Transportation Impact Analysis

BUILDING X

Prepared for:

Willow Run, LLC.

October 2019

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Introduction

This Transportation Impact Analysis (TIA) summarizes the potential transportation-related impacts associated with the proposed office and research and development lab space located west of Willows Road NE between NE 116th Street and 9900 Block-NE 100th Court, across from the Willows Run Golf Complex in the City of Redmond (see Figure 1). As necessary, mitigation measures are identified that would offset or reduce significant impacts.

Project Description

The Building X project would construct a 339,010 square foot (sf) building including office and research and development lab spaces as well as 794 vehicle parking stalls and 145 bicycle parking stalls. The existing approximately 37,400 sf office building would be removed with the development of the project. The site plan is shown on Figure 2. The development is anticipated to be completed and fully occupied by 2023.

A shuttle boarding station located at the southwestern corner of the building will be constructed with the project. This would enable the project sponsor to implement an extensive employee shuttle network, similar to established programs at existing technology firms in the Seattle area and Silicon Valley. With this transit infrastructure, as well as dedicated bicycle access with secured parking, the project sponsor can commit to an ambitious Transportation Management Program (TMP), including a single-occupant vehicles (SOVs) target of 65 percent or less. The project also includes parking for visitors and employees, and a dedicated off-street loading area for Transportation Network Companies (TNCs) and taxis.

The project will provide a shared use path connecting Willows Road to the project building. Additionally, the project will include significant on-site bicycle amenities to promote non-motorized travel including bike lockers and shower/locker facilities.

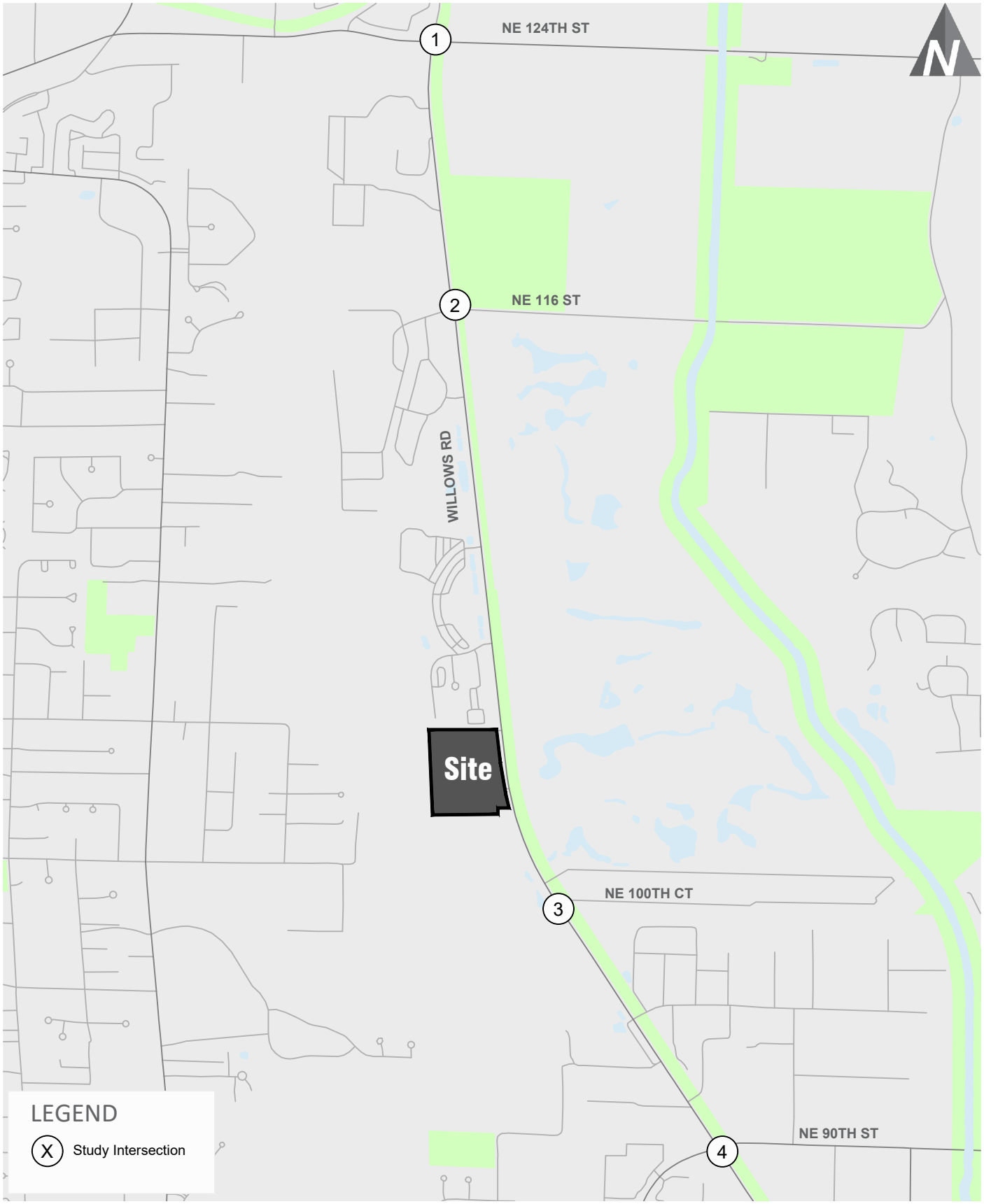
Access to the site is proposed via the two existing driveways to the site located along Willows Road. The driveways are proposed to remain full access with a traffic signal installed at the southern access that will be coordinated with the existing signals along the Willows corridor. The northern driveway on Willows Road would provide shuttle access to/from the shuttle station located on the west side of the site, while the southern driveway would provide the primary parking and ride hail access; however, access to the parking areas is provided via both driveways.

The proposed project also includes secured access into the on-site parking garage. Security checkpoints are located well inside the site, eliminating potential issues with garage queueing onto Willows Road NE. These security checkpoints and denial routes are shown on the attached site plan (Figure 2).

Scope of Analysis

The scope of this analysis is based on the City of Redmond Phase Two Traffic Study guidelines as described in the *City of Redmond Application Requirements for PREP- Land Use Entitlement* (May 2019) and based on coordination with City of Redmond staff.
The TIA identifies the study area and summarizes existing conditions including the street system, non-motorized, transit service, traffic volumes, traffic operations and traffic safety. Next, forecast conditions are summarized which include planned improvements future without-project traffic volumes, project trip generation, trip distribution and assignment, with-project traffic volumes, future traffic operations, site access analysis, traffic safety impacts, and non-motorized impacts. The TIA concludes with a discussion of mitigation measures and summary.

At the request of the City, the analysis also includes an assessment of the site access points assuming the future widening of Willows Road to a 5-lane section. The analysis is documented in the site access section of this report.



Site Vicinity & Study Intersections

Building X

FIGURE

1

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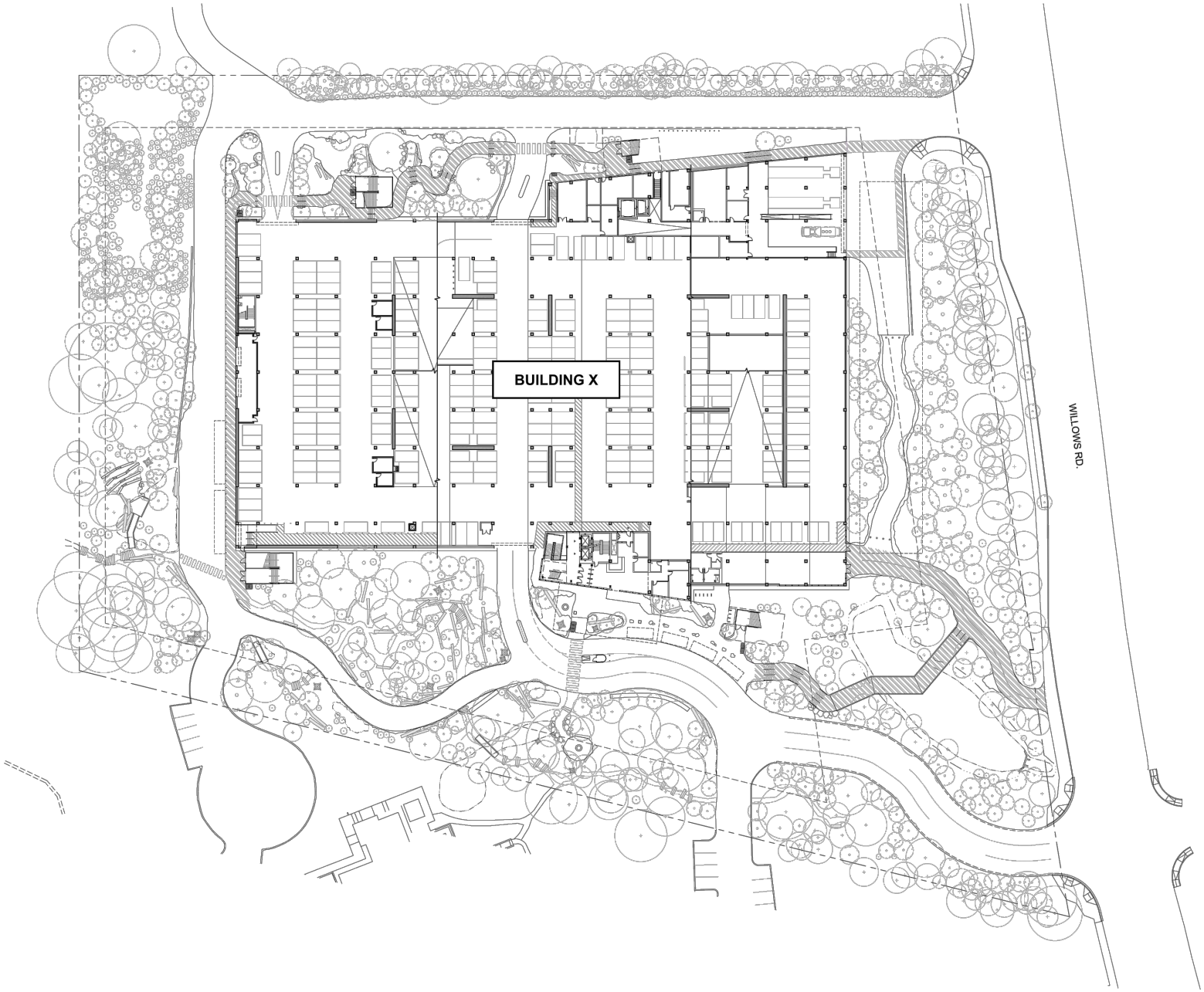

Site Plan

Building X

FIGURE

2

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Existing Conditions

This section describes existing conditions within the study area as identified below. Characteristics are provided for the street system, non-motorized facilities, transit service, traffic volumes, traffic operations, and traffic safety.

Study Area

Through coordination with the City of Redmond staff, the following four signalized intersections were identified for analysis during the weekday AM and PM peak hours:

1. Willows Road NE / NE 124th Street
2. Willows Road NE / NE 116th Street
3. Willows Road NE / 9900 Block-NE 100th Court
4. Willows Road NE / 148th Avenue NE

In addition to these 4 off-site study intersections, the two proposed site access driveways were analyzed under future (2023) with-project conditions.

Street System

The project site is located in along the Willows Road NE corridor between NE 116th Street and 9900 Block-NE 100th Court, across from the Willows Run Golf Complex in the City of Redmond. The existing street system characteristics of the primary roadways within the vicinity of the project are summarized below in Table 1.

Table 1. Existing Conditions Summary

Roadway	Street Classification[1]	Posted Speed Limit	Number of Lanes	Pedestrian Facilities[2]	Bicycle Facilities[2]
NE 124th Street	Primary Arterial	35	5-4	Sidewalks Both Sides	Partial Bike Lanes
NE 116th Street	Secondary Arterial	35	2-3	Sidewalks Both Sides	Bike Lanes
Willows Road NE	Minor Arterial	35-40	3-5	Intermittent	Bike Lanes
NE 90th Street/148th Avenue NE	Principal Arterial	30-40	3-5	Sidewalks Both Sides	Partial Bike Lanes

1. As classified per the City of Redmond or City of Kirkland.
2. Described in greater detail in the following section.

Non-Motorized Facilities

As summarized above in Table 1, most roadways in the project site vicinity have sidewalks on both sides of the street. Along Willows Road NE between NE 100th Court and NE 124th Street, sidewalks are intermittent on both sides of the street.

On-street bicycle lanes exist on both sides of Willows Road NE between NE 124th Street and NE 100th Court with the eastern bicycle lane along Willows Road extending further south to NE 90th Street.

In addition, the Eastside Rail Corridor/Redmond Central Connector is a shared use paved trail starting approximately quarter mile south of the project site along the eastern side of Willows Road connecting to the Sammamish River Trail, Redmond Town Center, and Bear Creek Trail.

Transit Service

Transit service in the vicinity of the site is provided by King County Metro. The nearest transit stops to the project site are located on the along Willows Road adjacent to the project site. Southbound stops are provided via pull-outs on Willows Road just south of the site driveways. Only one northbound stop is provided; located north of the southern driveway. These stops are served by three routes. The typical hours of operations and peak hour headways are summarized for the three routes below:

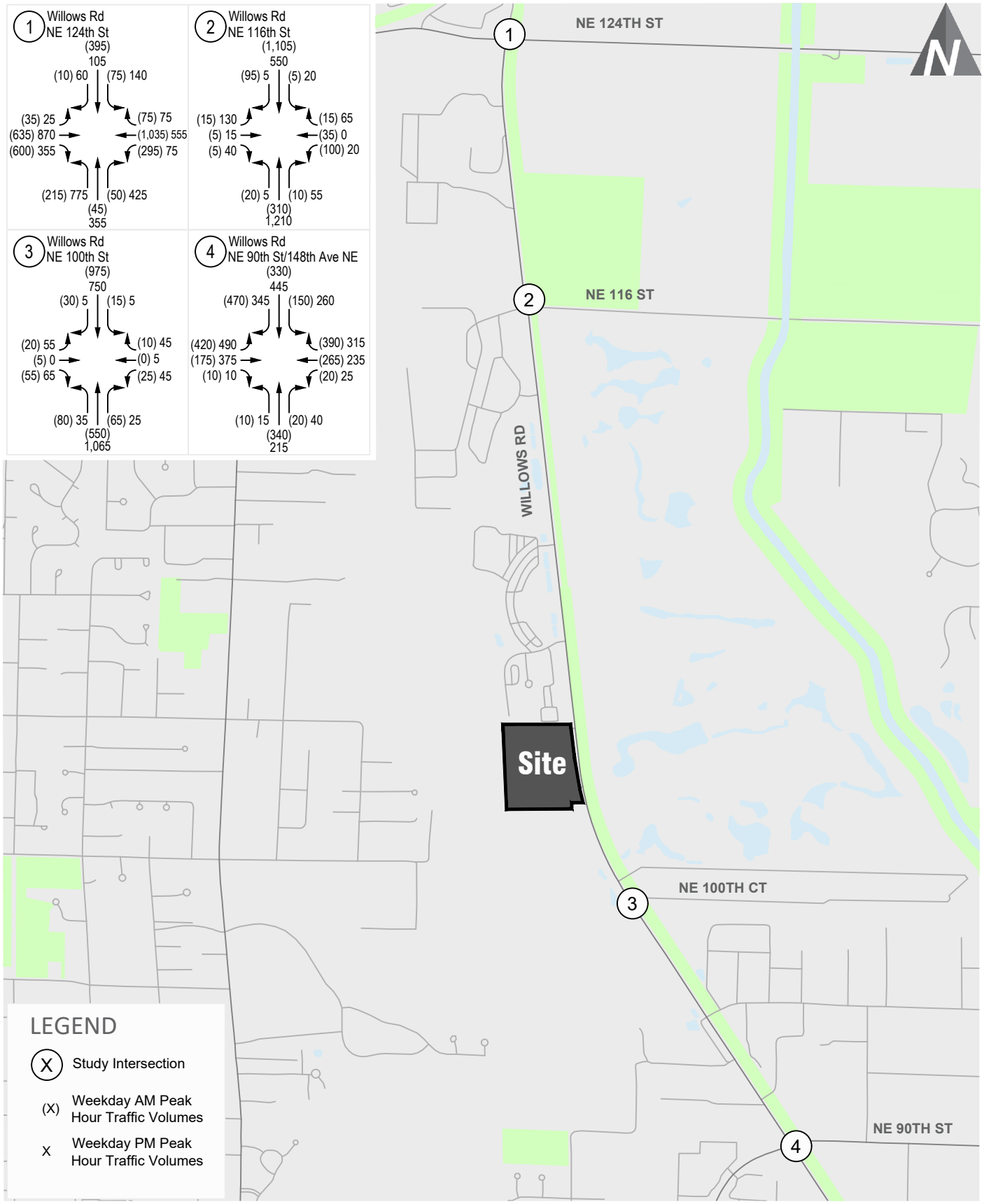
Route 243 is a commuter route that operates between Overlake Transit Center and Kenmore Park and Ride on weekdays only. The route provides service only during the AM peak period (5:30 a.m. – 7:00 a.m.) to Kenmore Park and Ride and PM peak period (5:30 p.m. – 7:00 p.m.) to Overlake Transit Center with 30-minute headways for both peak periods.

Route 244 is a commuter route that operates between Overlake Transit Center and Kenmore Park and Ride on weekdays only. The route provides service only during the AM peak period (6:30 a.m. – 8:30 a.m.) to Overlake Transit Center and PM peak period (4:15 p.m. – 6:15 p.m.) to Kenmore Park and Ride with 30-minute headways for both peak periods.

Route 930 is a commuter route that operates between Redmond Town Center and Kingsgate Park and Ride on weekdays only. The route provides service only during the AM peak period (6:00 a.m. – 9:30 a.m.) and PM peak period (2:30 p.m. – 6:30 p.m.). with 30-minute headways for both peak periods.

Traffic Volumes

Traffic counts at the study intersections were collected during the weekday AM and PM peak periods in June and October 2018. Detailed intersection traffic counts are included in Appendix A. Existing traffic volumes are shown in Figure 3. Traffic volumes were rounded to the nearest five vehicles since weekday volumes fluctuate day-to-day.



Existing Weekday AM and PM Peak Hour Traffic Volumes

FIGURE 3

Building X

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Jun 17, 2019 - 1:24pm polinab M:\17\1.17538.01 - Willows Building X\Graphics\1.17538.01 Willows X.dwg Layout: Existing Volumes

Traffic Operations

A level of service (LOS) analysis was conducted for the off-site study intersections for the weekday AM and PM peak hours.

The operational characteristics of an intersection are determined by calculating the intersection level of service (LOS). At signalized intersections, LOS is measured in average control delay per vehicle and is typically reported using the intersection delay. Traffic operations and average vehicle delay for an intersection can be described qualitatively with a range of levels of service (LOS A through LOS F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. Appendix B contains a detailed explanation of LOS criteria and definitions.

The study intersections are located within the City of Redmond jurisdiction with the exception of the Willows Road NE/NE 124th Street intersection, which is located within the City of Kirkland's jurisdiction. The City of Redmond and Kirkland both have a LOS D or better standard.

Weekday AM and PM peak hour traffic operations for existing conditions were evaluated at the study intersections based on the procedures identified in the *Highway Capacity Manual* (HCM) and were evaluated using *Synchro 10*. The most recent version of HCM 6th Edition was used to evaluate the study intersections. Signal timing settings were provided by the City of Redmond. Results for the existing and future without-project operations analyses are summarized in Table 2. Detailed LOS worksheets for each intersection analysis are included in Appendix C.

Table 2. Existing Peak Hour Level of Service Summary

		Weekday AM Peak Hour		Weekday PM Peak Hour	
Intersection	**Jurisdiction**	**LOS[1]**	**Delay[2]**	**LOS**	**Delay**
1. Willows Road NE / NE 124th St	Kirkland	D	49	D	45
2. Willows Road NE / NE 116th St	Redmond	C	23	B	17
3. Willows Road NE / 9900 Block	Redmond	B	11	B	12
4. Willows Road NE / 148th Ave NE	Redmond	D	47	D	45

1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (6th Edition).
2. Average delay in seconds per vehicle.

As shown in Table 2, all study intersections operate at the LOS D or better during the existing AM and PM peak hour and meet the LOS standards. During the weekday AM and PM peak hours congestion along the corridors results in rolling queues in the peak directions. This creates challenges for side-street traffic to access the Willows Road corridor.

Traffic Safety

Recent collision records were reviewed within the study area to identify existing traffic safety issues. The most recent three-year summary of accident data from the Washington State Department of Transportation (WSDOT) is for the period between January 1, 2016 and December 31, 2018. A summary of the total and average annual number of reported accidents at each study intersection and along the roadway segments in the study area are provided in Table 3.

The collision rate at the study intersections and along the roadway segments is also summarized in Table 3. The collision rate at the intersections is representative of the average number of collisions per one million entering vehicles (MEV) at each intersection. The collision rate along the roadway segments is representative of the average number of collisions per one million vehicle miles traveled (MEV). Intersections or segments with a rate greater than 1.0

collision per MEV or MVM are typically flagged for further investigation to determine whether an adverse condition exists.

Table 3. Three-Year Collision Summary – 2016 to 2018

Location	Collisions Per Year 2016	2017	2018	Annual Average	Collisions Per MEV[1]
Intersection					
1. Willows Road NE / NE 124th St	15	4	3	7.3	0.5
2. Willows Road NE / NE 116th St	3	2	0	1.7	0.2
3. Willows Road NE / 9900 Block	3	1	0	1.3	0.2
4. Willows Road NE / 148th Ave NE	4	4	3	3.7	0.4
Segment					**Collisions Per MVM[2]**
Willows Rd - NE 124th St to 116th St NE	4	9	4	5.7	1.6
Willows Rd - 116th St NE to 9900 Block	15	6	8	9.7	1.3
Willows Rd - 9900 Block to 148th Ave NE	7	13	8	9.3	2.1

1. MEV = one million entering vehicles
2. MVM = one million vehicle miles

As shown in Table 3, there was an average of less than 8 collisions per year and fewer than 1.0 collisions per MEV reported at the study intersections along Willows Road during the study period. The majority of collisions resulted in property damage only. The most frequent collision types were rear-end and angle collisions. There was 1 reported pedestrian and 1 reported bicyclist collision. The pedestrian collision occurred at the Willows Road NE/NE 90th Street intersection when a vehicle making a westbound right turn failed to yield to pedestrian. The bicyclist collision occurred at the Willows Road NE/NE 116th Street intersection when the bicyclist failed to yield to the vehicle. There were no reported fatalities within the study area.

In addition to the study intersections, the collisions along the Willows Road corridor were reviewed and showed an annual average of less than 10 collisions per year. Of the reported collisions, over 90 percent were rear-end collisions and the majority resulted in property damage only. The high number of rear-end and non-injury collisions is consistent with the rolling queue that exist along Willows Road during the peak periods. There were no fatalities or collisions involving pedestrians and bicyclists reported along the Willows Road roadway segments.

Forecasted Conditions

This section of the report documents the forecasted future (2023) conditions both without and with the proposed project. First, this section summarizes planned improvements, future without-project traffic volumes, and estimated traffic volumes generated by the proposed site are distributed and assigned to adjacent streets and intersections within the study area for the weekday AM and PM peak hour study period. Next, project trips are added to future without-project traffic volumes and any potential impact to traffic operations are identified. Site specific items are also discussed such as the operation of the site's access driveways and site circulation. Finally, traffic safety and non-motorized impacts are reviewed.

Planned Improvements

The planned vehicular, non-motorized, and transit improvements in the study area were reviewed and are summarized below.

Vehicular Improvements

Based on a review of the City of Redmond Six-Year Transportation Improvement Program (TIP) for 2019-2024, the following vehicular planned improvement projects were identified within the study area:

- **Willows Road Pavement Rehabilitation** – This project will repave Willows Road from NE 90th Street to NE 124th Street. It is anticipated this project would be completed by 2020. No changes to the existing roadway network are anticipated with this project.
- **Willows Road and NE 91st Street Intersection Realignment** – This project would realign the NE 91st Street/Willows Road intersection. This project is currently unfunded; however, is currently estimated to be completed by 2024, after the development of the proposed project. This realignment is not anticipated to result in changes to the existing roadway network.

Additionally, the City of Redmond Transportation Master Plan was reviewed for planned transportation improvements and one project was identified that will affect future traffic operations: Willows Road Widening South. The project includes widening the Willows Road corridor from NE 90th Street to NE 116th Street. The improvements include two through lanes in each direction with center turn lanes, bike and pedestrian improvements, transit amenities. The timing of the widening along Willows Road is unknown at this time and as such was not included in the future operations analyses.

In addition to the planned improvement projects identified above, the Proctor Willows pipeline development has identified an extension of the eastbound right-turn lane at the Willows Road/NE 124th Street intersection. This turn lane extension is to be constructed by 2021 and is included in the future operational analysis as described in greater detail in the traffic operations section below.

Non-Motorized Improvements

Based on a review of the City of Redmond Six-Year Transportation Improvement Program (TIP) for 2019-2024, the following non-motorized planned improvement projects were identified within the study area:

- **Willows Run Golf Course Mid-Block Crossing** – This project will include a mid-block crossing (10600 Block) located north of the project site with HAWK signals that will connect the existing golf course with office buildings to the west allowing access to transit stops. This project is expected to be completed in 2019.

- **Redmond Central Connector Phase III** – This project will extend the Redmond Central Connector from its current northern extent at NE 100th Court to NE 116th Street. This improvement is identified in the City of Redmond TIP and is anticipated to be completed by 2021.

In addition to the projects identified in the City of Redmond TIP, the Eastside Rail Corridor along Willows Road is planned to be extended from NE 116th Street to NE 124th Street and further north to 139th Avenue NE. The link between NE 124th Street and 139th Avenue NE is referred to as the missing link and is anticipated to be constructed by 2019. The completion of this trail will connect to the Cross-Kirkland Corridor Trail.

Transit Improvements

The final proposal of King County Metro's North Eastside Mobility Project has been submitted to King County Council in early 2019. The proposal if adopted would go into effect in March 2020, expanding and improving transit service in the north Eastside area. They included replacing Routes 243 and 244 with new and more efficient routes, better serving the area and providing additional service to Route 930 with peak and midday service between 6 a.m. and 7 p.m. with 30-minute headways.

Additionally, Sound Transit's Link Light Rail is planned to be extended to provide service to southern Redmond by 2023 as part of the East Link Extension and to Downtown Redmond by 2024 as part of the Downtown Redmond Link Extension. The Link Light Rail will provide connections to Seattle, SeaTac, Northgate, and Bellevue with additional extensions planned in the future as well. The nearest station to the project site will be located south of the 166th Avenue NE/SR 202 intersection, adjacent to the Redmond Central Connector Trail, approximately 2.5 miles southeast of the project site.

As noted above, the Redmond Central Connector adjacent to the proposed Downtown Redmond Link Light Rail station will be extended further north along the east side of the Willows Road corridor to NE 116th Street (the Redmond Central Connector Phase III), providing a continuous connection to the project site.

Future Without-Project Traffic Volumes

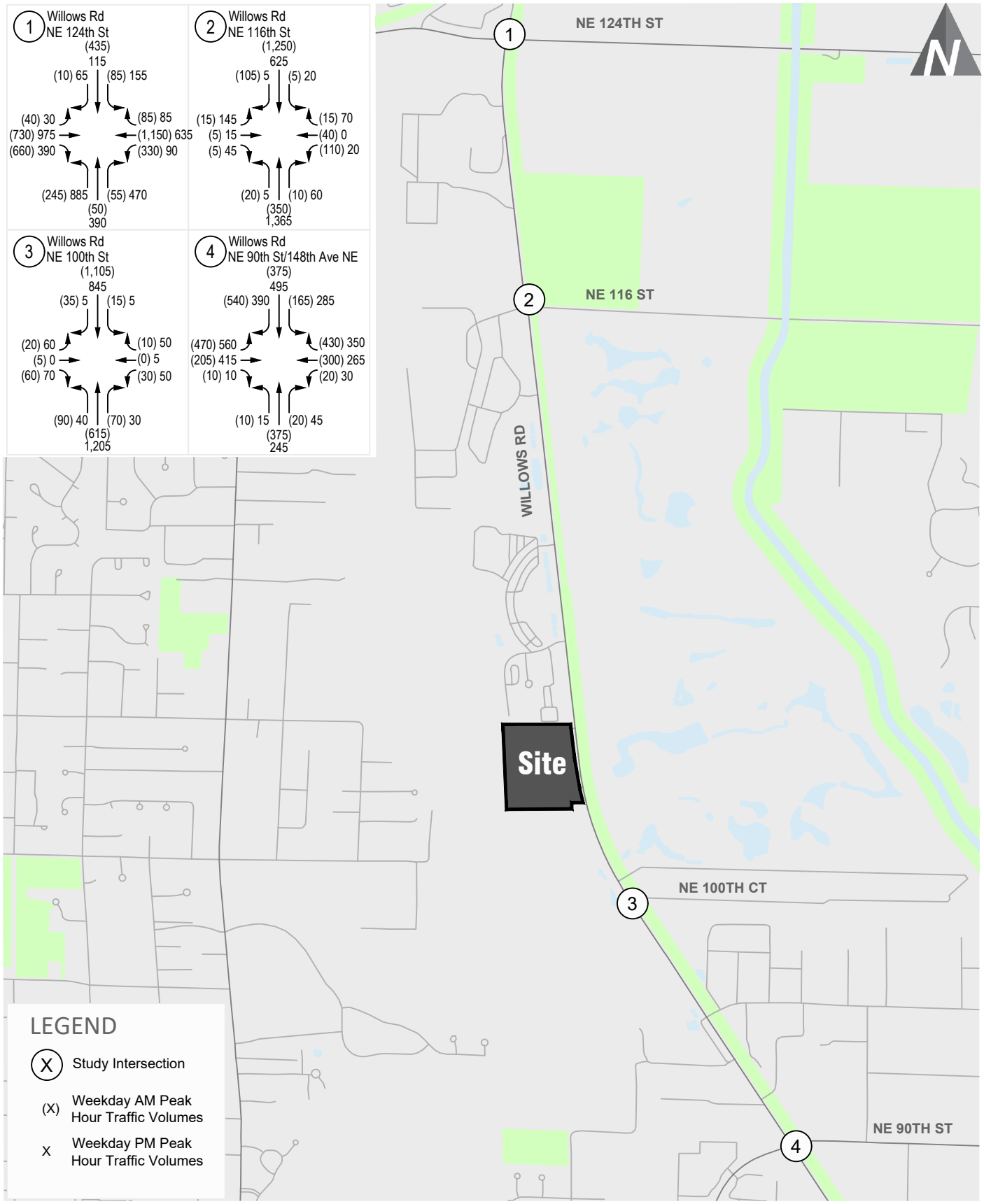
Future without-project traffic volumes for the 2023 horizon year were developed using the following assumptions:

- A 2 percent annual growth rate was applied to existing AM and PM peak hour traffic volumes. This growth rate is based on the City of Redmond's *Transportation Impact Analysis Outline* and coordination with City of Redmond staff.
- Weekday AM and PM peak hour project trips generated by two nearby "pipeline" developments (Willows Preparatory School[1] and Proctor Willows[2]) were included in the future traffic volumes as coordinated with City of Redmond staff.

Future (2023) without-project traffic volumes for the off-site study intersections are illustrated in Figure 4.

[1] Willows Preparatory School located southeast of the Redmond-Woodinville Road NE / NE 124th Street intersection. Traffic Impact Analysis prepared by Gibson Traffic Consultants. November 2016.

[2] *Proctor Willows Transportation Impact Analysis* (Transpo Group, March 2019).



Future (2023) Without-Project Weekday Peak Hour Traffic Volumes

FIGURE 4

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Trip Generation

Trip generation for the proposed project and existing use were calculated based on trip rates using the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition (2017). As noted previously, the proposed project would include 339,010 sf office and research and development lab spaces. ITE Office (Land Use #710) land use was assumed for the entire project. No reduction was taken for the lab areas which typically have a lower density and thus trip rate in the ITE Trip Generation Manual, resulting in a conservative trip generation estimate. The existing approximately 37,400 sf office building would be removed with the development of the project and the trip generation for that use was estimated based on ITE trip generation Office (Land Use #710). The total site generation for the north parcel as well as the net new weekday daily and weekday AM and PM peak hour vehicle trip generation for the proposed project is summarized in Table 4.

Table 4. Estimated Weekday Vehicle Trip Generation

			AM Peak-Hour Trips			PM Peak-Hour Trips		
Land Use	**Size**	**Daily Trips[1]**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Proposed Use								
Office	339,010 sf	3,468	297	48	345	58	305	363
Existing Use								
Office	37,408 sf	408	53	9	62	7	38	45
Net New Vehicle Trips		**3,060**	**244**	**39**	**283**	**51**	**267**	**318**

Notes: sf = square-feet
1. Daily and peak hour trip generation was based on ITE *Trip Generation Manual* (10th Edition, 2017). The equation was used for the analysis, consistent with the ITE Trip Generation procedure outlined in the *Trip Generation Handbook* (3rd Edition, 2017).

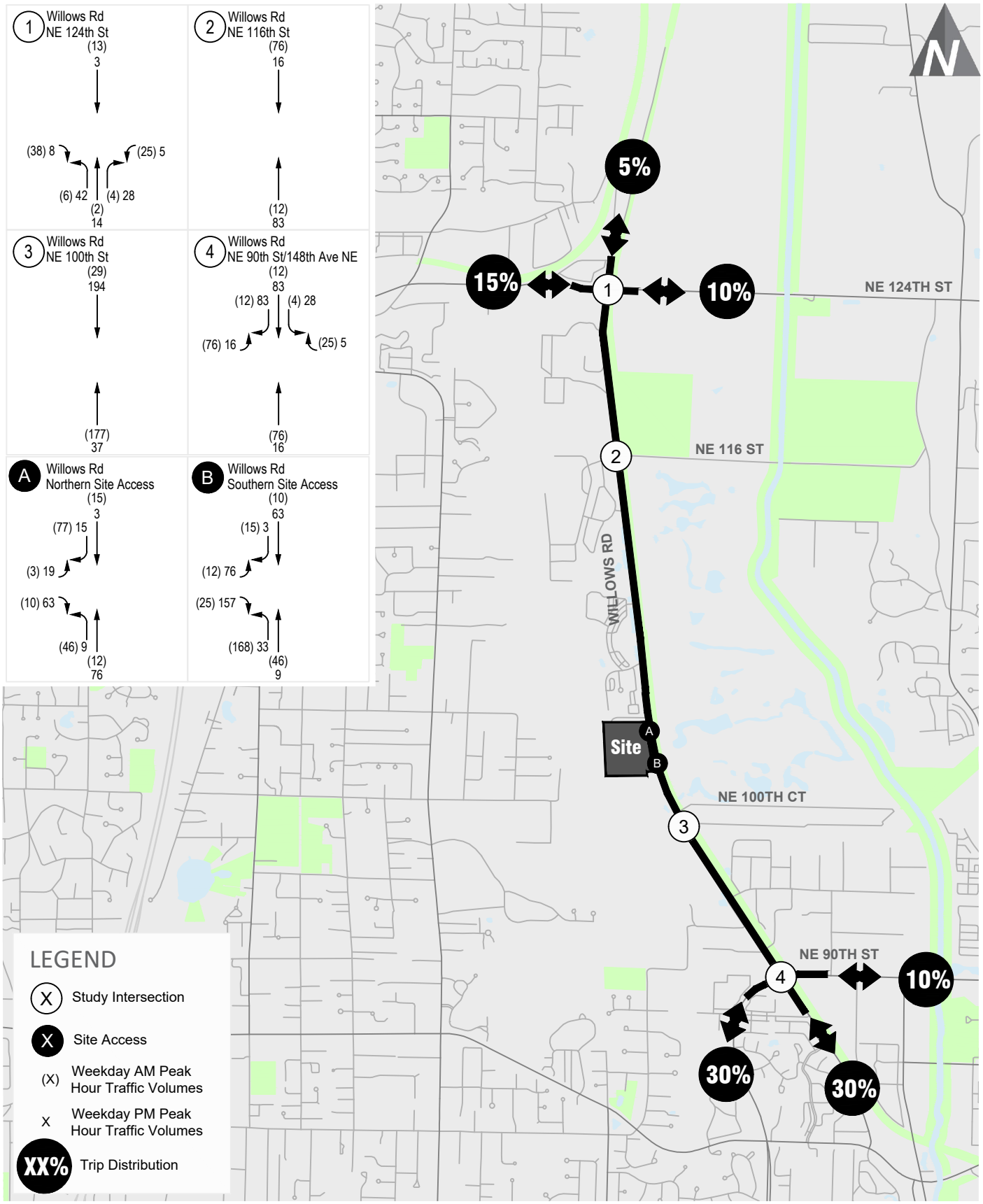
As shown in Table 4, the project is estimated to generate 283 and 318 net new weekday trips during the weekday AM and PM peak hours, respectively.

Trip Distribution & Assignment

The trip distribution for the project was determined by surveying existing travel patterns to/from the existing Oculus Origin site located approximately a quarter mile south of the proposed site.[3] The traffic counts showed approximately 30 percent of the trips are oriented to/from the north along Willows Road and 70 percent of the trips are oriented to/from the south along Willows Road (see Figure 5). Note that this site is shared by other office tenants, so this represents a mix of users.

