0.95	0.95	0.95	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.3	0.0	19.4	47.1	20.5	20.5	33.5	0.0	35.0	32.4	0.0	37.0
Incr Delay (d2), s/veh	0.2	0.0	54.4	0.4	3.4	3.3	0.4	0.0	67.6	9.8	0.0	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.4	0.0	65.5	1.3	15.8	15.9	2.2	0.0	25.5	7.3	0.0	9.7
LnGrp Delay(d),s/veh	27.5	0.0	73.9	47.5	23.8	23.8	34.0	0.0	102.6	42.2	0.0	39.2
LnGrp LOS	C		F	D	C	C	C		F	D		D
Approach Vol, veh/h		982			946			361			358	
Approach Delay, s/veh		69.9			24.5			92.9			40.4	
Approach LOS		E			C			F			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.8	24.0	12.2	57.0	8.9	29.9	12.2	57.0				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	10.0	19.0	7.0	52.0	10.0	19.0	7.0	52.0				
Max Q Clear Time (g_c+I1), s	9.9	21.0	2.0	54.0	4.7	15.1	2.0	24.9				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.1	0.2	0.1	18.5				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			52.8									
HCM 2010 LOS			D									

Timings  
5: Cleveland St/168 Ave NE & Redmond Way

Redmond Square  
04/03/2020

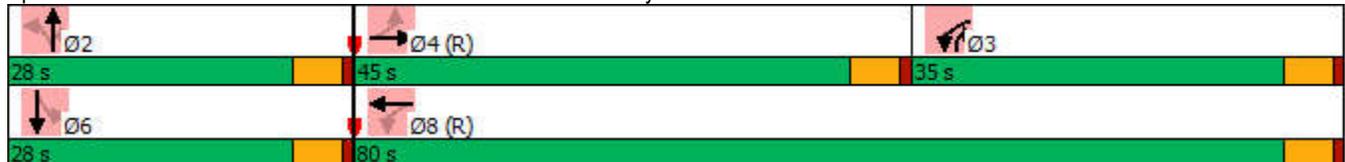


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↖	↖↗	↖	↖↗		↖	↖		↖↗
Traffic Volume (vph)	30	980	168	885	9	39	525	13	1
Future Volume (vph)	30	980	168	885	9	39	525	13	1
Turn Type	Perm	NA	pm+pt	NA	Perm	NA	pm+ov	Perm	NA
Protected Phases		4	3	8		2	3		6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	4 3	8	2	2	3	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	12.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	14.0	21.0	28.0	28.0	14.0	28.0	28.0
Total Split (s)	45.0	45.0	35.0	80.0	28.0	28.0	35.0	28.0	28.0
Total Split (%)	41.7%	41.7%	32.4%	74.1%	25.9%	25.9%	32.4%	25.9%	25.9%
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
Total Lost Time (s)	5.0	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	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	56.4	56.4	91.4	92.4		8.7	37.6		8.7
Actuated g/C Ratio	0.52	0.52	0.85	0.86		0.08	0.35		0.08
v/c Ratio	0.12	0.60	0.27	0.34		0.38	1.03		0.35
Control Delay	7.7	10.0	3.4	1.6		51.5	76.0		27.8
Queue Delay	0.0	0.1	0.1	0.2		0.0	0.0		0.0
Total Delay	7.7	10.1	3.5	1.8		51.5	76.0		27.8
LOS	A	B	A	A		D	E		C
Approach Delay		10.1		2.1		73.9			27.8
Approach LOS		B		A		E			C

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 100 (93%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.03  
 Intersection Signal Delay: 20.7  
 Intersection Capacity Utilization 90.5%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service E

Splits and Phases: 5: Cleveland St/168 Ave NE & Redmond Way



HCM 2010 Signalized Intersection Summary  
5: Cleveland St/168 Ave NE & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	980	5	168	885	25	9	39	525	13	1	34
Future Volume (veh/h)	30	980	5	168	885	25	9	39	525	13	1	34
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	1.00		0.99	0.97		0.96	0.98		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1676	1710	1693	1693	1710	1710	1710	1710	1710	1710	1710
Adj Flow Rate, veh/h	31	1000	5	171	903	26	9	40	536	13	1	35
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	265	1204	6	712	2520	73	56	178	707	65	20	107
Arrive On Green	0.49	0.49	0.49	0.75	1.00	1.00	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	537	3250	16	1612	3192	92	144	1507	1398	190	172	905
Grp Volume(v), veh/h	31	490	515	171	455	474	49	0	536	49	0	0
Grp Sat Flow(s),veh/h/ln	537	1593	1673	1612	1608	1676	1651	0	1398	1267	0	0
Q Serve(g_s), s	3.4	28.5	28.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.4	28.5	28.5	0.0	0.0	0.0	2.8	0.0	0.0	3.3	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.05	0.18		1.00	0.27		0.71
Lane Grp Cap(c), veh/h	265	590	620	712	1270	1323	234	0	707	192	0	0
V/C Ratio(X)	0.12	0.83	0.83	0.24	0.36	0.36	0.21	0.00	0.76	0.26	0.00	0.00
Avail Cap(c_a), veh/h	265	590	620	712	1270	1323	385	0	840	300	0	0
HCM Platoon Ratio	1.33	1.33	1.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.18	0.18	0.18	0.90	0.90	0.90	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.1	24.5	24.5	7.4	0.0	0.0	43.2	0.0	22.2	43.5	0.0	0.0
Incr Delay (d2), s/veh	0.2	2.7	2.5	0.2	0.7	0.7	0.4	0.0	3.4	0.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.9	15.3	16.0	2.4	0.5	0.5	2.5	0.0	19.5	2.5	0.0	0.0
LnGrp Delay(d),s/veh	18.3	27.2	27.0	7.5	0.7	0.7	43.7	0.0	25.5	44.1	0.0	0.0
LnGrp LOS	B	C	C	A	A	A	D		C	D		
Approach Vol, veh/h		1036			1100			585				49
Approach Delay, s/veh		26.8			1.8			27.1				44.1
Approach LOS		C			A			C				D
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		17.7	45.3	45.0		17.7		90.3				
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0		5.0				
Max Green Setting (Gmax), s		23.0	30.0	40.0		23.0		75.0				
Max Q Clear Time (g_c+I1), s		4.8	2.0	30.5		5.3		2.0				
Green Ext Time (p_c), s		2.0	0.6	3.5		0.1		4.5				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				17.2								
HCM 2010 LOS				B								

Timings  
6: Leary Way & Cleveland St

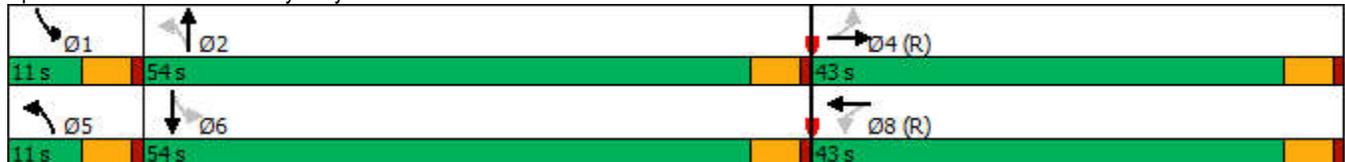


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔	↔	↔	↔	↔
Traffic Volume (vph)	10	310	41	164	46	381	12	217
Future Volume (vph)	10	310	41	164	46	381	12	217
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	5.0	5.0	5.0	4.0	5.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	11.0	22.0	11.0	22.0
Total Split (s)	43.0	43.0	43.0	43.0	11.0	54.0	11.0	54.0
Total Split (%)	39.8%	39.8%	39.8%	39.8%	10.2%	50.0%	10.2%	50.0%
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
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	Ped	None	Ped
Act Effct Green (s)		54.4		54.4	42.6	41.4	39.5	34.8
Actuated g/C Ratio		0.50		0.50	0.39	0.38	0.37	0.32
v/c Ratio		0.49		0.32	0.16	0.87	0.07	0.51
Control Delay		14.8		17.1	17.5	44.7	11.0	22.9
Queue Delay		0.0		0.0	0.0	1.0	0.0	0.3
Total Delay		14.8		17.1	17.5	45.7	11.0	23.2
LOS		B		B	B	D	B	C
Approach Delay		14.8		17.1		43.3		22.6
Approach LOS		B		B		D		C

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 93 (86%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 27.8  
 Intersection Capacity Utilization 80.7%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service D

Splits and Phases: 6: Leary Way & Cleveland St



HCM 2010 Signalized Intersection Summary  
6: Leary Way & Cleveland St

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	310	47	41	164	9	46	381	111	12	217	7
Future Volume (veh/h)	10	310	47	41	164	9	46	381	111	12	217	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.97	0.98		0.94	0.98		0.94	1.00		0.93
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90
Adj Sat Flow, veh/h/ln	1710	1710	1710	1710	1710	1710	1693	1693	1710	1693	1693	1710
Adj Flow Rate, veh/h	11	344	52	46	182	10	51	423	123	13	241	8
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	42	685	102	152	569	30	392	453	132	120	503	17
Arrive On Green	0.96	0.96	0.96	0.96	0.96	0.96	0.04	0.37	0.37	0.03	0.69	0.69
Sat Flow, veh/h	17	1425	211	233	1183	62	1612	1241	361	1612	1463	49
Grp Volume(v), veh/h	407	0	0	238	0	0	51	0	546	13	0	249
Grp Sat Flow(s),veh/h/ln	1653	0	0	1479	0	0	1612	0	1602	1612	0	1511
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	35.5	0.6	0.0	8.3
Cycle Q Clear(g_c), s	2.0	0.0	0.0	0.8	0.0	0.0	2.2	0.0	35.5	0.6	0.0	8.3
Prop In Lane	0.03		0.13	0.19		0.04	1.00		0.23	1.00		0.03
Lane Grp Cap(c), veh/h	829	0	0	751	0	0	392	0	585	120	0	520
V/C Ratio(X)	0.49	0.00	0.00	0.32	0.00	0.00	0.13	0.00	0.93	0.11	0.00	0.48
Avail Cap(c_a), veh/h	829	0	0	751	0	0	424	0	727	185	0	686
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.75	0.00	0.00	0.98	0.00	0.00	1.00	0.00	1.00	0.77	0.00	0.77
Uniform Delay (d), s/veh	1.1	0.0	0.0	1.1	0.0	0.0	21.8	0.0	33.0	27.1	0.0	12.3
Incr Delay (d2), s/veh	1.6	0.0	0.0	1.1	0.0	0.0	0.1	0.0	16.8	0.3	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.9	0.0	0.0	0.9	0.0	0.0	1.8	0.0	25.4	0.5	0.0	6.0
LnGrp Delay(d),s/veh	2.7	0.0	0.0	2.2	0.0	0.0	21.9	0.0	49.8	27.4	0.0	12.9
LnGrp LOS	A			A			C		D	C		B
Approach Vol, veh/h		407			238			597				262
Approach Delay, s/veh		2.7			2.2			47.4				13.6
Approach LOS		A			A			D				B
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	44.5		56.9	8.9	42.2		56.9				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	49.0		38.0	6.0	49.0		38.0				
Max Q Clear Time (g_c+I1), s	2.6	37.5		4.0	4.2	10.3		2.8				
Green Ext Time (p_c), s	0.0	2.0		1.8	0.0	1.0		1.1				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				22.3								
HCM 2010 LOS				C								

Timings  
7: 164 Ave NE & Cleveland St

Redmond Square  
04/03/2020

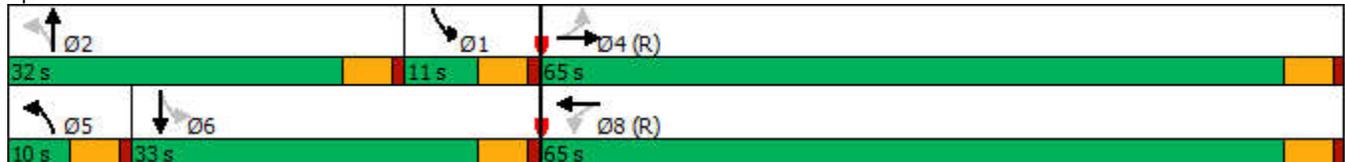


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↖	↗	↖	↗
Traffic Volume (vph)	17	405	5	178	24	197	44	101
Future Volume (vph)	17	405	5	178	24	197	44	101
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	6.0	6.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.0	22.0	22.0	22.0	10.0	20.0	11.0	20.0
Total Split (s)	65.0	65.0	65.0	65.0	10.0	32.0	11.0	33.0
Total Split (%)	60.2%	60.2%	60.2%	60.2%	9.3%	29.6%	10.2%	30.6%
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
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?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		68.7		68.7	20.9	20.9	24.4	23.3
Actuated g/C Ratio		0.64		0.64	0.19	0.19	0.23	0.22
v/c Ratio		0.53		0.23	0.14	0.78	0.20	0.35
Control Delay		7.8		7.5	34.8	56.0	15.5	15.1
Queue Delay		0.1		0.0	0.0	0.0	0.0	0.0
Total Delay		7.9		7.5	34.8	56.0	15.5	15.1
LOS		A		A	C	E	B	B
Approach Delay		7.9		7.5		54.0		15.2
Approach LOS		A		A		D		B

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 82 (76%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 19.9  
 Intersection Capacity Utilization 67.2%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C

Splits and Phases: 7: 164 Ave NE & Cleveland St



HCM 2010 Signalized Intersection Summary  
7: 164 Ave NE & Cleveland St

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	405	45	5	178	23	24	197	39	44	101	16
Future Volume (veh/h)	17	405	45	5	178	23	24	197	39	44	101	16
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	0.99		0.98	0.95		0.94	0.96		0.95
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1710	1710	1710	1710	1710	1693	1693	1710	1676	1676	1710
Adj Flow Rate, veh/h	18	431	48	5	189	24	26	210	41	47	107	17
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	2	2	2
Cap, veh/h	51	863	94	41	859	107	158	238	46	128	259	41
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.03	0.17	0.17	0.07	0.37	0.37
Sat Flow, veh/h	25	1325	144	11	1319	165	1612	1361	266	1597	1400	222
Grp Volume(v), veh/h	497	0	0	218	0	0	26	0	251	47	0	124
Grp Sat Flow(s),veh/h/ln	1495	0	0	1495	0	0	1612	0	1627	1597	0	1622
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	16.3	0.0	0.0	6.1
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	16.3	0.0	0.0	6.1
Prop In Lane	0.04		0.10	0.02		0.11	1.00		0.16	1.00		0.14
Lane Grp Cap(c), veh/h	1008	0	0	1008	0	0	158	0	285	128	0	300
V/C Ratio(X)	0.49	0.00	0.00	0.22	0.00	0.00	0.16	0.00	0.88	0.37	0.00	0.41
Avail Cap(c_a), veh/h	1008	0	0	1008	0	0	192	0	407	161	0	421
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.87	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.94	0.00	0.94
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	40.2	0.0	43.5	48.4	0.0	29.7
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.5	0.0	0.0	0.5	0.0	14.8	1.6	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.8	0.0	0.0	0.2	0.0	0.0	1.2	0.0	13.3	2.5	0.0	5.1
LnGrp Delay(d),s/veh	1.5	0.0	0.0	0.5	0.0	0.0	40.7	0.0	58.2	50.1	0.0	30.5
LnGrp LOS	A			A			D		E	D		C
Approach Vol, veh/h		497			218			277			171	
Approach Delay, s/veh		1.5			0.5			56.6			35.9	
Approach LOS		A			A			E			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.8	23.9		75.3	7.7	25.0		75.3				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	27.0		60.0	5.0	28.0		60.0				
Max Q Clear Time (g_c+I1), s	2.0	18.3		2.0	3.5	8.1		2.0				
Green Ext Time (p_c), s	0.0	0.6		2.3	0.0	0.4		0.9				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				19.5								
HCM 2010 LOS				B								

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Vol, veh/h	8	480	180	9	3	26
Future Vol, veh/h	8	480	180	9	3	26
Conflicting Peds, #/hr	23	0	0	23	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	9	511	191	10	3	28

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	224	0	-	0	748 219
Stage 1	-	-	-	-	219 -
Stage 2	-	-	-	-	529 -
Critical Hdwy	4.1	-	-	-	6.4 6.2
Critical Hdwy Stg 1	-	-	-	-	5.4 -
Critical Hdwy Stg 2	-	-	-	-	5.4 -
Follow-up Hdwy	2.2	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	1357	-	-	-	383 826
Stage 1	-	-	-	-	822 -
Stage 2	-	-	-	-	595 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1331	-	-	-	365 810
Mov Cap-2 Maneuver	-	-	-	-	365 -
Stage 1	-	-	-	-	799 -
Stage 2	-	-	-	-	584 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1331	-	-	-	719
HCM Lane V/C Ratio	0.006	-	-	-	0.043
HCM Control Delay (s)	7.7	0	-	-	10.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Timings  
9: 166 Ave NE & Cleveland St

