

*Date:* February 3, 2020  
*To:* City of Auburn  
*From:* KPFF Consulting Engineers  
*Subject:* R Street SE Corridor – Conceptual Design and Analysis

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## OVERVIEW AND PURPOSE

This study is focused on the R Street SE Corridor from 17<sup>th</sup> Street SE to the White River (approximately the 41<sup>st</sup> Street SE alignment). The corridor provides a key north south connection between Auburn Way South/SR164 and Lakeland Hills, Lake Tapps, and other areas in north Pierce County. (Figure 1). Currently, the R Street SE Corridor experiences heavy congestion during the AM and PM peak hours. Long queues from intersections at Howard Road (west leg), 21<sup>st</sup> Street SE and 29<sup>th</sup> Street SE create congestion that at times, has been observed to back up onto SR 164/Auburn Way South. R Street SE is classified as a minor arterial and has a posted speed of 35 MPH. There is one lane in each direction with left-turn lanes for various intersections, sidewalks, and bike lanes throughout the existing corridor.

The City of Auburn has requested a conceptual level design and analysis to identify and evaluate corridor and intersection improvements along R Street SE to address congestion issues while also considering safety and accessibility to neighborhoods along the corridor. Additionally, the City of Auburn has requested a conceptual level design and analysis of intersection improvements for M Street SE and 29<sup>th</sup> Street SE to address additional congestion issues.

This memo includes a brief summary of the identified issues, identification and evaluation of alternatives, and presentation of a preferred alternative with sequencing recommendations. Additional information regarding stormwater management considerations, costs, and right-of-way needs are included as appendices.

**Figure 1 – Study Area**



## ASSUMPTIONS

- The project limits are on R Street SE from Howard Road (to the west of R Street SE) to the White River bridge. No modifications will be made to the existing bridges at either end of the corridor.
- Since the posted Speed is 35 MPH, per current design standards, the design speed is 45 MPH. Reduced design speed may be considered with future detailed design.
- To determine the thickness for the pavement and base course required for the cost estimate, medium soil conditions are assumed.
- Based on input from the City of Auburn, the projected traffic in 2040 was assumed to have a 1% growth rate from existing traffic counts.
- Property acquisition cost is split into separate categories; partial and full takes. The cost of partial takes were estimated at \$20 per square foot based on the average property values surrounding R Street SE. The cost was derived from the assessed property values from King County, then increased to account for variations between assessed values and market value (roughly 20%). The cost of full takes were estimated at \$40 per square foot to account for relocation and administrative costs.
- Itemized costs are determined from WSDOT and City of Auburn bid tabulations from 2017-2019 in the Northwest Region.

## TRAFFIC ANALYSIS (NO BUILD)

The existing and future levels of service at project intersections and corridor segments were analyzed and compared against the City's level of service standards. The City's Comprehensive Transportation Plan adopted the following level of service standards relevant to this study:

**Table 1 – Level of Service Standards**

R Street Corridor LOS	D
Stop Controlled Intersections	D
Signalized Intersections (arterial/non-arterial)	D
Signalized Intersections (arterial/arterial)	E*
Roundabout Intersections	D

\* for a maximum of 30 minutes.

**Table 2 - Level of Service (No Build)**

	Corridor LOS	Intersection LOS			
		R/21 <sup>st</sup>	R/29 <sup>th</sup>	R/Howard	M/29th
Existing	<b>R St SE – Howard Rd to Lake Tapps Pkwy</b>	<b>B (Northbound), B (Southbound)<sup>1</sup></b>	<b>F*</b>	<b>F*</b>	<b>F*</b>
Future	<b>B (Northbound), C (Southbound)<sup>2</sup></b>	<b>F*</b>	<b>F*</b>	<b>F*</b>	<b>F*</b>

<sup>1</sup> In 2014 per City Comprehensive Plan

<sup>2</sup> In 2035 per City Comprehensive Plan

\* Indicates City LOS standard not met.

The corridor LOS under a no-build condition meets the City of Auburn's Level of Service Standards for both existing and future conditions. However, not each of the intersections in the R Street corridor meet the City of Auburn's Comprehensive Transportation Plan Level of Service Standards.

The existing LOS for R Street SE and 21<sup>st</sup> Street SE is F and the future LOS is F with no changes to the existing intersection configuration. This does not meet the City of Auburn's Level of Service Standards. This indicates that intersection improvements must be made to meet the city's Level of Service Standards for existing and future conditions.

The existing LOS for R Street SE and 29<sup>th</sup> Street SE is F and the future LOS is F with no changes to the existing intersection layout. This does not meet the city's Level of Service Standards. Therefore, with no changes or modifications to this intersection the delay at the intersection is too long to be acceptable in the City of Auburn and requires intersection improvements.

The existing LOS for R Street SE and Howard Road is F and the future LOS is F with no modifications to the existing intersection layout. This does not meet the city's Level of Service Standards and requires intersection improvements.

The existing LOS for M Street SE and 29<sup>th</sup> Street SE is C and the future LOS is F with no changes to the intersection. The current LOS for M Street SE and 29<sup>th</sup> Street SE does meet the City of Auburn's Level of Service standards. However, the future LOS assuming 1% traffic growth does not meet the city's standards and requires intersection improvements.

## CORRIDOR ALTERNATIVES

Three corridor alternatives were developed and analyzed that would re-channelize, re-configure, and/or widen the R Street SE Corridor. All of the alternatives assume 11' vehicle lanes with 8' sidewalks and 5' bicycle lanes on each side of the road. The alternatives also include the existing northbound right-turn and southbound left-turn lanes for access to and from Game Farm Park. In order to discuss and evaluate the alternatives, the corridor can be split into two segments: north and south as follows:

**South Segment:** For all three alternatives, the roadway from 37<sup>th</sup> Way SE to 29<sup>th</sup> Street SE could be re-channelized between the existing curb lines to provide the alternative roadway sections without any widening. The re-channelization could be done with or without a grind and overlay of the existing pavement. Per the City's 2019 pavement condition survey, as of August 2019, the pavement condition index (PCI) of the corridor in the south segment ranged from the low 70's to the high 50's, which indicates that a grind and overlay in the near future would be a reasonable asset management approach to prevent the roadway from falling into poor condition, thus requiring a much more costly full-depth pavement replacement. The grind and overlay would trigger the requirement to upgrade 16 curb ramps on the corridor to meet current ADA standards. Additionally, damaged sidewalks and curbs would be replaced with the grind and overlay of the roadway.

**North Segment:** North of 29<sup>th</sup> Street SE, widening of the roadway (and right of way acquisition) would be required for all alternatives. Except the south leg of the R/29<sup>th</sup> intersection, this analysis, assumed any corridor widening would be centered on the existing ROW and would therefore require sidewalks, curbs, and gutters to be replaced on both sides of the road. Because of this work, a full grind and overlay was assumed in existing pavement areas. On the south leg of the R/29<sup>th</sup> intersection, the improvements were moved as far east as possible to maximize the use of City property along the east side of the road. This helped reduce the private property needed on the west side of the road (avoiding a potential full-take and relocations). Since the property along the west side of the roadway is City of Auburn Parks Property, additional coordination and discussion is recommended with the Parks Department to further evaluate this approach.

### **Corridor Alternative 1 – Two southbound through lanes**

Corridor Alternative 1 would add a second southbound lane to R Street SE from Howard Road to 37<sup>th</sup> Way SE. This additional lane would help address significant congestion that occurs during PM peak hours.

### **Corridor Alternative 2 – Two-way left turn lane (TWLTL)**

Corridor Alternative 2 would add a two-way left turn lane to R Street SE from Howard Road to 37<sup>th</sup> Way SE. This lane would improve access to and from neighborhoods and parks along the corridor. It would also reduce or eliminate queuing in the southbound or northbound through lanes caused by vehicles waiting to find gaps to make left turns. At the intersections of 29<sup>th</sup> and 21<sup>st</sup>, the TWLTL is changed to a left-turn only lane.

### **Corridor Alternative 3 – Combination of 2 southbound lanes and two-way left turn lane (TWLTL)**

Corridor Alternative 3 is a combination of alternatives 1 and 2 and includes two southbound through lanes from Howard Road to 33<sup>rd</sup> Street SE. From 33<sup>rd</sup> Street SE to 37<sup>th</sup> Way SE the second southbound through lane is dropped and a two-way left turn lane is added. This option allows for improved mobility during the peak hour through the most congested intersections in the corridor and improved accessibility to neighborhoods on the south side of the corridor.

## **INTERSECTION ALTERNATIVES**

### **Intersection Alternative – Howard Rd/R Street SE**

As shown in Figure 2, Howard Rd intersects R Street SE at two locations. Howard Rd intersects R Street SE from the west approximately 125 feet south of the Auburn Way South bridge over R Street SE. This section of Howard Rd serves as a connection ramp from southbound Auburn Way South to R Street SE. From the east, Howard Rd intersects R Street SE at 21<sup>st</sup> Street SE, approximately 525 feet south of the west leg of Howard Rd. This study analyzed the two intersections separately and refers to the north intersection of Howard Road and R Street SE as the Howard Rd/R Street SE Intersection and the south intersection as the 21<sup>st</sup> Street SE/R Street SE Intersection, as shown on the figure below.

**Figure 2 – Howard Road Intersections**



During the PM peak, the eastbound Howard Rd to southbound R Street SE movement experiences very high volumes (724 vehicles per hour). Because this movement is stop-controlled, significant congestion has been observed that has backed up traffic from eastbound Howard Rd to eastbound Auburn Way South. The backup problem on Howard Rd west of R Street SE is compounded by congestion on southbound R Street SE that often backs up from 29<sup>th</sup> Street SE to Howard Rd. The other movements at the intersection are relatively light.

### **Intersection Alternative – 21<sup>st</sup> Street SE/R Street SE**

The 21<sup>st</sup> Street SE and R Street SE intersection alternatives address the current and future LOS issues with the existing intersection configuration. This intersection is currently stop-controlled on two legs (Howard Rd and 21<sup>st</sup> St SE) and experiences significant delay during AM and PM peak hours. Delay at this intersection is also compounded by congestion that backs up from R Street SE and 29<sup>th</sup> Street SE.

**Figure 3- 21<sup>st</sup> Street SE and R Street SE Intersection**



The first traffic signal option for R Street SE and 21<sup>st</sup> Street SE maintains the NB and SB through lanes on R Street SE and adds left-turn pockets on each approach of R Street SE. Additionally, a right-turn pocket is added to 21<sup>st</sup> Street SE. The primary changes to this alternative is adding signals, illumination, left-turn pockets on R Street, and a right-turn pocket on 21<sup>st</sup> Street.

The second traffic signal option for R Street SE and 21<sup>st</sup> Street SE includes an additional SB through lane on R Street SE, left-turn pockets on each approach of R Street SE, and a right-turn pocket on 21<sup>st</sup> Street SE. The primary change from the first traffic signal option is an additional SB through lane on R Street SE in addition to signalization and additional turn lanes.

The first roundabout option at R Street SE and 21<sup>st</sup> Street SE includes a reconfiguration of the intersection by adding a single-lane roundabout. This alternative would be compatible with either corridor alternatives, TWLTL or 2 SB lanes.

The second roundabout option at R Street SE and 21<sup>st</sup> Street SE includes a multi-lane roundabout with two-legs in the SB direction and one leg for every other approach. This intersection is compatible with the two SB lane corridor alternative on R Street SE.

### **Intersection Alternative – 29<sup>th</sup> Street SE/R Street SE**

The R Street SE and 29<sup>th</sup> Street SE intersection alternatives address existing LOS and delay problems with the existing intersection configuration. Congestion from this intersection currently backs up traffic from R Street SE and 29<sup>th</sup> Street SE to the west leg of Howard Road and onto SR 164/Auburn Way South. The following intersection alternatives analyzed provide LOS improvements and delay reductions to help mitigate the existing congestion at this intersection and throughout the R Street Corridor.

**Figure 4- R Street SE and 29<sup>th</sup> Street SE Intersection**



The first traffic signal alternative for R Street SE and 29<sup>th</sup> Street SE maintains the existing intersection lane configuration.

The second traffic signal alternative for R Street SE and 29<sup>th</sup> Street SE includes two SB through lanes on R Street SE, maintaining left-turn pockets for all approaches, and a new right-turn pocket on the NB approve on R Street SE.

The first roundabout alternative includes a reconfiguration of the intersection by adding a single-lane roundabout.

The second roundabout alternative includes a reconfiguration of the intersection by adding a multi-lane roundabout. This includes two SB approaches on R Street and one approach for all other legs of the roundabout.

#### **Intersection Alternative – 29<sup>th</sup> St SE/M St SE**

The M Street alternatives addresses the intersection at M Street and 29<sup>th</sup> Street SE. This intersection was recently re-channelized to include additional turn-lanes and is currently stop controlled. 29<sup>th</sup> Street SE is used as a connection from R Street to A Street, which serves as a route to downtown Auburn and various freeway accesses. M Street is also used as a bypass for R Street to avoid congestion during peak hours. Due to traffic at this intersection the M Street alternatives include signalization of M Street and 29<sup>th</sup> Street or converting the intersection to a single-lane roundabout.

The traffic signal option for M Street and 29<sup>th</sup> Street SE maintains the existing channelization. The primary change for this intersection would be adding signals and illumination. All lane widths and cross-sectional characteristics would remain the same.

The roundabout alternative involves a complete reconfiguration of the intersection due to ROW constraints. For both the signal and roundabout options, rather than tapering the left turn lanes on 29<sup>th</sup> Street between R Street and M Street, a TWLTL will be added.

#### **TRAFFIC ANALYSIS (ALTERNATIVES)**

Table 4 summarizes the level of service traffic analysis results for combinations of various intersection and corridor alternatives. The LOS is for the year 2040, with an assumed growth rate of 1%, provided by the City of Auburn. The full traffic analysis conducted by Fehr and Peers is included in Appendix A.

**Table 4 - 2040 Alternatives Level of Service**

	Corridor LOS	Intersection LOS				
		21 <sup>st</sup> Traffic Signal	21 <sup>st</sup> Roundabout <sup>1</sup>	29 <sup>th</sup> Traffic Signal	29 <sup>th</sup> Roundabout <sup>1</sup>	Howard Rd (west leg)
R St Alternative 1	17 <sup>th</sup> St SE to White River	B (Northbound), C (Southbound)	B	A (ML)	D	A (ML)
R St Alternative 2	B (Northbound), F (Southbound)	C	A (SL)	F	E (SL)	N/A
R St Alternative 3	B (Northbound), C (Southbound)	B	A (ML or SL)	D	A	N/A
Howard Rd (west leg)/R ST	N/A	N/A	N/A	N/A	N/A	A
M St	N/A	N/A	N/A	C	A (SL)	N/A

<sup>1</sup> Single lane roundabout = SL, Multilane roundabout = ML

#### TRAFFIC SIGNAL WARRANT ANALYSIS

A traffic signal warrant analysis was conducted for R Street SE/21<sup>st</sup> Street SE and M Street SE/29<sup>th</sup> Street SE since they are both currently stop-controlled. Traffic signal control is warranted at both intersections evaluated under existing conditions and for future (2040) conditions. At the R Street SE/21<sup>st</sup> Street SE intersection Warrant 2, Four-Hour Vehicular volume is met. At the M Street SE/29<sup>th</sup> Street SE intersection was found to meet Warrant 3, Peak Hour and Warrant 2, Four-Hour Vehicular volume. Based on these findings, it is recommended that the City of Auburn consider installing traffic signal or other traffic control at R Street SE/21<sup>st</sup> Street SE and M Street SE/29<sup>th</sup> Street SE. The complete warrant analysis is included in Appendix C.

#### ALTERNATIVE COSTS

Tables 5 and 6 summarize the conceptual level estimates of probable costs that were developed for combinations of various intersection and corridor alternatives and options. Details of the cost estimates are included in the study appendix. The Corridor alternatives were evaluated with options to exclude or limit pavement and or sidewalk replacements.

**Table 5 – R St Corridor Alternatives Cost Summary**

	Replace Sidewalk and Pavement	Replace channelization	Replace Pavement and S/W as-needed
Alternative 1	\$6,060,400	\$5,447,605	\$5,667,963
Alternative 2	\$5,981,200	\$5,369,184	\$5,564,615
Alternative 3	\$6,180,400	\$5,593,375	\$5,713,677

The first column, “Replace Sidewalk and Pavement”, refers to the entire corridor replacement, excluding intersections. It includes replacing all sidewalk and pavement along the R St SE corridor. The second column, “Replace channelization”, includes replacing all sidewalk and pavement until 33<sup>rd</sup> St SE. After 33<sup>rd</sup> St SE this cost alternative looks at modifying the channelization in the existing roadway footprint and not touching the existing sidewalk or curb ramps. The third column, “Replace Pavement and Sidewalk as-needed”, represents replacing all sidewalk and pavement until 33<sup>rd</sup> St SE, and then

replacing all pavement and sidewalk as-needed. This includes all curb ramps that do not meet ADA standards, adjacent sidewalk, and a grind/overlay to the existing roadway.

**Table 6 - Intersection Alternatives Cost Summary**

	Signal (1 SB lane)	Signal (2 SB lanes)	Roundabout (Single Lane)	Roundabout (Multi- Lane)	Free Right and Stop Control
<b>Howard Rd (West Leg)/R</b>	N/A	N/A	N/A	N/A	\$137,523
<b>21<sup>st</sup>/R</b>	\$1,075,502	\$1,275,325	\$598,000	\$860,238	N/A
<b>29<sup>th</sup>/R</b>	\$905,351	\$1,089,496	\$1,007,730	\$1,190,128	N/A
<b>29<sup>th</sup>/M</b>	\$633,370	N/A	\$693,995	N/A	N/A

The cost estimates for each intersection refers to the costs of site prep (clear/grub, remove pavement, remove sidewalk), paving, curb ramps, new sidewalk, ROW costs, soft costs, and misc. construction costs (mobilization, traffic control, etc.). Drainage costs, illumination, landscape restoration, environmental costs, and other lump sum costs are addressed in the corridor cost estimate. These costs do not change with different intersection types, so they are not included in the intersection cost break-outs. See Appendix D Engineer's Cost Estimate for more details in the cost estimate.

## PREFERRED ALTERNATIVES

### **Preferred R Street Corridor Alternative**

Through discussions with City staff and input provided from the City's Transportation Advisory Board, Corridor Alternative 3 is the preferred R Street SE corridor alternative. This alternative includes a combination of two southbound through lanes along from 21<sup>st</sup> Street SE to 33<sup>rd</sup> Street SE that will more efficiently move traffic through the corridors busiest intersection (29<sup>th</sup> Street SE). South of 33<sup>rd</sup> Street SE, the second southbound lane will be replaced by a two-way left turn lane to allow for better access to local residences and improved safety.

### **Preferred Alternative Howard Rd/R Street SE**

Through discussions with City staff, the preferred alternative is shown in Figure 5 and described as follows: reconfiguring the intersection to allow the eastbound Howard Rd to southbound R Street SE movement to be a separated free-right turn. This layout requires the addition of a second southbound lane between Howard Rd and R Street SE. Depending on the preferred alternative selected at the intersection of R Street SE and 21<sup>st</sup> Street SE and the corridor alternative selected south of 21<sup>st</sup> Street SE, this lane would either drop to a right turn only lane at 21<sup>st</sup> Street SE or continue as a second southbound lane.

### **Preferred Alternative – 21<sup>st</sup> St SE/R St SE**

Through discussions with City staff, the preferred alternative for this intersection is a single lane roundabout as shown in Figure 6. The single lane roundabout alternative was selected over the multiple lane and traffic signal alternatives because it meets LOS standards, is feasible from the ROW acquisition and cost standpoint, and because it supports the objective established in the City's adopted Comprehensive Plan regarding roundabouts: "Objective: Roundabouts, to seek air quality, safety, and capacity

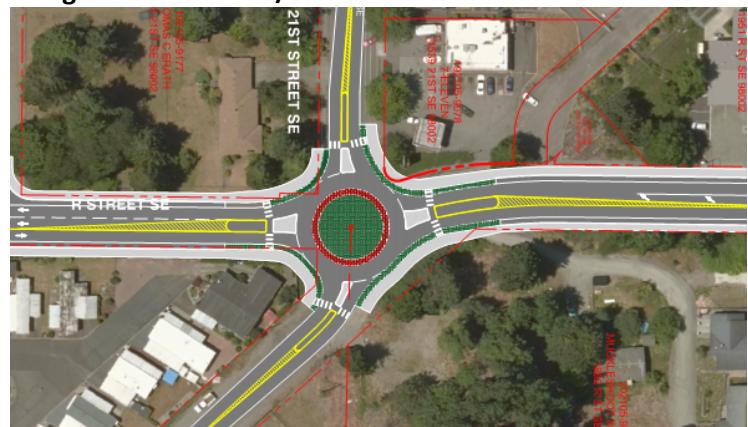
**Figure 5 – Howard Rd/R St SE Preferred Alternative**



benefits by promoting the use of roundabouts over traffic signals". The Comprehensive Plan states that intersections controlled with roundabouts are preferred over signalized intersections whenever feasible.

The single lane roundabout was selected over the multiple lane roundabout because the LOS between the single lane and dual lane roundabout was negligible and the dual lane roundabout would have significantly more right of way impacts. These impacts would include additional acquisition from MIT and the potential relocation of fuel tanks and dispensers from the gas station on the northwest corner.

**Figure 6 – 21<sup>st</sup> St SE/R St SE Preferred Alternative**



#### **Preferred Alternative – 29<sup>th</sup> St SE/R St SE**

Through discussions with City staff, the preferred alternative for this intersection is a signalized intersection as shown in Figure 7. Even though a multi-lane roundabout would have provided a higher level of service, it would have necessitated the purchase of a lower-income apartment building and relocation of its owner and tenants. This would likely be cost prohibitive and could have environmental justice issues since another option (the traffic signal) is available that would still meet City level of service standards.

**Figure 7 – 29<sup>th</sup> St SE/R St SE Preferred Alternative**



#### **Preferred Combined R Street Alternative**

Through discussions with City staff, the preferred alternative for the corridor is shown in Figure 8. This includes adding a second SB through lane from Howard Road to 133<sup>rd</sup> Street SE. After 133<sup>rd</sup> Street SE, the additional SB lane is dropped and a two-way left turn lane is added.

**Figure 8 – Preferred Alternative Corridor**

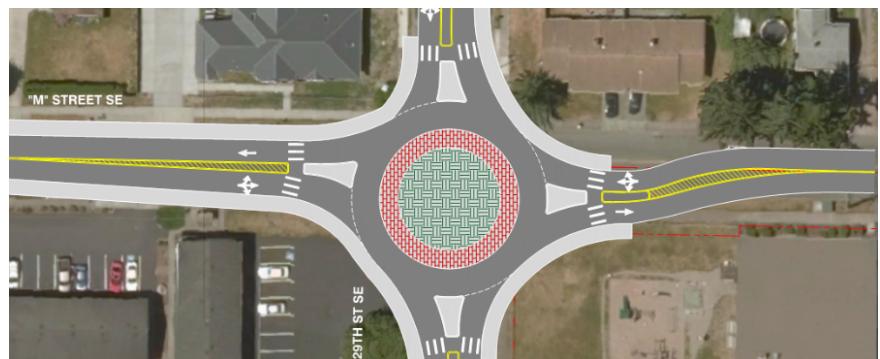




### **Preferred Alternative – 29<sup>th</sup> St SE/M St SE**

Through discussions with City staff, the preferred alternative for this intersection is a single lane roundabout as shown in Figure 9. The roundabout alternative was selected over the signalized traffic signal because it supports the objective established in the City's adopted Comprehensive Plan regarding roundabouts: "Objective: Roundabouts, to seek air quality, safety, and capacity benefits by promoting the use of roundabouts over traffic signals". The Comprehensive Plan states that intersections controlled with roundabouts are preferred over signalized intersections whenever feasible.

**Figure 9 – 29th St SE/M St SE Preferred Alternative**



### **R STREET CORRIDOR PROJECT SEQUENCING AND COSTS**

Improvements to the R Street Corridor can be separated into distinct projects that can each be constructed separately as its own standalone projects. Besides funding availability, the main consideration in sequencing the projects is that since the southbound congestion at 29<sup>th</sup>/R backs up through the 21<sup>st</sup>/R and Howard Rd (west leg)/R intersections, the improvements to 29<sup>th</sup>/R should occur prior to improvements at those intersections. If not, the intersections to the north would be improved but would still operate below LOS standards due to the backups from 29<sup>th</sup>/R. Additionally, combining the improvements to the 21<sup>st</sup>/R and Howard Rd (west leg)/R intersections into a single project that includes the segment in-between would likely maximize project delivery efficiencies and potentially increase grant scoring potential.

**Table 8 – R Street Project Sequencing**

Project	Sequence Order	Cost Estimate
29 <sup>th</sup> /R Intersection Improvements w/2 <sup>nd</sup> southbound lane from 22 <sup>nd</sup> to 33rd	1st	\$4,963,360
21 <sup>st</sup> /R and Howard Rd (west leg) /R Combined Improvements	2nd	\$1,360,921
R St Re-Channelization south of 33 <sup>rd</sup> Street SE to include two way left turn lane (w/o grind & overlay)	Any Order	\$587,025
R St Re-Channelization south of 33 <sup>rd</sup> Street SE to include two way left turn lane (w/grind & overlay)	Any Order	\$1,681,138

## ATTACHMENTS

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1. Alternative 1 – Two SB through lanes
2. Alternative 2 – TWLTL
3. Alternative 3- Combination
4. M-Street Alternatives

APPENDIX A – TRAFFIC ANALYSIS

APPENDIX B – DRAINAGE STUDY

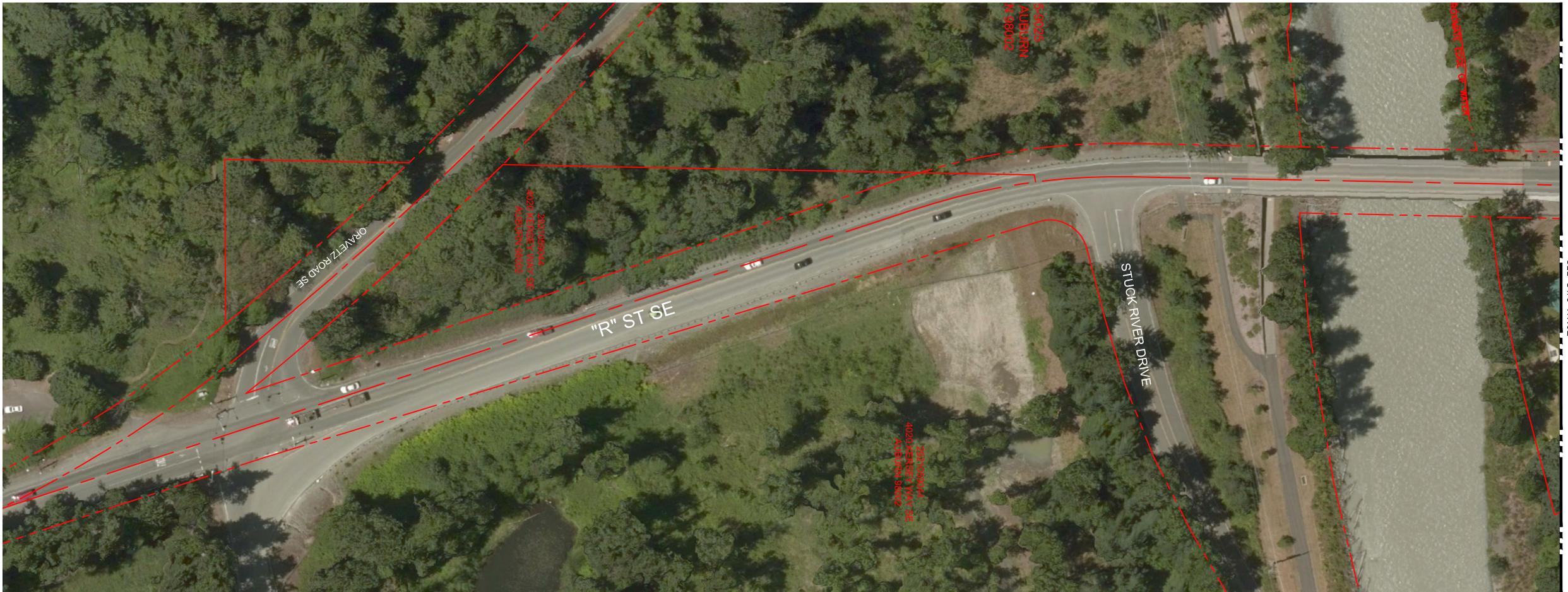
APPENDIX C – WARRANT ANALYSIS

APPENDIX D – COST ESTIMATE

**ATTACHMENT 1 –**

*ALTERNATIVE 1 - TWO SOUTHBOUND THROUGH LANES*

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1 inch = 50 feet



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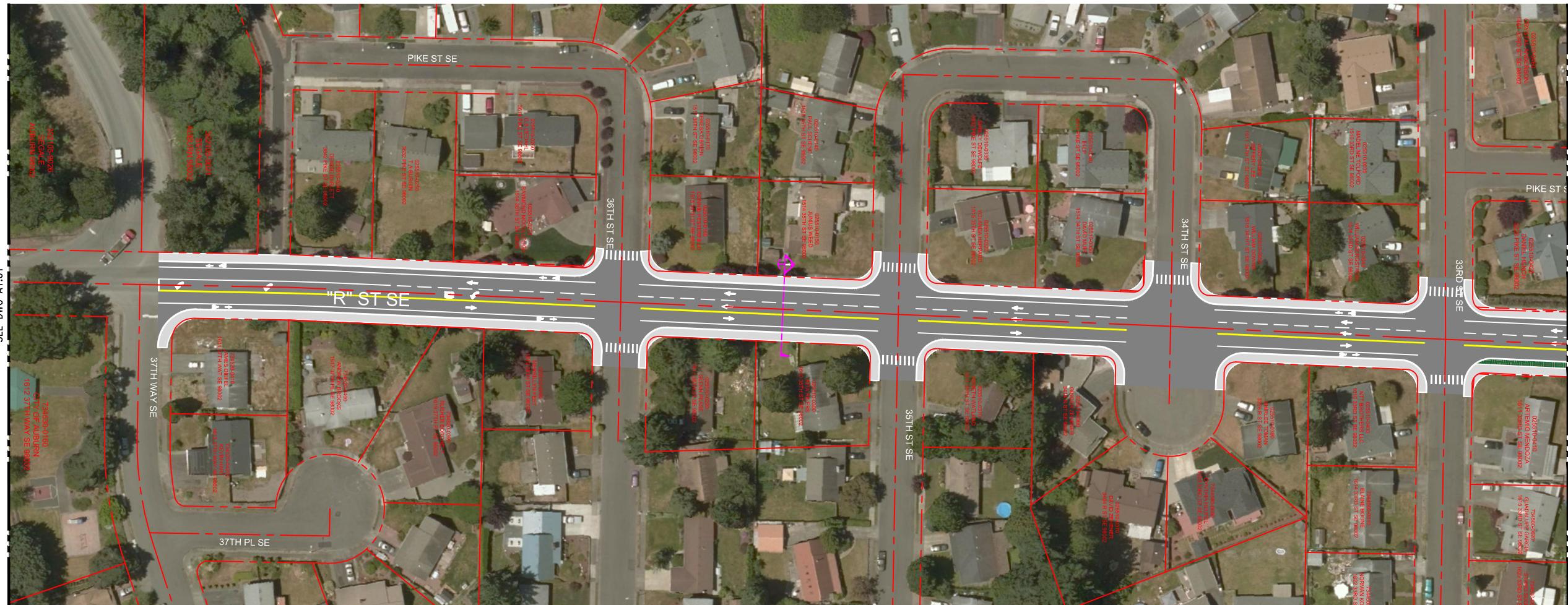
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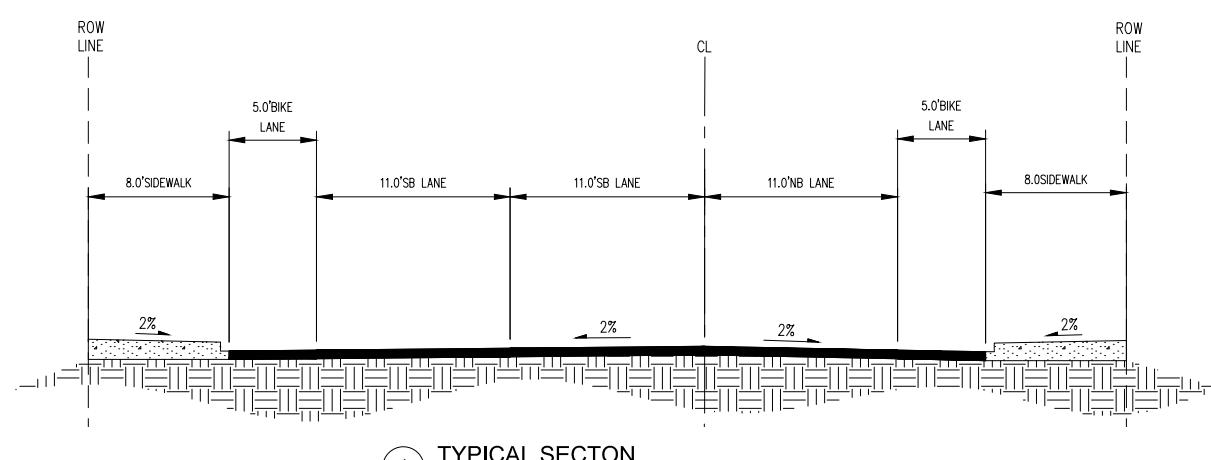
ALTERNATIVE 1  
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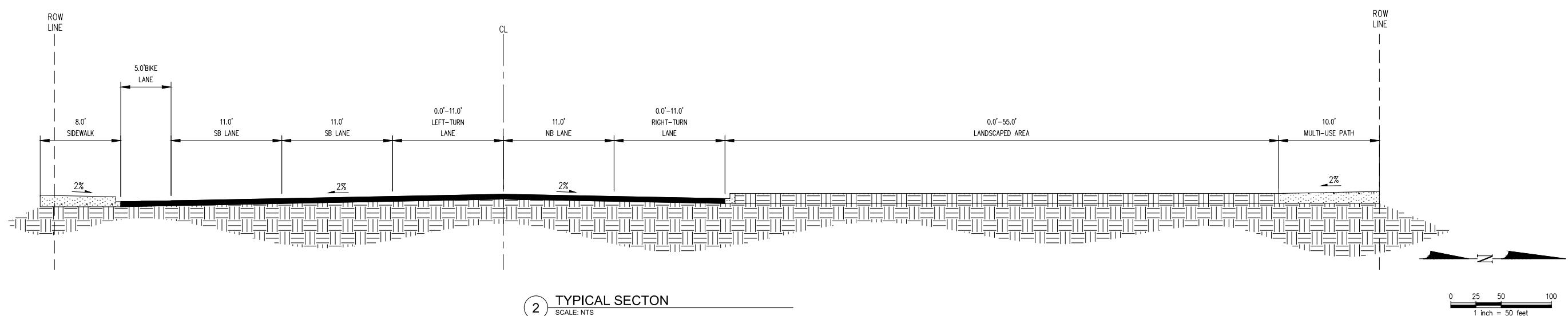
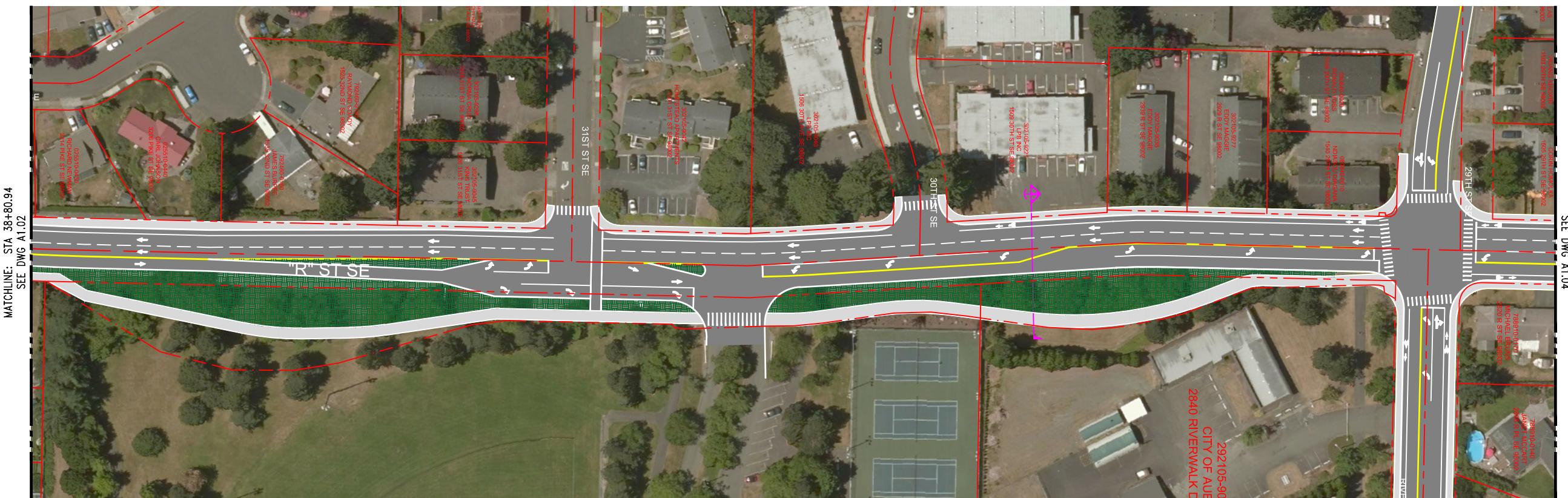


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## ALTERNATIVE 1 2 SB LANES

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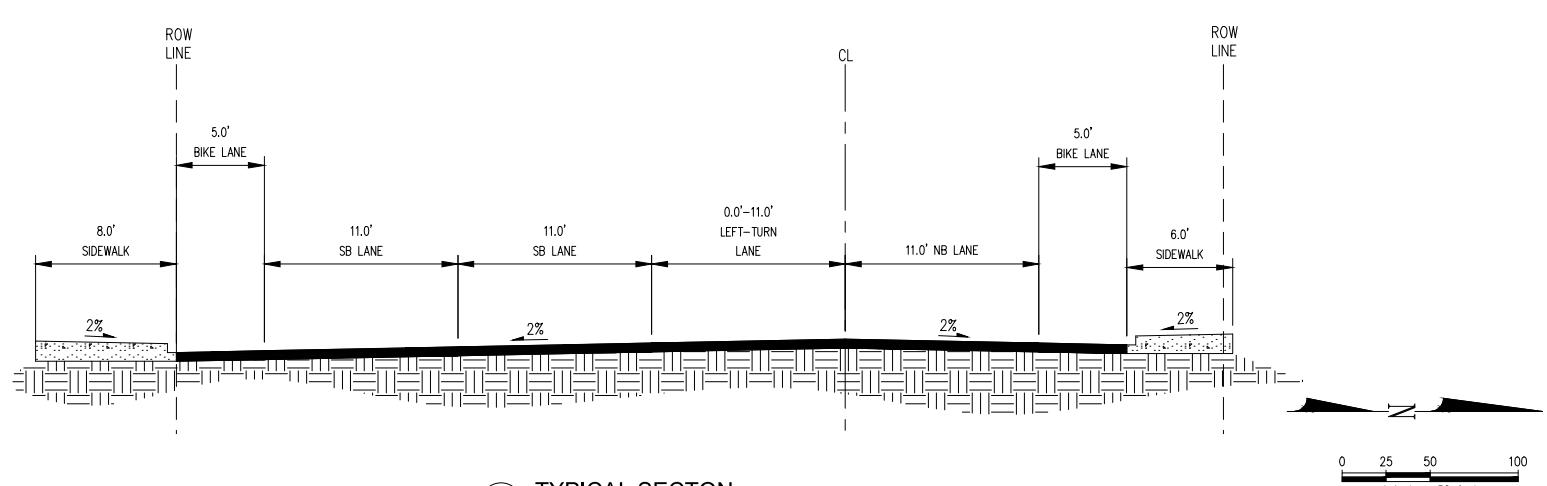
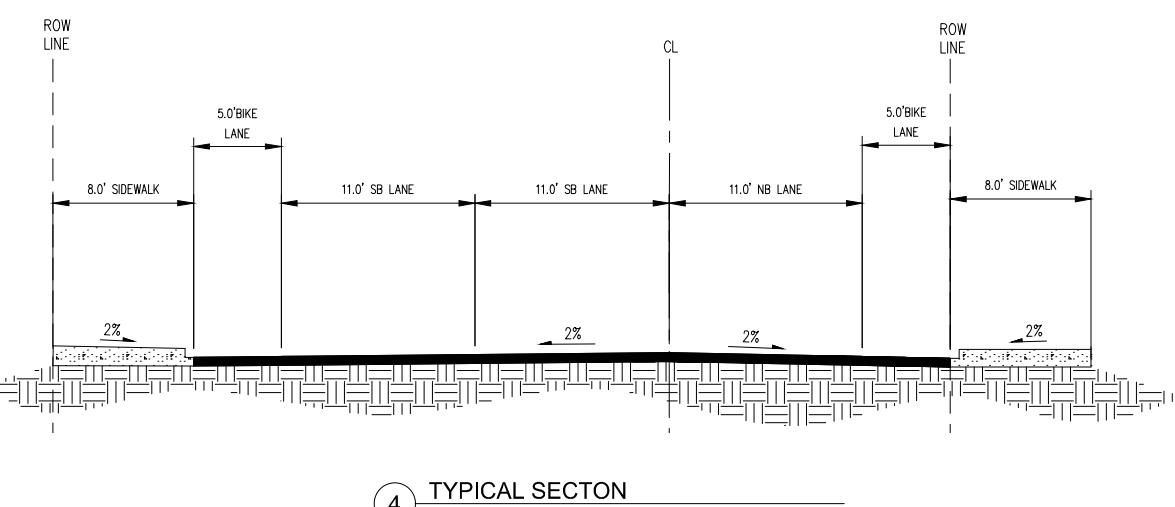
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ALTERNATIVE 1  
2 SB LANES

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**kpff**

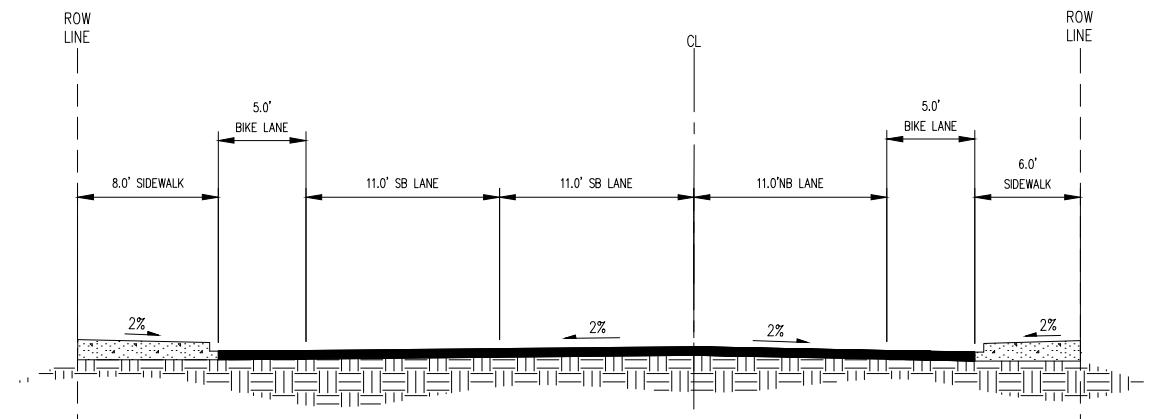
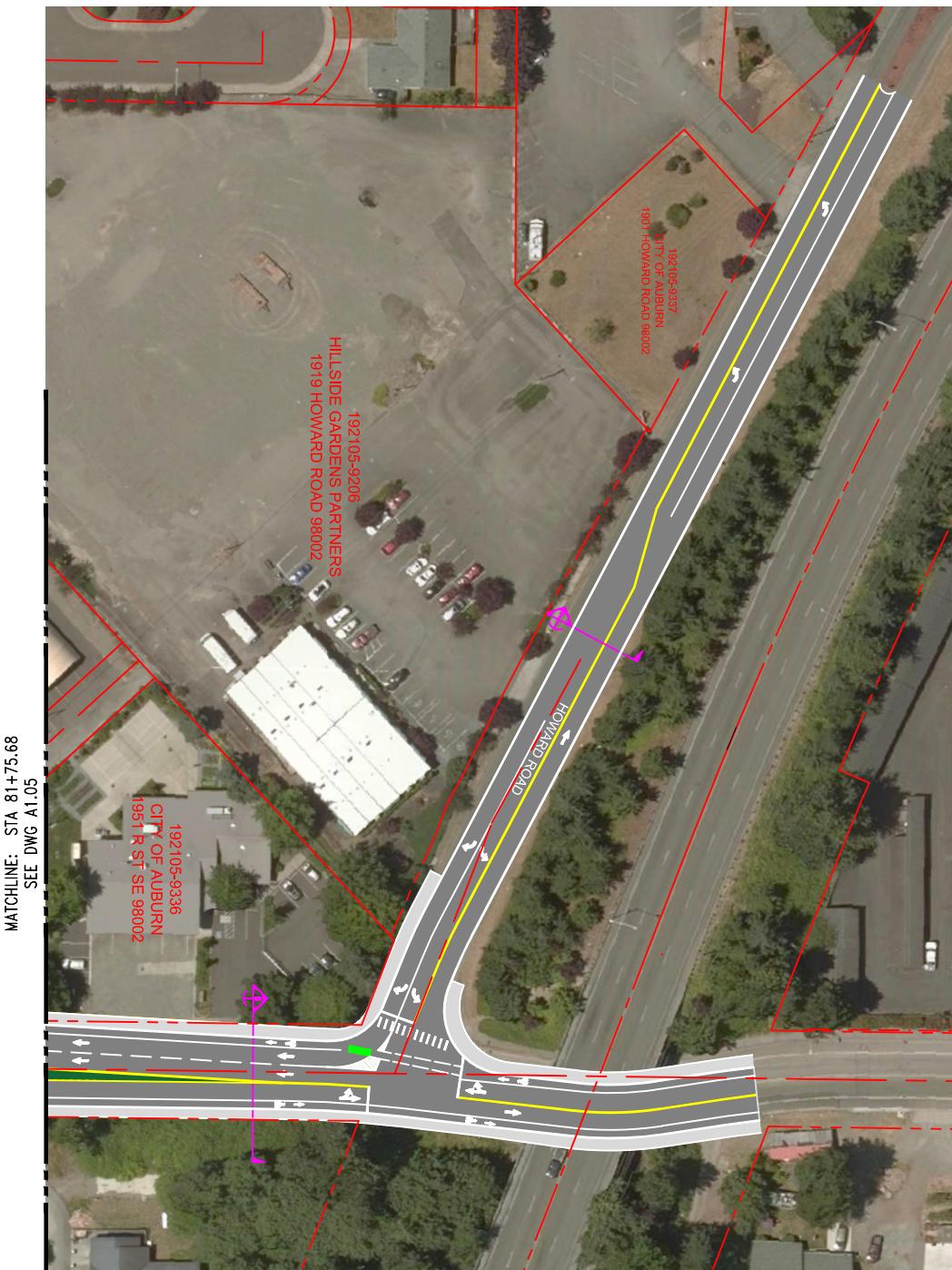
1601 5th Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822  
[www.kpff.com](http://www.kpff.com)



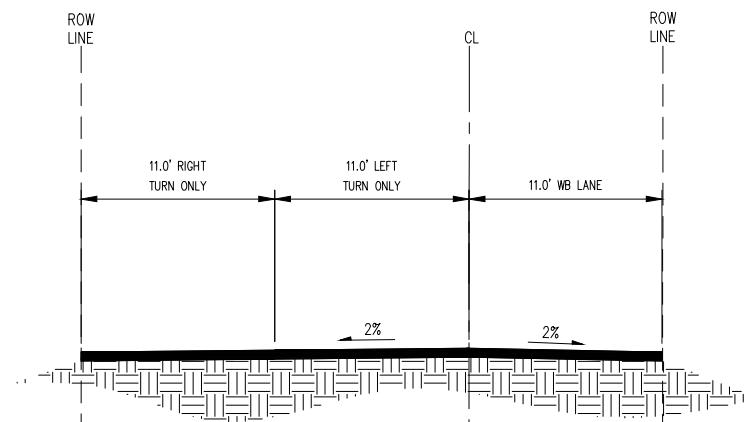
R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 1  
2 SB LANES

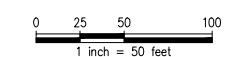
SHEET  
A1.05



6 TYPICAL SECTION  
SCALE: NTS



7 TYPICAL SECTION  
SCALE: NTS



Know what's below.  
Call before you dig.