To validate these trip distribution findings, the residence location of existing Oculus employees was obtained, which is shown in Appendix D. The general distribution of residents showed approximately 35 percent of the trips are oriented to/from the north along Willows Road and 65 percent of the trips are oriented to/from the south along Willows Road, providing similar results to the estimated trip distribution based on traffic counts. However, as the residence-based trip distribution will vary based on commuting choices such as decision making based on congestion, the project distribution based on the actual traffic counts was assumed for the analysis.

[3] The Oculus Origin site is located southwest of the Willows Road/NE 100th Court intersection. Weekday AM and PM peak period traffic volumes to/from the two driveways adjacent to the site were collected in June 2018.



Project Trip Distribution and Weekday Peak Hour Trip Assignment

Building X

FIGURE 5

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The anticipated weekday AM and PM peak hour net new vehicle trip generation was assigned to the street network and the study intersections based on the distribution patterns and site accesses as described above. The weekday AM and PM peak hour project trip assignment is shown in Figure 5.

Future With-Project Traffic Volumes

The project traffic was added to future without-project weekday AM and PM peak hour traffic volumes to form the basis of the with-project analysis. The resulting future (2023) with-project traffic volumes for the weekday AM and PM peak hours are shown on Figure 6. Note that the existing driveway trips to/from the site were mainlined under future with-project conditions to account for the southern on-site building remaining with the development of the project.

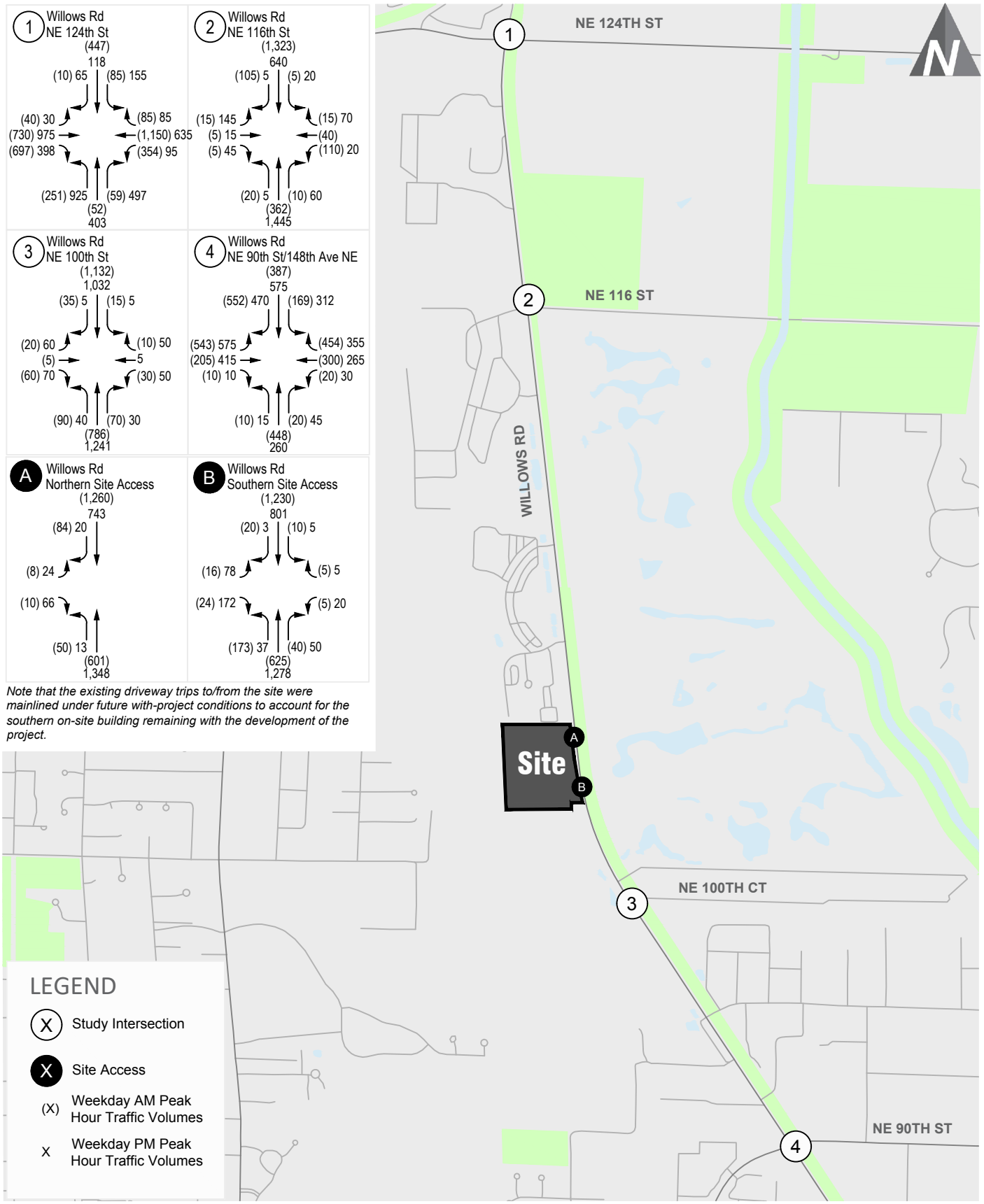
Table 5 summarizes the project traffic volume impact at the study intersections during the weekday AM and PM peak hours.

Table 5. Future (2023) Weekday Peak Hour Traffic Volume Impacts at Study Intersections

	AM Peak Hour				PM Peak Hour			
Intersection	**2023 Without-Project TEV**	**Project Trips**	**2023 With-Project TEV**	**Project Share**	**2023 Without-Project TEV**	**Project Trips**	**2023 With-Project TEV**	**Project Share**
1. Willows Rd NE / NE 124th St	3,875	85	3,960	2.1%	4,285	96	4,381	2.2%
2. Willows Rd NE / NE 116th St	1,930	85	2,015	4.2%	2,375	95	2,470	3.8%
3. Willows Rd NE / 9900 Block	2,055	198	2,253	8.8%	2,365	223	2,588	8.6%
4. Willows Rd NE / 148th Ave NE	2,920	198	3,118	6.4%	3,105	222	3,327	6.7%

Note: TEV = Total Entering Vehicles

As shown in Table 5, the project share at the off-site study intersections is estimated to be approximately 9 percent or less of future traffic volumes during the weekday AM and PM peak hour. Traffic volumes typically fluctuate day-to-day by five to ten percent depending on factors such as the day of the week, weather conditions, and traffic conditions elsewhere in the surrounding street network. This increase in traffic volumes related to project traffic falls within these normal fluctuations and will likely go unnoticed by the majority of roadway users in the study area.



Note that the existing driveway trips to/from the site were mainlined under future with-project conditions to account for the southern on-site building remaining with the development of the project.

Future (2023) With-Project Weekday Peak Hour Traffic Volumes

FIGURE 6

Building X

transpogroup

Oct 14, 2019 - 4:37pm francescal M:\17\1.17538.01 - Willows Building X\Graphics\1.17538.01 Willows X.dwg Layout: Future with project

Future Traffic Operations

Traffic operations at the study intersections were evaluated for future 2023 conditions based on the same methodologies and intersection parameters, such as channelization, intersection control, and signal timing, consistent with those used in the evaluation of existing conditions with the following exceptions:

- The Proctor Willows TIA identified an eastbound right-turn lane extension at the Willows Road/NE 124th Street intersection, extending the existing eastbound right-turn lane to a total of 700 feet.
- The splits and offsets of the coordinated signals along Willows Road at the 9900 Block and 148th Avenue NE intersections were updated under the future with-project conditions to accommodate the addition of the proposed signalized southern site access.

The future LOS at the study intersections relative to the without-project conditions are summarized in Table 6 to identify project-related impacts. Detailed LOS worksheets for 2023 without- and with-project traffic conditions are included in Appendix C of this report.

Table 6. Future (2023) Peak Hour Level of Service Summary

		2023 Without-Project		2023 With-Project	
Intersection	**Jurisdiction**	**LOS[1]**	**Delay[2]**	**LOS**	**Delay**
Weekday AM Peak Hour					
1. Willows Road NE / NE 124th St	Kirkland	E	62	E	71
2. Willows Road NE / NE 116th St	Redmond	D	39	D	51
3. Willows Road NE / 9900 Block	Redmond	B	14	A	7
4. Willows Road NE / 148th Ave NE	Redmond	D	52	D	53
Weekday PM Peak Hour					
1. Willows Road NE / NE 124th St	Kirkland	D	49	D	50
2. Willows Road NE / NE 116th St	Redmond	B	19	B	19
3. Willows Road NE / 9900 Block	Redmond	C	22	B	13
4. Willows Road NE / 148th Ave NE	Redmond	D	49	D	50

1. Level of service based on *2010 Highway Capacity Manual* methodology
2. Average delay in seconds per vehicle

As shown in Table 6, all intersections are forecast to operate at LOS D or better under future without and with project conditions during the weekday AM and PM peak hours meeting the City of Redmond LOS D standard with the exception of the Willows Road NE/NE 124th Street intersection during the weekday AM peak hour discussed below.

During the AM Peak Hour, the Willows Road NE/NE 124th St intersection is forecast to operate at LOS E under both future without-project and with-project conditions. With the project, approximately 9 seconds of delay are forecast to be added relative to future without-project conditions. The project share at this intersection is estimated to be approximately 2 percent during the weekday AM peak hour (see Table 5). Per City of Kirkland Traffic Impact Analysis Guidelines, mitigation for impacts at intersections are required when an intersection performs at LOS E or LOS F and the project's proportional share of daily traffic is greater than 15 percent or 5 percent, respectively. As the proportionate share at the Willows Road NE/NE 124th St intersection is estimated to be approximately 2 percent, no mitigation is necessary.

Site Access Analysis

Access to the site is proposed via the two existing driveways to the site located along Willows Road. The driveways are proposed to remain full access with a traffic signal installed at the southern access that will be coordinated with the existing signals along the Willows corridor. The northern driveway on Willows Road would provide shuttle access to/from the shuttle station, while the southern driveway would provide the primary parking and ride hail access; however, access to the parking areas is provided via both driveways.

The following section summarizes the site access analysis for the project including traffic signal warrants, traffic operations, and site circulation. Additionally, the traffic operations of the site accesses are evaluated under the post-Willows Road widening condition.

Traffic Signal Warrants

A signal warrant analysis was completed for the proposed signalization of the southern access using the HCS7 Software. The HCS software evaluates the Manual on Uniform Traffic Control Devices (MUTCD, 2009) four-hour and eight-hour traffic volume signal warrants. The analysis was conducted with the Building X trip generation assumptions as shown in Table 4 and the trip assignment as shown in Figure 5. Hourly traffic volumes were developed using the weekday AM and PM peak hour traffic volumes and apply the hourly distribution from the National Cooperative Highway Research Program (NCHRP) Report 365 Travel Estimation Techniques for Urban Planning. Both the four-hour and eight-hour traffic volume signal warrants at the southern access were shown to be met and are included in Appendix E.

Traffic Operations

The site driveways were evaluated consistent with the methodology as described above for the off-site study intersections. As noted above, the northern driveway is proposed to continue to operate as a full-access two-way stop-controlled intersection. At unsignalized side-street, stop-controlled intersections, LOS is measured by the average delay on the worst-movement of the intersection. The southern access to the site aligned with a Willows Run Golf Complex access is proposed to be signalized. The signal was assumed to be coordinated along the Willows Road corridor with cycle lengths matching the existing peak hour cycle lengths. The future with-project operations at the site driveways during the weekday AM and PM peak hours are summarized in Table 7. Detailed LOS worksheets are included in Appendix C of this report.

Table 7. Future (2023) With-Project Site Access Peak Hour Level of Service Summary

Site Access	Traffic Control	Weekday AM Peak Hour			Weekday PM Peak Hour		
		LOS[1]	Delay[2]	WM[3]	LOS	Delay	WM
A. Willows Rd NE / Northern Site Access	TWSC	D	35	EB	D	29	EB
B. Willows Rd NE / Southern Site Access	Signal	C	21	-	D	52	-

Note: TWSC = Two-Way Stop-Controlled
1. Level of service based on *2010 Highway Capacity Manual* methodology
2. Average delay in seconds per vehicle
3. Worst movement reported for unsignalized two-way stop controlled intersections. EB = eastbound movement.

As shown in Table 7, the site driveways are forecast to operate at LOS D or better during the weekday AM and PM peak hours.

In addition to level of service at the site driveways, the outbound queues from both driveways were also evaluated. The 95th percentile queues were evaluated using Synchro, consistent with the LOS analysis. The detailed queuing worksheets are also included in Appendix C.

The eastbound 95th percentile queues at the northern driveway were estimated to be 45 feet or less during the weekday peak hours. At the southern driveway, the eastbound left-turn 95th

percentile queues were estimated to be 110 feet or less in the peak hours whereas the eastbound through/right-turn queues were estimated to be 75 feet or less during the peak hours. The channelization of the internal roadway will be reviewed in detail during the Consolidated Civil Review (CCR) process.

Site Circulation

A circulation plan showing shuttle and auto routing patterns is shown in Figure 7. As shown in Figure 7, the northern driveway off of Willows Road would provide shuttle access to/from the site, while the southern driveway would provide the primary parking and ride hail access. However, access to the parking areas is provided via both driveways. Additional shuttle access is proposed via the connection to the northern development at the northwest corner of the site. The autoturns to/from the accesses are included in Appendix F.

Trucks accessing the site loading dock will access the site via the north driveway. The turning maneuvers are shown in Appendix G.

At the request of the City, a circulation analysis for an SU-30 was conducted to confirm accessibility for an aid car. A dedicated parking stall is provided in the first level of parking. An analysis showing the route from Willows Road to the parking garage is provided in Appendix H.

The non-motorized site circulation figure (Figure 8), shows a shared use-path for the bicyclists and pedestrians connecting from Willows Road to the building between the two site accesses. Additionally, bike lanes are provided along Willows Road. Northbound cyclists would use the proposed traffic signalized access by either using the northbound left-turn pocket or utilizing the crosswalk.

Vehicular Site Circulation

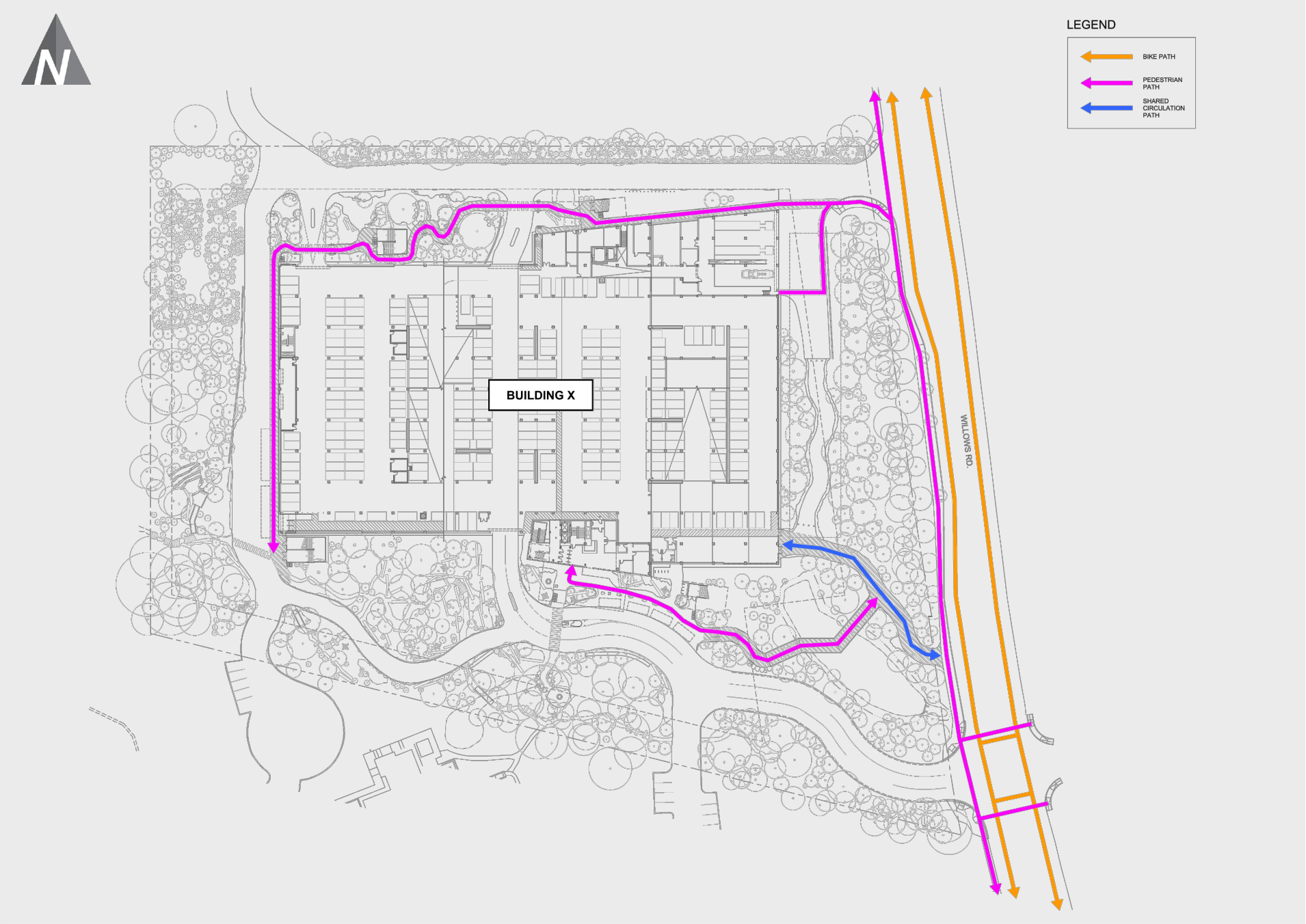
Building X

FIGURE

7

transpogroup

Oct 14, 2019 - 4:35pm francescal M:\17\1.17538.01 - Willows Building X\Graphics\1.17538.01 Willows X.dwg Layout: Veh Circulation



Non-Motorized Site Circulation

Building X

FIGURE

8

transpogroup

Oct 14, 2019 - 11:37am francescal M:\17\1.17538.01 - Willows Building X\Graphics\1.17538.01 Willows X.dwg Layout: Non-Mot Circulation

Post Willows Road Widening

An additional operations evaluation including both the LOS and 95th percentile queues was conducted at the site driveways reflecting the future widening of Willows Road to a five-lane section.[4] The methodology and intersection parameters assumed for the post Willows Road widening analysis was consistent with the operations analysis above including the northern driveway being side-street stop sign controlled and the southern driveway being signalized. Additionally, the future (2023) with-project peak hour traffic volumes were assumed for the analysis. The future with-project operations at the site driveways during the weekday AM and PM peak hours are summarized in Table 8. Detailed LOS worksheets are included in Appendix C.

Table 8. Post Willows Road Widening Future (2023) With-Project Site Access Peak Hour Level of Service Summary

Site Access	Traffic Control	Weekday AM Peak Hour			Weekday PM Peak Hour		
		LOS[1]	Delay[2]	WM[3]	LOS	Delay	WM
A. Willows Rd NE / Northern Site Access	TWSC	D	31	EB	C	18	EB
B. Willows Rd NE / Southern Site Access	Signal	A	7		B	13	

Note: TWSC = Two-Way Stop-Controlled
1. Level of service based on *2010 Highway Capacity Manual* methodology
2. Average delay in seconds per vehicle
3. Worst movement reported for unsignalized two-way stop controlled intersections. EB = eastbound movement.

As shown in Table 8, the site driveways are forecast to operate at LOS D or better during the weekday AM and PM peak hours with the widened Willows Road section.

The eastbound 95th percentile queues at the northern driveway were estimated to be up to 25 feet during the weekday peak hours. At the southern driveway, the eastbound left-turn 95th percentile queues were estimated to be 110 feet or less in the peak hours whereas the eastbound through/right-turn queues were estimated to be 75 feet or less during the peak hours.

Traffic Safety

Traffic generated by the proposed development would likely result in a proportionate increase in the probability of traffic accidents. It is unlikely, however, that this traffic would create a safety hazard or significantly increase the number of reported accidents at the locations within the project vicinity, based on the minimal increase in overall traffic volumes and the impacts to intersection operations.

The Willows Road corridor was shown to have an annual average of less than 10 collisions reported per year with over 90 percent being rear-end collisions and the majority resulting in property damage only. The high number of rear-end, low severity collisions is consistent with the rolling queue that exist along Willows Road during the peak periods. There is a long-term planned improvement to widen Willows Road, increasing the capacity of the roadway and likely reducing the number of collisions.

Non-Motorized Impacts

Pedestrians and bicyclists are anticipated to account for a share of the trips generated by the proposed project as the project. The project would install at a traffic signal at the southern site access providing signalized crossings for pedestrians and bicyclists across the Willows Road corridor. Additionally, the project will provide a shared use path connecting Willows Road to the

[4] The detailed physical improvements with the Willows widening is included in the engineering drawings.

project building. The project will include significant bicycle facilities on-site to promote non-motorized travel including bike lockers and shower/locker facilities.

Parking Demand

The parking supply, City of Redmond parking code requirements, and parking demand estimate for the proposed development are summarized in the following sections. Consistent with the trip generation estimates the peak parking demand has been estimated assuming the building is 100% office space. This assumption is conservative for the following reasons:

1. The building will include substantial lab space which has a lower employment density
2. The project has a SOV goal of no more than 65% and a corresponding TMP which outlines strategies and contingency measures should they not achieve this level
3. The employees have access to an extensive privately operated shuttle system that provides broader commuter access as well as inter-office connectivity.

Parking Supply

The project includes 794 vehicle parking stalls. Access to the vehicular parking will be provided via both the northern and southern driveways; however, the southern driveway will provide the primary parking and ride hail access.

Additionally, the project is proposing to include a total of 145 bicycle parking stalls (136 long-term and 9 short term stalls).

City of Redmond Vehicular Parking Code Requirements

The proposed project is required to provide a minimum and maximum number of vehicle parking stalls to meet the City of Redmond Zoning Code. The proposed project is located within the Business Park (BP) zone and requirements for parking are outlined RZC 21.12.070.[5] Minimum and maximum parking supply requirements summarized in Table 9. Note that This analysis has been updated to reflect the current proposal that includes a 339,010 sf building.

Table 9. Code Required Parking

Land Use	Size	Minimum Parking Rate[1]	Maximum Parking Rate[1]	Minimum Parking Required	Maximum Parking Allowed
Office	339,010 sf	2.0 stalls/1,000 sf gfa	3.0 stalls/1,000 sf gfa	678 stalls	1,017 stalls

Note: sf = square feet, gfa = gross floor area.
1. Table 21.14.030C Redmond Zoning Code

As shown in Table 9, the proposed project supply of 794 parking stalls falls within the City's code required minimum and maximum parking supply range.

Parking Demand

Parking demand for the project was estimated based on ITE's Parking Generation (5th Edition, 2019) assuming the General Office Building (LU #710) land use. Assuming the entire proposed development as the office land use, consistent with the trip generation analysis, provides a conservative estimate for the development as the project is estimated to include office space and research and development lab spaces. Based on a peak parking demand rate of 2.39 vehicles per 1,000 sf, up to 810 vehicles are estimated for the proposed 339,010 sf office building. As noted, the peak demand exceeds the supply by 16 vehicles. As noted previously,

[5] Table 21.14.030C

this analysis should be considered conservative as it does not account for the lab space internal to the building and thus overstates the projected demand.

The project is required to implement a Transportation Management Program (TMP) that includes monitoring of both employee commute patterns and mode choices as well as parking utilization. Should the project show that it is exceeding the parking supply through the surveys, then the contingency measures outlined in the TMP that include securing off-site parking could be triggered. As such, no impacts are anticipated with the project.

Mitigation Measures

Based on the results of the traffic analysis, no intersection improvements or mitigation has been identified. The project will be mitigating project impacts through both a Transportation Management Program (TMP) and payment of Transportation Impact Fees, both of which are described in the following sections.

Transportation Management Program

A transportation management program will be required for the building. Program elements for the project are anticipated to include but are not limited to the following:

- Preferential parking for high occupancy vehicles (HOVs) (e.g., carpools and vanpools)
- Bicycle facilities
- Ridematching
- Incentives for employees who use alternatives to driving alone
- Promotions of commuting alternatives
- Transportation information center

With the proposed transit infrastructure, as well as dedicated bicycle access with secured parking, the project sponsor can commit to an ambitious Transportation Management Program (TMP), including a single-occupant vehicles (SOVs) target of 65 percent or less. A proposed TMP has been submitted to the City under a separate cover.

Transportation Impact Fee

The City of Redmond transportation impact fees (TIF) will be estimated based on the *City of Redmond Impact Fee Schedule* effective at the time of building permit issuance. The estimated TIF for the proposed project based on 2019 fees with credit taken for the removal of the existing 37,400 sf office building is shown in Table 10.

Table 10. Transportation Impact Fees

Land Use	Size	Transportation Impact Fee Rate[1]	Estimated Fee
Proposed			
Office	339,010 sf	$17.48 / sf of GLFA	$5,925,894.80
Existing			
Office	37,400 sf	$23.32 / sf of GLFA	$872,168.00
Total Estimated Fee			**$5,053,726.80**

1. *City of Redmond Impact Fees Schedule* (12/10/2018) effective January 1, 2019 – December 31, 2019 reflecting the "rest of city" area.

As shown in Table 10, the TIF for the project is estimated to be $5,053,726.80. This estimate is preliminary and City staff will confirm the calculation of the required traffic impact fee at the time of building permit issuance.

Summary of Analysis and Mitigation

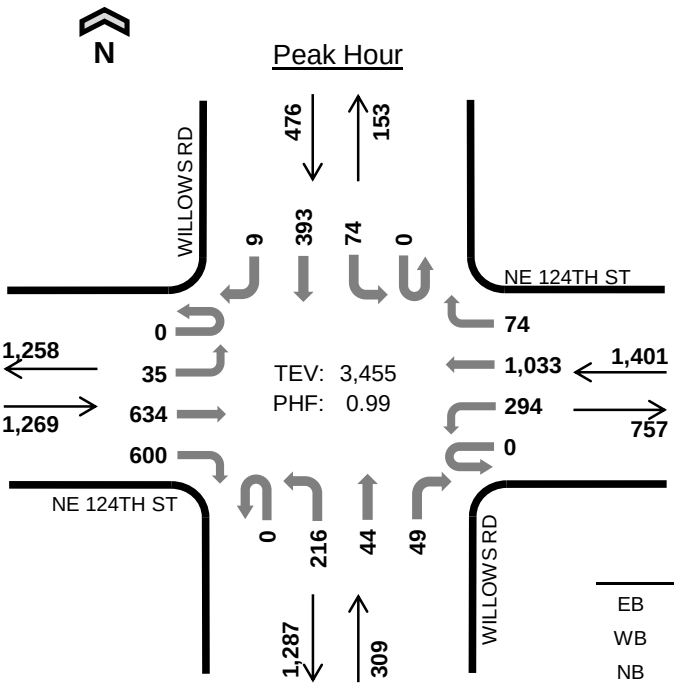
This analysis summarizes the project traffic impacts of the proposed Building X development located west of Willows Road NE between NE 116th Street and 9900 Block-NE 100th Court, across from the Willows Run Golf Complex in the City of Redmond. A summary of the analysis and mitigation are provided below:

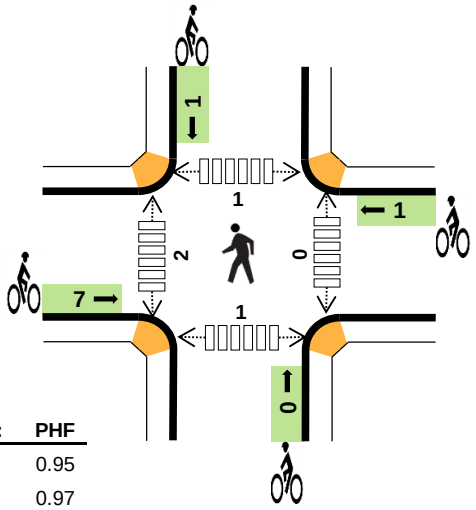
- The proposed project would construct a 339,010 sf building including office space and research and development lab spaces. The existing approximately 37,400 sf office building would be removed with the development of the project.
- Access to the site is proposed via the two existing driveways to the site located along Willows Road. The driveways are proposed to remain full access with a traffic signal installed at the southern access that will be coordinated with the existing signals along the Willows corridor. The northern driveway off of Willows Road would provide shuttle access to/from the shuttle station, while the southern driveway would provide the primary parking and ride hail access; however, access to the parking areas is provided via both driveways.
- The proposed development is expected to generate approximately 3,060 net new daily trips with 283 trips occurring during the weekday AM peak hour and 318 trips occurring during the weekday PM peak hour.
- All intersections are forecast to operate at LOS D or better under future without and with project conditions during the weekday AM and PM peak hours meeting the City of Redmond LOS D standard with the exception of the Willows Road NE/NE 124th Street intersection during the weekday AM peak hour.
- The Willows Road NE/NE 124th St intersection is forecast to operate at LOS E under both future without-project and with-project conditions during the weekday AM peak hour. With the project, approximately 9 seconds of delay are forecast to be added relative to future without-project conditions. The project share at this intersection is estimated to be approximately 2 percent during the weekday AM peak hour.
- Both site driveways are forecast to operate at LOS D or better during the weekday AM and PM peak hours. Additionally, post the Willows Road widening assuming a typical 5-lane section with no southbound right-turn pocket at either the north or south driveways, the site driveways are forecast to operate at LOS D or better during the weekday AM and PM peak hours.
- The project includes 794 vehicle parking stalls and 145 bicycle parking stalls. The proposed vehicular parking supply meets the City of Redmond parking code requirements.
- A proposed TMP has been submitted to the City under a separate cover. With the proposed transit infrastructure, as well as dedicated bicycle access with secured parking, the project sponsor can commit to an ambitious Transportation Management Program (TMP), including a single-occupant vehicles (SOVs) target of 65 percent or less.
- The peak parking demand of 810 vehicles exceeds the supply by 16 vehicles. As noted previously, this analysis should be considered conservative as it does not account for the lab space internal to the building and thus overstates the projected demand. Should the project show that it is exceeding the parking supply through required TMP surveys, then the contingency measures outlined in the TMP that include securing off-site parking could be triggered.
- The required traffic impact fee for the project will be calculated by City staff at the time of building permit issuance.

Appendix A: Traffic Counts

WILLOWS RD
NE 124TH ST

Date: Tue, Oct 09, 2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM





	HV %:	PHF
EB	2.3%	0.95
WB	1.3%	0.97
NB	4.2%	0.95
SB	1.1%	0.85
TOTAL	1.9%	0.99

Two-Hour Count Summaries

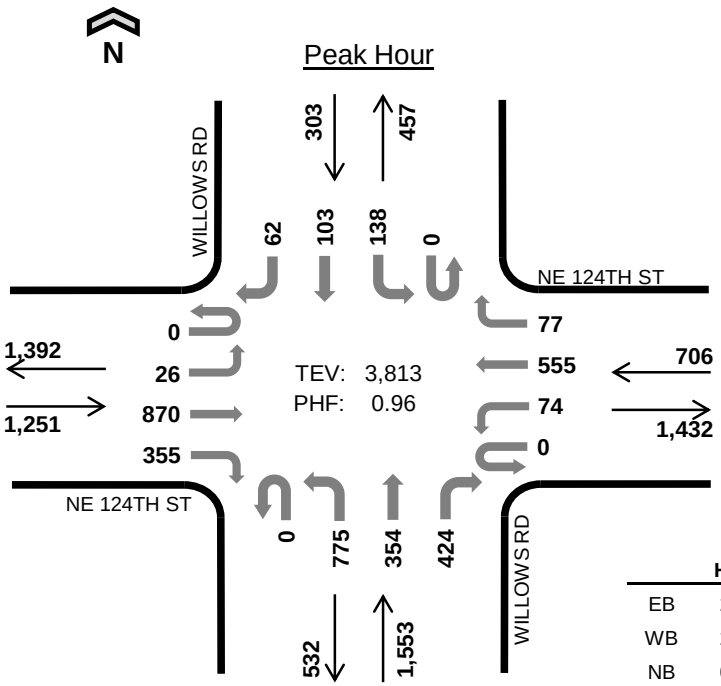
Interval Start	NE 124TH ST Eastbound				NE 124TH ST Westbound				WILLOWS RD Northbound				WILLOWS RD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	8	91	215	0	86	160	14	0	44	10	5	0	11	58	0	702	0
7:15 AM	0	8	120	198	0	86	222	8	0	58	8	13	0	13	56	2	792	0
7:30 AM	0	9	128	151	0	100	226	17	0	44	7	8	0	15	94	0	799	0
7:45 AM	0	9	149	174	0	79	208	22	0	58	12	11	0	14	84	3	823	3,116
8:00 AM	**0**	**12**	**161**	**162**	**0**	**78**	**262**	**22**	**0**	**51**	**10**	**13**	**0**	**14**	**86**	**2**	**873**	3,287
8:15 AM	**0**	**9**	**149**	**141**	**0**	**84**	**244**	**17**	**0**	**51**	**14**	**11**	**0**	**19**	**118**	**3**	**860**	3,355
8:30 AM	**0**	**6**	**157**	**149**	**0**	**65**	**256**	**23**	**0**	**55**	**12**	**14**	**0**	**22**	**98**	**3**	**860**	3,416
8:45 AM	**0**	**8**	**167**	**148**	**0**	**67**	**271**	**12**	**0**	**59**	**8**	**11**	**0**	**19**	**91**	**1**	**862**	**3,455**
Count Total	0	69	1,122	1,338	0	645	1,849	135	0	420	81	86	0	127	685	14	6,571	0
Peak Hour	**0**	**35**	**634**	**600**	**0**	**294**	**1,033**	**74**	**0**	**216**	**44**	**49**	**0**	**74**	**393**	**9**	**3,455**	**0**

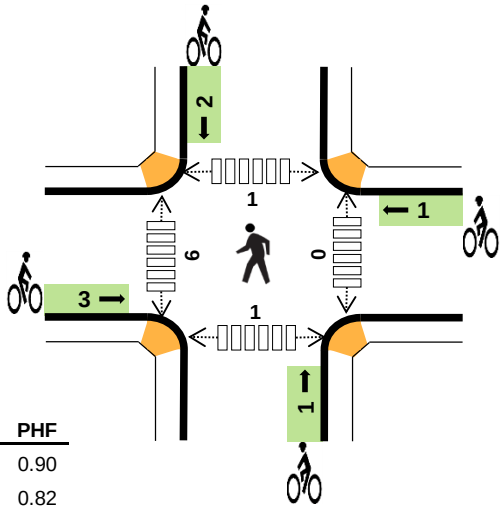
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	2	0	6	0	*8*	0	0	0	0	*0*	0	1	0	0	*1*
7:15 AM	4	6	11	0	*21*	0	0	0	1	*1*	0	1	0	1	*2*
7:30 AM	5	4	5	0	*14*	0	0	0	0	*0*	0	0	0	0	*0*
7:45 AM	4	5	8	0	*17*	1	2	0	0	*3*	0	0	0	0	*0*
8:00 AM	**9**	**6**	**2**	**0**	***17***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**1**	**0**	*1*
8:15 AM	**6**	**3**	**1**	**3**	***13***	**2**	**0**	**0**	**0**	***2***	**0**	**2**	**0**	**0**	*2*
8:30 AM	**6**	**2**	**6**	**1**	***15***	**4**	**1**	**0**	**0**	***5***	**0**	**0**	**0**	**0**	*0*
8:45 AM	**8**	**7**	**4**	**1**	***20***	**1**	**0**	**0**	**1**	***2***	**0**	**0**	**0**	**1**	***1***
Count Total	44	33	43	5	*125*	8	3	0	2	*13*	0	4	1	2	*7*
Peak Hour	**29**	**18**	**13**	**5**	***65***	**7**	**1**	**0**	**1**	***9***	**0**	**2**	**1**	**1**	***4***