Redmond Square  
04/03/2020

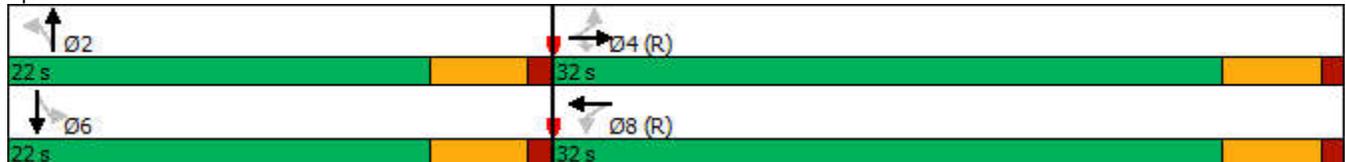


Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations		↖	↗		↔	↖	↗	↖	↗	↔
Traffic Volume (vph)	66	371	38	23	143	31	235	165	27	85
Future Volume (vph)	66	371	38	23	143	31	235	165	27	85
Turn Type	Perm	NA	Perm	Perm	NA	Perm	NA	Free	Perm	NA
Protected Phases		4			8		2			6
Permitted Phases	4		4	8		2		Free	6	
Detector Phase	4	4	4	8	8	2	2		6	6
Switch Phase										
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0		22.0	22.0
Total Split (s)	32.0	32.0	32.0	32.0	32.0	22.0	22.0		22.0	22.0
Total Split (%)	59.3%	59.3%	59.3%	59.3%	59.3%	40.7%	40.7%		40.7%	40.7%
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
Total Lost Time (s)		5.0	5.0		5.0	5.0	5.0		5.0	5.0
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	Ped	Ped		Ped	Ped
Act Effct Green (s)		27.0	27.0		27.0	17.0	17.0	54.0	17.0	17.0
Actuated g/C Ratio		0.50	0.50		0.50	0.31	0.31	1.00	0.31	0.31
v/c Ratio		0.59	0.06		0.25	0.09	0.46	0.12	0.10	0.22
Control Delay		13.3	3.7		3.6	14.0	18.4	0.2	20.1	16.9
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		13.3	3.7		3.6	14.0	18.4	0.2	20.1	16.9
LOS		B	A		A	B	B	A	C	B
Approach Delay		12.5			3.6		11.1			17.6
Approach LOS		B			A		B			B

Intersection Summary

Cycle Length: 54  
 Actuated Cycle Length: 54  
 Offset: 2 (4%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 45  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.59  
 Intersection Signal Delay: 11.2  
 Intersection Capacity Utilization 68.3%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C

Splits and Phases: 9: 166 Ave NE & Cleveland St



HCM 2010 Signalized Intersection Summary  
 9: 166 Ave NE & Cleveland St

Redmond Square  
 04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	371	38	23	143	21	31	235	165	27	85	23
Future Volume (veh/h)	66	371	38	23	143	21	31	235	165	27	85	23
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	1.00		0.99	0.98		1.00	0.98		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1676	1676	1710	1710	1710	1693	1693	1693	1660	1660	1710
Adj Flow Rate, veh/h	69	391	40	24	151	22	33	247	0	28	89	24
Adj No. of Lanes	0	1	1	0	1	0	1	1	1	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	0	0	0	1	1	1	3	3	3
Cap, veh/h	168	842	826	140	754	103	329	386	328	228	285	77
Arrive On Green	0.39	0.39	0.39	0.59	0.59	0.59	0.23	0.23	0.00	0.30	0.30	0.30
Sat Flow, veh/h	155	1435	1407	110	1285	175	1130	1693	1439	989	1250	337
Grp Volume(v), veh/h	460	0	40	197	0	0	33	247	0	28	0	113
Grp Sat Flow(s),veh/h/ln	1590	0	1407	1570	0	0	1130	1693	1439	989	0	1587
Q Serve(g_s), s	0.6	0.0	0.9	0.0	0.0	0.0	1.3	7.1	0.0	1.4	0.0	3.0
Cycle Q Clear(g_c), s	11.1	0.0	0.9	3.0	0.0	0.0	4.3	7.1	0.0	8.5	0.0	3.0
Prop In Lane	0.15		1.00	0.12		0.11	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	1010	0	826	997	0	0	329	386	328	228	0	362
V/C Ratio(X)	0.46	0.00	0.05	0.20	0.00	0.00	0.10	0.64	0.00	0.12	0.00	0.31
Avail Cap(c_a), veh/h	1010	0	826	997	0	0	427	533	453	314	0	500
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.1	0.0	7.1	5.2	0.0	0.0	19.0	18.8	0.0	20.7	0.0	15.6
Incr Delay (d2), s/veh	1.5	0.0	0.1	0.4	0.0	0.0	0.5	6.3	0.0	0.9	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.4	0.0	0.7	2.7	0.0	0.0	0.8	7.1	0.0	0.8	0.0	2.6
LnGrp Delay(d),s/veh	11.6	0.0	7.2	5.7	0.0	0.0	19.5	25.1	0.0	21.6	0.0	17.3
LnGrp LOS	B		A	A			B	C		C		B
Approach Vol, veh/h		500			197			280			141	
Approach Delay, s/veh		11.2			5.7			24.5			18.2	
Approach LOS		B			A			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		17.3		36.7		17.3		36.7				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		17.0		27.0		17.0		27.0				
Max Q Clear Time (g_c+I1), s		9.1		13.1		10.5		5.0				
Green Ext Time (p_c), s		1.6		4.7		0.6		2.1				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			14.4									
HCM 2010 LOS			B									

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	26	5	5	317	130	21
Future Vol, veh/h	26	5	5	317	130	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	28	5	5	345	141	23

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	508	153	164	0	-	0
Stage 1	153	-	-	-	-	-
Stage 2	355	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	525	893	1414	-	-	-
Stage 1	875	-	-	-	-	-
Stage 2	710	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	523	893	1414	-	-	-
Mov Cap-2 Maneuver	523	-	-	-	-	-
Stage 1	872	-	-	-	-	-
Stage 2	710	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.8	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1414	-	560	-	-
HCM Lane V/C Ratio	0.004	-	0.06	-	-
HCM Control Delay (s)	7.6	-	11.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Timings  
1: Leary Way & Redmond Way

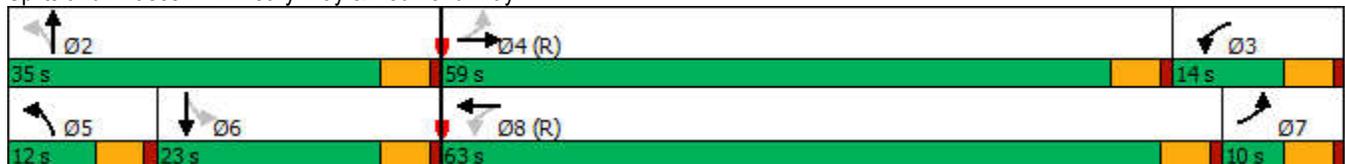


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗		↕
Traffic Volume (vph)	61	653	52	711	66	294	5	141
Future Volume (vph)	61	653	52	711	66	294	5	141
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	Perm	NA
Protected Phases	7	4	3	8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	8.0	5.0	8.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	21.0	14.0	19.0	12.0	21.0	21.0	21.0
Total Split (s)	10.0	59.0	14.0	63.0	12.0	35.0	23.0	23.0
Total Split (%)	9.3%	54.6%	13.0%	58.3%	11.1%	32.4%	21.3%	21.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Lead/Lag	Lag	Lead	Lag	Lead	Lead		Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	64.1	59.1	70.5	62.3	27.7	27.7		18.1
Actuated g/C Ratio	0.59	0.55	0.65	0.58	0.26	0.26		0.17
v/c Ratio	0.27	0.75	0.16	0.78	0.33	0.91		0.72
Control Delay	13.0	26.5	2.6	9.5	23.1	40.3		58.3
Queue Delay	0.0	1.0	0.0	0.2	0.0	15.3		0.0
Total Delay	13.0	27.5	2.6	9.8	23.1	55.7		58.3
LOS	B	C	A	A	C	E		E
Approach Delay		26.3		9.3		50.7		58.3
Approach LOS		C		A		D		E

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 76 (70%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 27.6  
 Intersection Capacity Utilization 97.7%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service F

Splits and Phases: 1: Leary Way & Redmond Way



HCM 2010 Signalized Intersection Summary  
1: Leary Way & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	653	14	52	711	16	66	294	75	5	141	26
Future Volume (veh/h)	61	653	14	52	711	16	66	294	75	5	141	26
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		0.97	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90
Adj Sat Flow, veh/h/ln	1693	1693	1710	1693	1693	1710	1693	1693	1710	1710	1693	1710
Adj Flow Rate, veh/h	64	680	15	54	741	17	69	306	78	5	147	27
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	498	825	18	571	885	20	222	328	84	36	171	31
Arrive On Green	0.14	1.00	1.00	0.21	1.00	1.00	0.09	0.51	0.51	0.16	0.16	0.16
Sat Flow, veh/h	1612	1650	36	1612	1648	38	1612	1293	330	8	1062	190
Grp Volume(v), veh/h	64	0	695	54	0	758	69	0	384	179	0	0
Grp Sat Flow(s),veh/h/ln	1612	0	1686	1612	0	1686	1612	0	1623	1260	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	23.9	1.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	23.9	15.3	0.0	0.0
Prop In Lane	1.00		0.02	1.00		0.02	1.00		0.20	0.03		0.15
Lane Grp Cap(c), veh/h	498	0	843	571	0	905	222	0	412	237	0	0
V/C Ratio(X)	0.13	0.00	0.82	0.09	0.00	0.84	0.31	0.00	0.93	0.75	0.00	0.00
Avail Cap(c_a), veh/h	498	0	843	571	0	905	251	0	451	245	0	0
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00	0.58	0.00	0.58	0.33	0.00	0.33	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.2	0.0	0.0	8.3	0.0	0.0	32.1	0.0	25.7	43.5	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	9.0	0.0	0.0	5.5	0.2	0.0	10.9	11.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	0.0	3.8	1.1	0.0	2.5	2.8	0.0	14.9	10.0	0.0	0.0
LnGrp Delay(d),s/veh	10.2	0.0	9.0	8.3	0.0	5.5	32.3	0.0	36.6	55.0	0.0	0.0
LnGrp LOS	B		A	A		A	C		D	E		
Approach Vol, veh/h		759			812			453			179	
Approach Delay, s/veh		9.1			5.7			36.0			55.0	
Approach LOS		A			A			D			E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s		32.4	16.6	59.0	10.0	22.4	12.6	63.0				
Change Period (Y+Rc), s		5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s		30.0	9.0	54.0	7.0	18.0	5.0	58.0				
Max Q Clear Time (g_c+I1), s		25.9	2.0	2.0	5.7	17.3	2.0	2.0				
Green Ext Time (p_c), s		0.8	0.1	2.6	0.0	0.0	0.0	8.4				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				17.1								
HCM 2010 LOS				B								

Timings  
2: 164 Ave NE & Redmond Way

Redmond Square  
04/03/2020

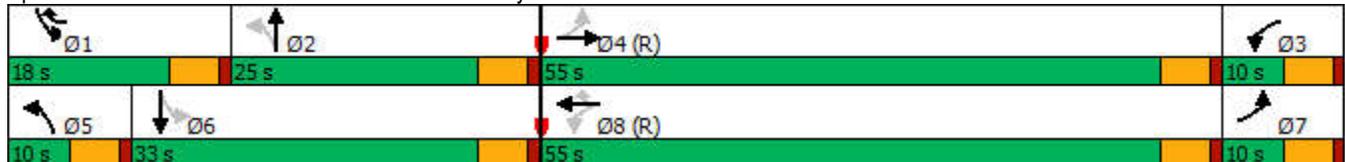


Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↖	↗	↖	↗
Traffic Volume (vph)	23	707	14	671	219	57	167	281	136
Future Volume (vph)	23	707	14	671	219	57	167	281	136
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	1	5	2	1	6
Permitted Phases	4		8		8	2		6	
Detector Phase	7	4	3	8	1	5	2	1	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	10.0	24.0	10.0	26.0	10.0	10.0	25.0	10.0	26.0
Total Split (s)	10.0	55.0	10.0	55.0	18.0	10.0	25.0	18.0	33.0
Total Split (%)	9.3%	50.9%	9.3%	50.9%	16.7%	9.3%	23.1%	16.7%	30.6%
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	Lag	Lead	Lag	Lead	Lead	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes								
Recall Mode	None	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	59.7	54.7	59.7	54.7	72.4	22.7	16.6	39.3	30.4
Actuated g/C Ratio	0.55	0.51	0.55	0.51	0.67	0.21	0.15	0.36	0.28
v/c Ratio	0.11	0.84	0.08	0.79	0.22	0.22	0.75	0.81	0.35
Control Delay	2.6	18.4	4.1	15.7	0.4	10.2	30.7	37.1	21.4
Queue Delay	0.0	50.1	0.0	0.0	0.0	0.0	2.0	1.2	0.0
Total Delay	2.6	68.5	4.1	15.8	0.4	10.2	32.7	38.3	21.4
LOS	A	E	A	B	A	B	C	D	C
Approach Delay		66.5		11.9			27.5		32.3
Approach LOS		E		B			C		C

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 80 (74%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 34.6  
 Intersection Capacity Utilization 86.7%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service E

Splits and Phases: 2: 164 Ave NE & Redmond Way



HCM 2010 Signalized Intersection Summary  
2: 164 Ave NE & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	707	2	14	671	219	57	167	25	281	136	20
Future Volume (veh/h)	23	707	2	14	671	219	57	167	25	281	136	20
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	0.94		0.87	0.94		0.95
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1693	1693	1710	1693	1693	1693	1710	1710	1710	1613	1613	1710
Adj Flow Rate, veh/h	23	714	2	14	678	221	58	169	25	284	137	20
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	6	6	6
Cap, veh/h	365	781	2	361	784	832	295	222	33	299	323	47
Arrive On Green	0.15	0.93	0.93	0.15	0.93	0.93	0.08	0.31	0.31	0.20	0.39	0.39
Sat Flow, veh/h	1612	1687	5	1612	1693	1424	1629	1425	211	1536	1366	199
Grp Volume(v), veh/h	23	0	716	14	678	221	58	0	194	284	0	157
Grp Sat Flow(s),veh/h/ln	1612	0	1692	1612	1693	1424	1629	0	1636	1536	0	1565
Q Serve(g_s), s	0.0	0.0	22.0	0.0	16.1	0.7	3.2	0.0	11.6	13.0	0.0	7.9
Cycle Q Clear(g_c), s	0.0	0.0	22.0	0.0	16.1	0.7	3.2	0.0	11.6	13.0	0.0	7.9
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.13	1.00		0.13
Lane Grp Cap(c), veh/h	365	0	783	361	784	832	295	0	255	299	0	370
V/C Ratio(X)	0.06	0.00	0.91	0.04	0.86	0.27	0.20	0.00	0.76	0.95	0.00	0.42
Avail Cap(c_a), veh/h	365	0	783	361	784	832	306	0	303	299	0	406
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.67	1.67	1.67
Upstream Filter(I)	0.57	0.00	0.57	1.00	1.00	1.00	0.54	0.00	0.54	0.87	0.00	0.87
Uniform Delay (d), s/veh	19.2	0.0	3.0	22.4	2.7	0.4	34.8	0.0	35.4	34.5	0.0	27.3
Incr Delay (d2), s/veh	0.0	0.0	10.9	0.0	12.2	0.8	0.2	0.0	5.1	35.7	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.7	0.0	14.3	0.5	13.5	0.8	2.6	0.0	8.4	14.8	0.0	6.2
LnGrp Delay(d),s/veh	19.2	0.0	13.9	22.4	15.0	1.2	34.9	0.0	40.4	70.1	0.0	28.0
LnGrp LOS	B		B	C	B	A	C		D	E		C
Approach Vol, veh/h		739			913			252			441	
Approach Delay, s/veh		14.1			11.8			39.2			55.1	
Approach LOS		B			B			D			E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.0	21.8	13.2	55.0	9.3	30.5	13.2	55.0				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	13.0	20.0	5.0	50.0	5.0	28.0	5.0	50.0				
Max Q Clear Time (g_c+I1), s	15.0	13.6	2.0	24.0	5.2	9.9	2.0	18.1				
Green Ext Time (p_c), s	0.0	0.6	0.0	8.0	0.0	0.9	0.0	4.3				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			23.6									
HCM 2010 LOS			C									

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↕↕		↔
Traffic Vol, veh/h	984	38	25	904	0	36
Future Vol, veh/h	984	38	25	904	0	36
Conflicting Peds, #/hr	0	20	20	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1036	40	26	952	0	38

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1096	0	- 1076
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	4.13	-	- 6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	2.219	-	- 3.319
Pot Cap-1 Maneuver	-	-	635	-	0 266
Stage 1	-	-	-	-	0 -
Stage 2	-	-	-	-	0 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	624	-	- 262
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	21.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	262	-	-	624	-
HCM Lane V/C Ratio	0.145	-	-	0.042	-
HCM Control Delay (s)	21.1	-	-	11	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Timings  
4: 166 Ave NE & Redmond Way