				DRAWN BY M. VU	DESIGNED BY J. SHINN	CHECKED BY S. BATTLE	APPROVED BY —	CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555	DATE —	S C A L E: 1" = 50'
NO.	DATE	BY	CHD.	APPR.						REVISION

**kpff**

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Seattle, WA 98101  
206.622.5822  
[www.kpff.com](http://www.kpff.com)

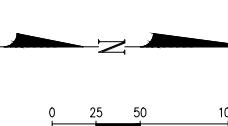


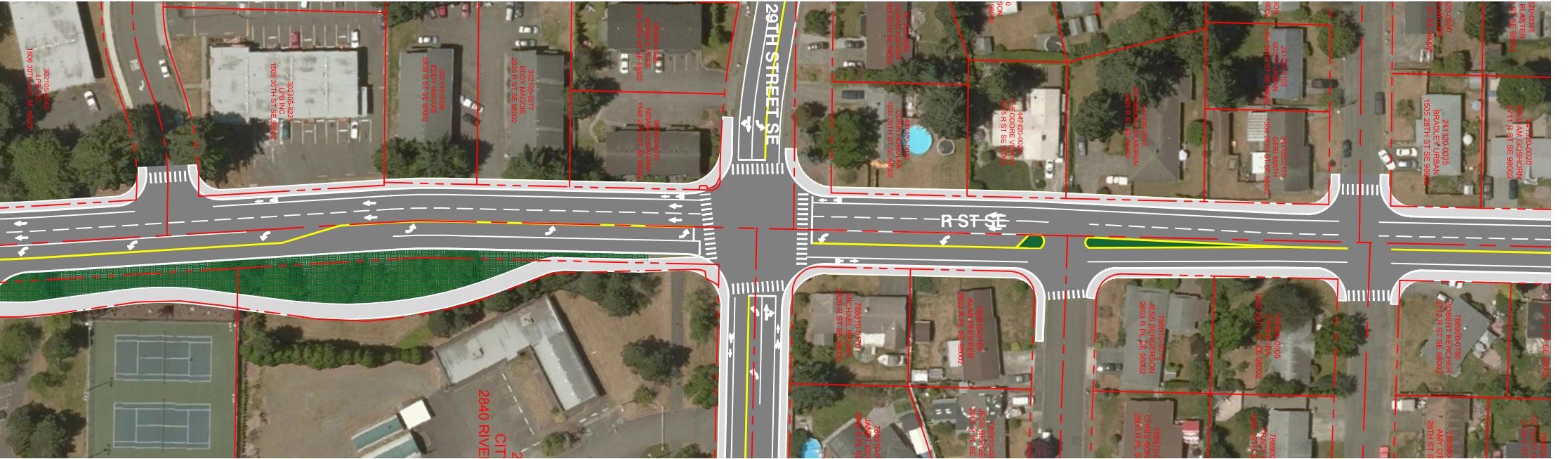
R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 1  
2 SB LANES

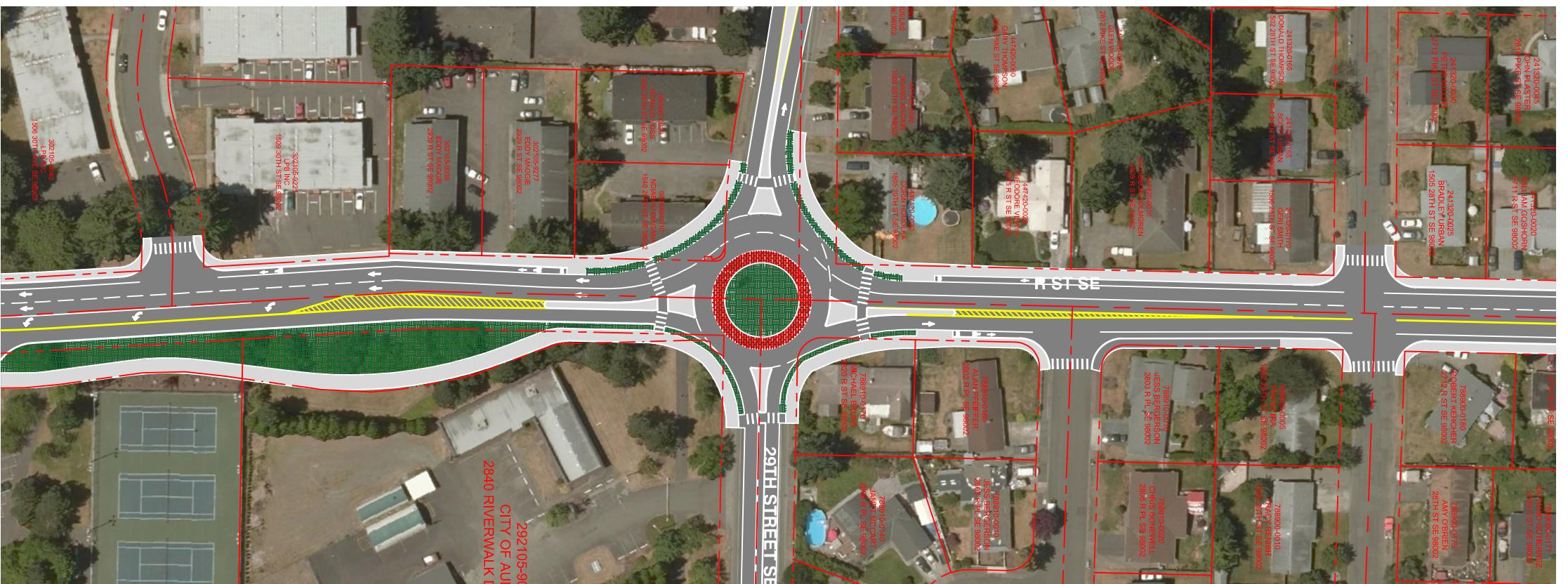
SHEET

A1.06





① SIGNALIZED  
INTERSECTION R ST AND 29TH SE SE  
SCALE: 1' = 50'



② MULTI-LANE ROUNDABOUT R ST AND 29TH ST SE  
SCALE: 1' = 50'

0 15 30 60  
1 inch = 30 feet



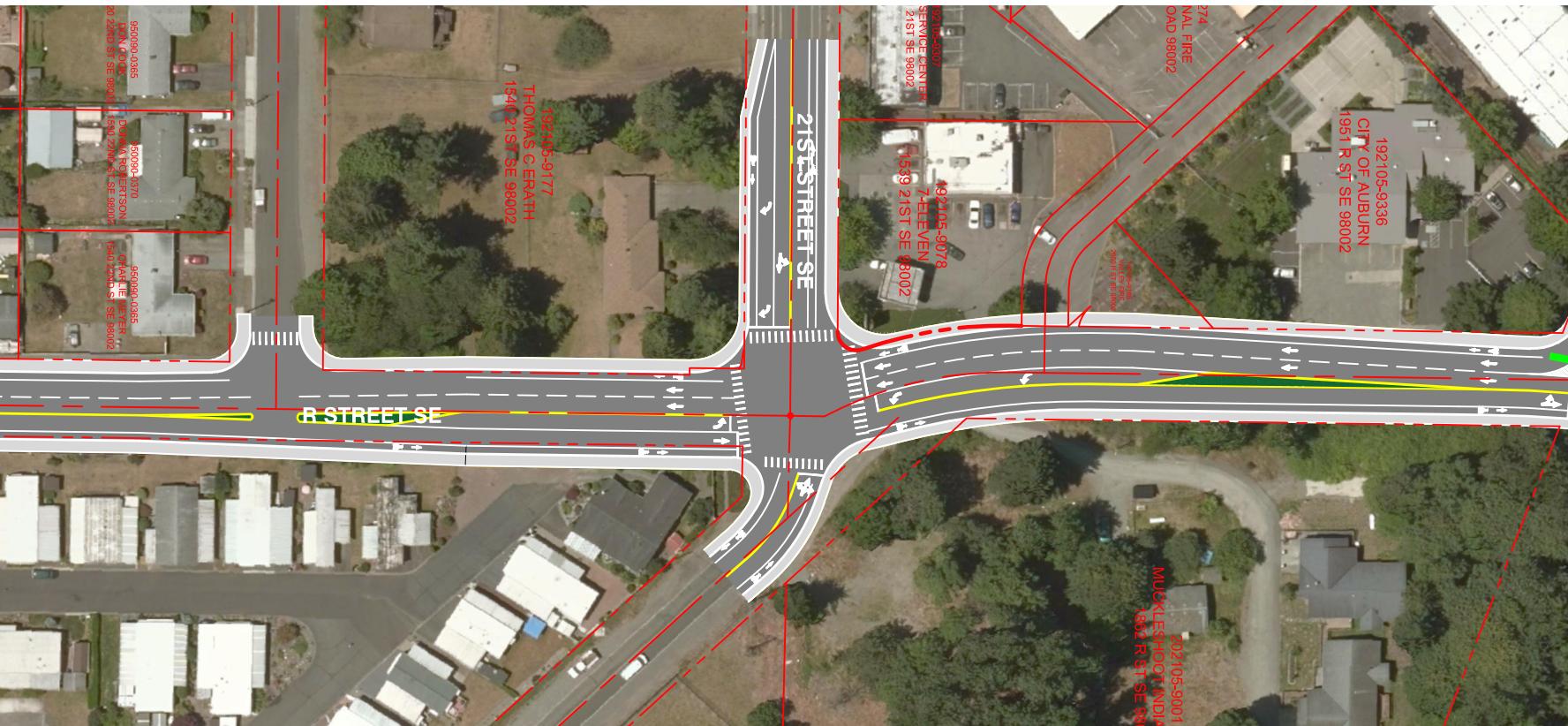
Know what's below.  
Call before you dig.

				DRAWN BY M. VU	DESIGNED BY J. SHINN	CHECKED BY S. BATTLE	APPROVED BY —	DATE —	SHEET A1.07
NO.	DATE	BY	CHD.	APPR.	REVISION	J O B N o . : —	S C A L E: 1" = 50'	ALTERNATIVE 1 R STREET & 29TH ST INTERSECTION OPTIONS	
									R STREET CORRIDOR STUDY/CITY OF AUBURN AUBURN, WASHINGTON

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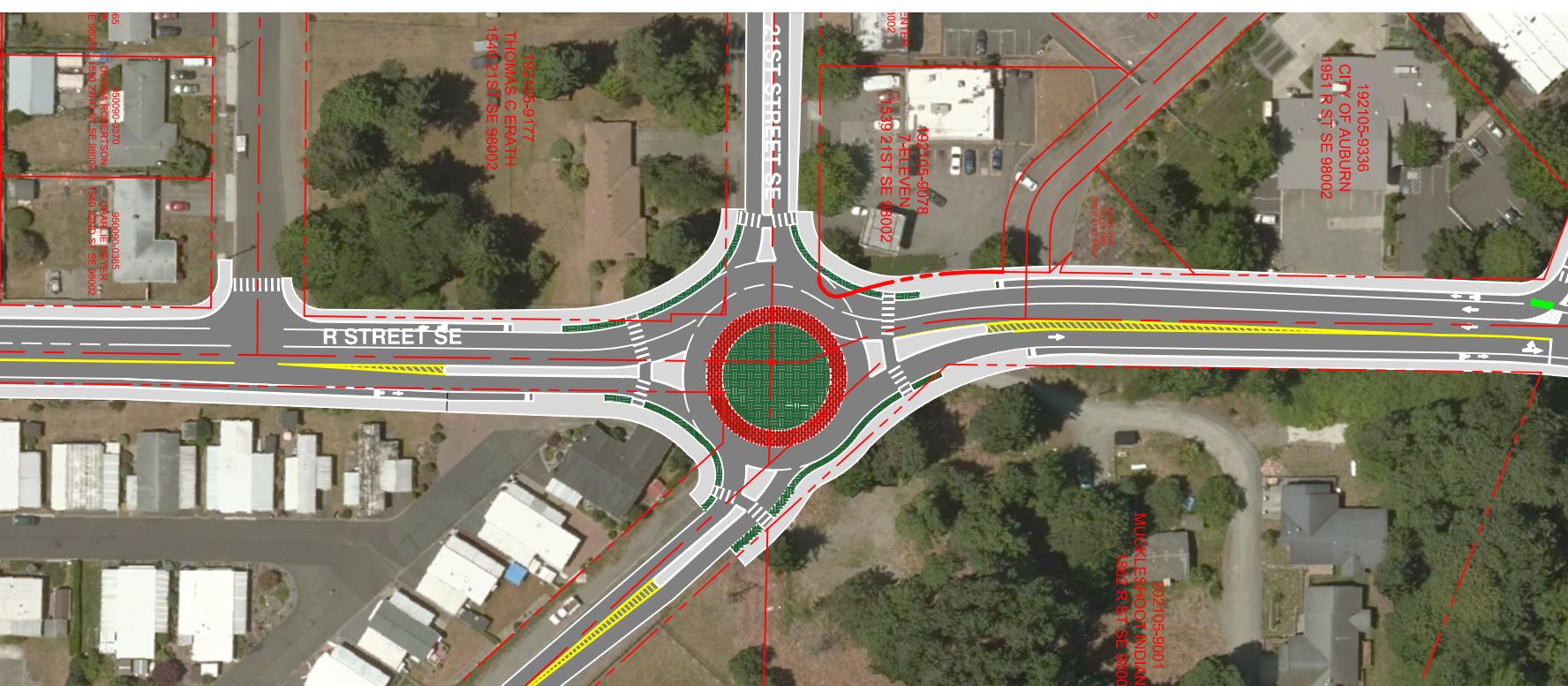




**SIGNALIZED  
INTERSECTION R ST AND 21ST ST SE**

1

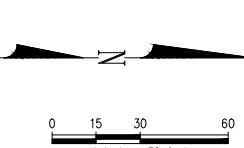
SCALE: 1" = 50'



**MULTI-LANE ROUNDABOUT R ST AND 21ST ST SE**

2

SCALE: 1" = 50'



Know what's below.  
Call before you dig.

				DRAWN BY M. VU	DESIGNED BY J. SHINN		
				CHECKED BY S. BATTLE	APPROVED BY —		
				DATE —			
				J O B N o . : —			
NO.	DATE	BY	CHD.	APPR.	REVISION	SCA L E: 1" = 50'	

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AUBURN, WASHINGTON

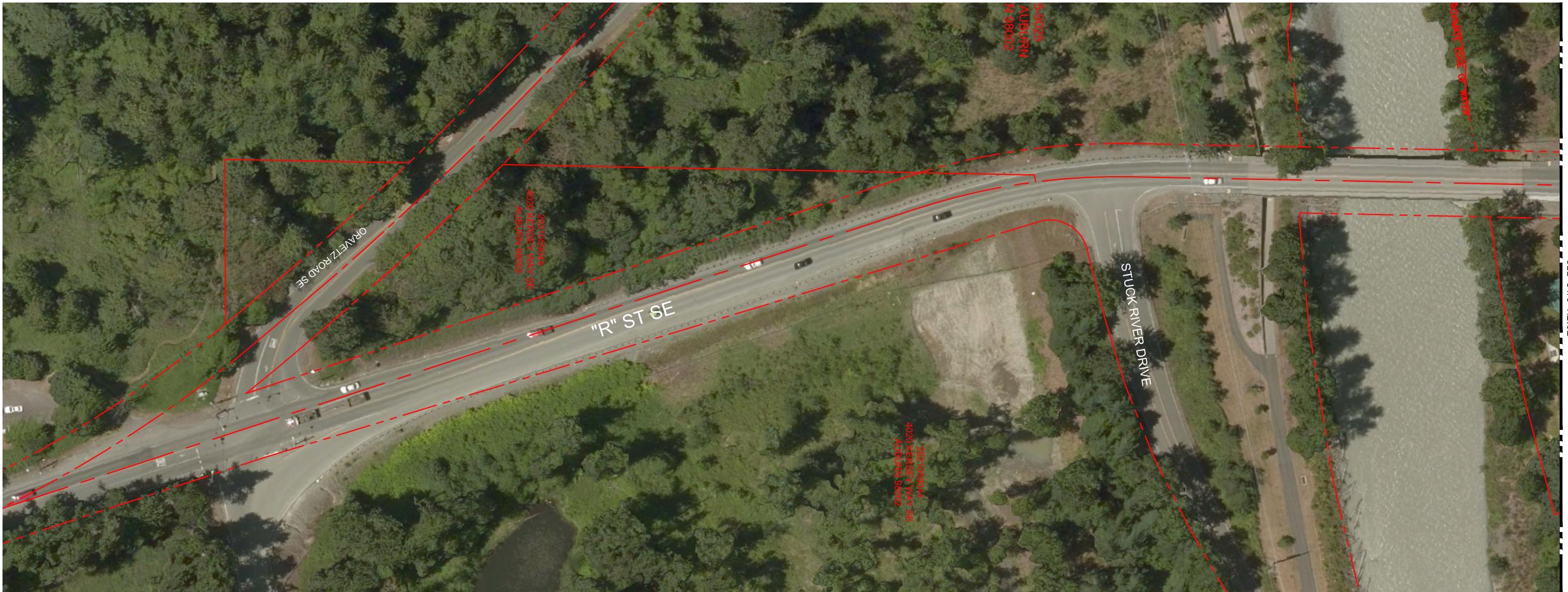
ALTERNATIVE 1  
R STREET & 21ST INTERSECTION OPTIONS

A1.08

**ATTACHMENT 2 –**

*ALTERNATIVE 2 - TWO-WAY LEFT TURN LANE*

---



MATCHLINE: STA 24+49.51  
SEE DWG A2.02

N  
0 25 50 100  
1 inch = 50 feet



Know what's below.  
Call before you dig.

				DRAWN BY M. VU	DESIGNED BY J. SHINN	
				CHECKED BY S. BATTLE	APPROVED BY —	
				DATE —		
				CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555		
				J O B No. : —	S C A L E: 1" = 50'	
NO.	DATE	BY	CHD.	APPR.	REVISION	

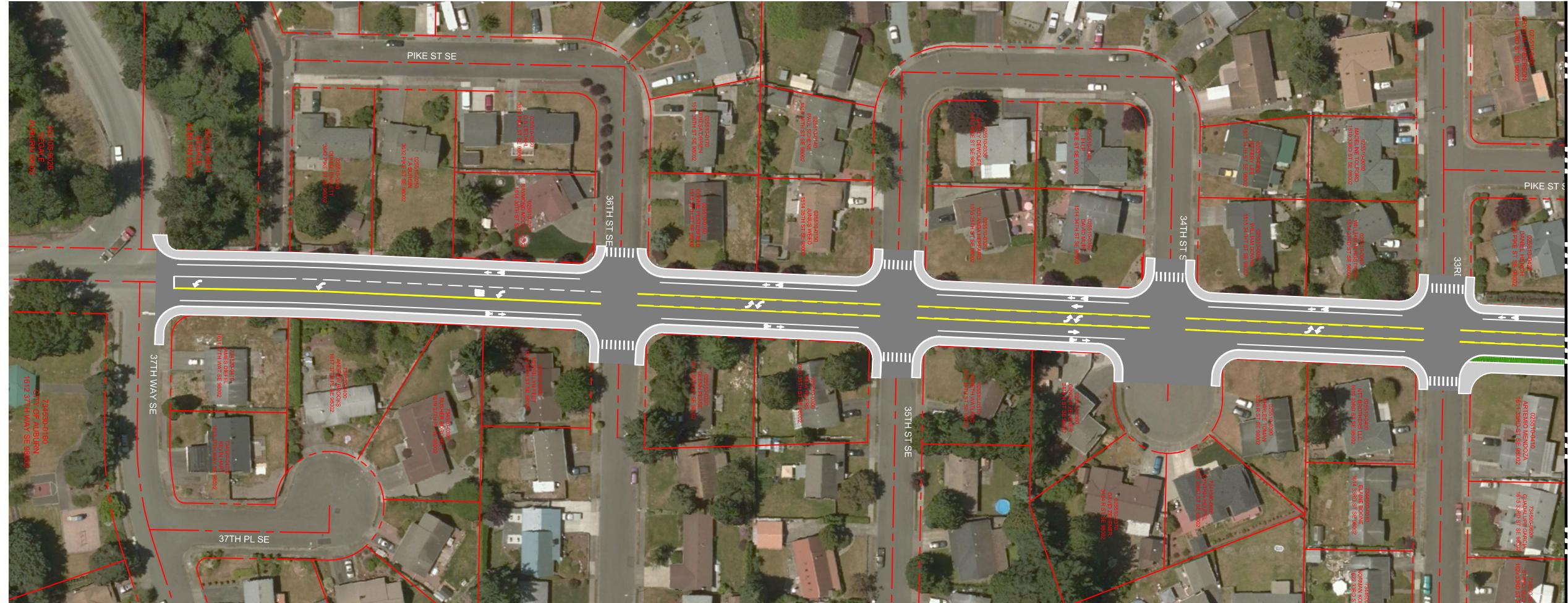
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206.622.5822  
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R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 2  
TWO-WAY LEFT TURN LANE

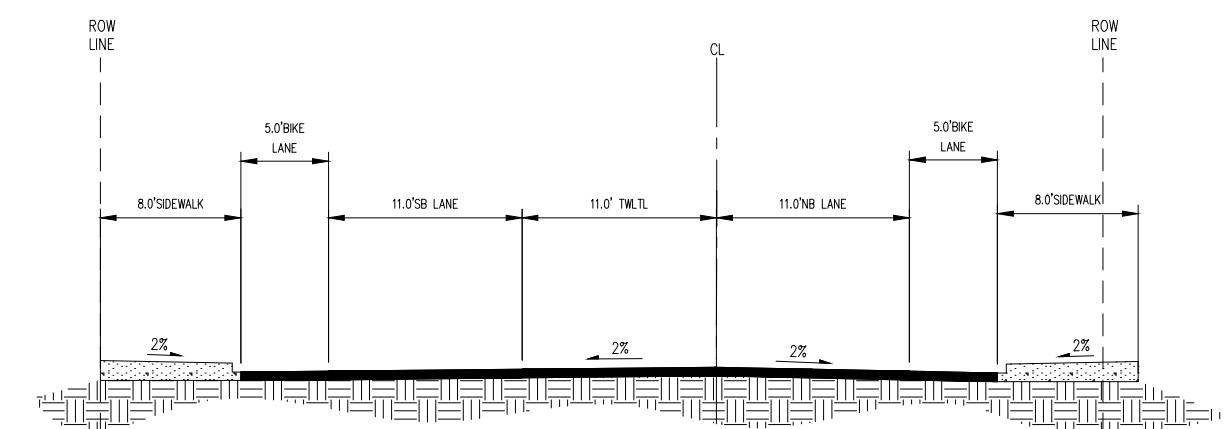
SHEET  
A2.01





MATCHLINE: STA 53+12.09  
SEE DWG A2.05

MATCHLINE: STA 67+42.69  
SEE DWG A2.05



3 TYPICAL SECTION  
SCALE: NTS



Know what's below.  
Call before you dig.

				DRAWN BY M. VU	DESIGNED BY J. SHINN
				CHECKED BY S. BATTLE	APPROVED BY —
				DATE —	—
				S C A L E: 1" = 50'	
NO.	DATE	BY	CHD.	APPR.	REVISION

CALL TWO BUSINESS  
DAYS BEFORE YOU DIG  
1-800-424-5555

kpf  
1601 5th Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822  
www.kpff.com  
JOB No.: —

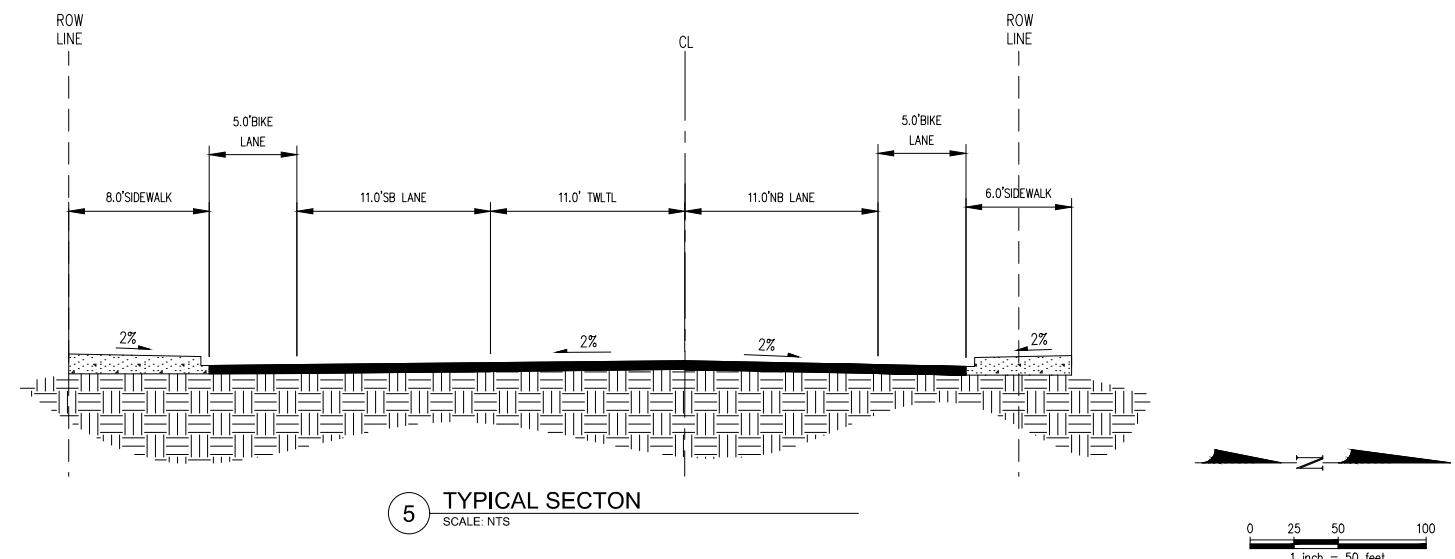
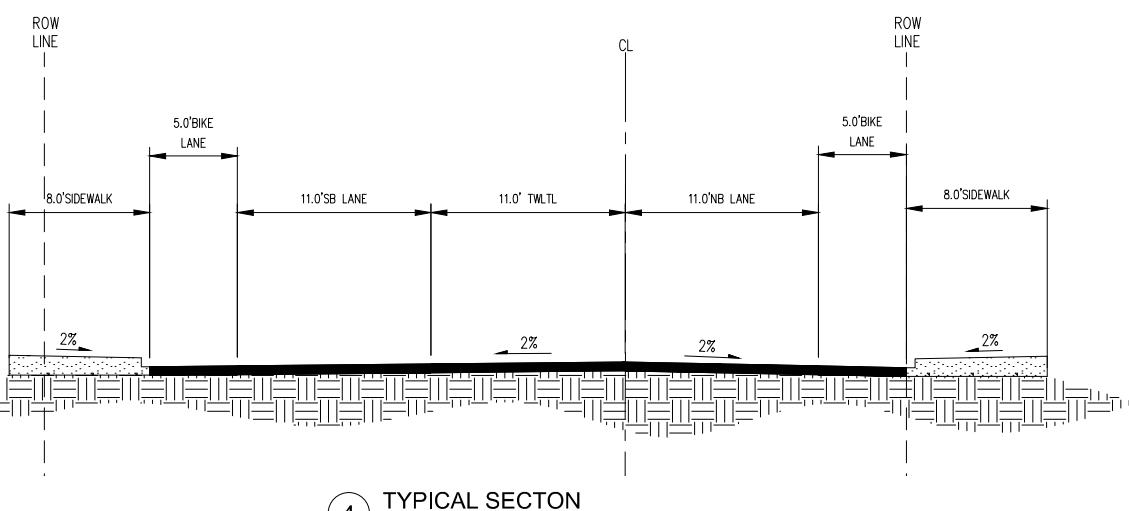


R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 2  
TWO-WAY LEFT TURN LANE

SHEET

A2.04



DRAWN BY M. VU	DESIGNED BY J. SHINN
CHECKED BY S. BATTLE	APPROVED BY —
DATE —	
CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555	
S C A L E: 1" = 50'	
NO. DATE BY CHD. APPR. REVISION	
JOB No.: —	

**kpff**

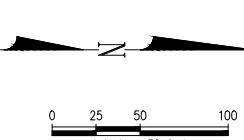
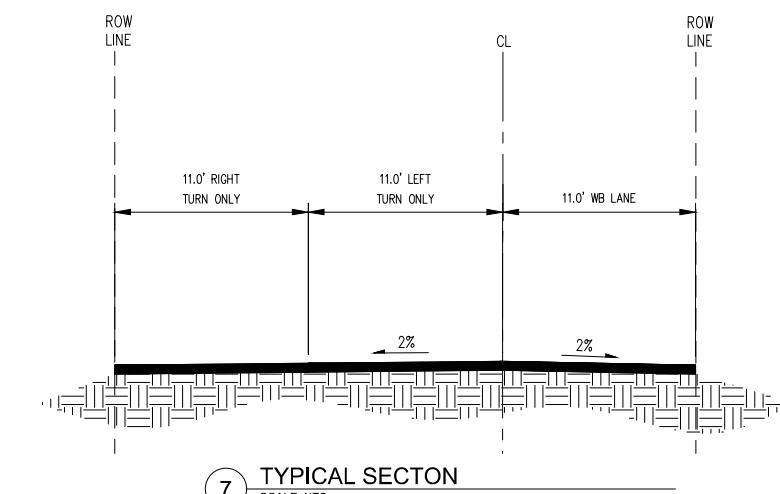
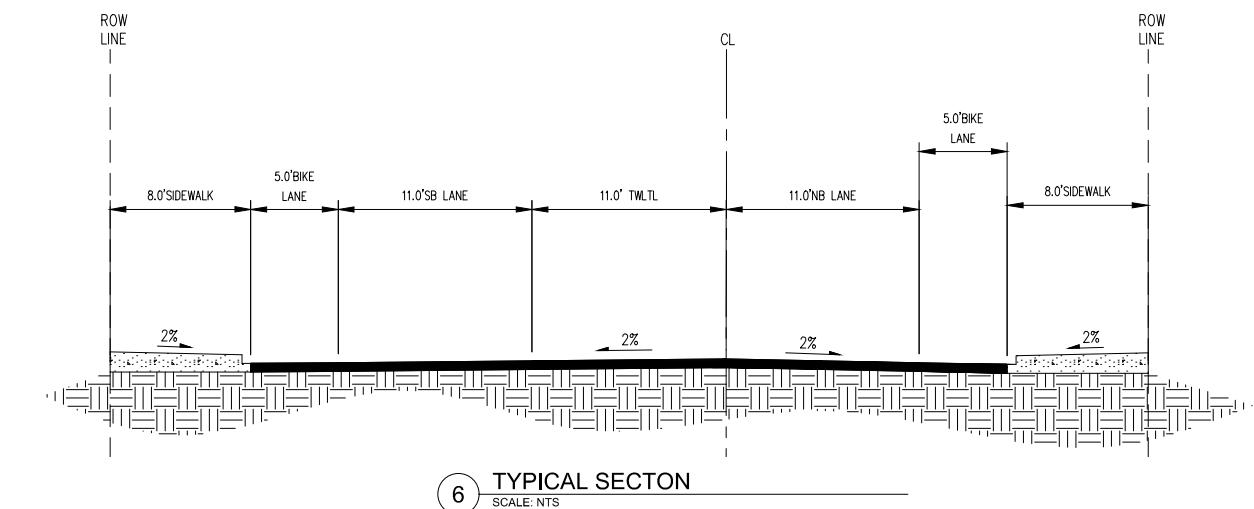
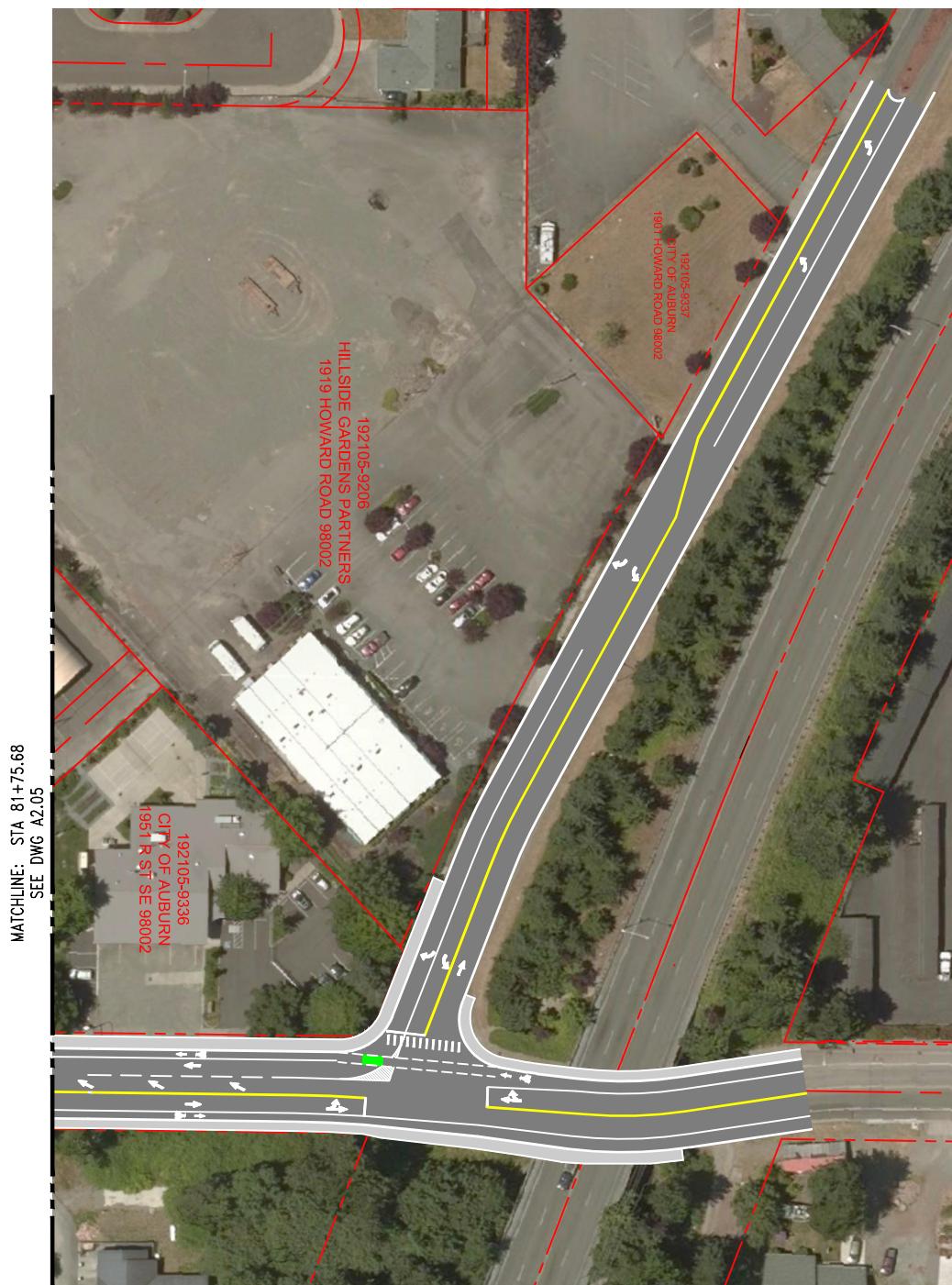
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ALTERNATIVE 2  
TWO-WAY LEFT TURN LANE

SHEET  
A2.05



				DRAWN BY M. VU	DESIGNED BY J. SHINN	
				CHECKED BY S. BATTLE	APPROVED BY —	
				DATE —		
				S C A L E: 1" = 50'		
NO.	DATE	BY	CHD.	APPR.	J O B N o . : —	
					REVISION	

kpff

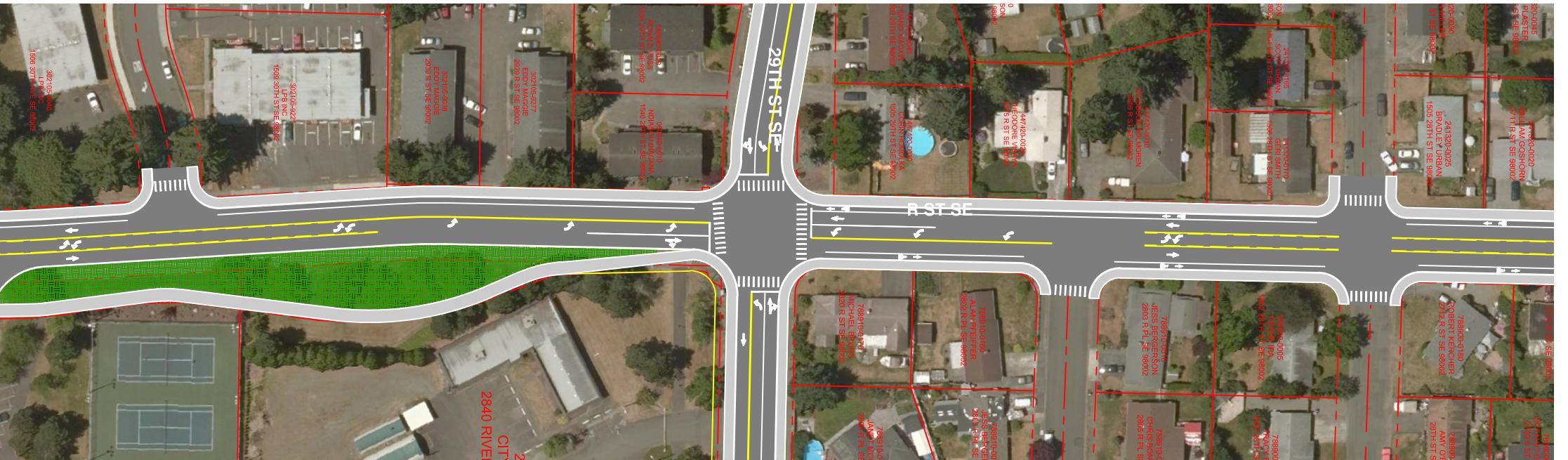
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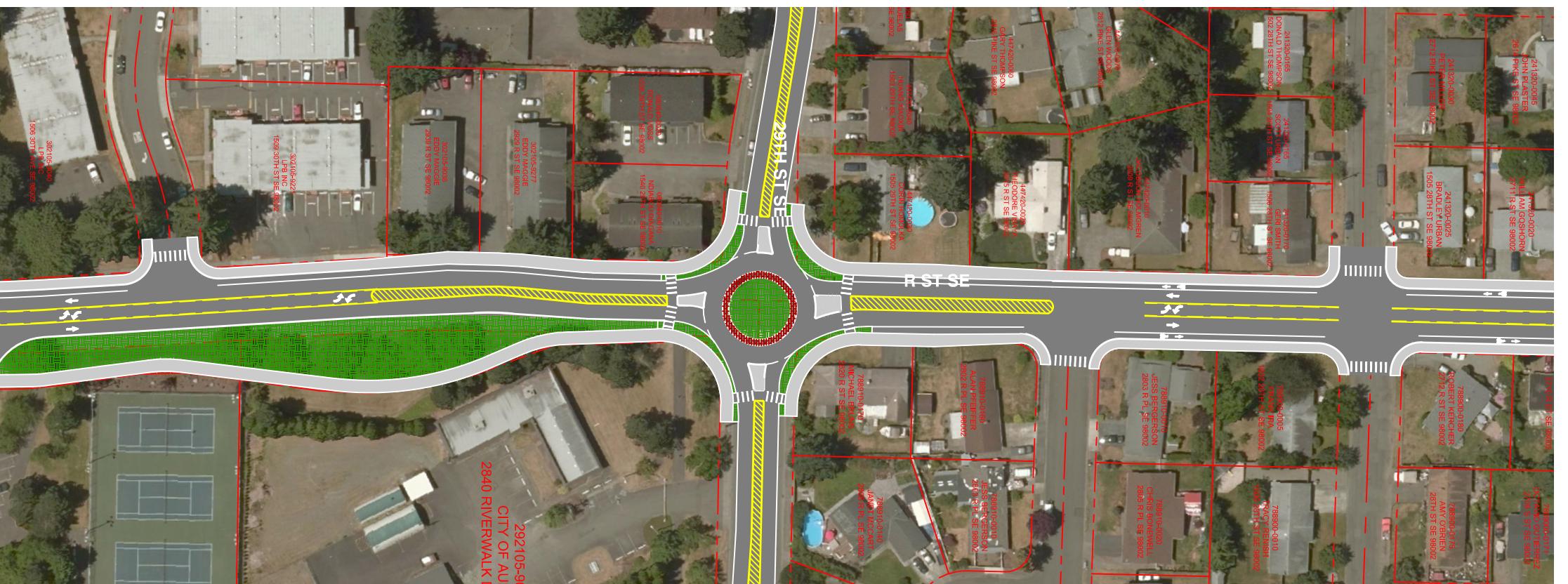
R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 2  
TWO-WAY LEFT TURN LANE