WILLOWS RD
NE 124TH ST

Date: Thu, Jun 14, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM





	HV %:	PHF
EB	2.5%	0.90
WB	2.5%	0.82
NB	0.8%	0.87
SB	2.3%	0.91
TOTAL	1.8%	0.96

Two-Hour Count Summaries

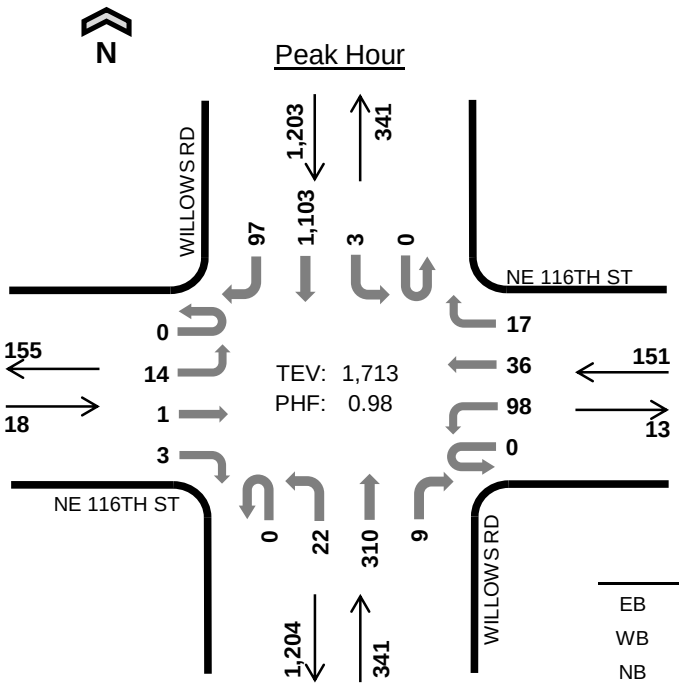
Interval Start	NE 124TH ST Eastbound				NE 124TH ST Westbound				WILLOWS RD Northbound				WILLOWS RD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**6**	**213**	**93**	**0**	**19**	**131**	**18**	**0**	**237**	**90**	**117**	**0**	**30**	**23**	**19**	**996**	0
4:15 PM	**0**	**9**	**245**	**94**	**0**	**26**	**164**	**25**	**0**	**179**	**82**	**102**	**0**	**36**	**19**	**11**	**992**	0
4:30 PM	**0**	**8**	**214**	**89**	**0**	**13**	**133**	**16**	**0**	**205**	**92**	**102**	**0**	**40**	**25**	**17**	**954**	0
4:45 PM	**0**	**3**	**198**	**79**	**0**	**16**	**127**	**18**	**0**	**154**	**90**	**103**	**0**	**32**	**36**	**15**	**871**	**3,813**
5:00 PM	0	5	262	88	0	17	111	20	0	169	70	99	0	41	28	23	933	3,750
5:15 PM	0	9	244	87	0	24	134	16	0	209	83	102	0	30	16	15	969	3,727
5:30 PM	0	7	273	92	0	18	154	21	0	181	75	87	0	21	24	9	962	3,735
5:45 PM	0	7	221	62	0	16	129	26	0	194	80	125	0	22	20	11	913	3,777
Count Total	0	54	1,870	684	0	149	1,083	160	0	1,528	662	837	0	252	191	120	7,590	0
Peak Hour	**0**	**26**	**870**	**355**	**0**	**74**	**555**	**77**	**0**	**775**	**354**	**424**	**0**	**138**	**103**	**62**	**3,813**	**0**

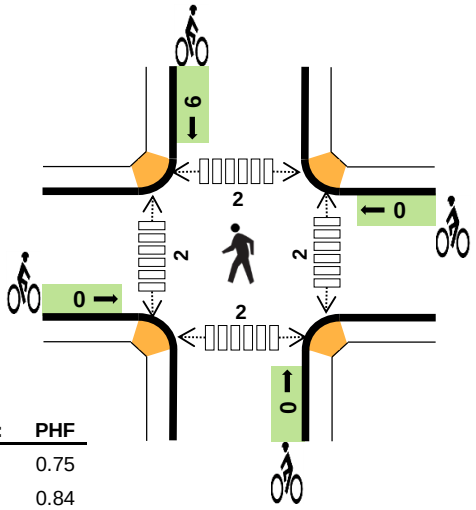
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**7**	**7**	**6**	**4**	***24***	**0**	**1**	**0**	**0**	***1***	**0**	**1**	**0**	**0**	*1*
4:15 PM	**9**	**9**	**1**	**3**	***22***	**1**	**0**	**0**	**1**	***2***	**0**	**1**	**0**	**0**	*1*
4:30 PM	**8**	**0**	**3**	**0**	***11***	**0**	**0**	**1**	**1**	***2***	**0**	**2**	**1**	**1**	*4*
4:45 PM	**7**	**2**	**2**	**0**	***11***	**2**	**0**	**0**	**0**	***2***	**0**	**2**	**0**	**0**	***2***
5:00 PM	8	1	1	0	*10*	1	0	0	0	*1*	1	0	0	1	*2*
5:15 PM	7	2	2	0	*11*	0	0	2	0	*2*	1	0	0	0	*1*
5:30 PM	7	2	1	0	*10*	0	0	2	1	*3*	0	0	2	1	*3*
5:45 PM	6	0	3	2	*11*	1	1	0	1	*3*	0	0	0	0	*0*
Count Total	59	23	19	9	*110*	5	2	5	4	*16*	2	6	3	3	*14*
Peak Hour	**31**	**18**	**12**	**7**	***68***	**3**	**1**	**1**	**2**	***7***	**0**	**6**	**1**	**1**	***8***

WILLOWS RD
NE 116TH ST

Date: Tue, Oct 09, 2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:45 AM to 8:45 AM





	HV %:	PHF
EB	0.0%	0.75
WB	2.0%	0.84
NB	4.7%	0.91
SB	0.9%	0.96
TOTAL	1.8%	0.98

Two-Hour Count Summaries

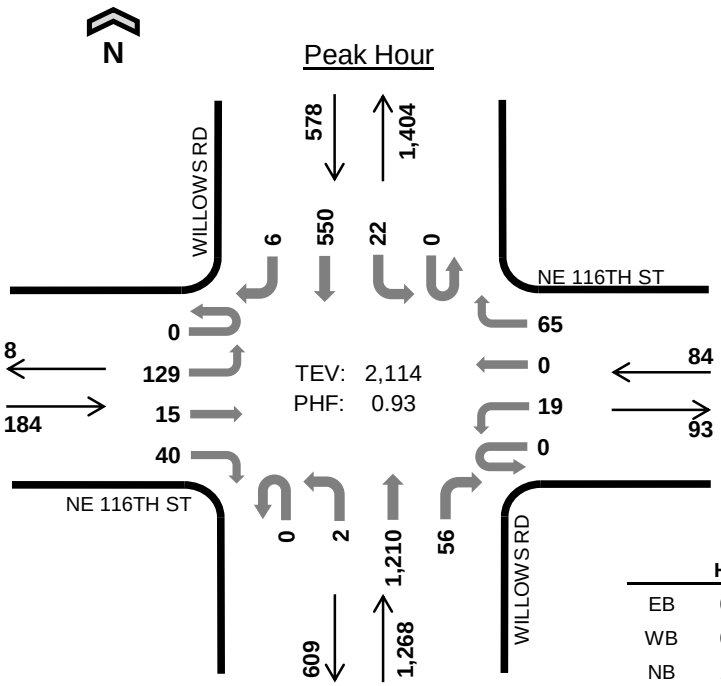
Interval Start	NE 116TH ST Eastbound				NE 116TH ST Westbound				WILLOWS RD Northbound				WILLOWS RD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	2	0	2	0	12	3	3	0	9	67	0	0	3	282	31	414	0
7:15 AM	0	2	0	1	0	8	3	6	0	9	77	1	0	1	285	23	416	0
7:30 AM	0	3	0	0	0	7	3	2	0	8	66	1	0	1	295	28	414	0
7:45 AM	**0**	**2**	**1**	**3**	**0**	**31**	**6**	**5**	**0**	**6**	**72**	**3**	**0**	**1**	**265**	**27**	**422**	1,666
8:00 AM	**0**	**3**	**0**	**0**	**0**	**19**	**5**	**7**	**0**	**7**	**84**	**3**	**0**	**0**	**273**	**25**	**426**	1,678
8:15 AM	**0**	**5**	**0**	**0**	**0**	**19**	**11**	**3**	**0**	**3**	**82**	**1**	**0**	**2**	**289**	**23**	**438**	1,700
8:30 AM	**0**	**4**	**0**	**0**	**0**	**29**	**14**	**2**	**0**	**6**	**72**	**2**	**0**	**0**	**276**	**22**	**427**	**1,713**
8:45 AM	0	3	0	2	0	16	11	4	0	4	80	3	0	1	272	23	419	1,710
Count Total	0	24	1	8	0	141	56	32	0	52	600	14	0	9	2,237	202	3,376	0
Peak Hour	**0**	**14**	**1**	**3**	**0**	**98**	**36**	**17**	**0**	**22**	**310**	**9**	**0**	**3**	**1,103**	**97**	**1,713**	**0**

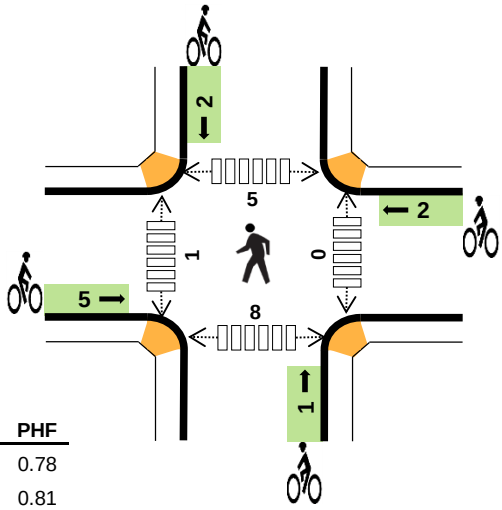
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	7	3	*10*	0	1	0	1	*2*	0	1	1	1	*3*
7:15 AM	0	0	12	6	*18*	0	0	0	0	*0*	0	0	1	1	*2*
7:30 AM	0	0	5	4	*9*	0	0	0	0	*0*	0	0	0	0	*0*
7:45 AM	**0**	**2**	**6**	**3**	***11***	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**2**	*3*
8:00 AM	**0**	**1**	**3**	**4**	***8***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
8:15 AM	**0**	**0**	**1**	**3**	***4***	**0**	**0**	**0**	**3**	***3***	**1**	**1**	**1**	**0**	*3*
8:30 AM	**0**	**0**	**6**	**1**	***7***	**0**	**0**	**0**	**3**	***3***	**0**	**1**	**1**	**0**	***2***
8:45 AM	2	0	6	6	*14*	0	1	0	3	*4*	0	1	0	1	*2*
Count Total	2	3	46	30	*81*	0	2	0	10	*12*	2	4	4	5	*15*
Peak Hour	**0**	**3**	**16**	**11**	***30***	**0**	**0**	**0**	**6**	***6***	**2**	**2**	**2**	**2**	***8***

WILLOWS RD
NE 116TH ST

Date: Thu, Jun 14, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM





	HV %:	PHF
EB	0.0%	0.78
WB	0.0%	0.81
NB	1.0%	0.96
SB	4.5%	0.89
TOTAL	1.8%	0.93

Two-Hour Count Summaries

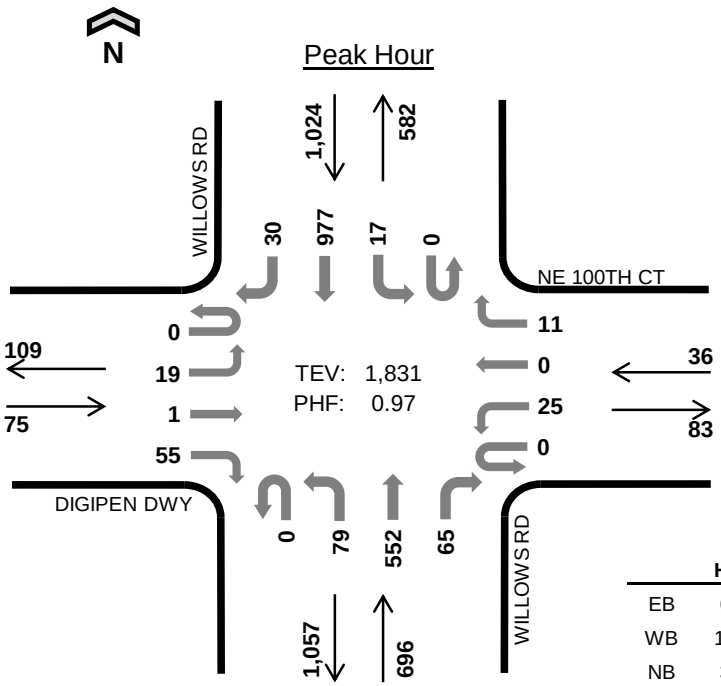
Interval Start	NE 116TH ST Eastbound				NE 116TH ST Westbound				WILLOWS RD Northbound				WILLOWS RD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**36**	**5**	**18**	**0**	**6**	**0**	**13**	**0**	**0**	**315**	**14**	**0**	**11**	**149**	**2**	**569**	0
4:15 PM	**0**	**32**	**1**	**7**	**0**	**5**	**0**	**13**	**0**	**0**	**311**	**9**	**0**	**4**	**138**	**0**	**520**	0
4:30 PM	**0**	**34**	**6**	**8**	**0**	**4**	**0**	**17**	**0**	**1**	**307**	**20**	**0**	**5**	**133**	**2**	**537**	0
4:45 PM	**0**	**27**	**3**	**7**	**0**	**4**	**0**	**22**	**0**	**1**	**277**	**13**	**0**	**2**	**130**	**2**	**488**	**2,114**
5:00 PM	0	59	7	10	0	3	0	11	0	1	265	15	0	15	125	2	513	2,058
5:15 PM	0	46	4	7	0	4	0	14	0	0	280	11	0	24	126	3	519	2,057
5:30 PM	0	37	5	6	0	8	1	15	0	1	296	9	0	12	131	1	522	2,042
5:45 PM	0	30	4	3	0	6	1	12	0	1	308	19	0	5	96	5	490	2,044
Count Total	0	301	35	66	0	40	2	117	0	5	2,359	110	0	78	1,028	17	4,158	0
Peak Hour	**0**	**129**	**15**	**40**	**0**	**19**	**0**	**65**	**0**	**2**	**1,210**	**56**	**0**	**22**	**550**	**6**	**2,114**	**0**

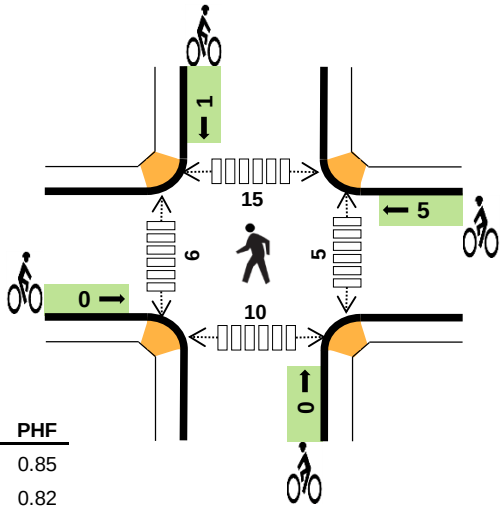
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**0**	**7**	**10**	***17***	**1**	**0**	**1**	**1**	***3***	**0**	**0**	**0**	**5**	*5*
4:15 PM	**0**	**0**	**1**	**9**	***10***	**2**	**0**	**0**	**0**	***2***	**0**	**0**	**0**	**1**	*1*
4:30 PM	**0**	**0**	**4**	**5**	***9***	**1**	**2**	**0**	**1**	***4***	**0**	**1**	**0**	**1**	*2*
4:45 PM	**0**	**0**	**1**	**2**	***3***	**1**	**0**	**0**	**0**	***1***	**0**	**0**	**5**	**1**	***6***
5:00 PM	0	0	1	4	*5*	1	0	0	2	*3*	0	1	1	1	*3*
5:15 PM	0	0	2	0	*2*	3	0	1	0	*4*	0	1	1	1	*3*
5:30 PM	0	1	2	4	*7*	1	2	1	1	*5*	0	0	0	3	*3*
5:45 PM	0	0	1	2	*3*	2	0	0	1	*3*	0	0	0	2	*2*
Count Total	0	1	19	36	*56*	12	4	3	6	*25*	0	3	7	15	*25*
Peak Hour	**0**	**0**	**13**	**26**	***39***	**5**	**2**	**1**	**2**	***10***	**0**	**1**	**5**	**8**	***14***

WILLOWS RD
NE 100TH CT

Date: Thu, Jun 14, 2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM





	HV %:	PHF
EB	6.7%	0.85
WB	11.1%	0.82
NB	3.6%	0.85
SB	1.6%	0.94
TOTAL	2.7%	0.97

Two-Hour Count Summaries

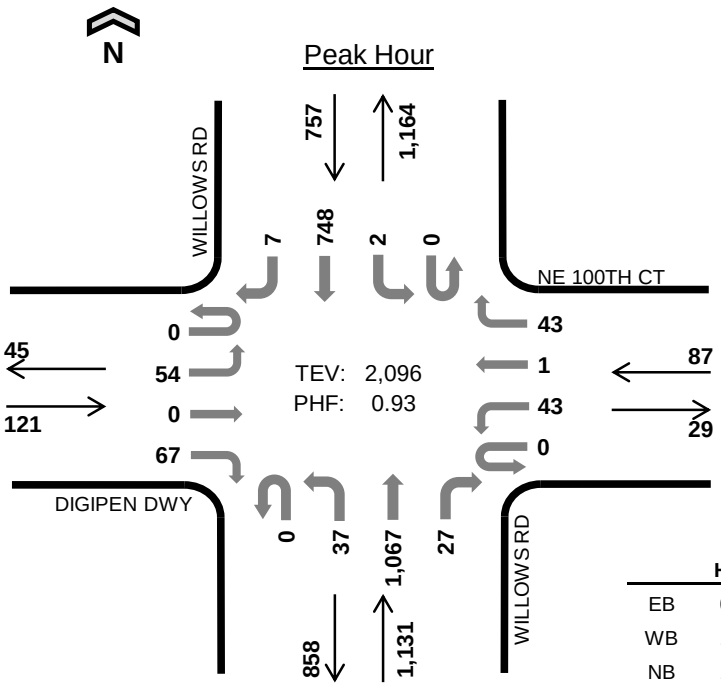
Interval Start	DIGIPEN DWY Eastbound				NE 100TH CT Westbound				WILLOWS RD Northbound				WILLOWS RD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	3	0	5	0	7	1	1	0	8	103	18	0	7	224	10	387	0
7:15 AM	0	3	0	10	0	3	0	0	0	15	119	10	0	6	266	12	444	0
7:30 AM	0	1	0	9	0	2	0	0	0	16	142	5	0	4	262	8	449	0
7:45 AM	0	1	0	13	0	5	0	1	0	13	138	29	0	7	232	15	454	1,734
8:00 AM	**0**	**5**	**0**	**17**	**0**	**6**	**0**	**2**	**0**	**11**	**154**	**9**	**0**	**4**	**245**	**3**	**456**	1,803
8:15 AM	**0**	**2**	**0**	**15**	**0**	**6**	**0**	**3**	**0**	**13**	**124**	**14**	**0**	**6**	**256**	**11**	**450**	1,809
8:30 AM	**0**	**4**	**0**	**10**	**0**	**7**	**0**	**4**	**0**	**20**	**135**	**12**	**0**	**5**	**246**	**10**	**453**	1,813
8:45 AM	**0**	**8**	**1**	**13**	**0**	**6**	**0**	**2**	**0**	**35**	**139**	**30**	**0**	**2**	**230**	**6**	**472**	**1,831**
Count Total	0	27	1	92	0	42	1	13	0	131	1,054	127	0	41	1,961	75	3,565	0
Peak Hour	**0**	**19**	**1**	**55**	**0**	**25**	**0**	**11**	**0**	**79**	**552**	**65**	**0**	**17**	**977**	**30**	**1,831**	**0**

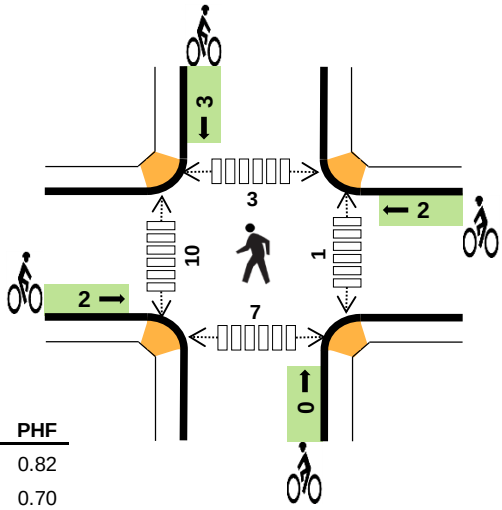
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	1	1	9	10	*21*	0	1	0	0	*1*	0	1	0	4	*5*
7:15 AM	1	2	5	6	*14*	0	0	0	1	*1*	0	0	1	2	*3*
7:30 AM	1	1	5	3	*10*	0	2	0	1	*3*	0	2	0	2	*4*
7:45 AM	0	0	6	6	*12*	0	2	1	0	*3*	0	0	0	1	*1*
8:00 AM	**1**	**1**	**2**	**1**	***5***	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	*0*
8:15 AM	**0**	**0**	**6**	**8**	***14***	**0**	**1**	**0**	**0**	***1***	**1**	**0**	**3**	**1**	*5*
8:30 AM	**3**	**1**	**8**	**2**	***14***	**0**	**2**	**0**	**1**	***3***	**1**	**4**	**1**	**6**	*12*
8:45 AM	**1**	**2**	**9**	**5**	***17***	**0**	**1**	**0**	**0**	***1***	**3**	**2**	**11**	**3**	***19***
Count Total	8	8	50	41	*107*	0	10	1	3	*14*	5	9	16	19	*49*
Peak Hour	**5**	**4**	**25**	**16**	***50***	**0**	**5**	**0**	**1**	***6***	**5**	**6**	**15**	**10**	***36***

WILLOWS RD
NE 100TH CT

Date: Thu, Jun 14, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM





	HV %:	PHF
EB	0.0%	0.82
WB	1.1%	0.70
NB	1.3%	0.90
SB	3.4%	0.93
TOTAL	2.0%	0.93

Two-Hour Count Summaries

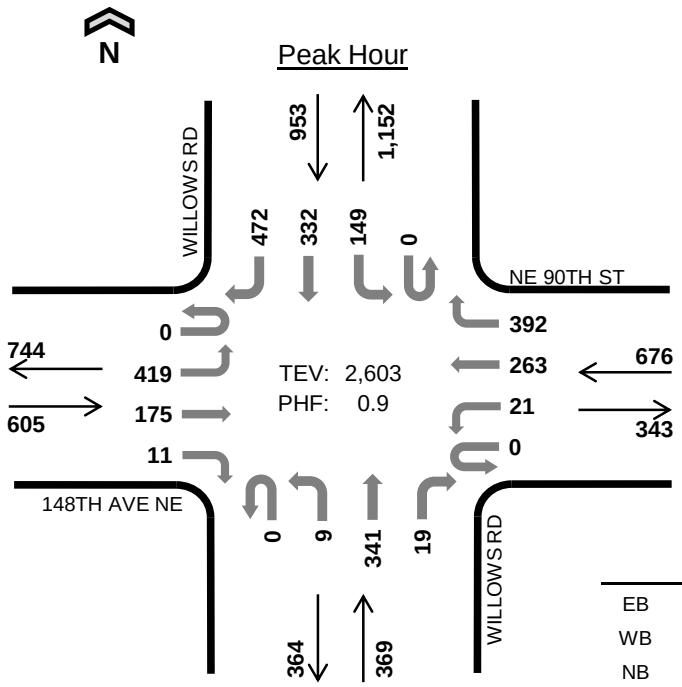
Interval Start	DIGIPEN DWY Eastbound				NE 100TH CT Westbound				WILLOWS RD Northbound				WILLOWS RD Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**16**	**0**	**21**	**0**	**6**	**0**	**6**	**0**	**7**	**305**	**3**	**0**	**1**	**198**	**1**	**564**	0
4:15 PM	**0**	**7**	**0**	**19**	**0**	**4**	**0**	**12**	**0**	**10**	**284**	**10**	**0**	**0**	**202**	**2**	**550**	0
4:30 PM	**0**	**14**	**0**	**19**	**0**	**12**	**1**	**15**	**0**	**11**	**257**	**9**	**0**	**1**	**193**	**2**	**534**	0
4:45 PM	**0**	**17**	**0**	**8**	**0**	**21**	**0**	**10**	**0**	**9**	**221**	**5**	**0**	**0**	**155**	**2**	**448**	**2,096**
5:00 PM	0	22	0	24	0	8	2	13	0	9	213	14	0	1	192	1	499	2,031
5:15 PM	0	14	0	16	0	5	2	20	0	5	206	13	0	2	172	3	458	1,939
5:30 PM	0	18	0	14	0	30	1	16	0	13	245	19	0	1	168	4	529	1,934
5:45 PM	0	13	0	6	0	5	1	3	0	8	253	10	0	2	130	7	438	1,924
Count Total	0	121	0	127	0	91	7	95	0	72	1,984	83	0	8	1,410	22	4,020	0
Peak Hour	**0**	**54**	**0**	**67**	**0**	**43**	**1**	**43**	**0**	**37**	**1,067**	**27**	**0**	**2**	**748**	**7**	**2,096**	**0**

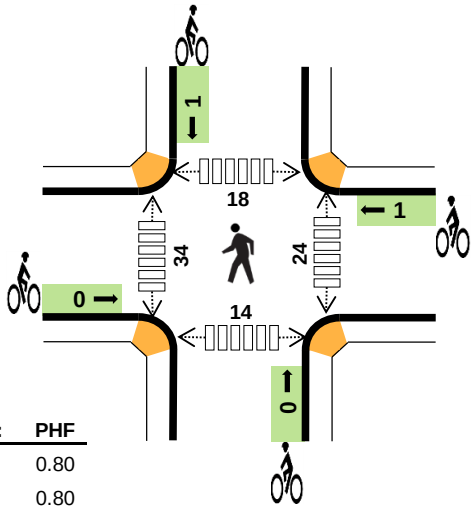
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**0**	**8**	**10**	***18***	**0**	**1**	**0**	**1**	***2***	**1**	**4**	**0**	**6**	*11*
4:15 PM	**0**	**0**	**0**	**8**	***8***	**0**	**0**	**0**	**1**	***1***	**0**	**2**	**0**	**1**	*3*
4:30 PM	**0**	**0**	**4**	**6**	***10***	**0**	**0**	**0**	**1**	***1***	**0**	**1**	**1**	**0**	*2*
4:45 PM	**0**	**1**	**3**	**2**	***6***	**2**	**1**	**0**	**0**	***3***	**0**	**3**	**2**	**0**	***5***
5:00 PM	0	1	3	3	*7*	0	0	1	1	*2*	0	0	1	7	*8*
5:15 PM	0	0	0	2	*2*	0	0	0	0	*0*	1	12	1	2	*16*
5:30 PM	0	0	6	4	*10*	1	0	0	0	*1*	0	6	1	6	*13*
5:45 PM	0	2	0	2	*4*	2	0	0	1	*3*	0	9	2	3	*14*
Count Total	0	4	24	37	*65*	5	2	1	5	*13*	2	37	8	25	*72*
Peak Hour	**0**	**1**	**15**	**26**	***42***	**2**	**2**	**0**	**3**	***7***	**1**	**10**	**3**	**7**	***21***

WILLOWS RD
NE 90TH ST

Date: Tue, Oct 16, 2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 8:00 AM to 9:00 AM





	HV %:	PHF
EB	5.0%	0.80
WB	3.3%	0.80
NB	3.3%	0.89
SB	4.0%	0.94
TOTAL	3.9%	0.90

Two-Hour Count Summaries

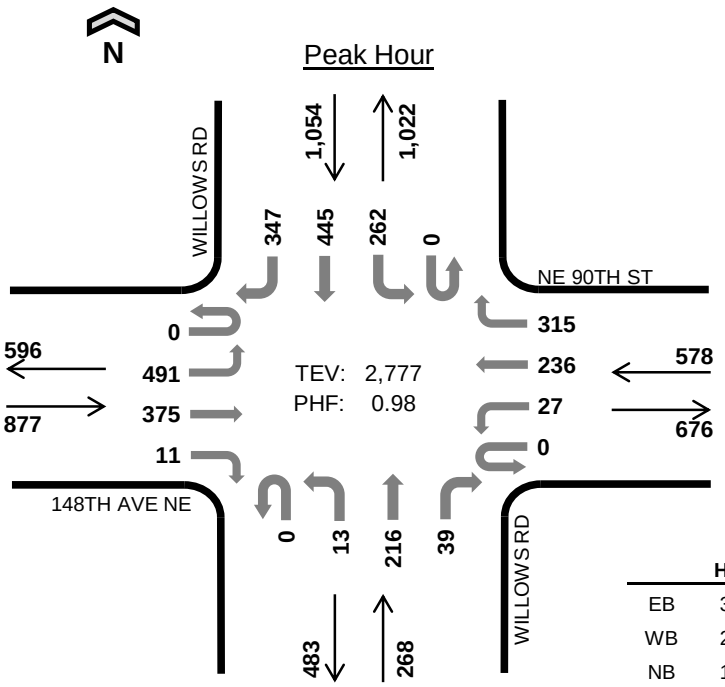
Interval Start	148TH AVE NE				NE 90TH ST				WILLOWS RD				WILLOWS RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	41	27	2	0	5	52	50	0	14	37	1	0	43	78	83	433	0
7:15 AM	0	51	49	2	0	8	53	45	0	6	41	3	0	36	79	99	472	0
7:30 AM	0	48	31	3	0	3	76	72	0	9	61	4	0	31	82	98	518	0
7:45 AM	0	84	52	2	0	3	59	87	0	9	59	5	0	37	100	112	609	2,032
8:00 AM	**0**	**100**	**37**	**2**	**0**	**3**	**60**	**80**	**0**	**0**	**75**	**6**	**0**	**40**	**68**	**127**	**598**	2,197
8:15 AM	**0**	**86**	**41**	**2**	**0**	**2**	**59**	**100**	**0**	**2**	**83**	**4**	**0**	**41**	**93**	**120**	**633**	2,358
8:30 AM	**0**	**109**	**37**	**3**	**0**	**7**	**65**	**88**	**0**	**6**	**80**	**9**	**0**	**36**	**88**	**118**	**646**	2,486
8:45 AM	**0**	**124**	**60**	**4**	**0**	**9**	**79**	**124**	**0**	**1**	**103**	**0**	**0**	**32**	**83**	**107**	**726**	**2,603**
Count Total	0	643	334	20	0	40	503	646	0	47	539	32	0	296	671	864	4,635	0
Peak Hour	**0**	**419**	**175**	**11**	**0**	**21**	**263**	**392**	**0**	**9**	**341**	**19**	**0**	**149**	**332**	**472**	**2,603**	**0**

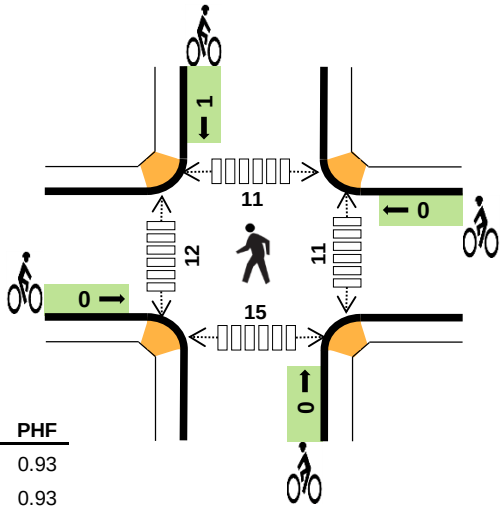
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	2	4	0	9	*15*	0	0	0	0	*0*	2	0	0	0	*2*
7:15 AM	4	7	0	8	*19*	0	0	0	0	*0*	3	2	1	2	*8*
7:30 AM	3	5	1	10	*19*	0	0	0	0	*0*	0	1	1	0	*2*
7:45 AM	5	4	2	5	*16*	0	0	0	1	*1*	1	1	1	1	*4*
8:00 AM	**8**	**3**	**4**	**9**	***24***	**0**	**0**	**0**	**0**	***0***	**2**	**6**	**2**	**7**	*17*
8:15 AM	**7**	**5**	**2**	**11**	***25***	**0**	**1**	**0**	**0**	***1***	**4**	**3**	**2**	**2**	*11*
8:30 AM	**9**	**5**	**2**	**7**	***23***	**0**	**0**	**0**	**1**	***1***	**10**	**20**	**3**	**1**	*34*
8:45 AM	**6**	**9**	**4**	**11**	***30***	**0**	**0**	**0**	**0**	***0***	**8**	**5**	**11**	**4**	***28***
Count Total	44	42	15	70	*171*	0	1	0	2	*3*	30	38	21	17	*106*
Peak Hour	**30**	**22**	**12**	**38**	***102***	**0**	**1**	**0**	**1**	***2***	**24**	**34**	**18**	**14**	***90***

WILLOWS RD
148TH AVE NE

Date: Thu, Jun 14, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM





	HV %:	PHF
EB	3.1%	0.93
WB	2.8%	0.93
NB	1.5%	0.80
SB	1.5%	0.92
TOTAL	2.3%	0.98

Two-Hour Count Summaries

Interval Start	148TH AVE NE				NE 90TH ST				WILLOWS RD				WILLOWS RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	0	119	87	0	0	7	78	85	0	2	68	8	0	60	114	91	719	0
4:15 PM	0	105	85	3	0	4	64	83	0	1	55	10	0	77	107	98	692	0
4:30 PM	**0**	**136**	**95**	**5**	**0**	**6**	**63**	**77**	**0**	**6**	**43**	**6**	**0**	**50**	**102**	**84**	**673**	0
4:45 PM	**0**	**125**	**90**	**2**	**0**	**7**	**49**	**71**	**0**	**2**	**71**	**11**	**0**	**60**	**117**	**83**	**688**	2,772
5:00 PM	**0**	**108**	**96**	**1**	**0**	**7**	**59**	**84**	**0**	**5**	**47**	**11**	**0**	**84**	**108**	**94**	**704**	2,757
5:15 PM	**0**	**122**	**94**	**3**	**0**	**7**	**65**	**83**	**0**	**0**	**55**	**11**	**0**	**68**	**118**	**86**	**712**	**2,777**
5:30 PM	0	118	101	2	0	10	65	62	0	2	44	8	0	51	97	83	643	2,747
5:45 PM	0	116	102	2	0	10	70	61	0	6	70	9	0	51	100	71	668	2,727
Count Total	0	949	750	18	0	58	513	606	0	24	453	74	0	501	863	690	5,499	0
Peak Hour	**0**	**491**	**375**	**11**	**0**	**27**	**236**	**315**	**0**	**13**	**216**	**39**	**0**	**262**	**445**	**347**	**2,777**	**0**

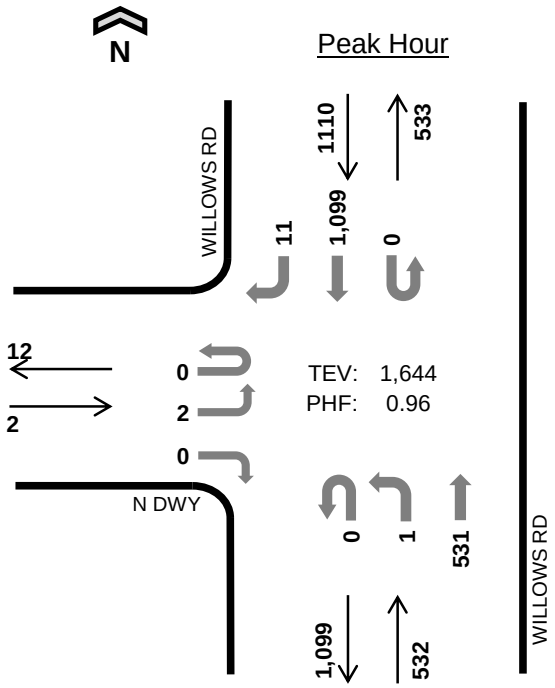
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

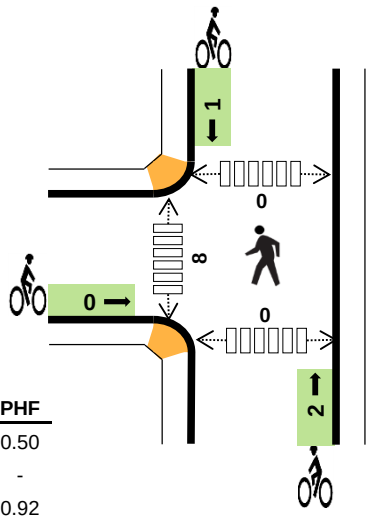
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	7	3	2	3	*15*	1	0	0	0	*1*	3	8	0	3	*14*
4:15 PM	11	5	2	6	*24*	0	0	0	0	*0*	2	3	1	4	*10*
4:30 PM	**6**	**6**	**0**	**3**	***15***	**0**	**0**	**0**	**0**	***0***	**1**	**2**	**4**	**4**	*11*
4:45 PM	**11**	**5**	**2**	**3**	***21***	**0**	**0**	**0**	**0**	***0***	**0**	**4**	**0**	**2**	*6*
5:00 PM	**3**	**3**	**1**	**9**	***16***	**0**	**0**	**0**	**1**	***1***	**4**	**2**	**2**	**2**	*10*
5:15 PM	**7**	**2**	**1**	**1**	***11***	**0**	**0**	**0**	**0**	***0***	**6**	**4**	**5**	**7**	***22***
5:30 PM	5	3	1	5	*14*	0	0	0	0	*0*	4	12	1	1	*18*
5:45 PM	3	5	0	5	*13*	0	1	0	0	*1*	13	7	3	3	*26*
Count Total	53	32	9	35	*129*	1	1	0	1	*3*	33	42	16	26	*117*
Peak Hour	**27**	**16**	**4**	**16**	***63***	**0**	**0**	**0**	**1**	***1***	**11**	**12**	**11**	**15**	***49***

WILLOWS RD
N DWY

Date: Wed, Aug 29, 2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:15 AM to 8:15 AM