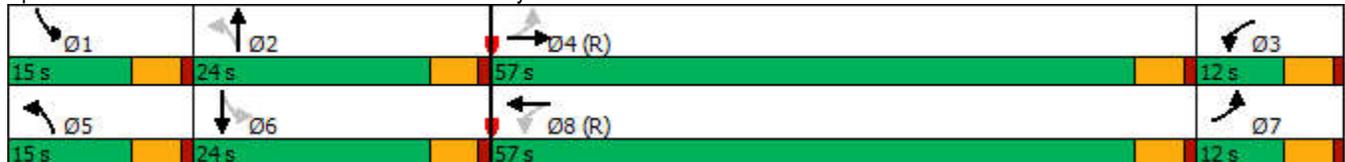


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	80	849	48	791	45	273	142	106
Future Volume (vph)	80	849	48	791	45	273	142	106
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	10.0	5.0	5.0	5.0	5.0
Minimum Split (s)	12.0	23.0	12.0	23.0	15.0	24.0	15.0	24.0
Total Split (s)	12.0	57.0	12.0	57.0	15.0	24.0	15.0	24.0
Total Split (%)	11.1%	52.8%	11.1%	52.8%	13.9%	22.2%	13.9%	22.2%
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	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	C-Max	None	C-Max	None	None	None	None
Act Effct Green (s)	60.7	54.6	60.7	54.6	26.7	19.0	32.4	23.8
Actuated g/C Ratio	0.56	0.51	0.56	0.51	0.25	0.18	0.30	0.22
v/c Ratio	0.31	1.17	0.37	0.60	0.17	1.12	0.71	0.57
Control Delay	15.2	110.2	27.9	16.8	22.1	123.2	48.5	39.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.2	110.2	27.9	16.8	22.1	123.2	48.5	39.7
LOS	B	F	C	B	C	F	D	D
Approach Delay		102.7		17.4		110.7		43.3
Approach LOS		F		B		F		D

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 64 (59%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 140  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.17  
 Intersection Signal Delay: 66.1  
 Intersection LOS: E  
 Intersection Capacity Utilization 104.7%  
 ICU Level of Service G  
 Analysis Period (min) 15

Splits and Phases: 4: 166 Ave NE & Redmond Way



HCM 2010 Signalized Intersection Summary  
4: 166 Ave NE & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	849	91	48	791	99	45	273	45	142	106	91
Future Volume (veh/h)	80	849	91	48	791	99	45	273	45	142	106	91
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	0.98		0.96	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1710	1710	1660	1660	1710	1710	1710	1710	1676	1676	1710
Adj Flow Rate, veh/h	84	894	96	51	833	104	47	287	47	149	112	96
Adj No. of Lanes	1	1	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	3	3	3	0	0	0	2	2	2
Cap, veh/h	319	730	78	172	1356	169	242	250	41	212	192	164
Arrive On Green	0.09	0.64	0.64	0.07	0.48	0.48	0.07	0.35	0.35	0.09	0.23	0.23
Sat Flow, veh/h	1629	1516	163	1581	2817	352	1629	1424	233	1597	827	708
Grp Volume(v), veh/h	84	0	990	51	466	471	47	0	334	149	0	208
Grp Sat Flow(s),veh/h/ln	1629	0	1678	1581	1577	1592	1629	0	1657	1597	0	1535
Q Serve(g_s), s	0.0	0.0	52.0	0.0	23.5	23.5	2.5	0.0	19.0	7.9	0.0	13.0
Cycle Q Clear(g_c), s	0.0	0.0	52.0	0.0	23.5	23.5	2.5	0.0	19.0	7.9	0.0	13.0
Prop In Lane	1.00		0.10	1.00		0.22	1.00		0.14	1.00		0.46
Lane Grp Cap(c), veh/h	319	0	808	172	759	766	242	0	291	212	0	356
V/C Ratio(X)	0.26	0.00	1.23	0.30	0.61	0.61	0.19	0.00	1.15	0.70	0.00	0.58
Avail Cap(c_a), veh/h	319	0	808	172	759	766	335	0	291	215	0	356
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.94	0.94	0.94	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.8	0.0	19.4	47.1	20.6	20.6	33.6	0.0	35.0	32.4	0.0	36.8
Incr Delay (d2), s/veh	0.4	0.0	112.3	0.9	3.5	3.5	0.4	0.0	98.2	9.8	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.6	0.0	87.9	2.6	16.2	16.4	2.0	0.0	29.7	7.3	0.0	9.6
LnGrp Delay(d),s/veh	28.3	0.0	131.7	48.0	24.1	24.1	34.0	0.0	133.2	42.2	0.0	39.0
LnGrp LOS	C		F	D	C	C	C		F	D		D
Approach Vol, veh/h		1074			988			381			357	
Approach Delay, s/veh		123.6			25.3			120.9			40.3	
Approach LOS		F			C			F			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.8	24.0	12.2	57.0	8.8	30.1	12.2	57.0				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	10.0	19.0	7.0	52.0	10.0	19.0	7.0	52.0				
Max Q Clear Time (g_c+I1), s	9.9	21.0	2.0	54.0	4.5	15.0	2.0	25.5				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.1	0.2	0.1	18.5				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				77.9								
HCM 2010 LOS				E								
<b>Notes</b>												

Timings  
5: Cleveland St/168 Ave NE & Redmond Way

Redmond Square  
04/03/2020

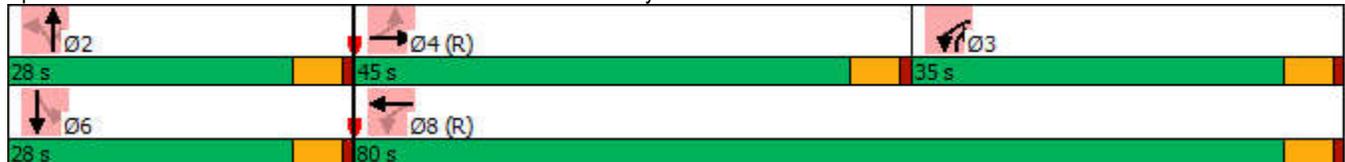


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↖	↕	↖	↕		↕	↗		↕
Traffic Volume (vph)	30	1006	171	924	9	39	525	13	1
Future Volume (vph)	30	1006	171	924	9	39	525	13	1
Turn Type	Perm	NA	pm+pt	NA	Perm	NA	pm+ov	Perm	NA
Protected Phases		4	3	8		2	3		6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	4 3	8	2	2	3	6	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	12.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	14.0	21.0	28.0	28.0	14.0	28.0	28.0
Total Split (s)	45.0	45.0	35.0	80.0	28.0	28.0	35.0	28.0	28.0
Total Split (%)	41.7%	41.7%	32.4%	74.1%	25.9%	25.9%	32.4%	25.9%	25.9%
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
Total Lost Time (s)	5.0	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	C-Max	None	C-Max	None	None	None	None	None
Act Effct Green (s)	56.4	56.4	91.4	92.4		8.7	37.6		8.7
Actuated g/C Ratio	0.52	0.52	0.85	0.86		0.08	0.35		0.08
v/c Ratio	0.13	0.62	0.27	0.35		0.38	1.04		0.35
Control Delay	7.7	9.9	3.7	1.7		52.2	77.1		27.8
Queue Delay	0.0	0.1	0.0	0.2		0.0	0.0		0.0
Total Delay	7.7	10.0	3.8	1.9		52.2	77.1		27.8
LOS	A	B	A	A		D	E		C
Approach Delay		9.9		2.2		75.0			27.8
Approach LOS		A		A		E			C

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 100 (93%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 1.04  
 Intersection Signal Delay: 20.5  
 Intersection Capacity Utilization 91.3%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service F

Splits and Phases: 5: Cleveland St/168 Ave NE & Redmond Way



HCM 2010 Signalized Intersection Summary  
5: Cleveland St/168 Ave NE & Redmond Way

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	1006	5	171	924	25	9	39	525	13	1	34
Future Volume (veh/h)	30	1006	5	171	924	25	9	39	525	13	1	34
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	1.00		0.99	0.97		0.96	0.98		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1676	1676	1710	1693	1693	1710	1710	1710	1710	1710	1710	1710
Adj Flow Rate, veh/h	31	1027	5	174	943	26	9	40	536	13	1	35
Adj No. of Lanes	1	2	0	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	1	1	1	0	0	0	0	0	0
Cap, veh/h	258	1204	6	705	2524	70	56	178	707	65	20	107
Arrive On Green	0.49	0.49	0.49	0.75	1.00	1.00	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	517	3250	16	1612	3197	88	144	1507	1398	190	172	905
Grp Volume(v), veh/h	31	503	529	174	474	495	49	0	536	49	0	0
Grp Sat Flow(s),veh/h/ln	517	1593	1673	1612	1608	1677	1651	0	1398	1267	0	0
Q Serve(g_s), s	3.6	29.9	29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.6	29.9	29.9	0.0	0.0	0.0	2.8	0.0	0.0	3.3	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.05	0.18		1.00	0.27		0.71
Lane Grp Cap(c), veh/h	258	590	620	705	1270	1323	234	0	707	192	0	0
V/C Ratio(X)	0.12	0.85	0.85	0.25	0.37	0.37	0.21	0.00	0.76	0.26	0.00	0.00
Avail Cap(c_a), veh/h	258	590	620	705	1270	1323	385	0	840	300	0	0
HCM Platoon Ratio	1.33	1.33	1.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.89	0.89	0.89	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.2	24.8	24.8	7.8	0.0	0.0	43.2	0.0	22.2	43.5	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.6	1.5	0.2	0.7	0.7	0.4	0.0	3.4	0.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.9	15.1	15.8	2.4	0.5	0.5	2.5	0.0	19.5	2.5	0.0	0.0
LnGrp Delay(d),s/veh	18.2	26.4	26.3	7.9	0.7	0.7	43.7	0.0	25.5	44.1	0.0	0.0
LnGrp LOS	B	C	C	A	A	A	D		C	D		
Approach Vol, veh/h		1063			1143			585			49	
Approach Delay, s/veh		26.1			1.8			27.1			44.1	
Approach LOS		C			A			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		17.7	45.3	45.0		17.7		90.3				
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0		5.0				
Max Green Setting (Gmax), s		23.0	30.0	40.0		23.0		75.0				
Max Q Clear Time (g_c+I1), s		4.8	2.0	31.9		5.3		2.0				
Green Ext Time (p_c), s		2.0	0.7	3.3		0.1		4.7				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				16.8								
HCM 2010 LOS				B								

Timings  
6: Leary Way & Cleveland St

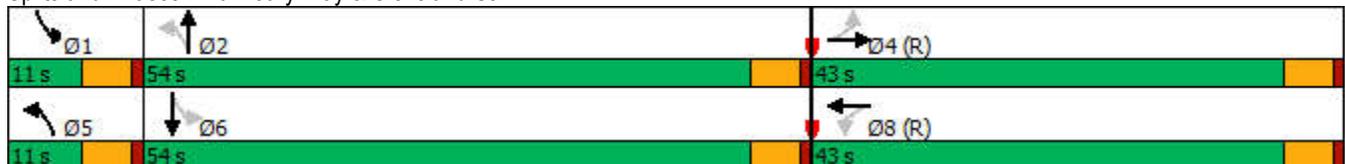


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↔		↔	↖	↗	↖	↗
Traffic Volume (vph)	10	310	65	174	46	400	12	217
Future Volume (vph)	10	310	65	174	46	400	12	217
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	5.0	5.0	5.0	4.0	5.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	11.0	22.0	11.0	22.0
Total Split (s)	43.0	43.0	43.0	43.0	11.0	54.0	11.0	54.0
Total Split (%)	39.8%	39.8%	39.8%	39.8%	10.2%	50.0%	10.2%	50.0%
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
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	Ped	None	Ped
Act Effct Green (s)		52.3		52.3	44.7	43.5	41.6	36.9
Actuated g/C Ratio		0.48		0.48	0.41	0.40	0.39	0.34
v/c Ratio		0.51		0.42	0.15	0.89	0.07	0.48
Control Delay		15.6		17.6	16.5	45.7	9.4	18.3
Queue Delay		0.0		0.0	0.0	2.3	0.0	0.3
Total Delay		15.6		17.6	16.5	48.0	9.4	18.5
LOS		B		B	B	D	A	B
Approach Delay		15.6		17.6		45.4		18.1
Approach LOS		B		B		D		B

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 93 (86%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.89  
 Intersection Signal Delay: 28.4  
 Intersection Capacity Utilization 90.7%  
 Analysis Period (min) 15  
 Intersection LOS: C  
 ICU Level of Service E

Splits and Phases: 6: Leary Way & Cleveland St



HCM 2010 Signalized Intersection Summary  
6: Leary Way & Cleveland St

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	310	47	65	174	9	46	400	128	12	217	7
Future Volume (veh/h)	10	310	47	65	174	9	46	400	128	12	217	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.96	0.99		0.94	0.98		0.94	1.00		0.94
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90
Adj Sat Flow, veh/h/ln	1710	1710	1710	1710	1710	1710	1693	1693	1710	1693	1693	1710
Adj Flow Rate, veh/h	11	344	52	72	193	10	51	444	142	13	241	8
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	42	650	96	187	473	23	429	472	151	118	539	18
Arrive On Green	0.91	0.91	0.91	0.91	0.91	0.91	0.04	0.39	0.39	0.03	0.74	0.74
Sat Flow, veh/h	17	1424	211	317	1037	51	1612	1210	387	1612	1463	49
Grp Volume(v), veh/h	407	0	0	275	0	0	51	0	586	13	0	249
Grp Sat Flow(s),veh/h/ln	1652	0	0	1405	0	0	1612	0	1597	1612	0	1511
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	38.2	0.5	0.0	7.0
Cycle Q Clear(g_c), s	4.5	0.0	0.0	2.3	0.0	0.0	2.1	0.0	38.2	0.5	0.0	7.0
Prop In Lane	0.03		0.13	0.26		0.04	1.00		0.24	1.00		0.03
Lane Grp Cap(c), veh/h	788	0	0	683	0	0	429	0	623	118	0	557
V/C Ratio(X)	0.52	0.00	0.00	0.40	0.00	0.00	0.12	0.00	0.94	0.11	0.00	0.45
Avail Cap(c_a), veh/h	788	0	0	683	0	0	460	0	725	183	0	686
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.75	0.00	0.00	0.97	0.00	0.00	1.00	0.00	1.00	0.78	0.00	0.78
Uniform Delay (d), s/veh	2.8	0.0	0.0	2.7	0.0	0.0	20.0	0.0	31.8	26.4	0.0	9.9
Incr Delay (d2), s/veh	1.8	0.0	0.0	1.7	0.0	0.0	0.1	0.0	18.9	0.3	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.9	0.0	0.0	2.2	0.0	0.0	1.7	0.0	27.4	0.4	0.0	5.1
LnGrp Delay(d),s/veh	4.6	0.0	0.0	4.4	0.0	0.0	20.1	0.0	50.7	26.7	0.0	10.3
LnGrp LOS	A			A			C		D	C		B
Approach Vol, veh/h		407			275			637				262
Approach Delay, s/veh		4.6			4.4			48.2				11.1
Approach LOS		A			A			D				B
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	47.1		54.3	8.9	44.8		54.3				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	49.0		38.0	6.0	49.0		38.0				
Max Q Clear Time (g_c+I1), s	2.5	40.2		6.5	4.1	9.0		4.3				
Green Ext Time (p_c), s	0.0	1.9		1.8	0.0	1.0		1.3				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				23.2								
HCM 2010 LOS				C								

Timings  
7: 164 Ave NE & Cleveland St

Redmond Square  
04/03/2020

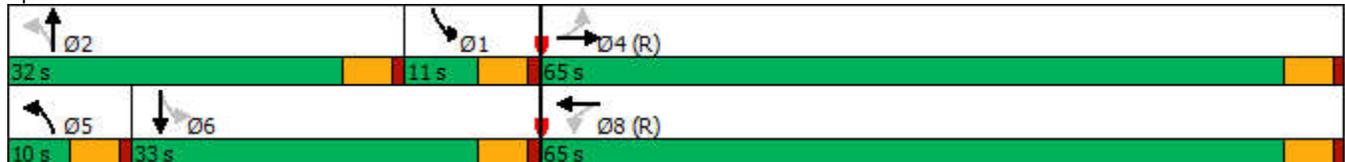


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations		↕		↕	↖	↗	↖	↗
Traffic Volume (vph)	17	422	7	211	24	197	40	101
Future Volume (vph)	17	422	7	211	24	197	40	101
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	6.0	6.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.0	22.0	22.0	22.0	10.0	20.0	11.0	20.0
Total Split (s)	65.0	65.0	65.0	65.0	10.0	32.0	11.0	33.0
Total Split (%)	60.2%	60.2%	60.2%	60.2%	9.3%	29.6%	10.2%	30.6%
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
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?								
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None	None	None
Act Effct Green (s)		70.9		70.9	20.8	20.8	23.3	21.1
Actuated g/C Ratio		0.66		0.66	0.19	0.19	0.22	0.20
v/c Ratio		0.53		0.27	0.14	0.78	0.19	0.38
Control Delay		7.5		8.2	34.9	56.0	15.7	17.1
Queue Delay		0.1		0.0	0.0	0.0	0.0	0.0
Total Delay		7.5		8.2	34.9	56.0	15.7	17.1
LOS		A		A	C	E	B	B
Approach Delay		7.5		8.2		54.0		16.7
Approach LOS		A		A		D		B

Intersection Summary

Cycle Length: 108  
 Actuated Cycle Length: 108  
 Offset: 82 (76%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 19.4  
 Intersection Capacity Utilization 67.5%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service C