SHEET  
A2.06



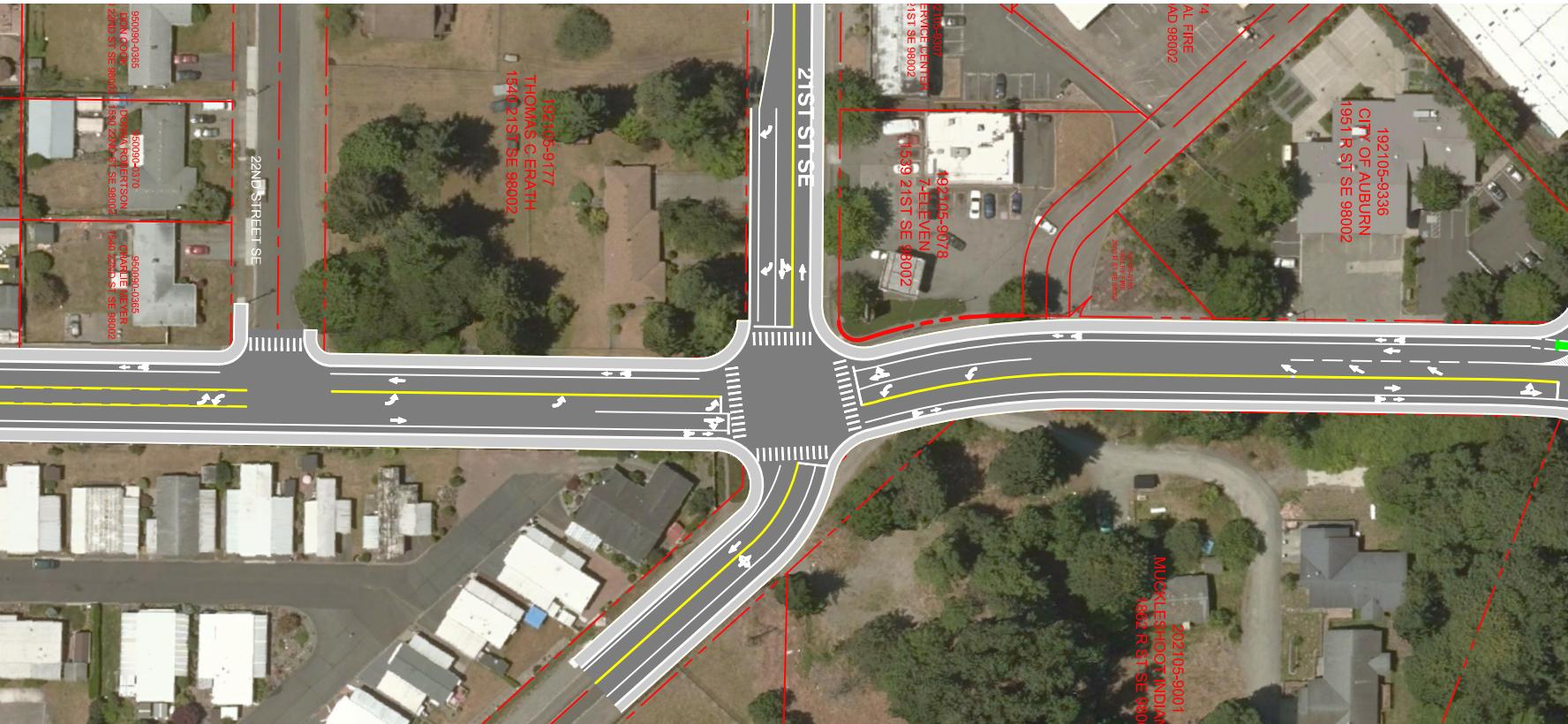
1 SIGNALIZED  
INTERSECTION R ST AND 29TH ST SE  
SCALE: 1" = 50'



2 SINGLE LANE ROUNDABOUT R ST AND 29TH ST SE  
SCALE: 1" = 50'

811  
Know what's below.  
Call before you dig.

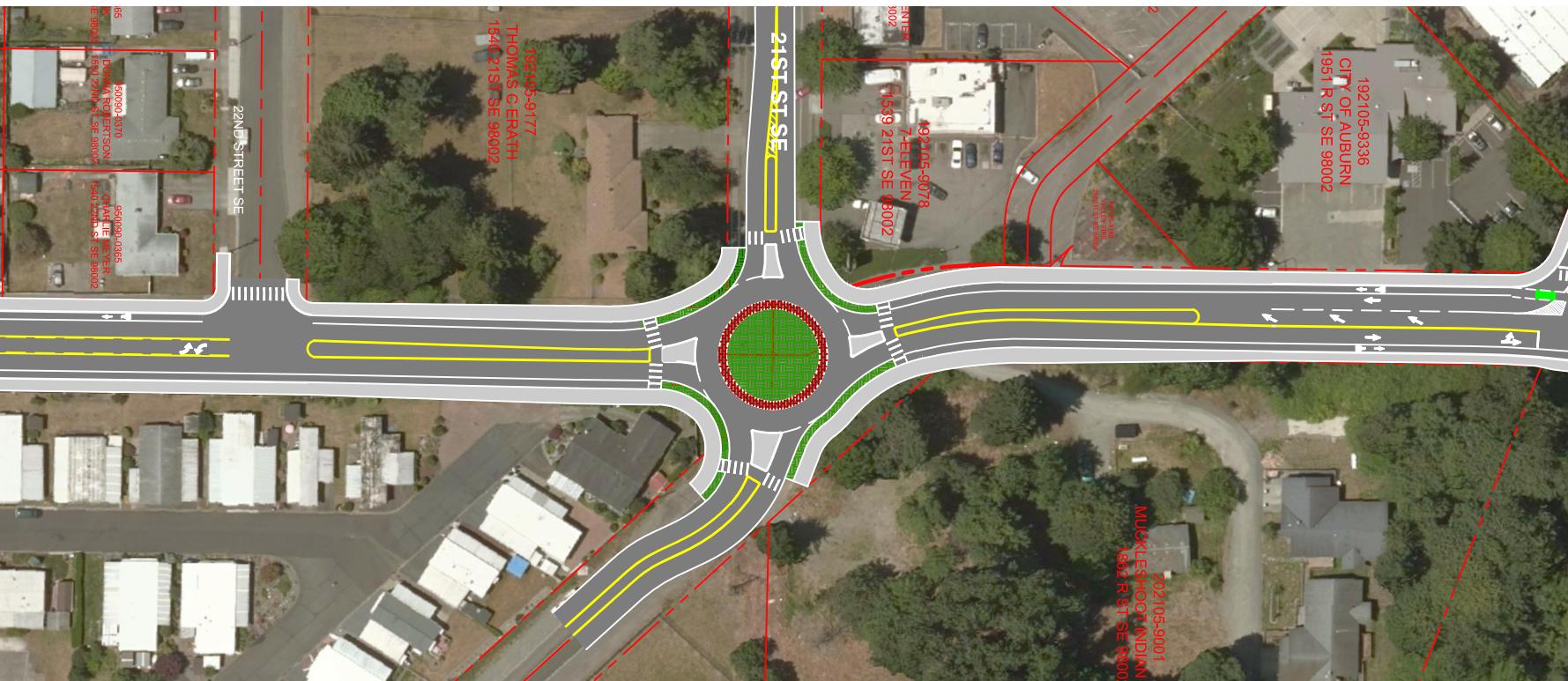
				DRAWN BY M. VU	DESIGNED BY J. SHINN	CITY OF AUBURN WASHINGTON	R STREET CORRIDOR STUDY/CITY OF AUBURN AUBURN, WASHINGTON	SHEET
				CHECKED BY S. BATTLE	APPROVED BY —	kpff	ALTERNATIVE 2 R STREET AND 29TH ST INTERSECTION OPTIONS	A2.07
				DATE —	DATE —			
				JOB No.: —	SCALE: 1" = 50'			
NO.	DATE	BY	CHD.	APPR.	REVISION	1601 5th Avenue, Suite 1600 Seattle, WA 98101 206.622.5822 <a href="http://www.kpff.com">www.kpff.com</a>		



**SIGNALIZED  
INTERSECTON R ST AND 21ST ST SE**

1

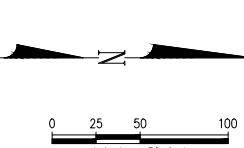
SCALE: 1" = 50'



**SINGLE LANE ROUNDABOUT R ST AND 21ST ST SE**

2

SCALE: 1" = 50'



Know what's below.  
Call before you dig.

				DRAWN BY M. VU	DESIGNED BY J. SHINN		
				CHECKED BY S. BATTLE	APPROVED BY —		
				DATE —	—		
				J O B N o . : —	S C A L E: 1" = 50'		
NO.	DATE	BY	CHD.	APPR.	REVISION		

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R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 2  
R STREET & 21ST ST INTERSECTION OPTIONS

SHEET

A2.08

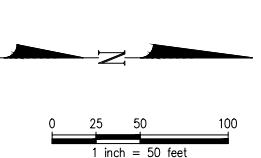
**ATTACHMENT 3 –**

*ALTERNATIVE 3 - COMBINATION SOUTHBOUND LANES AND TWLTL*

---



MATCHLINE: STA 24+49.51  
SEE DWG A3.02



Know what's below.  
Call before you dig.

				DRAWN BY M. VU	DESIGNED BY J. SHINN	
				CHECKED BY S. BATTLE	APPROVED BY —	
				DATE —	—	
				J O B No. : —	S C A L E: 1" = 50'	
NO.	DATE	BY	CHD.	APPR.	REVISION	

CALL TWO BUSINESS  
DAYS BEFORE YOU DIG  
1-800-424-5555

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206.622.5822  
[www.kpff.com](http://www.kpff.com)

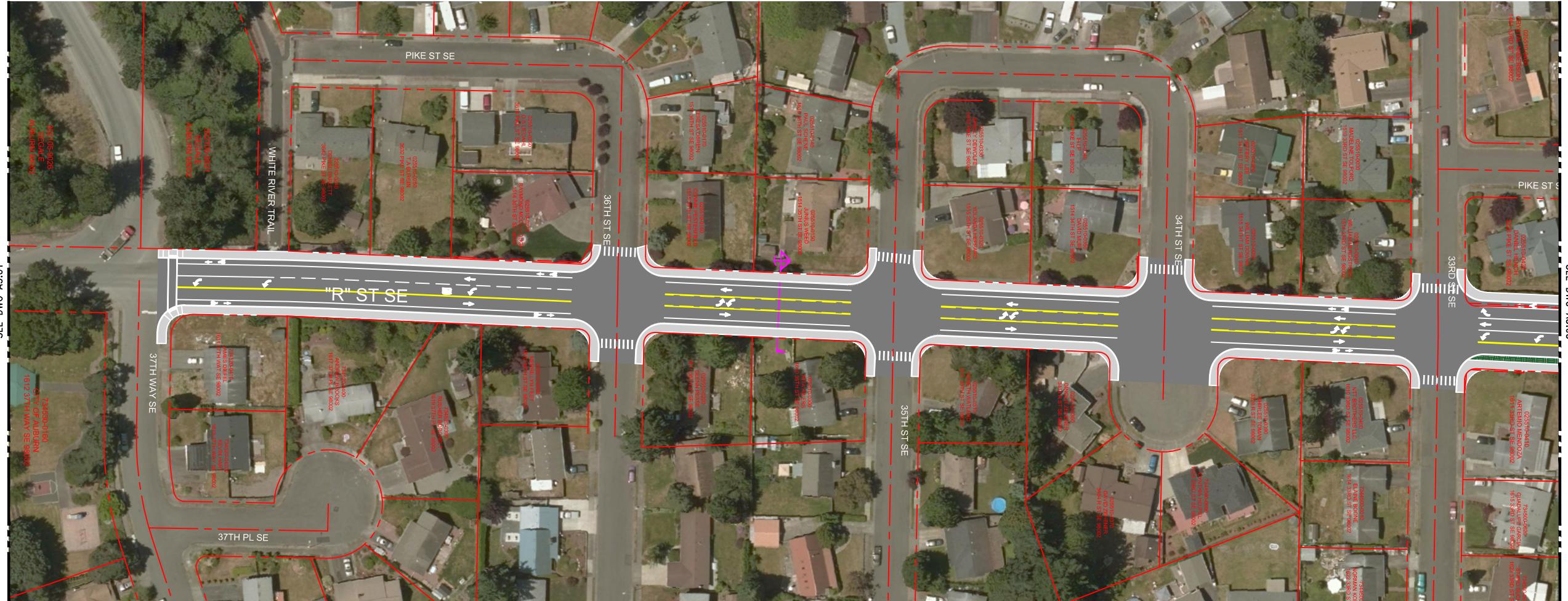


R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

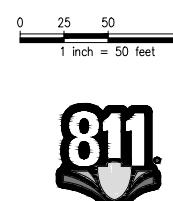
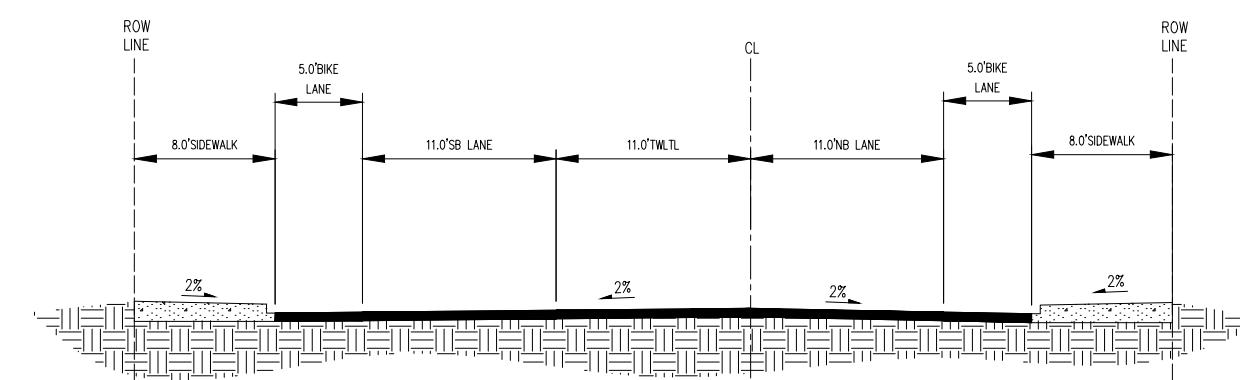
ALTERNATIVE 3  
2 SB LANES AND TWLTL COMBINATION

SHEET  
A3.01

MATCHLINE: STA 24+49.51



MATCHLINE: STA 38+80.94  
SEE DWG A3.03



Know what's below.  
Call before you dig.

1 TYPICAL SECTION

SCALE: NTS

0 25 50 100  
1 inch = 50 feet

DRAWN BY M. VU	DESIGNED BY J. SHINN
CHECKED BY S. BATTLE	APPROVED BY —
DATE —	—
REVISION	JOB No.: —
NO. DATE BY CHD. APPR.	SCALE: 1" = 50'

CALL TWO BUSINESS  
DAYS BEFORE YOU DIG  
1-800-424-5555

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R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 3  
2 SB LANES AND TWLTL COMBINATION

SHEET

A3.02a



MATCHLINE: STA 38+80.94  
SEE DWG A3.03

0 25 50 100  
1 inch = 50 feet



Know what's below.  
Call before you dig.

DRAWN BY M. VU	DESIGNED BY J. SHINN			
CHECKED BY S. BATTLE	APPROVED BY —			
DATE —				
CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555				
S C A L E: 1" = 50'				
JOB No.: —				
NO.	DATE	BY	CHD.	APPR.
REVISION				

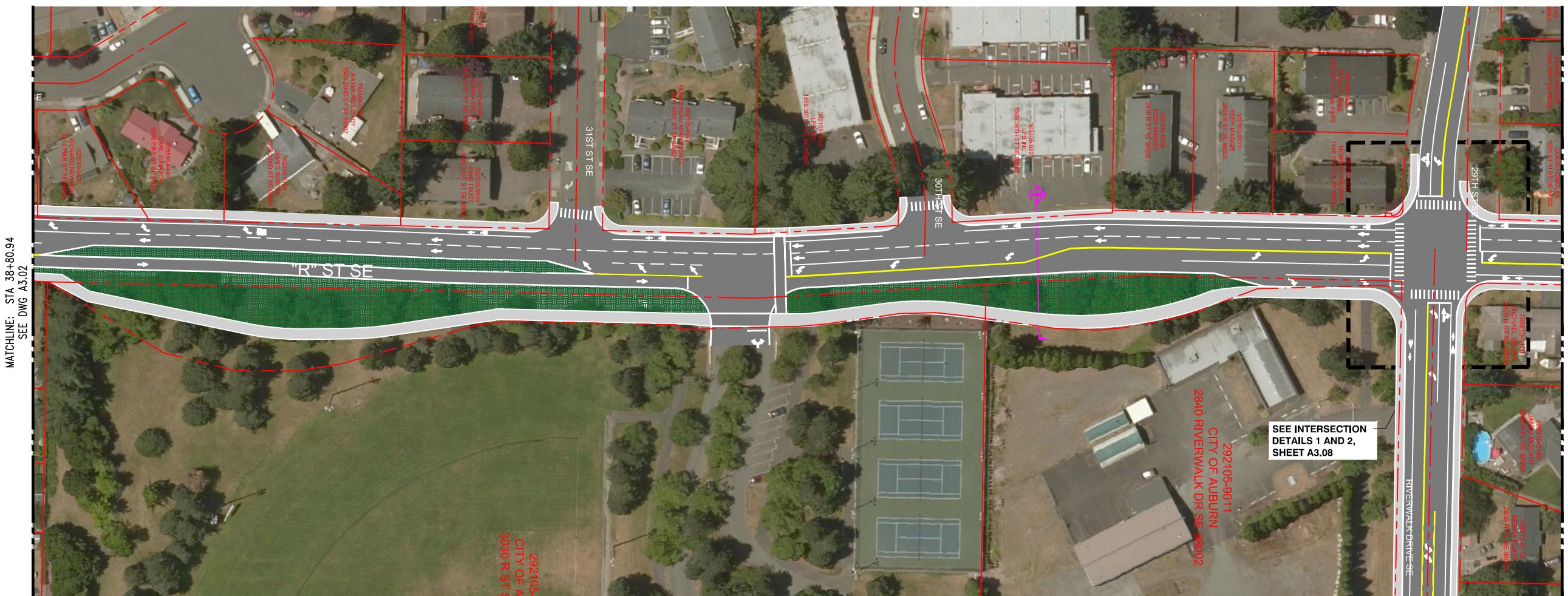
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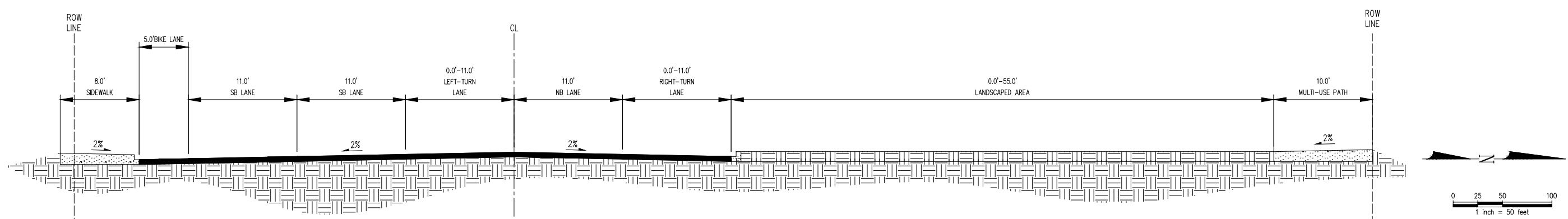


R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON  
ALTERNATIVE 3  
2 SB LANES AND TWLTL COMBINATION  
CHANNELIZATION ONLY

SHEET  
A3.02b



MATCHLINE: STA 53+12.09  
SEE DWG A3.04



2 TYPICAL SECTION  
SCALE: NTS



Know what's below.  
Call before you dig.

DRAWN BY M. VU	DESIGNED BY J. SHINN				
CHECKED BY S. BATTLE	APPROVED BY —				
CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555					
DATE —	—				
S C A L E: 1" = 50'					
JOB No.: —					
NO.	DATE	BY	CHD.	APPR.	REVISION



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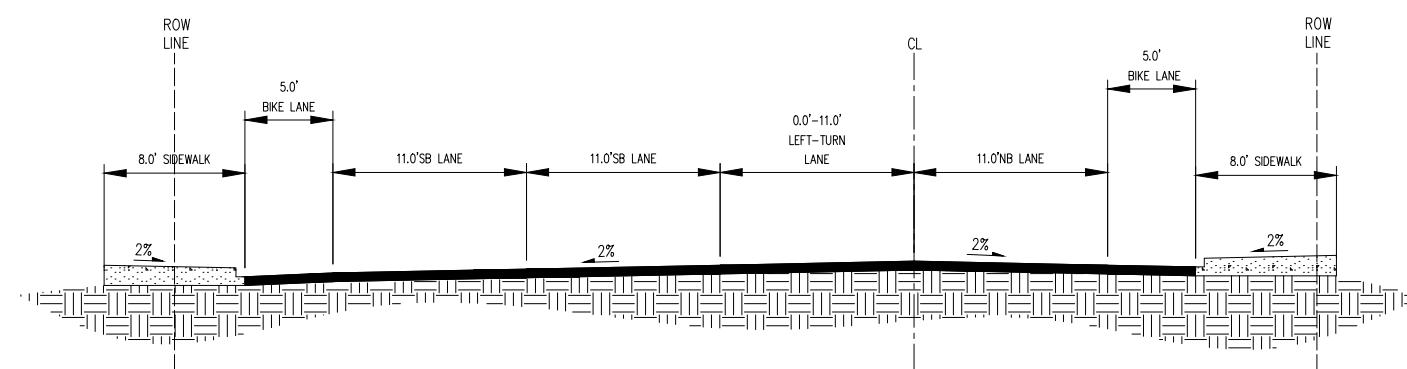


R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 3  
PREFERRED ALTERNATIVE

SHEET  
A3.03

MATCHLINE: STA 67+42.69  
SEE DWG A3.05



Know what's below.  
Call before you dig.

DRAWN BY M. VU	DESIGNED BY J. SHINN			
CHECKED BY S. BATTLE	APPROVED BY —			
CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555				
DATE —	DATE —			
JOB No.: —				
NO.	DATE	BY	CHD.	APPR.
REVISION				



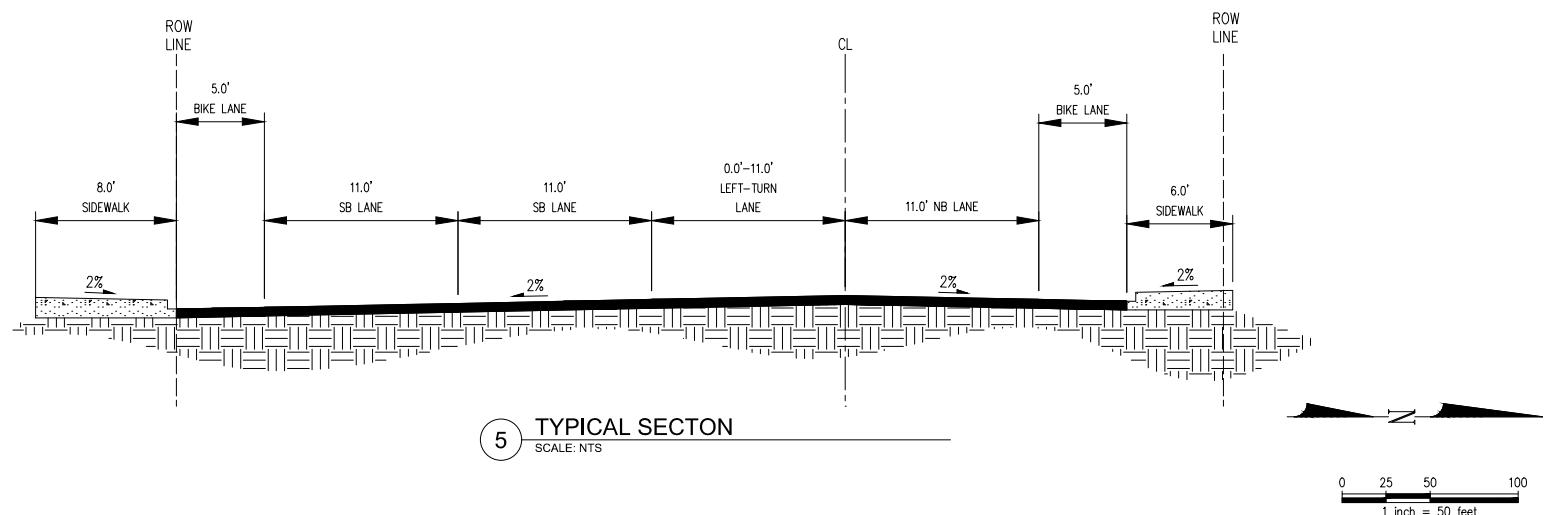
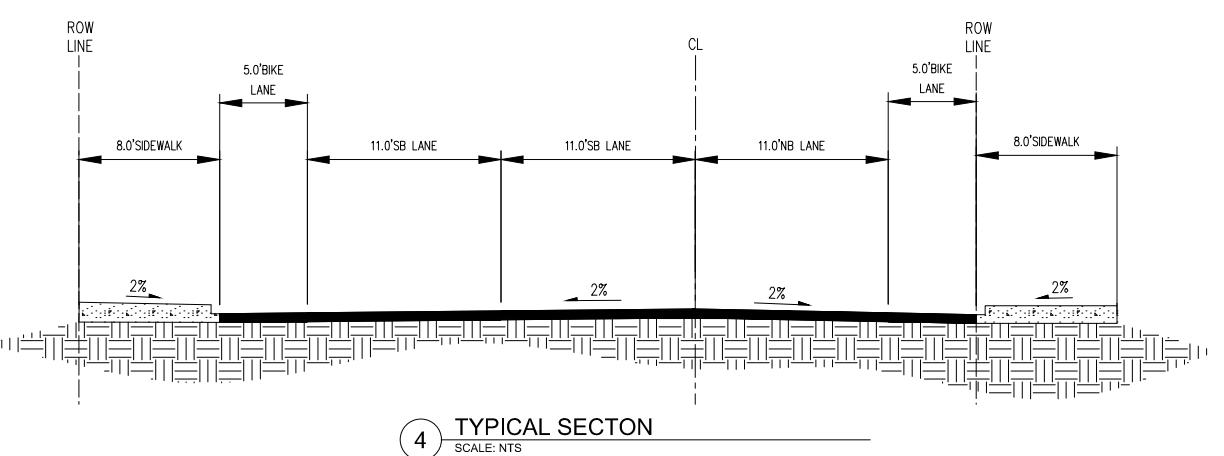
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Seattle, WA 98101  
206.622.5822  
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R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 3  
2 SB LANES AND TWLTL COMBINATION

SHEET  
A3.04



**Know what's below.  
Call before you dig.**

						DRAWN BY M. VU	DESIGNED BY J. SHINN
						CHECKED BY S. BATTLE	APPROVED BY —
						DATE —	
NO.	DATE	BY	CHD.	APPR.	REVISION	J O B No. : —	S C A 1" =



CALL TWO BUSINESS  
DAYS BEFORE YOU DIG  
1-800-424-5555

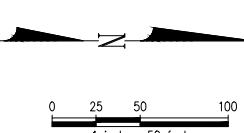
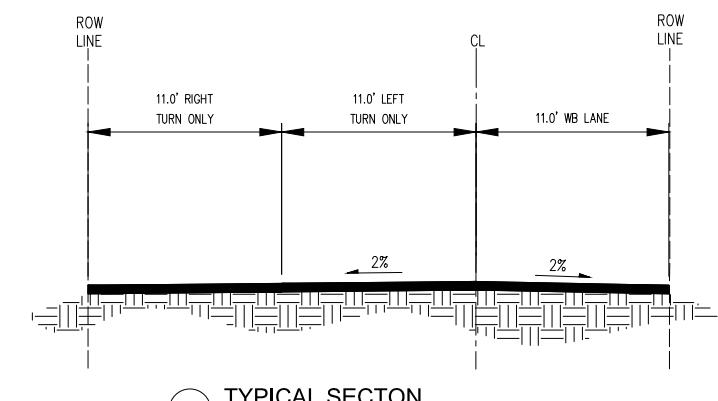
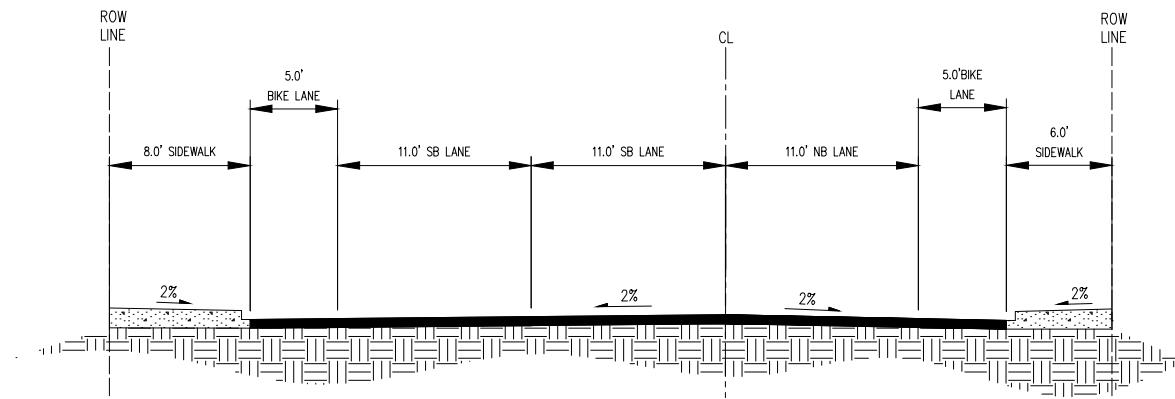
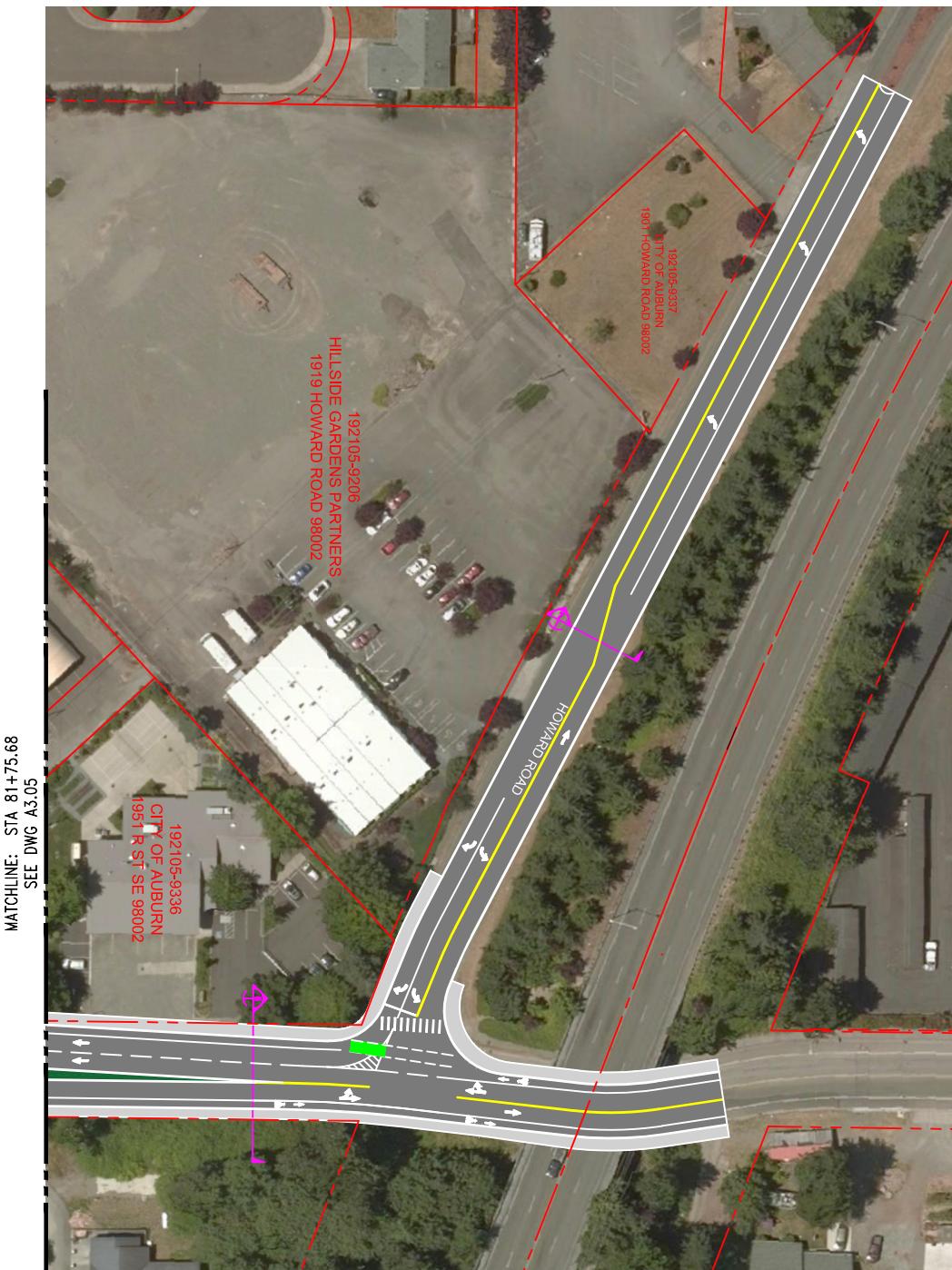
S C A L E:  
1" = 50'



R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

### ALTERNATIVE 3 2 SB LANES AND TWLTL COMBINATION

SHEET



Know what's below.  
Call before you dig.

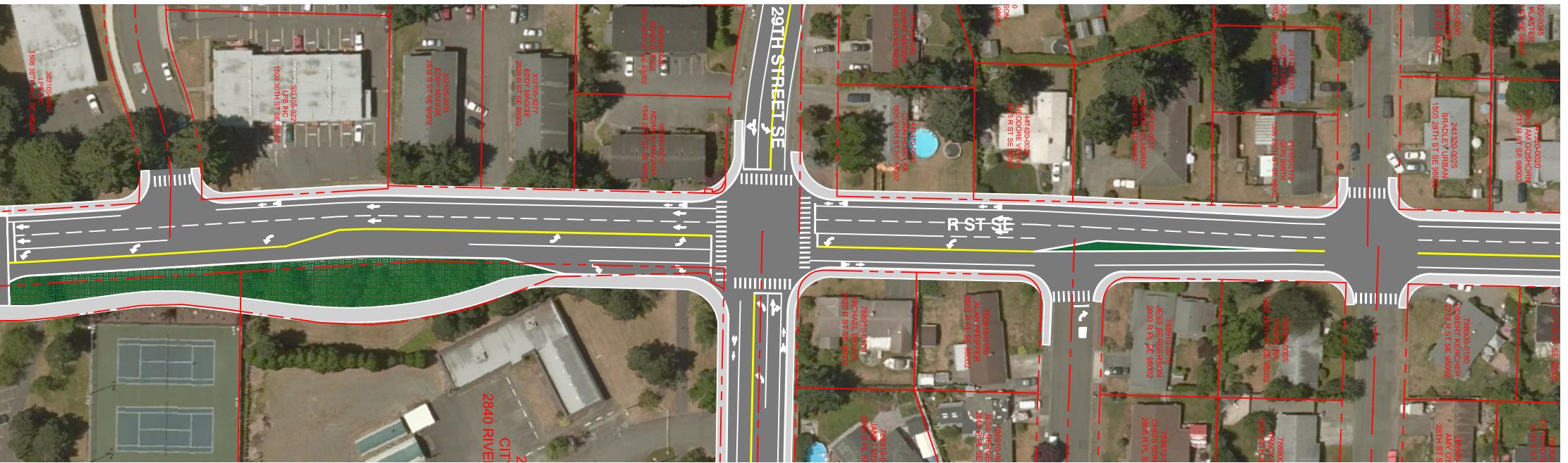
				DRAWN BY M. VU	DESIGNED BY J. SHINN	CHECKED BY S. BATTLE	APPROVED BY —	DATE —	CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555	1601 5th Avenue, Suite 1600 Seattle, WA 98101 206.622.5822 www.kpff.com
NO.	DATE	BY	CHD.	APPR.		REVISION	J O B N o . : —	S C A L E: 1" = 50'		



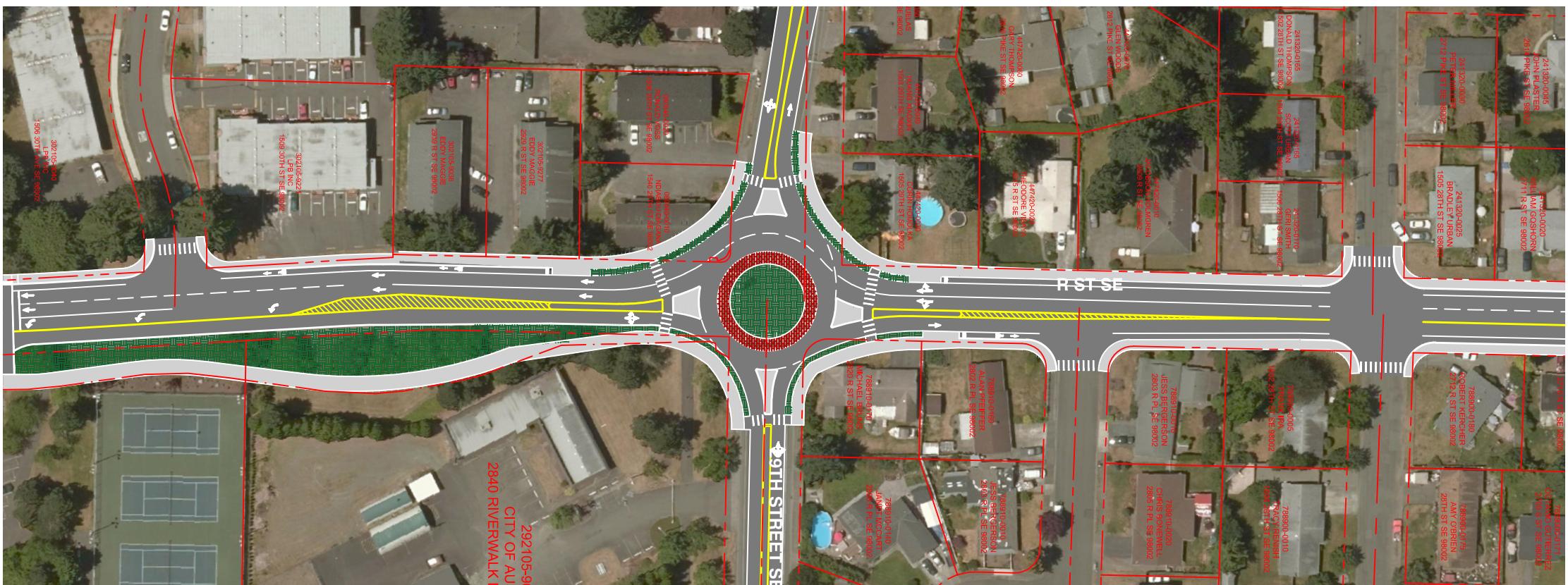
R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 3  
2 SB LANES AND TWLTL COMBINATION

SHEET  
A3.06



**SIGNALIZED  
INTERSECTION R ST AND 29TH SE S**



**MULTI-LANE ROUNDABOUT R ST AND 29TH ST SE**

**Know what's below.  
Call before you dig.**

	DRAWN BY M. VU	
	CHECKED BY S. BATTLE	A
	DAT	
	—	
	J O B No. :	

kpf

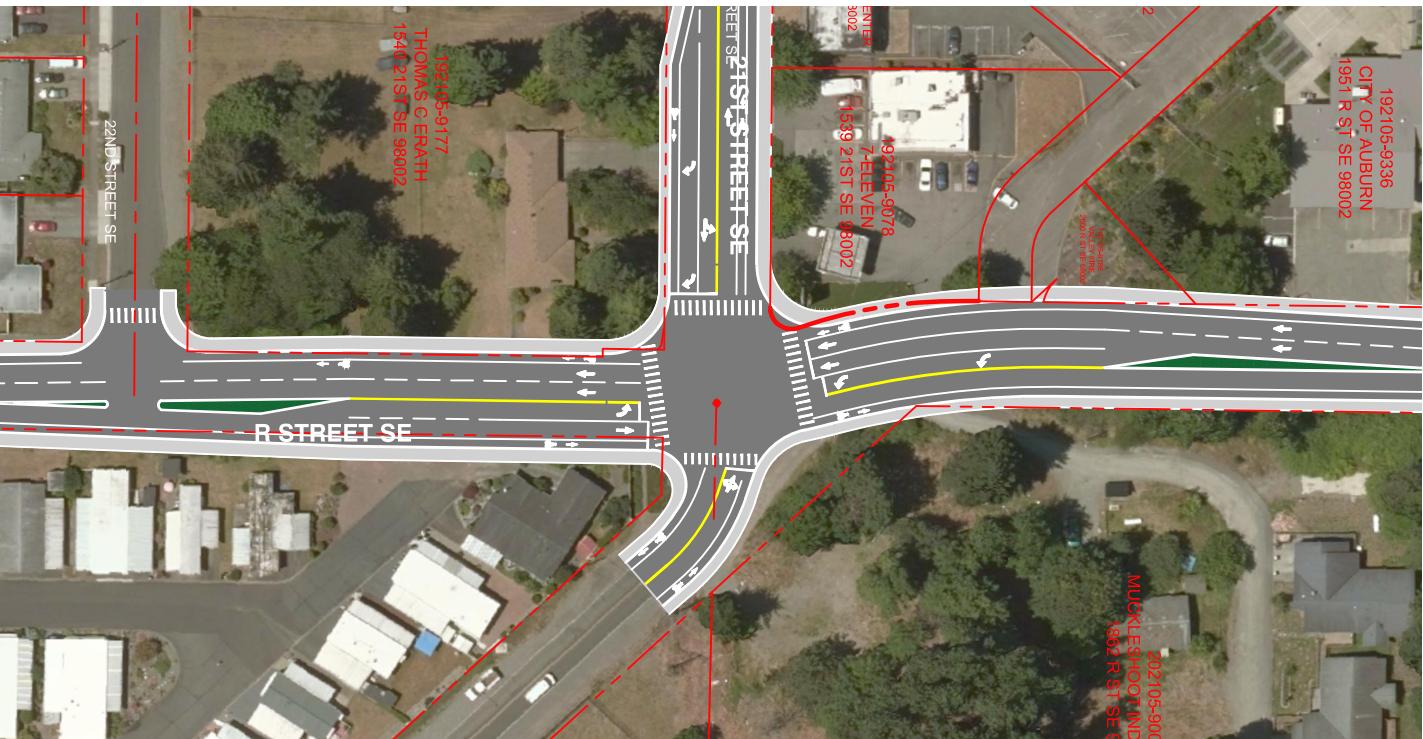
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**206.622.5822**  
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The logo for the City of Auburn, Washington. It features the word "CITY OF" above "AUBURN" in a serif font, with "WASHINGTON" below it. The letter "A" in "AUBURN" is stylized with a wavy underline. Three five-pointed stars are positioned at the top right of "AUBURN".