Peak Hour





	HV %:	PHF
EB	0.0%	0.50
WB	-	-
NB	3.6%	0.92
SB	2.3%	0.98
TOTAL	2.7%	0.96

Two-Hour Count Summaries

Interval Start	N DWY				0				WILLOWS RD				WILLOWS RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	1	0	0	0	0	0	0	0	1	98	0	0	0	248	2	350	0
7:15 AM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**123**	**0**	**0**	**0**	**270**	**1**	**395**	0
7:30 AM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**120**	**0**	**0**	**0**	**274**	**0**	**396**	0
7:45 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**145**	**0**	**0**	**0**	**278**	**6**	**429**	1,570
8:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**143**	**0**	**0**	**0**	**277**	**4**	**424**	**1,644**
8:15 AM	0	1	0	0	0	0	0	0	0	2	114	0	0	0	269	2	388	1,637
8:30 AM	0	1	0	2	0	0	0	0	0	2	111	0	0	0	249	4	369	1,610
8:45 AM	0	2	0	0	0	0	0	0	0	3	141	0	0	0	273	3	422	1,603
Count Total	0	7	0	2	0	0	0	0	0	9	995	0	0	0	2,138	22	3,173	0
Peak Hour	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**531**	**0**	**0**	**0**	**1,099**	**11**	**1,644**	**0**

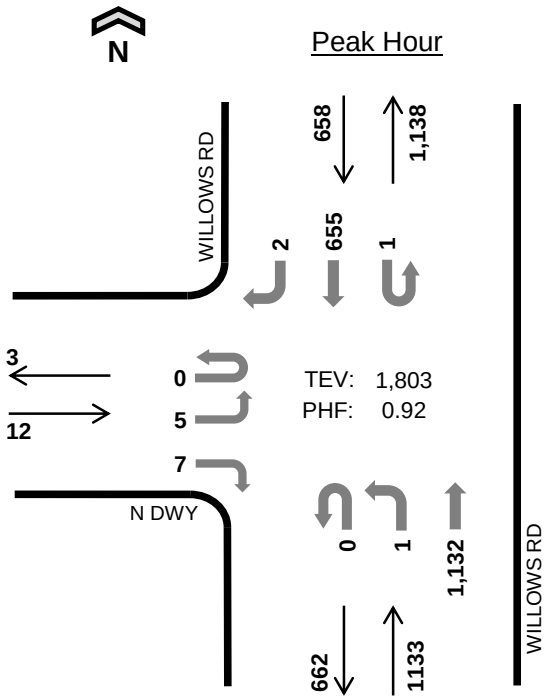
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

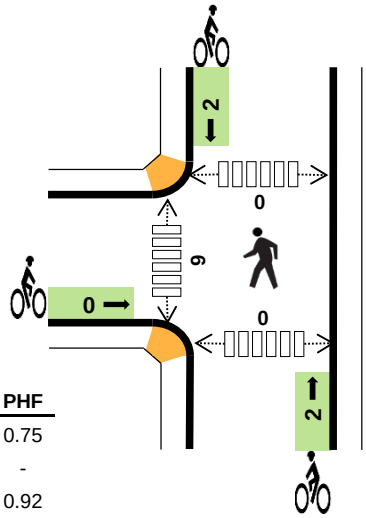
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	7	3	*10*	0	0	0	1	*1*	0	0	0	0	*0*
7:15 AM	**0**	**0**	**3**	**8**	***11***	**0**	**0**	**0**	**0**	***0***	**0**	**2**	**0**	**0**	*2*
7:30 AM	**0**	**0**	**4**	**6**	***10***	**0**	**0**	**0**	**0**	***0***	**0**	**3**	**0**	**0**	*3*
7:45 AM	**0**	**0**	**7**	**6**	***13***	**0**	**0**	**1**	**0**	***1***	**0**	**1**	**0**	**0**	*1*
8:00 AM	**0**	**0**	**5**	**5**	***10***	**0**	**0**	**1**	**1**	***2***	**0**	**2**	**0**	**0**	***2***
8:15 AM	0	0	5	8	*13*	0	0	0	1	*1*	0	5	0	0	*5*
8:30 AM	1	0	3	8	*12*	0	0	0	0	*0*	0	3	0	0	*3*
8:45 AM	0	0	5	5	*10*	0	0	0	1	*1*	0	1	0	0	*1*
Count Total	1	0	39	49	*89*	0	0	2	4	*6*	0	17	0	0	*17*
Peak Hr	**0**	**0**	**19**	**25**	***44***	**0**	**0**	**2**	**1**	***3***	**0**	**8**	**0**	**0**	***8***

WILLOWS RD
N DWY

Date: Wed, Aug 29, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM

Peak Hour





	HV %:	PHF
EB	0.0%	0.75
WB	-	-
NB	0.7%	0.92
SB	2.4%	0.93
TOTAL	1.3%	0.92

Two-Hour Count Summaries

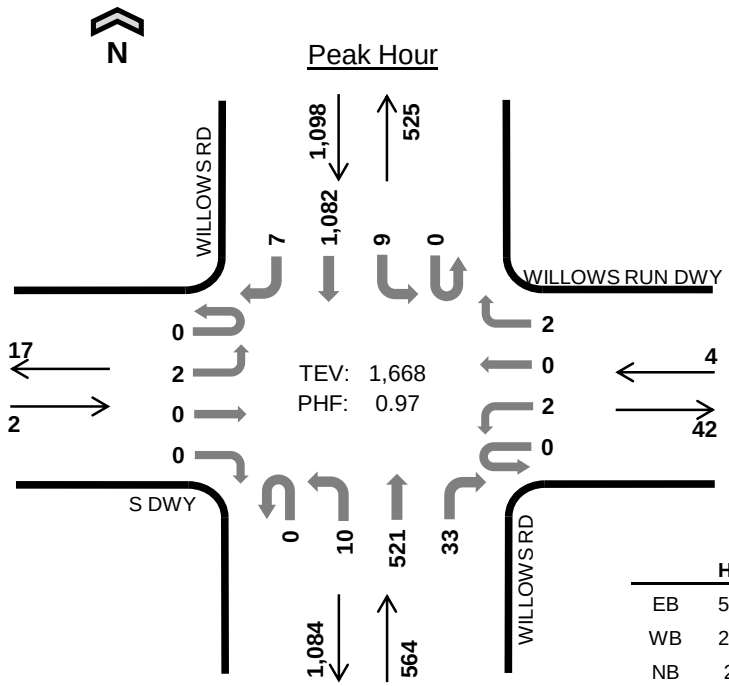
Interval Start	N DWY				0				WILLOWS RD				WILLOWS RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**1**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**1**	**308**	**0**	**0**	**0**	**176**	**0**	**489**	0
4:15 PM	**0**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**278**	**0**	**0**	**0**	**160**	**2**	**444**	0
4:30 PM	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**278**	**0**	**0**	**0**	**156**	**0**	**436**	0
4:45 PM	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**268**	**0**	**1**	**0**	**163**	**0**	**434**	**1,803**
5:00 PM	0	1	0	0	0	0	0	0	0	0	306	0	0	0	174	0	481	1,795
5:15 PM	0	1	0	1	0	0	0	0	0	0	256	0	0	0	169	0	427	1,778
5:30 PM	0	2	0	1	0	0	0	0	0	0	235	0	0	0	201	0	439	1,781
5:45 PM	0	1	0	0	0	0	0	0	0	0	244	0	0	0	168	0	413	1,760
Count Total	0	10	0	9	0	0	0	0	0	1	2,173	0	1	0	1,367	2	3,563	0
Peak Hour	**0**	**5**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**1**	**1,132**	**0**	**1**	**0**	**655**	**2**	**1,803**	**0**

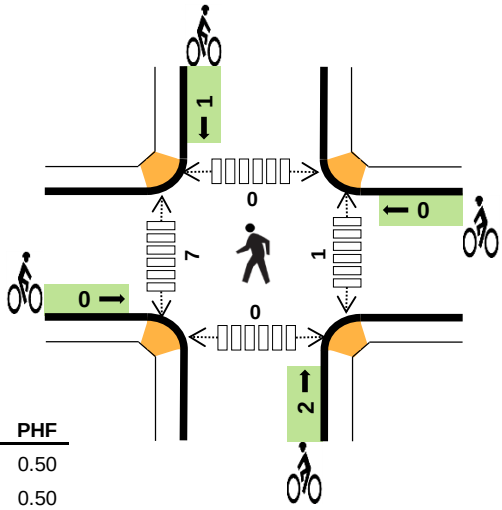
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**0**	**2**	**6**	***8***	**0**	**0**	**0**	**0**	***0***	**0**	**1**	**0**	**0**	*1*
4:15 PM	**0**	**0**	**2**	**5**	***7***	**0**	**0**	**0**	**1**	***1***	**0**	**4**	**0**	**0**	*4*
4:30 PM	**0**	**0**	**3**	**3**	***6***	**0**	**0**	**1**	**0**	***1***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**0**	**0**	**1**	**2**	***3***	**0**	**0**	**1**	**1**	***2***	**0**	**4**	**0**	**0**	***4***
5:00 PM	0	0	4	4	*8*	0	0	2	0	*2*	0	4	0	0	*4*
5:15 PM	0	0	1	2	*3*	0	0	1	0	*1*	0	3	0	0	*3*
5:30 PM	0	0	4	4	*8*	0	0	0	2	*2*	0	3	0	0	*3*
5:45 PM	0	0	1	2	*3*	0	0	0	4	*4*	0	2	0	0	*2*
Count Total	0	0	18	28	*46*	0	0	5	8	*13*	0	21	0	0	*21*
Peak Hr	**0**	**0**	**8**	**16**	***24***	**0**	**0**	**2**	**2**	***4***	**0**	**9**	**0**	**0**	***9***

WILLOWS RD
WILLOWS RUN DWY

Date: Wed, Aug 29, 2018
Count Period: 7:00 AM to 9:00 AM
Peak Hour: 7:15 AM to 8:15 AM





	HV %:	PHF
EB	50.0%	0.50
WB	25.0%	0.50
NB	2.8%	0.93
SB	2.3%	0.99
TOTAL	2.6%	0.97

Two-Hour Count Summaries

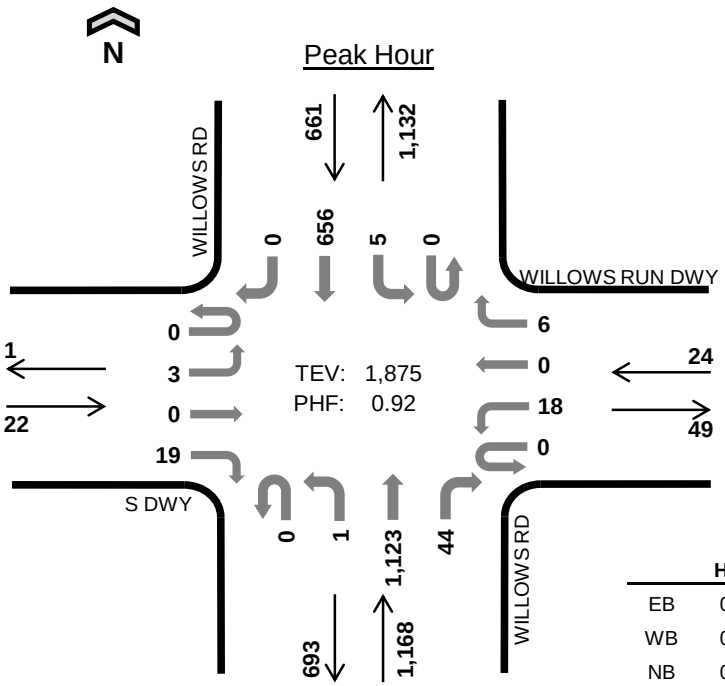
Interval Start	S DWY				WILLOWS RUN DWY				WILLOWS RD				WILLOWS RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
7:00 AM	0	0	0	1	0	0	0	0	0	4	103	9	0	2	244	0	363	0
7:15 AM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**123**	**15**	**0**	**4**	**266**	**2**	**412**	0
7:30 AM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**6**	**115**	**8**	**0**	**2**	**270**	**3**	**405**	0
7:45 AM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**3**	**142**	**7**	**0**	**0**	**274**	**2**	**430**	1,610
8:00 AM	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**141**	**3**	**0**	**3**	**272**	**0**	**421**	**1,668**
8:15 AM	0	0	0	0	0	0	0	1	0	2	114	5	0	1	270	1	394	1,650
8:30 AM	0	0	0	0	0	1	0	0	0	4	113	4	0	1	245	1	369	1,614
8:45 AM	0	1	0	1	0	1	0	1	0	3	142	3	0	1	271	2	426	1,610
Count Total	0	3	0	2	0	4	0	4	0	23	993	54	0	14	2,112	11	3,220	0
Peak Hour	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**2**	**0**	**10**	**521**	**33**	**0**	**9**	**1,082**	**7**	**1,668**	**0**

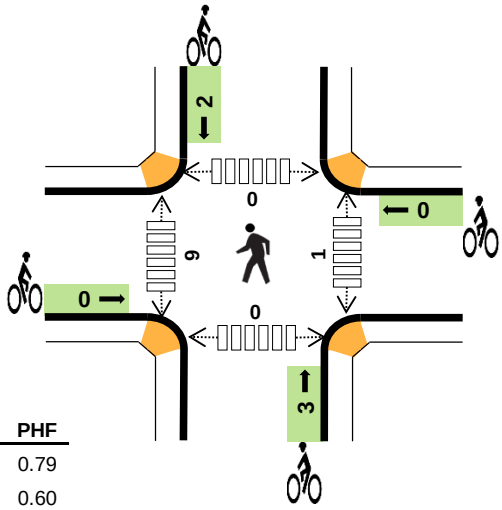
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
7:00 AM	0	0	7	3	*10*	0	0	0	1	*1*	0	0	0	0	*0*
7:15 AM	**1**	**0**	**3**	**8**	***12***	**0**	**0**	**0**	**0**	***0***	**0**	**1**	**0**	**0**	*1*
7:30 AM	**0**	**0**	**3**	**6**	***9***	**0**	**0**	**1**	**0**	***1***	**0**	**4**	**0**	**0**	*4*
7:45 AM	**0**	**1**	**5**	**5**	***11***	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**0**	*1*
8:00 AM	**0**	**0**	**5**	**6**	***11***	**0**	**0**	**1**	**1**	***2***	**0**	**2**	**0**	**0**	***2***
8:15 AM	0	0	5	8	*13*	0	0	0	1	*1*	0	5	0	0	*5*
8:30 AM	0	0	4	8	*12*	0	0	0	0	*0*	0	2	0	0	*2*
8:45 AM	0	0	5	5	*10*	0	0	0	1	*1*	0	1	0	0	*1*
Count Total	1	1	37	49	*88*	0	0	2	4	*6*	1	15	0	0	*16*
Peak Hour	**1**	**1**	**16**	**25**	***43***	**0**	**0**	**2**	**1**	***3***	**1**	**7**	**0**	**0**	***8***

WILLOWS RD
WILLOWS RUN DWY

Date: Wed, Aug 29, 2018
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM





	HV %:	PHF
EB	0.0%	0.79
WB	0.0%	0.60
NB	0.8%	0.91
SB	2.4%	0.93
TOTAL	1.3%	0.92

Two-Hour Count Summaries

Interval Start	S DWY				WILLOWS RUN DWY				WILLOWS RD				WILLOWS RD				15-min Total	Rolling One Hour
	Eastbound				Westbound				Northbound				Southbound					
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**3**	**0**	**4**	**0**	**4**	**0**	**1**	**0**	**1**	**307**	**13**	**0**	**2**	**175**	**0**	**510**	0
4:15 PM	**0**	**0**	**0**	**5**	**0**	**4**	**0**	**1**	**0**	**0**	**277**	**9**	**0**	**1**	**160**	**0**	**457**	0
4:30 PM	**0**	**0**	**0**	**7**	**0**	**4**	**0**	**0**	**0**	**0**	**280**	**11**	**0**	**2**	**157**	**0**	**461**	0
4:45 PM	**0**	**0**	**0**	**3**	**0**	**6**	**0**	**4**	**0**	**0**	**259**	**11**	**0**	**0**	**164**	**0**	**447**	**1,875**
5:00 PM	0	1	0	2	0	7	0	8	0	1	297	11	0	1	174	0	502	1,867
5:15 PM	0	0	0	5	0	9	0	4	0	1	255	7	0	2	168	0	451	1,861
5:30 PM	0	1	0	2	0	8	0	4	0	0	233	12	0	3	200	0	463	1,863
5:45 PM	0	1	0	0	0	16	0	6	0	0	234	5	0	2	166	0	430	1,846
Count Total	0	6	0	28	0	58	0	28	0	3	2,142	79	0	13	1,364	0	3,721	0
Peak Hour	**0**	**3**	**0**	**19**	**0**	**18**	**0**	**6**	**0**	**1**	**1,123**	**44**	**0**	**5**	**656**	**0**	**1,875**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**0**	**3**	**6**	***9***	**0**	**0**	**0**	**0**	***0***	**0**	**1**	**0**	**0**	*1*
4:15 PM	**0**	**0**	**1**	**5**	***6***	**0**	**0**	**0**	**1**	***1***	**0**	**4**	**0**	**0**	*4*
4:30 PM	**0**	**0**	**3**	**3**	***6***	**0**	**0**	**1**	**0**	***1***	**0**	**1**	**0**	**0**	*1*
4:45 PM	**0**	**0**	**2**	**2**	***4***	**0**	**0**	**2**	**1**	***3***	**1**	**3**	**0**	**0**	***4***
5:00 PM	0	0	4	4	*8*	0	0	1	0	*1*	0	5	0	0	*5*
5:15 PM	0	0	0	2	*2*	0	0	1	0	*1*	0	2	0	0	*2*
5:30 PM	0	0	4	4	*8*	0	0	0	2	*2*	0	2	0	0	*2*
5:45 PM	0	0	1	2	*3*	0	0	0	4	*4*	0	5	0	0	*5*
Count Total	0	0	18	28	*46*	0	0	5	8	*13*	1	23	0	0	*24*
Peak Hour	**0**	**0**	**9**	**16**	***25***	**0**	**0**	**3**	**2**	***5***	**1**	**9**	**0**	**0**	***10***

Appendix B: LOS Definitions

Highway Capacity Manual 6th Edition

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 6th Edition* (Transportation Research Board, 2016).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 6th Edition*, Transportation Research Board, 2016.
1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop and two-way stop control. All-way stop control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 6th Edition*, Transportation Research Board, 2016.
1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Appendix C: LOS Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	635	600	295	1035	75	215	45	50	75	395	10
Future Volume (veh/h)	35	635	600	295	1035	75	215	45	50	75	395	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1841	1841	1841	1885	1885	1885
Adj Flow Rate, veh/h	35	641	606	298	1045	76	217	45	51	76	399	10
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, %	2	2	2	1	1	1	4	4	4	1	1	1
Cap, veh/h	58	1227	655	320	1661	121	265	471	677	96	424	11
Arrive On Green	0.03	0.35	0.35	0.18	0.49	0.49	0.08	0.26	0.26	0.05	0.23	0.23
Sat Flow, veh/h	1781	3554	1539	1795	3380	246	3401	1841	1556	1795	1830	46
Grp Volume(v), veh/h	35	641	606	298	554	567	217	45	51	76	0	409
Grp Sat Flow(s),veh/h/ln	1781	1777	1539	1795	1791	1835	1700	1841	1556	1795	0	1876
Q Serve(g_s), s	2.6	19.4	46.6	22.1	30.7	30.8	8.5	2.5	2.6	5.6	0.0	28.9
Cycle Q Clear(g_c), s	2.6	19.4	46.6	22.1	30.7	30.8	8.5	2.5	2.6	5.6	0.0	28.9
Prop In Lane	1.00		1.00	1.00		0.13	1.00		1.00	1.00		0.02
Lane Grp Cap(c), veh/h	58	1227	655	320	880	901	265	471	677	96	0	435
V/C Ratio(X)	0.60	0.52	0.93	0.93	0.63	0.63	0.82	0.10	0.08	0.79	0.00	0.94
Avail Cap(c_a), veh/h	119	1227	655	332	880	901	441	539	734	166	0	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	64.5	35.3	37.0	54.6	25.3	25.3	61.3	38.3	22.3	63.2	0.0	51.0
Incr Delay (d2), s/veh	3.7	1.6	20.9	30.7	3.4	3.3	2.4	0.0	0.0	5.4	0.0	24.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	8.7	22.5	12.7	13.8	14.1	3.8	1.2	1.0	2.7	0.0	16.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.2	36.9	58.0	85.3	28.7	28.6	63.7	38.3	22.3	68.6	0.0	75.3
LnGrp LOS	E	D	E	F	C	C	E	D	C	E	A	E
Approach Vol, veh/h		1282			1419			313			485	
Approach Delay, s/veh		47.7			40.5			53.3			74.3	
Approach LOS		D			D			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.4	71.8	12.7	40.1	30.1	52.1	16.0	36.8
Change Period (Y+Rc), s	6.0	* 5.5	5.5	5.5	6.0	5.5	5.5	* 5.5
Max Green Setting (Gmax), s	9.0	* 53	12.5	39.5	25.0	35.5	17.5	* 35
Max Q Clear Time (g_c+I1), s	4.6	32.8	7.6	4.6	24.1	48.6	10.5	30.9
Green Ext Time (p_c), s	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	49.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	5	5	100	35	15	20	310	10	5	1105	95
Future Volume (veh/h)	15	5	5	100	35	15	20	310	10	5	1105	95
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	0.99		0.99	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1870	1870	1870	1826	1826	1826	1885	1885	1885
Adj Flow Rate, veh/h	15	5	5	102	36	15	20	316	10	5	1128	97
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, %	0	0	0	2	2	2	5	5	5	1	1	1
Cap, veh/h	276	159	159	173	47	18	163	2297	73	751	1235	1020
Arrive On Green	0.02	0.18	0.18	0.12	0.12	0.12	0.02	0.67	0.67	0.01	0.66	0.66
Sat Flow, veh/h	1810	869	869	978	382	148	1739	3432	108	1795	1885	1558
Grp Volume(v), veh/h	15	0	10	153	0	0	20	159	167	5	1128	97
Grp Sat Flow(s),veh/h/ln	1810	0	1738	1508	0	0	1739	1735	1806	1795	1885	1558
Q Serve(g_s), s	0.8	0.0	0.5	10.8	0.0	0.0	0.4	3.7	3.8	0.1	57.5	2.6
Cycle Q Clear(g_c), s	0.8	0.0	0.5	11.1	0.0	0.0	0.4	3.7	3.8	0.1	57.5	2.6
Prop In Lane	1.00		0.50	0.67		0.10	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	276	0	318	237	0	0	163	1161	1209	751	1235	1020
V/C Ratio(X)	0.05	0.00	0.03	0.64	0.00	0.00	0.12	0.14	0.14	0.01	0.91	0.10
Avail Cap(c_a), veh/h	456	0	574	309	0	0	329	1274	1326	980	1418	1172
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.2	0.0	37.6	48.0	0.0	0.0	21.4	6.7	6.7	6.5	16.6	7.1
Incr Delay (d2), s/veh	0.1	0.0	0.0	2.2	0.0	0.0	0.2	0.1	0.1	0.0	8.8	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(50%),veh/ln	0.4	0.0	0.2	4.3	0.0	0.0	0.3	1.3	1.4	0.0	25.1	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.2	0.0	37.6	50.2	0.0	0.0	21.7	6.8	6.8	6.5	25.4	7.2
LnGrp LOS	D	A	D	D	A	A	C	A	A	A	C	A
Approach Vol, veh/h		25			153			346			1230	
Approach Delay, s/veh		39.2			50.2			7.7			23.8	
Approach LOS		D			D			A			C	

Timer - Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.7	80.7		25.5	7.3	79.1	6.9	18.6
Change Period (Y+Rc), s	5.0	5.8		5.0	5.0	5.8	5.0	5.0
Max Green Setting (Gmax), s	15.0	82.2		37.0	13.0	84.2	13.0	19.0
Max Q Clear Time (g_c+I1), s	2.1	5.8		2.5	2.4	59.5	2.8	13.1
Green Ext Time (p_c), s	0.0	2.6		0.0	0.0	13.8	0.0	0.3

Intersection Summary	
HCM 6th Ctrl Delay	23.2
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	5	55	25	0	10	80	550	65	15	975	30
Future Volume (veh/h)	20	5	55	25	0	10	80	550	65	15	975	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.93		0.93	0.95		0.90	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1737	1737	1737	1841	1841	1841	1870	1870	1870
Adj Flow Rate, veh/h	21	5	57	26	0	10	82	567	67	15	1005	31
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	7	7	7	11	11	11	4	4	4	2	2	2
Cap, veh/h	63	24	107	181	0	144	348	1380	1165	665	1360	1124
Arrive On Green	0.11	0.11	0.11	0.11	0.00	0.11	0.08	1.00	1.00	0.02	0.73	0.73
Sat Flow, veh/h	229	221	986	1185	0	1320	1753	1841	1554	1781	1870	1546
Grp Volume(v), veh/h	83	0	0	26	0	10	82	567	67	15	1005	31
Grp Sat Flow(s),veh/h/ln	1435	0	0	1185	0	1320	1753	1841	1554	1781	1870	1546
Q Serve(g_s), s	1.8	0.0	0.0	0.0	0.0	0.8	1.4	0.0	0.0	0.3	38.0	0.7
Cycle Q Clear(g_c), s	6.3	0.0	0.0	2.7	0.0	0.8	1.4	0.0	0.0	0.3	38.0	0.7
Prop In Lane	0.25		0.69	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	194	0	0	181	0	144	348	1380	1165	665	1360	1124
V/C Ratio(X)	0.43	0.00	0.00	0.14	0.00	0.07	0.24	0.41	0.06	0.02	0.74	0.03
Avail Cap(c_a), veh/h	274	0	0	250	0	220	426	1380	1165	784	1360	1124
HCM Platoon Ratio	1.00	1.00	1.00	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	0.00	1.00	0.00	1.00	0.63	0.63	0.63	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.4	0.0	0.0	48.9	0.0	48.0	10.1	0.0	0.0	4.0	9.7	4.6
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.4	0.0	0.2	0.2	0.6	0.1	0.0	3.6	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(50%),veh/ln	2.4	0.0	0.0	0.7	0.0	0.3	0.7	0.2	0.0	0.1	14.9	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.9	0.0	0.0	49.2	0.0	48.2	10.3	0.6	0.1	4.0	13.3	4.6
LnGrp LOS	D	A	A	D	A	D	B	A	A	A	B	A
Approach Vol, veh/h		83			36			716			1051	
Approach Delay, s/veh		51.9			48.9			1.6			12.9	
Approach LOS		D			D			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.0	95.0		18.1	9.7	92.3		18.1				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	10.0	75.0		20.0	10.0	75.0		20.0				
Max Q Clear Time (g_c+I1), s	2.3	2.0		8.3	3.4	40.0		4.7				
Green Ext Time (p_c), s	0.0	4.7		0.3	0.1	10.8		0.1				

Intersection Summary												
HCM 6th Ctrl Delay			11.0									
HCM 6th LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	420	175	10	20	265	390	10	340	20	150	330	470
Future Volume (veh/h)	420	175	10	20	265	390	10	340	20	150	330	470
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.95	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1856	1856	1856	1856	1856	1856	1841	1841	1841
Adj Flow Rate, veh/h	467	194	11	22	294	433	11	378	22	167	367	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, %	5	5	5	3	3	3	3	3	3	4	4	4
Cap, veh/h	563	541	31	242	531	605	23	462	27	199	676	
Arrive On Green	0.17	0.32	0.32	0.14	0.29	0.29	0.01	0.27	0.27	0.04	0.12	0.00
Sat Flow, veh/h	3374	1708	97	1767	1856	1491	1767	1732	101	1753	1841	1560
Grp Volume(v), veh/h	467	0	205	22	294	433	11	0	400	167	367	0
Grp Sat Flow(s),veh/h/ln	1687	0	1805	1767	1856	1491	1767	0	1833	1753	1841	1560
Q Serve(g_s), s	16.1	0.0	10.5	1.3	16.1	14.8	0.7	0.0	24.6	11.4	22.5	0.0
Cycle Q Clear(g_c), s	16.1	0.0	10.5	1.3	16.1	14.8	0.7	0.0	24.6	11.4	22.5	0.0
Prop In Lane	1.00		0.05	1.00		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	563	0	572	242	531	605	23	0	489	199	676	
V/C Ratio(X)	0.83	0.00	0.36	0.09	0.55	0.72	0.49	0.00	0.82	0.84	0.54	
Avail Cap(c_a), veh/h	590	0	572	242	531	605	221	0	489	292	676	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.66	0.66	0.00
Uniform Delay (d), s/veh	48.3	0.0	31.6	45.3	36.3	30.0	58.8	0.0	41.3	56.7	43.3	0.0
Incr Delay (d2), s/veh	9.3	0.0	1.8	0.2	1.2	4.0	15.3	0.0	14.2	10.1	0.8	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(50%),veh/ln	7.5	0.0	4.9	0.6	7.5	5.0	0.4	0.0	12.9	5.9	11.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.6	0.0	33.4	45.4	37.6	34.0	74.1	0.0	55.4	66.8	44.0	0.0
LnGrp LOS	E	A	C	D	D	C	E	A	E	E	D	
Approach Vol, veh/h		672			749			411			534	A
Approach Delay, s/veh		50.2			35.7			55.9			51.2	
Approach LOS		D			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.0	39.4	6.5	49.1	21.4	43.0	18.6	37.0
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	21.0	27.0	15.0	37.0	10.0	38.0	20.0	32.0
Max Q Clear Time (g_c+I1), s	18.1	18.1	2.7	24.5	3.3	12.5	13.4	26.6
Green Ext Time (p_c), s	0.6	2.4	0.0	2.4	0.0	1.2	0.3	1.1

Intersection Summary	
HCM 6th Ctrl Delay	46.8
HCM 6th LOS	D

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	870	355	75	555	75	775	355	425	140	105	60
Future Volume (veh/h)	25	870	355	75	555	75	775	355	425	140	105	60
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	1.00		0.98	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	25	879	359	76	561	76	783	359	429	141	106	61
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, %	3	3	3	3	3	3	1	1	1	2	2	2
Cap, veh/h	47	1460	1008	95	1373	185	824	526	524	164	148	85
Arrive On Green	0.03	0.41	0.41	0.05	0.44	0.44	0.24	0.28	0.28	0.09	0.13	0.13
Sat Flow, veh/h	1767	3526	1535	1767	3111	420	3483	1885	1567	1781	1101	634
Grp Volume(v), veh/h	25	879	359	76	317	320	783	359	429	141	0	167
Grp Sat Flow(s),veh/h/ln	1767	1763	1535	1767	1763	1769	1742	1885	1567	1781	0	1735
Q Serve(g_s), s	2.0	27.2	14.9	6.0	17.2	17.3	31.0	23.7	35.2	10.9	0.0	12.9
Cycle Q Clear(g_c), s	2.0	27.2	14.9	6.0	17.2	17.3	31.0	23.7	35.2	10.9	0.0	12.9
Prop In Lane	1.00		1.00	1.00		0.24	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	47	1460	1008	95	778	781	824	526	524	164	0	234
V/C Ratio(X)	0.53	0.60	0.36	0.80	0.41	0.41	0.95	0.68	0.82	0.86	0.00	0.71
Avail Cap(c_a), veh/h	88	1460	1008	114	778	781	933	734	696	197	0	409
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	67.3	32.0	11.2	65.5	26.6	26.7	52.6	44.9	42.9	62.7	0.0	58.0
Incr Delay (d2), s/veh	3.4	1.8	1.0	23.3	1.6	1.6	16.8	0.6	4.3	23.4	0.0	1.5
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(50%),veh/ln	0.9	12.0	5.3	3.3	7.6	7.7	15.5	11.2	14.2	6.0	0.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.7	33.8	12.1	88.8	28.2	28.3	69.5	45.5	47.2	86.1	0.0	59.5
LnGrp LOS	E	C	B	F	C	C	E	D	D	F	A	E
Approach Vol, veh/h		1263			713			1571			308	
Approach Delay, s/veh		28.4			34.7			57.9			71.7	
Approach LOS		C			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.7	67.3	18.4	44.6	13.5	63.5	38.6	24.4
Change Period (Y+Rc), s	6.0	* 5.5	5.5	5.5	6.0	5.5	5.5	* 5.5
Max Green Setting (Gmax), s	7.0	* 42	15.5	54.5	9.0	38.5	37.5	* 33
Max Q Clear Time (g_c+I1), s	4.0	19.3	12.9	37.2	8.0	29.2	33.0	14.9
Green Ext Time (p_c), s	0.0	0.7	0.0	0.3	0.0	1.1	0.1	0.2

Intersection Summary	
HCM 6th Ctrl Delay	45.1
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	15	40	20	0	65	5	1210	55	20	550	5
Future Volume (veh/h)	130	15	40	20	0	65	5	1210	55	20	550	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.96	0.97		0.94	1.00		0.98	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1826	1826	1826
Adj Flow Rate, veh/h	140	16	43	22	0	70	5	1301	59	22	591	5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	5	5	5
Cap, veh/h	403	112	302	78	14	122	373	1850	84	226	1001	829
Arrive On Green	0.09	0.26	0.26	0.11	0.00	0.11	0.01	0.53	0.53	0.02	0.55	0.55
Sat Flow, veh/h	1810	441	1184	228	131	1143	1795	3486	158	1739	1826	1513
Grp Volume(v), veh/h	140	0	59	92	0	0	5	668	692	22	591	5
Grp Sat Flow(s),veh/h/ln	1810	0	1625	1502	0	0	1795	1791	1853	1739	1826	1513
Q Serve(g_s), s	5.4	0.0	2.3	1.7	0.0	0.0	0.1	23.2	23.3	0.5	18.0	0.1
Cycle Q Clear(g_c), s	5.4	0.0	2.3	4.7	0.0	0.0	0.1	23.2	23.3	0.5	18.0	0.1
Prop In Lane	1.00		0.73	0.24		0.76	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	403	0	414	214	0	0	373	951	983	226	1001	829
V/C Ratio(X)	0.35	0.00	0.14	0.43	0.00	0.00	0.01	0.70	0.70	0.10	0.59	0.01
Avail Cap(c_a), veh/h	635	0	414	392	0	0	643	2139	2212	499	2181	1807
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.5	0.0	23.9	35.2	0.0	0.0	10.6	14.6	14.6	11.8	12.5	8.5
Incr Delay (d2), s/veh	0.4	0.0	0.1	1.0	0.0	0.0	0.0	1.2	1.1	0.1	0.7	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(50%),veh/ln	2.3	0.0	0.9	1.8	0.0	0.0	0.0	8.7	9.1	0.2	6.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.8	0.0	24.0	36.2	0.0	0.0	10.6	15.7	15.7	11.9	13.2	8.5
LnGrp LOS	C	A	C	D	A	A	B	B	B	B	B	A
Approach Vol, veh/h		199			92			1365			618	
Approach Delay, s/veh		26.7			36.2			15.7			13.1	
Approach LOS		C			D			B			B	

Timer - Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.0	49.9		26.2	5.5	51.3	12.3	13.9
Change Period (Y+Rc), s	5.0	5.8		5.0	5.0	5.8	5.0	5.0
Max Green Setting (Gmax), s	15.0	99.2		20.0	13.0	99.2	18.0	19.0
Max Q Clear Time (g_c+I1), s	2.5	25.3		4.3	2.1	20.0	7.4	6.7
Green Ext Time (p_c), s	0.0	18.8		0.2	0.0	5.9	0.2	0.3

Intersection Summary	
HCM 6th Ctrl Delay	16.8
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	0	65	45	5	45	35	1065	25	5	750	5
Future Volume (veh/h)	55	0	65	45	5	45	35	1065	25	5	750	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.98		0.95	1.00		0.99	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1885	1885	1885	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	59	0	70	48	5	48	38	1145	27	5	806	5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	3	3	3
Cap, veh/h	107	13	91	195	19	178	453	1397	1176	401	1332	1096
Arrive On Green	0.13	0.00	0.13	0.13	0.13	0.13	0.04	0.99	0.99	0.01	0.72	0.72
Sat Flow, veh/h	497	105	714	1321	146	1397	1795	1885	1587	1767	1856	1528
Grp Volume(v), veh/h	129	0	0	48	0	53	38	1145	27	5	806	5
Grp Sat Flow(s),veh/h/ln	1316	0	0	1321	0	1542	1795	1885	1587	1767	1856	1528
Q Serve(g_s), s	8.0	0.0	0.0	0.0	0.0	3.7	0.7	5.4	0.0	0.1	26.0	0.1
Cycle Q Clear(g_c), s	11.7	0.0	0.0	5.4	0.0	3.7	0.7	5.4	0.0	0.1	26.0	0.1
Prop In Lane	0.46		0.54	1.00		0.91	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	212	0	0	195	0	197	453	1397	1176	401	1332	1096
V/C Ratio(X)	0.61	0.00	0.00	0.25	0.00	0.27	0.08	0.82	0.02	0.01	0.61	0.00
Avail Cap(c_a), veh/h	268	0	0	247	0	257	624	1397	1176	611	1332	1096
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	0.80	0.80	0.80	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.1	0.0	0.0	48.0	0.0	47.3	6.8	0.3	0.2	4.6	8.5	4.8
Incr Delay (d2), s/veh	2.8	0.0	0.0	0.6	0.0	0.7	0.1	4.4	0.0	0.0	2.0	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(50%),veh/ln	3.9	0.0	0.0	1.4	0.0	1.5	0.2	2.1	0.0	0.0	10.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.9	0.0	0.0	48.7	0.0	48.0	6.9	4.7	0.3	4.6	10.5	4.8
LnGrp LOS	D	A	A	D	A	D	A	A	A	A	B	A
Approach Vol, veh/h		129			101			1210			816	
Approach Delay, s/veh		53.9			48.3			4.7			10.4	
Approach LOS		D			D			A			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.8	93.9		20.3	8.6	91.1		20.3
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	15.0	70.0		20.0	15.0	70.0		20.0
Max Q Clear Time (g_c+I1), s	2.1	7.4		13.7	2.7	28.0		7.4
Green Ext Time (p_c), s	0.0	16.4		0.3	0.0	7.4		0.3