Splits and Phases: 7: 164 Ave NE & Cleveland St



HCM 2010 Signalized Intersection Summary  
7: 164 Ave NE & Cleveland St

Redmond Square  
04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	422	45	7	211	33	24	197	37	40	101	16
Future Volume (veh/h)	17	422	45	7	211	33	24	197	37	40	101	16
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	0.99		0.98	0.95		0.94	0.95		0.95
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1710	1710	1710	1710	1710	1693	1693	1710	1676	1676	1710
Adj Flow Rate, veh/h	18	449	48	7	224	35	26	210	39	43	107	17
Adj No. of Lanes	0	1	0	0	1	0	1	1	0	1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	2	2	2
Cap, veh/h	50	871	91	43	835	128	156	238	44	126	255	40
Arrive On Green	1.00	1.00	1.00	1.00	1.00	1.00	0.03	0.17	0.17	0.07	0.36	0.36
Sat Flow, veh/h	24	1331	139	14	1276	195	1612	1374	255	1597	1400	222
Grp Volume(v), veh/h	515	0	0	266	0	0	26	0	249	43	0	124
Grp Sat Flow(s),veh/h/ln	1495	0	0	1485	0	0	1612	0	1630	1597	0	1622
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	16.1	0.0	0.0	6.2
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	16.1	0.0	0.0	6.2
Prop In Lane	0.03		0.09	0.03		0.13	1.00		0.16	1.00		0.14
Lane Grp Cap(c), veh/h	1012	0	0	1006	0	0	156	0	283	126	0	295
V/C Ratio(X)	0.51	0.00	0.00	0.26	0.00	0.00	0.17	0.00	0.88	0.34	0.00	0.42
Avail Cap(c_a), veh/h	1012	0	0	1006	0	0	190	0	407	161	0	421
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	0.86	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.95	0.00	0.95
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	40.4	0.0	43.5	48.6	0.0	30.1
Incr Delay (d2), s/veh	1.6	0.0	0.0	0.6	0.0	0.0	0.5	0.0	14.5	1.5	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.8	0.0	0.0	0.3	0.0	0.0	1.2	0.0	13.2	2.3	0.0	5.1
LnGrp Delay(d),s/veh	1.6	0.0	0.0	0.6	0.0	0.0	40.9	0.0	58.0	50.2	0.0	31.0
LnGrp LOS	A			A			D		E	D		C
Approach Vol, veh/h		515			266			275			167	
Approach Delay, s/veh		1.6			0.6			56.4			35.9	
Approach LOS		A			A			E			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.6	23.7		75.6	7.7	24.6		75.6				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	27.0		60.0	5.0	28.0		60.0				
Max Q Clear Time (g_c+I1), s	2.0	18.1		2.0	3.5	8.2		2.0				
Green Ext Time (p_c), s	0.0	0.6		2.4	0.0	0.4		1.1				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			18.4									
HCM 2010 LOS			B									

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑			↑
Traffic Vol, veh/h	0	500	223	52	0	29
Future Vol, veh/h	0	500	223	52	0	29
Conflicting Peds, #/hr	23	0	0	23	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	532	237	55	0	31

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	-	0	-	0	288
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.2
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	-	0 756
Stage 1	0	-	-	-	0 -
Stage 2	0	-	-	-	0 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	742
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	742
HCM Lane V/C Ratio	-	-	-	0.042
HCM Control Delay (s)	-	-	-	10.1
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1



HCM 2010 Signalized Intersection Summary  
 9: 166 Ave NE & Cleveland St

Redmond Square  
 04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	368	38	23	146	21	35	252	165	27	92	93
Future Volume (veh/h)	94	368	38	23	146	21	35	252	165	27	92	93
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	1.00		0.99	0.98		1.00	0.98		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1676	1676	1710	1710	1710	1693	1693	1693	1660	1660	1710
Adj Flow Rate, veh/h	99	387	40	24	154	22	37	265	0	28	97	98
Adj No. of Lanes	0	1	1	0	1	0	1	1	1	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	0	0	0	1	1	1	3	3	3
Cap, veh/h	213	754	806	136	742	99	276	409	348	232	180	182
Arrive On Green	0.38	0.38	0.38	0.57	0.57	0.57	0.24	0.24	0.00	0.32	0.32	0.32
Sat Flow, veh/h	231	1315	1406	107	1295	173	1055	1693	1439	974	746	753
Grp Volume(v), veh/h	486	0	40	200	0	0	37	265	0	28	0	195
Grp Sat Flow(s),veh/h/ln	1547	0	1406	1575	0	0	1055	1693	1439	974	0	1499
Q Serve(g_s), s	5.0	0.0	1.0	0.0	0.0	0.0	1.7	7.6	0.0	1.4	0.0	5.8
Cycle Q Clear(g_c), s	12.6	0.0	1.0	3.1	0.0	0.0	7.5	7.6	0.0	9.0	0.0	5.8
Prop In Lane	0.20		1.00	0.12		0.11	1.00		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	967	0	806	977	0	0	276	409	348	232	0	362
V/C Ratio(X)	0.50	0.00	0.05	0.20	0.00	0.00	0.13	0.65	0.00	0.12	0.00	0.54
Avail Cap(c_a), veh/h	967	0	806	977	0	0	353	533	453	303	0	472
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(l)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.9	0.0	7.4	5.6	0.0	0.0	20.9	18.4	0.0	20.4	0.0	15.8
Incr Delay (d2), s/veh	1.9	0.0	0.1	0.5	0.0	0.0	0.8	6.1	0.0	0.8	0.0	4.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.1	0.0	0.7	2.8	0.0	0.0	1.0	7.6	0.0	0.8	0.0	5.0
LnGrp Delay(d),s/veh	12.7	0.0	7.5	6.1	0.0	0.0	21.7	24.5	0.0	21.2	0.0	20.3
LnGrp LOS	B		A	A			C	C		C		C
Approach Vol, veh/h		526			200			302			223	
Approach Delay, s/veh		12.3			6.1			24.2			20.4	
Approach LOS		B			A			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		18.1		35.9		18.1		35.9				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		17.0		27.0		17.0		27.0				
Max Q Clear Time (g_c+I1), s		9.6		14.6		11.0		5.1				
Green Ext Time (p_c), s		1.7		4.7		1.0		2.1				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			15.6									
HCM 2010 LOS			B									

Intersection						
Int Delay, s/veh	2.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	51	50	312	161	84
Future Vol, veh/h	51	51	50	312	161	84
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	25	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	2	2	0
Mvmt Flow	54	54	53	328	169	88

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	647	213	257	0	0
Stage 1	213	-	-	-	-
Stage 2	434	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-
Pot Cap-1 Maneuver	439	832	1320	-	-
Stage 1	827	-	-	-	-
Stage 2	658	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	421	832	1320	-	-
Mov Cap-2 Maneuver	421	-	-	-	-
Stage 1	794	-	-	-	-
Stage 2	658	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	1.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1320	-	559	-	-
HCM Lane V/C Ratio	0.04	-	0.192	-	-
HCM Control Delay (s)	7.8	-	13	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.7	-	-

HCM 2010 Signalized Intersection Summary - VOLUME SHIFT  
 4: 166 Ave NE & Redmond Way

Redmond Square  
 04/03/2020

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	700	91	48	791	99	45	273	45	142	106	91
Future Volume (veh/h)	80	700	91	48	791	99	45	273	45	142	106	91
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	0.98		0.96	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1710	1710	1710	1660	1660	1710	1710	1710	1710	1676	1676	1710
Adj Flow Rate, veh/h	84	737	96	51	833	104	47	287	47	149	112	96
Adj No. of Lanes	1	1	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	3	3	3	0	0	0	2	2	2
Cap, veh/h	319	712	93	172	1356	169	242	250	41	212	192	164
Arrive On Green	0.09	0.64	0.64	0.07	0.48	0.48	0.07	0.35	0.35	0.09	0.23	0.23
Sat Flow, veh/h	1629	1480	193	1581	2817	352	1629	1424	233	1597	827	708
Grp Volume(v), veh/h	84	0	833	51	466	471	47	0	334	149	0	208
Grp Sat Flow(s),veh/h/ln	1629	0	1672	1581	1577	1592	1629	0	1657	1597	0	1535
Q Serve(g_s), s	0.0	0.0	52.0	0.0	23.5	23.5	2.5	0.0	19.0	7.9	0.0	13.0
Cycle Q Clear(g_c), s	0.0	0.0	52.0	0.0	23.5	23.5	2.5	0.0	19.0	7.9	0.0	13.0
Prop In Lane	1.00		0.12	1.00		0.22	1.00		0.14	1.00		0.46
Lane Grp Cap(c), veh/h	319	0	805	172	759	766	242	0	291	212	0	356
V/C Ratio(X)	0.26	0.00	1.03	0.30	0.61	0.61	0.19	0.00	1.15	0.70	0.00	0.58
Avail Cap(c_a), veh/h	319	0	805	172	759	766	335	0	291	215	0	356
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.94	0.94	0.94	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.8	0.0	19.4	47.1	20.6	20.6	33.6	0.0	35.0	32.4	0.0	36.8
Incr Delay (d2), s/veh	0.4	0.0	40.9	0.9	3.5	3.5	0.4	0.0	98.2	9.8	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.6	0.0	58.9	2.6	16.2	16.4	2.0	0.0	29.7	7.3	0.0	9.6
LnGrp Delay(d),s/veh	28.3	0.0	60.4	48.0	24.1	24.1	34.0	0.0	133.2	42.2	0.0	39.0
LnGrp LOS	C		F	D	C	C	C		F	D		D
Approach Vol, veh/h		917			988			381			357	
Approach Delay, s/veh		57.4			25.3			120.9			40.3	
Approach LOS		E			C			F			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.8	24.0	12.2	57.0	8.8	30.1	12.2	57.0				
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	10.0	19.0	7.0	52.0	10.0	19.0	7.0	52.0				
Max Q Clear Time (g_c+I1), s	9.9	21.0	2.0	54.0	4.5	15.0	2.0	25.5				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.1	0.2	0.1	18.5				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			52.3									
HCM 2010 LOS			D									
<b>Notes</b>												

## Driveway Deviation



8250 - 165th Avenue NE  
Suite 100  
Redmond, WA 98052-6628  
T 425-883-4134  
F 425-867-0898  
www.tsinw.com

April 9, 2019

Min Luo, PE, PTOE, PTP  
Senior Engineer, Transportation  
City of Redmond Planning & Community Development  
15670 NE 85<sup>th</sup> St  
Redmond, WA 98052

Subject: Redmond Square – Cleveland St and 166th Ave NE Site Accesses Deviations  
16563 Redmond Way and 16425 Cleveland St

Dear Ms. Luo,

This letter requests a deviation from the City of Redmond's minimum driveway spacing standard for maintaining the use of the two existing curb cuts currently serving the property on Cleveland St and on 166th Ave NE. An overall site plan for Redmond Square is included as Figure 1.

The Project's West Access on Cleveland St is a shared driveway, proposed to serve the Project's Building A. The West Access is proposed approximately 50 feet from the westbound stop bar at 164th Ave NE. An existing easement between the Project and the adjacent and adjoining Key Bank property, allows Key Bank continued use of this driveway with the Project. The West Access will provide the only ingress to the Key Bank site.

The Project's East Access on 166th Ave NE is at an existing midblock location between Redmond Way and Cleveland St. The driveway is approximately 130 feet north of Cleveland St and 110 feet south of Redmond Way. Existing driveways on the east side of 166th Ave NE serve the adjacent commercial property and are also within 150 feet of the East Access.

Both the West Access and East Access do not meet the City of Redmond Zoning Code's driveway spacing requirement, and a deviation from this standard is required.

### Standard

Redmond Zoning Code (RMC 21), Appendix 2.D.4.b states:

The City shall not permit any driveway within 150 feet of the nearside face of the curb of the intersecting street or from any other such driveway. In the event it is either impossible or undesirable to separate by 150 feet, then driveways shall be located as far away from the nearside of curb of the intersecting street or any other such driveway. Separations less than 150 feet shall obtain approval from the Technical Committee. This separation requirement shall not typically be applied to the distance between single-family driveways on local streets.

Figure 2 shows West Access and East Access and their proximity to adjacent intersections.

### Project Summary

The Applicant proposes to develop the site into a West Block and an East Block separated by a pedestrian plaza between Redmond Way and Cleveland St. The West Block includes Building A and the East Block includes Buildings B and C. Table 1 summarizes the development plan.

**Table 1: Development Plan**

<b>Building</b>	<b>West Bldg. A</b>	<b>East Bldg. B</b>	<b>East Bldg. C</b>
Multifamily (dwelling units)	300	145	142
Commercial/Retail (sq. ft.)	4,978	3,117	13,000
Restaurant (sq. ft.)	3,184	3,577	1,258

Onsite parking areas for each development block are not connected. Full build-out is anticipated by 2024.

## Setting

In downtown Redmond the speed limit is 30-mph. Roadways surrounding the site are described below:

- Redmond Way is classified as a Minor Arterial. Between 166th Ave NE and 164th Ave NE Redmond Way is part of the SR 202 corridor. Redmond Way’s includes two westbound travel lanes, a center-turn lane, one eastbound travel lane and parallel parking on both sides of the road. The year 2018 Average Daily Traffic (ADT) volume on Redmond Way between 164th Ave NE and 166th Ave NE is estimated at 15,000 vehicles per day.
- Cleveland St is classified as a Collector Arterial and includes one travel lane east in the eastbound and westbound directions and parallel parking on both sides of the roadway. The year 2018 ADT volume on Cleveland St between 164th Ave NE and 166th Ave NE is estimated at 5,500 vehicles per day.
- 166th Ave NE is classified as a Collector Arterial and includes one travel lane northbound, a center lane with back-to-back left turn pockets at Redmond Way and Cleveland St and one travel lane southbound. The year 2018 ADT volume on 166th Ave NE between 164th Ave NE and 166th Ave NE is estimated at 3,850 vehicles per day.
- 164th Ave NE is classified as a Minor Arterial and includes one travel lane northbound, a center lane with back-to-back left-turn pockets at Redmond Way and Cleveland St, one travel lane southbound, and short segments of on-street parallel parking on both sides of the road.

## West Access / Cleveland St – West Block – Building A

The West Access is proposed at an existing driveway, located approximately 50 feet east of 164th Ave NE on Cleveland St. Figure 2 shows the proposed driveway and its offset from the 164th Ave NE, measured from the westbound stop bar on Cleveland St to the edge of the driveway apron. The West Access is over 250 feet from the near-side edge of the proposed pedestrian plaza and there are no conflicting driveways on Cleveland St within 250 feet east of this access.

Key Bank has an easement for continued use of this driveway. Without revising the onsite parking and traffic circulation on the adjacent Key Bank property, the West Access would provide the only ingress to Key Bank. Figure 3 shows the Key Bank property layout in reference to the West Access.

Figure 4 illustrates the stopping and entering sight distance triangles associated with the West Access. The graphic depicts the sight triangle along Cleveland St based on a 40-mph design speed. For reference, the speed limit in downtown Redmond is 30-mph. From the AASHTO Green Book, the stopping sight distance standard is 305 feet and the entering sight distance standard is 445 feet. There are no sightline impediments at the proposed driveway and the West Access meets the sight distance standards.

Crash records, provided by the WSDOT, between January 1, 2013 and December 31, 2017, showed 24 crashes during a five-year period on Cleveland St between 164th Ave NE and 166th Ave NE. The data showed:

- 42% of the reported crashes were “sideswipe”, typical for multi-lanes of travel in a same direction.
- 33% of the reported crashes were related to left-turn movements from driveways.

Through much of 2017, Cleveland St was oriented for one-way eastbound traffic flow and Redmond Way was oriented for one-way westbound traffic flow. More recently both Redmond Way and Cleveland St were reoriented for two-way traffic flow. On Cleveland St, the one-lane eastbound and one-way westbound circulation orientation reduces the potential for same direction and sideswipe crashes.

Left turn related crashes will be mitigated with the Project. The West Access is proposed to be restricted to right-turns in and out, with sloped mountable curb on Cleveland Street to prohibit left turn movements. Furthermore, with the Project, the two other existing driveways on the north side of Cleveland St will be removed and replaced by a pedestrian plaza more central to the existing superblock.

The West Access allows the Applicant to utilize an existing break in the pedestrian travel-way and negate the need for a new vehicle break in the sidewalk on Cleveland St. As noted above, other than the proposed pedestrian plaza, other existing accesses on Cleveland St to Redmond Square are removed.

With two-way traffic flow on Cleveland St, the City of Redmond identified a deficiency for large vehicles and buses making a northbound to eastbound right from 164th Ave NE to Cleveland St. To mitigate this non-Project deficiency, support transit activity on Cleveland St resulting from the Light Rail Station, the City of Redmond staff identified a need to adjust the curb at the southeast corner of Cleveland St / 164th Ave NE so that right-turn vehicles would not encroach over the centerline on Cleveland St.

The Applicant has property rights to the land parcel at the southeast corner of Cleveland St / 164th Ave NE. Redevelopment of this parcel is not part of this Project. To accommodate large vehicles and buses and to minimize their impacts on the West Access, the Applicant is proposing to facilitate an improvement to the southeast corner of the intersection, to include a “pork chop” island for northbound to eastbound right turns. A conceptual design for the proposed improvement is attached. The proposed concept would be designed to accommodate large vehicles and buses.

Concurrent with the proposed intersection improvement, the Applicant is proposing to restrict the West Access to right-in and right-out vehicle movements only and to design the access to Project vehicles.

In conclusion, a deviation from the City of Redmond’s driveway location standards is reasonable for the West Access because:

- The access would be restricted to right-in and right-out movements only.
- The Applicant will facilitate an improvement at the Cleveland St / 164th Ave intersection to allow northbound to eastbound vehicle movements to not need to cross the centerline of Cleveland Street to complete their right-turn maneuver.
- The proposed West Access would retain an existing break in the pedestrian network and the Applicant is not proposing any new break in the pedestrian network on Cleveland St except for the proposed pedestrian plaza.
- The crash history is no significant, considering the current two-way traffic circulation on Cleveland St and the proposed removal of two existing curb cuts on Cleveland St.
- The West Access has adequate stopping and entering sight distance.