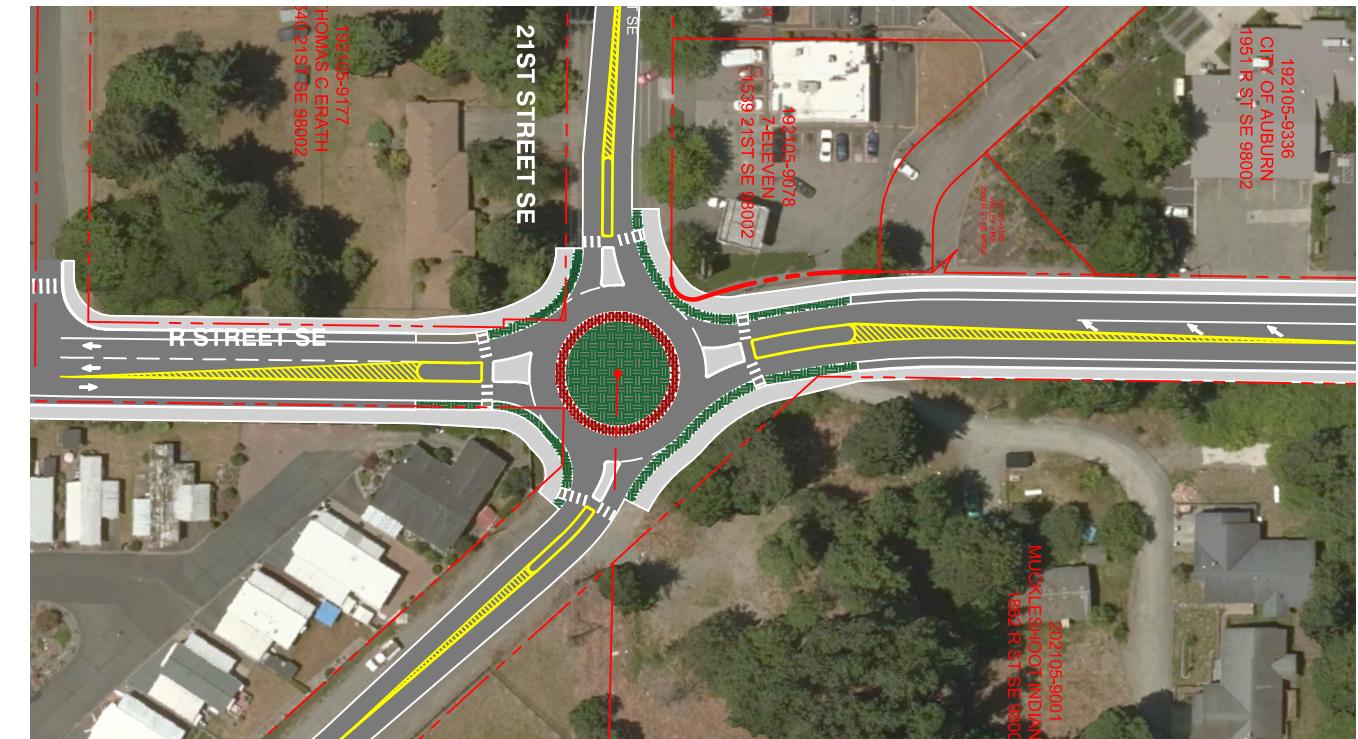
R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 3  
R STREET & 29TH ST INTERSECTION OPTIONS

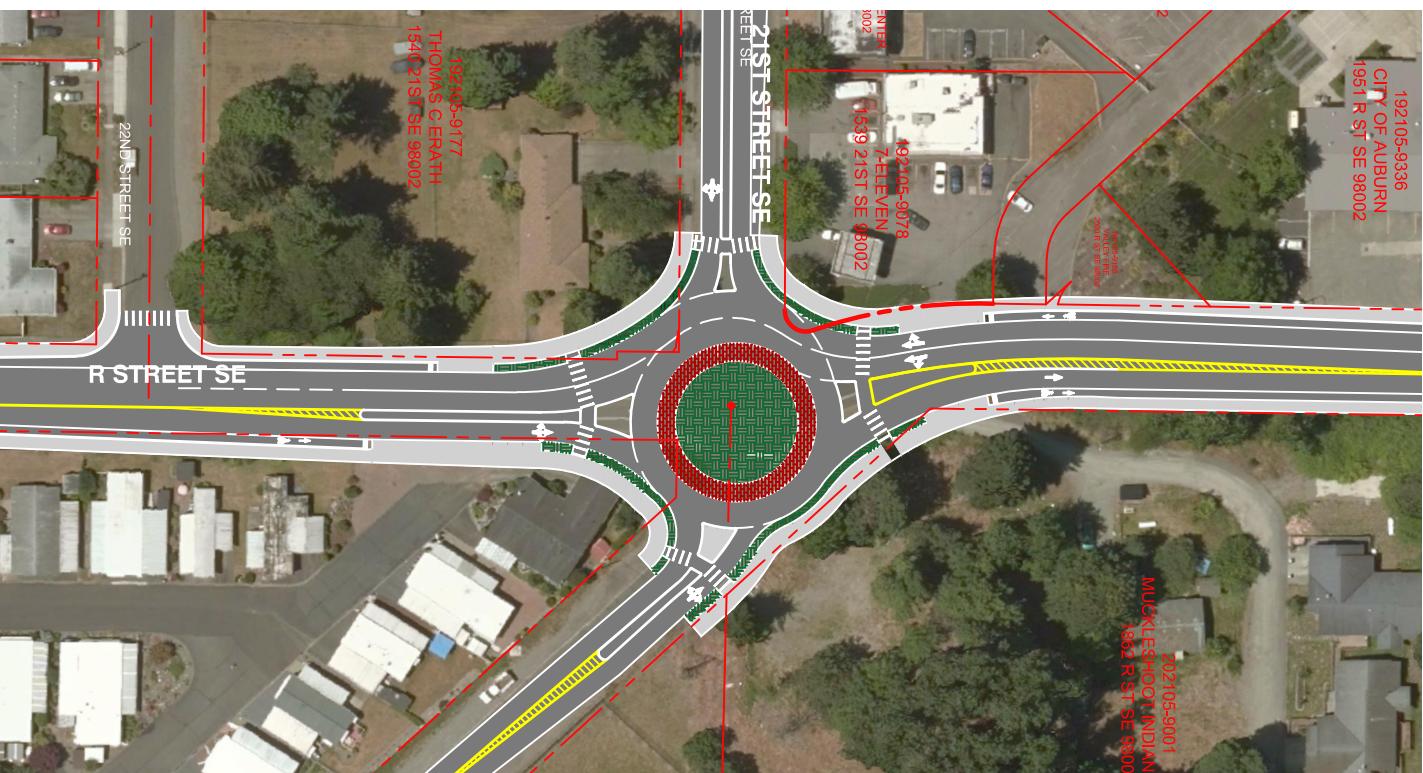
SHEET  
A3.07



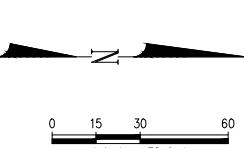
**SIGNALIZED INTERSECTION R ST AND 21ST ST SE**  
1  
SCALE: 1" = 50'



**SINGLE LANE ROUNDABOUT R ST AND 21ST ST SE**  
3  
SCALE: 1" = 50'



**MULTI-LANE ROUNDABOUT R ST AND 21ST ST SE**  
2  
SCALE: 1" = 50'



Know what's below.  
Call before you dig.

				DRAWN BY M. VU	DESIGNED BY J. SHINN	
				CHECKED BY S. BATTLE	APPROVED BY —	
				DATE —		
				J O B N o . : —		
NO.	DATE	BY	CHD.	APPR.	REVISION	

**kpff** 1601 5th Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822  
[www.kpff.com](http://www.kpff.com)



R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 3  
R STREET & 21ST ST INTERSECTION OPTIONS

SHEET  
A3.08

**ATTACHMENT 4 –**

*M STREET ALTERNATIVES*

---

## M STREET ALTERNATIVES

### OVERVIEW

The M Street alternatives addresses the intersection at M Street and 29<sup>th</sup> Street SE. This intersection was recently re-channelized to include additional turn-lanes and is currently stop controlled. 29<sup>th</sup> Street SE is used as a connection from R Street to A Street, which serves as a route to downtown Auburn and various freeway accesses. M Street is also used as a bypass for R Street to avoid congestion during peak hours. Due to the increased traffic at this intersection and public opinion Alternative four includes signalization of M Street and 29<sup>th</sup> Street or converting the intersection to a single-lane roundabout.

### GEOMETRICS & CHANNELIZATION

The traffic signal option for M Street and 29<sup>th</sup> Street maintains the existing channelization. The primary change for this intersection would be adding signals and illumination. All lane widths and cross-sectional characteristics would remain the same.

The roundabout alternative involves a complete reconfiguration of the intersection due to ROW constraints. For both the signal and roundabout options, rather than tapering the left turn lanes on 29<sup>th</sup> Street between R Street and M Street, a TWLTL will be added.

### TRAFFIC

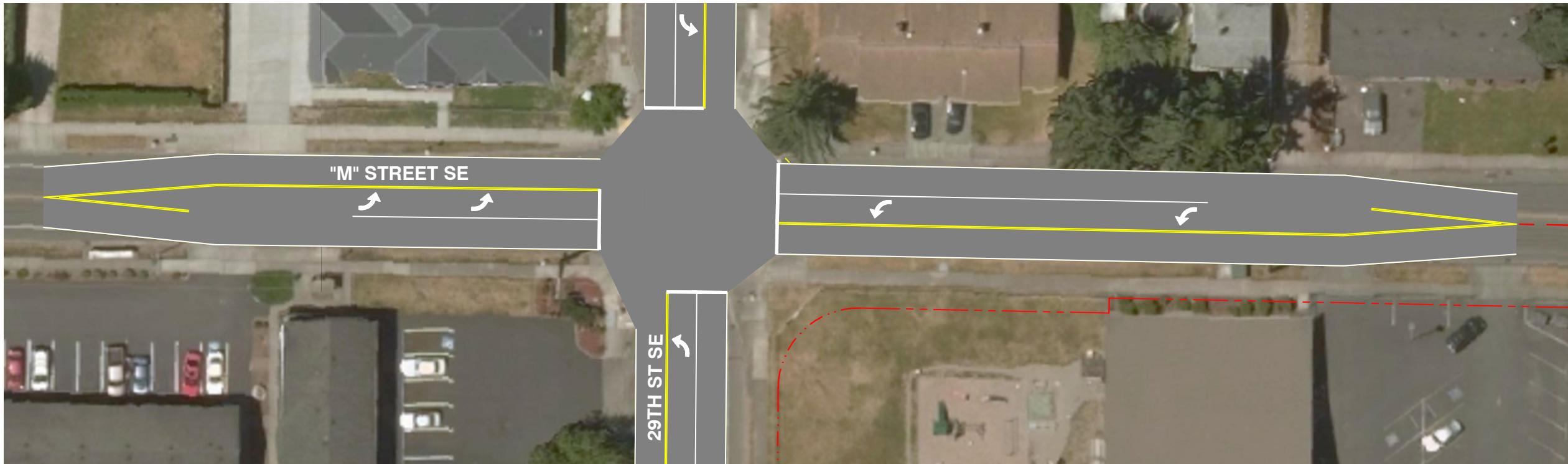
For Alternative one, the PM peak hour analysis results are listed below:

- M Street/29<sup>th</sup> Street Signal: **LOS C**
- + M Street/29<sup>th</sup> Street Roundabout: **LOS A**

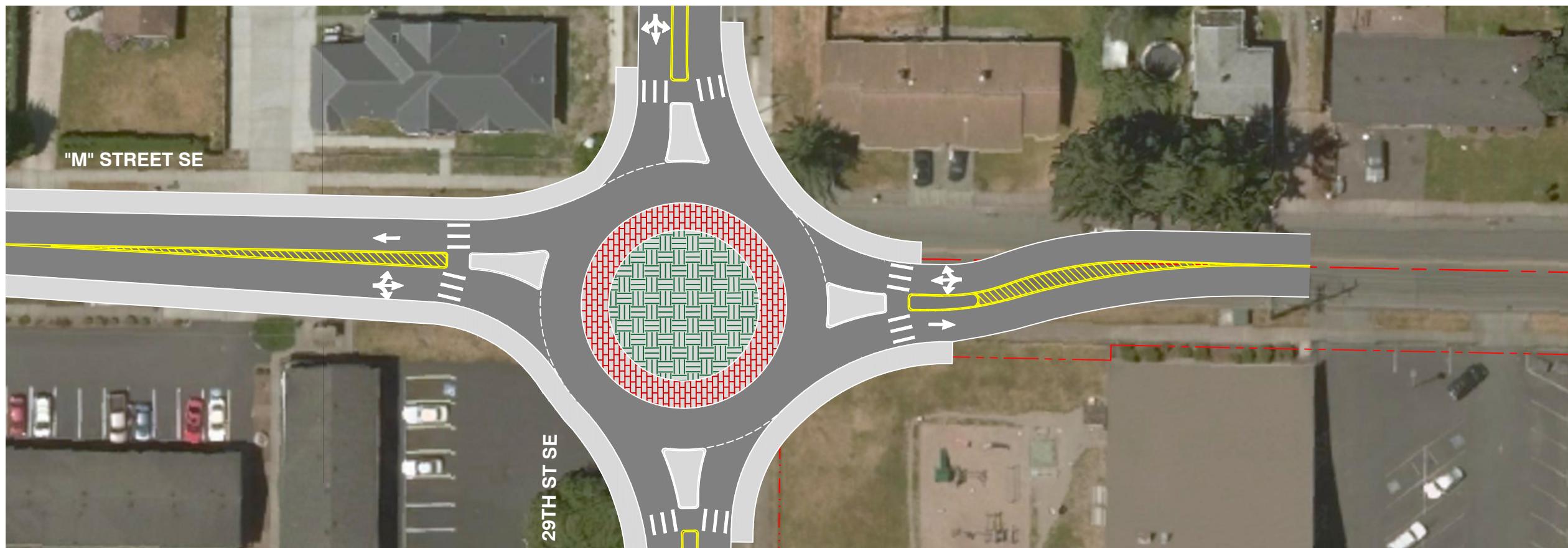
The difference between the roundabout and signal option for LOS in 2040 is not significant. LOS C is a typical level to design to since LOS A may have larger costs associated with the design. Both options will provide acceptable LOS for the next twenty years, assuming a 1% growth rate. An in-depth traffic analysis is included in Appendix A.

### COST

Adding a traffic signal would only have a cost for the new signals, maintenance for the future, and construction. While the roundabout alternative would incur more cost for acquiring ROW and construction costs for materials. The cost estimate is broken down following the conceptual design of the alternatives. WSDOT unit bid analysis was used to find the unit costs of most items included in the cost estimate. King County Parcel viewer was used to access right-of-way acquisition costs.



1 SIGNALIZED  
INTERSECTION M ST AND 29TH ST SE  
SCALE: 1" = 20'



2 SINGLE LANE ROUNDABOUT M ST AND 29TH ST SE  
SCALE: 1" = 20'

811  
Know what's below.  
Call before you dig.

DRAWN BY M. VU	DESIGNED BY J. SHINN				
CHECKED BY S. BATTLE	APPROVED BY —				
	DATE —				
	J O B N o : —	S C A L E: 1" = 20'			
NO.	DATE	BY	CHD.	APPR.	REVISION

**ATTACHMENT 5 –**

*Project Phasing*

---

## APPENDIX A – TRAFFIC STUDY

# Memorandum

Date: August 16, 2019  
To: Sean Battle, PE, KPFF  
From: Christopher Grgich, PE, PTOE, Fehr & Peers  
**Subject: R Street Corridor Traffic Analysis**

---

Fehr & Peers completed an operational analysis of the proposed intersection alternatives for three locations in Auburn, WA:

- R Street SE/21<sup>st</sup> Street SE,
- R Street SE/29<sup>th</sup> Street SE, and
- M Street SE/29<sup>th</sup> Street SE.

Each location considered a roundabout and signalized option for each intersection. For the R Street intersections, two alternatives for both signals and roundabouts were considered. Alternative 1 consisted of two southbound lanes at both intersections, while Alternative 2 consisted of one southbound lane through lane. Concept drawings of the alternatives are attached for reference.

## Methods

Future (2040) traffic volumes were estimated by applying a 1-percent annual growth rate to traffic volumes collected in 2018 (provided by KPFF and attached for reference). Modeling for the signalized alternatives was completed using Synchro 10, and HCM 6 methods. Future signal timings were estimated by assuming an actuated uncoordinated system with the natural and optimized cycle length and signal splits. Modeling for the roundabout alternatives was completed using Sidra Intersection 8, and the July 2019 WSDOT roundabout modeling policy standards (attached for reference).



## Results

LOS and Delay outputs are summarized in Table 1 and Table 2, below. HCM 6 worksheets and detailed Sidra model outputs are attached for reference.

**Table 1: AM Peak Hour Analysis Results**

Scenario	Intersection		Worst Approach		
	LOS	Delay (s)	Approach	LOS	Delay (s)
R Street SE/21st Street SE Signal Alternative 1	C	24	NB	C	26
R Street SE/21st Street SE Signal Alternative 2	B	18	SB	C	26
R Street SE/21st Street SE Roundabout Alternative 1	A	8	WB	B	10
R Street SE/21st Street SE Roundabout Alternative 2	A	8	WB	B	10
R Street SE/29th Street SE Signal Alternative 1	C	34	EB	D	43
R Street SE/29th Street SE Signal Alternative 2	D	35	EB	D	43
R Street SE/29th Street SE Roundabout Alternative 1	C	25	WB	F	>100
R Street SE/29th Street SE Roundabout Alternative 2	C	30	WB	F	>100
M Street SE/29th Street SE Signal Alternative	B	16	SB	C	23
M Street SE/29th Street SE Roundabout Alternative	A	8	WB	B	10

Source: Fehr & Peers.

**Table 2: PM Peak Hour Analysis Results**

Scenario	Intersection		Worst Approach		
	LOS	Delay (s)	Approach	LOS	Delay (s)
R Street SE/21st Street SE Signal Alternative 1	B	17	SB	B	19
R Street SE/21st Street SE Signal Alternative 2	C	26	SB	C	31
R Street SE/21st Street SE Roundabout Alternative 1	A	5	EB	A	7
R Street SE/21st Street SE Roundabout Alternative 2	A	6	EB	B	13
R Street SE/29th Street SE Signal Alternative 1	D	37	SB	D	45
R Street SE/29th Street SE Signal Alternative 2	F	85	EB	F	>100
R Street SE/29th Street SE Roundabout Alternative 1	A	9	EB	B	13
R Street SE/29th Street SE Roundabout Alternative 2	E	67	EB	F	>100
M Street SE/29th Street SE Signal Alternative	C	20	SB	C	24
M Street SE/29th Street SE Roundabout Alternative	A	8	EB	A	A

Source: Fehr & Peers.



## Conclusion

### *R Street SE/21<sup>st</sup> Street SE*

R Street SE/21<sup>st</sup> Street SE is expected to operate at LOS C or better under all the alternatives. The signalized alternative 2 operates better than alternative 1 due to the high northbound left-turn. Under alternative 1, the northbound left-turn must cross two southbound through lanes and is not able to process as many vehicles during the permitted phase.

The best operations are expected in the roundabout alternative. The roundabout with a single southbound lane is expected to operate at LOS A.

### *R Street SE/29<sup>th</sup> Street SE*

R Street SE/29<sup>th</sup> Street SE will not operate at LOS D or above without the second southbound lane in either the roundabout or signalized alternative. The intersection operates at LOS D or better under the two-lane signalized alternative in both the AM and PM peak hour. The two-lane roundabout will also operate at LOS D or better, however the northbound leg is expected to operate at LOS E in the morning peak hour. The two-lane roundabout outperforms the two-lane signal in the PM peak hour, with a LOS A compared to LOS D for the signalized alternative.

### *M Street SE/29<sup>th</sup> Street SE*

M Street SE/29<sup>th</sup> Street SE will operate at LOS A as a roundabout under both the AM and PM peak hour conditions, while operating at LOS B and C as a signal under the AM and PM peak hour conditions, respectively.



Prepared for:

## City of Auburn

### Traffic Count Consultants, Inc.

Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

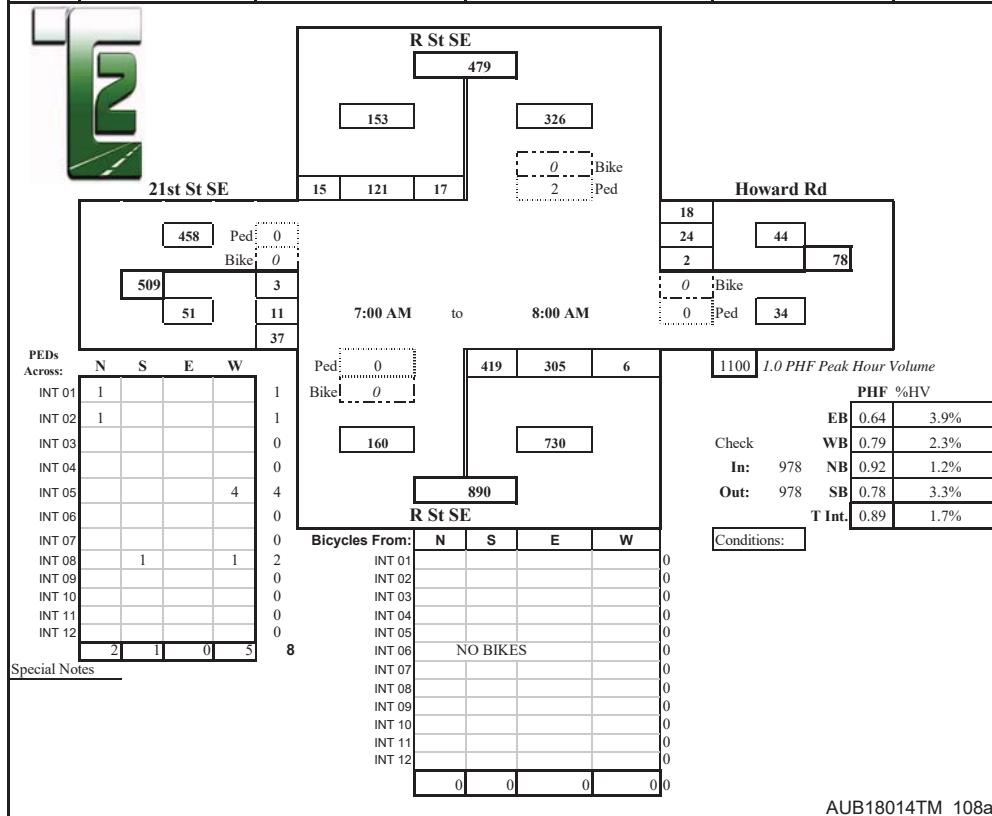
**Intersection:** R St SE & Howard Rd/21st St SE

**Date of Count:** Wed 3/28/2018

**Location:** Auburn, Washington

**Checked By:** Jess

Time Interval Ending at	From North on (SB) R St SE				From South on (NB) R St SE				From East on (WB) Howard Rd				From West on (EB) 21st St SE				<b>Interval Total</b>
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	2	4	24	2	0	104	87	1	0	0	4	7	1	0	0	6	239
7:30 A	2	7	35	7	3	114	85	0	1	1	9	4	1	1	2	10	275
7:45 A	0	2	34	4	3	120	74	3	0	1	4	4	0	1	6	13	266
8:00 A	1	4	28	2	3	81	59	2	0	0	7	3	0	1	3	8	198
8:15 A	4	2	41	5	3	70	87	0	0	1	4	3	0	1	5	6	225
8:30 A	1	5	40	1	1	52	90	4	0	0	7	2	0	1	4	6	212
8:45 A	0	4	38	3	1	40	87	0	0	0	9	3	1	1	5	4	194
9:00 A	1	7	37	6	0	24	80	0	0	0	7	6	0	1	4	4	176
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total Survey</b>	11	35	277	30	14	605	649	10	1	3	51	32	3	7	29	57	1785
	Peak Hour: 7:00 AM to 8:00 AM																
<b>Total</b>	5	17	121	15	9	419	305	6	1	2	24	18	2	3	11	37	978
<b>Approach</b>	153				730				44				51				978
%HV	3.3%				1.2%				2.3%				3.9%				1.7%
PHF	0.78				0.92				0.79				0.64				0.89





Prepared for: **City of Auburn**

### **Traffic Count Consultants, Inc.**

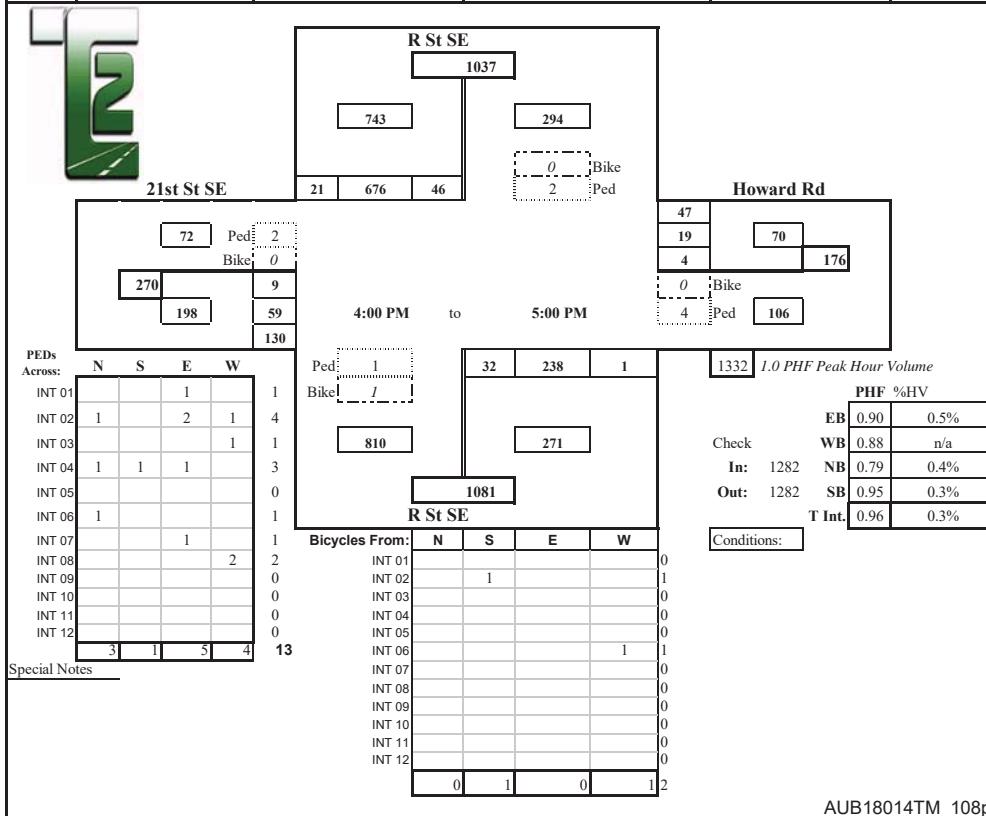
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

**Intersection:** R St SE & Howard Rd/21st St SE  
**Location:** Auburn, Washington

**Date of Count:** Wed 3/28/2018  
**Checked By:** Jess

Time Interval Ending at	From North on (SB) R St SE				From South on (NB) R St SE				From East on (WB) Howard Rd				From West on (EB) 21st St SE				<b>Interval Total</b>
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	13	172	10	1	9	52	0	0	0	3	11	0	4	14	31	319
4:30 P	1	10	177	2	0	8	59	0	0	1	5	13	1	0	19	36	330
4:45 P	0	11	156	5	0	10	47	0	0	0	5	12	0	4	12	38	300
5:00 P	1	12	171	4	0	5	80	1	0	3	6	11	0	1	14	25	333
5:15 P	0	22	173	3	1	9	48	4	0	1	3	3	0	3	12	26	307
5:30 P	2	18	180	3	0	10	46	2	0	0	2	8	0	4	12	27	312
5:45 P	2	18	152	3	0	9	58	0	0	0	4	7	0	1	17	20	289
6:00 P	0	11	165	4	0	8	57	2	0	0	6	5	0	6	13	37	314
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	6	115	1346	34	2	68	447	9	0	5	34	70	1	23	113	240	2504
	Peak Hour: 4:00 PM to 5:00 PM																
Total	2	46	676	21	1	32	238	1	0	4	19	47	1	9	59	130	1282
Approach																	
%HV																	
PHF																	





Prepared for:

## City of Auburn

### Traffic Count Consultants, Inc.

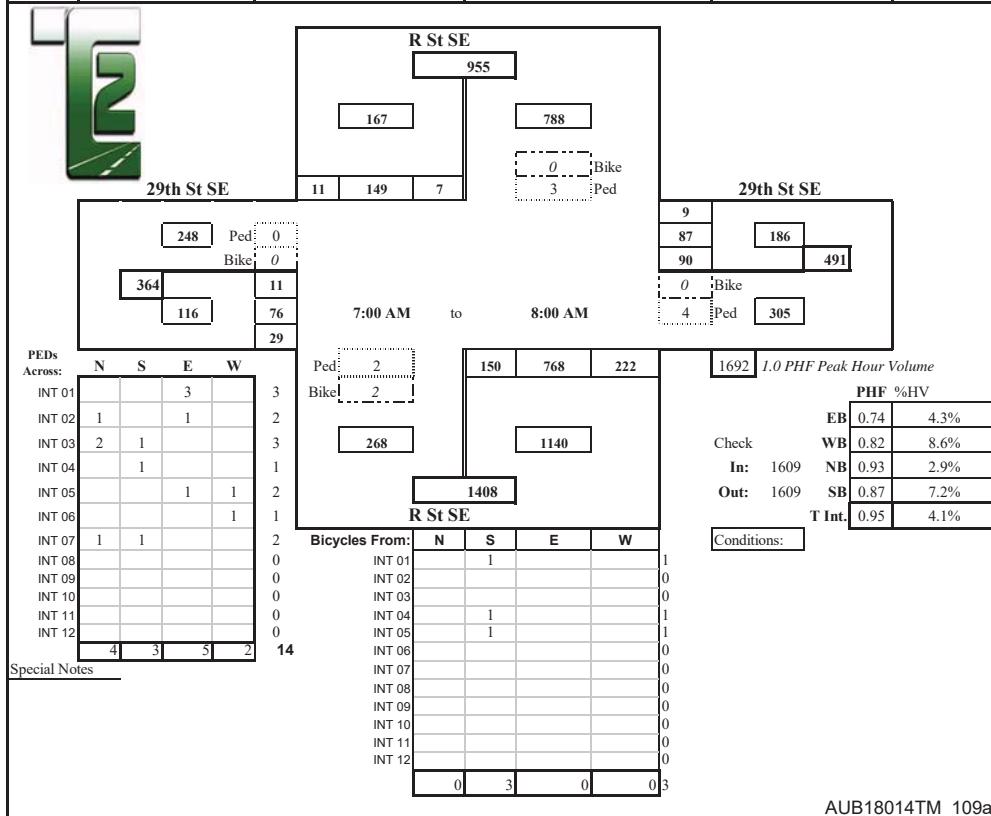
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

**Intersection:** R St SE & 29th St SE  
**Location:** Auburn, Washington

**Date of Count:** Wed 2/28/2018  
**Checked By:** Jess

Time Interval Ending at	From North on (SB) R St SE				From South on (NB) R St SE				From East on (WB) 29th St SE				From West on (EB) 29th St SE				<b>Interval Total</b>
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	2	0	30	4	6	36	201	25	7	21	17	4	0	5	19	2	364
7:30 A	2	3	40	3	6	40	202	56	3	18	21	2	2	4	16	8	413
7:45 A	2	1	38	0	8	31	186	57	5	28	28	1	3	2	22	15	409
8:00 A	6	3	41	4	13	43	179	84	1	23	21	2	0	0	19	4	423
8:15 A	2	1	47	4	3	22	146	48	3	24	21	0	1	3	26	3	345
8:30 A	2	1	34	7	7	18	147	28	1	27	30	2	3	3	26	3	326
8:45 A	6	1	30	3	3	21	114	35	2	20	19	0	2	6	23	9	281
9:00 A	3	1	35	1	6	21	91	26	3	12	17	2	1	3	14	3	226
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	25	11	295	26	52	232	1266	359	25	173	174	13	12	26	165	47	2787
	Peak Hour: 7:00 AM to 8:00 AM																
Total	12	7	149	11	33	150	768	222	16	90	87	9	5	11	76	29	1609
Approach	167								1140								1609
%HV	7.2%								2.9%								4.1%
PHF	0.87								0.93								0.95



AUB18014TM\_109a



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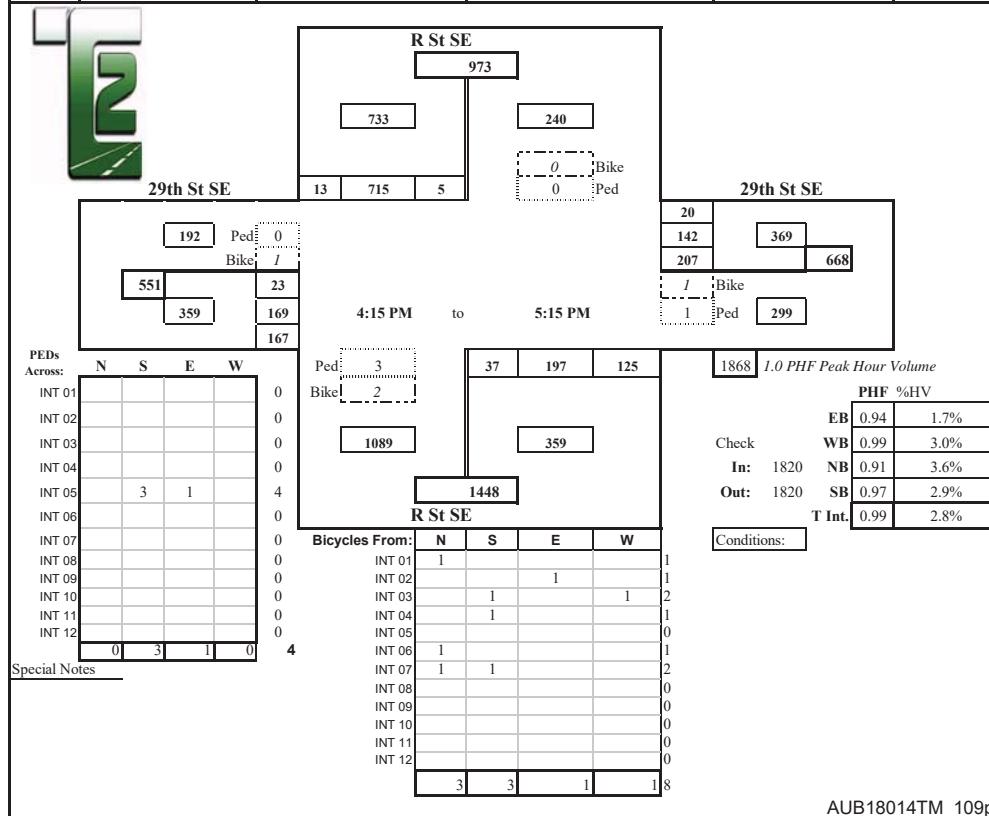
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WBE/DBE

**Intersection:** R St SE & 29th St SE  
**Location:** Auburn, Washington

**Date of Count:** Wed 2/28/2018  
**Checked By:** Jess

Time Interval Ending at	From North on (SB) R St SE				From South on (NB) R St SE				From East on (WB) 29th St SE				From West on (EB) 29th St SE				<b>Interval Total</b>
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	8	1	187	3	3	9	51	15	4	56	42	2	4	7	36	30	439
4:30 P	4	0	183	3	5	12	53	34	5	48	37	6	1	8	34	43	461
4:45 P	3	2	168	2	5	9	49	33	3	55	32	6	5	9	43	42	450
5:00 P	7	1	184	3	3	8	45	31	3	58	30	5	0	2	46	37	450
5:15 P	7	2	180	5	0	8	50	27	0	46	43	3	0	4	46	45	459
5:30 P	2	1	144	8	0	13	41	33	0	47	37	3	0	4	44	47	422
5:45 P	6	3	183	7	5	5	52	27	4	59	35	3	0	6	60	23	463
6:00 P	6	1	174	3	2	12	61	39	0	39	35	0	1	4	54	45	467
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	43	11	1403	34	23	76	402	239	19	408	291	28	11	44	363	312	3611
	Peak Hour: 4:15 PM to 5:15 PM																
Total	21	5	715	13	13	37	197	125	11	207	142	20	6	23	169	167	1820
Approach	733				359				369				359				1820
%HV	2.9%				3.6%				3.0%				1.7%				2.8%
PHF	0.97				0.91				0.99				0.94				0.99





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## City of Auburn

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Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

**Intersection:** M St SE & 29th St SE

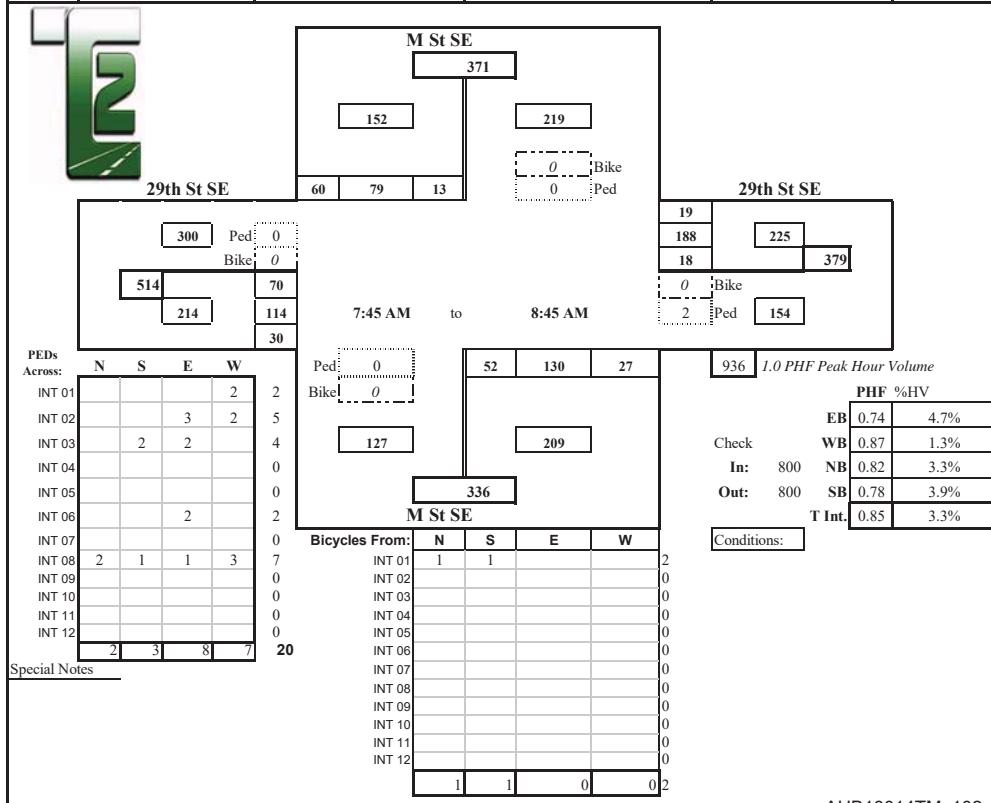
**Location:** Auburn, Washington

**Date of Count:** Thurs 3/08/2018

**Checked By:** Jess

Time Interval Ending at	From North on (SB) M St SE				From South on (NB) M St SE				From East on (WB) 29th St SE				From West on (EB) 29th St SE				<b>Interval Total</b>
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	0	1	17	4	0	27	30	7	0	4	48	5	1	6	16	12	177
7:30 A	2	1	10	7	2	31	57	10	1	3	47	7	0	17	16	10	216
7:45 A	1	4	13	4	1	14	49	2	2	5	69	8	2	9	21	6	204
8:00 A	0	2	12	11	1	18	33	2	1	2	55	8	0	14	32	3	192
8:15 A	2	3	21	5	1	4	29	3	0	2	45	2	2	12	28	8	162
8:30 A	2	3	27	19	5	16	34	6	0	7	44	6	5	32	26	14	234
8:45 A	2	5	19	25	0	14	34	16	2	7	44	3	3	12	28	5	212
9:00 A	0	0	14	6	1	13	19	7	0	2	35	8	0	11	19	3	137
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Total Survey	9	19	133	81	11	137	285	53	6	32	387	47	13	113	186	61	1534
Peak Hour: 7:45 AM to 8:45 AM																	
Total	6	13	79	60	7	52	130	27	3	18	188	19	10	70	114	30	800
Approach	152				209				225				214				800
%HV	3.9%				3.3%				1.3%				4.7%				3.3%
PHF	0.78				0.82				0.87				0.74				0.85





Prepared for:

## City of Auburn

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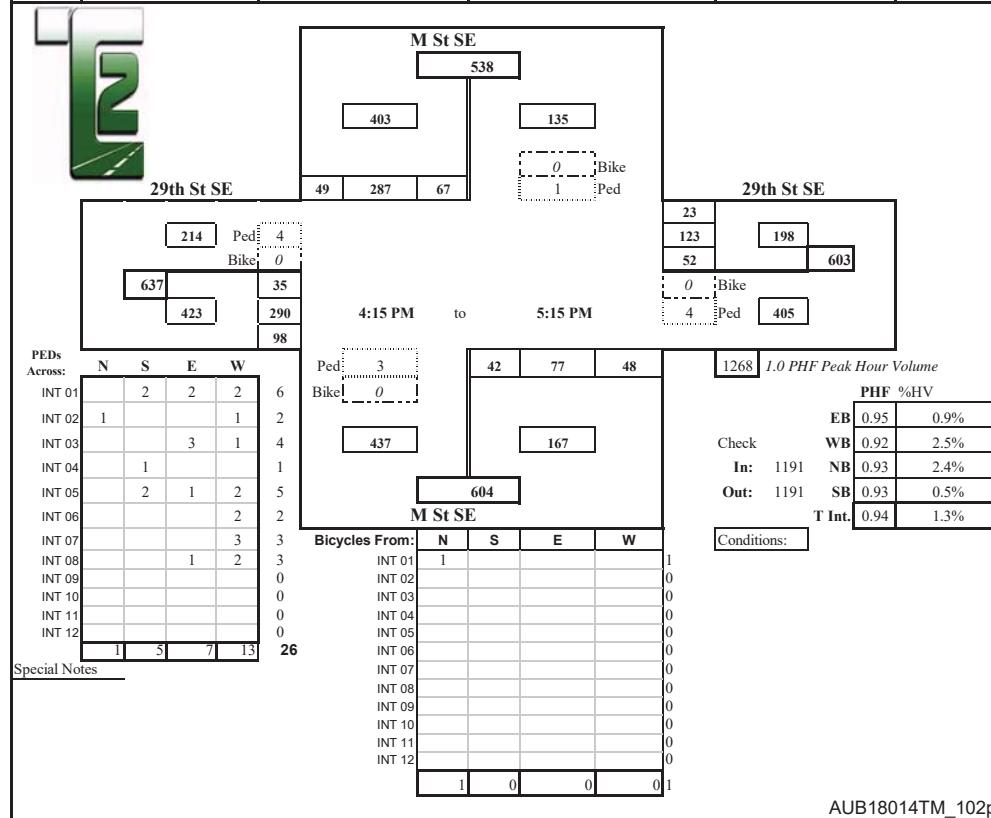
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

**Intersection:** M St SE & 29th St SE  
**Location:** Auburn, Washington

**Date of Count:** Thurs 3/08/2018  
**Checked By:** Jess

Time Interval Ending at	From North on (SB) M St SE				From South on (NB) M St SE				From East on (WB) 29th St SE				From West on (EB) 29th St SE				<b>Interval Total</b>
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	15	60	21	1	9	24	7	2	6	37	6	0	12	62	21	280
4:30 P	0	22	69	14	1	10	24	10	1	12	26	8	1	9	61	26	291
4:45 P	1	18	66	9	2	16	15	12	3	11	33	3	1	8	79	24	294
5:00 P	0	14	84	10	0	7	21	17	1	18	33	3	1	10	76	24	317
5:15 P	1	13	68	16	1	9	17	9	0	11	31	9	1	8	74	24	289
5:30 P	1	20	65	6	0	6	15	6	0	14	38	0	0	6	84	19	279
5:45 P	0	12	52	8	0	9	22	12	0	6	28	7	1	12	47	28	243
6:00 P	1	8	57	11	1	15	27	10	0	12	34	5	0	9	64	19	271
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	122	521	95	6	81	165	83	7	90	260	41	5	74	547	185	2264
	Peak Hour: 4:15 PM to 5:15 PM																
Total	2	67	287	49	4	42	77	48	5	52	123	23	4	35	290	98	1191
Approach	403				167				198				423				1191
%HV	0.5%				2.4%				2.5%				0.9%				1.3%
PHF	0.93				0.93				0.92				0.95				0.94