Intersection Summary	
HCM 6th Ctrl Delay	11.5
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	490	375	10	25	235	315	15	215	40	260	445	345
Future Volume (veh/h)	490	375	10	25	235	315	15	215	40	260	445	345
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		0.97	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	500	383	10	26	240	321	15	219	41	265	454	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, %	3	3	3	3	3	3	2	2	2	2	2	2
Cap, veh/h	651	762	20	43	479	659	29	331	62	301	690	
Arrive On Green	0.19	0.42	0.42	0.02	0.26	0.26	0.02	0.22	0.22	0.06	0.12	0.00
Sat Flow, veh/h	3428	1799	47	1767	1856	1527	1781	1527	286	1781	1870	1585
Grp Volume(v), veh/h	500	0	393	26	240	321	15	0	260	265	454	0
Grp Sat Flow(s),veh/h/ln	1714	0	1846	1767	1856	1527	1781	0	1813	1781	1870	1585
Q Serve(g_s), s	16.6	0.0	18.7	1.7	13.2	0.0	1.0	0.0	15.7	17.7	27.8	0.0
Cycle Q Clear(g_c), s	16.6	0.0	18.7	1.7	13.2	0.0	1.0	0.0	15.7	17.7	27.8	0.0
Prop In Lane	1.00		0.03	1.00		1.00	1.00		0.16	1.00		1.00
Lane Grp Cap(c), veh/h	651	0	782	43	479	659	29	0	393	301	690	
V/C Ratio(X)	0.77	0.00	0.50	0.61	0.50	0.49	0.51	0.00	0.66	0.88	0.66	
Avail Cap(c_a), veh/h	657	0	782	162	479	659	163	0	393	386	690	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.80	0.80	0.00
Uniform Delay (d), s/veh	46.1	0.0	25.3	58.0	37.9	24.8	58.5	0.0	43.0	55.5	45.5	0.0
Incr Delay (d2), s/veh	5.5	0.0	2.3	13.2	0.8	0.6	13.3	0.0	8.5	15.0	2.1	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(50%),veh/ln	7.6	0.0	8.7	0.9	6.1	6.6	0.6	0.0	8.0	9.8	14.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.6	0.0	27.6	71.2	38.7	25.3	71.8	0.0	51.5	70.4	47.5	0.0
LnGrp LOS	D	A	C	E	D	C	E	A	D	E	D	
Approach Vol, veh/h		893			587			275			719	A
Approach Delay, s/veh		41.0			32.8			52.6			56.0	
Approach LOS		D			C			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.8	36.0	7.0	49.3	7.9	55.9	25.2	31.0
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	23.0	25.0	11.0	41.0	11.0	37.0	26.0	26.0
Max Q Clear Time (g_c+I1), s	18.6	15.2	3.0	29.8	3.7	20.7	19.7	17.7
Green Ext Time (p_c), s	0.8	1.9	0.0	2.9	0.0	2.2	0.5	0.9

Intersection Summary	
HCM 6th Ctrl Delay	44.7
HCM 6th LOS	D

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	730	660	330	1150	85	245	50	55	85	435	10
Future Volume (veh/h)	40	730	660	330	1150	85	245	50	55	85	435	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1841	1841	1841	1885	1885	1885
Adj Flow Rate, veh/h	40	737	667	333	1162	86	247	51	56	86	439	10
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, %	2	2	2	1	1	1	4	4	4	1	1	1
Cap, veh/h	62	1104	615	332	1557	115	294	512	721	107	461	10
Arrive On Green	0.03	0.31	0.31	0.19	0.46	0.46	0.09	0.28	0.28	0.06	0.25	0.25
Sat Flow, veh/h	1781	3554	1538	1795	3375	250	3401	1841	1557	1795	1835	42
Grp Volume(v), veh/h	40	737	667	333	616	632	247	51	56	86	0	449
Grp Sat Flow(s),veh/h/ln	1781	1777	1538	1795	1791	1834	1700	1841	1557	1795	0	1877
Q Serve(g_s), s	3.0	24.4	41.9	25.0	38.1	38.3	9.7	2.8	2.7	6.4	0.0	31.8
Cycle Q Clear(g_c), s	3.0	24.4	41.9	25.0	38.1	38.3	9.7	2.8	2.7	6.4	0.0	31.8
Prop In Lane	1.00		1.00	1.00		0.14	1.00		1.00	1.00		0.02
Lane Grp Cap(c), veh/h	62	1104	615	332	826	846	294	512	721	107	0	471
V/C Ratio(X)	0.65	0.67	1.09	1.00	0.75	0.75	0.84	0.10	0.08	0.80	0.00	0.95
Avail Cap(c_a), veh/h	119	1104	615	332	826	846	441	539	744	166	0	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	64.4	40.5	40.8	55.0	29.9	29.9	60.7	36.2	20.2	62.7	0.0	49.8
Incr Delay (d2), s/veh	4.2	3.2	61.5	49.7	6.1	6.0	5.6	0.0	0.0	7.1	0.0	28.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	11.2	30.7	15.9	17.7	18.1	4.4	1.3	1.0	3.1	0.0	18.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.6	43.7	102.4	104.7	35.9	35.9	66.4	36.2	20.2	69.8	0.0	78.1
LnGrp LOS	E	D	F	F	D	D	E	D	C	E	A	E
Approach Vol, veh/h		1444			1581			354			535	
Approach Delay, s/veh		71.5			50.4			54.7			76.8	
Approach LOS		E			D			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	67.8	13.6	43.0	31.0	47.4	17.2	39.4
Change Period (Y+Rc), s	6.0	* 5.5	5.5	5.5	6.0	5.5	5.5	* 5.5
Max Green Setting (Gmax), s	9.0	* 53	12.5	39.5	25.0	35.5	17.5	* 35
Max Q Clear Time (g_c+I1), s	5.0	40.3	8.4	4.8	27.0	43.9	11.7	33.8
Green Ext Time (p_c), s	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	62.2
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	5	5	110	40	15	20	350	10	5	1250	105
Future Volume (veh/h)	15	5	5	110	40	15	20	350	10	5	1250	105
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	0.99		0.99	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1870	1870	1870	1826	1826	1826	1885	1885	1885
Adj Flow Rate, veh/h	15	5	5	112	41	15	20	357	10	5	1276	107
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, %	0	0	0	2	2	2	5	5	5	1	1	1
Cap, veh/h	272	160	160	175	48	17	92	2356	66	730	1263	1044
Arrive On Green	0.02	0.18	0.18	0.13	0.13	0.13	0.02	0.68	0.68	0.01	0.67	0.67
Sat Flow, veh/h	1810	869	869	994	377	134	1739	3447	96	1795	1885	1558
Grp Volume(v), veh/h	15	0	10	168	0	0	20	179	188	5	1276	107
Grp Sat Flow(s),veh/h/ln	1810	0	1738	1505	0	0	1739	1735	1808	1795	1885	1558
Q Serve(g_s), s	0.9	0.0	0.6	13.6	0.0	0.0	0.5	4.6	4.6	0.1	84.2	3.1
Cycle Q Clear(g_c), s	0.9	0.0	0.6	13.8	0.0	0.0	0.5	4.6	4.6	0.1	84.2	3.1
Prop In Lane	1.00		0.50	0.67		0.09	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	272	0	320	241	0	0	92	1186	1236	730	1263	1044
V/C Ratio(X)	0.06	0.00	0.03	0.70	0.00	0.00	0.22	0.15	0.15	0.01	1.01	0.10
Avail Cap(c_a), veh/h	430	0	512	275	0	0	237	1186	1236	933	1263	1044
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.7	0.0	42.0	53.7	0.0	0.0	34.3	7.0	7.0	6.6	20.7	7.4
Incr Delay (d2), s/veh	0.1	0.0	0.0	5.7	0.0	0.0	0.9	0.1	0.1	0.0	27.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.3	5.6	0.0	0.0	0.4	1.7	1.7	0.0	42.8	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.7	0.0	42.1	59.4	0.0	0.0	35.2	7.1	7.1	6.6	48.6	7.4
LnGrp LOS	D	A	D	E	A	A	D	A	A	A	F	A
Approach Vol, veh/h		25			168			387			1388	
Approach Delay, s/veh		43.7			59.4			8.5			45.3	
Approach LOS		D			E			A			D	

Timer - Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.8	91.7		28.2	7.5	90.0	7.0	21.1
Change Period (Y+Rc), s	5.0	5.8		5.0	5.0	5.8	5.0	5.0
Max Green Setting (Gmax), s	15.0	82.2		37.0	13.0	84.2	13.0	19.0
Max Q Clear Time (g_c+I1), s	2.1	6.6		2.6	2.5	86.2	2.9	15.8
Green Ext Time (p_c), s	0.0	2.9		0.0	0.0	0.0	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	39.3
HCM 6th LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	5	60	30	0	10	90	615	70	15	1105	35
Future Volume (veh/h)	20	5	60	30	0	10	90	615	70	15	1105	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.93	0.95		0.90	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1737	1737	1737	1841	1841	1841	1870	1870	1870
Adj Flow Rate, veh/h	21	5	62	31	0	10	93	634	72	15	1139	36
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	7	7	7	11	11	11	4	4	4	2	2	2
Cap, veh/h	61	23	113	181	0	147	268	1376	1161	626	1354	1119
Arrive On Green	0.11	0.11	0.11	0.11	0.00	0.11	0.08	1.00	1.00	0.02	0.72	0.72
Sat Flow, veh/h	215	209	1012	1182	0	1322	1753	1841	1554	1781	1870	1546
Grp Volume(v), veh/h	88	0	0	31	0	10	93	634	72	15	1139	36
Grp Sat Flow(s),veh/h/ln	1437	0	0	1182	0	1322	1753	1841	1554	1781	1870	1546
Q Serve(g_s), s	2.0	0.0	0.0	0.0	0.0	0.8	1.6	0.0	0.0	0.3	51.6	0.8
Cycle Q Clear(g_c), s	6.8	0.0	0.0	3.5	0.0	0.8	1.6	0.0	0.0	0.3	51.6	0.8
Prop In Lane	0.24		0.70	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	197	0	0	181	0	147	268	1376	1161	626	1354	1119
V/C Ratio(X)	0.45	0.00	0.00	0.17	0.00	0.07	0.35	0.46	0.06	0.02	0.84	0.03
Avail Cap(c_a), veh/h	274	0	0	246	0	220	344	1376	1161	745	1354	1119
HCM Platoon Ratio	1.00	1.00	1.00	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	0.00	1.00	0.00	1.00	0.49	0.49	0.49	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.3	0.0	0.0	48.9	0.0	47.8	16.5	0.0	0.0	4.1	11.7	4.7
Incr Delay (d2), s/veh	1.6	0.0	0.0	0.4	0.0	0.2	0.4	0.5	0.1	0.0	6.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	0.0	0.9	0.0	0.3	1.3	0.2	0.0	0.1	20.9	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.9	0.0	0.0	49.4	0.0	48.0	16.9	0.5	0.1	4.1	18.1	4.7
LnGrp LOS	D	A	A	D	A	D	B	A	A	A	B	A
Approach Vol, veh/h		88			41			799			1190	
Approach Delay, s/veh		51.9			49.0			2.4			17.6	
Approach LOS		D			D			A			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.0	94.7		18.3	9.8	91.9		18.3
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	10.0	75.0		20.0	10.0	75.0		20.0
Max Q Clear Time (g_c+I1), s	2.3	2.0		8.8	3.6	53.6		5.5
Green Ext Time (p_c), s	0.0	5.5		0.3	0.1	10.9		0.1

Intersection Summary	
HCM 6th Ctrl Delay	13.9
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	470	205	10	20	300	430	10	375	20	165	375	540
Future Volume (veh/h)	470	205	10	20	300	430	10	375	20	165	375	540
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.95	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1856	1856	1856	1856	1856	1856	1841	1841	1841
Adj Flow Rate, veh/h	522	228	11	22	333	478	11	417	22	183	417	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, %	5	5	5	3	3	3	3	3	3	4	4	4
Cap, veh/h	574	546	26	225	508	600	23	465	25	215	693	
Arrive On Green	0.17	0.32	0.32	0.13	0.27	0.27	0.01	0.27	0.27	0.04	0.12	0.00
Sat Flow, veh/h	3374	1725	83	1767	1856	1488	1767	1743	92	1753	1841	1560
Grp Volume(v), veh/h	522	0	239	22	333	478	11	0	439	183	417	0
Grp Sat Flow(s),veh/h/ln	1687	0	1808	1767	1856	1488	1767	0	1835	1753	1841	1560
Q Serve(g_s), s	18.2	0.0	12.5	1.3	19.1	18.3	0.7	0.0	27.7	12.4	25.7	0.0
Cycle Q Clear(g_c), s	18.2	0.0	12.5	1.3	19.1	18.3	0.7	0.0	27.7	12.4	25.7	0.0
Prop In Lane	1.00		0.05	1.00		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	574	0	573	225	508	600	23	0	489	215	693	
V/C Ratio(X)	0.91	0.00	0.42	0.10	0.66	0.80	0.49	0.00	0.90	0.85	0.60	
Avail Cap(c_a), veh/h	590	0	573	225	508	600	221	0	489	292	693	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.42	0.42	0.00
Uniform Delay (d), s/veh	48.9	0.0	32.3	46.3	38.5	31.6	58.8	0.0	42.4	56.5	44.0	0.0
Incr Delay (d2), s/veh	17.9	0.0	2.2	0.2	3.0	7.4	15.3	0.0	21.8	8.1	0.7	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(50%),veh/ln	9.1	0.0	5.8	0.6	9.1	6.8	0.4	0.0	15.4	6.4	12.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.8	0.0	34.5	46.4	41.6	39.0	74.1	0.0	64.2	64.6	44.8	0.0
LnGrp LOS	E	A	C	D	D	D	E	A	E	E	D	
Approach Vol, veh/h		761			833			450			600	A
Approach Delay, s/veh		56.6			40.2			64.5			50.8	
Approach LOS		E			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.4	37.9	6.5	50.2	20.3	43.0	19.7	37.0
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	21.0	27.0	15.0	37.0	10.0	38.0	20.0	32.0
Max Q Clear Time (g_c+I1), s	20.2	21.1	2.7	27.7	3.3	14.5	14.4	29.7
Green Ext Time (p_c), s	0.2	2.1	0.0	2.3	0.0	1.4	0.3	0.6

Intersection Summary	
HCM 6th Ctrl Delay	51.5
HCM 6th LOS	D

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	975	390	90	635	85	885	390	470	155	115	65
Future Volume (veh/h)	30	975	390	90	635	85	885	390	470	155	115	65
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	1.00		0.98	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	30	985	394	91	641	86	894	394	475	157	116	66
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, %	3	3	3	3	3	3	1	1	1	2	2	2
Cap, veh/h	52	1295	984	112	1249	167	931	580	584	180	157	89
Arrive On Green	0.03	0.37	0.37	0.06	0.40	0.40	0.27	0.31	0.31	0.10	0.14	0.14
Sat Flow, veh/h	1767	3526	1534	1767	3115	417	3483	1885	1568	1781	1106	630
Grp Volume(v), veh/h	30	985	394	91	362	365	894	394	475	157	0	182
Grp Sat Flow(s),veh/h/ln	1767	1763	1534	1767	1763	1769	1742	1885	1568	1781	0	1736
Q Serve(g_s), s	2.3	34.3	17.7	7.1	21.7	21.8	35.4	25.6	38.3	12.2	0.0	14.1
Cycle Q Clear(g_c), s	2.3	34.3	17.7	7.1	21.7	21.8	35.4	25.6	38.3	12.2	0.0	14.1
Prop In Lane	1.00		1.00	1.00		0.24	1.00		1.00	1.00		0.36
Lane Grp Cap(c), veh/h	52	1295	984	112	707	710	931	580	584	180	0	246
V/C Ratio(X)	0.58	0.76	0.40	0.81	0.51	0.51	0.96	0.68	0.81	0.87	0.00	0.74
Avail Cap(c_a), veh/h	88	1295	984	114	707	710	933	734	712	197	0	409
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	67.1	38.9	12.6	64.8	31.6	31.6	50.6	42.4	39.7	62.0	0.0	57.6
Incr Delay (d2), s/veh	3.7	4.3	1.2	32.3	2.6	2.7	20.2	1.0	4.9	28.6	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	15.6	6.3	4.2	9.8	9.9	18.0	12.1	15.5	6.9	0.0	6.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.7	43.1	13.8	97.0	34.3	34.3	70.8	43.4	44.7	90.6	0.0	59.3
LnGrp LOS	E	D	B	F	C	C	E	D	D	F	A	E
Approach Vol, veh/h		1409			818			1763			339	
Approach Delay, s/veh		35.5			41.3			57.6			73.8	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.1	61.6	19.6	48.6	14.9	56.9	42.9	25.3
Change Period (Y+Rc), s	6.0	* 5.5	5.5	5.5	6.0	5.5	5.5	* 5.5
Max Green Setting (Gmax), s	7.0	* 42	15.5	54.5	9.0	38.5	37.5	* 33
Max Q Clear Time (g_c+I1), s	4.3	23.8	14.2	40.3	9.1	36.3	37.4	16.1
Green Ext Time (p_c), s	0.0	0.8	0.0	0.4	0.0	0.6	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	48.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	15	45	20	0	70	5	1365	60	20	625	5
Future Volume (veh/h)	145	15	45	20	0	70	5	1365	60	20	625	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.96	0.96		0.94	1.00		0.98	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1826	1826	1826
Adj Flow Rate, veh/h	156	16	48	22	0	75	5	1468	65	22	672	5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	5	5	5
Cap, veh/h	378	101	302	67	13	121	349	1990	88	197	1071	887
Arrive On Green	0.09	0.25	0.25	0.10	0.00	0.10	0.01	0.57	0.57	0.02	0.59	0.59
Sat Flow, veh/h	1810	404	1213	218	122	1159	1795	3490	154	1739	1826	1513
Grp Volume(v), veh/h	156	0	64	97	0	0	5	751	782	22	672	5
Grp Sat Flow(s),veh/h/ln	1810	0	1617	1499	0	0	1795	1791	1853	1739	1826	1513
Q Serve(g_s), s	7.4	0.0	3.1	2.5	0.0	0.0	0.1	31.0	31.3	0.5	24.0	0.1
Cycle Q Clear(g_c), s	7.4	0.0	3.1	6.1	0.0	0.0	0.1	31.0	31.3	0.5	24.0	0.1
Prop In Lane	1.00		0.75	0.23		0.77	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	378	0	402	201	0	0	349	1021	1057	197	1071	887
V/C Ratio(X)	0.41	0.00	0.16	0.48	0.00	0.00	0.01	0.74	0.74	0.11	0.63	0.01
Avail Cap(c_a), veh/h	534	0	402	326	0	0	572	1780	1843	418	1815	1504
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.3	0.0	29.3	42.7	0.0	0.0	11.5	15.9	16.0	13.6	13.5	8.6
Incr Delay (d2), s/veh	0.5	0.0	0.1	1.3	0.0	0.0	0.0	1.3	1.3	0.2	0.7	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(50%),veh/ln	3.2	0.0	1.2	2.3	0.0	0.0	0.0	12.1	12.6	0.2	9.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.9	0.0	29.5	44.0	0.0	0.0	11.5	17.2	17.2	13.8	14.2	8.6
LnGrp LOS	C	A	C	D	A	A	B	B	B	B	B	A
Approach Vol, veh/h		220			97			1538			699	
Approach Delay, s/veh		32.6			44.0			17.2			14.2	
Approach LOS		C			D			B			B	

Timer - Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.3	62.7		29.8	5.6	64.3	14.4	15.4
Change Period (Y+Rc), s	5.0	5.8		5.0	5.0	5.8	5.0	5.0
Max Green Setting (Gmax), s	15.0	99.2		20.0	13.0	99.2	18.0	19.0
Max Q Clear Time (g_c+I1), s	2.5	33.3		5.1	2.1	26.0	9.4	8.1
Green Ext Time (p_c), s	0.0	23.6		0.2	0.0	7.2	0.2	0.3

Intersection Summary	
HCM 6th Ctrl Delay	18.7
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	0	70	50	5	50	40	1205	30	5	845	5
Future Volume (veh/h)	60	0	70	50	5	50	40	1205	30	5	845	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.99		0.95	1.00		0.99	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1885	1885	1885	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	65	0	75	54	5	54	43	1296	32	5	909	5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	3	3	3
Cap, veh/h	112	13	94	201	18	193	379	1380	1162	130	1312	1080
Arrive On Green	0.14	0.00	0.14	0.14	0.14	0.14	0.03	0.73	0.73	0.01	0.71	0.71
Sat Flow, veh/h	498	97	687	1317	131	1412	1795	1885	1587	1767	1856	1528
Grp Volume(v), veh/h	140	0	0	54	0	59	43	1296	32	5	909	5
Grp Sat Flow(s),veh/h/ln	1283	0	0	1317	0	1543	1795	1885	1587	1767	1856	1528
Q Serve(g_s), s	9.0	0.0	0.0	0.0	0.0	4.1	0.8	70.7	0.7	0.1	33.8	0.1
Cycle Q Clear(g_c), s	13.1	0.0	0.0	6.2	0.0	4.1	0.8	70.7	0.7	0.1	33.8	0.1
Prop In Lane	0.46		0.54	1.00		0.92	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	219	0	0	201	0	211	379	1380	1162	130	1312	1080
V/C Ratio(X)	0.64	0.00	0.00	0.27	0.00	0.28	0.11	0.94	0.03	0.04	0.69	0.00
Avail Cap(c_a), veh/h	262	0	0	241	0	257	546	1380	1162	339	1312	1080
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	0.69	0.69	0.69	0.76	0.76	0.76
Uniform Delay (d), s/veh	50.9	0.0	0.0	47.4	0.0	46.5	9.3	13.8	4.4	24.3	10.1	5.2
Incr Delay (d2), s/veh	3.8	0.0	0.0	0.7	0.0	0.7	0.1	10.1	0.0	0.1	2.3	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(50%),veh/ln	4.3	0.0	0.0	1.5	0.0	1.6	0.3	29.0	0.2	0.1	13.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	0.0	0.0	48.1	0.0	47.2	9.4	23.9	4.4	24.4	12.4	5.2
LnGrp LOS	D	A	A	D	A	D	A	C	A	C	B	A
Approach Vol, veh/h		140			113			1371			919	
Approach Delay, s/veh		54.7			47.7			23.0			12.5	
Approach LOS		D			D			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.8	92.9		21.4	8.8	89.8		21.4				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	15.0	70.0		20.0	15.0	70.0		20.0				
Max Q Clear Time (g_c+I1), s	2.1	72.7		15.1	2.8	35.8		8.2				
Green Ext Time (p_c), s	0.0	0.0		0.3	0.0	8.8		0.3				

Intersection Summary		
HCM 6th Ctrl Delay		22.0
HCM 6th LOS		C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	560	415	10	30	265	350	15	245	45	285	495	390
Future Volume (veh/h)	560	415	10	30	265	350	15	245	45	285	495	390
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		0.97	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	571	423	10	31	270	357	15	250	46	291	505	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, %	3	3	3	3	3	3	2	2	2	2	2	2
Cap, veh/h	627	734	17	47	465	670	29	332	61	326	716	
Arrive On Green	0.18	0.41	0.41	0.03	0.25	0.25	0.02	0.22	0.22	0.06	0.13	0.00
Sat Flow, veh/h	3428	1804	43	1767	1856	1525	1781	1532	282	1781	1870	1585
Grp Volume(v), veh/h	571	0	433	31	270	357	15	0	296	291	505	0
Grp Sat Flow(s),veh/h/ln	1714	0	1847	1767	1856	1525	1781	0	1814	1781	1870	1585
Q Serve(g_s), s	19.6	0.0	21.8	2.1	15.3	0.0	1.0	0.0	18.3	19.5	31.1	0.0
Cycle Q Clear(g_c), s	19.6	0.0	21.8	2.1	15.3	0.0	1.0	0.0	18.3	19.5	31.1	0.0
Prop In Lane	1.00		0.02	1.00		1.00	1.00		0.16	1.00		1.00
Lane Grp Cap(c), veh/h	627	0	752	47	465	670	29	0	393	326	716	
V/C Ratio(X)	0.91	0.00	0.58	0.65	0.58	0.53	0.51	0.00	0.75	0.89	0.70	
Avail Cap(c_a), veh/h	657	0	752	162	465	670	163	0	393	386	716	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.70	0.70	0.00
Uniform Delay (d), s/veh	48.0	0.0	27.6	57.8	39.4	24.9	58.5	0.0	44.0	55.2	45.9	0.0
Incr Delay (d2), s/veh	16.4	0.0	3.2	14.2	1.8	0.8	13.3	0.0	12.6	15.6	2.4	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(50%),veh/ln	9.8	0.0	10.2	1.1	7.2	7.5	0.6	0.0	9.6	10.8	16.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.5	0.0	30.8	72.0	41.2	25.7	71.8	0.0	56.5	70.8	48.3	0.0
LnGrp LOS	E	A	C	E	D	C	E	A	E	E	D	
Approach Vol, veh/h		1004			658			311			796	A
Approach Delay, s/veh		49.9			34.3			57.3			56.6	
Approach LOS		D			C			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.0	35.1	7.0	51.0	8.2	53.8	26.9	31.0
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	23.0	25.0	11.0	41.0	11.0	37.0	26.0	26.0
Max Q Clear Time (g_c+I1), s	21.6	17.3	3.0	33.1	4.1	23.8	21.5	20.3
Green Ext Time (p_c), s	0.4	1.9	0.0	2.6	0.0	2.2	0.5	0.8

Intersection Summary	
HCM 6th Ctrl Delay	48.9
HCM 6th LOS	D

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	730	697	354	1150	85	251	52	59	85	447	10
Future Volume (veh/h)	40	730	697	354	1150	85	251	52	59	85	447	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1841	1841	1841	1885	1885	1885
Adj Flow Rate, veh/h	40	737	704	358	1162	86	254	53	60	86	452	10
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, %	2	2	2	1	1	1	4	4	4	1	1	1
Cap, veh/h	62	1074	605	332	1528	113	301	527	735	107	473	10
Arrive On Green	0.03	0.30	0.30	0.19	0.45	0.45	0.09	0.29	0.29	0.06	0.26	0.26
Sat Flow, veh/h	1781	3554	1537	1795	3375	250	3401	1841	1557	1795	1836	41
Grp Volume(v), veh/h	40	737	704	358	616	632	254	53	60	86	0	462
Grp Sat Flow(s),veh/h/ln	1781	1777	1537	1795	1791	1834	1700	1841	1557	1795	0	1877
Q Serve(g_s), s	3.0	24.7	40.8	25.0	38.7	38.9	9.9	2.9	2.9	6.4	0.0	32.7
Cycle Q Clear(g_c), s	3.0	24.7	40.8	25.0	38.7	38.9	9.9	2.9	2.9	6.4	0.0	32.7
Prop In Lane	1.00		1.00	1.00		0.14	1.00		1.00	1.00		0.02
Lane Grp Cap(c), veh/h	62	1074	605	332	811	830	301	527	735	107	0	483
V/C Ratio(X)	0.65	0.69	1.16	1.08	0.76	0.76	0.84	0.10	0.08	0.80	0.00	0.96
Avail Cap(c_a), veh/h	119	1074	605	332	811	830	441	539	744	166	0	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	1.00	0.00	1.00
Uniform Delay (d), s/veh	64.4	41.5	41.3	55.0	30.8	30.8	60.6	35.4	19.6	62.7	0.0	49.4
Incr Delay (d2), s/veh	4.2	3.6	90.9	71.3	6.6	6.5	6.4	0.0	0.0	7.1	0.0	29.5
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(50%),veh/ln	1.4	11.4	35.1	17.9	18.0	18.5	4.6	1.3	1.1	3.1	0.0	19.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.6	45.1	132.2	126.3	37.4	37.4	67.0	35.4	19.6	69.8	0.0	78.9
LnGrp LOS	E	D	F	F	D	D	E	D	B	E	A	E
Approach Vol, veh/h		1481			1606			367			548	
Approach Delay, s/veh		87.1			57.2			54.7			77.4	
Approach LOS		F			E			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	66.6	13.6	44.2	31.0	46.3	17.5	40.3
Change Period (Y+Rc), s	6.0	* 5.5	5.5	5.5	6.0	5.5	5.5	* 5.5
Max Green Setting (Gmax), s	9.0	* 53	12.5	39.5	25.0	35.5	17.5	* 35
Max Q Clear Time (g_c+I1), s	5.0	40.9	8.4	4.9	27.0	42.8	11.9	34.7
Green Ext Time (p_c), s	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	70.8
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	5	5	110	40	15	20	362	10	5	1323	105
Future Volume (veh/h)	15	5	5	110	40	15	20	362	10	5	1323	105
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	0.99		0.99	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1870	1870	1870	1826	1826	1826	1885	1885	1885
Adj Flow Rate, veh/h	15	5	5	112	41	15	20	369	10	5	1350	107
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, %	0	0	0	2	2	2	5	5	5	1	1	1
Cap, veh/h	272	160	160	175	48	17	92	2358	64	721	1263	1044
Arrive On Green	0.02	0.18	0.18	0.13	0.13	0.13	0.02	0.68	0.68	0.01	0.67	0.67
Sat Flow, veh/h	1810	869	869	994	377	134	1739	3450	93	1795	1885	1558
Grp Volume(v), veh/h	15	0	10	168	0	0	20	185	194	5	1350	107
Grp Sat Flow(s),veh/h/ln	1810	0	1738	1505	0	0	1739	1735	1809	1795	1885	1558
Q Serve(g_s), s	0.9	0.0	0.6	13.6	0.0	0.0	0.5	4.8	4.8	0.1	84.2	3.1
Cycle Q Clear(g_c), s	0.9	0.0	0.6	13.8	0.0	0.0	0.5	4.8	4.8	0.1	84.2	3.1
Prop In Lane	1.00		0.50	0.67		0.09	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	272	0	320	241	0	0	92	1186	1236	721	1263	1044
V/C Ratio(X)	0.06	0.00	0.03	0.70	0.00	0.00	0.22	0.16	0.16	0.01	1.07	0.10
Avail Cap(c_a), veh/h	430	0	512	275	0	0	237	1186	1236	924	1263	1044
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.7	0.0	42.0	53.7	0.0	0.0	34.3	7.0	7.0	6.6	20.7	7.4
Incr Delay (d2), s/veh	0.1	0.0	0.0	5.7	0.0	0.0	0.9	0.1	0.1	0.0	45.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.3	5.6	0.0	0.0	0.4	1.7	1.8	0.0	49.2	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.7	0.0	42.1	59.4	0.0	0.0	35.2	7.1	7.1	6.6	66.7	7.4
LnGrp LOS	D	A	D	E	A	A	D	A	A	A	F	A
Approach Vol, veh/h		25			168			399			1462	
Approach Delay, s/veh		43.7			59.4			8.5			62.1	
Approach LOS		D			E			A			E	

Timer - Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.8	91.7		28.2	7.5	90.0	7.0	21.1
Change Period (Y+Rc), s	5.0	5.8		5.0	5.0	5.8	5.0	5.0
Max Green Setting (Gmax), s	15.0	82.2		37.0	13.0	84.2	13.0	19.0
Max Q Clear Time (g_c+I1), s	2.1	6.8		2.6	2.5	86.2	2.9	15.8
Green Ext Time (p_c), s	0.0	3.0		0.0	0.0	0.0	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	51.3
HCM 6th LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	5	60	30	0	10	90	786	70	15	1132	35
Future Volume (veh/h)	20	5	60	30	0	10	90	786	70	15	1132	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.93	0.95		0.90	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1796	1796	1796	1737	1737	1737	1841	1841	1841	1870	1870	1870
Adj Flow Rate, veh/h	21	5	62	31	0	10	93	810	72	15	1167	36
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	7	7	7	11	11	11	4	4	4	2	2	2
Cap, veh/h	61	23	113	181	0	147	461	1376	1161	435	1354	1119
Arrive On Green	0.11	0.11	0.11	0.11	0.00	0.11	0.04	0.75	0.75	0.03	1.00	1.00
Sat Flow, veh/h	215	209	1012	1182	0	1322	1753	1841	1554	1781	1870	1546
Grp Volume(v), veh/h	88	0	0	31	0	10	93	810	72	15	1167	36
Grp Sat Flow(s),veh/h/ln	1437	0	0	1182	0	1322	1753	1841	1554	1781	1870	1546
Q Serve(g_s), s	2.0	0.0	0.0	0.0	0.0	0.8	1.6	23.8	1.5	0.3	0.0	0.0
Cycle Q Clear(g_c), s	6.8	0.0	0.0	3.5	0.0	0.8	1.6	23.8	1.5	0.3	0.0	0.0
Prop In Lane	0.24		0.70	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	197	0	0	181	0	147	461	1376	1161	435	1354	1119
V/C Ratio(X)	0.45	0.00	0.00	0.17	0.00	0.07	0.20	0.59	0.06	0.03	0.86	0.03
Avail Cap(c_a), veh/h	274	0	0	246	0	220	537	1376	1161	554	1354	1119
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	0.09	0.09	0.09	0.23	0.23	0.23
Uniform Delay (d), s/veh	50.3	0.0	0.0	48.9	0.0	47.8	3.5	6.8	4.0	5.9	0.0	0.0
Incr Delay (d2), s/veh	1.6	0.0	0.0	0.4	0.0	0.2	0.0	0.2	0.0	0.0	1.9	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(50%),veh/ln	2.6	0.0	0.0	0.9	0.0	0.3	0.5	8.1	0.4	0.1	0.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.9	0.0	0.0	49.4	0.0	48.0	3.6	7.0	4.0	5.9	1.9	0.0
LnGrp LOS	D	A	A	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		88			41			975			1218	
Approach Delay, s/veh		51.9			49.0			6.5			1.8	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.0	94.7		18.3	9.8	91.9		18.3
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	10.0	75.0		20.0	10.0	75.0		20.0
Max Q Clear Time (g_c+I1), s	2.3	25.8		8.8	3.6	2.0		5.5
Green Ext Time (p_c), s	0.0	7.9		0.3	0.1	17.8		0.1

Intersection Summary	
HCM 6th Ctrl Delay	6.5
HCM 6th LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	543	205	10	20	300	454	10	448	20	169	387	552
Future Volume (veh/h)	543	205	10	20	300	454	10	448	20	169	387	552
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		0.94	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1856	1856	1856	1856	1856	1856	1841	1841	1841
Adj Flow Rate, veh/h	603	228	11	22	333	504	11	498	22	188	430	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, %	5	5	5	3	3	3	3	3	3	4	4	4
Cap, veh/h	717	698	34	38	396	509	23	499	22	218	726	
Arrive On Green	0.21	0.40	0.40	0.02	0.21	0.21	0.01	0.28	0.28	0.12	0.39	0.00
Sat Flow, veh/h	3374	1725	83	1767	1856	1473	1767	1760	78	1753	1841	1560
Grp Volume(v), veh/h	603	0	239	22	333	504	11	0	520	188	430	0
Grp Sat Flow(s),veh/h/ln	1687	0	1809	1767	1856	1473	1767	0	1838	1753	1841	1560
Q Serve(g_s), s	20.6	0.0	10.9	1.5	20.6	19.7	0.7	0.0	33.9	12.6	22.1	0.0
Cycle Q Clear(g_c), s	20.6	0.0	10.9	1.5	20.6	19.7	0.7	0.0	33.9	12.6	22.1	0.0
Prop In Lane	1.00		0.05	1.00		1.00	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	717	0	731	38	396	509	23	0	521	218	726	
V/C Ratio(X)	0.84	0.00	0.33	0.57	0.84	0.99	0.49	0.00	1.00	0.86	0.59	
Avail Cap(c_a), veh/h	717	0	731	147	495	588	280	0	521	292	726	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.38	0.38	0.00
Uniform Delay (d), s/veh	45.3	0.0	24.5	58.2	45.2	18.1	58.8	0.0	43.0	51.6	28.7	0.0
Incr Delay (d2), s/veh	8.9	0.0	1.2	12.9	10.3	32.6	15.3	0.0	39.1	8.3	0.6	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(50%),veh/ln	9.5	0.0	4.9	0.8	10.6	10.5	0.4	0.0	20.9	6.0	9.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.2	0.0	25.7	71.0	55.5	50.7	74.1	0.0	82.0	59.9	29.3	0.0
LnGrp LOS	D	A	C	E	E	D	E	A	F	E	C	
Approach Vol, veh/h		842			859			531			618	A
Approach Delay, s/veh		46.1			53.1			81.9			38.6	
Approach LOS		D			D			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	30.5	30.6	6.5	52.4	7.6	53.5	19.9	39.0
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	14.0	32.0	19.0	35.0	10.0	36.0	20.0	34.0
Max Q Clear Time (g_c+I1), s	22.6	22.6	2.7	24.1	3.5	12.9	14.6	35.9
Green Ext Time (p_c), s	0.0	3.0	0.0	2.7	0.0	1.4	0.3	0.0