*Deviation Review of Criteria – Cleveland St Driveway – West Block – Building A*

**Table 2: Cleveland St Driveway – West Block – Building A – Deviation Criteria**

<b>City of Redmond Deviation Criteria<sup>1</sup></b>	<b>Assessment</b>
The deviation produces a compensating or comparable result, which is in the public interest.	Driveway location maintains the existing pedestrian travel ways on Cleveland St. The driveway also continues to support access to the Key Bank property.
The deviation meets requirements for safety, public health, function, fire protection, transit needs, appearance, and maintainability in any other criteria deemed by the city.	Impacts to public health, function, fire protection, transit needs, appearance and maintainability are not anticipated. Retaining the existing driveway location maintains the current curb-cut and no new conflict points are created. By restricting the driveway to right-in/right-out left turn conflicts are eliminated. Vehicle queues would be onsite, on private property. The driveway also reduces the draw for vehicles to use the woonerf to access the site.
The deviation provides substantially equivalent (or improved) environmental protection as would be provided if the standard requirements were met.	There are no environmental impacts identified.
The deviation needs to reflect sound engineering practices.	City of Redmond sight distance triangle standards are satisfied at the driveway. Modification to the southeast corner of Cleveland St / 166th Ave NE physically improve transit and single-unit truck northbound right turn movements onto Cleveland St.
The deviation needs to avoid damage to other properties in the vicinity of and downstream of the proposal.	The request does not impact adjacent properties. The driveway would retain the shared-use easement for the adjoining Key Bank property.
Any deviation from the Standards that does not meet the Fire Code will require concurrence by the City Fire Marshal.	No deviation from the Fire Code is requested.

<sup>1</sup>Source: City of Redmond Procedures for Requesting and Approving Administrative Engineering Deviation Requests

**East Access / 166th Ave – East Block – Buildings B and C**

The East Access is proposed at an existing driveway, located roughly midblock on 166th Ave NE between Redmond Way and Cleveland St. The driveway is approximately 130 feet north of Cleveland St and 110 feet south of Redmond Way (see Figure 2).

Development leasing restrictions do not allow the parking areas for both Project Block to be connected.

The stopping and entering sight distance standards along 166th Ave NE were evaluated based on a 40-mph design speed. For reference, the speed limit in downtown Redmond is 30-mph. The stopping sight distance standard is 305 feet and the entering sight distance standard is 445 feet. There are no sightline impediments at the proposed driveway and the East Access meets the City of Redmond standards (see Figure 4).

Crash records, provided by the WSDOT, between January 1, 2013 and December 31, 2017, showed only one crash during this period on 166th Ave NE between Redmond Way and Cleveland St. In 2016, there was an incident involving a vehicle leaving the north driveway on the east side of 166th Ave NE and a vehicle traveling southbound on 166th Ave NE. Only property damage was reported. There were no historical crash trends on 166th Ave NE that suggest the proposed site access location would adversely contribute to.

The 166th Ave NE driveway location is reasonable to support access to and from the East Block of the proposed development and a deviation from the City of Redmond’s driveway location standards is reasonable.

*Deviation Review of Criteria – 164th Ave NE Driveway – East Block – Buildings B and C*

**Table 3: 166th Ave NE Driveway – East Block – Buildings B and C– Deviation Criteria**

<b>City of Redmond Deviation Criteria<sup>1</sup></b>	<b>Assessment</b>
The deviation produces a compensating or comparable result, which is in the public interest.	Driveway location maintains the existing pedestrian travel ways on 166th Ave NE.
The deviation meets requirements for safety, public health, function, fire protection, transit needs, appearance, and maintainability in any other criteria deemed by the city.	Impacts to safety, public health, function, fire protection, transit needs, appearance and maintainability are not anticipated.
The deviation provides substantially equivalent (or improved) environmental protection as would be provided if the standard requirements were met.	There are no environmental impacts identified.
The deviation needs to reflect sound engineering practices.	City of Redmond sight distance triangle standards are satisfied at the driveway.
The deviation needs to avoid damage to other properties in the vicinity of and downstream of the proposal.	The request does not impact adjacent properties.
Any deviation from the Standards that does not meet the Fire Code will require concurrence by the City Fire Marshal.	No deviation from the Fire Code is requested.

<sup>1</sup> Source: City of Redmond Procedures for Requesting and Approving Administrative Engineering Deviation Requests

Should you have any questions please contact me at your convenience.

Thank you and sincerely,  
**Transportation Solutions, Inc.**



Jeffrey P. K. Hee, P.E.



4/9/2019

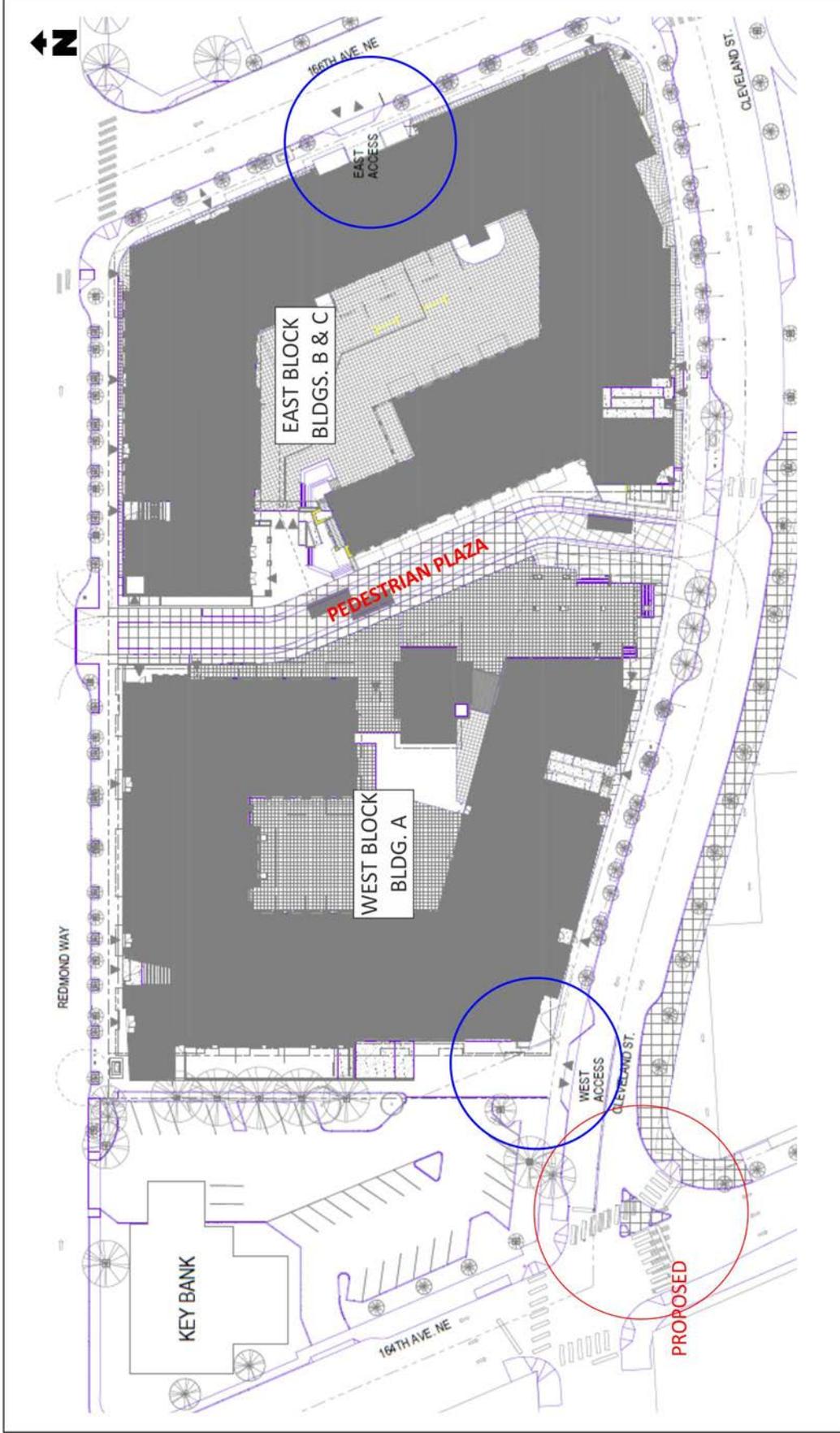


Figure 1: Conceptual Site Plan

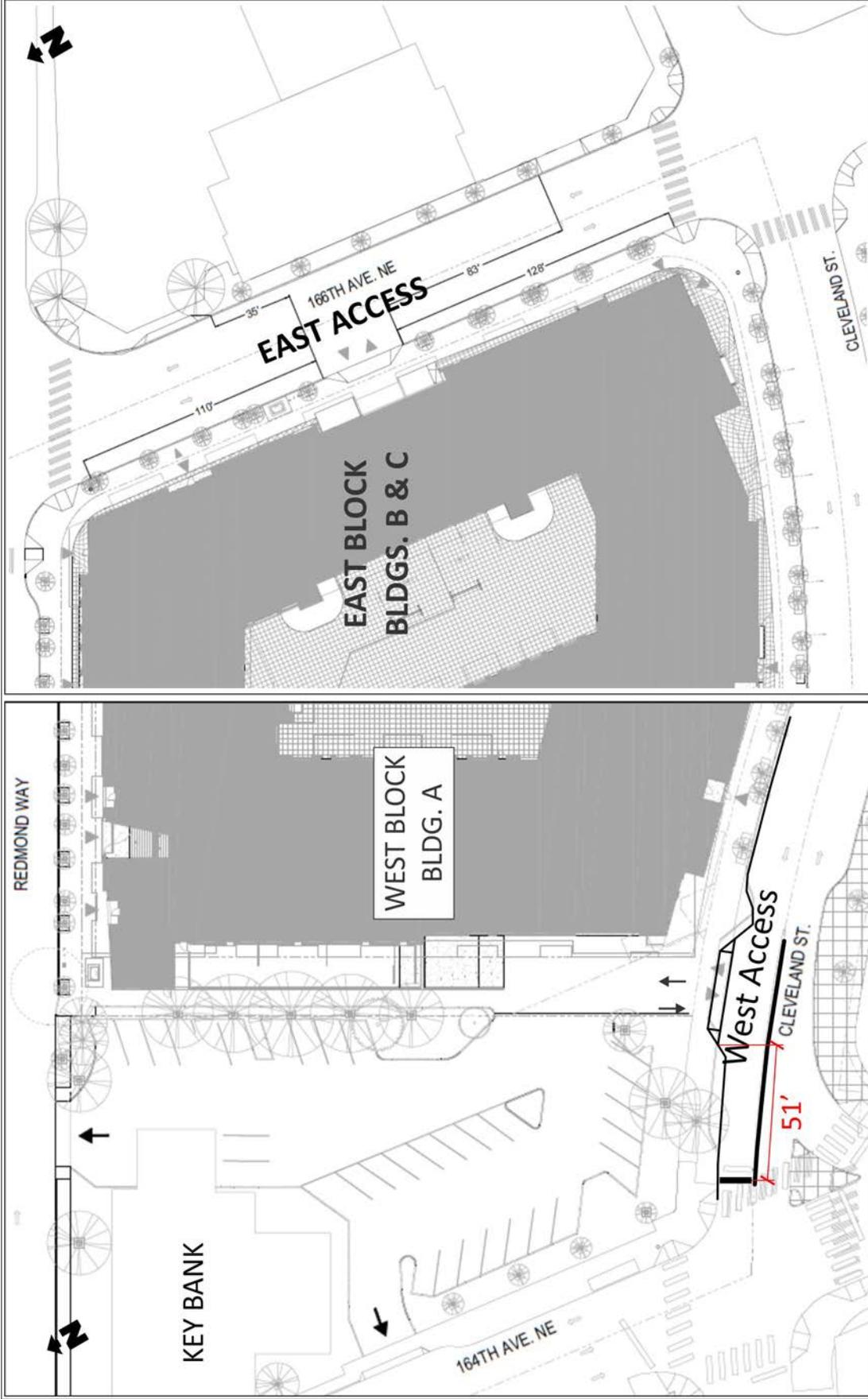


Figure 2: West and East Accesses and Offsets

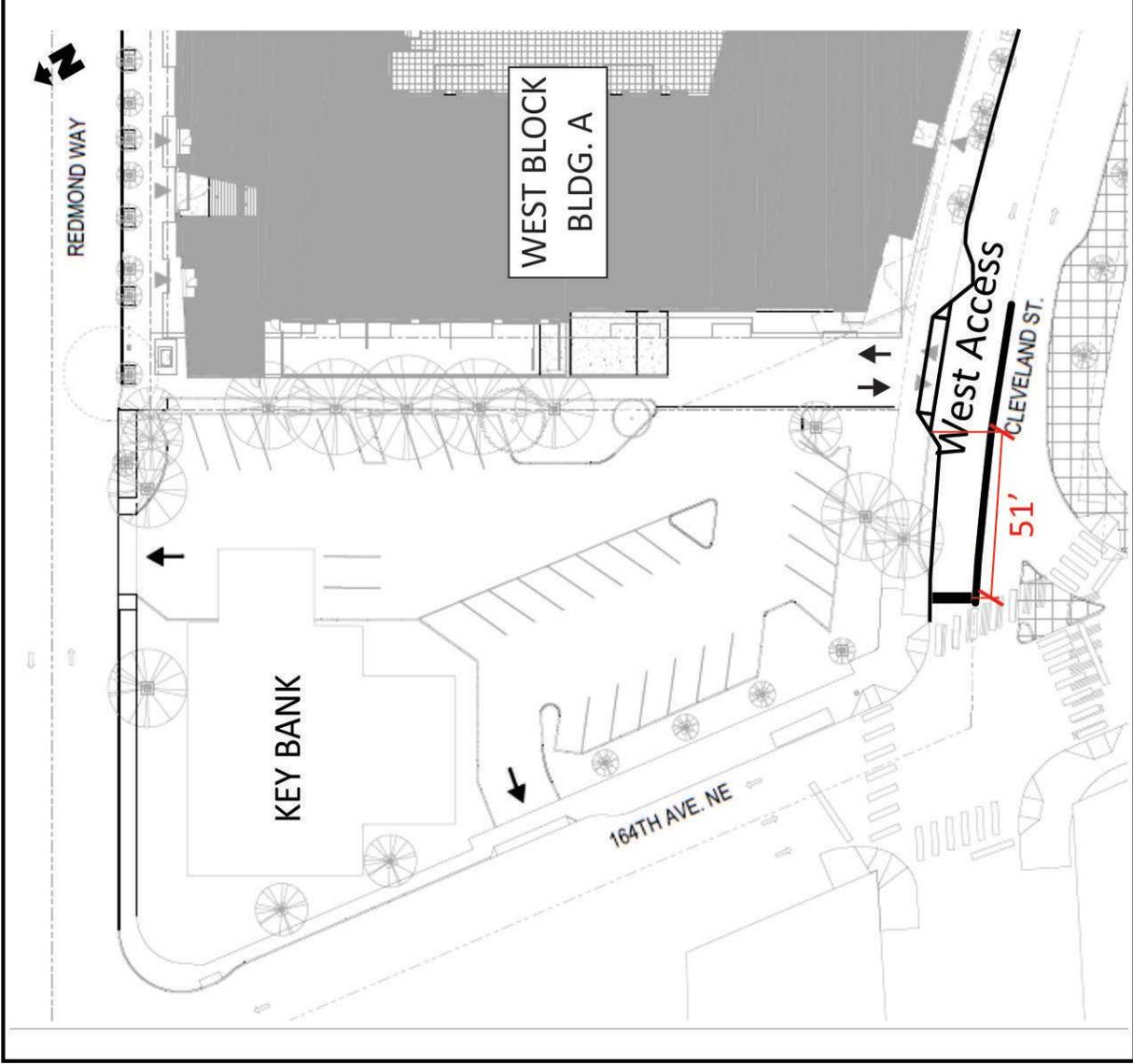


Figure 3: Key Bank Property

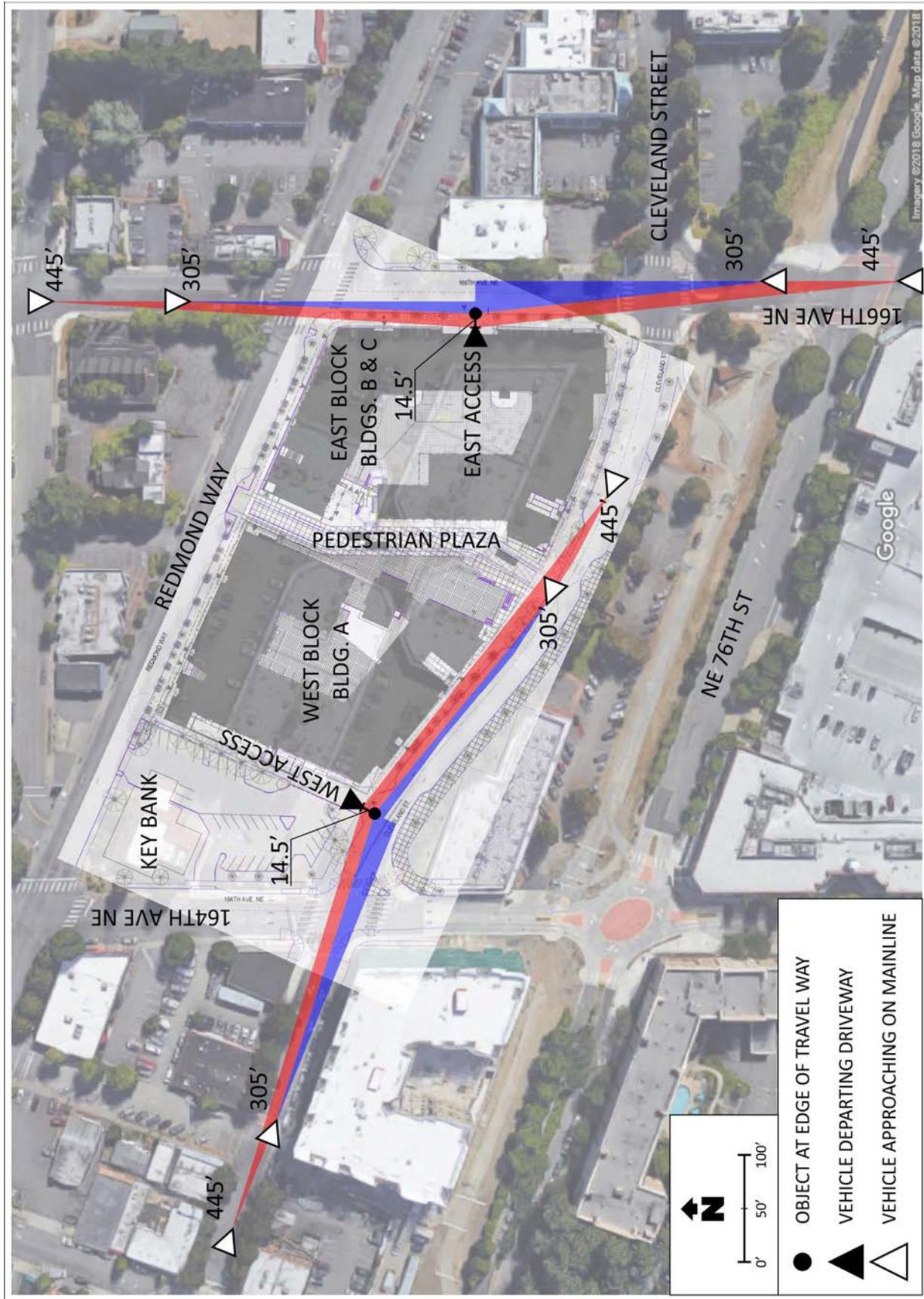


Figure 4: Stopping and Intersection Sight Distance



August 19, 2019

Jeffrey Hee, P.E.  
Transportation Solutions, Inc.  
8250 165<sup>th</sup> Avenue NE, Suite 100  
Redmond, WA 98052