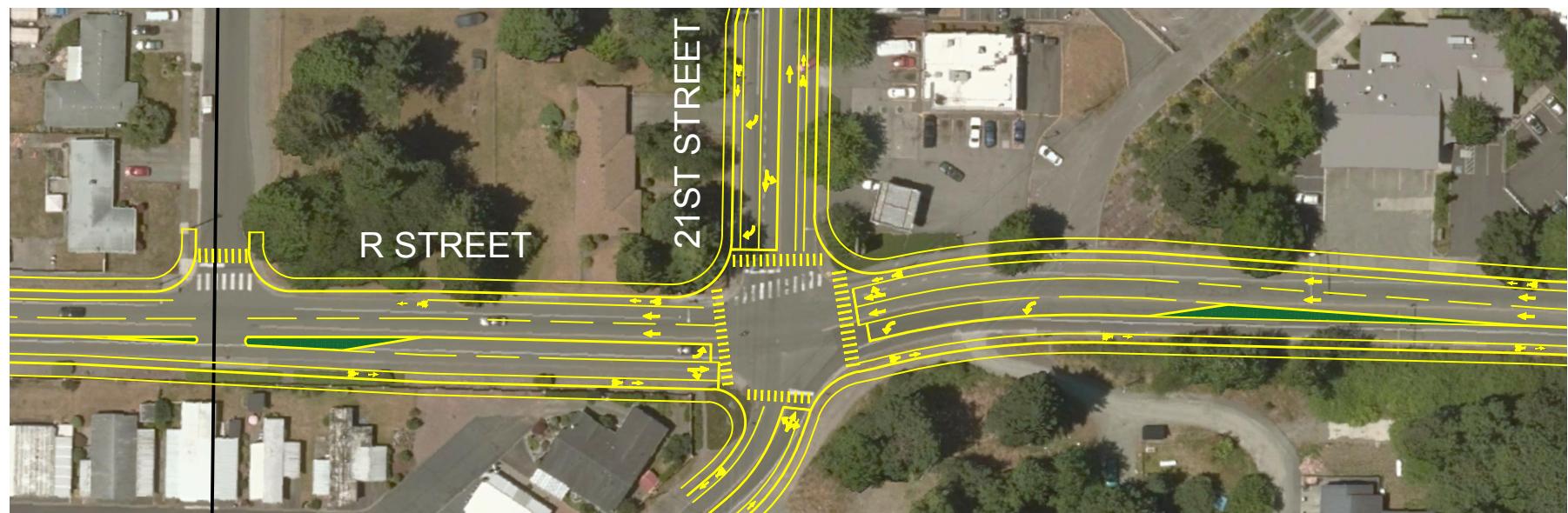
R Street Corridor Traffic Analysis  
Turning Movement Forecasts

<b>Scenario</b>	<b>EBL</b>	<b>EBT</b>	<b>EBR</b>	<b>WBL</b>	<b>WBT</b>	<b>WBR</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
R St/21st 2018 AM	3	11	37	2	24	18	419	305	6	17	121	15
R St/29st 2018 AM	11	76	29	90	87	9	150	768	22	7	149	11
M St/29th 2018 AM	70	114	30	18	188	19	52	130	27	13	79	60
R St/21st 2018 PM	9	59	130	4	19	47	32	238	1	46	676	21
R St/29st 2018 PM	23	169	167	207	142	20	37	197	125	5	715	13
M St/29th 2018 PM	35	290	98	52	123	23	42	77	48	67	287	49

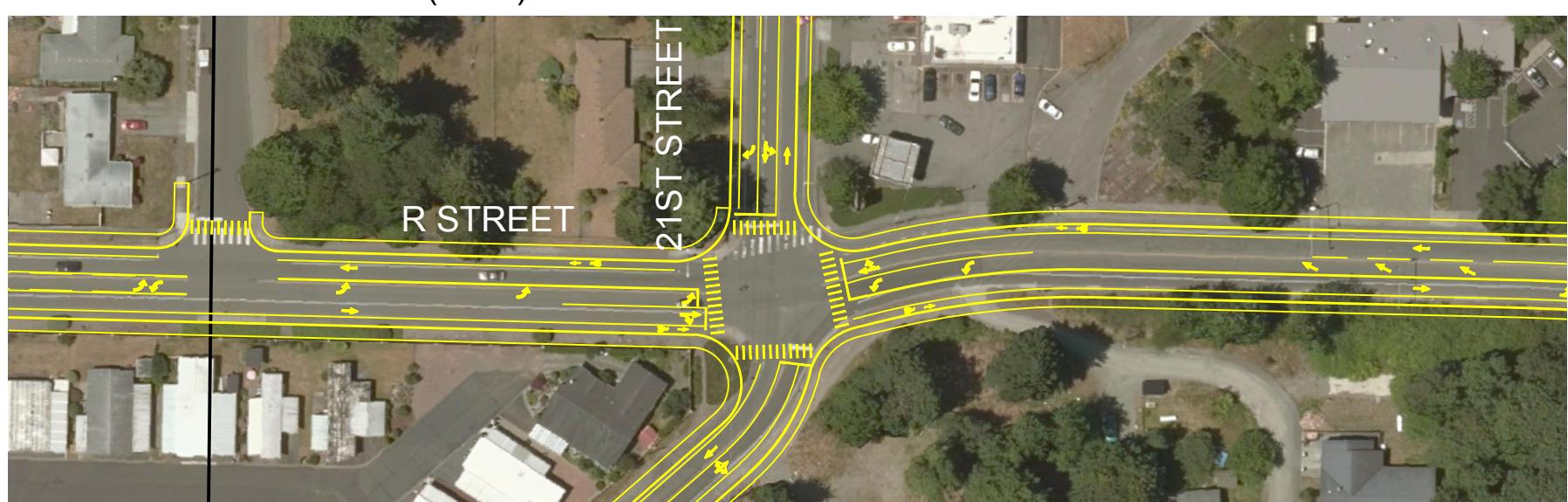
<b>Scenario</b>	<b>EBL</b>	<b>EBT</b>	<b>EBR</b>	<b>WBL</b>	<b>WBT</b>	<b>WBR</b>	<b>NBL</b>	<b>NBT</b>	<b>NBR</b>	<b>SBL</b>	<b>SBT</b>	<b>SBR</b>
R St/21st 2040 AM	4	14	47	3	30	23	522	380	8	22	151	19
R St/29th 2040 AM	14	95	37	113	109	12	187	956	28	9	186	14
M St/29th 2040 AM	88	142	38	23	235	24	65	162	34	17	99	75
R St/21st 2040 PM	12	74	162	5	24	59	40	297	2	58	842	27
R St/29th 2040 PM	29	211	208	258	177	25	47	246	156	7	890	17
M St/29th 2040 PM	44	361	122	65	154	29	53	96	60	84	358	61

# R STREET AND 21ST STREET INTERSECTION

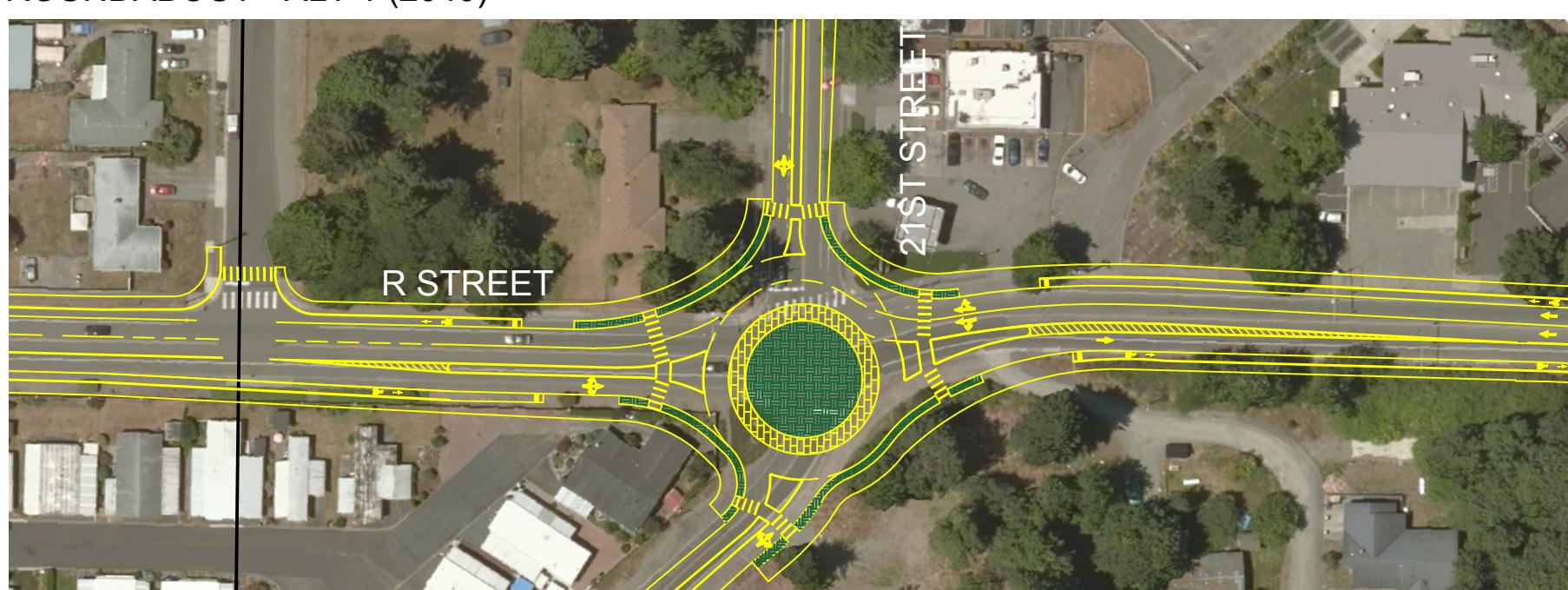
TRAFFIC SIGNAL - ALT 1 (2040)



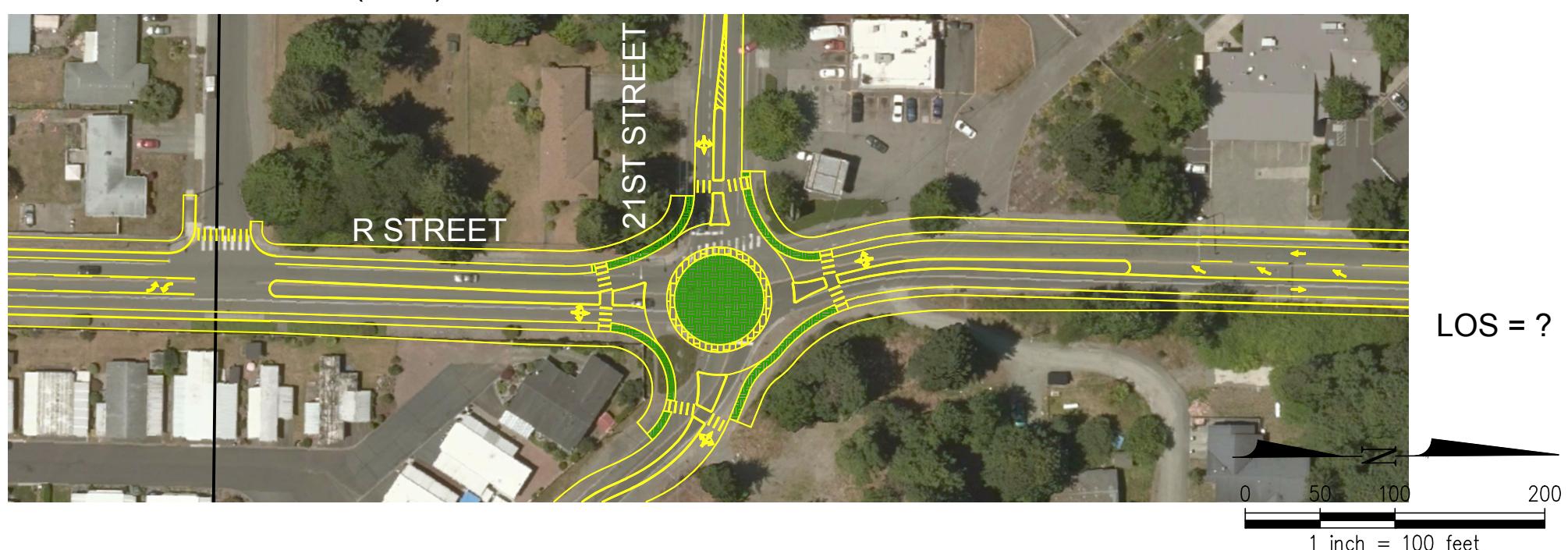
TRAFFIC SIGNAL - ALT 2 (2040)



ROUNDABOUT - ALT 1 (2040)

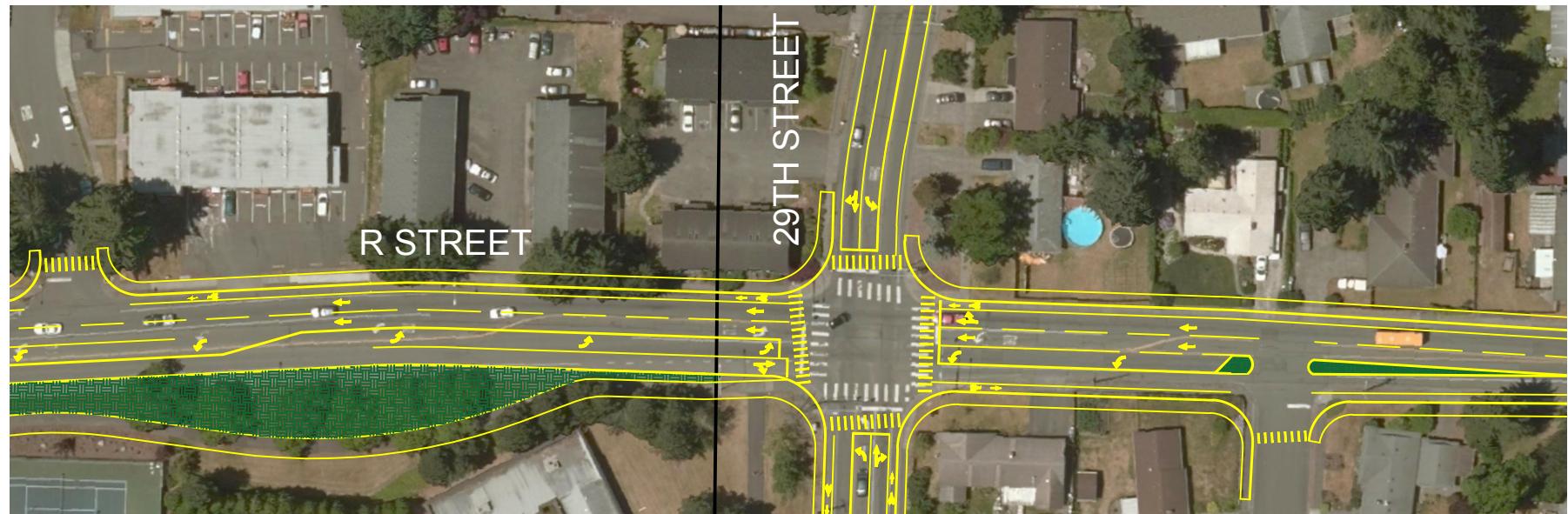


ROUNDABOUT - ALT 2 (2040)

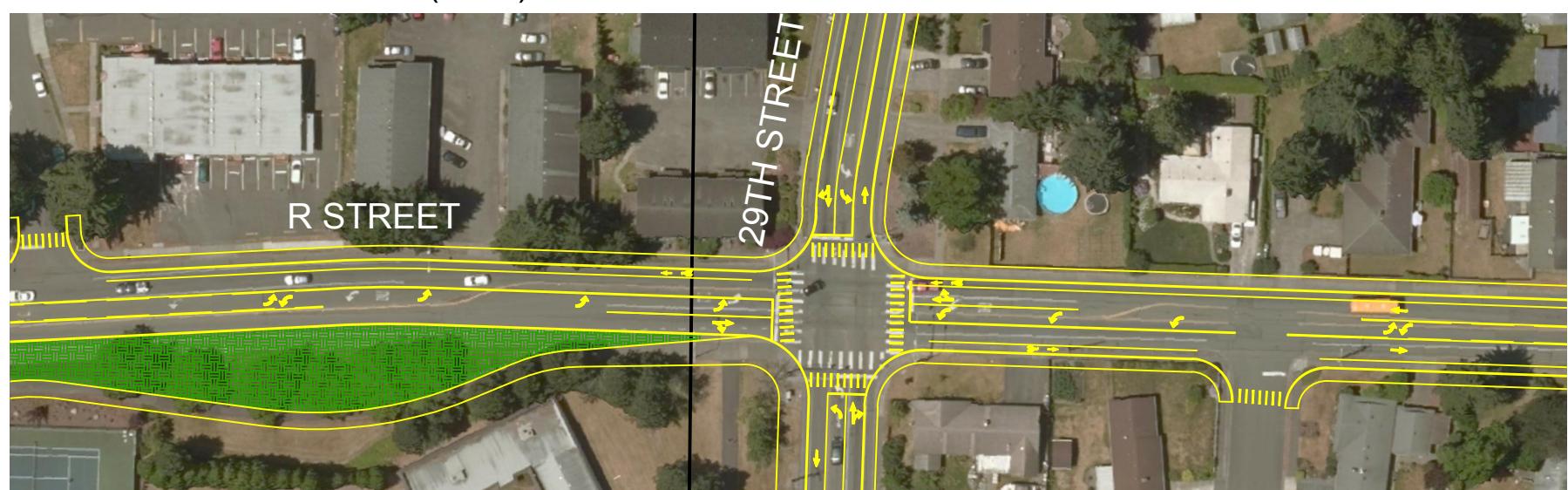


# R STREET AND 29TH STREET INTERSECTION

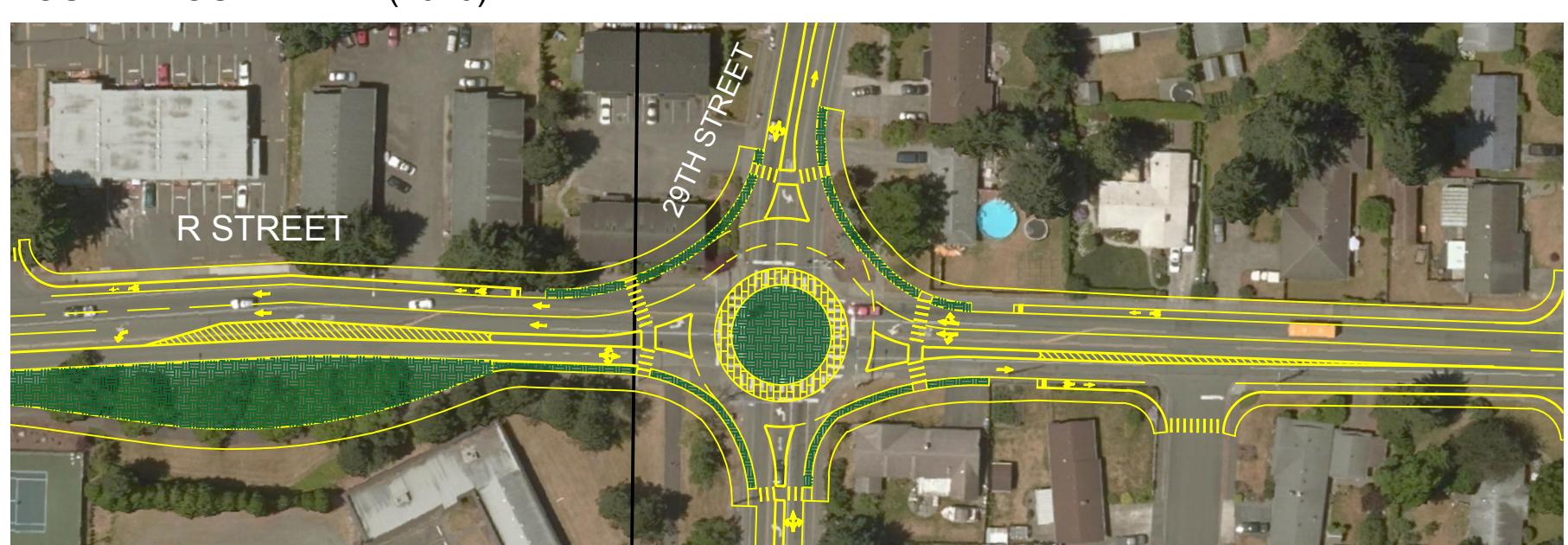
TRAFFIC SIGNAL - ALT 1 (2040)



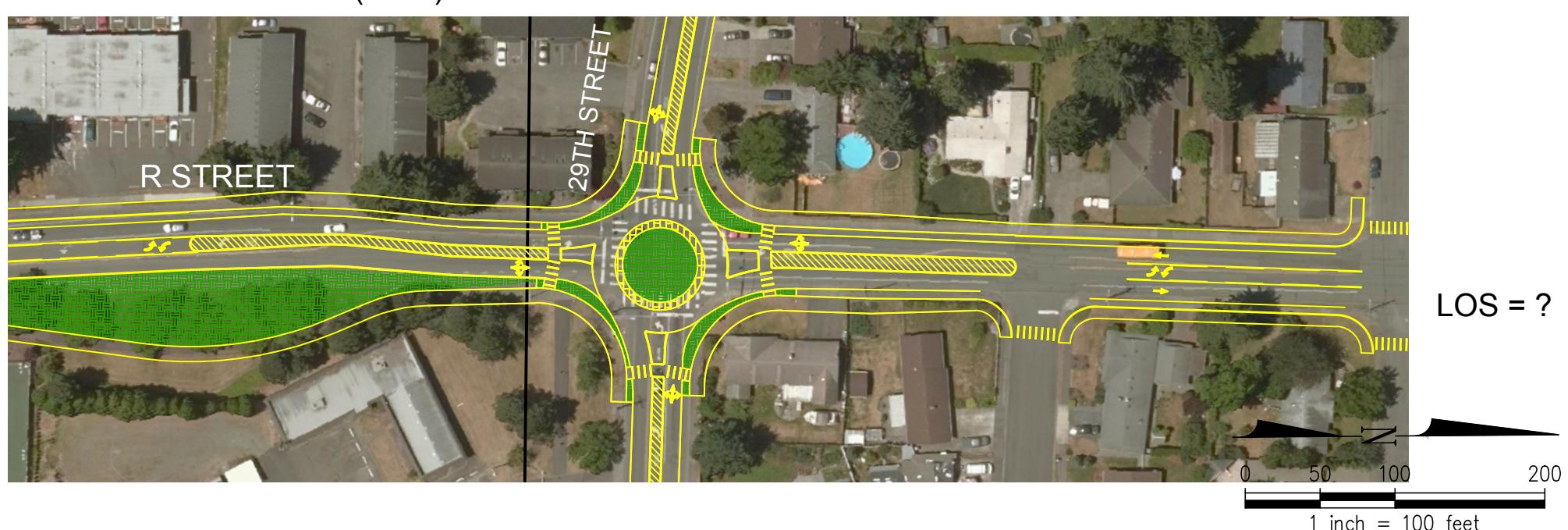
TRAFFIC SIGNAL - ALT 2 (2040)



ROUNDABOUT - ALT 1 (2040)

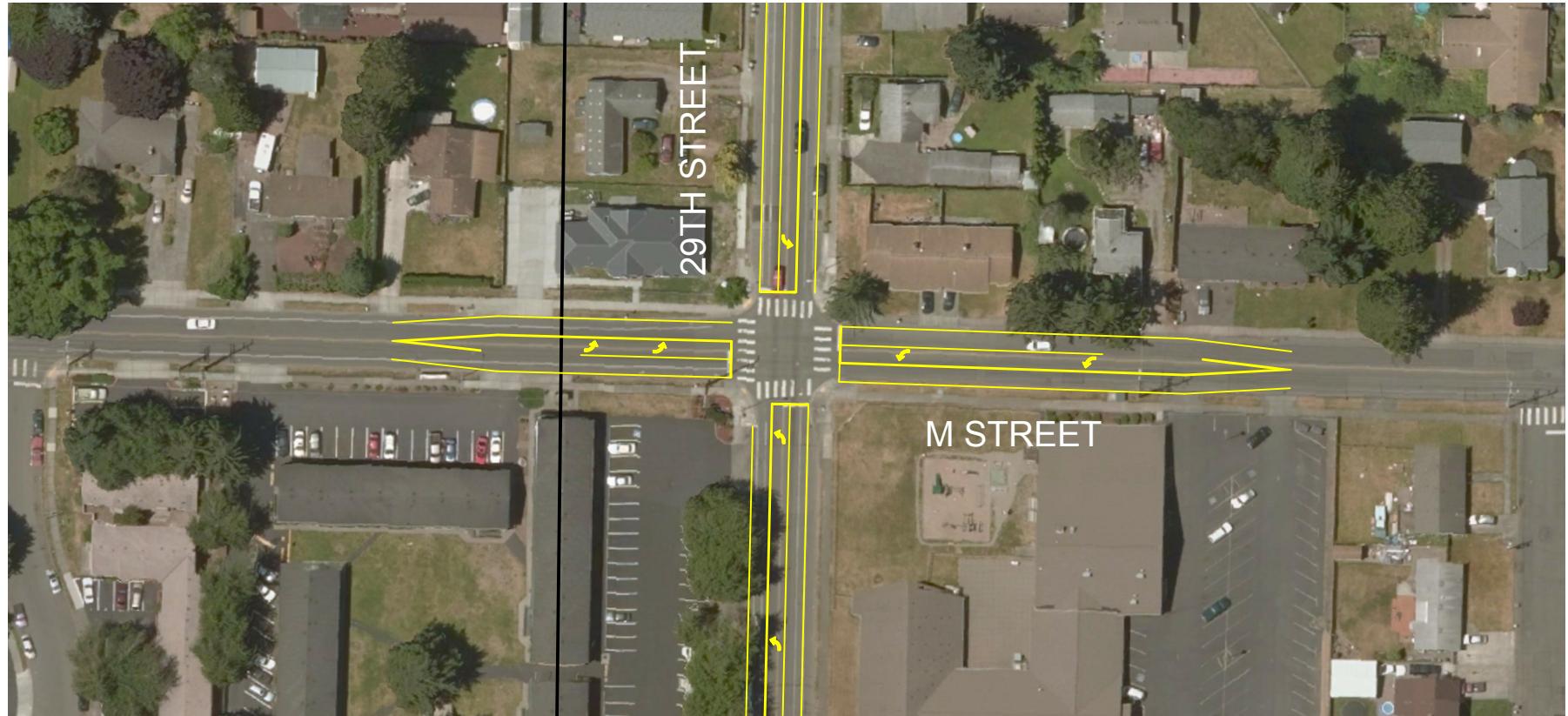


ROUNDABOUT - ALT 2 (2040)

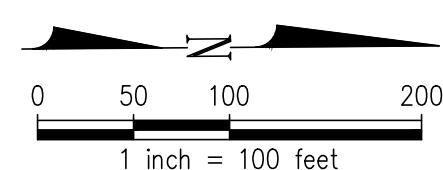
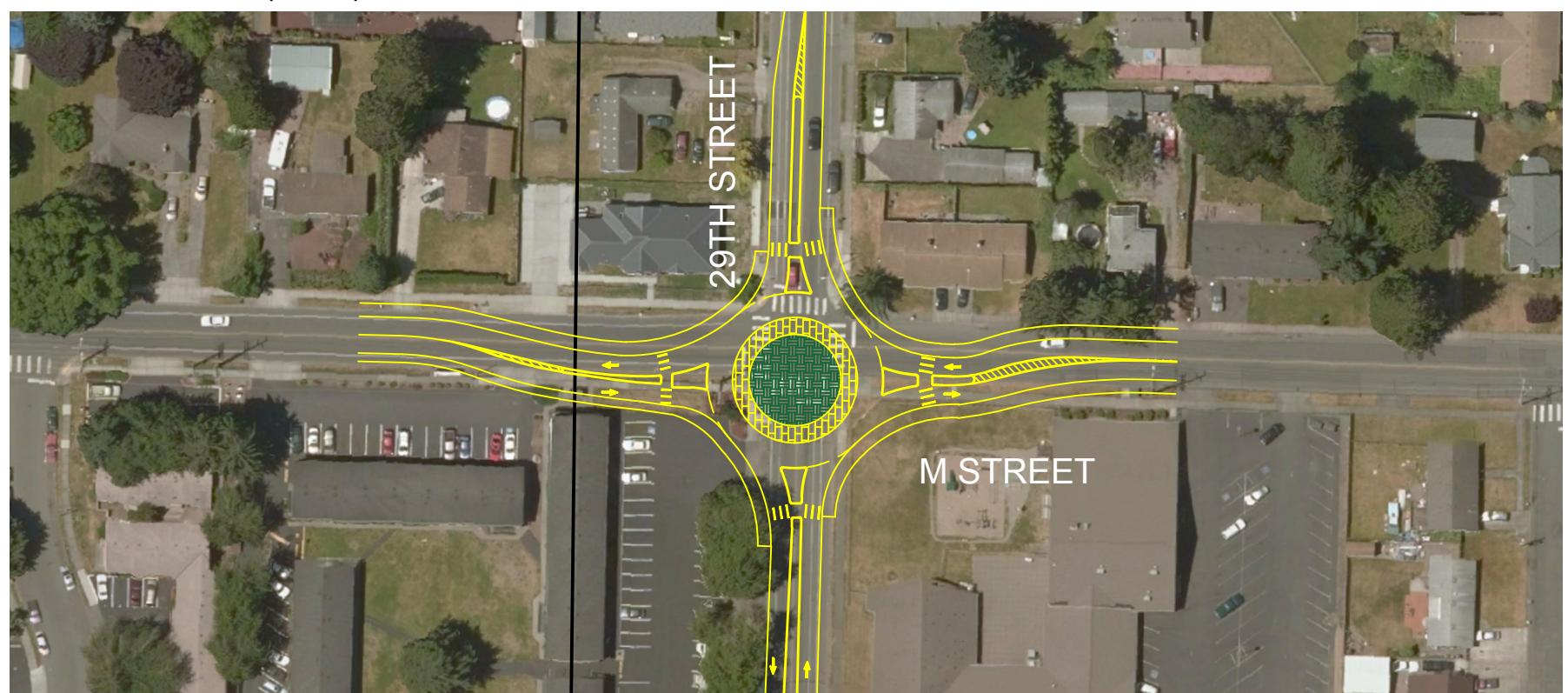


# M STREET AND 29TH STREET INTERSECTION

TRAFFIC SIGNAL (2040)



ROUNDABOUT (2040)



HCM 6th Signalized Intersection Summary  
R Street SE/21st Street SE

Alternative 1  
Timing Plan: AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	14	47	3	30	23	522	380	8	22	151	19
Future Volume (veh/h)	4	14	47	3	30	23	522	380	8	22	151	19
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00		1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	4	15	51	3	33	25	567	413	9	24	164	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	181	593	606	87	384	272	620	551	12	299	343	43
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.22	0.30	0.30	0.03	0.11	0.11
Sat Flow, veh/h	230	1550	1585	18	1006	711	1781	1823	40	1781	3174	401
Grp Volume(v), veh/h	19	0	51	61	0	0	567	0	422	24	91	94
Grp Sat Flow(s), veh/h/ln	1780	0	1585	1735	0	0	1781	0	1863	1781	1777	1798
Q Serve(g_s), s	0.0	0.0	1.0	0.0	0.0	0.0	10.5	0.0	9.6	0.6	2.3	2.3
Cycle Q Clear(g_c), s	0.3	0.0	1.0	1.1	0.0	0.0	10.5	0.0	9.6	0.6	2.3	2.3
Prop In Lane	0.21			1.00	0.05		0.41	1.00		0.02	1.00	0.22
Lane Grp Cap(c), veh/h	773	0	606	743	0	0	620	0	563	299	192	194
V/C Ratio(X)	0.02	0.00	0.08	0.08	0.00	0.00	0.91	0.00	0.75	0.08	0.47	0.49
Avail Cap(c_a), veh/h	773	0	606	743	0	0	620	0	930	437	679	687
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(l)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.1	0.0	9.3	9.3	0.0	0.0	14.7	0.0	14.8	17.8	19.7	19.8
Incr Delay (d2), s/veh	0.1	0.0	0.3	0.2	0.0	0.0	18.1	0.0	2.0	0.1	1.8	1.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.1	0.0	0.3	0.4	0.0	0.0	7.5	0.0	3.7	0.2	0.9	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	9.1	0.0	9.6	9.5	0.0	0.0	32.9	0.0	16.8	17.9	21.5	21.6
LnGrp LOS	A	A	A	A	A	A	C	A	B	B	C	C
Approach Vol, veh/h		70			61			989			209	
Approach Delay, s/veh		9.4			9.5			26.0			21.2	
Approach LOS		A			A			C			C	
Timer - Assigned Phs	2	3	4		6	7	8					
Phs Duration (G+Y+R <sub>c</sub> ), s	22.5	5.8	18.7		22.5	15.0	9.6					
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5		4.5	4.5	4.5					
Max Green Setting (Gmax), s	18.0	5.0	23.5		18.0	10.5	18.0					
Max Q Clear Time (g_c+l1), s	3.1	2.6	11.6		3.0	12.5	4.3					
Green Ext Time (p_c), s	0.2	0.0	2.0		0.2	0.0	0.8					
Intersection Summary												
HCM 6th Ctrl Delay			23.6									
HCM 6th LOS				C								

HCM 6th Signalized Intersection Summary  
R Street SE/21st Street SE

Alternative 2  
Timing Plan: PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	74	162	5	24	59	40	297	2	58	842	27
Future Volume (veh/h)	12	74	162	5	24	59	40	297	2	58	842	27
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	13	80	176	5	26	64	43	323	2	63	915	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	606	568	80	186	400	281	610	4	436	1200	38
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.04	0.33	0.33	0.06	0.34	0.34
Sat Flow, veh/h	125	1692	1585	22	518	1115	1781	1857	11	1781	3516	111
Grp Volume(v), veh/h	93	0	176	95	0	0	43	0	325	63	462	482
Grp Sat Flow(s), veh/h/ln	1817	0	1585	1655	0	0	1781	0	1868	1781	1777	1850
Q Serve(g_s), s	0.0	0.0	4.2	0.0	0.0	0.0	0.8	0.0	7.5	1.2	12.2	12.2
Cycle Q Clear(g_c), s	1.8	0.0	4.2	2.0	0.0	0.0	0.8	0.0	7.5	1.2	12.2	12.2
Prop In Lane	0.14		1.00	0.05		0.67	1.00		0.01	1.00		0.06
Lane Grp Cap(c), veh/h	729	0	568	665	0	0	281	0	614	436	606	631
V/C Ratio(X)	0.13	0.00	0.31	0.14	0.00	0.00	0.15	0.00	0.53	0.14	0.76	0.76
Avail Cap(c_a), veh/h	729	0	568	665	0	0	374	0	797	506	758	789
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(l)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.4	0.0	12.2	11.5	0.0	0.0	12.0	0.0	14.4	10.9	15.5	15.5
Incr Delay (d2), s/veh	0.4	0.0	1.4	0.5	0.0	0.0	0.3	0.0	0.7	0.2	3.6	3.4
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	0.7	0.0	1.5	0.7	0.0	0.0	0.3	0.0	2.9	0.4	4.8	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	11.8	0.0	13.6	12.0	0.0	0.0	12.2	0.0	15.1	11.0	19.0	18.9
LnGrp LOS	B	A	B	B	A	A	B	A	B	B	B	B
Approach Vol, veh/h	269				95			368			1007	
Approach Delay, s/veh	13.0				12.0			14.8			18.5	
Approach LOS	B				B			B			B	
Timer - Assigned Phs	2	3	4		6	7	8					
Phs Duration (G+Y+R <sub>c</sub> ), s	23.4	7.5	21.8		23.4	6.8	22.5					
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5		4.5	4.5	4.5					
Max Green Setting (Gmax), s	18.9	5.1	22.5		18.9	5.1	22.5					
Max Q Clear Time (g_c+l1), s	4.0	3.2	9.5		6.2	2.8	14.2					
Green Ext Time (p_c), s	0.4	0.0	1.5		0.9	0.0	3.8					
Intersection Summary												
HCM 6th Ctrl Delay			16.5									
HCM 6th LOS			B									

## HCM 6th Signalized Intersection Summary

R Street SE/21st Street SE

Alternative 2

Timing Plan: AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	14	47	3	30	23	522	380	8	22	151	19
Future Volume (veh/h)	4	14	47	3	30	23	522	380	8	22	151	19
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00		1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	4	15	51	3	33	25	567	413	9	24	164	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	508	519	75	329	233	692	727	16	320	235	30
Arrive On Green	0.33	0.33	0.33	0.33	0.33	0.33	0.28	0.40	0.40	0.03	0.14	0.14
Sat Flow, veh/h	230	1550	1585	19	1005	711	1781	1823	40	1781	1625	208
Grp Volume(v), veh/h	19	0	51	61	0	0	567	0	422	24	0	185
Grp Sat Flow(s), veh/h/ln	1780	0	1585	1735	0	0	1781	0	1863	1781	0	1833
Q Serve(g_s), s	0.0	0.0	1.2	0.0	0.0	0.0	13.8	0.0	9.7	0.6	0.0	5.3
Cycle Q Clear(g_c), s	0.4	0.0	1.2	1.3	0.0	0.0	13.8	0.0	9.7	0.6	0.0	5.3
Prop In Lane	0.21			1.00	0.05		0.41	1.00		0.02	1.00	0.11
Lane Grp Cap(c), veh/h	662	0	519	637	0	0	692	0	743	320	0	265
V/C Ratio(X)	0.03	0.00	0.10	0.10	0.00	0.00	0.82	0.00	0.57	0.07	0.00	0.70
Avail Cap(c_a), veh/h	662	0	519	637	0	0	692	0	966	433	0	600
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(l)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.6	0.0	12.8	12.9	0.0	0.0	12.4	0.0	12.8	19.1	0.0	22.4
Incr Delay (d2), s/veh	0.1	0.0	0.4	0.3	0.0	0.0	7.7	0.0	0.7	0.1	0.0	3.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.2	0.0	0.4	0.5	0.0	0.0	5.9	0.0	3.6	0.2	0.0	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	12.6	0.0	13.2	13.2	0.0	0.0	20.1	0.0	13.5	19.2	0.0	25.7
LnGrp LOS	B	A	B	B	A	A	C	A	B	B	A	C
Approach Vol, veh/h		70			61			989			209	
Approach Delay, s/veh		13.1			13.2			17.3			24.9	
Approach LOS		B			B			B			C	
Timer - Assigned Phs	2	3	4		6	7	8					
Phs Duration (G+Y+R <sub>c</sub> ), s	22.5	6.0	26.4		22.5	20.0	12.5					
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5		4.5	4.5	4.5					
Max Green Setting (Gmax), s	18.0	5.0	28.5		18.0	15.5	18.0					
Max Q Clear Time (g_c+l1), s	3.3	2.6	11.7		3.2	15.8	7.3					
Green Ext Time (p_c), s	0.2	0.0	2.4		0.1	0.0	0.7					
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay		18.1										
HCM 6th LOS		B										

HCM 6th Signalized Intersection Summary  
R Street SE/21st Street SE

Alternative 2  
Timing Plan: PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	74	162	5	24	59	40	297	2	58	842	27
Future Volume (veh/h)	12	74	162	5	24	59	40	297	2	58	842	27
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	13	80	176	5	26	64	43	323	2	63	915	29
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	85	419	393	56	127	276	199	979	6	631	967	31
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.04	0.53	0.53	0.05	0.54	0.54
Sat Flow, veh/h	125	1692	1585	25	514	1114	1781	1857	11	1781	1803	57
Grp Volume(v), veh/h	93	0	176	95	0	0	43	0	325	63	0	944
Grp Sat Flow(s), veh/h/ln	1817	0	1585	1653	0	0	1781	0	1868	1781	0	1860
Q Serve(g_s), s	0.0	0.0	7.2	0.0	0.0	0.0	0.8	0.0	7.6	1.2	0.0	36.5
Cycle Q Clear(g_c), s	3.0	0.0	7.2	3.5	0.0	0.0	0.8	0.0	7.6	1.2	0.0	36.5
Prop In Lane	0.14		1.00	0.05		0.67	1.00		0.01	1.00		0.03
Lane Grp Cap(c), veh/h	504	0	393	459	0	0	199	0	985	631	0	997
V/C Ratio(X)	0.18	0.00	0.45	0.21	0.00	0.00	0.22	0.00	0.33	0.10	0.00	0.95
Avail Cap(c_a), veh/h	504	0	393	459	0	0	248	0	1041	664	0	1036
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(l)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	24.3	22.9	0.0	0.0	16.4	0.0	10.3	7.5	0.0	16.7
Incr Delay (d2), s/veh	0.8	0.0	3.7	1.0	0.0	0.0	0.5	0.0	0.2	0.1	0.0	16.4
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	0.0	3.0	1.4	0.0	0.0	0.4	0.0	2.9	0.4	0.0	17.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	23.5	0.0	28.0	23.9	0.0	0.0	16.9	0.0	10.5	7.6	0.0	33.0
LnGrp LOS	C	A	C	C	A	A	B	A	B	A	A	C
Approach Vol, veh/h	269				95			368			1007	
Approach Delay, s/veh	26.4				23.9			11.3			31.4	
Approach LOS	C				C			B			C	
Timer - Assigned Phs	2	3	4		6	7	8					
Phs Duration (G+Y+R <sub>c</sub> ), s	23.4	8.2	44.7		23.4	7.5	45.4					
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5		4.5	4.5	4.5					
Max Green Setting (Gmax), s	18.9	5.1	42.5		18.9	5.1	42.5					
Max Q Clear Time (g_c+l1), s	5.5	3.2	9.6		9.2	2.8	38.5					
Green Ext Time (p_c), s	0.3	0.0	2.1		0.7	0.0	2.4					
Intersection Summary												
HCM 6th Ctrl Delay			26.0									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary  
R Street SE/23rd Street SE

Alternative 1  
Timing Plan: AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑		↑	↑		↑	↑		↑	↑↑	
Traffic Volume (veh/h)	14	95	37	113	109	12	187	956	28	9	186	14
Future Volume (veh/h)	14	95	37	113	109	12	187	956	28	9	186	14
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00		1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	15	103	40	123	118	13	203	1039	30	10	202	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	291	229	89	294	354	39	772	1062	31	105	1781	131
Arrive On Green	0.02	0.18	0.18	0.05	0.21	0.21	0.07	0.59	0.59	0.01	0.53	0.53
Sat Flow, veh/h	1781	1283	498	1781	1655	182	1781	1809	52	1781	3355	247
Grp Volume(v), veh/h	15	0	143	123	0	131	203	0	1069	10	106	111
Grp Sat Flow(s), veh/h/ln	1781	0	1781	1781	0	1838	1781	0	1861	1781	1777	1826
Q Serve(g_s), s	0.7	0.0	7.6	5.5	0.0	6.4	5.2	0.0	59.0	0.3	3.2	3.2
Cycle Q Clear(g_c), s	0.7	0.0	7.6	5.5	0.0	6.4	5.2	0.0	59.0	0.3	3.2	3.2
Prop In Lane	1.00			1.00			0.10	1.00		0.03	1.00	0.14
Lane Grp Cap(c), veh/h	291	0	318	294	0	393	772	0	1092	105	943	969
V/C Ratio(X)	0.05	0.00	0.45	0.42	0.00	0.33	0.26	0.00	0.98	0.10	0.11	0.11
Avail Cap(c_a), veh/h	347	0	318	294	0	393	784	0	1100	170	1003	1031
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.5	0.0	38.8	33.6	0.0	35.2	8.9	0.0	21.2	24.7	12.4	12.4
Incr Delay (d2), s/veh	0.1	0.0	4.5	0.9	0.0	2.3	0.2	0.0	21.9	0.4	0.1	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	0.3	0.0	3.7	2.6	0.0	3.1	1.9	0.0	29.9	0.1	1.2	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.6	0.0	43.3	34.5	0.0	37.5	9.0	0.0	43.1	25.0	12.4	12.4
LnGrp LOS	C	A	D	C	A	D	A	A	D	C	B	B
Approach Vol, veh/h	158			254			1272			227		
Approach Delay, s/veh	42.5			36.0			37.7			13.0		
Approach LOS	D			D			D			B		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	6.3	27.1	5.8	66.6	10.0	23.4	11.7	60.6				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	19.3	5.1	62.5	5.5	18.9	7.9	59.7				
Max Q Clear Time (g_c+l1), s	2.7	8.4	2.3	61.0	7.5	9.6	7.2	5.2				
Green Ext Time (p_c), s	0.0	0.4	0.0	1.1	0.0	0.4	0.0	1.3				
Intersection Summary												
HCM 6th Ctrl Delay				34.9								
HCM 6th LOS				C								