Intersection Summary	
HCM 6th Ctrl Delay	53.2
HCM 6th LOS	D

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	10	50	601	1260	84
Future Vol, veh/h	8	10	50	601	1260	84
Conflicting Peds, #/hr	8	8	8	0	0	8
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	160
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	45	45	4	4	2	2
Mvmt Flow	8	10	52	626	1313	88

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2059	1329	1409	0	-	0
Stage 1	1321	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Critical Hdwy	6.85	6.65	4.14	-	-	-
Critical Hdwy Stg 1	5.85	-	-	-	-	-
Critical Hdwy Stg 2	5.85	-	-	-	-	-
Follow-up Hdwy	3.905	3.705	2.236	-	-	-
Pot Cap-1 Maneuver	46	153	478	-	-	-
Stage 1	203	-	-	-	-	-
Stage 2	404	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	40	151	474	-	-	-
Mov Cap-2 Maneuver	128	-	-	-	-	-
Stage 1	179	-	-	-	-	-
Stage 2	401	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	34.7	1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	474	-	140	-	-
HCM Lane V/C Ratio	0.11	-	0.134	-	-
HCM Control Delay (s)	13.5	-	34.7	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

6: Willows Rd & Southern Site Access/Willows Run

Future (2023) With-Project AM Peak Hour

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	16	25	10	178	685	10	1268	21
v/c Ratio	0.24	0.13	0.06	0.59	0.41	0.02	0.94	0.02
Control Delay	60.4	1.5	0.8	37.2	1.8	7.2	30.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	60.4	1.5	0.8	37.2	1.9	7.2	30.6	0.1
Queue Length 50th (ft)	12	0	0	85	12	2	770	0
Queue Length 95th (ft)	34	0	0	189	170	10	#1383	0
Internal Link Dist (ft)		428	325		559		518	
Turn Bay Length (ft)				300		150		150
Base Capacity (vph)	66	454	453	300	1664	546	1350	1126
Starvation Cap Reductn	0	0	0	0	172	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.06	0.02	0.59	0.46	0.02	0.94	0.02

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	0	24	5	0	5	173	625	40	10	1230	20
Future Volume (veh/h)	16	0	24	5	0	5	173	625	40	10	1230	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	0.94		0.99	1.00		0.97	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1159	1159	1159	1530	1530	1530	1856	1856	1856	1870	1870	1870
Adj Flow Rate, veh/h	16	0	25	5	0	5	178	644	41	10	1268	21
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	50	50	50	25	25	25	3	3	3	2	2	2
Cap, veh/h	151	0	109	71	11	37	204	1396	89	612	1366	1128
Arrive On Green	0.02	0.00	0.11	0.06	0.00	0.06	0.09	1.00	1.00	0.73	0.73	0.73
Sat Flow, veh/h	1104	0	952	435	178	613	1767	1723	110	755	1870	1545
Grp Volume(v), veh/h	16	0	25	10	0	0	178	0	685	10	1268	21
Grp Sat Flow(s),veh/h/ln	1104	0	952	1226	0	0	1767	0	1832	755	1870	1545
Q Serve(g_s), s	1.6	0.0	2.9	0.0	0.0	0.0	3.0	0.0	0.0	0.4	68.1	0.4
Cycle Q Clear(g_c), s	1.6	0.0	2.9	0.8	0.0	0.0	3.0	0.0	0.0	0.4	68.1	0.4
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	151	0	109	119	0	0	204	0	1485	612	1366	1128
V/C Ratio(X)	0.11	0.00	0.23	0.08	0.00	0.00	0.87	0.00	0.46	0.02	0.93	0.02
Avail Cap(c_a), veh/h	178	0	337	370	0	0	225	0	1485	612	1366	1128
HCM Platoon Ratio	1.00	1.00	1.00	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	1.00	0.00	0.00	0.80	0.00	0.80	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.0	0.0	48.3	53.4	0.0	0.0	31.1	0.0	0.0	4.4	13.6	4.4
Incr Delay (d2), s/veh	0.3	0.0	1.1	0.3	0.0	0.0	23.1	0.0	0.8	0.0	12.3	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(50%),veh/ln	0.5	0.0	0.7	0.3	0.0	0.0	5.1	0.0	0.3	0.1	28.7	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.3	0.0	49.3	53.7	0.0	0.0	54.2	0.0	0.8	4.5	25.9	4.5
LnGrp LOS	D	A	D	D	A	A	D	A	A	A	C	A
Approach Vol, veh/h		41			10			863			1299	
Approach Delay, s/veh		49.7			53.7			11.8			25.4	
Approach LOS		D			D			B			C	

Timer - Assigned Phs		2		4	5	6	7	8
Phs Duration (G+Y+Rc), s		101.7		18.3	9.6	92.1	6.6	11.7
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s		68.5		42.5	6.5	57.5	5.0	33.0
Max Q Clear Time (g_c+I1), s		2.0		4.9	5.0	70.1	3.6	2.8
Green Ext Time (p_c), s		5.9		0.1	0.1	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	20.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	975	398	95	635	85	925	403	497	155	118	65
Future Volume (veh/h)	30	975	398	95	635	85	925	403	497	155	118	65
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	1.00		0.98	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	30	985	402	96	641	86	934	407	502	157	119	66
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, %	3	3	3	3	3	3	1	1	1	2	2	2
Cap, veh/h	52	1280	978	114	1239	166	933	586	591	180	161	89
Arrive On Green	0.03	0.36	0.36	0.06	0.40	0.40	0.27	0.31	0.31	0.10	0.14	0.14
Sat Flow, veh/h	1767	3526	1534	1767	3115	417	3483	1885	1568	1781	1118	620
Grp Volume(v), veh/h	30	985	402	96	362	365	934	407	502	157	0	185
Grp Sat Flow(s),veh/h/ln	1767	1763	1534	1767	1763	1769	1742	1885	1568	1781	0	1738
Q Serve(g_s), s	2.3	34.6	18.4	7.5	21.8	21.9	37.5	26.6	41.2	12.2	0.0	14.3
Cycle Q Clear(g_c), s	2.3	34.6	18.4	7.5	21.8	21.9	37.5	26.6	41.2	12.2	0.0	14.3
Prop In Lane	1.00		1.00	1.00		0.24	1.00		1.00	1.00		0.36
Lane Grp Cap(c), veh/h	52	1280	978	114	701	704	933	586	591	180	0	251
V/C Ratio(X)	0.58	0.77	0.41	0.85	0.52	0.52	1.00	0.69	0.85	0.87	0.00	0.74
Avail Cap(c_a), veh/h	88	1280	978	114	701	704	933	734	713	197	0	410
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.59	0.59	0.59	1.00	0.00	1.00
Uniform Delay (d), s/veh	67.1	39.4	12.9	64.8	32.0	32.0	51.3	42.4	40.2	62.0	0.0	57.4
Incr Delay (d2), s/veh	3.7	4.5	1.3	39.4	2.7	2.7	22.9	0.7	4.4	28.6	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	15.8	6.6	4.6	9.9	10.0	19.3	12.5	16.5	6.9	0.0	6.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.7	43.9	14.2	104.3	34.7	34.7	74.1	43.1	44.5	90.6	0.0	59.0
LnGrp LOS	E	D	B	F	C	C	F	D	D	F	A	E
Approach Vol, veh/h		1417			823			1843			342	
Approach Delay, s/veh		36.1			42.8			59.2			73.5	
Approach LOS		D			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.1	61.2	19.6	49.0	15.0	56.3	43.0	25.7
Change Period (Y+Rc), s	6.0	* 5.5	5.5	5.5	6.0	5.5	5.5	* 5.5
Max Green Setting (Gmax), s	7.0	* 42	15.5	54.5	9.0	38.5	37.5	* 33
Max Q Clear Time (g_c+I1), s	4.3	23.9	14.2	43.2	9.5	36.6	39.5	16.3
Green Ext Time (p_c), s	0.0	0.8	0.0	0.4	0.0	0.5	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	49.9
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	15	45	20	0	70	5	1445	60	20	640	5
Future Volume (veh/h)	145	15	45	20	0	70	5	1445	60	20	640	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.96	0.96		0.93	1.00		0.98	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1826	1826	1826
Adj Flow Rate, veh/h	156	16	48	22	0	75	5	1554	65	22	688	5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	5	5	5
Cap, veh/h	363	98	293	63	12	118	356	2061	86	185	1104	915
Arrive On Green	0.09	0.24	0.24	0.10	0.00	0.10	0.01	0.59	0.59	0.02	0.60	0.60
Sat Flow, veh/h	1810	404	1212	220	120	1158	1795	3500	146	1739	1826	1513
Grp Volume(v), veh/h	156	0	64	97	0	0	5	792	827	22	688	5
Grp Sat Flow(s),veh/h/ln	1810	0	1616	1497	0	0	1795	1791	1855	1739	1826	1513
Q Serve(g_s), s	8.0	0.0	3.4	2.9	0.0	0.0	0.1	35.1	35.6	0.5	25.7	0.1
Cycle Q Clear(g_c), s	8.0	0.0	3.4	6.6	0.0	0.0	0.1	35.1	35.6	0.5	25.7	0.1
Prop In Lane	1.00		0.75	0.23		0.77	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	363	0	391	194	0	0	356	1055	1093	185	1104	915
V/C Ratio(X)	0.43	0.00	0.16	0.50	0.00	0.00	0.01	0.75	0.76	0.12	0.62	0.01
Avail Cap(c_a), veh/h	497	0	391	302	0	0	561	1650	1710	388	1683	1395
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.4	0.0	32.2	46.3	0.0	0.0	11.5	16.3	16.4	14.6	13.5	8.4
Incr Delay (d2), s/veh	0.6	0.0	0.1	1.5	0.0	0.0	0.0	1.3	1.3	0.2	0.7	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(50%),veh/ln	3.6	0.0	1.3	2.6	0.0	0.0	0.0	13.8	14.4	0.2	10.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	0.0	32.4	47.8	0.0	0.0	11.5	17.6	17.7	14.8	14.2	8.4
LnGrp LOS	D	A	C	D	A	A	B	B	B	B	B	A
Approach Vol, veh/h		220			97			1624			715	
Approach Delay, s/veh		35.6			47.8			17.7			14.2	
Approach LOS		D			D			B			B	

Timer - Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.4	69.2		31.0	5.7	70.9	15.1	16.0
Change Period (Y+Rc), s	5.0	5.8		5.0	5.0	5.8	5.0	5.0
Max Green Setting (Gmax), s	15.0	99.2		20.0	13.0	99.2	18.0	19.0
Max Q Clear Time (g_c+I1), s	2.5	37.6		5.4	2.1	27.7	10.0	8.6
Green Ext Time (p_c), s	0.0	25.8		0.2	0.0	7.4	0.2	0.3

Intersection Summary		
HCM 6th Ctrl Delay		19.3
HCM 6th LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	0	70	50	5	50	40	1241	30	5	1032	5
Future Volume (veh/h)	60	0	70	50	5	50	40	1241	30	5	1032	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.95	0.99		0.95	1.00		0.99	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1885	1885	1885	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	65	0	75	54	5	54	43	1334	32	5	1110	5
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	3	3	3
Cap, veh/h	112	13	94	201	18	193	476	1380	1162	350	1312	1080
Arrive On Green	0.14	0.00	0.14	0.14	0.14	0.14	0.06	1.00	1.00	0.01	1.00	1.00
Sat Flow, veh/h	498	97	687	1317	131	1412	1795	1885	1587	1767	1856	1528
Grp Volume(v), veh/h	140	0	0	54	0	59	43	1334	32	5	1110	5
Grp Sat Flow(s),veh/h/ln	1283	0	0	1317	0	1543	1795	1885	1587	1767	1856	1528
Q Serve(g_s), s	9.0	0.0	0.0	0.0	0.0	4.1	0.8	0.0	0.0	0.1	0.0	0.0
Cycle Q Clear(g_c), s	13.1	0.0	0.0	6.2	0.0	4.1	0.8	0.0	0.0	0.1	0.0	0.0
Prop In Lane	0.46		0.54	1.00		0.92	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	219	0	0	201	0	211	476	1380	1162	350	1312	1080
V/C Ratio(X)	0.64	0.00	0.00	0.27	0.00	0.28	0.09	0.97	0.03	0.01	0.85	0.00
Avail Cap(c_a), veh/h	262	0	0	241	0	257	569	1380	1162	486	1312	1080
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	0.65	0.65	0.65	0.75	0.75	0.75
Uniform Delay (d), s/veh	50.9	0.0	0.0	47.4	0.0	46.5	4.1	0.0	0.0	4.9	0.0	0.0
Incr Delay (d2), s/veh	3.8	0.0	0.0	0.7	0.0	0.7	0.1	13.1	0.0	0.0	5.3	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(50%),veh/ln	4.3	0.0	0.0	1.5	0.0	1.6	0.3	5.0	0.0	0.0	1.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	0.0	0.0	48.1	0.0	47.2	4.1	13.1	0.0	4.9	5.3	0.0
LnGrp LOS	D	A	A	D	A	D	A	B	A	A	A	A
Approach Vol, veh/h		140			113			1409			1120	
Approach Delay, s/veh		54.7			47.7			12.5			5.2	
Approach LOS		D			D			B			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.8	92.9		21.4	8.8	89.8		21.4
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0
Max Green Setting (Gmax), s	10.0	75.0		20.0	10.0	75.0		20.0
Max Q Clear Time (g_c+I1), s	2.1	2.0		15.1	2.8	2.0		8.2
Green Ext Time (p_c), s	0.0	26.8		0.3	0.0	15.4		0.3

Intersection Summary	
HCM 6th Ctrl Delay	13.1
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	575	415	10	30	265	355	15	260	45	312	575	470
Future Volume (veh/h)	575	415	10	30	265	355	15	260	45	312	575	470
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		0.96	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	587	423	10	31	270	362	15	265	46	318	587	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, %	3	3	3	3	3	3	2	2	2	2	2	2
Cap, veh/h	646	649	15	47	367	609	29	387	67	351	805	
Arrive On Green	0.19	0.36	0.36	0.03	0.20	0.20	0.02	0.25	0.25	0.06	0.14	0.00
Sat Flow, veh/h	3428	1804	43	1767	1856	1513	1781	1549	269	1781	1870	1585
Grp Volume(v), veh/h	587	0	433	31	270	362	15	0	311	318	587	0
Grp Sat Flow(s),veh/h/ln	1714	0	1847	1767	1856	1513	1781	0	1817	1781	1870	1585
Q Serve(g_s), s	20.1	0.0	23.5	2.1	16.4	0.0	1.0	0.0	18.6	21.3	36.0	0.0
Cycle Q Clear(g_c), s	20.1	0.0	23.5	2.1	16.4	0.0	1.0	0.0	18.6	21.3	36.0	0.0
Prop In Lane	1.00		0.02	1.00		1.00	1.00		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	646	0	664	47	367	609	29	0	454	351	805	
V/C Ratio(X)	0.91	0.00	0.65	0.65	0.74	0.59	0.51	0.00	0.68	0.91	0.73	
Avail Cap(c_a), veh/h	686	0	664	147	367	609	223	0	454	386	805	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.49	0.49	0.00
Uniform Delay (d), s/veh	47.7	0.0	32.1	57.8	45.2	28.5	58.5	0.0	40.7	55.0	44.8	0.0
Incr Delay (d2), s/veh	15.5	0.0	4.9	14.2	7.5	1.6	13.3	0.0	8.1	13.6	1.8	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(50%),veh/ln	9.9	0.0	11.3	1.1	8.3	8.4	0.6	0.0	9.3	11.5	18.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.2	0.0	37.1	72.0	52.7	30.1	71.8	0.0	48.8	68.6	46.6	0.0
LnGrp LOS	E	A	D	E	D	C	E	A	D	E	D	
Approach Vol, veh/h		1020			663			326			905	A
Approach Delay, s/veh		52.1			41.2			49.9			54.3	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.6	28.8	7.0	56.7	8.2	48.1	28.6	35.0
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	24.0	20.0	15.0	41.0	10.0	34.0	26.0	30.0
Max Q Clear Time (g_c+I1), s	22.1	18.4	3.0	38.0	4.1	25.5	23.3	20.6
Green Ext Time (p_c), s	0.5	0.5	0.0	1.4	0.0	1.7	0.3	1.2

Intersection Summary	
HCM 6th Ctrl Delay	50.1
HCM 6th LOS	D

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	24	66	13	1348	743	20
Future Vol, veh/h	24	66	13	1348	743	20
Conflicting Peds, #/hr	9	9	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	160
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	1	1	2	2
Mvmt Flow	26	72	14	1465	808	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2319	826	839	0	-	0
Stage 1	817	-	-	-	-	-
Stage 2	1502	-	-	-	-	-
Critical Hdwy	6.5	6.3	4.11	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.39	2.209	-	-	-
Pot Cap-1 Maneuver	39	360	800	-	-	-
Stage 1	421	-	-	-	-	-
Stage 2	195	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	38	354	793	-	-	-
Mov Cap-2 Maneuver	135	-	-	-	-	-
Stage 1	410	-	-	-	-	-
Stage 2	193	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	28.8	0.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	793	-	247	-	-
HCM Lane V/C Ratio	0.018	-	0.396	-	-
HCM Control Delay (s)	9.6	-	28.8	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0.1	-	1.8	-	-

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	85	187	27	40	1443	5	871	3
v/c Ratio	0.49	0.58	0.17	0.09	0.94	0.08	0.62	0.00
Control Delay	59.1	15.7	2.3	1.1	13.1	8.8	10.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay	59.1	15.7	2.3	1.1	13.1	8.8	10.6	0.0
Queue Length 50th (ft)	61	7	0	1	171	1	324	0
Queue Length 95th (ft)	110	74	0	m3	m#1394	7	475	0
Internal Link Dist (ft)		145	227		669		401	
Turn Bay Length (ft)				300		150		150
Base Capacity (vph)	174	665	487	434	1529	65	1406	1162
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	4	2	0	0	0	52	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.28	0.06	0.09	0.94	0.08	0.64	0.00

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	0	172	20	0	5	37	1278	50	5	801	3
Future Volume (veh/h)	78	0	172	20	0	5	37	1278	50	5	801	3
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	0.99		1.00	1.00		0.97	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	85	0	187	22	0	5	40	1389	54	5	871	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	2	2	2
Cap, veh/h	345	0	369	110	6	14	371	1244	48	60	920	756
Arrive On Green	0.04	0.00	0.23	0.16	0.00	0.16	0.32	1.00	1.00	0.49	0.49	0.49
Sat Flow, veh/h	1810	0	1579	353	36	88	1795	1800	70	370	1870	1537
Grp Volume(v), veh/h	85	0	187	27	0	0	40	0	1443	5	871	3
Grp Sat Flow(s),veh/h/ln	1810	0	1579	477	0	0	1795	0	1870	370	1870	1537
Q Serve(g_s), s	0.0	0.0	12.4	1.8	0.0	0.0	0.0	0.0	83.0	0.0	53.2	0.1
Cycle Q Clear(g_c), s	0.0	0.0	12.4	14.2	0.0	0.0	0.0	0.0	83.0	59.0	53.2	0.1
Prop In Lane	1.00		1.00	0.81		0.19	1.00		0.04	1.00		1.00
Lane Grp Cap(c), veh/h	345	0	369	129	0	0	371	0	1293	60	920	756
V/C Ratio(X)	0.25	0.00	0.51	0.21	0.00	0.00	0.11	0.00	1.12	0.08	0.95	0.00
Avail Cap(c_a), veh/h	350	0	559	278	0	0	371	0	1293	60	920	756
HCM Platoon Ratio	1.00	1.00	1.00	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	1.00	0.00	0.00	0.31	0.00	0.31	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.7	0.0	40.0	51.2	0.0	0.0	33.0	0.0	0.0	60.0	29.0	15.5
Incr Delay (d2), s/veh	0.4	0.0	1.1	0.8	0.0	0.0	0.0	0.0	56.1	2.7	19.3	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(50%),veh/ln	2.2	0.0	4.9	0.8	0.0	0.0	0.8	0.0	20.2	0.2	27.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.1	0.0	41.0	52.0	0.0	0.0	33.0	0.0	56.1	62.7	48.4	15.5
LnGrp LOS	D	A	D	D	A	A	C	A	F	E	D	B
Approach Vol, veh/h		272			27			1483			879	
Approach Delay, s/veh		41.7			52.0			55.5			48.3	
Approach LOS		D			D			E			D	

Timer - Assigned Phs		2		4	5	6	7	8
Phs Duration (G+Y+Rc), s		87.5		32.5	24.0	63.5	9.2	23.3
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s		68.5		42.5	5.0	59.0	5.0	33.0
Max Q Clear Time (g_c+I1), s		85.0		14.4	2.0	61.0	2.0	16.2
Green Ext Time (p_c), s		0.0		1.2	0.0	0.0	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	51.7
HCM 6th LOS	D

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	10	50	601	1260	84
Future Vol, veh/h	8	10	50	601	1260	84
Conflicting Peds, #/hr	8	8	8	0	0	8
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	45	45	4	4	2	2
Mvmt Flow	8	10	52	626	1313	88

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1790	717	1409	0	-	0
Stage 1	1365	-	-	-	-	-
Stage 2	425	-	-	-	-	-
Critical Hdwy	7.7	7.8	4.18	-	-	-
Critical Hdwy Stg 1	6.7	-	-	-	-	-
Critical Hdwy Stg 2	6.7	-	-	-	-	-
Follow-up Hdwy	3.95	3.75	2.24	-	-	-
Pot Cap-1 Maneuver	45	288	470	-	-	-
Stage 1	139	-	-	-	-	-
Stage 2	517	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	39	284	466	-	-	-
Mov Cap-2 Maneuver	100	-	-	-	-	-
Stage 1	122	-	-	-	-	-
Stage 2	513	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	31.2	1.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	466	-	156	-	-
HCM Lane V/C Ratio	0.112	-	0.12	-	-
HCM Control Delay (s)	13.7	-	31.2	-	-
HCM Lane LOS	B	-	D	-	-
HCM 95th %tile Q(veh)	0.4	-	0.4	-	-

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	16	25	10	178	685	10	1289
v/c Ratio	0.24	0.09	0.06	0.44	0.22	0.02	0.47
Control Delay	60.2	0.6	0.8	5.8	1.2	6.6	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	60.2	0.7	0.8	5.8	1.2	6.6	7.4
Queue Length 50th (ft)	12	0	0	13	14	2	168
Queue Length 95th (ft)	34	0	0	45	89	10	356
Internal Link Dist (ft)		428	325		559		518
Turn Bay Length (ft)				300		150	
Base Capacity (vph)	66	534	477	447	3162	563	2732
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	133	0	0	0	0	416
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.06	0.02	0.40	0.22	0.02	0.56

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	0	24	5	0	5	173	625	40	10	1230	20
Future Volume (veh/h)	16	0	24	5	0	5	173	625	40	10	1230	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	0.95		1.00	1.00		0.97	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1159	1159	1159	1530	1530	1530	1856	1856	1856	1870	1870	1870
Adj Flow Rate, veh/h	16	0	25	5	0	5	178	644	41	10	1268	21
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	50	50	50	25	25	25	3	3	3	2	2	2
Cap, veh/h	153	0	111	72	11	38	383	2715	173	608	2596	43
Arrive On Green	0.02	0.00	0.12	0.06	0.00	0.06	0.09	1.00	1.00	0.73	0.73	0.73
Sat Flow, veh/h	1104	0	953	440	174	614	1767	3360	214	755	3576	59
Grp Volume(v), veh/h	16	0	25	10	0	0	178	338	347	10	630	659
Grp Sat Flow(s),veh/h/ln	1104	0	953	1227	0	0	1767	1763	1811	755	1777	1858
Q Serve(g_s), s	1.6	0.0	2.9	0.0	0.0	0.0	3.1	0.0	0.0	0.4	18.0	18.1
Cycle Q Clear(g_c), s	1.6	0.0	2.9	0.8	0.0	0.0	3.1	0.0	0.0	0.4	18.0	18.1
Prop In Lane	1.00		1.00	0.50		0.50	1.00		0.12	1.00		0.03
Lane Grp Cap(c), veh/h	153	0	111	121	0	0	383	1425	1463	608	1290	1349
V/C Ratio(X)	0.10	0.00	0.22	0.08	0.00	0.00	0.46	0.24	0.24	0.02	0.49	0.49
Avail Cap(c_a), veh/h	181	0	354	390	0	0	500	1425	1463	608	1290	1349
HCM Platoon Ratio	1.00	1.00	1.00	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	1.00	0.00	0.00	0.80	0.80	0.80	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.8	0.0	48.1	53.2	0.0	0.0	5.6	0.0	0.0	4.6	7.0	7.0
Incr Delay (d2), s/veh	0.3	0.0	1.0	0.3	0.0	0.0	0.7	0.3	0.3	0.0	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.7	0.3	0.0	0.0	0.9	0.1	0.1	0.1	6.6	6.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.0	0.0	49.1	53.4	0.0	0.0	6.3	0.3	0.3	4.6	8.3	8.2
LnGrp LOS	D	A	D	D	A	A	A	A	A	A	A	A
Approach Vol, veh/h		41			10			863			1299	
Approach Delay, s/veh		49.4			53.4			1.5			8.2	
Approach LOS		D			D			A			A	

Timer - Assigned Phs		2		4	5	6	7	8
Phs Duration (G+Y+Rc), s		101.5		18.5	9.8	91.6	6.6	12.0
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s		66.4		44.6	13.3	48.6	5.1	35.0
Max Q Clear Time (g_c+I1), s		2.0		4.9	5.1	20.1	3.6	2.8
Green Ext Time (p_c), s		5.0		0.1	0.3	10.9	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	6.6
HCM 6th LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	24	66	13	1348	743	20
Future Vol, veh/h	24	66	13	1348	743	20
Conflicting Peds, #/hr	9	9	9	0	0	9
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	10	1	1	2	2
Mvmt Flow	26	72	14	1465	808	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1598	433	839	0	-	0
Stage 1	828	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Critical Hdwy	7	7.1	4.12	-	-	-
Critical Hdwy Stg 1	6	-	-	-	-	-
Critical Hdwy Stg 2	6	-	-	-	-	-
Follow-up Hdwy	3.6	3.4	2.21	-	-	-
Pot Cap-1 Maneuver	90	549	798	-	-	-
Stage 1	370	-	-	-	-	-
Stage 2	397	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	87	540	791	-	-	-
Mov Cap-2 Maneuver	211	-	-	-	-	-
Stage 1	360	-	-	-	-	-
Stage 2	393	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.7	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	791	-	381	-	-
HCM Lane V/C Ratio	0.018	-	0.257	-	-
HCM Control Delay (s)	9.6	-	17.7	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1	-	-

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	85	187	27	40	1443	5	874
v/c Ratio	0.49	0.58	0.17	0.08	0.50	0.02	0.33
Control Delay	59.2	15.7	2.3	4.3	7.7	5.8	6.1
Queue Delay	0.0	0.1	0.0	0.0	0.4	0.0	0.0
Total Delay	59.2	15.8	2.3	4.3	8.0	5.8	6.1
Queue Length 50th (ft)	61	7	0	7	294	1	122
Queue Length 95th (ft)	110	74	0	m10	m467	5	161
Internal Link Dist (ft)		145	227		669		401
Turn Bay Length (ft)				300		150	
Base Capacity (vph)	174	694	511	517	2907	219	2658
Starvation Cap Reductn	0	0	0	0	793	0	0
Spillback Cap Reductn	0	64	47	0	0	0	268
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.30	0.06	0.08	0.68	0.02	0.37

Intersection Summary

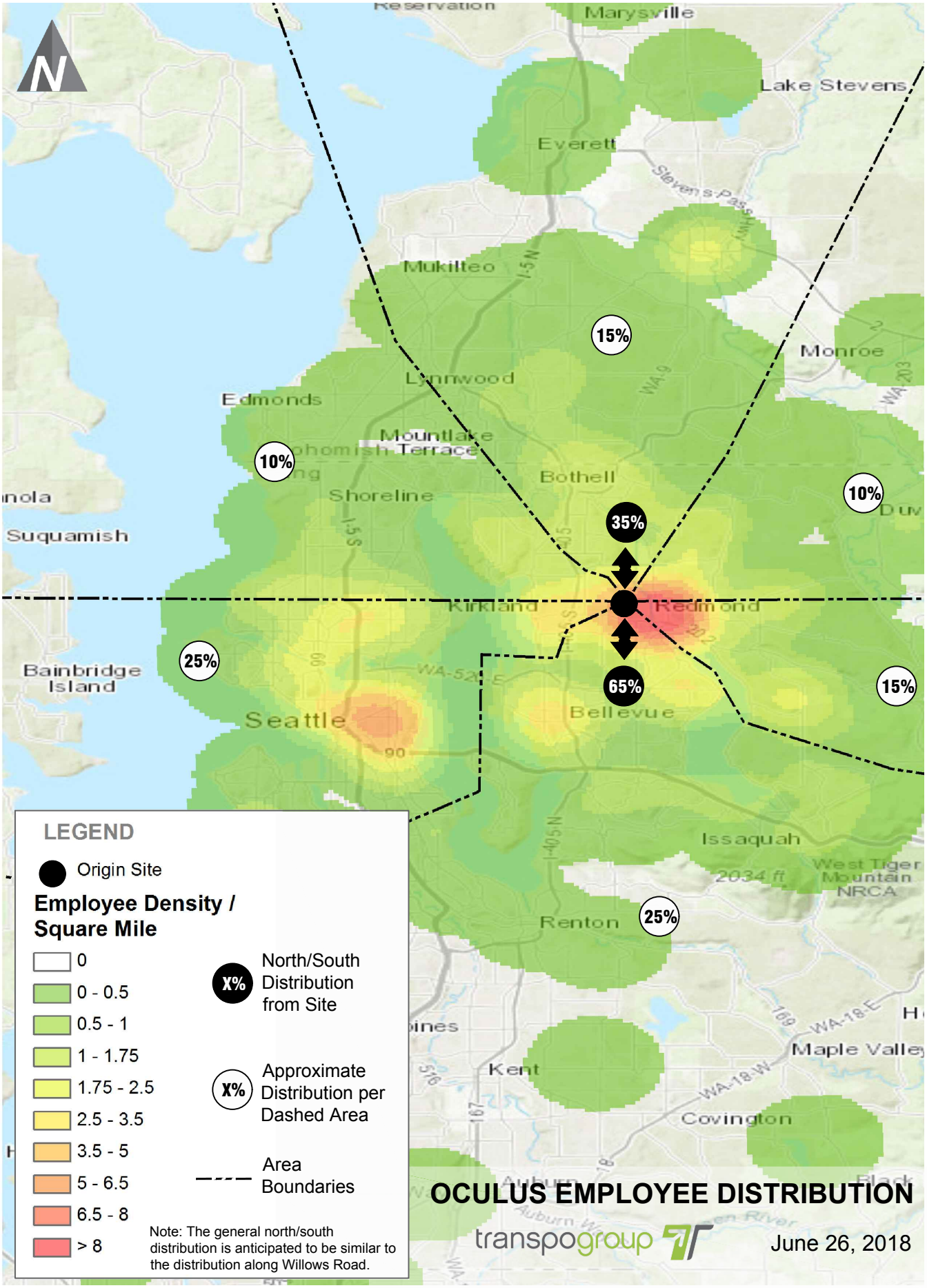
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	0	172	20	0	5	37	1278	50	5	801	3
Future Volume (veh/h)	78	0	172	20	0	5	37	1278	50	5	801	3
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	0.99		1.00	1.00		0.97	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1870	1870	1870
Adj Flow Rate, veh/h	85	0	187	22	0	5	40	1389	54	5	871	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	2	2	2
Cap, veh/h	349	0	373	113	6	14	572	2419	94	232	1695	6
Arrive On Green	0.04	0.00	0.24	0.16	0.00	0.16	0.37	1.00	1.00	0.47	0.47	0.47
Sat Flow, veh/h	1810	0	1579	365	36	91	1795	3511	136	369	3632	13
Grp Volume(v), veh/h	85	0	187	27	0	0	40	707	736	5	426	448
Grp Sat Flow(s),veh/h/ln	1810	0	1579	491	0	0	1795	1791	1856	369	1777	1868
Q Serve(g_s), s	0.0	0.0	12.3	1.8	0.0	0.0	0.0	0.0	0.0	0.9	20.2	20.2
Cycle Q Clear(g_c), s	0.0	0.0	12.3	14.1	0.0	0.0	0.0	0.0	0.0	0.9	20.2	20.2
Prop In Lane	1.00		1.00	0.81		0.19	1.00		0.07	1.00		0.01
Lane Grp Cap(c), veh/h	349	0	373	133	0	0	572	1234	1279	232	829	872
V/C Ratio(X)	0.24	0.00	0.50	0.20	0.00	0.00	0.07	0.57	0.58	0.02	0.51	0.51
Avail Cap(c_a), veh/h	361	0	592	299	0	0	572	1234	1279	232	829	872
HCM Platoon Ratio	1.00	1.00	1.00	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	1.00	0.00	0.00	0.31	0.31	0.31	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	0.0	39.7	50.9	0.0	0.0	13.9	0.0	0.0	17.3	22.5	22.5
Incr Delay (d2), s/veh	0.4	0.0	1.0	0.7	0.0	0.0	0.0	0.6	0.6	0.2	2.3	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(50%),veh/ln	2.2	0.0	4.9	0.8	0.0	0.0	0.5	0.2	0.2	0.1	8.9	9.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.9	0.0	40.8	51.6	0.0	0.0	13.9	0.6	0.6	17.5	24.7	24.6
LnGrp LOS	D	A	D	D	A	A	B	A	A	B	C	C
Approach Vol, veh/h		272			27			1483			879	
Approach Delay, s/veh		41.4			51.6			1.0			24.6	
Approach LOS		D			D			A			C	

Timer - Assigned Phs		2		4	5	6	7	8
Phs Duration (G+Y+Rc), s		87.2		32.8	26.7	60.5	9.2	23.6
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s		66.0		45.0	5.5	56.0	5.5	35.0
Max Q Clear Time (g_c+I1), s		2.0		14.3	2.0	22.2	2.0	16.1
Green Ext Time (p_c), s		16.1		1.3	0.0	6.6	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	13.4
HCM 6th LOS	B

Appendix D: Trip Distribution (Residence Based)


N
Marysville
Lake Stevens
Everett
Mukilteo
15%
Monroe
Lynnwood
Edmonds
Mountlake Terrace
10%
Bothell
Shoreline
10%
35%
Suquamish
Kirkland
Redmond
25%
Bainbridge Island
65%
15%
Seattle
Bellevue
Issaquah
West Tiger Mountain NRCA
Renton
25%
Kent
Maple Valley
Covington
LEGEND
Origin Site
Employee Density / Square Mile
0
0 - 0.5
0.5 - 1
1 - 1.75
1.75 - 2.5
2.5 - 3.5
3.5 - 5
5 - 6.5
6.5 - 8
> 8
X%
North/South Distribution from Site
X%
Approximate Distribution per Dashed Area
Area Boundaries
Note: The general north/south distribution is anticipated to be similar to the distribution along Willows Road.
OCULUS EMPLOYEE DISTRIBUTION
transpogroup
June 26, 2018

Appendix E: Traffic Signal Warrants

Warrants Summary

Information			
Analyst	Transpo Group	Intersection	Willows Rd/South Access
Agency/Co	Redmond	Jurisdiction	Redmond
Date Performed	10/14/2019	Units	U.S. Customary
Project ID	17538	Time Period Analyzed	4:00 PM to 5:00 PM
East/West Street	South Access	North/South Street	Willows Rd
File Name	South Access.xhy	Major Street	North-South

Project Description *17538*

General				Roadway Network	
Major Street Speed (mph)	40	☐	Population < 10,000	Two Major Routes	☐
Nearest Signal (ft)	3400	☐	Coordinated Signal System	Weekend Count	☐
Crashes (per year)	0	☐	Adequate Trials of Alternatives	5-yr Growth Factor	0

Geometry and Traffic	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N	1	0	1	1	0	1	1	1	0	0	1	1
Lane usage	L		R	L		R	L	TR			LT	R
Vehicle Volume Averages (vph)	48	0	105	12	0	4	54	870	37	4	704	5
Peds (ped/h) / Gaps (gaps/h)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--
Delay (s/veh) / (veh-hr)	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--	--	0 / 0	--

Warrant 1: Eight-Hour Vehicular Volume	☑
1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	☐
1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	☑
1 (80%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	☐
Warrant 2: Four-Hour Vehicular Volume	☑
2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 3: Peak Hour	☑
3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume) --or--	☐
3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	☑
Warrant 4: Pedestrian Volume	☐
4 A. Four Hour Volumes --or--	☐
4 B. One-Hour Volumes	☐
Warrant 5: School Crossing	☐
5. Student Volumes --and--	☐
5. Gaps Same Period	☐
Warrant 6: Coordinated Signal System	☐
6. Degree of Platooning (Predominant direction or both directions)	☐
Warrant 7: Crash Experience	☐
7 A. Adequate trials of alternatives, observance and enforcement failed --and--	☐
7 B. Reported crashes susceptible to correction by signal (12-month period) --and--	☐
7 C. (80%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied	☑

Warrant 8: Roadway Network	☐
8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or--	☐
8 B. Weekend Volume (Five hours total)	☐
Warrant 9: Grade Crossing	☐
9 A. Grade Crossing within 140 ft --and--	☐
9 B. Peak-Hour Vehicular Volumes	☐