Sent via email: [jeffh@tsinw.com](mailto:jeffh@tsinw.com)  
Copy Scott Glazebrook at [ScottG@tiscareno.net](mailto:ScottG@tiscareno.net)

**Subject: Responses to Driveway Spacing Deviation Request (DEVREQ-2019-00760) for Redmond Square (LAND-2019-01089)**

Dear Mr. Hee:

This letter is to respond to the driveway spacing deviation request for Redmond Square (LAND-2019-01089) dated July 13, 2019. You have requested to waive the minimum 150-foot driveway separation requirement for the following driveway accesses:

1. **The West Accesses:** The driveway access on Cleveland Street will serve the west building and is approximately 50 feet east of 164<sup>th</sup> Avenue NE.
2. **The North Access:** The driveway access on Shared Street will serve the west building and is approximately 70-feet south of Redmond Way.
3. **The East Access:** The driveway access on 166<sup>th</sup> Avenue NE will serve the east building and is approximately 140-feet to Cleveland Street, 110-feet to Redmond Way, 30-feet to the north and 75-feet to the south of the driveways on the east side of 166<sup>th</sup> Avenue NE.

*Per Redmond Zoning Code Title 21 Appendix 2.D.4.b, the City shall not permit any driveway within 150-feet of the nearside face of the curb of the intersecting street or from any other such driveway. In the event it is either impossible or undesirable to separate by 150-feet, then driveways shall be located as far away from the nearside of curb of the intersecting street or any other such driveway. Separations less than 150-feet shall obtain approval from the Technical Committee. This separation requirement shall not typically be applied to the distance between single-family driveways on local streets.*



After careful and thorough review on the deviation justifications and supporting documents including auto turn simulation, sight distance exhibits, intersection Level of Service and queuing analysis, and historical crash data evaluation, the Technical Committee has made the following decisions:

1. **Approve with Conditions for the West Access on Cleveland Street:**

- **Approve** right-in/right-out access on Cleveland Street for limited commercial parking, perspective tenants visiting parking, loading/unloading and trash pickup only.
- **Conditions:**
  - a. No permanent residential parking access is allowed. Measures shall be worked out to prevent general residential parking via this access.
  - b. A mountable curb or C-curb shall be installed on Cleveland Street to restrict left-in/left-out access and improvements at the SE corner of 164<sup>th</sup> Avenue NE/Cleveland Street shall be provided to facilitate bus movements and turning.
  - c. Solution should be planned out for this shared driveway with Key Bank on the west in the short-term and long-term basis.

2. **Approve with Conditions for the North Access on Shared Street:**

- **Approve** general vehicle access for the west building via Shared Street on the north section only.
- **Conditions:**
  - a. The general vehicle access to and from Redmond Way shall be restricted as right-in/right-out and left-in only. Left-out from Shared Street to Redmond Way shall be prohibited.
  - b. The south section is to be reserved for pedestrians, cyclists, and emergency vehicle access only. Measures and treatments shall be worked out to prevent general vehicular access on the south section and are subject to Fire approval and permitting.



- c. Without sharing the underground parking garages, the City reserves the right to restrict some movements if significant blocking/queuing issues resulting from Redmond Square are observed on Redmond Way.

3. **Approve with Conditions for the East Access on 166<sup>th</sup> Avenue NE:**

- **Approve** full access and no turn restriction on 166th Ave NE for general vehicle access, onsite trash truck pickup and loading/unloading for the east building.
- **Condition:** Without sharing the underground parking garages, the City reserves the right to restrict some movements if significant blocking/queuing issues resulting from Redmond Square are observed on 166<sup>th</sup> Ave NE.

The Technical Committee's decision may be appealed to the Hearing Examiner by filing an appeal with the Planning and Community Development Department within fourteen (14) calendar days of the date of the reconsideration decision. Appeal forms are available on-line at [www.redmond.gov](http://www.redmond.gov). A completed appeal form must be submitted by 5:00 p.m. on the last day of the appeal period.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Lisa Rigg, P.E.  
Development Engineering and Construction Manager  
Development Services, Planning Department  
City of Redmond

cc City Staff:

Paul Cho, P.E., Traffic Operations Manager, Public Works  
Don Cairns, P.E., Engineering Manager, Planning  
Scott Reynolds, Planner, Planning & Community Development  
Min Luo, P.E., Senior Transportation Engineer, Development Services  
Andy Chow, P.E., Senior Transportation Engineer, Development Services  
Duniel Murillo, Administrative Specialist, Development Services

## Parking Deviation



8250 - 165th Avenue NE  
 Suite 100  
 Redmond, WA 98052-6628  
 T 425-883-4134  
 F 425-867-0898  
 www.tsinw.com

April 30, 2020

Scott Reynolds, Planner  
 City of Redmond  
 15670 NE 85th Street  
 Redmond, WA 98052

Subject: Redmond Square – Multifamily Parking Deviation Update  
 16563 Redmond Way and 16425 Cleveland Street

Dear Mr. Reynolds,

The letter requests a deviation from the City of Redmond’s minimum multifamily parking standards for Redmond Square based on the current development plans for Buildings A (West) and B (East).

**DEVIATION REQUESTED**

Table 1 summarizes the multifamily parking requirement deviation request.

**Table 1: Deviation from Minimum Parking Requirement**

Source	Land Use	Parking Ratio
City of Redmond	Multifamily	1.25 spaces / unit <sup>1</sup>
Proposed Building A (West)	Multifamily	0.82 spaces / unit
Proposed Building B (East)	Multifamily	0.80 spaces / unit

1. RZC Table 21.10.040C. One space per dwelling unit plus one guest space per every four units

The Applicant is requesting a deviation from the City of Redmond’s multifamily parking requirements. The proposed parking ratios for both buildings are based on the unit types proposed and the site’s location. Since the buildings are separate it is reasonable for each to have separate parking needs and variance requests for lower multifamily parking ratios.

**PROJECT SUMMARY**

Redmond Square is in the Anderson Park downtown Redmond subzone, see Figure 1 for a vicinity map. The site is near the future link light rail station, which is planned south of Cleveland Street within a block to the south of the site and east of 164th Ave NE.

The Applicant proposes to develop two mixed-use buildings on two blocks, separated by a pedestrian plaza between Redmond Way and Cleveland Street. Table 2 summarizes the development plan:

**Table 2: Development Plan**

Building	Building A (West)	Building B (East)	Total
Multifamily (units)	302	311	613
Retail (sq. ft.)	4,932	15,749	20,681
Food and Beverage (sq. ft.)	4,008	3,960	7,968
Onsite Parking (spaces)	283	302	585

A conceptual site plan is provided at Figure 2. Full build-out is anticipated by 2024.



Figure 1: Vicinity Map

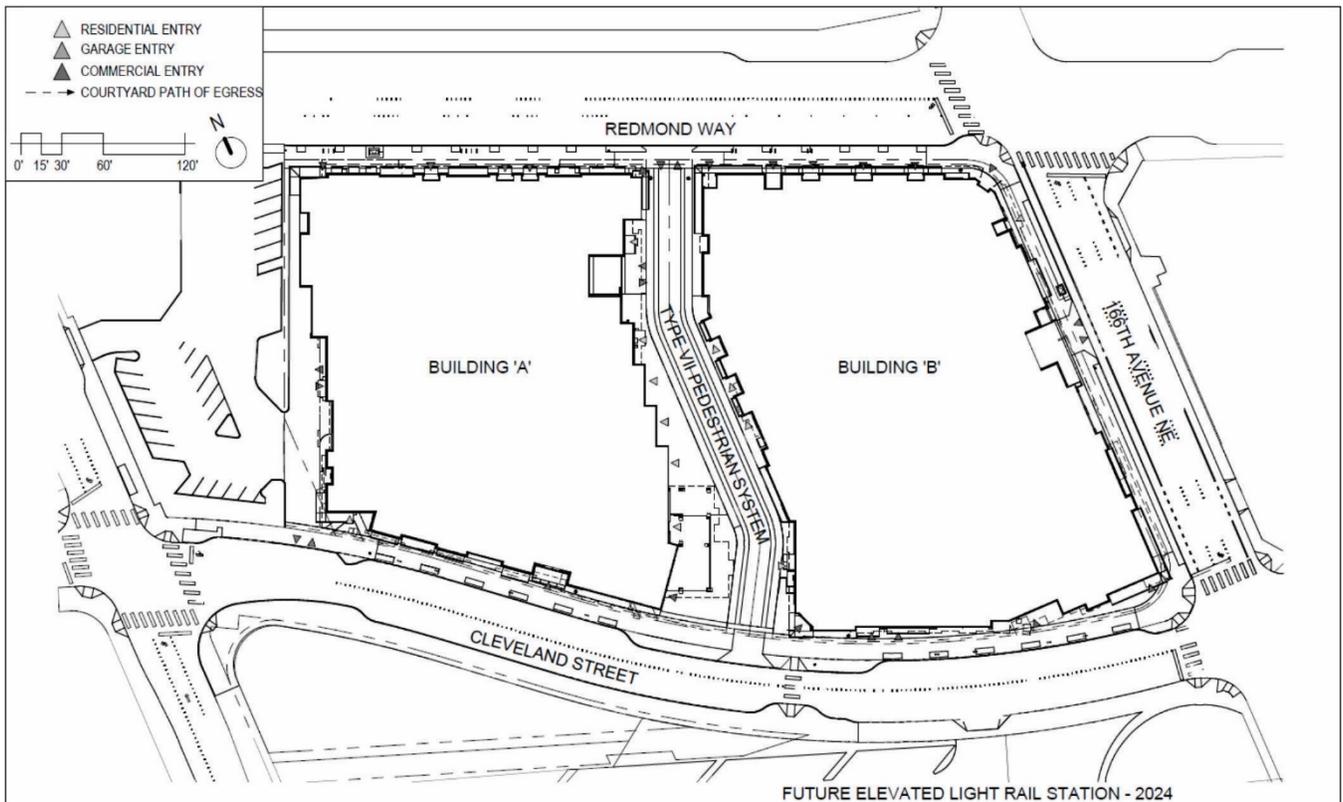


Figure 2: Site Plan



All parking will be provided onsite.

The following includes a review of the City of Redmond’s minimum parking requirements, multifamily parking analyses and recommendations, review of the effects of shared parking with the proposal, and a summary of deviation review criteria.

**MINIMUM PARKING REQUIREMENTS**

Table 3 summarizes the minimum parking requirements per the Redmond Zoning Code (RZC).

**Table 3: Redmond Parking Requirements (RZC Table 21.10.40C)**

Land Use	Size	RZC Parking Ratio	Parking Required	Parking Proposed
<b>Building A (West)</b>				
Multifamily	302 dwelling units	1.25 / dwelling unit	378 spaces	253 spaces
Retail	4,932 sq. ft.	2.00 / 1,000 sq. ft.	10 spaces	10 spaces
Food and Beverage	4,008 sq. ft.	5.00 / 1,000 sq. ft.	20 spaces	20 spaces
<b>Total</b>			<b>408 spaces</b>	<b>283 spaces</b>
<b>Building B (East)</b>				
Multifamily	311 dwelling units	1.25 / dwelling unit	389 spaces	251 spaces
Retail	15,749 sq. ft.	2.00 / 1,000 sq. ft.	31 spaces	31 spaces
Food and Beverage	3,960 sq. ft.	5.00 / 1,000 sq. ft.	20 spaces	20 spaces
<b>Total</b>			<b>439 spaces</b>	<b>302 spaces</b>

The Project will provide onsite parking to satisfy the RZC parking requirements for the commercial retail and food and beverage uses.

The Applicant proposes a deviation from the City of Redmond’s multifamily parking requirements, given the site’s location in an urban center, very near future link light rail, near the Redmond Connector and within walking distance from Redmond Transit Center.

Figures 3, 4 and 5 show the site’s location in reference to local bicycle and transit routes and the future link light rail station and line. These travel mode amenities are seen as viable options for multifamily tenants and guests and commercial (retail and food and beverage) staff and visitors to travel to and from the site without needing to park onsite or adversely impact in the local area.