HCM 6th Signalized Intersection Summary  
R Street SE/23rd Street SE

Alternative 1  
Timing Plan: PM

Movement	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↑↓	
Traffic Volume (veh/h)	29	211	208	258	177	25	47	246	156	7	890	17
Future Volume (veh/h)	29	211	208	258	177	25	47	246	156	7	890	17
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00			1.00			1.00		1.00
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	32	229	226	280	192	27	51	267	170	8	967	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	496	257	253	363	631	89	191	353	225	214	1063	20
Arrive On Green	0.03	0.30	0.30	0.13	0.39	0.39	0.04	0.33	0.33	0.01	0.30	0.30
Sat Flow, veh/h	1781	864	853	1781	1604	226	1781	1068	680	1781	3569	66
Grp Volume(v), veh/h	32	0	455	280	0	219	51	0	437	8	481	504
Grp Sat Flow(s), veh/h/ln	1781	0	1717	1781	0	1830	1781	0	1748	1781	1777	1858
Q Serve(g_s), s	0.9	0.0	19.5	7.9	0.0	6.4	1.5	0.0	17.2	0.2	20.1	20.1
Cycle Q Clear(g_c), s	0.9	0.0	19.5	7.9	0.0	6.4	1.5	0.0	17.2	0.2	20.1	20.1
Prop In Lane	1.00		0.50	1.00		0.12	1.00		0.39	1.00		0.04
Lane Grp Cap(c), veh/h	496	0	510	363	0	720	191	0	578	214	529	554
V/C Ratio(X)	0.06	0.00	0.89	0.77	0.00	0.30	0.27	0.00	0.76	0.04	0.91	0.91
Avail Cap(c_a), veh/h	556	0	510	377	0	720	232	0	578	314	541	566
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.7	0.0	25.9	17.5	0.0	16.1	20.1	0.0	23.0	20.0	26.1	26.1
Incr Delay (d2), s/veh	0.1	0.0	20.6	9.2	0.0	1.1	0.7	0.0	5.7	0.1	19.2	18.6
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	0.4	0.0	10.5	3.9	0.0	2.7	0.6	0.0	7.6	0.1	10.8	11.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	17.7	0.0	46.5	26.7	0.0	17.2	20.8	0.0	28.7	20.0	45.3	44.6
LnGrp LOS	B	A	D	C	A	B	C	A	C	C	D	D
Approach Vol, veh/h	487				499			488			993	
Approach Delay, s/veh	44.6				22.5			27.9			44.8	
Approach LOS		D			C			C			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	7.0	34.8	5.3	30.0	14.4	27.4	7.8	27.5				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	28.3	5.1	23.5	10.5	22.9	5.1	23.5				
Max Q Clear Time (g_c+l1), s	2.9	8.4	2.2	19.2	9.9	21.5	3.5	22.1				
Green Ext Time (p_c), s	0.0	1.2	0.0	1.1	0.1	0.4	0.0	0.8				
Intersection Summary												
HCM 6th Ctrl Delay				36.9								
HCM 6th LOS				D								

HCM 6th Signalized Intersection Summary  
R Street SE/23rd Street SE

Alternative 2  
Timing Plan: AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	
Traffic Volume (veh/h)	14	95	37	113	109	12	187	956	28	9	186	14
Future Volume (veh/h)	14	95	37	113	109	12	187	956	28	9	186	14
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00		1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	15	103	40	123	118	13	203	1039	30	10	202	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	291	229	89	294	354	39	735	1062	31	105	912	68
Arrive On Green	0.02	0.18	0.18	0.05	0.21	0.21	0.07	0.59	0.59	0.01	0.53	0.53
Sat Flow, veh/h	1781	1283	498	1781	1655	182	1781	1809	52	1781	1720	128
Grp Volume(v), veh/h	15	0	143	123	0	131	203	0	1069	10	0	217
Grp Sat Flow(s), veh/h/ln	1781	0	1781	1781	0	1838	1781	0	1861	1781	0	1847
Q Serve(g_s), s	0.7	0.0	7.6	5.5	0.0	6.4	5.2	0.0	59.0	0.3	0.0	6.6
Cycle Q Clear(g_c), s	0.7	0.0	7.6	5.5	0.0	6.4	5.2	0.0	59.0	0.3	0.0	6.6
Prop In Lane	1.00			0.28	1.00		0.10	1.00		0.03	1.00	0.07
Lane Grp Cap(c), veh/h	291	0	318	294	0	393	735	0	1092	105	0	980
V/C Ratio(X)	0.05	0.00	0.45	0.42	0.00	0.33	0.28	0.00	0.98	0.10	0.00	0.22
Avail Cap(c_a), veh/h	347	0	318	294	0	393	756	0	1100	170	0	1032
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.5	0.0	38.8	33.6	0.0	35.2	9.1	0.0	21.2	24.7	0.0	13.2
Incr Delay (d2), s/veh	0.1	0.0	4.5	0.9	0.0	2.3	0.2	0.0	21.9	0.4	0.0	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	0.3	0.0	3.7	2.6	0.0	3.1	1.9	0.0	29.9	0.1	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.6	0.0	43.3	34.5	0.0	37.5	9.3	0.0	43.1	25.0	0.0	13.3
LnGrp LOS	C	A	D	C	A	D	A	A	D	C	A	B
Approach Vol, veh/h	158				254				1272			227
Approach Delay, s/veh	42.5				36.0				37.7			13.8
Approach LOS		D				D			D			B
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	6.3	27.1	5.8	66.6	10.0	23.4	11.8	60.6				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	19.3	5.1	62.5	5.5	18.9	8.5	59.1				
Max Q Clear Time (g_c+l1), s	2.7	8.4	2.3	61.0	7.5	9.6	7.2	8.6				
Green Ext Time (p_c), s	0.0	0.4	0.0	1.1	0.0	0.4	0.1	1.4				
Intersection Summary												
HCM 6th Ctrl Delay				35.1								
HCM 6th LOS				D								

HCM 6th Signalized Intersection Summary  
R Street SE/23rd Street SE

Alternative 2  
Timing Plan: PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	
Traffic Volume (veh/h)	29	211	208	258	177	25	47	246	156	7	890	17
Future Volume (veh/h)	29	211	208	258	177	25	47	246	156	7	890	17
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	32	229	226	280	192	27	51	267	170	8	967	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	371	211	208	274	560	79	95	539	343	385	890	17
Arrive On Green	0.02	0.24	0.24	0.13	0.35	0.35	0.03	0.51	0.51	0.01	0.49	0.49
Sat Flow, veh/h	1781	864	853	1781	1604	226	1781	1068	680	1781	1830	34
Grp Volume(v), veh/h	32	0	455	280	0	219	51	0	437	8	0	985
Grp Sat Flow(s), veh/h/ln	1781	0	1717	1781	0	1830	1781	0	1748	1781	0	1864
Q Serve(g_s), s	2.1	0.0	38.9	20.5	0.0	14.1	2.3	0.0	26.3	0.4	0.0	77.5
Cycle Q Clear(g_c), s	2.1	0.0	38.9	20.5	0.0	14.1	2.3	0.0	26.3	0.4	0.0	77.5
Prop In Lane	1.00		0.50	1.00		0.12	1.00		0.39	1.00		0.02
Lane Grp Cap(c), veh/h	371	0	419	274	0	638	95	0	883	385	0	907
V/C Ratio(X)	0.09	0.00	1.09	1.02	0.00	0.34	0.54	0.00	0.50	0.02	0.00	1.09
Avail Cap(c_a), veh/h	386	0	419	274	0	638	102	0	883	426	0	907
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.5	0.0	60.2	51.6	0.0	38.4	38.2	0.0	26.0	22.1	0.0	40.9
Incr Delay (d2), s/veh	0.1	0.0	69.0	59.8	0.0	1.5	4.6	0.0	0.4	0.0	0.0	56.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	1.0	0.0	25.0	12.4	0.0	6.7	1.1	0.0	11.2	0.2	0.0	49.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	43.6	0.0	129.3	111.4	0.0	39.8	42.8	0.0	26.5	22.1	0.0	97.2
LnGrp LOS	D	A	F	F	A	D	D	A	C	C	A	F
Approach Vol, veh/h	487				499			488			993	
Approach Delay, s/veh	123.6				80.0			28.2			96.6	
Approach LOS	F				E			C			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	8.3	60.1	6.0	85.0	25.0	43.4	9.0	82.0				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	54.3	5.1	77.5	20.5	38.9	5.1	77.5				
Max Q Clear Time (g_c+l1), s	4.1	16.1	2.4	28.3	22.5	40.9	4.3	79.5				
Green Ext Time (p_c), s	0.0	1.4	0.0	3.3	0.0	0.0	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay				85.0								
HCM 6th LOS				F								

HCM 6th Signalized Intersection Summary  
M Street SE/23rd Street SE

Alternative 1  
Timing Plan: AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	
Traffic Volume (veh/h)	88	142	38	23	235	24	65	162	34	17	99	75
Future Volume (veh/h)	88	142	38	23	235	24	65	162	34	17	99	75
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1885	1885	1885	1856	1856	1856	1841	1841	1841
Adj Flow Rate, veh/h	96	154	41	25	255	26	71	176	37	18	108	82
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, %	5	5	5	1	1	1	3	3	3	4	4	4
Cap, veh/h	526	556	148	582	600	61	312	294	62	283	153	117
Arrive On Green	0.07	0.40	0.40	0.03	0.36	0.36	0.06	0.20	0.20	0.02	0.16	0.16
Sat Flow, veh/h	1739	1389	370	1795	1683	172	1767	1487	313	1753	971	737
Grp Volume(v), veh/h	96	0	195	25	0	281	71	0	213	18	0	190
Grp Sat Flow(s), veh/h/ln	1739	0	1759	1795	0	1854	1767	0	1799	1753	0	1708
Q Serve(g_s), s	1.7	0.0	3.8	0.4	0.0	5.9	1.7	0.0	5.5	0.4	0.0	5.4
Cycle Q Clear(g_c), s	1.7	0.0	3.8	0.4	0.0	5.9	1.7	0.0	5.5	0.4	0.0	5.4
Prop In Lane	1.00		0.21	1.00		0.09	1.00		0.17	1.00		0.43
Lane Grp Cap(c), veh/h	526	0	704	582	0	661	312	0	356	283	0	270
V/C Ratio(X)	0.18	0.00	0.28	0.04	0.00	0.43	0.23	0.00	0.60	0.06	0.00	0.70
Avail Cap(c_a), veh/h	592	0	704	705	0	661	375	0	631	415	0	599
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.2	0.0	10.4	9.8	0.0	12.5	16.6	0.0	18.7	17.5	0.0	20.5
Incr Delay (d2), s/veh	0.2	0.0	1.0	0.0	0.0	2.0	0.4	0.0	1.6	0.1	0.0	3.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.6	0.0	1.4	0.2	0.0	2.5	0.6	0.0	2.2	0.2	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	9.4	0.0	11.4	9.9	0.0	14.5	16.9	0.0	20.3	17.6	0.0	23.8
LnGrp LOS	A	A	B	A	A	B	B	A	C	B	A	C
Approach Vol, veh/h	291				306			284			208	
Approach Delay, s/veh	10.7				14.1			19.5			23.3	
Approach LOS	B				B			B			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	8.2	22.8	5.6	14.7	6.0	25.0	7.7	12.6				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.7	18.3	5.0	18.0	5.0	19.0	5.0	18.0				
Max Q Clear Time (g_c+l1), s	3.7	7.9	2.4	7.5	2.4	5.8	3.7	7.4				
Green Ext Time (p_c), s	0.0	1.1	0.0	0.8	0.0	0.8	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay				16.4								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary  
M Street SE/23rd Street SE

Alternative 1  
Timing Plan: PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↑↓	
Traffic Volume (veh/h)	44	361	122	65	154	29	53	96	60	84	358	61
Future Volume (veh/h)	44	361	122	65	154	29	53	96	60	84	358	61
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1856	1856	1856	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	48	392	133	71	167	32	58	104	65	91	389	66
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, %	1	1	1	3	3	3	2	2	2	1	1	1
Cap, veh/h	611	540	183	360	625	120	275	183	115	340	565	95
Arrive On Green	0.05	0.40	0.40	0.06	0.41	0.41	0.05	0.17	0.17	0.07	0.18	0.18
Sat Flow, veh/h	1795	1346	457	1767	1513	290	1781	1076	673	1795	3067	516
Grp Volume(v), veh/h	48	0	525	71	0	199	58	0	169	91	226	229
Grp Sat Flow(s), veh/h/ln	1795	0	1803	1767	0	1803	1781	0	1749	1795	1791	1792
Q Serve(g_s), s	0.9	0.0	14.5	1.3	0.0	4.3	1.5	0.0	5.2	2.4	7.0	7.1
Cycle Q Clear(g_c), s	0.9	0.0	14.5	1.3	0.0	4.3	1.5	0.0	5.2	2.4	7.0	7.1
Prop In Lane	1.00		0.25	1.00		0.16	1.00		0.38	1.00		0.29
Lane Grp Cap(c), veh/h	611	0	723	360	0	745	275	0	298	340	330	330
V/C Ratio(X)	0.08	0.00	0.73	0.20	0.00	0.27	0.21	0.00	0.57	0.27	0.68	0.69
Avail Cap(c_a), veh/h	683	0	723	409	0	745	336	0	536	377	549	549
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.4	0.0	15.0	10.9	0.0	11.4	18.8	0.0	22.5	18.4	22.5	22.6
Incr Delay (d2), s/veh	0.1	0.0	6.3	0.3	0.0	0.9	0.4	0.0	1.7	0.4	2.5	2.6
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.3	0.0	6.4	0.5	0.0	1.7	0.6	0.0	2.1	1.0	2.9	3.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	9.4	0.0	21.2	11.2	0.0	12.3	19.2	0.0	24.2	18.8	25.0	25.2
LnGrp LOS	A	A	C	B	A	B	B	A	C	B	C	C
Approach Vol, veh/h	573				270			227			546	
Approach Delay, s/veh	20.2				12.0			22.9			24.1	
Approach LOS	C				B			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	7.2	28.9	8.4	14.6	7.9	28.2	7.6	15.4				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	23.7	5.1	18.1	5.1	23.7	5.1	18.1				
Max Q Clear Time (g_c+l1), s	2.9	6.3	4.4	7.2	3.3	16.5	3.5	9.1				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.6	0.0	2.0	0.0	1.8				
Intersection Summary												
HCM 6th Ctrl Delay			20.5									
HCM 6th LOS			C									

Intersection

Intersection Delay, s/veh 58.2

Intersection LOS F

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑		↑	↑	
Traffic Vol, veh/h	41	724	53	238	29	11
Future Vol, veh/h	41	724	53	238	29	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	787	58	259	32	12
Number of Lanes	1	1	0	1	1	0
Approach	EB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	SB		EB			
Conflicting Lanes Left	1		2		0	
Conflicting Approach Right	NB				EB	
Conflicting Lanes Right	1		0		2	
HCM Control Delay	76.9		15.8		10.1	
HCM LOS	F		C		B	

Lane	NBLn1	EBLn1	EBLn2	SBLn1
Vol Left, %	18%	100%	0%	0%
Vol Thru, %	82%	0%	0%	72%
Vol Right, %	0%	0%	100%	28%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	291	41	724	40
LT Vol	53	41	0	0
Through Vol	238	0	0	29
RT Vol	0	0	724	11
Lane Flow Rate	316	45	787	44
Geometry Grp	2	7	7	2
Degree of Util (X)	0.523	0.077	1.088	0.076
Departure Headway (Hd)	6.178	6.187	4.976	6.563
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	588	582	732	549
Service Time	4.178	3.887	2.676	4.563
HCM Lane V/C Ratio	0.537	0.077	1.075	0.08
HCM Control Delay	15.8	9.4	80.7	10.1
HCM Lane LOS	C	A	F	B
HCM 95th-tile Q	3	0.2	21.6	0.2

Intersection

Intersection Delay, s/veh 10.7

Intersection LOS B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑	↓	↑	↓	↑
Traffic Vol, veh/h	13	173	7	359	14	1
Future Vol, veh/h	13	173	7	359	14	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	188	8	390	15	1
Number of Lanes	1	1	0	1	1	0
Approach	EB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	SB		EB			
Conflicting Lanes Left	1		2		0	
Conflicting Approach Right	NB			EB		
Conflicting Lanes Right	1		0		2	
HCM Control Delay	9.1		11.7		8	
HCM LOS	A		B		A	

Lane	NBLn1	EBLn1	EBLn2	SBLn1
Vol Left, %	2%	100%	0%	0%
Vol Thru, %	98%	0%	0%	93%
Vol Right, %	0%	0%	100%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	366	13	173	15
LT Vol	7	13	0	0
Through Vol	359	0	0	14
RT Vol	0	0	173	1
Lane Flow Rate	398	14	188	16
Geometry Grp	2	7	7	2
Degree of Util (X)	0.492	0.024	0.25	0.022
Departure Headway (Hd)	4.456	6.005	4.795	4.842
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	808	596	748	737
Service Time	2.481	3.74	2.53	2.885
HCM Lane V/C Ratio	0.493	0.023	0.251	0.022
HCM Control Delay	11.7	8.9	9.1	8
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	2.8	0.1	1	0.1

Intersection

Intersection Delay, s/veh 42.5

Intersection LOS E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↑		↔			↔			↔	
Traffic Vol, veh/h	3	11	37	2	24	18	419	305	6	17	121	15
Future Vol, veh/h	3	11	37	2	24	18	419	305	6	17	121	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	12	40	2	26	20	455	332	7	18	132	16
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			2			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			2			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			1			2		
HCM Control Delay	9.5			9.8			53.6			9.7		
HCM LOS	A			A			F			A		

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	57%	21%	0%	5%	11%
Vol Thru, %	42%	79%	0%	55%	79%
Vol Right, %	1%	0%	100%	41%	10%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	730	14	37	44	153
LT Vol	419	3	0	2	17
Through Vol	305	11	0	24	121
RT Vol	6	0	37	18	15
Lane Flow Rate	793	15	40	48	166
Geometry Grp	2	7	7	5	2
Degree of Util (X)	1.002	0.029	0.068	0.081	0.234
Departure Headway (Hd)	4.547	7.038	6.213	6.222	5.076
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	793	512	580	579	700
Service Time	2.596	4.738	3.913	4.222	3.155
HCM Lane V/C Ratio	1	0.029	0.069	0.083	0.237
HCM Control Delay	53.6	9.9	9.4	9.8	9.7
HCM Lane LOS	F	A	A	A	A
HCM 95th-tile Q	17.3	0.1	0.2	0.3	0.9

Intersection

Intersection Delay, s/veh 79.9

Intersection LOS F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	59	130	4	19	47	32	238	1	46	676	21
Future Vol, veh/h	9	59	130	4	19	47	32	238	1	46	676	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	64	141	4	21	51	35	259	1	50	735	23
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			2			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			2			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			1			2		
HCM Control Delay	12			11.6			15			128.1		
HCM LOS	B			B			B			F		

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	12%	13%	0%	6%	6%
Vol Thru, %	88%	87%	0%	27%	91%
Vol Right, %	0%	0%	100%	67%	3%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	271	68	130	70	743
LT Vol	32	9	0	4	46
Through Vol	238	59	0	19	676
RT Vol	1	0	130	47	21
Lane Flow Rate	295	74	141	76	808
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.485	0.15	0.256	0.143	1.211
Departure Headway (Hd)	6.262	7.808	7.018	7.358	5.396
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	580	462	516	491	678
Service Time	4.262	5.508	4.718	5.358	3.425
HCM Lane V/C Ratio	0.509	0.16	0.273	0.155	1.192
HCM Control Delay	15	11.9	12.1	11.6	128.1
HCM Lane LOS	B	B	B	B	F
HCM 95th-tile Q	2.6	0.5	1	0.5	28.2

Intersection

Intersection Delay, s/veh 189.1

Intersection LOS F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	74	162	5	24	59	40	297	2	58	842	27
Future Vol, veh/h	12	74	162	5	24	59	40	297	2	58	842	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	80	176	5	26	64	43	323	2	63	915	29
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	1			2			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			2			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			1			2		
HCM Control Delay	14.4			13.8			22.1			313.6		
HCM LOS	B			B			C			F		

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	12%	14%	0%	6%	6%
Vol Thru, %	88%	86%	0%	27%	91%
Vol Right, %	1%	0%	100%	67%	3%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	339	86	162	88	927
LT Vol	40	12	0	5	58
Through Vol	297	74	0	24	842
RT Vol	2	0	162	59	27
Lane Flow Rate	368	93	176	96	1008
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.641	0.197	0.333	0.192	1.645
Departure Headway (Hd)	7.17	8.842	8.04	8.731	5.879
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	508	408	451	414	625
Service Time	5.17	6.542	5.74	6.731	3.922
HCM Lane V/C Ratio	0.724	0.228	0.39	0.232	1.613
HCM Control Delay	22.1	13.7	14.7	13.8	313.6
HCM Lane LOS	C	B	B	B	F
HCM 95th-tile Q	4.5	0.7	1.4	0.7	55.7

Intersection

Intersection Delay, s/veh 121.6

Intersection LOS F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	14	47	3	30	23	522	380	8	22	151	19
Future Vol, veh/h	4	14	47	3	30	23	522	380	8	22	151	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	15	51	3	33	25	567	413	9	24	164	21
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0
Approach												
Opposing Approach	WB			EB			NB			SB		
Opposing Lanes	1			2			1			1		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	1			1			2			1		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	1			1			1			2		
HCM Control Delay	10.3			10.7			159.7			10.9		
HCM LOS	B			B			F			B		

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	57%	22%	0%	5%	11%
Vol Thru, %	42%	78%	0%	54%	79%
Vol Right, %	1%	0%	100%	41%	10%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	910	18	47	56	192
LT Vol	522	4	0	3	22
Through Vol	380	14	0	30	151
RT Vol	8	0	47	23	19
Lane Flow Rate	989	20	51	61	209
Geometry Grp	2	7	7	5	2
Degree of Util (X)	1.297	0.038	0.088	0.105	0.301
Departure Headway (Hd)	4.72	7.714	6.88	6.91	5.56
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	772	467	524	522	651
Service Time	2.762	5.414	4.58	4.91	3.56
HCM Lane V/C Ratio	1.281	0.043	0.097	0.117	0.321
HCM Control Delay	159.7	10.7	10.2	10.7	10.9
HCM Lane LOS	F	B	B	B	B
HCM 95th-tile Q	37.8	0.1	0.3	0.3	1.3

Intersection

Intersection Delay, s/veh 13.8  
Intersection LOS B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	
Traffic Vol, veh/h	88	142	38	23	235	24	65	162	34	17	99	75
Future Vol, veh/h	88	142	38	23	235	24	65	162	34	17	99	75
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	5	5	5	1	1	1	3	3	3	4	4	4
Mvmt Flow	96	154	41	25	255	26	71	176	37	18	108	82
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	2			2			2			2		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	2			2			2			2		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	2			2			2			2		
HCM Control Delay	12.7			15.8			13.4			13		
HCM LOS	B			C			B			B		

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	83%	0%	79%	0%	91%	0%	57%
Vol Right, %	0%	17%	0%	21%	0%	9%	0%	43%
Sign Control	Stop							
Traffic Vol by Lane	65	196	88	180	23	259	17	174
LT Vol	65	0	88	0	23	0	17	0
Through Vol	0	162	0	142	0	235	0	99
RT Vol	0	34	0	38	0	24	0	75
Lane Flow Rate	71	213	96	196	25	282	18	189
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.145	0.401	0.195	0.362	0.05	0.519	0.039	0.355
Departure Headway (Hd)	7.407	6.772	7.328	6.667	7.216	6.64	7.576	6.756
Convergence, Y/N	Yes							
Cap	485	533	491	540	498	543	473	533
Service Time	5.136	4.502	5.054	4.393	4.94	4.364	5.316	4.496
HCM Lane V/C Ratio	0.146	0.4	0.196	0.363	0.05	0.519	0.038	0.355
HCM Control Delay	11.4	14	11.8	13.1	10.3	16.3	10.6	13.2
HCM Lane LOS	B	B	B	B	B	C	B	B
HCM 95th-tile Q	0.5	1.9	0.7	1.6	0.2	3	0.1	1.6

Intersection

Intersection Delay, s/veh 11.2  
Intersection LOS B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	
Traffic Vol, veh/h	70	114	30	18	188	19	52	130	27	13	79	60
Future Vol, veh/h	70	114	30	18	188	19	52	130	27	13	79	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	5	5	5	1	1	1	3	3	3	4	4	4
Mvmt Flow	76	124	33	20	204	21	57	141	29	14	86	65
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Approach	EB		WB			NB			SB			
Opposing Approach	WB		EB			SB			NB			
Opposing Lanes	2		2			2			2			
Conflicting Approach Left	SB		NB			EB			WB			
Conflicting Lanes Left	2		2			2			2			
Conflicting Approach Right	NB		SB			WB			EB			
Conflicting Lanes Right	2		2			2			2			
HCM Control Delay	10.8		12.1			11.1			10.7			
HCM LOS	B		B			B			B			

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	83%	0%	79%	0%	91%	0%	57%
Vol Right, %	0%	17%	0%	21%	0%	9%	0%	43%
Sign Control	Stop							
Traffic Vol by Lane	52	157	70	144	18	207	13	139
LT Vol	52	0	70	0	18	0	13	0
Through Vol	0	130	0	114	0	188	0	79
RT Vol	0	27	0	30	0	19	0	60
Lane Flow Rate	57	171	76	157	20	225	14	151
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.106	0.289	0.14	0.261	0.036	0.374	0.027	0.253
Departure Headway (Hd)	6.724	6.095	6.647	5.992	6.562	5.99	6.853	6.039
Convergence, Y/N	Yes							
Cap	532	589	539	598	545	601	522	594
Service Time	4.47	3.841	4.393	3.738	4.307	3.735	4.604	3.789
HCM Lane V/C Ratio	0.107	0.29	0.141	0.263	0.037	0.374	0.027	0.254
HCM Control Delay	10.3	11.3	10.5	10.9	9.6	12.3	9.8	10.8
HCM Lane LOS	B	B	B	B	A	B	A	B
HCM 95th-tile Q	0.4	1.2	0.5	1	0.1	1.7	0.1	1

Intersection

Intersection Delay, s/veh 62.1

Intersection LOS F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↑↓	
Traffic Vol, veh/h	44	361	122	65	154	29	53	96	60	84	358	61
Future Vol, veh/h	44	361	122	65	154	29	53	96	60	84	358	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	1	1	1	3	3	3	2	2	2	1	1	1
Mvmt Flow	48	392	133	71	167	32	58	104	65	91	389	66
Number of Lanes	1	1	0	1	1	0	1	1	0	1	2	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	2			2			3			2		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	3			2			2			2		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	2			3			2			2		
HCM Control Delay	137.6			20.3			18.9			21.6		
HCM LOS	F			C			C			C		

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	62%	0%	75%	0%	84%	0%	100%	66%
Vol Right, %	0%	38%	0%	25%	0%	16%	0%	0%	34%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	53	156	44	483	65	183	84	239	180
LT Vol	53	0	44	0	65	0	84	0	0
Through Vol	0	96	0	361	0	154	0	239	119
RT Vol	0	60	0	122	0	29	0	0	61
Lane Flow Rate	58	170	48	525	71	199	91	259	196
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.159	0.432	0.121	1.23	0.192	0.506	0.23	0.619	0.455
Departure Headway (Hd)	10.737	9.927	9.128	8.434	10.392	9.756	9.745	9.225	8.979
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	336	365	392	431	348	372	371	394	404
Service Time	8.437	7.627	6.893	6.198	8.092	7.456	7.445	6.925	6.679
HCM Lane V/C Ratio	0.173	0.466	0.122	1.218	0.204	0.535	0.245	0.657	0.485
HCM Control Delay	15.5	20	13.2	148.9	15.5	22	15.3	25.8	19
HCM Lane LOS	C	C	B	F	C	C	C	D	C
HCM 95th-tile Q	0.6	2.1	0.4	21.3	0.7	2.7	0.9	4	2.3

Intersection

Intersection Delay, s/veh 23.8

Intersection LOS C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↑↓	
Traffic Vol, veh/h	35	290	98	52	123	23	42	77	48	67	287	49
Future Vol, veh/h	35	290	98	52	123	23	42	77	48	67	287	49
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	1	1	1	3	3	3	2	2	2	1	1	1
Mvmt Flow	38	315	107	57	134	25	46	84	52	73	312	53
Number of Lanes	1	1	0	1	1	0	1	1	0	1	2	0
Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	2			2			3			2		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	3			2			2			2		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	2			3			2			2		
HCM Control Delay	39.6			15.1			14.4			15.4		
HCM LOS	E			C			B			C		

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	62%	0%	75%	0%	84%	0%	100%	66%
Vol Right, %	0%	38%	0%	25%	0%	16%	0%	0%	34%
Sign Control	Stop								
Traffic Vol by Lane	42	125	35	388	52	146	67	191	145
LT Vol	42	0	35	0	52	0	67	0	0
Through Vol	0	77	0	290	0	123	0	191	96
RT Vol	0	48	0	98	0	23	0	0	49
Lane Flow Rate	46	136	38	422	57	159	73	208	157
Geometry Grp	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.117	0.314	0.085	0.867	0.141	0.368	0.169	0.454	0.333
Departure Headway (Hd)	9.204	8.419	8.09	7.402	8.966	8.34	8.377	7.864	7.621
Convergence, Y/N	Yes								
Cap	391	429	441	485	402	435	426	455	469
Service Time	6.917	6.119	5.881	5.192	6.666	6.04	6.176	5.663	5.419
HCM Lane V/C Ratio	0.118	0.317	0.086	0.87	0.142	0.366	0.171	0.457	0.335
HCM Control Delay	13.1	14.9	11.6	42.1	13.1	15.8	12.9	17.1	14.2
HCM Lane LOS	B	B	B	E	B	C	B	C	B
HCM 95th-tile Q	0.4	1.3	0.3	9.1	0.5	1.7	0.6	2.3	1.4

HCM 6th Signalized Intersection Summary  
R Street SE/29th Street SE

No-build  
Timing Plan: AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑		↑	↑		↑	↑		↑	↑	
Traffic Volume (veh/h)	14	95	37	113	109	12	187	956	28	9	186	14
Future Volume (veh/h)	14	95	37	113	109	12	187	956	28	9	186	14
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00		1.00	1.00		1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	15	103	40	123	118	13	203	1039	30	10	202	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	291	229	89	294	354	39	735	1062	31	105	913	68
Arrive On Green	0.02	0.18	0.18	0.05	0.21	0.21	0.07	0.59	0.59	0.01	0.53	0.53
Sat Flow, veh/h	1781	1283	498	1781	1655	182	1781	1809	52	1781	1720	128
Grp Volume(v), veh/h	15	0	143	123	0	131	203	0	1069	10	0	217
Grp Sat Flow(s), veh/h/ln	1781	0	1781	1781	0	1838	1781	0	1861	1781	0	1847
Q Serve(g_s), s	0.7	0.0	7.6	5.5	0.0	6.4	5.2	0.0	59.0	0.3	0.0	6.6
Cycle Q Clear(g_c), s	0.7	0.0	7.6	5.5	0.0	6.4	5.2	0.0	59.0	0.3	0.0	6.6
Prop In Lane	1.00			0.28	1.00		0.10	1.00		0.03	1.00	0.07
Lane Grp Cap(c), veh/h	291	0	318	294	0	393	735	0	1092	105	0	981
V/C Ratio(X)	0.05	0.00	0.45	0.42	0.00	0.33	0.28	0.00	0.98	0.10	0.00	0.22
Avail Cap(c_a), veh/h	347	0	318	294	0	393	746	0	1100	170	0	1043
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.5	0.0	38.8	33.6	0.0	35.2	9.1	0.0	21.2	24.7	0.0	13.2
Incr Delay (d2), s/veh	0.1	0.0	4.5	0.9	0.0	2.3	0.2	0.0	21.9	0.4	0.0	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	0.3	0.0	3.7	2.6	0.0	3.1	1.9	0.0	29.9	0.1	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.6	0.0	43.3	34.5	0.0	37.5	9.3	0.0	43.1	25.0	0.0	13.3
LnGrp LOS	C	A	D	C	A	D	A	A	D	C	A	B
Approach Vol, veh/h	158				254				1272			227
Approach Delay, s/veh	42.5				36.0				37.7			13.8
Approach LOS		D				D			D			B
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	6.3	27.1	5.8	66.6	10.0	23.4	11.7	60.6				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	19.3	5.1	62.5	5.5	18.9	7.9	59.7				
Max Q Clear Time (g_c+l1), s	2.7	8.4	2.3	61.0	7.5	9.6	7.2	8.6				
Green Ext Time (p_c), s	0.0	0.4	0.0	1.1	0.0	0.4	0.0	1.4				
Intersection Summary												
HCM 6th Ctrl Delay				35.1								
HCM 6th LOS				D								

HCM 6th Signalized Intersection Summary  
R Street SE/29th Street SE

Existing  
Timing Plan: AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	
Traffic Volume (veh/h)	11	76	29	90	87	9	150	768	222	7	149	11
Future Volume (veh/h)	11	76	29	90	87	9	150	768	222	7	149	11
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00			1.00			1.00		
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	12	83	32	98	95	10	163	835	241	8	162	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	311	229	88	316	360	38	769	823	238	86	933	69
Arrive On Green	0.01	0.18	0.18	0.05	0.22	0.22	0.06	0.59	0.59	0.01	0.54	0.54
Sat Flow, veh/h	1781	1286	496	1781	1664	175	1781	1395	403	1781	1720	127
Grp Volume(v), veh/h	12	0	115	98	0	105	163	0	1076	8	0	174
Grp Sat Flow(s), veh/h/ln	1781	0	1781	1781	0	1839	1781	0	1798	1781	0	1847
Q Serve(g_s), s	0.6	0.0	6.0	4.7	0.0	5.0	4.1	0.0	62.5	0.2	0.0	5.0
Cycle Q Clear(g_c), s	0.6	0.0	6.0	4.7	0.0	5.0	4.1	0.0	62.5	0.2	0.0	5.0
Prop In Lane	1.00			0.28	1.00		0.10	1.00		0.22	1.00	
Lane Grp Cap(c), veh/h	311	0	318	316	0	398	769	0	1061	86	0	1002
V/C Ratio(X)	0.04	0.00	0.36	0.31	0.00	0.26	0.21	0.00	1.01	0.09	0.00	0.17
Avail Cap(c_a), veh/h	371	0	318	316	0	398	800	0	1061	154	0	1041
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.8	0.0	38.2	32.3	0.0	34.5	8.7	0.0	21.7	26.2	0.0	12.3
Incr Delay (d2), s/veh	0.1	0.0	3.2	0.6	0.0	1.6	0.1	0.0	31.3	0.5	0.0	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	0.3	0.0	2.9	2.0	0.0	2.4	1.5	0.0	33.0	0.1	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.8	0.0	41.4	32.8	0.0	36.1	8.9	0.0	53.0	26.7	0.0	12.3
LnGrp LOS	C	A	D	C	A	D	A	A	F	C	A	B
Approach Vol, veh/h		127			203			1239			182	
Approach Delay, s/veh		40.8			34.5			47.2			13.0	
Approach LOS		D			C			D			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	6.0	27.4	5.5	67.0	10.0	23.4	10.6	62.0				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	19.3	5.1	62.5	5.5	18.9	7.9	59.7				
Max Q Clear Time (g_c+l1), s	2.6	7.0	2.2	64.5	6.7	8.0	6.1	7.0				
Green Ext Time (p_c), s	0.0	0.3	0.0	0.0	0.0	0.4	0.1	1.1				
Intersection Summary												
HCM 6th Ctrl Delay			41.7									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary  
R Street SE/29th Street SE

Existing  
Timing Plan: PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑		↑	↑		↑	↑		↑	↑	
Traffic Volume (veh/h)	23	169	167	207	142	20	37	197	125	5	715	13
Future Volume (veh/h)	23	169	167	207	142	20	37	197	125	5	715	13
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	25	184	182	225	154	22	40	214	136	5	777	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	510	262	259	406	617	88	162	366	233	291	571	10
Arrive On Green	0.03	0.30	0.30	0.11	0.39	0.39	0.04	0.34	0.34	0.01	0.31	0.31
Sat Flow, veh/h	1781	863	854	1781	1601	229	1781	1069	679	1781	1831	33
Grp Volume(v), veh/h	25	0	366	225	0	176	40	0	350	5	0	791
Grp Sat Flow(s), veh/h/ln	1781	0	1717	1781	0	1829	1781	0	1748	1781	0	1864
Q Serve(g_s), s	0.7	0.0	14.2	6.1	0.0	4.9	1.1	0.0	12.4	0.1	0.0	23.5
Cycle Q Clear(g_c), s	0.7	0.0	14.2	6.1	0.0	4.9	1.1	0.0	12.4	0.1	0.0	23.5
Prop In Lane	1.00		0.50	1.00		0.13	1.00		0.39	1.00		0.02
Lane Grp Cap(c), veh/h	510	0	521	406	0	705	162	0	599	291	0	581
V/C Ratio(X)	0.05	0.00	0.70	0.55	0.00	0.25	0.25	0.00	0.58	0.02	0.00	1.36
Avail Cap(c_a), veh/h	583	0	521	460	0	705	216	0	599	399	0	581
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.1	0.0	23.3	15.8	0.0	15.8	20.0	0.0	20.4	18.3	0.0	26.0
Incr Delay (d2), s/veh	0.0	0.0	7.7	1.2	0.0	0.8	0.8	0.0	1.5	0.0	0.0	173.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	0.3	0.0	6.6	2.4	0.0	2.1	0.5	0.0	5.0	0.1	0.0	37.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	17.2	0.0	31.0	17.0	0.0	16.6	20.8	0.0	21.8	18.3	0.0	199.7
LnGrp LOS	B	A	C	B	A	B	C	A	C	B	A	F
Approach Vol, veh/h	391				401			390			796	
Approach Delay, s/veh	30.1				16.9			21.7			198.6	
Approach LOS	C				B			C			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	6.5	33.6	5.0	30.3	12.7	27.4	7.3	28.0				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	28.3	5.1	23.5	10.5	22.9	5.1	23.5				
Max Q Clear Time (g_c+l1), s	2.7	6.9	2.1	14.4	8.1	16.2	3.1	25.5				
Green Ext Time (p_c), s	0.0	0.9	0.0	1.4	0.2	1.2	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			93.6									
HCM 6th LOS			F									

Intersection

Intersection Delay, s/veh 10.7

Intersection LOS B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑	↓	↑	↓	↑
Traffic Vol, veh/h	13	173	7	359	14	1
Future Vol, veh/h	13	173	7	359	14	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	188	8	390	15	1
Number of Lanes	1	1	0	1	1	0
Approach	EB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	SB		EB			
Conflicting Lanes Left	1		2		0	
Conflicting Approach Right	NB			EB		
Conflicting Lanes Right	1		0		2	
HCM Control Delay	9.1		11.7		8	
HCM LOS	A		B		A	

Lane	NBLn1	EBLn1	EBLn2	SBLn1
Vol Left, %	2%	100%	0%	0%
Vol Thru, %	98%	0%	0%	93%
Vol Right, %	0%	0%	100%	7%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	366	13	173	15
LT Vol	7	13	0	0
Through Vol	359	0	0	14
RT Vol	0	0	173	1
Lane Flow Rate	398	14	188	16
Geometry Grp	2	7	7	2
Degree of Util (X)	0.492	0.024	0.25	0.022
Departure Headway (Hd)	4.456	6.005	4.795	4.842
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	808	596	748	737
Service Time	2.481	3.74	2.53	2.885
HCM Lane V/C Ratio	0.493	0.023	0.251	0.022
HCM Control Delay	11.7	8.9	9.1	8
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	2.8	0.1	1	0.1

Intersection

Intersection Delay, s/veh 13.1

Intersection LOS B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑	↓	↑	↓	2
Traffic Vol, veh/h	16	211	9	439	17	2
Future Vol, veh/h	16	211	9	439	17	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	229	10	477	19	2
Number of Lanes	1	1	0	1	1	0
Approach	EB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	SB		EB			
Conflicting Lanes Left	1		2		0	
Conflicting Approach Right	NB				EB	
Conflicting Lanes Right	1		0		2	
HCM Control Delay	10.1		14.9		8.3	
HCM LOS	B		B		A	

Lane	NBLn1	EBLn1	EBLn2	SBLn1
Vol Left, %	2%	100%	0%	0%
Vol Thru, %	98%	0%	0%	89%
Vol Right, %	0%	0%	100%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	448	16	211	19
LT Vol	9	16	0	0
Through Vol	439	0	0	17
RT Vol	0	0	211	2
Lane Flow Rate	487	17	229	21
Geometry Grp	2	7	7	2
Degree of Util (X)	0.621	0.03	0.321	0.029
Departure Headway (Hd)	4.588	6.243	5.031	5.073
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	784	571	711	700
Service Time	2.632	4.003	2.791	3.148
HCM Lane V/C Ratio	0.621	0.03	0.322	0.03
HCM Control Delay	14.9	9.2	10.2	8.3
HCM Lane LOS	B	A	B	A
HCM 95th-tile Q	4.4	0.1	1.4	0.1

Intersection

Intersection Delay, s/veh 135.5

Intersection LOS F

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑	↑		↑	↑	
Traffic Vol, veh/h	50	884	65	291	36	13
Future Vol, veh/h	50	884	65	291	36	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	961	71	316	40	14
Number of Lanes	1	1	0	1	1	0
Approach	EB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	SB		EB			
Conflicting Lanes Left	1		2		0	
Conflicting Approach Right	NB			EB		
Conflicting Lanes Right	1		0		2	
HCM Control Delay	185.8		20.9		11.1	
HCM LOS	F		C		B	

Lane	NBLn1	EBLn1	EBLn2	SBLn1
Vol Left, %	18%	100%	0%	0%
Vol Thru, %	82%	0%	0%	73%
Vol Right, %	0%	0%	100%	27%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	356	50	884	49
LT Vol	65	50	0	0
Through Vol	291	0	0	36
RT Vol	0	0	884	13
Lane Flow Rate	387	54	961	54
Geometry Grp	2	7	7	2
Degree of Util (X)	0.64	0.096	1.379	0.096
Departure Headway (Hd)	6.725	6.379	5.166	7.308
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	542	560	701	493
Service Time	4.725	4.143	2.929	5.308
HCM Lane V/C Ratio	0.714	0.096	1.371	0.11
HCM Control Delay	20.9	9.8	195.8	11.1
HCM Lane LOS	C	A	F	B
HCM 95th-tile Q	4.5	0.3	41.2	0.3

### Summary of All Intervals

Run Number	1	10	11	2	3	4	5
Start Time	6:57	6:57	6:57	6:57	6:57	6:57	6:57
End Time	7:10	7:10	7:10	7:10	7:10	7:10	7:10
Total Time (min)	13	13	13	13	13	13	13
Time Recorded (min)	10	10	10	10	10	10	10
# of Intervals	2	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1	1
Vehs Entered	222	222	222	222	222	222	222
Vehs Exited	229	229	229	229	229	229	229
Starting Vehs	13	13	13	13	13	13	13
Ending Vehs	6	6	6	6	6	6	6
Travel Distance (mi)	25	25	25	25	25	25	25
Travel Time (hr)	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total Delay (hr)	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total Stops	97	97	97	97	97	97	97
Fuel Used (gal)	1.3	1.3	1.3	1.3	1.3	1.3	1.3

### Summary of All Intervals

Run Number	6	7	8	93835F0A199F	Avg
Start Time	6:57	6:57	6:57	6:57	6:57
End Time	7:10	7:10	7:10	7:10	7:10
Total Time (min)	13	13	13	13	13
Time Recorded (min)	10	10	10	10	10
# of Intervals	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1
Vehs Entered	222	222	222	222	222
Vehs Exited	229	229	229	229	229
Starting Vehs	13	13	13	13	13
Ending Vehs	6	6	6	6	6
Travel Distance (mi)	25	25	25	25	25
Travel Time (hr)	1.8	1.8	1.8	1.8	1.8
Total Delay (hr)	0.7	0.7	0.7	0.7	0.7
Total Stops	97	97	97	97	97
Fuel Used (gal)	1.3	1.3	1.3	1.3	1.3

### Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

HCM 6th Signalized Intersection Summary  
R Street SE/29th Street SE

No-build  
Timing Plan: PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	
Traffic Volume (veh/h)	29	211	208	258	177	25	47	246	156	7	890	17
Future Volume (veh/h)	29	211	208	258	177	25	47	246	156	7	890	17
Initial Q (Q <sub>b</sub> ), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	32	229	226	280	192	27	51	267	170	8	967	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	492	254	251	360	628	88	169	358	228	219	553	10
Arrive On Green	0.03	0.29	0.29	0.13	0.39	0.39	0.04	0.33	0.33	0.01	0.30	0.30
Sat Flow, veh/h	1781	864	853	1781	1604	226	1781	1068	680	1781	1830	34
Grp Volume(v), veh/h	32	0	455	280	0	219	51	0	437	8	0	985
Grp Sat Flow(s), veh/h/ln	1781	0	1717	1781	0	1830	1781	0	1748	1781	0	1864
Q Serve(g_s), s	1.0	0.0	19.8	8.0	0.0	6.4	1.5	0.0	17.2	0.2	0.0	23.5
Cycle Q Clear(g_c), s	1.0	0.0	19.8	8.0	0.0	6.4	1.5	0.0	17.2	0.2	0.0	23.5
Prop In Lane	1.00		0.50	1.00		0.12	1.00		0.39	1.00		0.02
Lane Grp Cap(c), veh/h	492	0	506	360	0	716	169	0	586	219	0	563
V/C Ratio(X)	0.07	0.00	0.90	0.78	0.00	0.31	0.30	0.00	0.75	0.04	0.00	1.75
Avail Cap(c_a), veh/h	552	0	506	371	0	716	209	0	586	317	0	563
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(l)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.0	0.0	26.3	17.8	0.0	16.4	20.7	0.0	22.9	19.9	0.0	27.1
Incr Delay (d2), s/veh	0.1	0.0	21.6	9.9	0.0	1.1	1.0	0.0	5.2	0.1	0.0	344.0
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	10.7	4.0	0.0	2.8	0.6	0.0	7.5	0.1	0.0	63.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	18.0	0.0	47.9	27.6	0.0	17.5	21.7	0.0	28.1	19.9	0.0	371.1
LnGrp LOS	B	A	D	C	A	B	C	A	C	B	A	F
Approach Vol, veh/h	487				499			488			993	
Approach Delay, s/veh	46.0				23.2			27.5			368.3	
Approach LOS		D			C			C			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+R <sub>c</sub> ), s	7.0	34.9	5.3	30.5	14.5	27.4	7.8	28.0				
Change Period (Y+R <sub>c</sub> ), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.1	28.3	5.1	23.5	10.5	22.9	5.1	23.5				
Max Q Clear Time (g_c+l1), s	3.0	8.4	2.2	19.2	10.0	21.8	3.5	25.5				
Green Ext Time (p_c), s	0.0	1.2	0.0	1.1	0.0	0.3	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			167.4									
HCM 6th LOS			F									

**4: R Street SE & Howard Rd Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	3.0	1.2	0.8	0.6	0.1	0.1	1.1
Total Delay (hr)	0.0	0.3	0.0	0.1	0.0	0.0	0.4
Total Del/Veh (s)	6.7	6.1	7.0	8.4	4.3	2.4	6.7
Stop Delay (hr)	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Stop Del/Veh (s)	2.6	0.3	4.2	4.7	2.2	2.4	1.7

**Total Network Performance**

Denied Delay (hr)	0.1
Denied Del/Veh (s)	1.1
Total Delay (hr)	0.6
Total Del/Veh (s)	9.2
Stop Delay (hr)	0.1
Stop Del/Veh (s)	2.1

## Arterial Level of Service - Corridor Alternative 2

02/03/2020

### Arterial Level of Service: NB R Street SE

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
29th St	III	30	64.4	12.1	76.5	0.54	25.3	B
Howard Rd	III	30	64.3	6.7	71.0	0.51	25.7	B
Total	III		128.7	18.8	147.5	1.04	25.5	B

### Arterial Level of Service: SB R Street SE

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
21st St	III	30	14.1	23.2	37.3	0.10	9.7	F
29th St	III	30	64.3	174.6	238.9	0.51	7.6	F
Total	III		78.4	197.8	276.2	0.61	7.9	F

Arterial Level of Service - Corridor Alternative 3

02/03/2020

Arterial Level of Service: NB R Street SE

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
29th St	III	30	64.4	12.1	76.5	0.54	25.3	B
Howard Rd	III	30	64.3	6.7	71.0	0.51	25.7	B
Total	III		128.7	18.8	147.5	1.04	25.5	B

Arterial Level of Service: SB R Street SE

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
21st St	III	30	14.1	6.8	20.9	0.10	17.3	D
29th St	III	30	64.3	14.4	78.7	0.51	23.2	C
Total	III		78.4	21.2	99.6	0.61	21.9	C

## Arterial Level of Service- Corridor Alternative 1

02/03/2020

### Arterial Level of Service: NB R Street SE

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
29th St	III	30	64.4	12.1	76.5	0.54	25.3	B
Howard Rd	III	30	64.3	6.7	71.0	0.51	25.7	B
Total	III		128.7	18.8	147.5	1.04	25.5	B

### Arterial Level of Service: SB R Street SE

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
21st St	III	30	14.1	6.8	20.9	0.10	17.3	D
29th St	III	30	64.3	14.4	78.7	0.51	23.2	C
Total	III		78.4	21.2	99.6	0.61	21.9	C

# USER REPORT FOR SITE

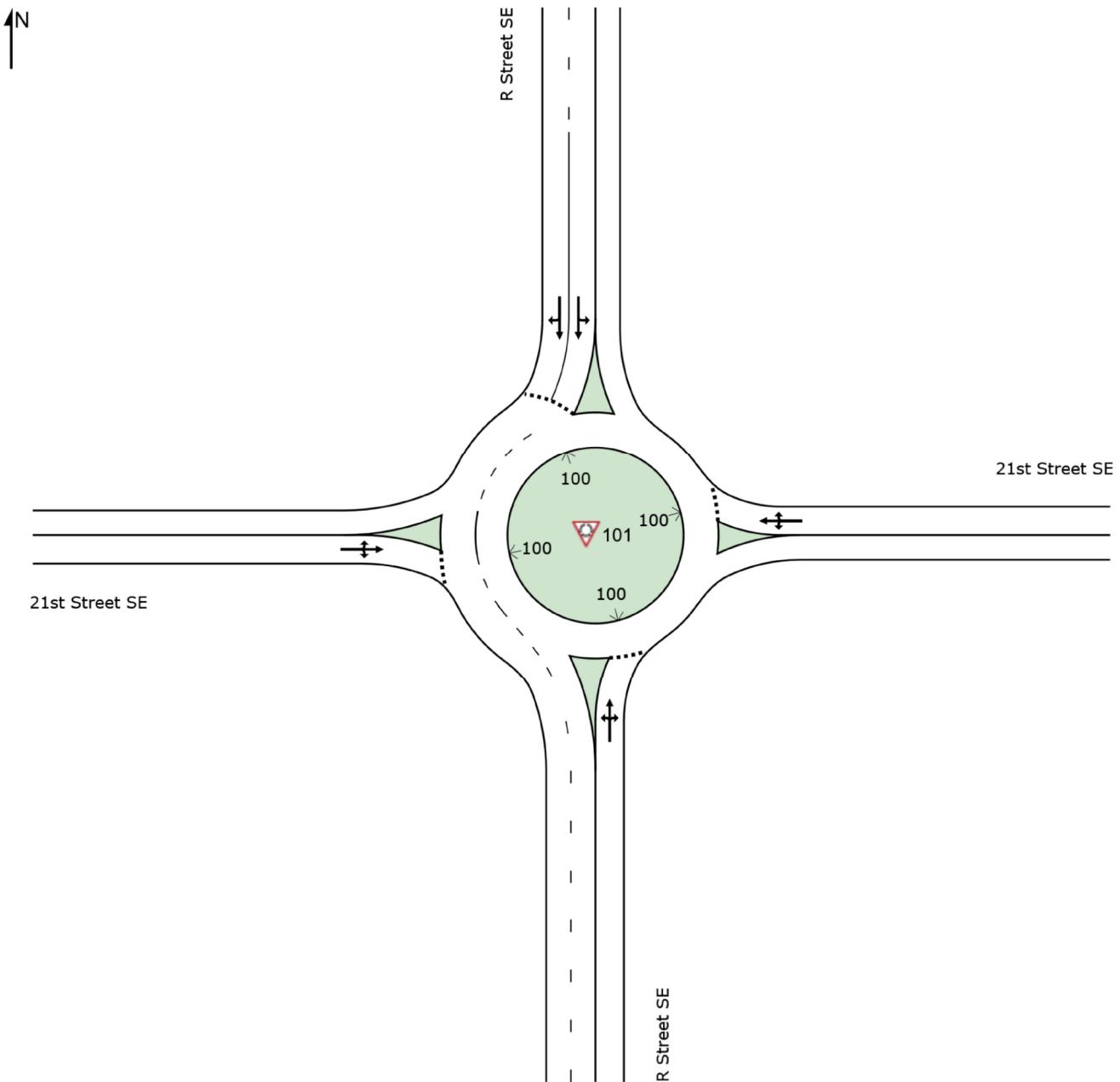
Project: R-Street\_Analysis

Template: Roundabout v/c,  
delay, & LOS

## Site: 101 [R Street SE/21st Street SE Alt 1-AM]

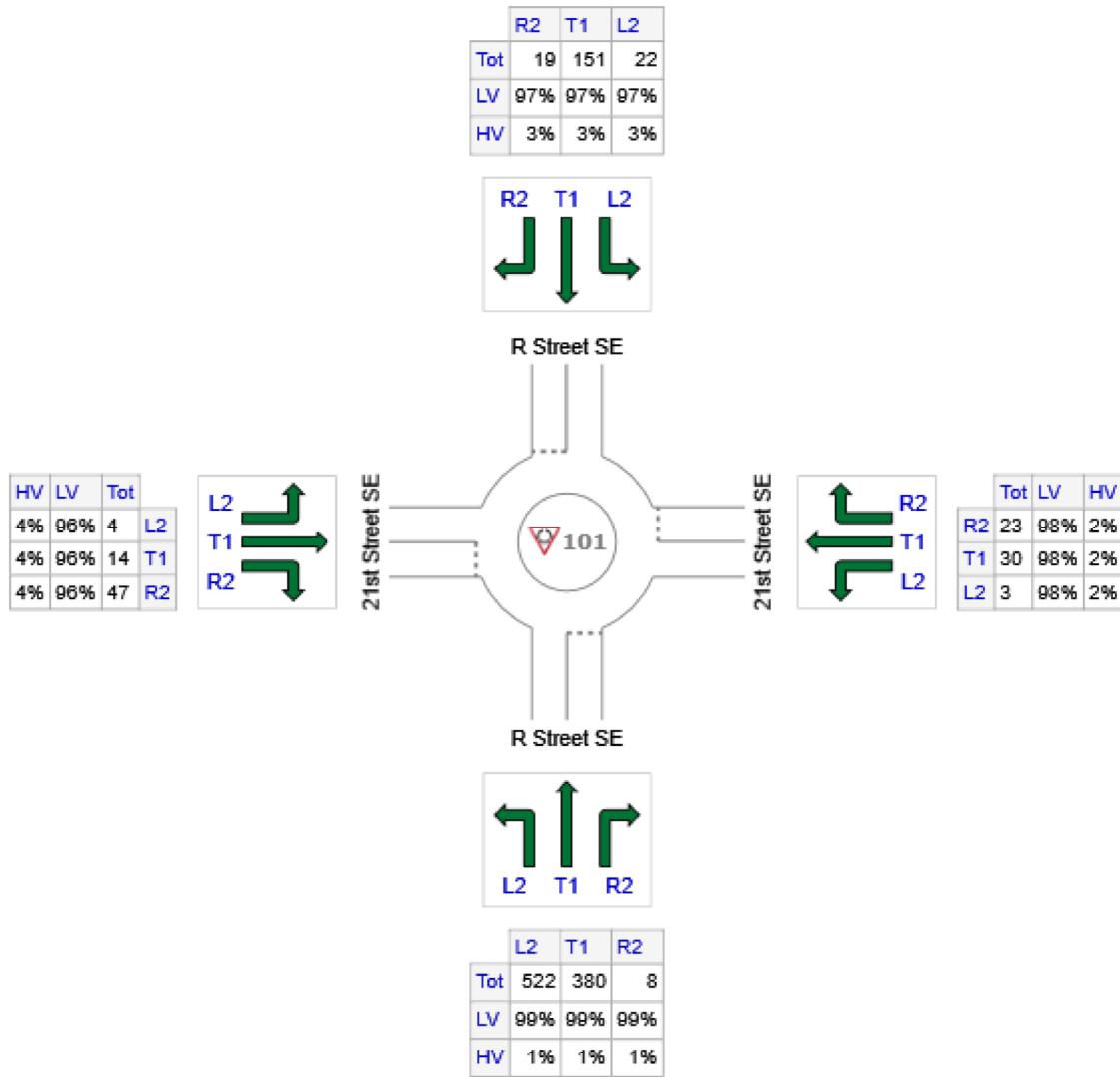
Site Category: -  
Roundabout

### Site Layout



## Input Volumes

### Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: R Street SE	910	901	9
E: 21st Street SE	56	55	1
N: R Street SE	192	186	6
W: 21st Street SE	65	62	3
Total	1223	1204	19

**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Upstr Signal	Extra Bunchin g
		ft	ft	ft	ft	°			ft	ft		%
South	R Street SE	100.00	30.00	148.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	21st Street SE	100.00	18.00	148.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	R Street SE	100.00	18.00	148.0	90.0	30.0	1	2	14.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	21st Street SE	100.00	30.00	148.0	90.0	30.0	2	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

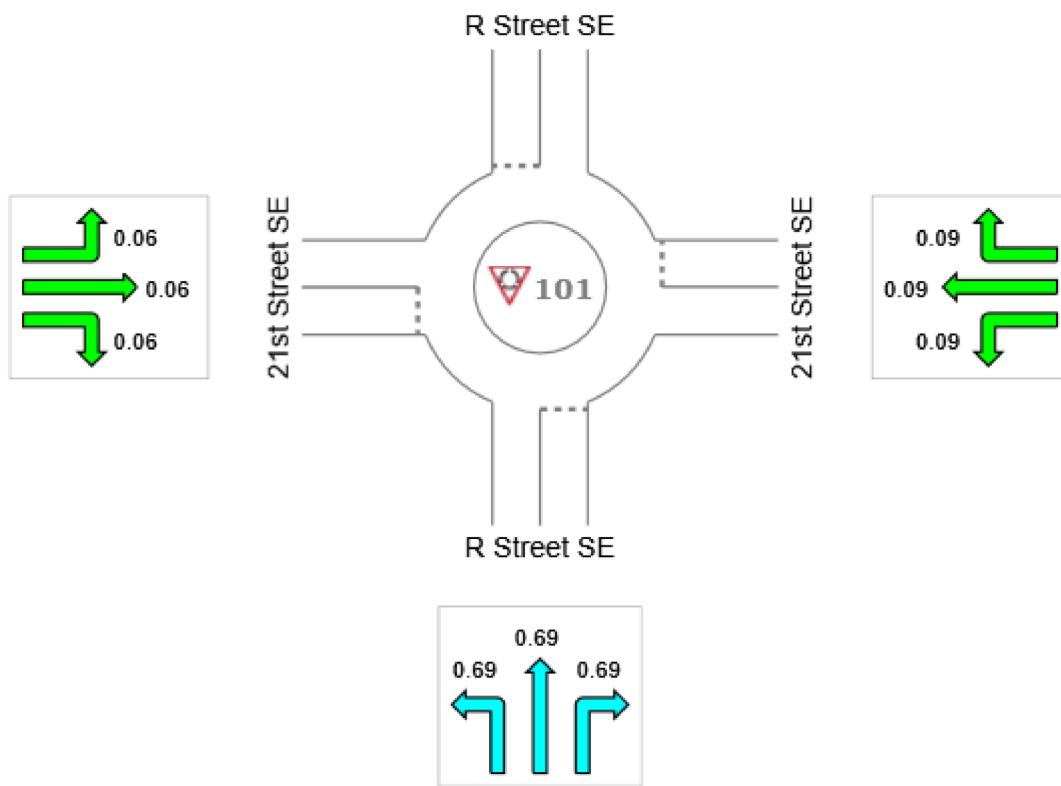
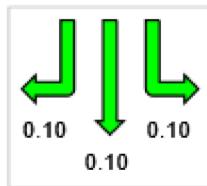
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

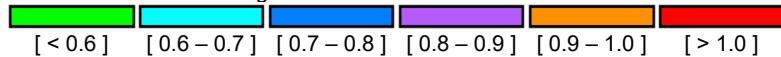
## Degree of Saturation

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.69	0.09	0.10	0.06	0.69



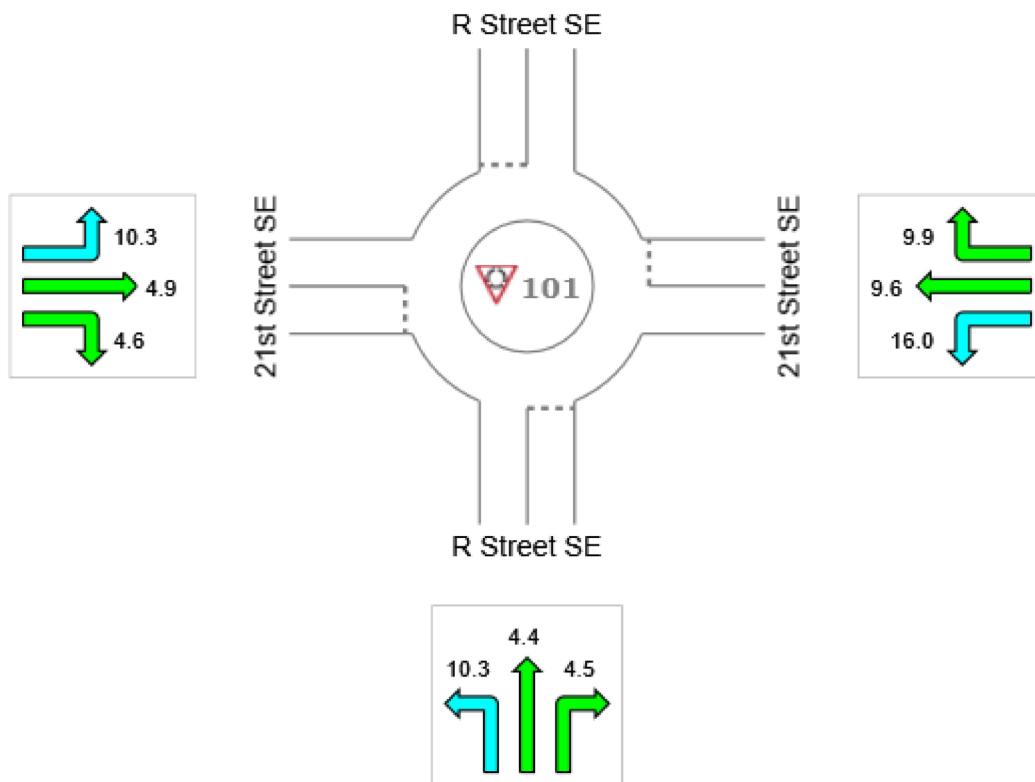
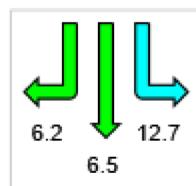
Colour code based on Degree of Saturation



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	7.7	10.1	7.2	5.0	7.6
LOS	A	B	A	A	A



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

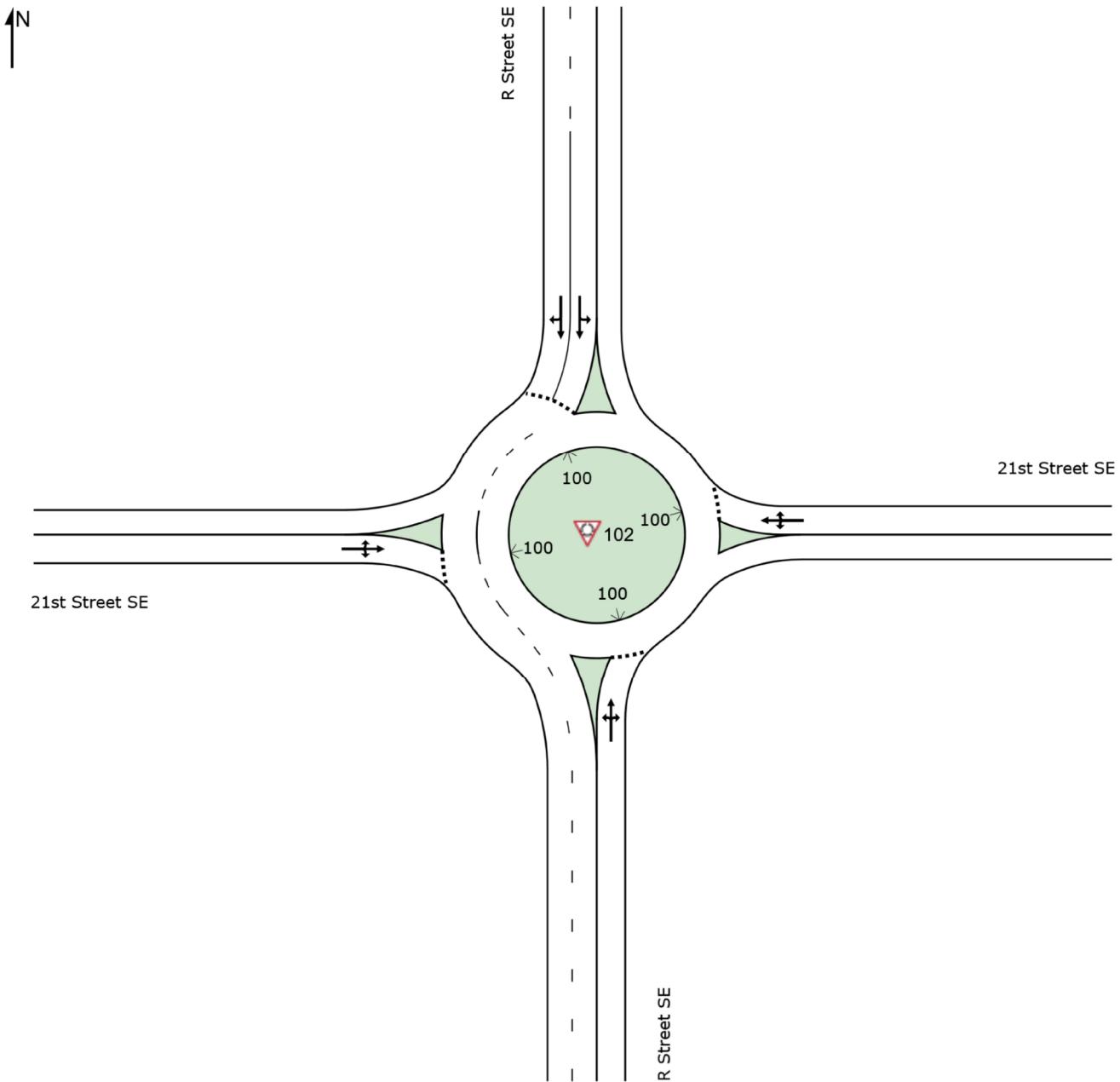
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

▼ Site: 102 [R Street SE/21st Street SE Alt 1-PM]

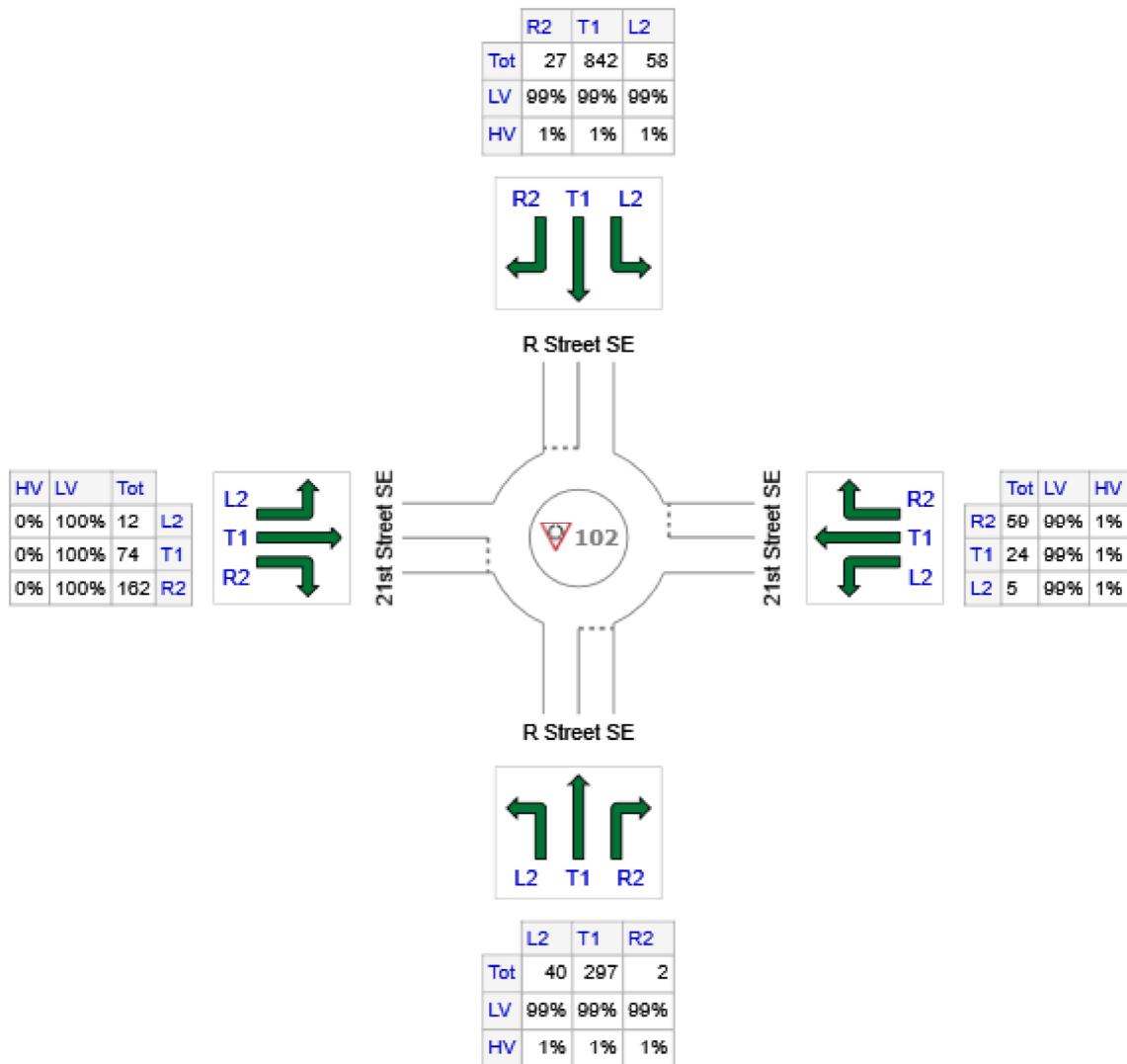
Site Category: -  
Roundabout

Site Layout



## Input Volumes

### Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: R Street SE	339	336	3
E: 21st Street SE	88	87	1
N: R Street SE	927	918	9
W: 21st Street SE	248	248	0
Total	1602	1588	14

**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Upstr Signal	Extra Bunchin g
		ft	ft	ft	ft	°			ft	ft		%
South	R Street SE	100.00	30.00	148.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	21st Street SE	100.00	18.00	148.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	R Street SE	100.00	18.00	148.0	90.0	30.0	1	2	14.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	21st Street SE	100.00	30.00	148.0	90.0	30.0	2	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

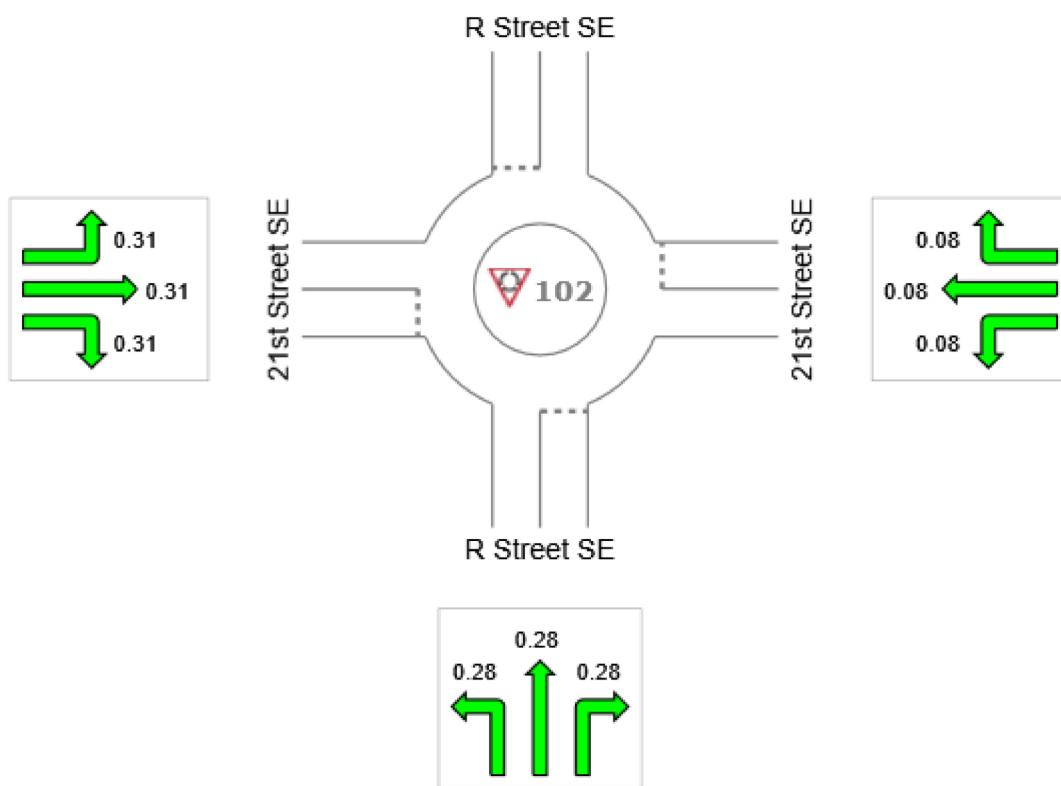
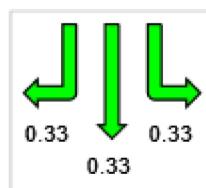
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

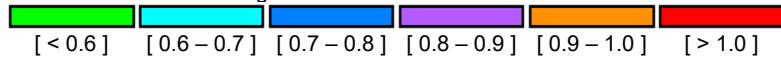
## Degree of Saturation

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.28	0.08	0.33	0.31	0.33



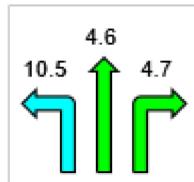
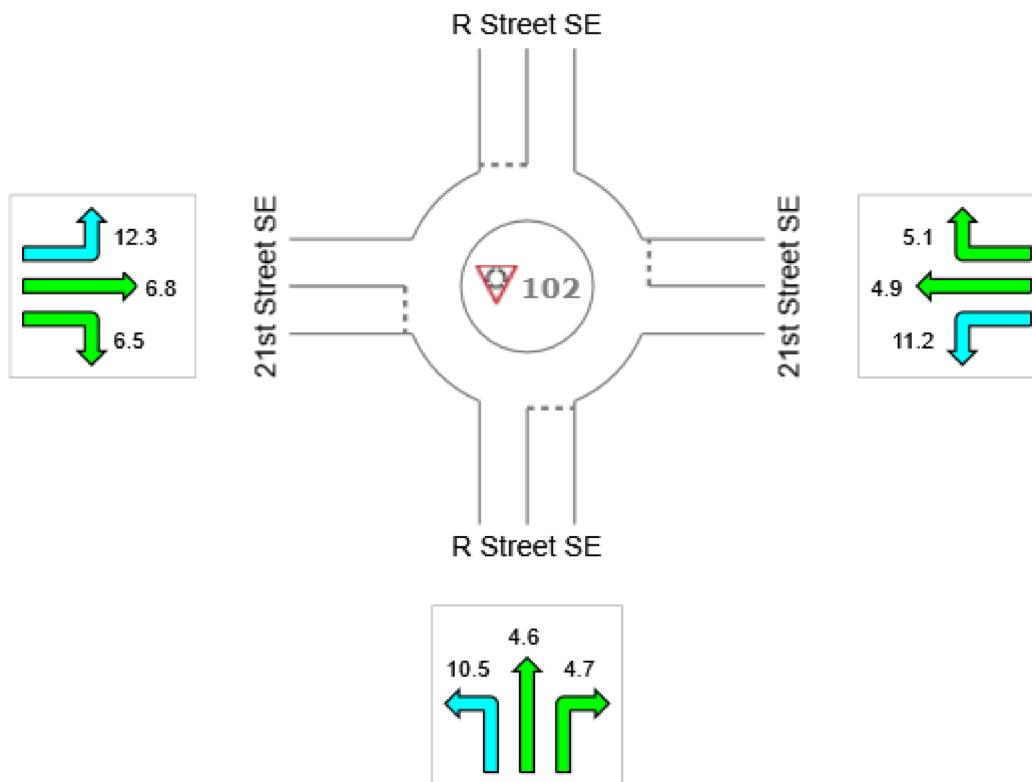
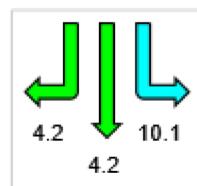
Colour code based on Degree of Saturation



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	5.3	5.4	4.6	6.9	5.1
LOS	A	A	A	A	A



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

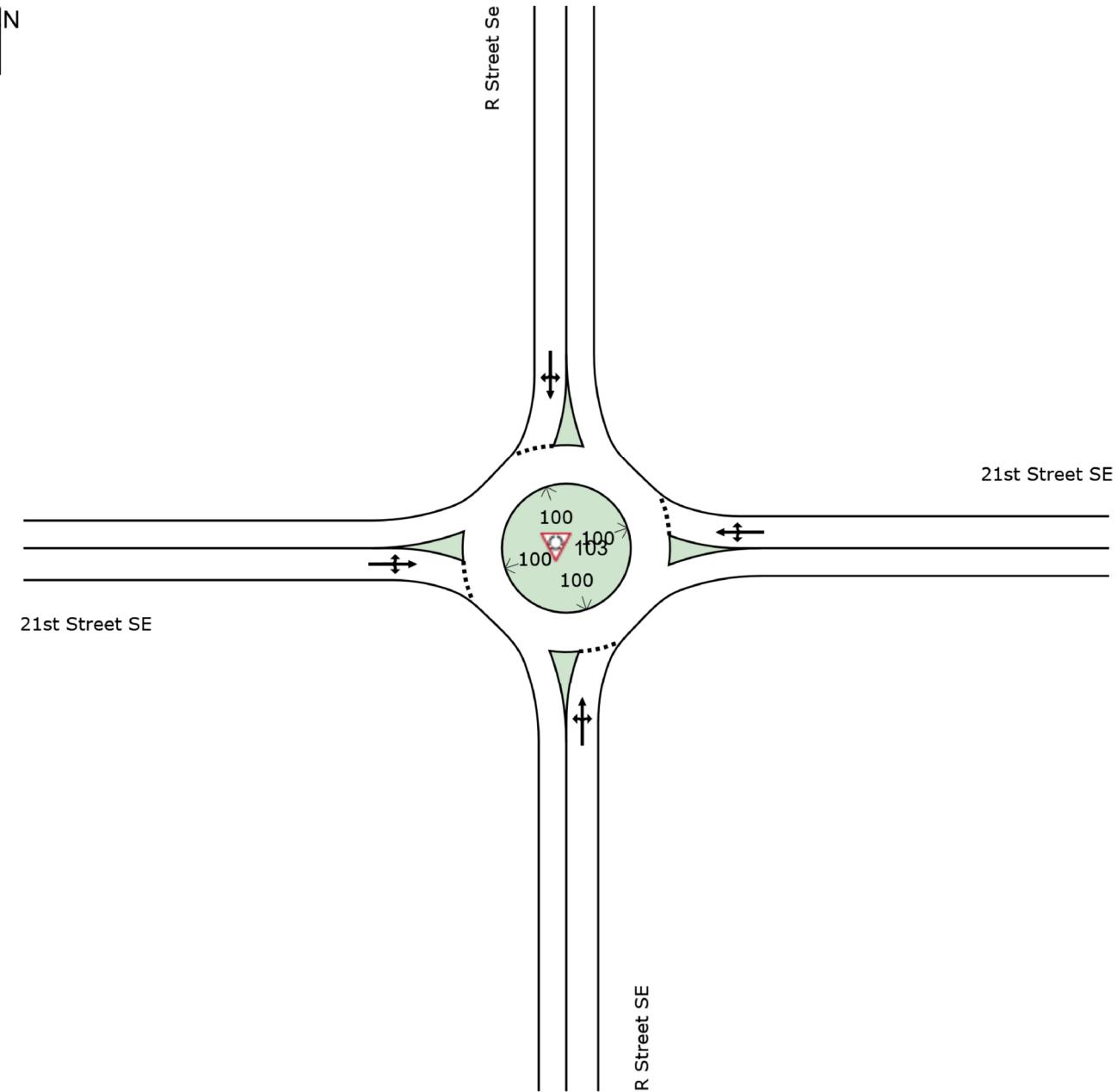
 Site: 103 [R Street SE/21st Street SE Alt 2-AM ]

New Site

Site Category: (None)

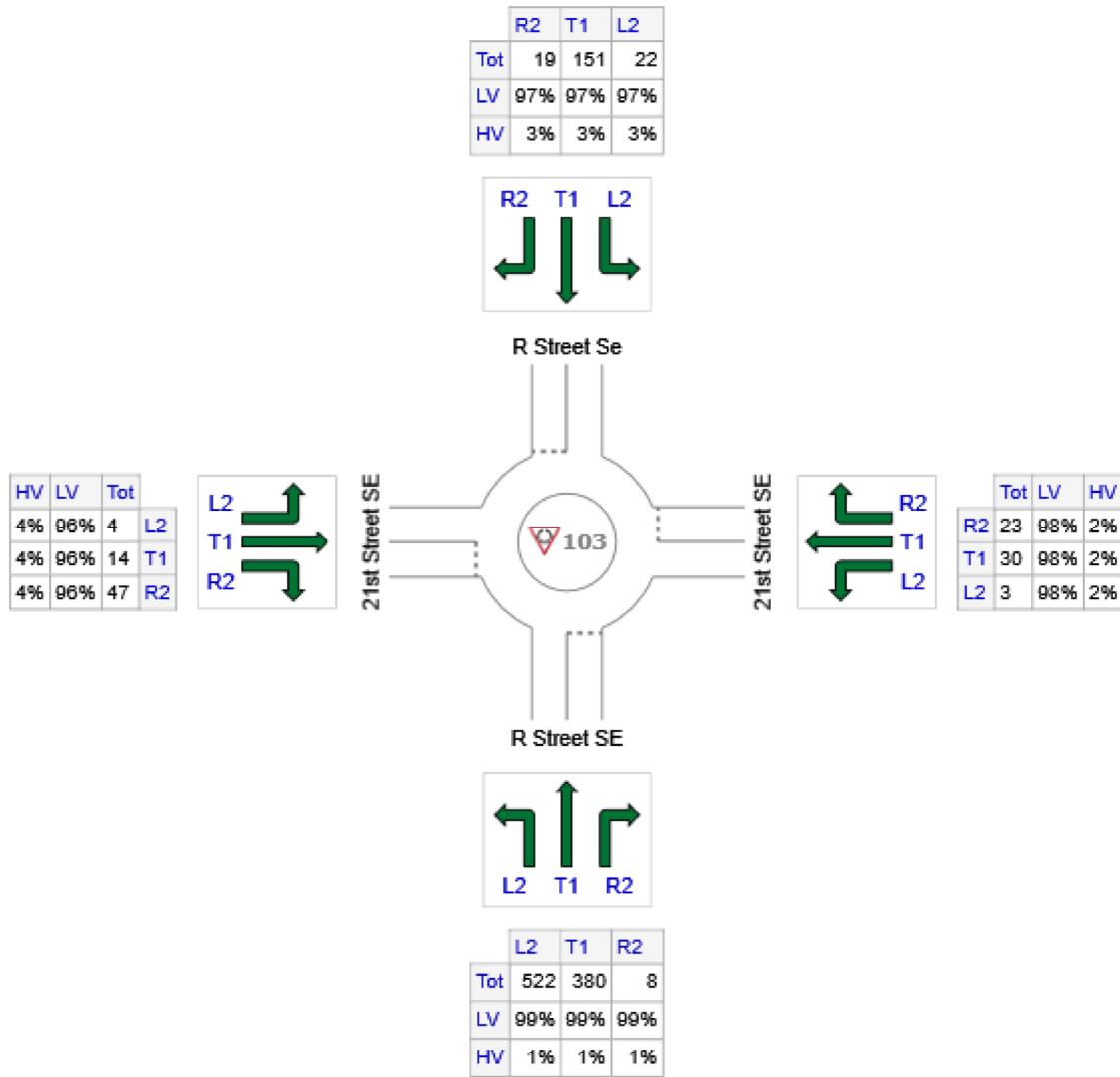
Roundabout

Site Layout



## Input Volumes

### Volume Display Method: Total and %



**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Upstr Signal	Extra Bunchin g
		ft	ft	ft	ft	°			ft	ft		%
South	R Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	21st Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	R Street Se	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	21st Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

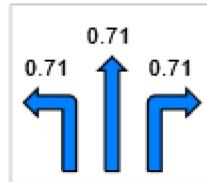
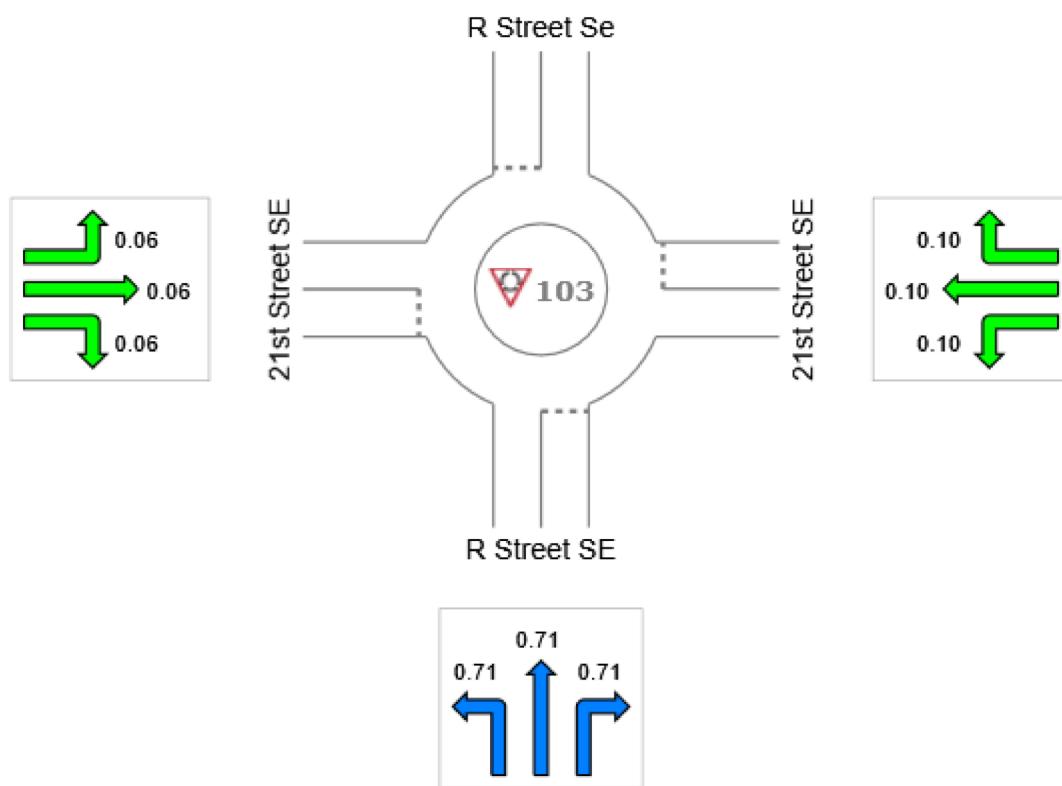
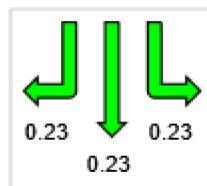
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