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Warrants Volume

Information

Analyst	Transpo Group	Intersection	Willows Rd/South Access
Agency/Co	Redmond	Jurisdiction	Redmond
Date Performed	10/14/2019	Units	U.S. Customary
Project ID	17538	Time Period Analyzed	4:00 PM to 5:00 PM
East/West Street	South Access	North/South Street	Willows Rd
File Name	South Access.xhy	Major Street	North-South

Project Description *17538*

Warrant 1

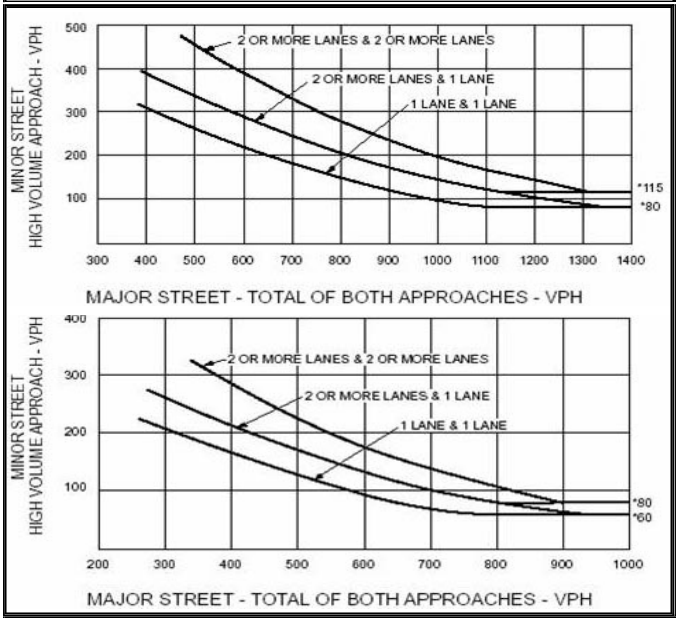
Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

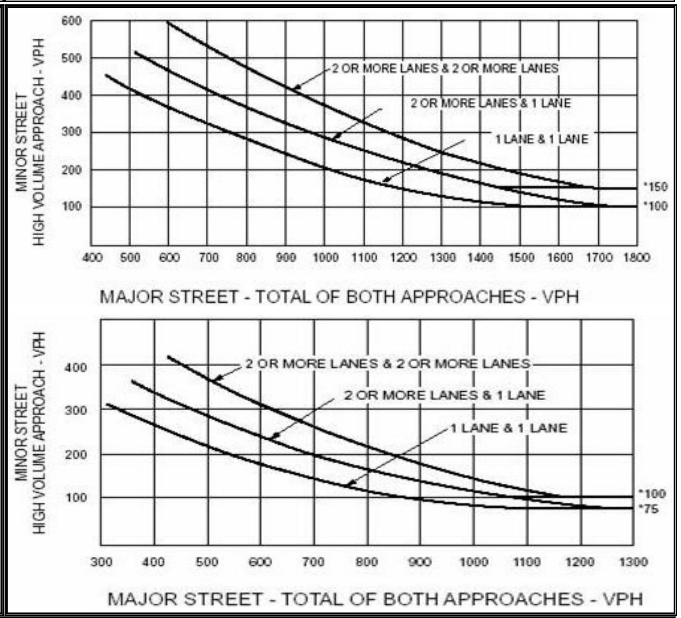
Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%	80%	70%	56%	100%	80%	70%	56%
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

Warrant 2



Warrant 3



Volume Summary

Major Street Lanes 2+ **Minor Street Lanes** 2+ **Speed** 40 **Population** 10000+

Hours	Major Volume	Minor Volume	Total Volume	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (100%)
07-08	2098	40	2148	No	No	No	No	No	No	No
08-09	1561	30	1599	No	No	No	No	No	No	No
09-10	1129	22	1157	No	No	No	No	No	No	No
10-11	1137	131	1281	No	No	Yes	Yes	No	No	No
11-12	1321	152	1488	No	No	Yes	Yes	Yes	No	No
12-13	1731	199	1950	No	Yes	Yes	Yes	Yes	No	Yes
13-14	1486	171	1674	No	Yes	Yes	Yes	Yes	No	No
14-15	1630	187	1836	No	Yes	Yes	Yes	Yes	No	Yes
15-16	2115	243	2382	Yes	Yes	Yes	Yes	Yes	No	Yes
16-17	2174	250	2449	Yes	Yes	Yes	Yes	Yes	No	Yes
17-18	2150	247	2422	Yes	Yes	Yes	Yes	Yes	No	Yes
18-19	1591	183	1793	No	Yes	Yes	Yes	Yes	No	Yes
Totals	20123	1855	22179	3	7	9	9	8	0	6

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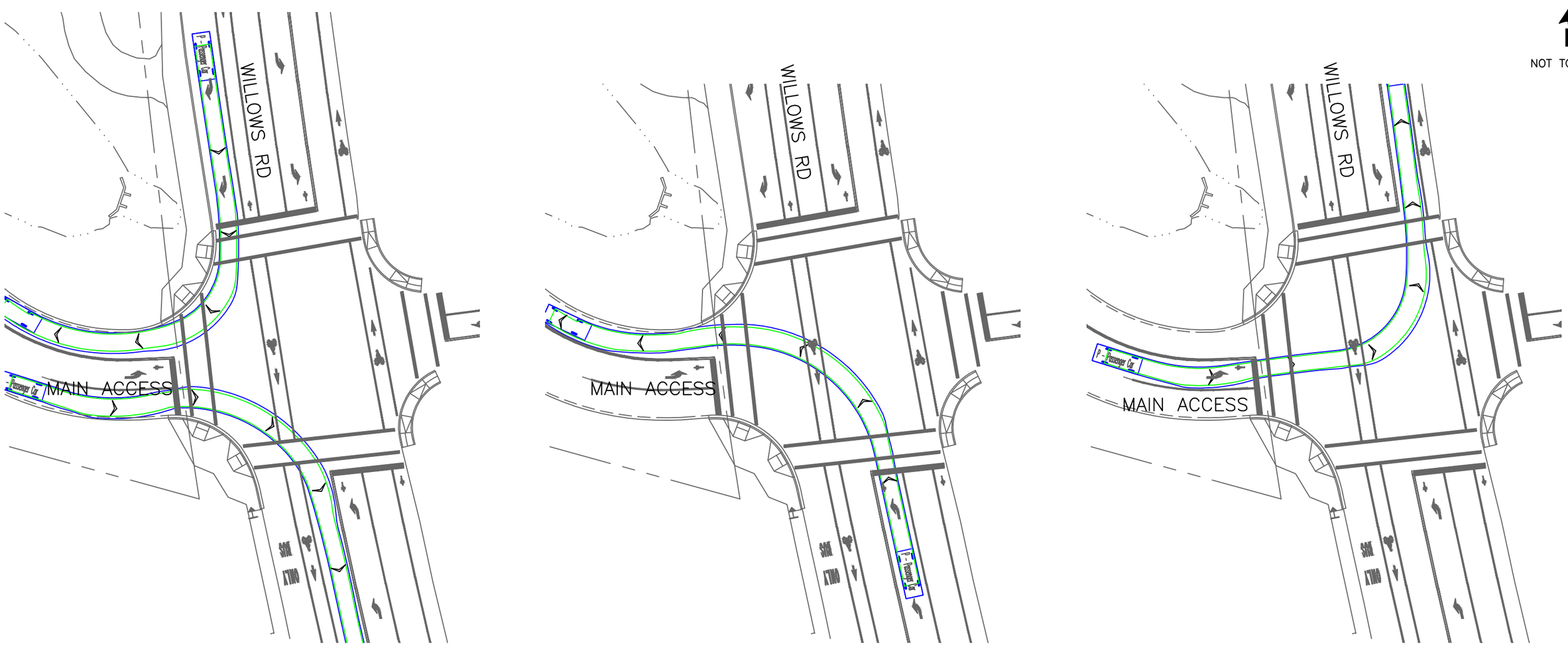
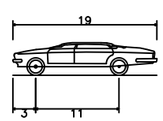
Appendix F: Driveway Autoturns





P – Passenger Car

Overall Length	19.000ft
Overall Width	7.000ft
Overall Body Height	4.300ft
Min Body Ground Clearance	1.115ft
Track Width	6.000ft
Lock–to–lock time	4.00s
Max Steering Angle (Virtual)	31.60°

Main Access Vehicle Maneuvers

October 11, 2019

FIGURE

1

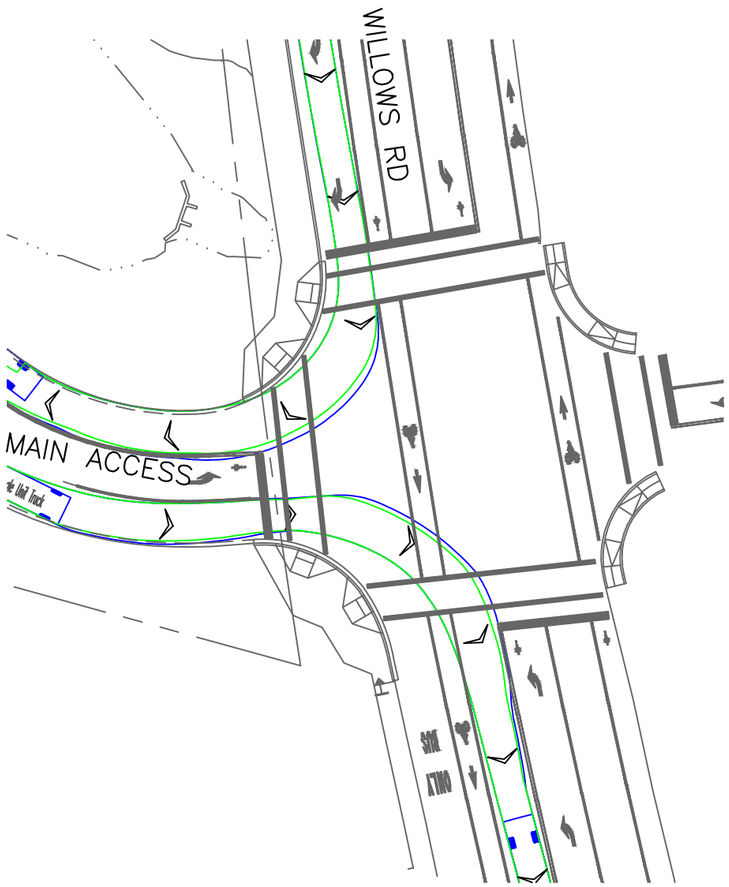
1.17538.01 - Willows Building X

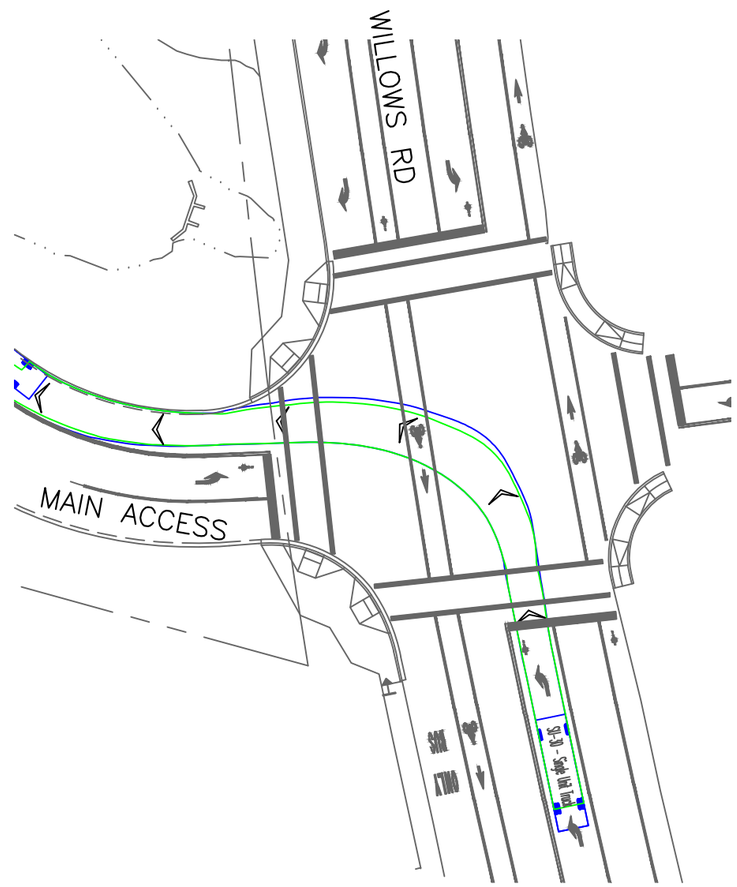
transpogroup
WHAT TRANSPORTATION CAN BE.

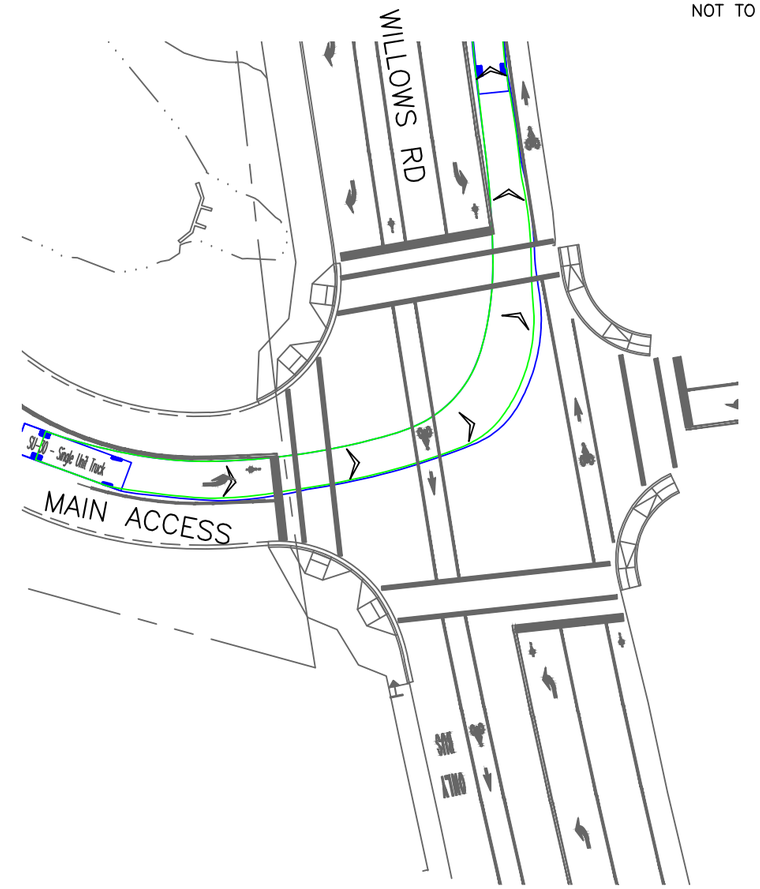
Oct 11, 2019 – 10:26am DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: Main – Car

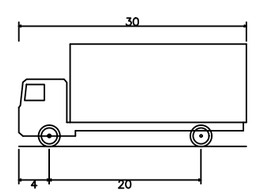
N

NOT TO SCALE









SU-30 – Single Unit Truck	
Overall Length	30.000ft
Overall Width	8.000ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.367ft
Track Width	8.000ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	31.80°

Main Access Vehicle Maneuvers

October 11, 2019

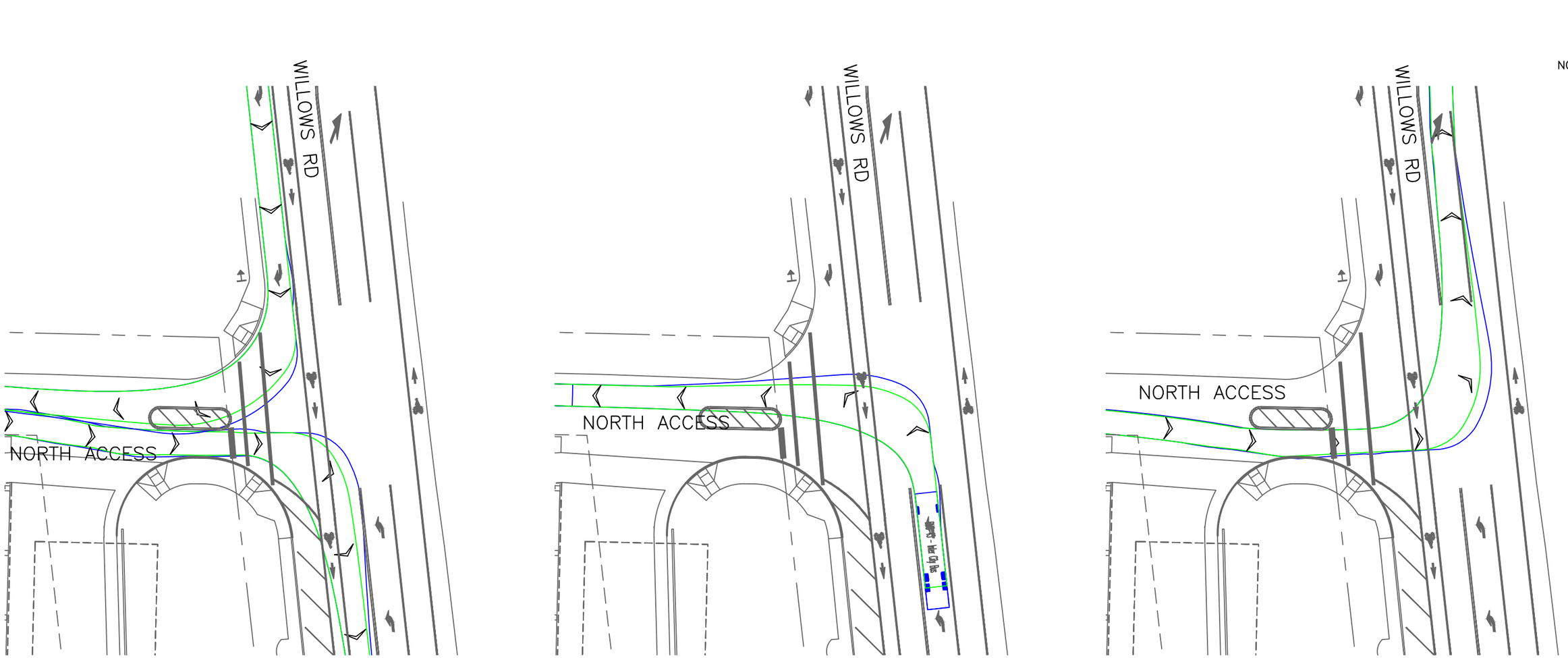
FIGURE

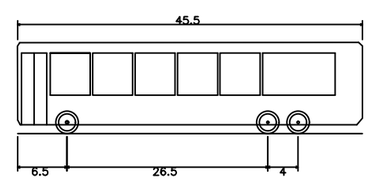
2

1.17538.01 - Willows Building X

transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 – 10:26am DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: Main – SU30





BUS-45 - Inter City Bus	
Overall Length	45.500ft
Overall Width	8.500ft
Overall Body Height	12.008ft
Min Body Ground Clearance	1.158ft
Track Width	8.500ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	45.20°

North Access Vehicle Maneuvers

October 11, 2019

FIGURE

4

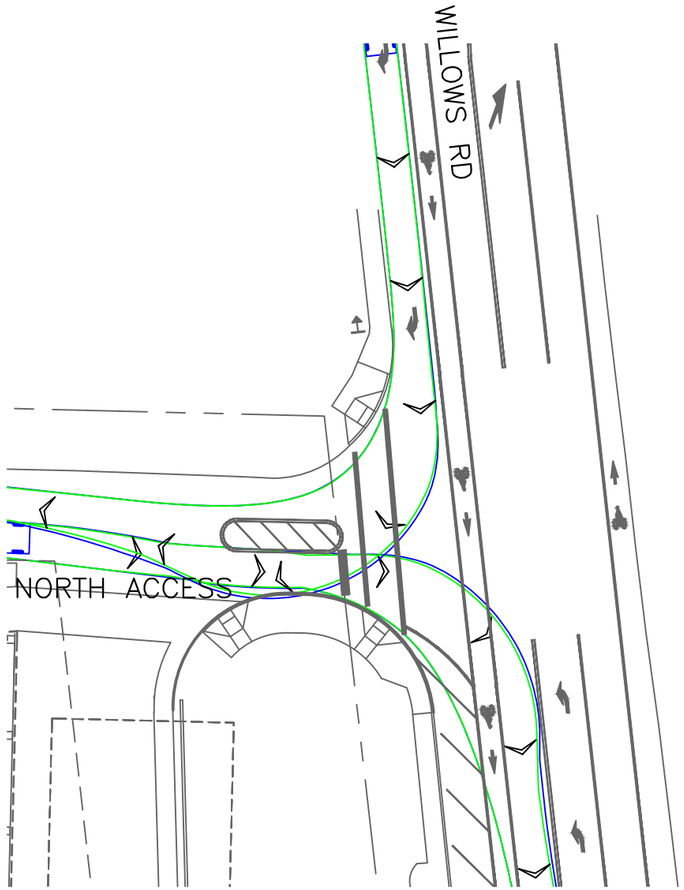
1.17538.01 - Willows Building X

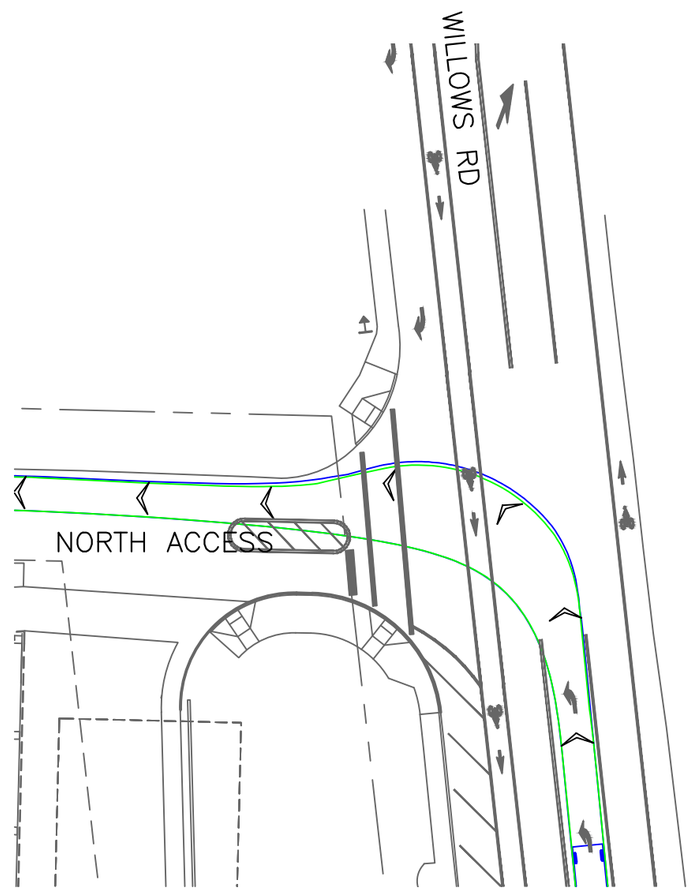
transpogroup
WHAT TRANSPORTATION CAN BE.

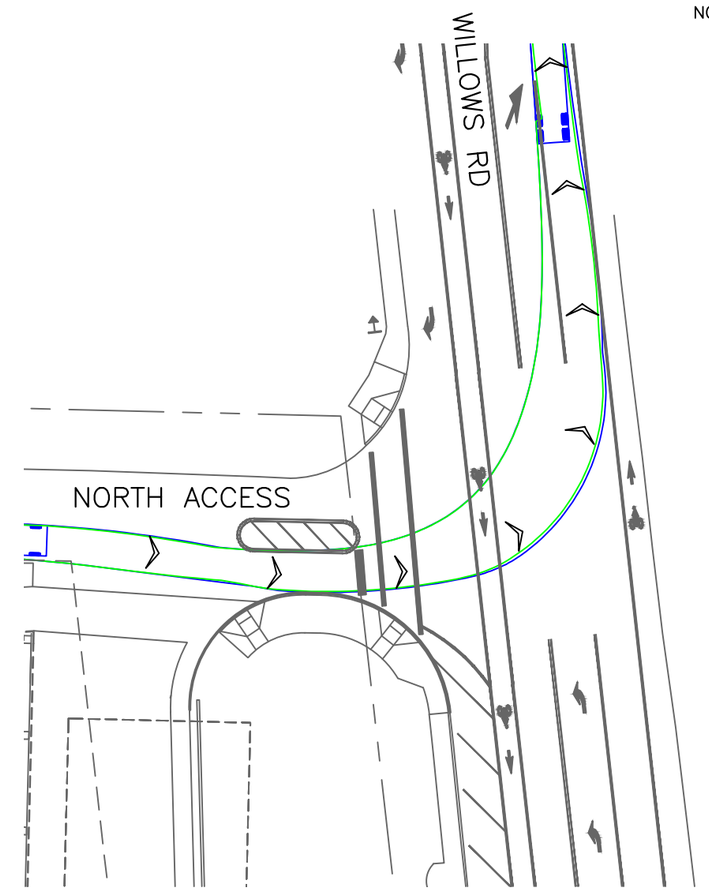
Oct 11, 2019 - 10:26am DamaniN M:\17\1.17538.01 - Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North - Bus

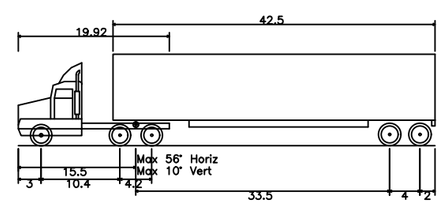
N

NOT TO SCALE









WB-50 - Intermediate Semi-Trailer	
Overall Length	55.000ft
Overall Width	8.500ft
Overall Body Height	12.052ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	17.90°

North Access Vehicle Maneuvers

October 11, 2019

FIGURE

5

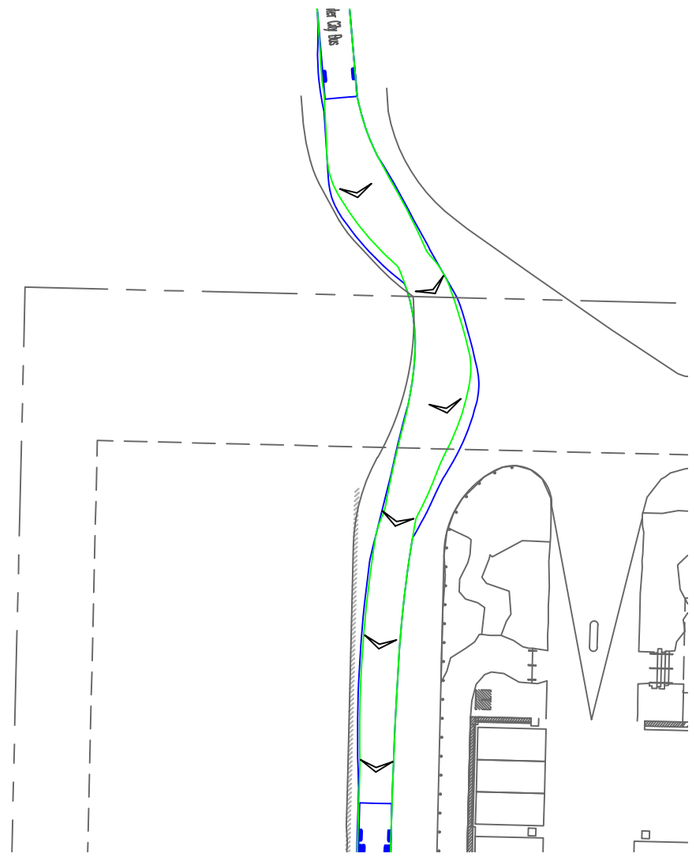
1.17538.01 - Willows Building X

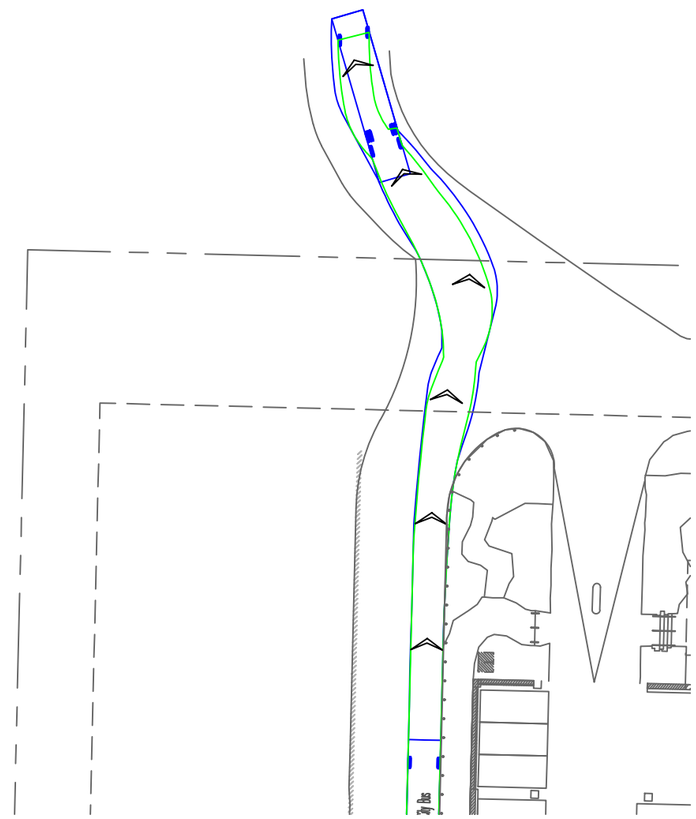
transpogroup
WHAT TRANSPORTATION CAN BE.

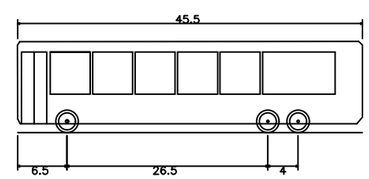
Oct 11, 2019 - 10:26am DamaniN M:\17\1.17538.01 - Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North - WB50

N

NOT TO SCALE







BUS-45 - Inter City Bus	
Overall Length	45.500ft
Overall Width	8.500ft
Overall Body Height	12.008ft
Min Body Ground Clearance	1.158ft
Track Width	8.500ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	45.20°

On-Site to Adjacent Property Vehicle Maneuvers

October 11, 2019

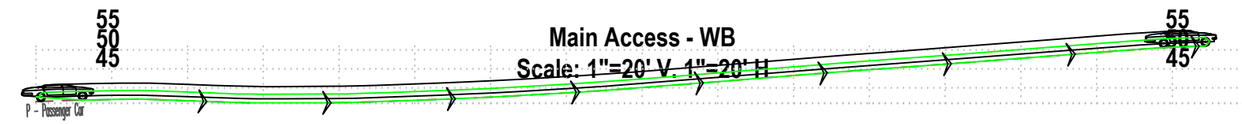
FIGURE

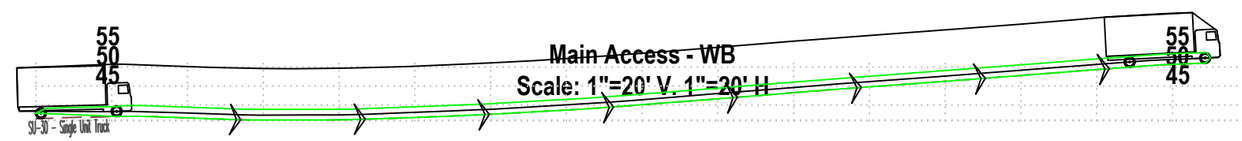
12

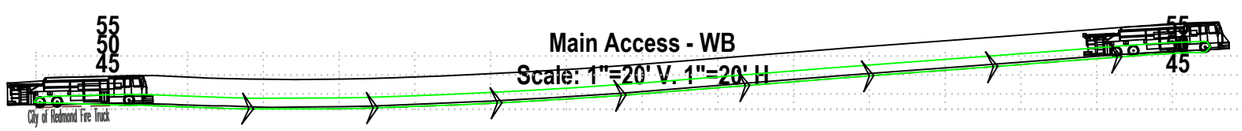
1.17538.01 - Willows Building X

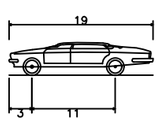
transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 - 10:27am DamaniN M:\17\1.17538.01 - Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: NW - Bus



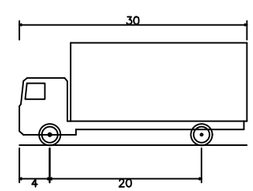






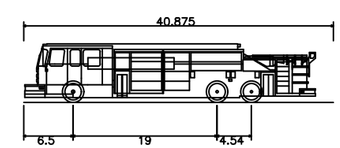
P – Passenger Car

Overall Length	19.000ft
Overall Width	7.000ft
Overall Body Height	4.300ft
Min Body Ground Clearance	1.115ft
Track Width	6.000ft
Lock–to–lock time	4.00s
Max Steering Angle (Virtual)	31.60°



SU–30 – Single Unit Truck

Overall Length	30.000ft
Overall Width	8.000ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.367ft
Track Width	8.000ft
Lock–to–lock time	5.00s
Max Steering Angle (Virtual)	31.80°



City of Redmond Fire Truck

Overall Length	40.875ft
Overall Width	8.167ft
Overall Body Height	7.745ft
Min Body Ground Clearance	0.656ft
Track Width	8.167ft
Lock–to–lock time	5.00s
Wall to Wall Turning Radius	47.500ft

Main Access - WB Vertical Vehicle Maneuvers

October 11, 2019

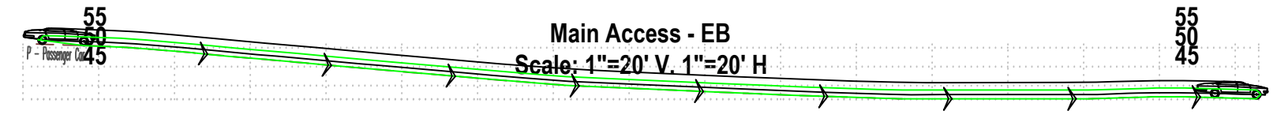
FIGURE

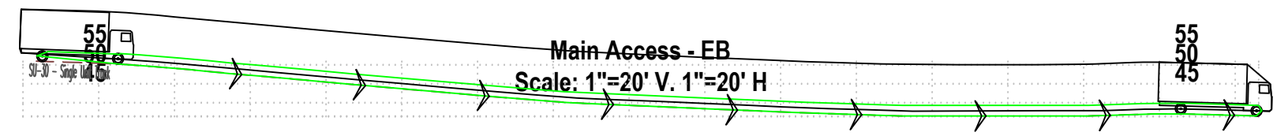
13

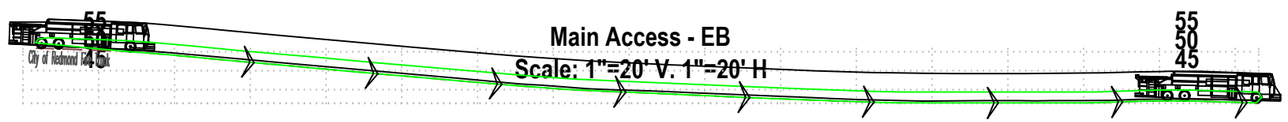
1.17538.01 - Willows Building X

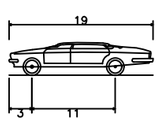
transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 – 10:27am DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: Main Profiles – WB



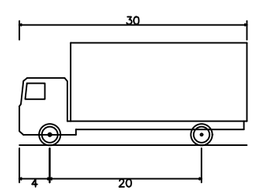






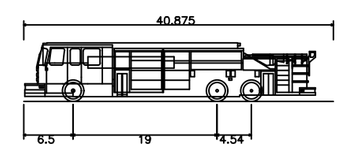
P – Passenger Car

Overall Length	19.000ft
Overall Width	7.000ft
Overall Body Height	4.300ft
Min Body Ground Clearance	1.115ft
Track Width	6.000ft
Lock–to–lock time	4.00s
Max Steering Angle (Virtual)	31.60°



SU–30 – Single Unit Truck

Overall Length	30.000ft
Overall Width	8.000ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.367ft
Track Width	8.000ft
Lock–to–lock time	5.00s
Max Steering Angle (Virtual)	31.80°



City of Redmond Fire Truck

Overall Length	40.875ft
Overall Width	8.167ft
Overall Body Height	7.745ft
Min Body Ground Clearance	0.656ft
Track Width	8.167ft
Lock–to–lock time	5.00s
Wall to Wall Turning Radius	47.500ft