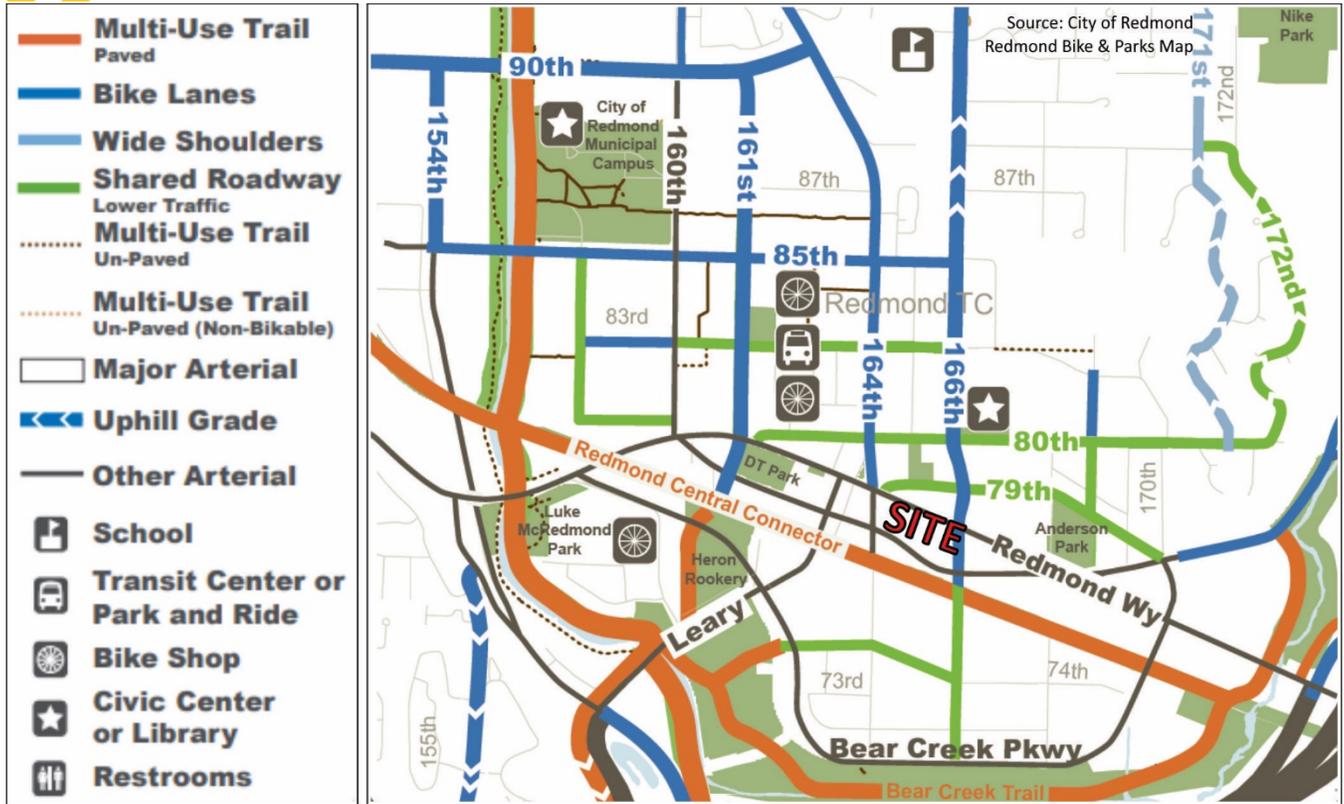
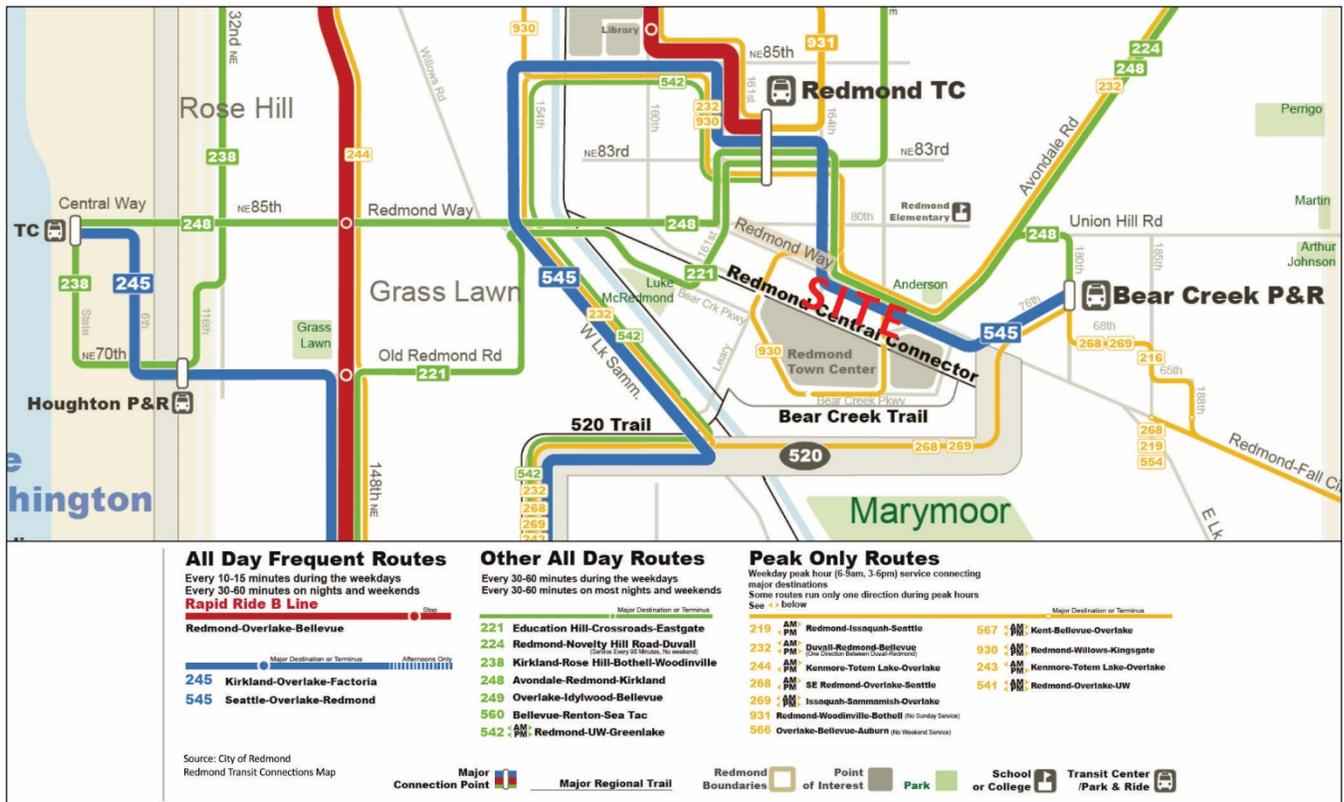
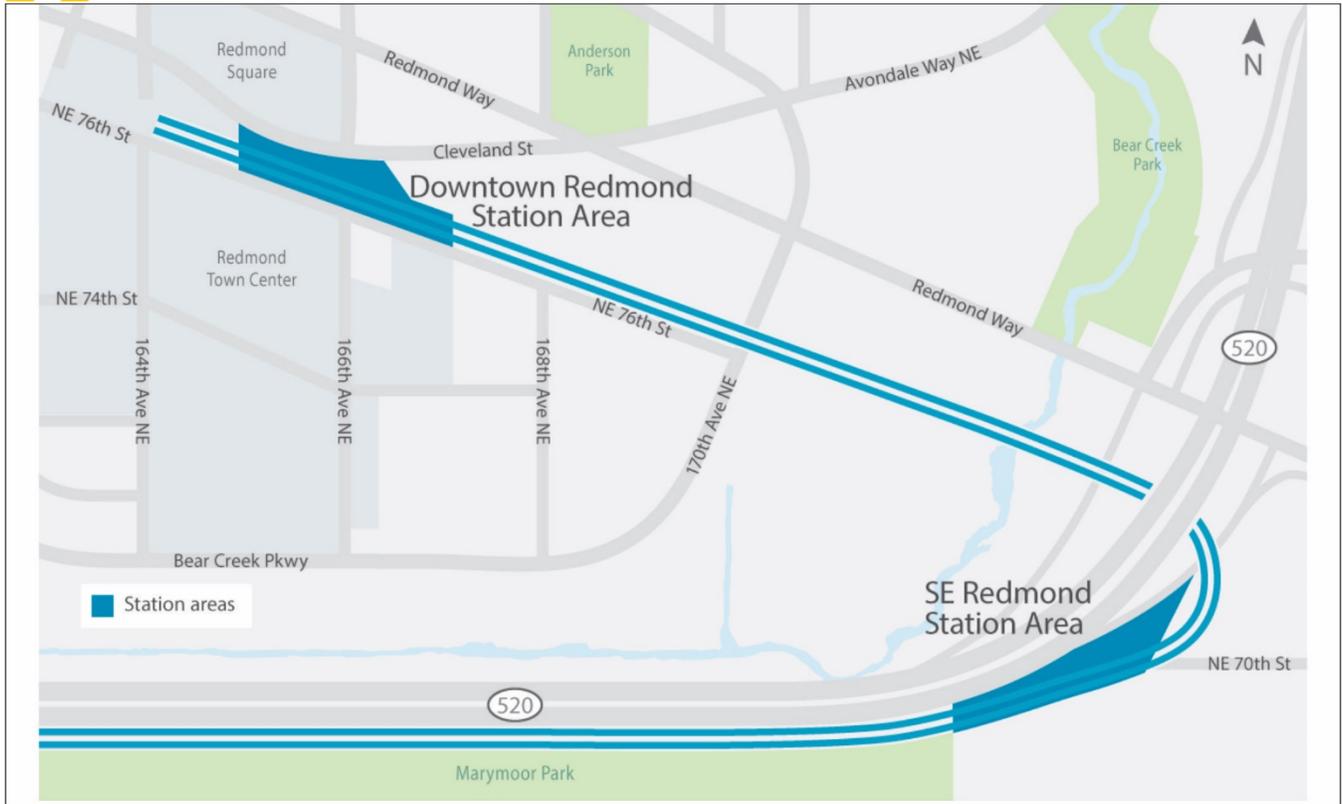


Figure 3: Downtown Redmond Bicycle Map

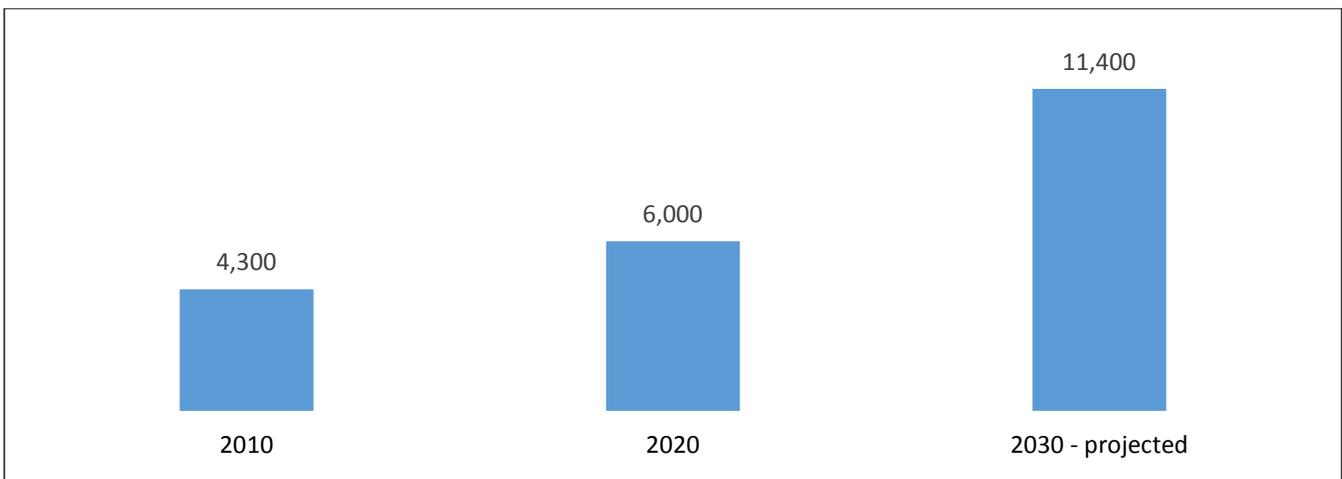




**Figure 5: Sound Transit Link Light Rail Station and Line Map**

**CITY OF REDMOND DOWNTOWN PARKING MANAGEMENT STRATEGIC PLAN**

This section reviews the Project within the context of the City of Redmond Downtown Parking Management Strategic Plan. Figure 6 is from the strategic plan, showing the local growth forecasts and represents an increasing density in downtown Redmond.



**Figure 6: Downtown Redmond Population Growth**

From the strategic plan, overall, the average off-street parking occupancy in downtown Redmond between 32% and 44%. In the Anderson Park subzone, the evening parking occupancy is 32.7%. The evening time frame, generally represents the time when most residents are “home”.

The low off-street parking occupancies in downtown Redmond show that the off-street parking not currently being fully utilized; and thus, a reduction from the City of Redmond’s parking requirements is reasonable.

**MULTIFAMILY RESIDENT PARKING DEVIATION REQUEST TECHNICAL EVALUATION**

Functional parking supply needs for the multifamily component of the Project were evaluated using recommendations from King County’s *Multi-Family Residential Parking Calculator* (Right Size Parking Calculator). Statistics and forecasts from US Census Bureau and data from the ITE Parking Generation Manual were used to support the Right Size Parking findings and final recommendations.

*Right Size Parking Calculator*

The Right Size Parking Calculator is a tool developed by King County to assist planners, developers and community members in assessing a reasonable and economic amount of parking needed to support multifamily development. Parking recommendations are based on the location of the site and its proximity to transit and population and job concentrations. The calculator includes input for the number, type, average floor area, monthly rent, and parking cost for the multifamily units.

For this analysis, it was assumed that the market price per month for the units is consistent with the median rents in the City of Redmond<sup>1</sup> and the cost for parking onsite is \$200 per month. Table 4 compares the monthly parking costs for local development. The monthly parking cost for the Project are on the high end of current rates in downtown Redmond.

**Table 4: Downtown Redmond Market Survey**

<b>Property</b>	<b>Monthly Parking Cost / Stall</b>
Redmond Square * Proposed *	\$200
Triangle Apartments	\$150-\$250
Blackbird Apartments	\$125-\$180
Station House Apartments	\$125-\$180
Talisman Apartments	\$125
Milehouse Apartments	\$145
Moderate Redmond	\$125-\$165
Heron Flats	\$125-\$208

The intent is for tenants to use the other transportation modes, specifically light rail and transit, in this evolving urban center. We note that a higher monthly cost for parking onsite reduces onsite parking demands and incentivizes use of other transportation modes as primary modes of travel.

The City of Redmond requires a minimum of 10% of the new units satisfy affordable housing criteria.

The parking recommendations which are attached were “right sized” using the optimized parking supply recommendations.

A breakdown of the proposed multifamily units by type and average unit floor areas is summarized in Table 5.

---

<sup>1</sup> <https://www.apartmentlist.com/wa/redmond>



**Table 5: Multifamily Unit Breakdown**

Unit Type	Building A (West)		Building B (East)		Average Rent/Mo.
	No. of Units	Avg. Sq. Ft. <sup>1</sup>	No. of Units	Avg. Sq. Ft. <sup>1</sup>	
Studios	179	560	139	570	\$1,638
1- Bedrooms	93	685	137	670	\$1,875
2-Bedrooms	20	880	30	885	\$2,335
3-Bedrooms	10	1,250	5	1,385	\$3,390

1. Average floor area

Figure 7 summarizes the Right Size Parking recommendations for Buildings A and B. Building A’s multifamily parking ratio is 0.57 spaces per unit. Building B’s multifamily parking ratio is 0.55.

The parking ratios do not assume the site’s parking is fully unbundled from the unit leases, as previously proposed. With the parking unbundled there could be more parking available onsite.

Table 6 shows the combined multifamily and commercial parking recommendations for each building.

**Table 6: Project Parking Analysis with Unbundled Multifamily Parking**

Bldg.	Proposed Units	Multifamily Rate <sup>1</sup>	Guest Rate <sup>2</sup>	Total Rate	Total Spaces	Commercial Parking <sup>3</sup>	Total Parking	Proposed Supply
A	302	0.57/unit	0.25/unit	0.85	248	30	278	283
B	311	0.55/unit	0.25/unit	0.83	249	51	300	302

1. From Right Size Parking Unbundled Parking Ratios with parking cost at \$200 per month  
 2. RZC Table 21.10.040C. Represents 1 guest space per every 4 dwelling units  
 3. See Table 3

Building A is proposed with 283 onsite parking spaces, with 30 spaces dedicated for commercial staff and commercial visitors and 253 spaces dedicated to multifamily tenants and multifamily guests. The Right Size Parking recommends a minimum of 172 multifamily tenant parking spaces (302 units X 0.57 spaces per unit). The RZC requires 76 multifamily guest parking spaces (302 X 0.25 spaces per unit). The onsite residential parking supply (253 spaces) is able to accommodate the combined multifamily tenant and guest parking (248 spaces). And the commercial supply satisfies the City of Redmond’s code requirements without a deviation.

Building B is proposed with 302 onsite parking spaces, with 51 spaces dedicated for commercial staff and commercial visitors and 251 spaces dedicated to multifamily tenants and multifamily guests. The Right Size Parking recommends a minimum of 171 multifamily tenant parking spaces (311 units X 0.55 spaces per unit). The RZC requires 78 multifamily guest parking spaces (311 X 0.25 spaces per unit). The onsite residential parking supply (251 spaces) is able to accommodate the combined multifamily tenant and guest parking (249 spaces). And the commercial supply satisfies the City of Redmond’s code requirements without a deviation.

Overall, the proposed onsite parking supplies for Buildings A and B satisfy the parking recommendations from Right Size Parking and are reasonable to meet the minimum parking needs of future residents.

It should also be emphasized that the above analysis is conservative and:

- (a) Does not account for future parking reductions with future light rail.
- (b) Does not factor in the availability of on-street parking along the site’s public frontage.

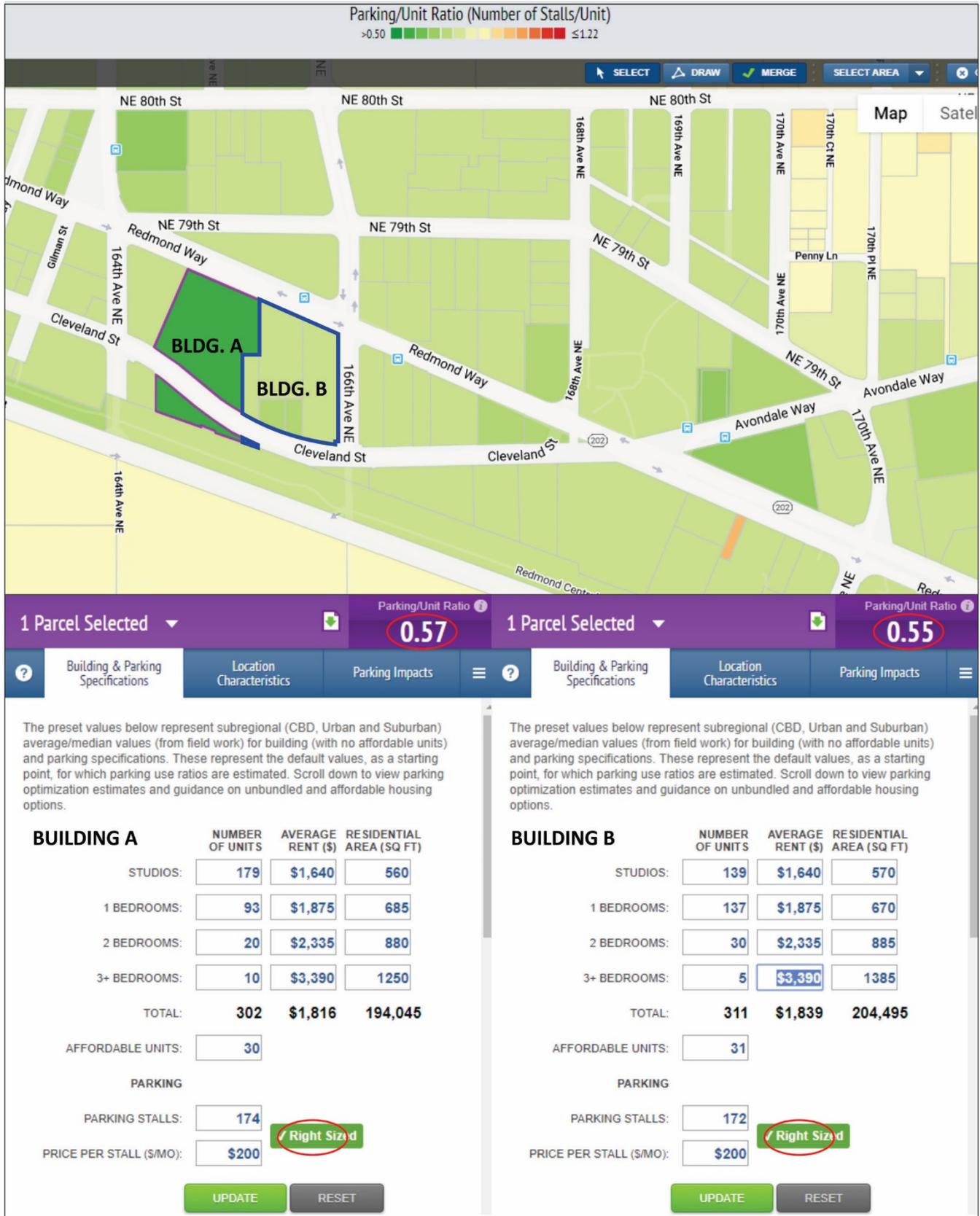


Figure 7: Right Size Parking Buildings A and B



US Census American Fact Finder and Analysis

The proposal is in King County Census Tract 323.09. The following analysis is based on data from the U.S. Census Bureau’s American Fact Finder application. The data is included to compare with the Right Size Parking recommendations. The year 2018 statistics for the number of vehicles available for renter-occupied housing units are: 21.0% no vehicle, 56.2% one vehicle, 18.8% two vehicles and 4.0% three or more vehicles. For this study, the census statistics were updated from the 2017 data provided previously, based on the U.S. Census Bureau’s current information.