Main Access - EB Vertical Vehicle Maneuvers

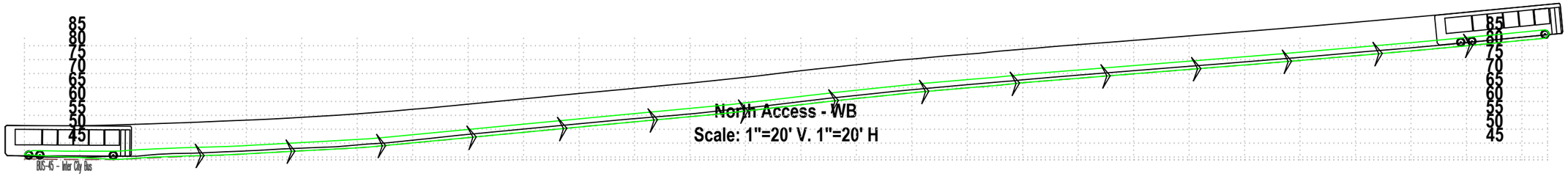
October 11, 2019

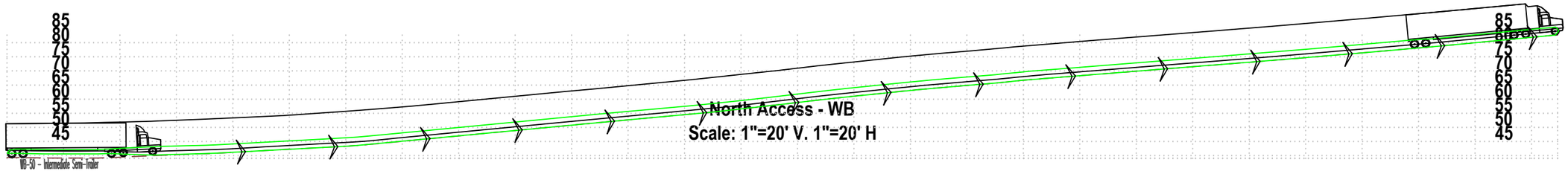
FIGURE **14**

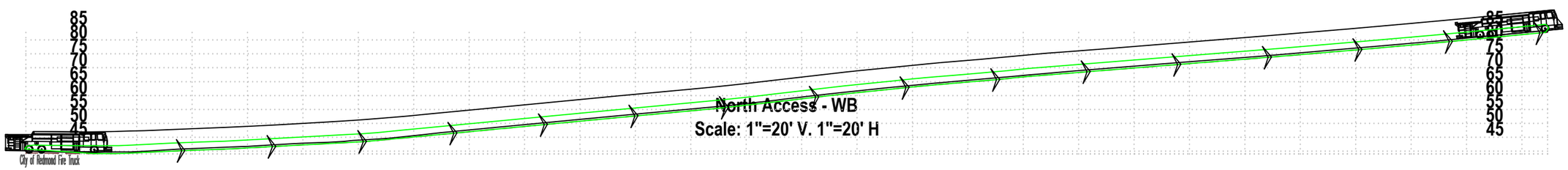
1.17538.01 - Willows Building X

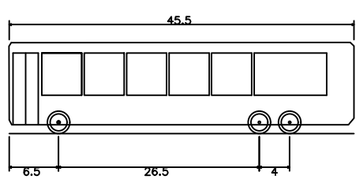
transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 – 10:27am DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: Main Profiles – EB



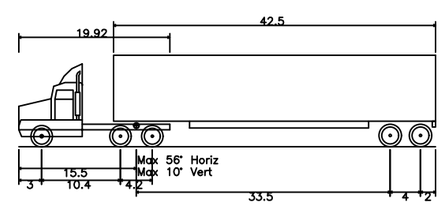






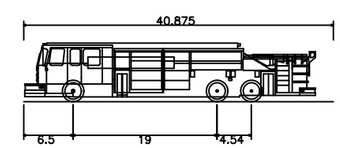
BUS-45 - Inter City Bus

Overall Length	45.500ft
Overall Width	8.500ft
Overall Body Height	12.008ft
Min Body Ground Clearance	1.158ft
Track Width	8.500ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	45.20°



WB-50 - Intermediate Semi-Trailer

Overall Length	55.000ft
Overall Width	8.500ft
Overall Body Height	12.052ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	17.90°



City of Redmond Fire Truck

Overall Length	40.875ft
Overall Width	8.167ft
Overall Body Height	7.745ft
Min Body Ground Clearance	0.656ft
Track Width	8.167ft
Lock-to-lock time	5.00s
Wall to Wall Turning Radius	47.500ft

North Access - WB Vertical Vehicle Maneuvers

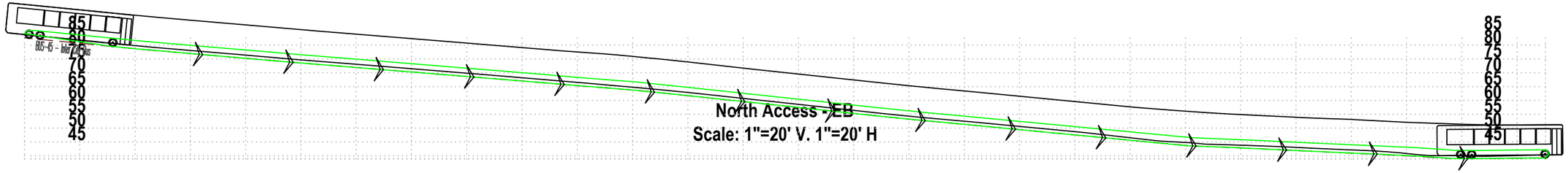
October 11, 2019

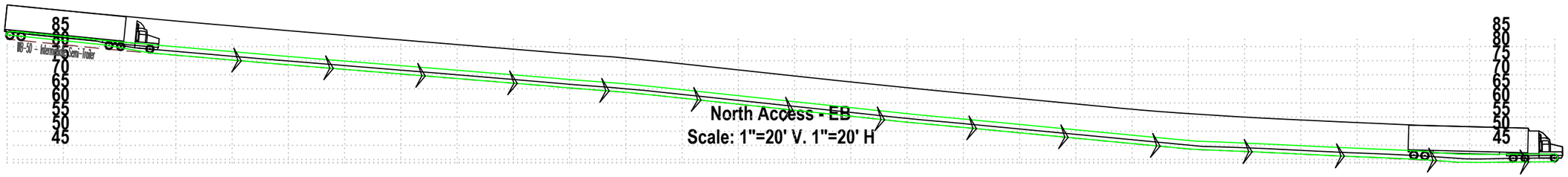
FIGURE **15**

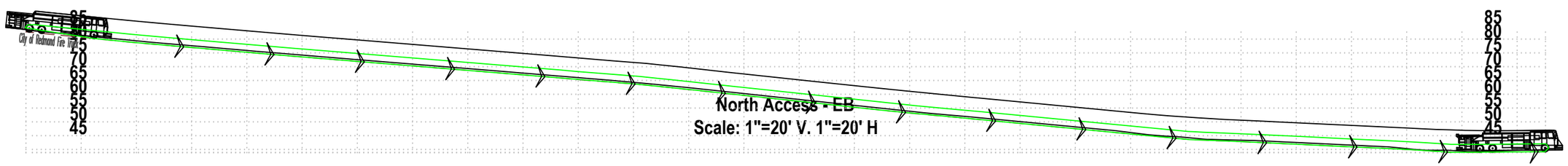
1.17538.01 - Willows Building X

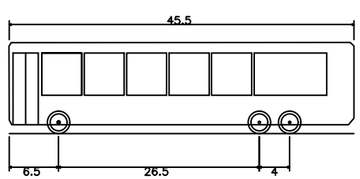
transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 - 10:27am DamaniN M:\17\1.17538.01 - Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North Profiles - WB



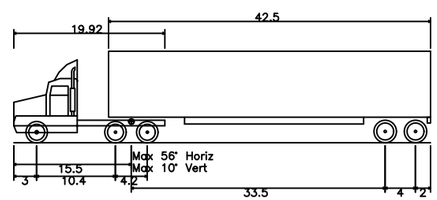






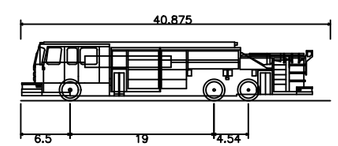
BUS–45 – Inter City Bus

Overall Length	45.500ft
Overall Width	8.500ft
Overall Body Height	12.008ft
Min Body Ground Clearance	1.158ft
Track Width	8.500ft
Lock–to–lock time	5.00s
Max Steering Angle (Virtual)	45.20°



WB–50 – Intermediate Semi–Trailer

Overall Length	55.000ft
Overall Width	8.500ft
Overall Body Height	12.052ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock–to–lock time	6.00s
Max Steering Angle (Virtual)	17.90°



City of Redmond Fire Truck

Overall Length	40.875ft
Overall Width	8.167ft
Overall Body Height	7.745ft
Min Body Ground Clearance	0.656ft
Track Width	8.167ft
Lock–to–lock time	5.00s
Wall to Wall Turning Radius	47.500ft

North Access - EB Vertical Vehicle Maneuvers

October 11, 2019

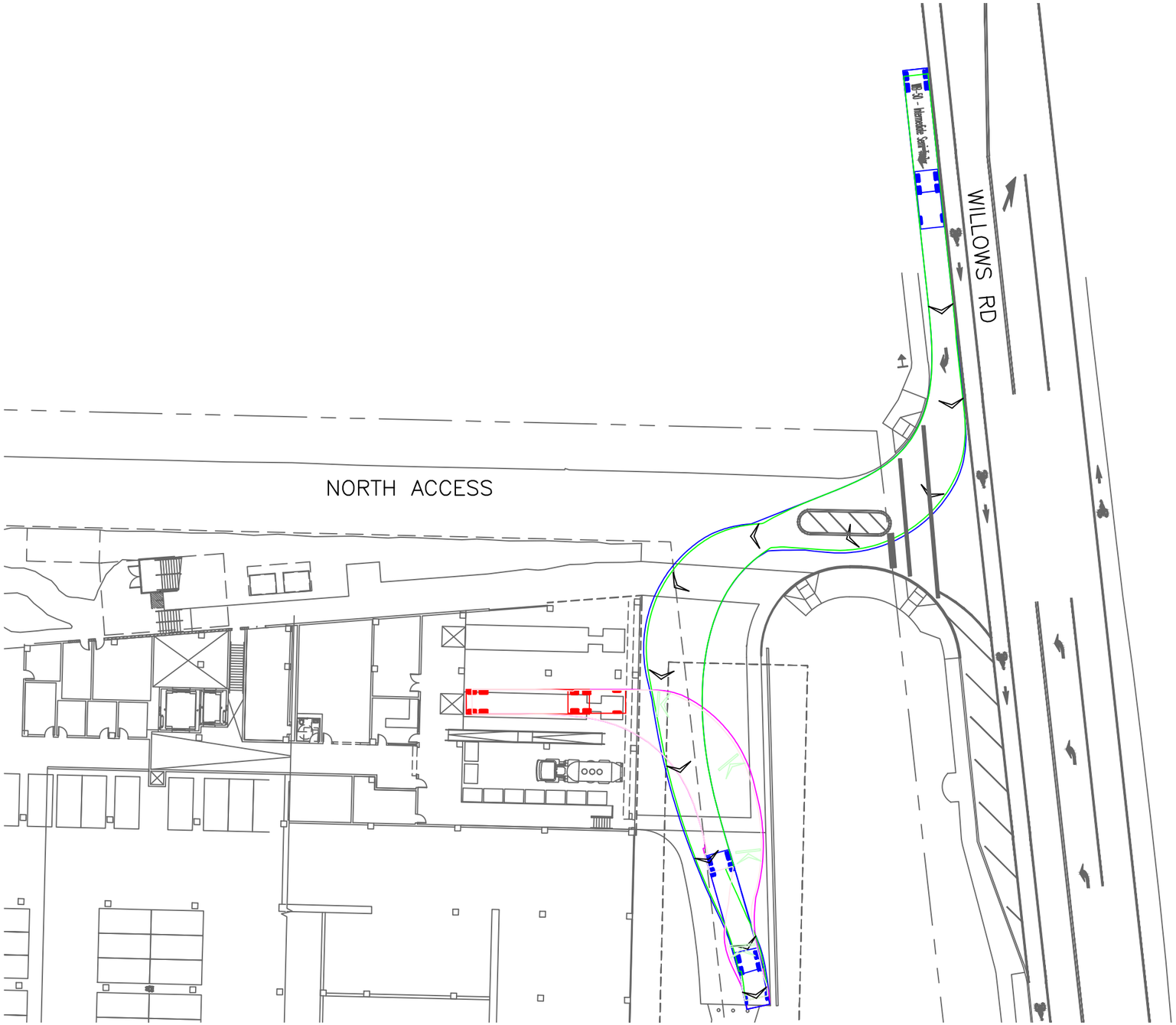
FIGURE **16**

1.17538.01 - Willows Building X

transpogroup
WHAT TRANSPORTATION CAN BE.

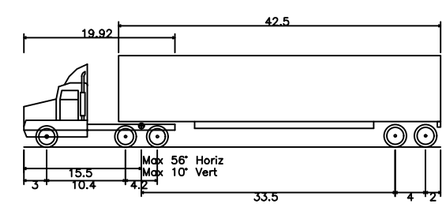
Oct 11, 2019 – 10:27am DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North Profiles – EB

Appendix G: Loading Dock Autoturns



N

NOT TO SCALE



WB-50 - Intermediate Semi-Trailer

Overall Length	55.000ft
Overall Width	8.500ft
Overall Body Height	12.052ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	17.90°

North Loading Dock Vehicle Maneuvers

October 11, 2019

FIGURE 7

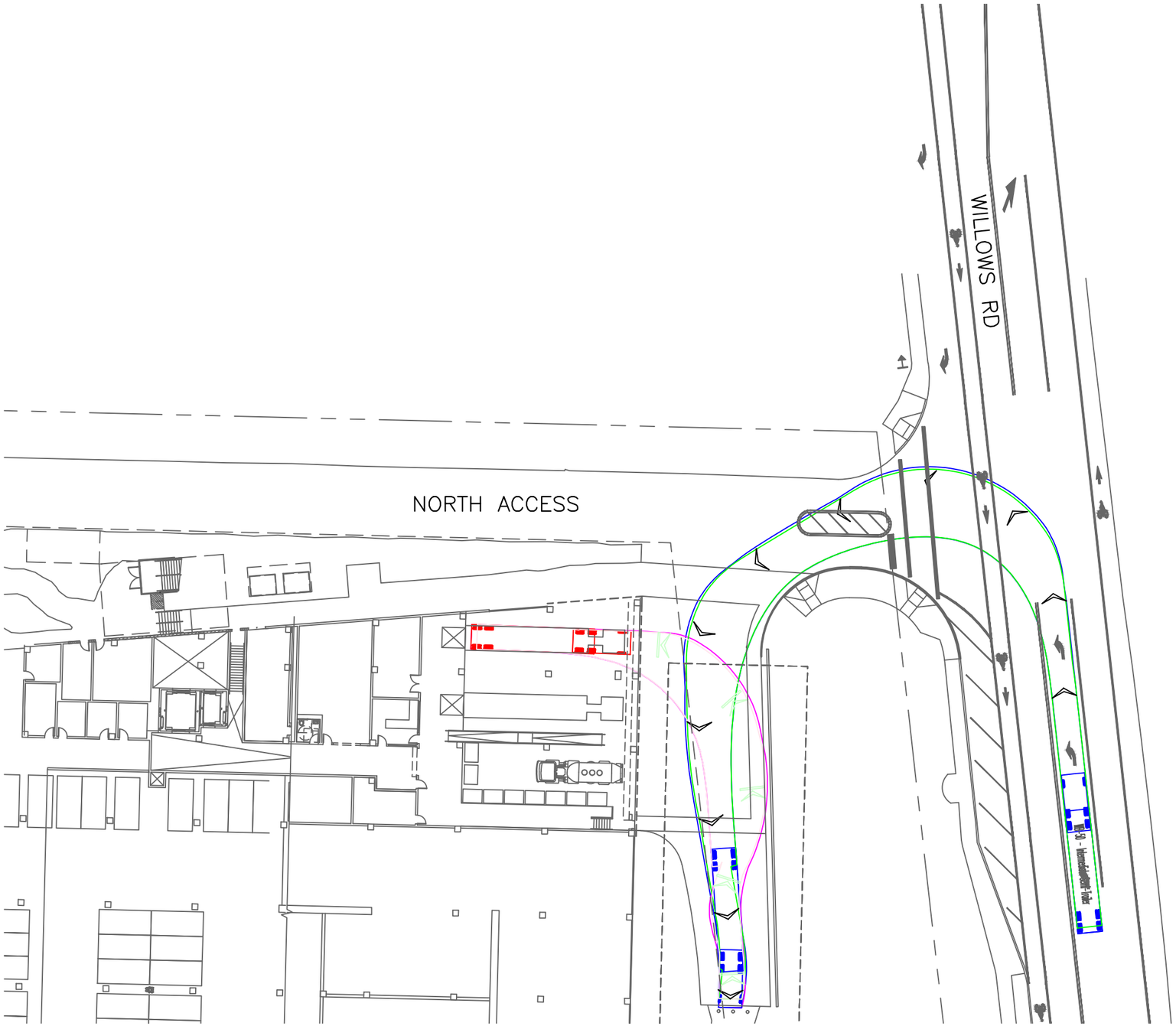
1.17538.01 - Willows Building X

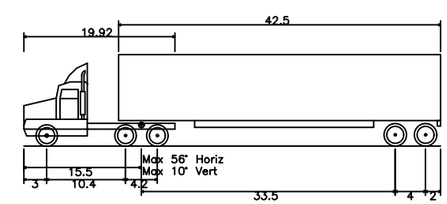
transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 - 12:37pm DamaniN M:\17\1.17538.01 - Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North Loading Dock - WB-50 Entry N

N

NOT TO SCALE





WB-50 – Intermediate Semi-Trailer	
Overall Length	55.000ft
Overall Width	8.500ft
Overall Body Height	12.052ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	17.90°

North Loading Dock Vehicle Maneuvers

October 11, 2019

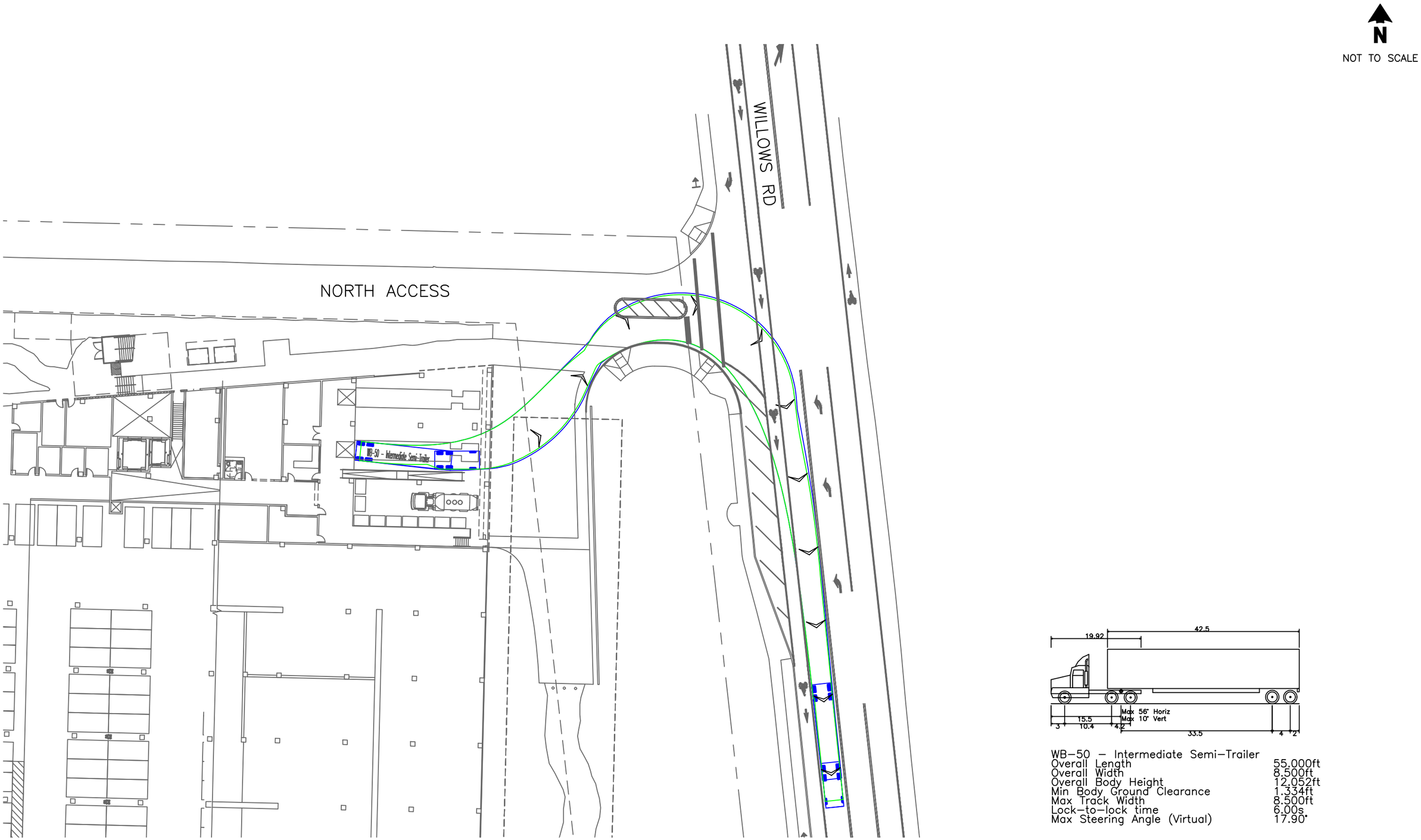
FIGURE

8

1.17538.01 - Willows Building X

transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 – 12:37pm DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North Loading Dock – WB-50 Entry S



North Loading Dock Vehicle Maneuvers

October 11, 2019

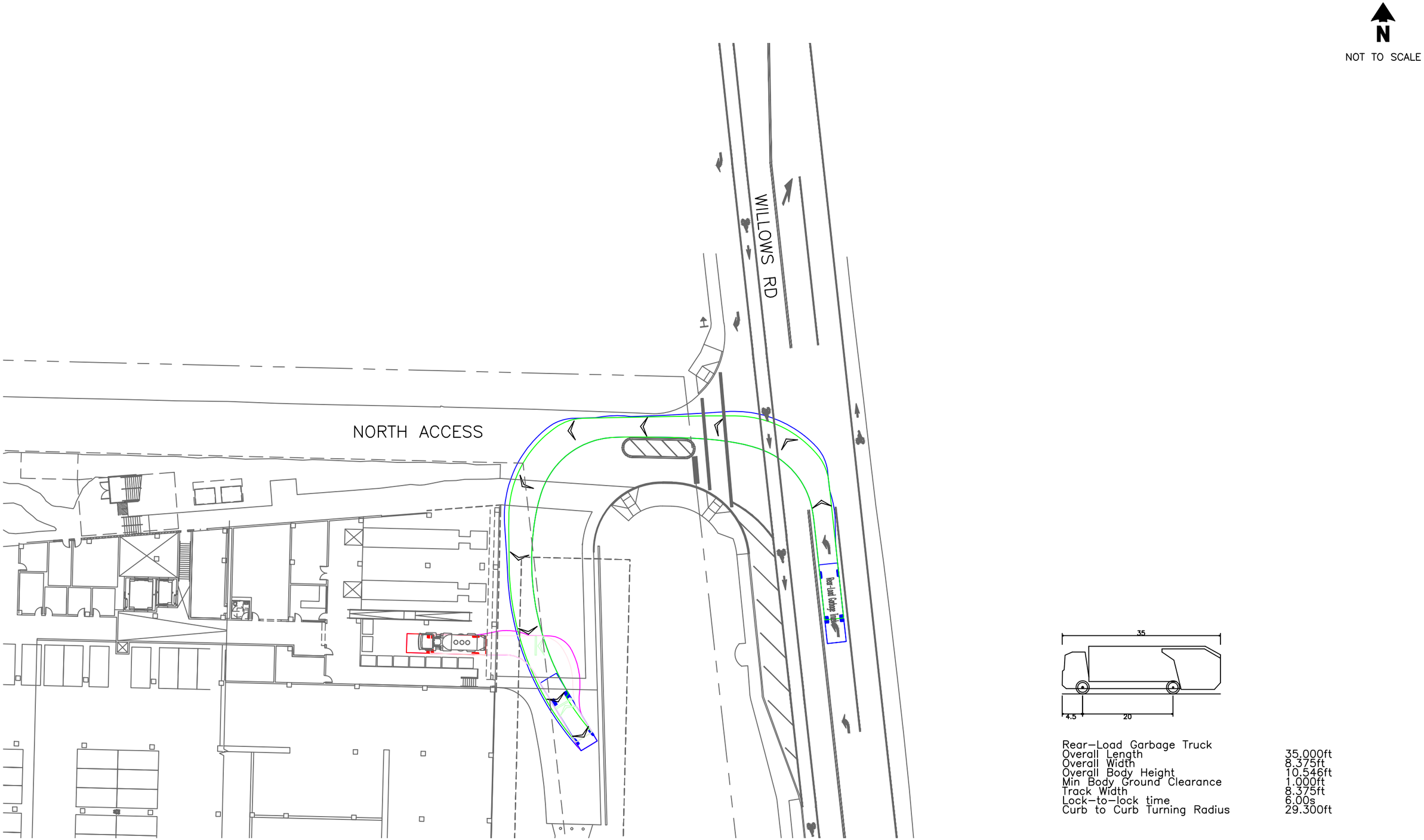
FIGURE

9

1.17538.01 - Willows Building X

transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 – 10:27am DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North Loading Dock – WB-50 Exit S



North Loading Dock Vehicle Maneuvers

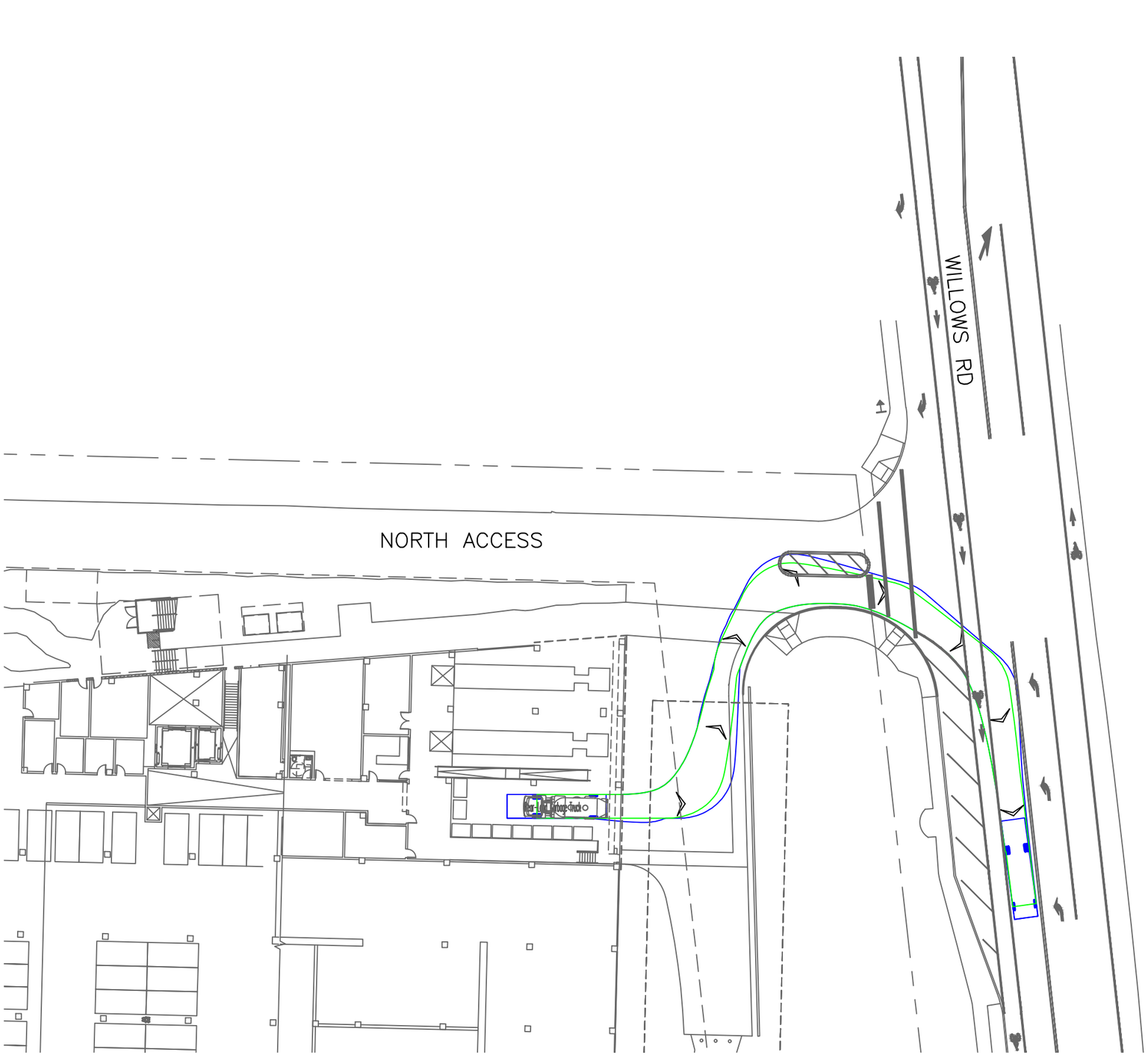
October 11, 2019

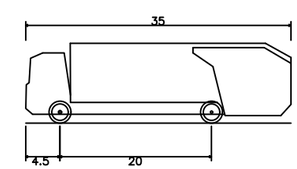
FIGURE **10**

1.17538.01 - Willows Building X

transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 – 12:37pm DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North Loading Dock – Garbage Entry S





Rear–Load Garbage Truck	
Overall Length	35.000ft
Overall Width	8.375ft
Overall Body Height	10.546ft
Min Body Ground Clearance	1.000ft
Track Width	8.375ft
Lock–to–lock time	6.00s
Curb to Curb Turning Radius	29.300ft

North Loading Dock Vehicle Maneuvers

October 11, 2019

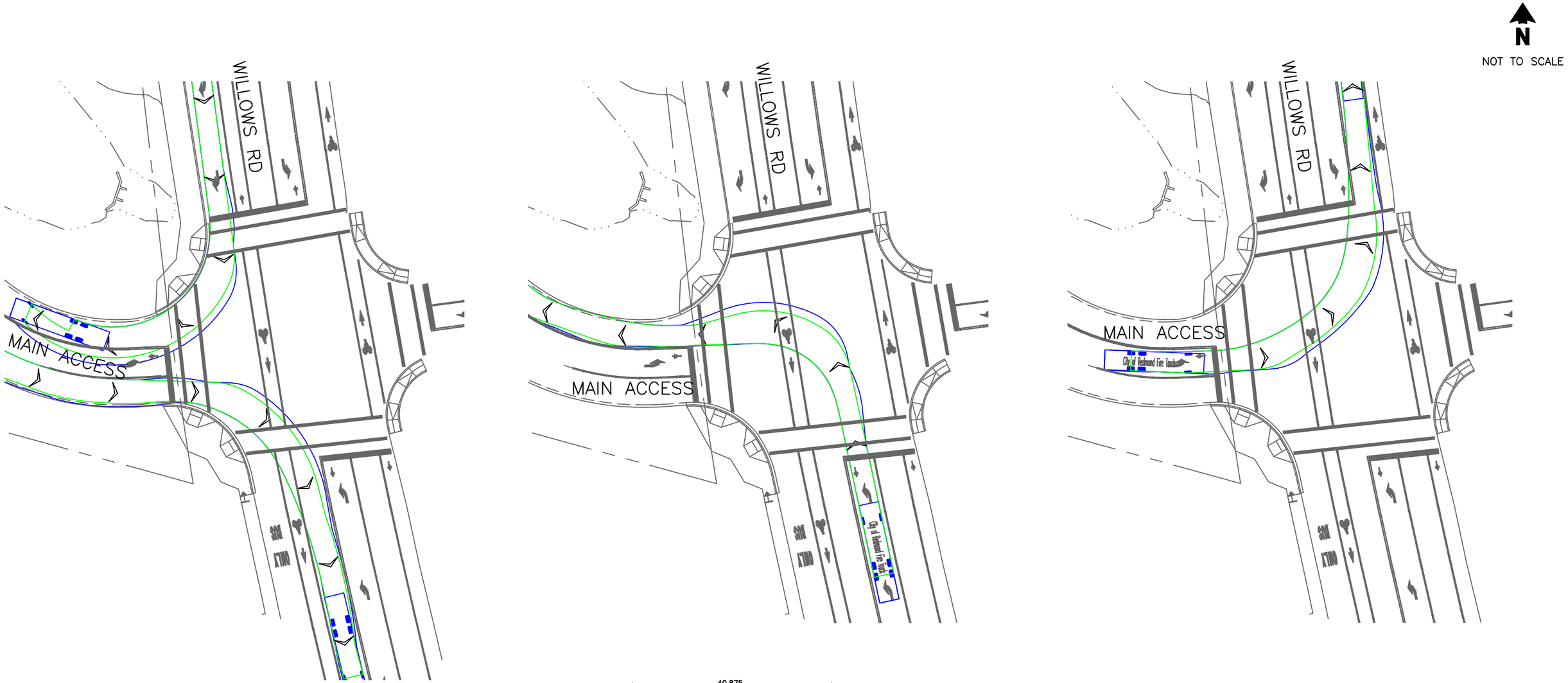
FIGURE **11**

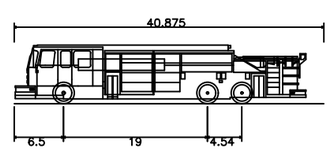
1.17538.01 - Willows Building X

transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 – 10:27am DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North Loading Dock – Garbage Exit S

Appendix H: Aid Car Autoturns





City of Redmond Fire Truck	
Overall Length	40.875ft
Overall Width	8.167ft
Overall Body Height	7.745ft
Min Body Ground Clearance	0.656ft
Track Width	8.167ft
Lock-to-lock time	5.00s
Wall to Wall Turning Radius	47.500ft

Main Access Vehicle Maneuvers

October 11, 2019

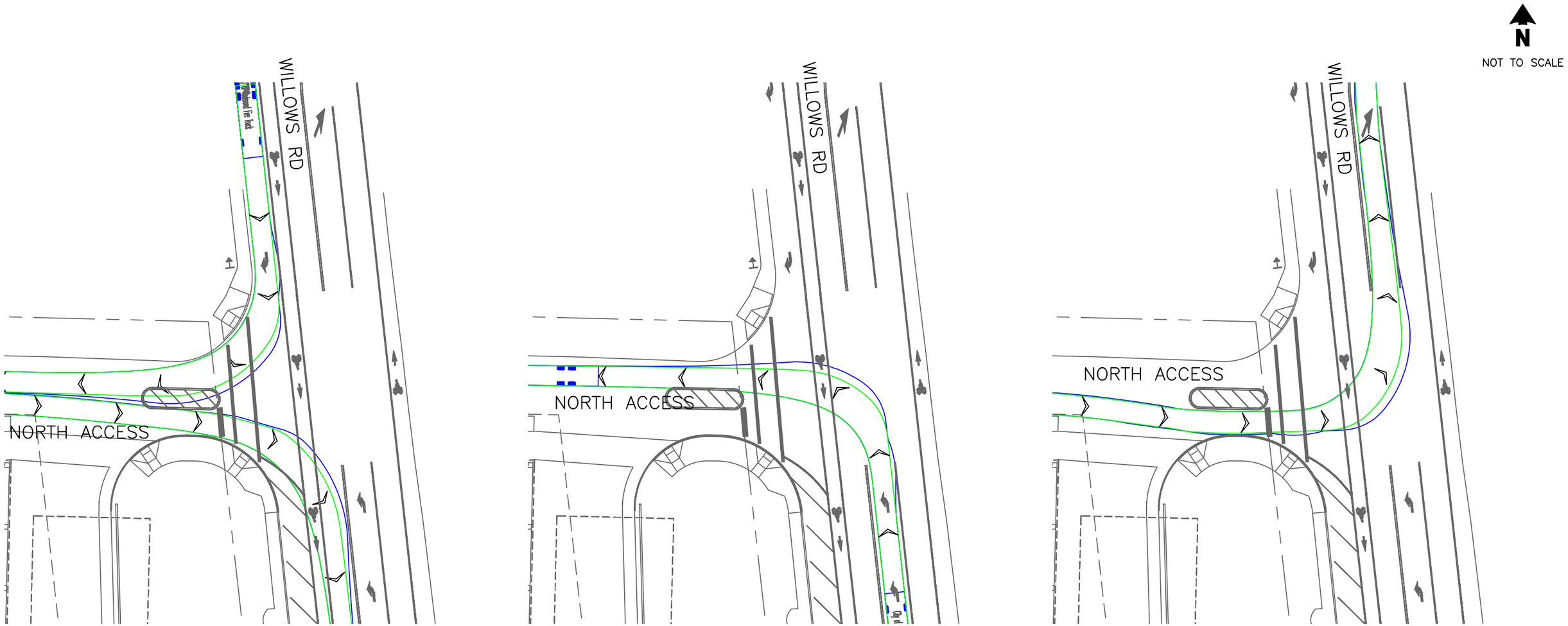
FIGURE

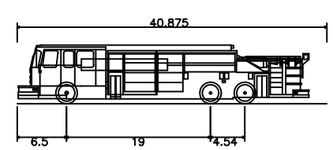
3

1.17538.01 - Willows Building X

transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 – 10:26am DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: Main – Fire





City of Redmond Fire Truck	
Overall Length	40.875ft
Overall Width	8.167ft
Overall Body Height	7.745ft
Min Body Ground Clearance	0.656ft
Track Width	8.167ft
Lock-to-lock time	5.00s
Wall to Wall Turning Radius	47.500ft

North Access Vehicle Maneuvers

October 11, 2019

FIGURE

6

1.17538.01 - Willows Building X

transpogroup
WHAT TRANSPORTATION CAN BE.

Oct 11, 2019 – 10:26am DamaniN M:\17\1.17538.01 – Willows Building X\Engineering\CAD\Supporting Files\Autoturn\Willows X AutoTurns.dwg Layout: North – Fire