For this analysis, it was assumed that studio unit and one-bedroom unit tenants would either have zero or one vehicle available for use, two-bedroom unit tenants would have up to two vehicles available for use, and three-bedroom unit tenants would have up to three vehicles available for use.

Table 7 summarizes the parking demand based on the proposal’s unit mix and “vehicle availability” assumptions for the building. The parking ratios represent the minimum parking needed to support multifamily tenants.

**Table 7: Unit Mix and U.S. Census Data Parking Demand**

Unit Type	Renter-Occupied Units		Building A (West)		Building B (East)	
	Vehicles/Unit	Proportion <sup>1</sup>	Units	Vehicles	Units	Vehicles
Studio and 1-Bedroom	0	27.2%	74	0	75	0
	1	72.8%	198	198	201	201
2-Bedrooms	0	21.9%	4	0	7	0
	1	58.5%	12	12	18	118
	2	19.6%	4	8	6	12
3-Bedrooms	0	21.0%	2	0	1	0
	1	56.2%	6	6	3	3
	2	18.8%	2	4	1	2
	3	4.0%	0	0	0	0
<b>Total<sup>2</sup></b>			<b>302</b>	<b>228</b>	<b>311</b>	<b>236</b>

1. Proportions are based on the ratios of numbers of vehicles available for renter-occupied units and assumptions from above
2. Calculated results include some rounding

The US Census data shows that Building A needs at least 228 parking spaces and Building B needs at least 236 parking spaces to support the multifamily components of each site; compared to the City of Redmond Code which would require the Applicant to provide 378 multifamily parking spaces for Building A and 389 parking multifamily spaces for Building B.

The census analysis also shows a lower parking output compared to the Right Size Parking recommendations, which supports a reduction from the City of Redmond parking requirements.

Overall, the proposed onsite parking is reasonable to meet the minimum parking needs of future residents.

ITE Parking Generation Check

The ITE Parking Generation, 4th Edition, manual shows that the minimum peak parking demand rates observed for Land Use 221: Low/Mid-Rise Apartment are 0.59 vehicles per unit for suburban sites and 0.66 vehicles per unit for urban sites. The ITE peak parking demand data shows the Right Size Parking recommendations (0.85 spaces per unit, for Building A, and 0.83 spaces, per unit for Building B) and US Census statistical analysis (0.75 spaces per unit, for Building A, and 0.76 spaces, per unit for Building B) are within the range of data compiled by the ITE and are reasonable.



**MULTIFAMILY PARKING SUMMARY**

Table 8 compares the RZC multifamily parking requirements to the parking ratios recommended via the Right Size Parking Calculator, US Census statistics, and as proposed.

**Table 8: Multifamily Parking Ratio Comparison**

Source	Building A (West)			Building B (East)		
	Units	Ratio	Spaces	Units	Ratio	Spaces
Redmond Zoning Code	302	1.25/unit	378	311	1.25/unit	389
Right Size Parking + RZC Guest <sup>1</sup>	302	0.82/unit	248	311	0.80/unit	249
US Census Renter-Occupied <sup>2</sup>	302	0.75/unit	228	311	0.76/unit	236
Proposed	302	0.82/unit	248	311	0.80/unit	249

1. Parking ratio based on parking recommendations from Table 6, ratio includes guest parking at 0.25 spaces/unit.
2. Parking ratio based on parking recommendations from Table 7.

- The proposed multifamily parking for the Building A is 248 spaces or 0.82 spaces per unit
- The proposed multifamily parking for the Building B is 249 spaces or 0.80 spaces per unit

**CONCLUSIONS**

Based on current data sources, the proposed onsite parking is forecast to support the needs of future tenants. The proposal will meet the RZC parking requirements for the commercial (retail and restaurant) tenants.

The Applicant’s proposed multifamily parking supplies are less than the RZC parking requirements. Analysis of parking needs based Right Size Parking and U.S. Census data and compared to ITE peak parking demand data show that overall, the proposed onsite parking supplies can support the needs of the multifamily tenants:

- Building A (West) is proposed with 283 onsite parking spaces. There are 253 multifamily parking spaces proposed for 302 multifamily tenants and guests and 30 commercial parking spaces proposed for the future retail and food and beverage staff and visitors. The multifamily component of the site is forecast to generate a need for 248 parking spaces, with 172 spaces for tenants and 76 spaces for guests. The total onsite parking supply proposed for Building A is able to meet the needs of the proposed uses. A multifamily parking ration reduction to 0.82 spaces per unit is reasonable to support the multifamily component of Building A.
- Building B (East) is proposed with 302 parking spaces. There are 251 multifamily parking spaces proposed for 310 multifamily tenants and guests and 51 commercial parking spaces proposed for the future retail and food and beverage staff and visitors. The multifamily component of the site is forecast to generate a need for 249 parking spaces, with 171 spaces for tenants and 78 spaces for guests. The total onsite parking supply proposed for Building B is able to meet the needs of the proposed uses. A multifamily parking reduction to 0.80 spaces per unit is reasonable to support the multifamily component of Building B.

**DEVIATION REVIEW OF CRITERIA**

**Table 9: Parking Deviation – Deviation Criteria**

<b>City of Redmond Deviation Criteria<sup>1</sup></b>	<b>Assessment</b>
The deviation produces a compensating or comparable result, which is in the public interest.	The number of off-street parking spaces proposed can accommodate the minimum parking needs and demands.
The deviation meets requirements for safety, public health, function, fire protection, transit needs, appearance, and maintainability in any other criteria deemed by the city.	Impacts to safety, public health, function, fire protection, transit needs, appearance and maintainability are not anticipated.
The deviation provides substantially equivalent (or improved) environmental protection as would be provided if the standard requirements were met.	There are no environmental impacts identified. The off-street parking can meet the needs of the proposed uses to effectively minimize the potential for spillover parking.
The deviation needs to reflect sound engineering practices.	King County Right Size Parking and US Census statistics were used to justify the proposed deviation and parking recommendations.
The deviation needs to avoid damage to other properties in the vicinity of and downstream of the proposal.	The request does not impact adjacent properties.
Any deviation from the Standards that does not meet the Fire Code will require concurrence by the City Fire Marshal.	No deviation from the Fire Code is being proposed.

1. Source: City of Redmond Procedures for Requesting and Approving Administrative Engineering Deviation Requests

If you have any questions, please contact me at your convenience.

Thank you and sincerely,  
**Transportation Solutions, Inc.**



Jeffrey P. K. Hee, P.E.  
Sr. Transportation Engineer



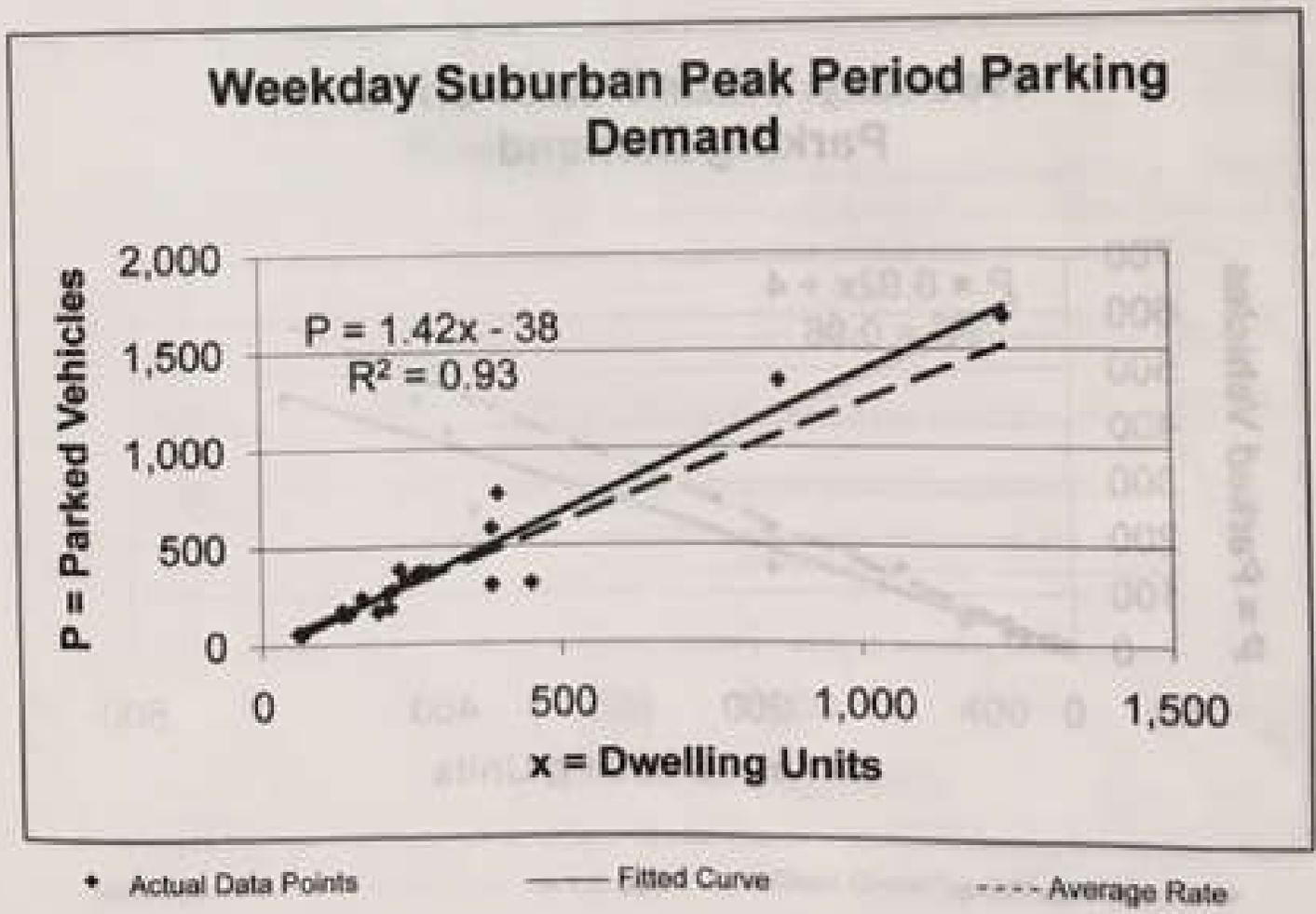
4/30/2020

# Land Use: 221

## Low/Mid-Rise Apartment

Average Peak Period Parking Demand vs. Dwelling Units  
 On a: Weekday  
 Location: Suburban ←

Statistic	Peak Period Demand
	12:00-5:00 a.m.
Peak Period	12:00-5:00 a.m.
Number of Study Sites	21
Average Size of Study Sites	311 dwelling units
Average Peak Period Parking Demand	1.23 vehicles per dwelling unit
Standard Deviation	0.32
Coefficient of Variation	21%
95% Confidence Interval	1.10-1.37 vehicles per dwelling unit
Range	0.59-1.94 vehicles per dwelling unit
85th Percentile	1.94 vehicles per dwelling unit
33rd Percentile	0.68 vehicles per dwelling unit

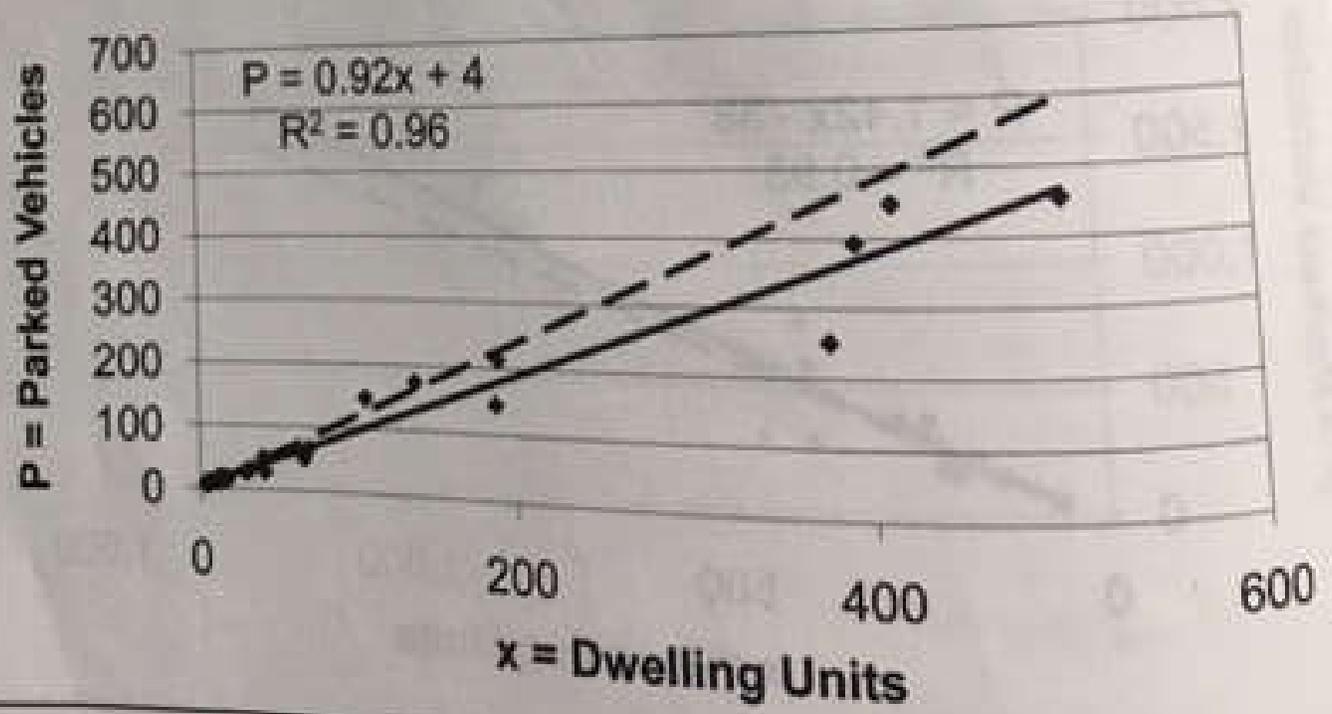


# Land Use: Low/Mid-Rise Apartment

Average Peak Period Parking Demand vs. Dwelling Units  
 On a: Weekday  
 Location: Urban ←

Statistic	Peak Period Demand
	10:00 p.m.–5:00 a.m.
Peak Period	40
Number of Study Sites	70 dwelling units
Average Size of Study Sites	1.20 vehicles per dwelling unit
Average Peak Period Parking Demand	0.42
Standard Deviation	35%
Coefficient of Variation	1.07–1.33 vehicles per dwelling unit
95% Confidence Interval	→ 0.66–2.50 vehicles per dwelling unit
Range	1.61 vehicles per dwelling unit
85th Percentile	0.93 vehicles per dwelling unit
33rd Percentile	

## Weekday Urban Peak Period Parking Demand



- Actual Data Points
- Fitted Curve
- Average Rate



Table Results (4)

TENURE BY VEHICLES AVAILABLE [VIEW TABLE INFORMATION](#)

Census Tract 323.09, King County, Washington		
	Estimate	Margin of Error
▼ Total:	4,152	+/-193
▼ Owner occupied:	722	+/-159
No vehicle available	0	+/-17
1 vehicle available	391	+/-115
2 vehicles available	287	+/-118
3 vehicles available	44	+/-41
4 vehicles available	0	+/-17
5 or more vehicles available	0	+/-17
▼ Renter occupied:	3,430	+/-235
No vehicle available	722	+/-209
1 vehicle available	1,928	+/-311
2 vehicles available	644	+/-171
3 vehicles available	102	+/-71
4 vehicles available	14	+/-20
5 or more vehicles available	20	+/-33