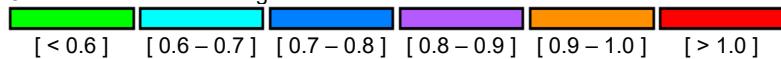
## Degree of Saturation

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.71	0.10	0.23	0.06	0.71



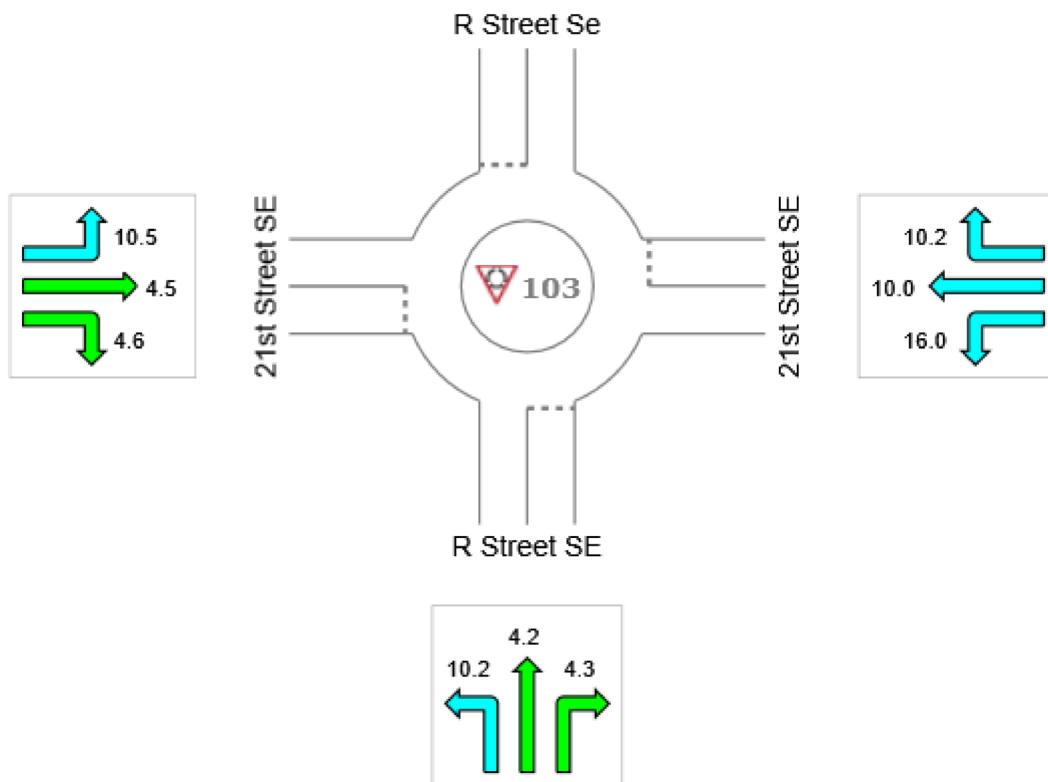
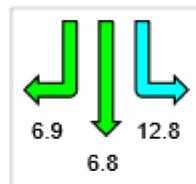
Colour code based on Degree of Saturation



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	7.6	10.4	7.5	4.9	7.6
LOS	A	B	A	A	A



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

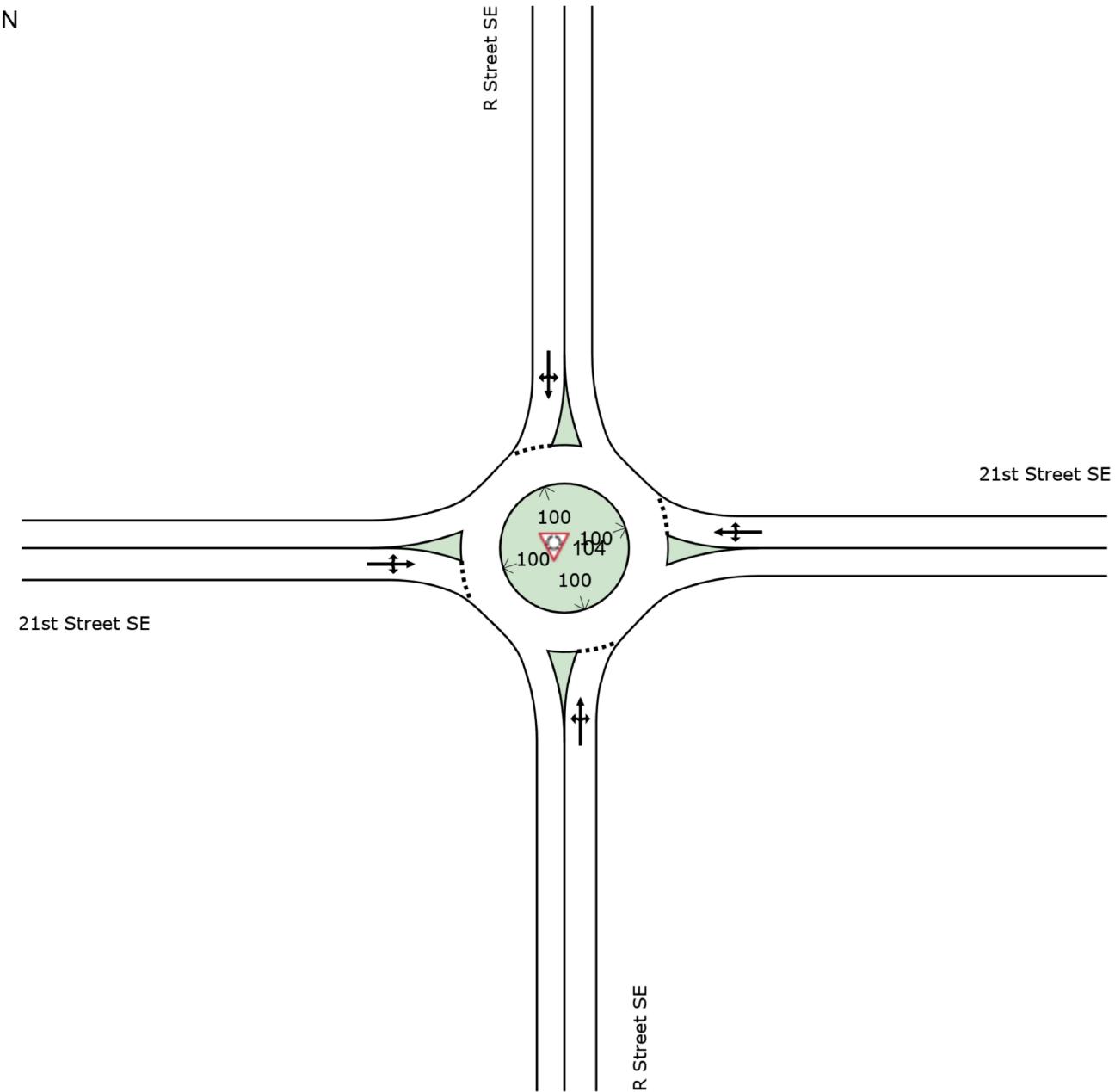
 Site: 104 [R Street SE/21st Street SE Alt 2-PM]

New Site

Site Category: (None)

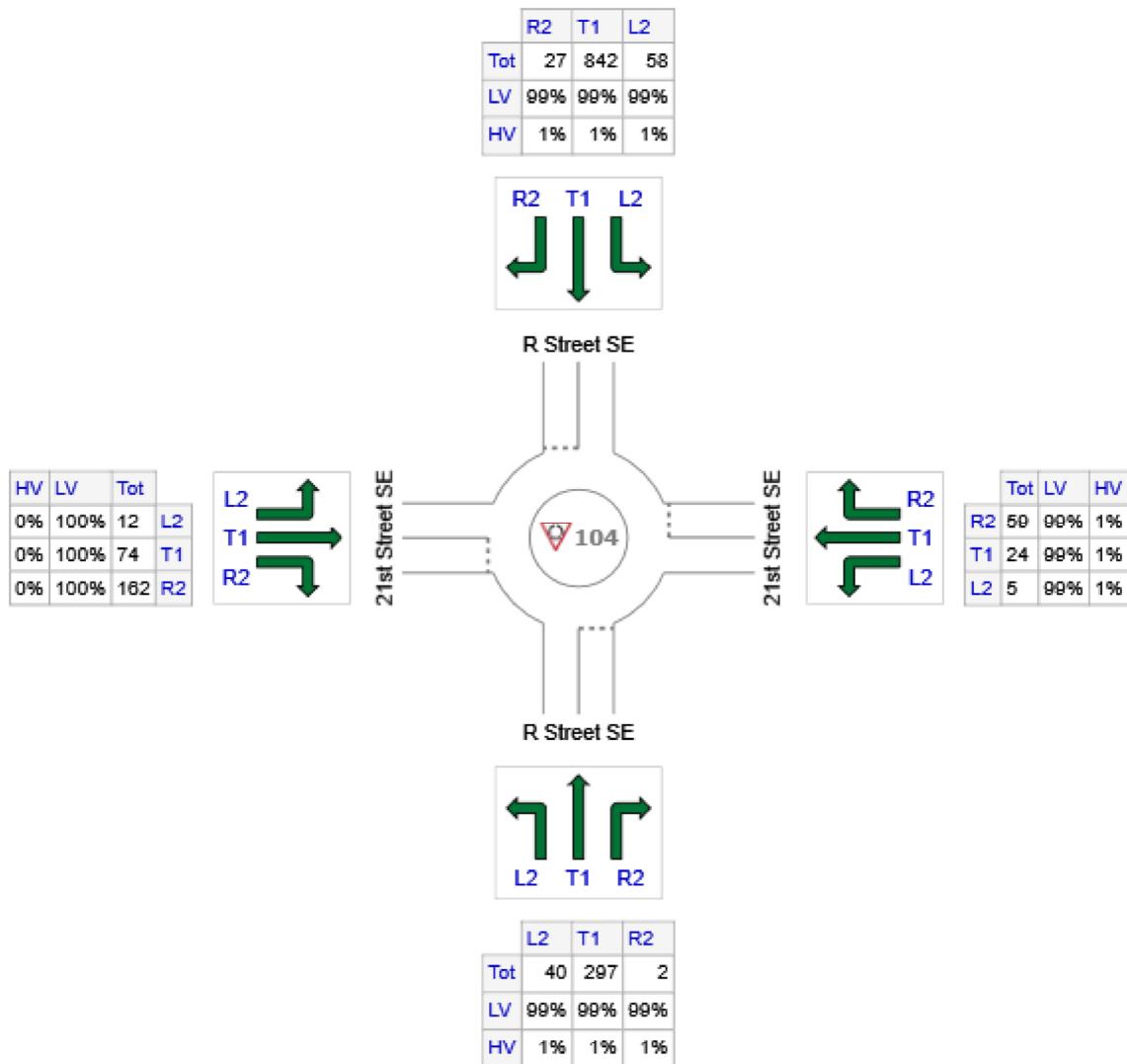
Roundabout

Site Layout



## Input Volumes

### Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: R Street SE	339	336	3
E: 21st Street SE	88	87	1
N: R Street SE	927	918	9
W: 21st Street SE	248	248	0
Total	1602	1588	14

**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Upstr Signal	Extra Bunching
		ft	ft	ft	ft	°			ft	ft		%
South	R Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	21st Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	R Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	21st Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

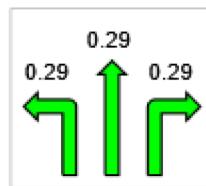
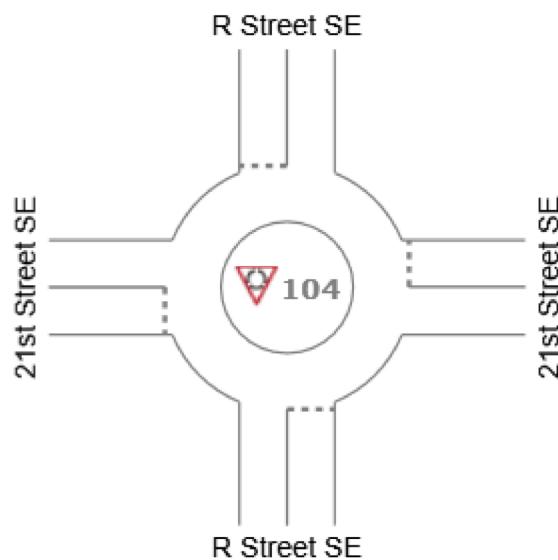
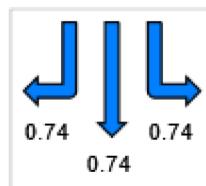
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

## Degree of Saturation

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.29	0.09	0.74	0.43	0.74



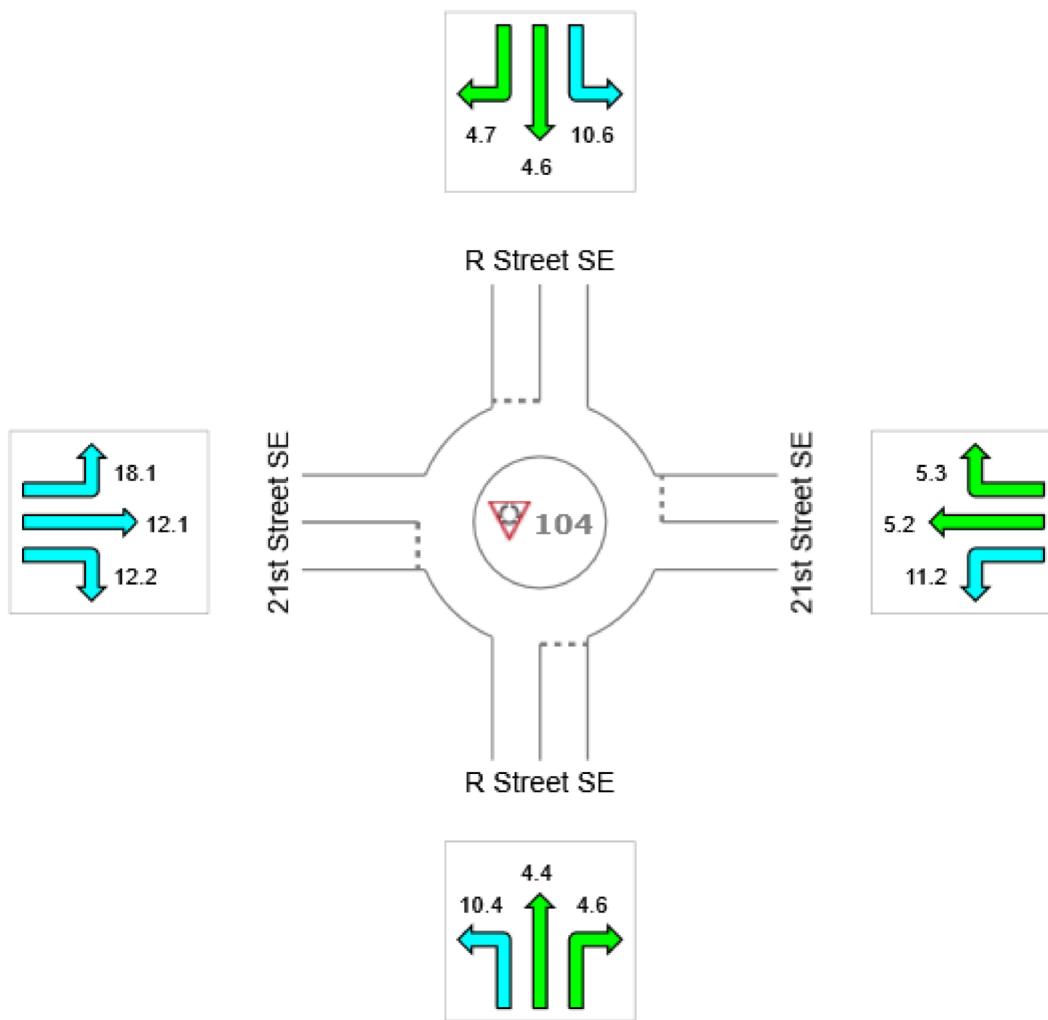
Colour code based on Degree of Saturation



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	5.1	5.6	4.9	12.5	6.2
LOS	A	A	A	B	A



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

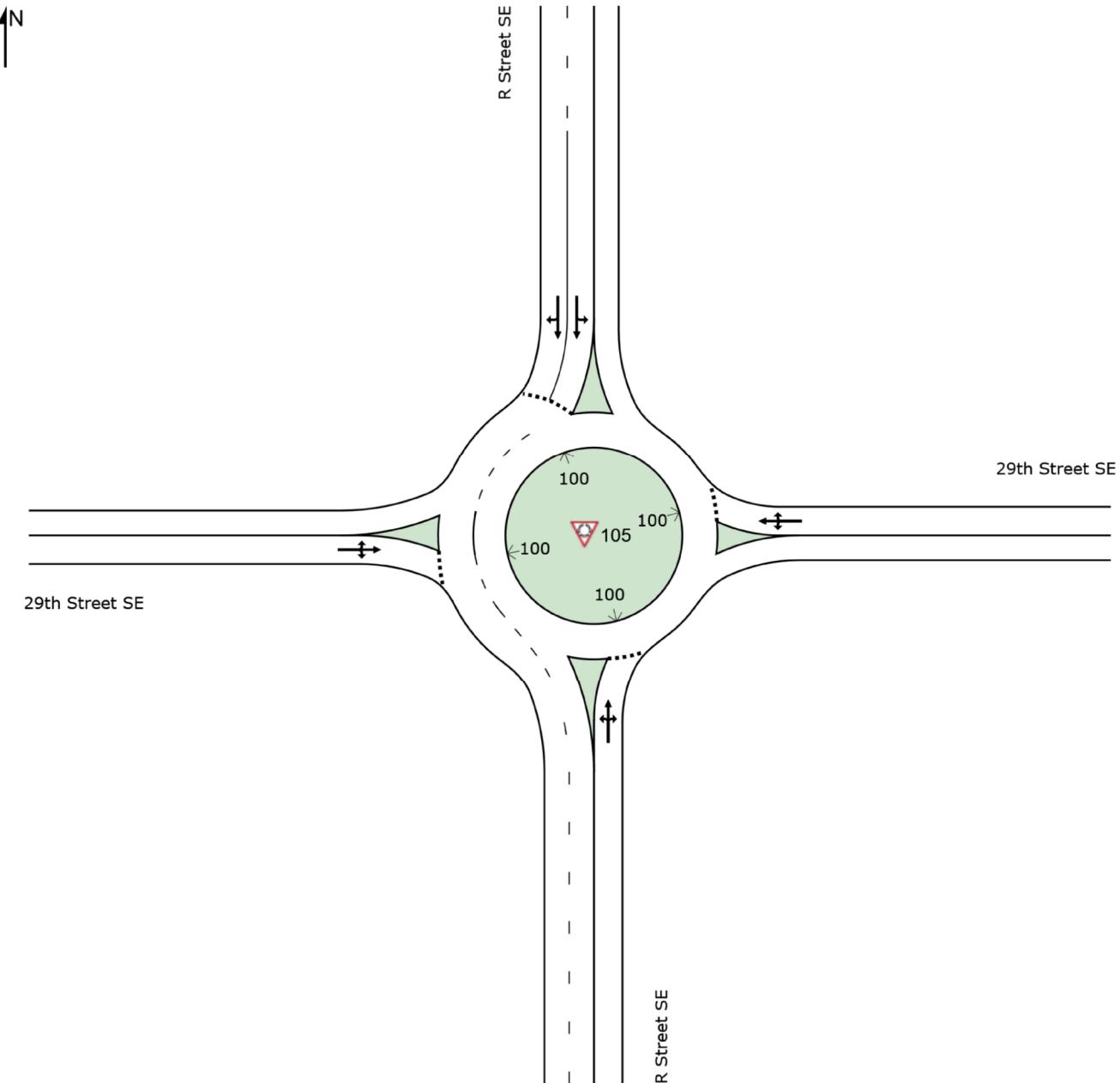
▼ Site: 105 [R Street SE/29th Street SE Alt 1-AM]

New Site

Site Category: (None)

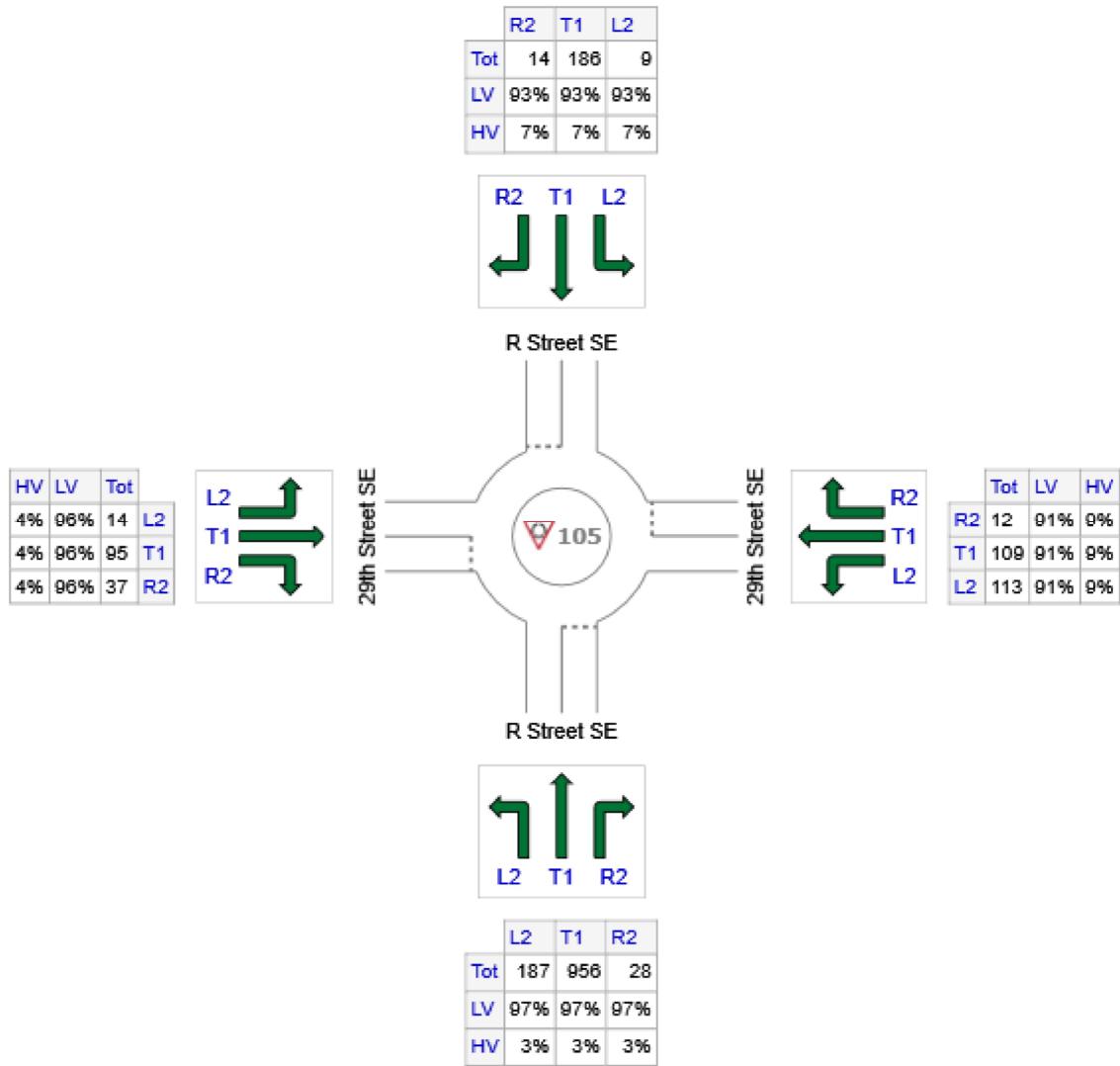
Roundabout

Site Layout



## Input Volumes

### Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: R Street SE	1171	1136	35
E: 29th Street SE	234	213	21
N: R Street SE	209	194	15
W: 29th Street SE	146	140	6
Total	1760	1683	77

**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Upstr Signal	Extra Bunchin g
		ft	ft	ft	ft	°			ft	ft		%
South	R Street SE	100.00	30.00	148.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	29th Street SE	100.00	18.00	148.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	R Street SE	100.00	18.00	148.0	90.0	30.0	1	2	14.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	29th Street SE	100.00	30.00	148.0	90.0	30.0	2	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

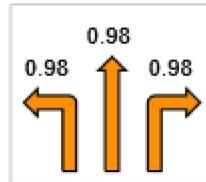
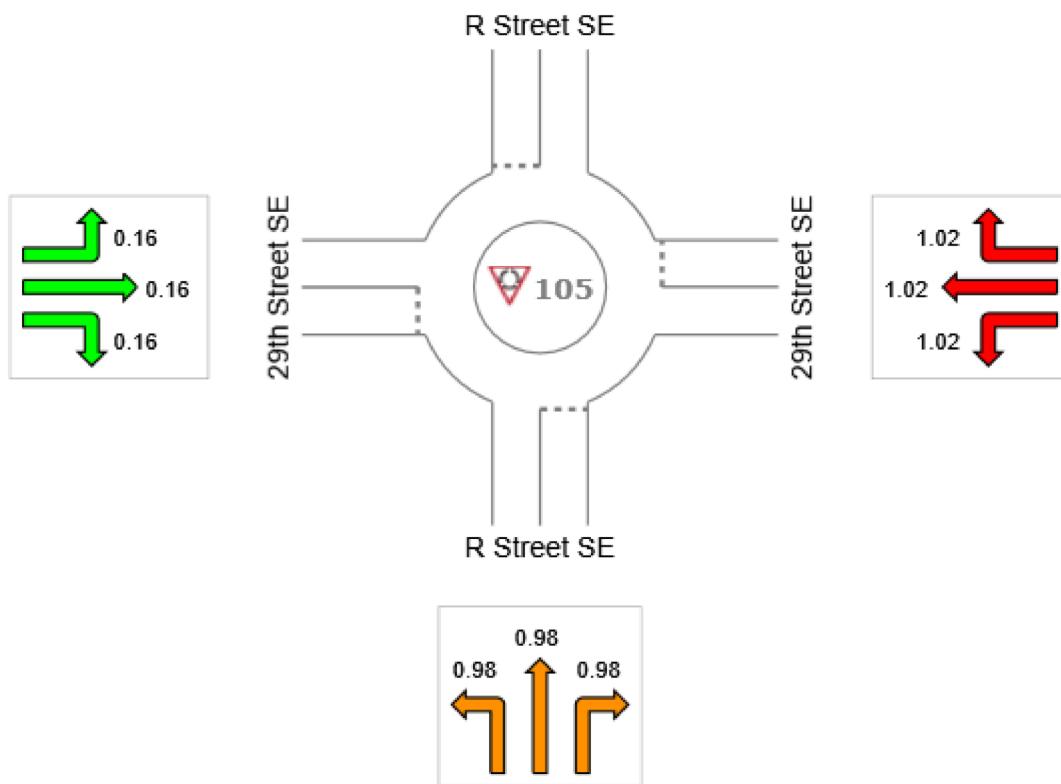
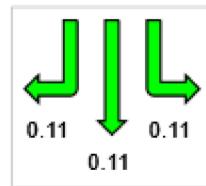
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

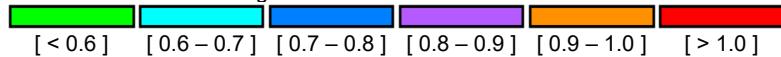
## Degree of Saturation

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.98	1.02	0.11	0.16	1.02



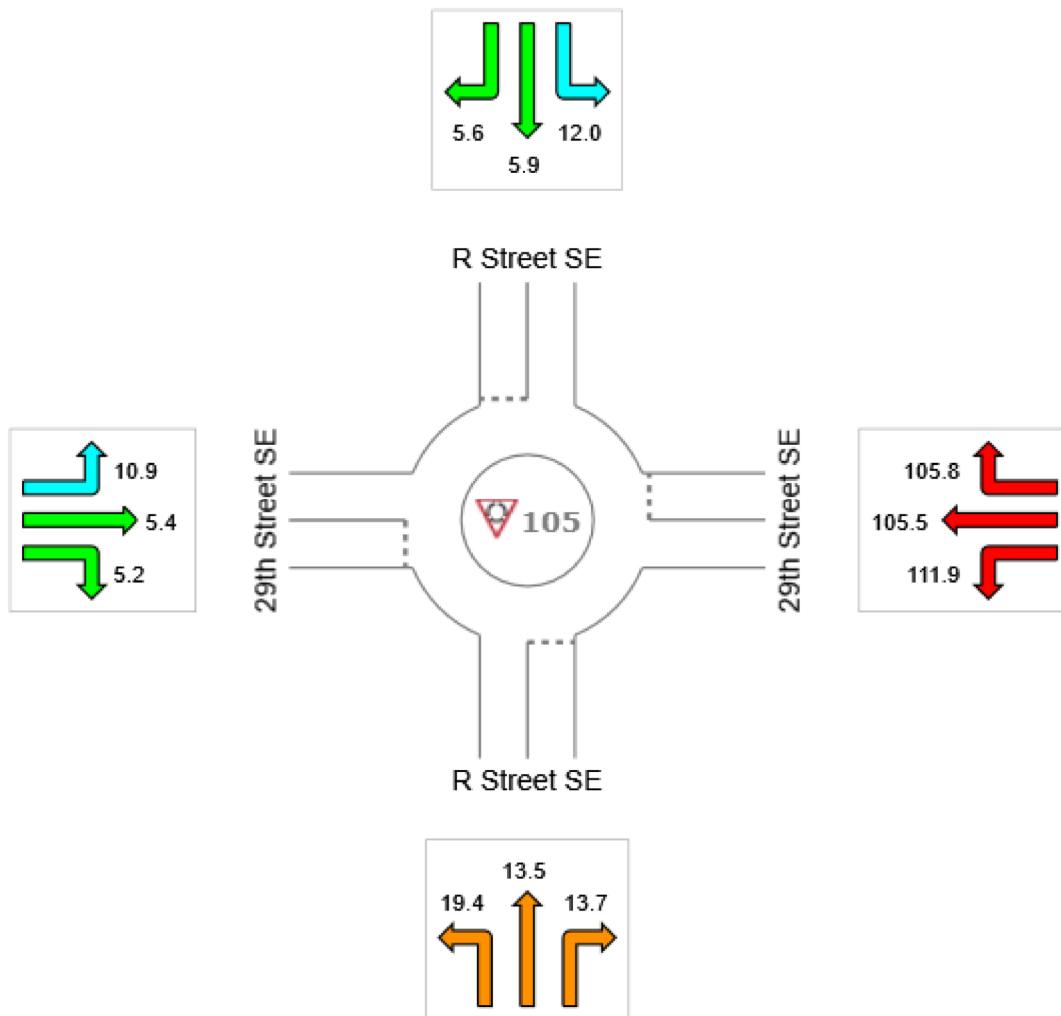
Colour code based on Degree of Saturation



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	14.5	108.6	6.1	5.9	25.3
LOS	B	F	A	A	C



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

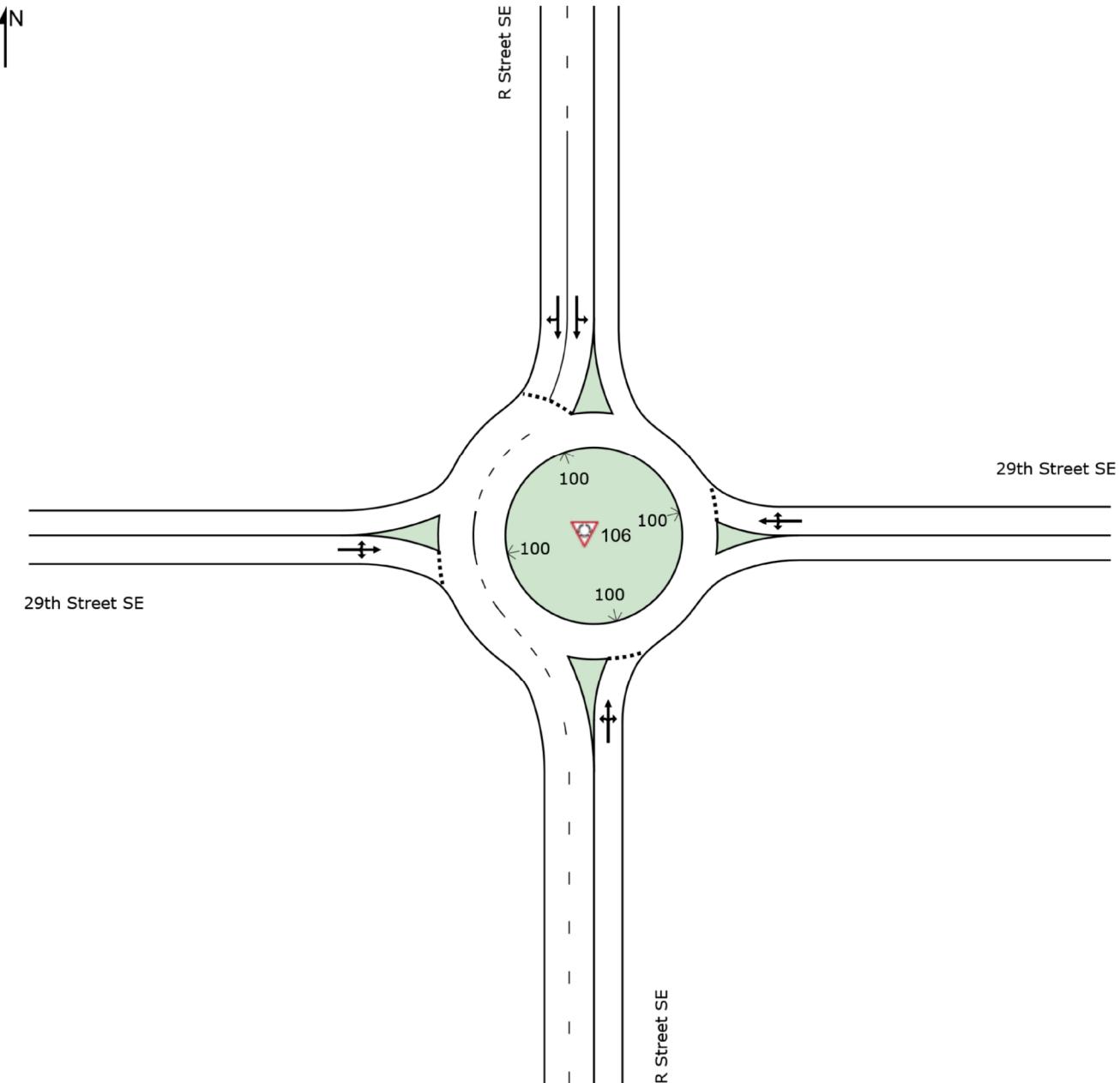
▼ Site: 106 [R Street SE/29th Street SE Alt 1-PM]

New Site

Site Category: (None)

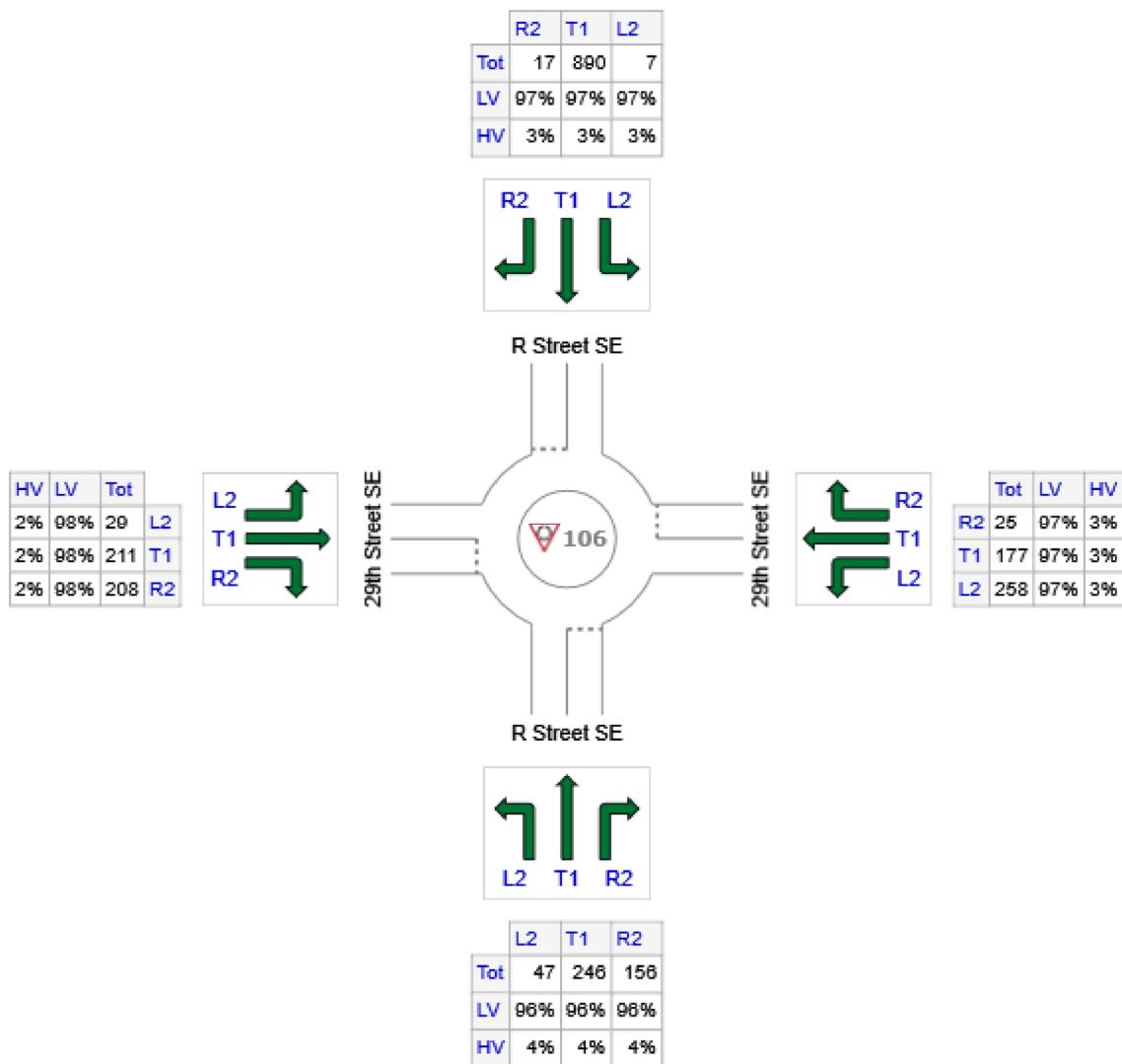
Roundabout

Site Layout



## Input Volumes

### Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: R Street SE	449	431	18
E: 29th Street SE	460	446	14
N: R Street SE	914	887	27
W: 29th Street SE	448	439	9
Total	2271	2203	68

**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Upstr Signal	Extra Bunchin g
		ft	ft	ft	ft	°			ft	ft		%
South	R Street SE	100.00	30.00	148.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	29th Street SE	100.00	18.00	148.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	R Street SE	100.00	18.00	148.0	90.0	30.0	1	2	14.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	29th Street SE	100.00	30.00	148.0	90.0	30.0	2	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

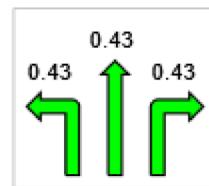
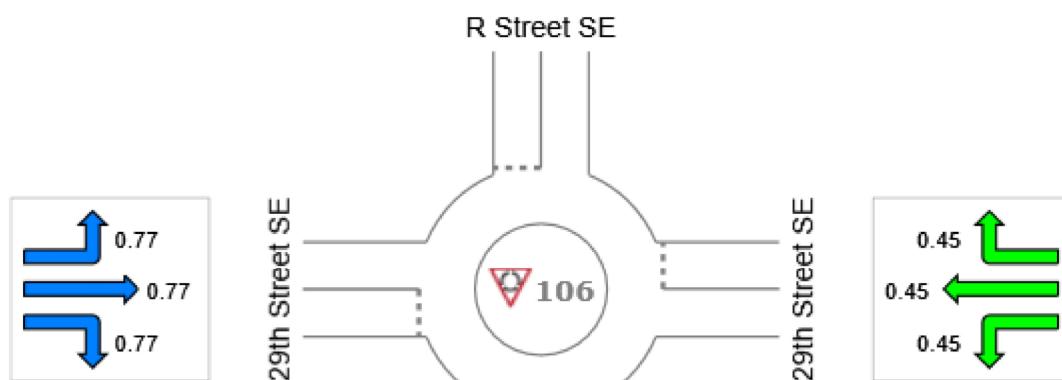
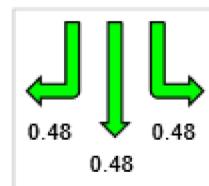
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

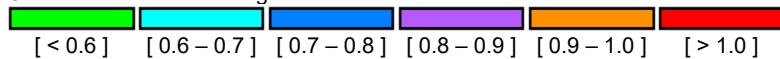
## Degree of Saturation

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.43	0.45	0.48	0.77	0.77



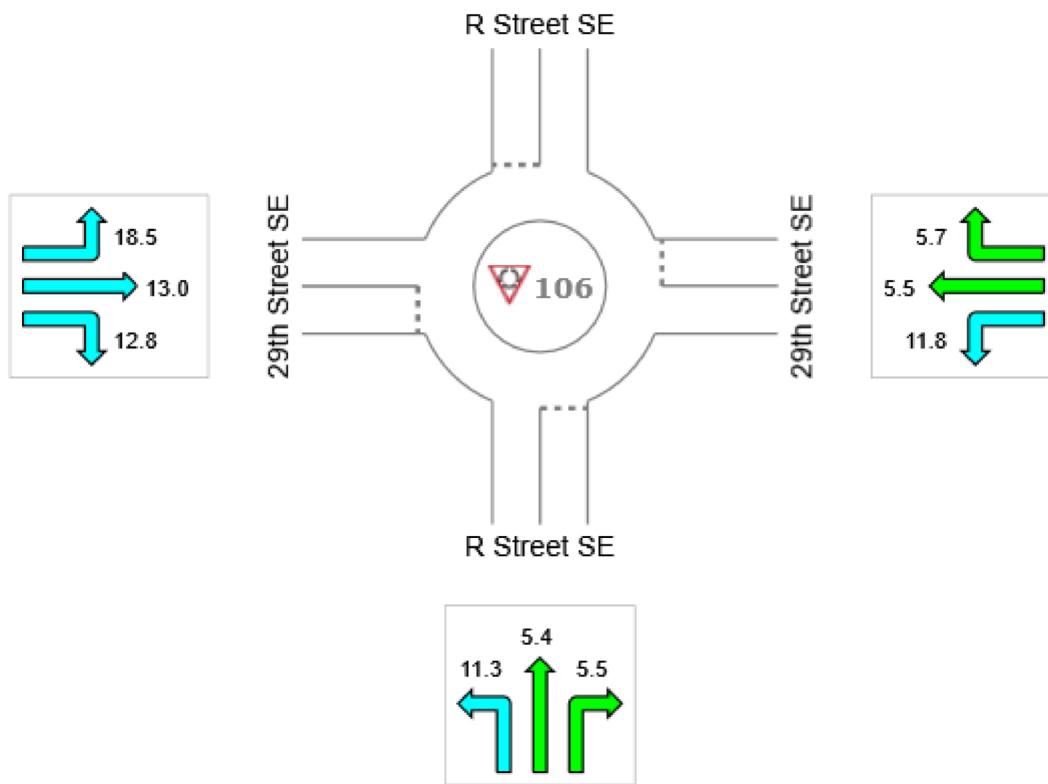
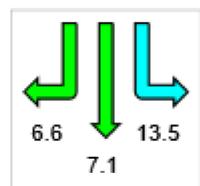
Colour code based on Degree of Saturation



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	6.1	9.0	7.1	13.3	8.5
LOS	A	A	A	B	A



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

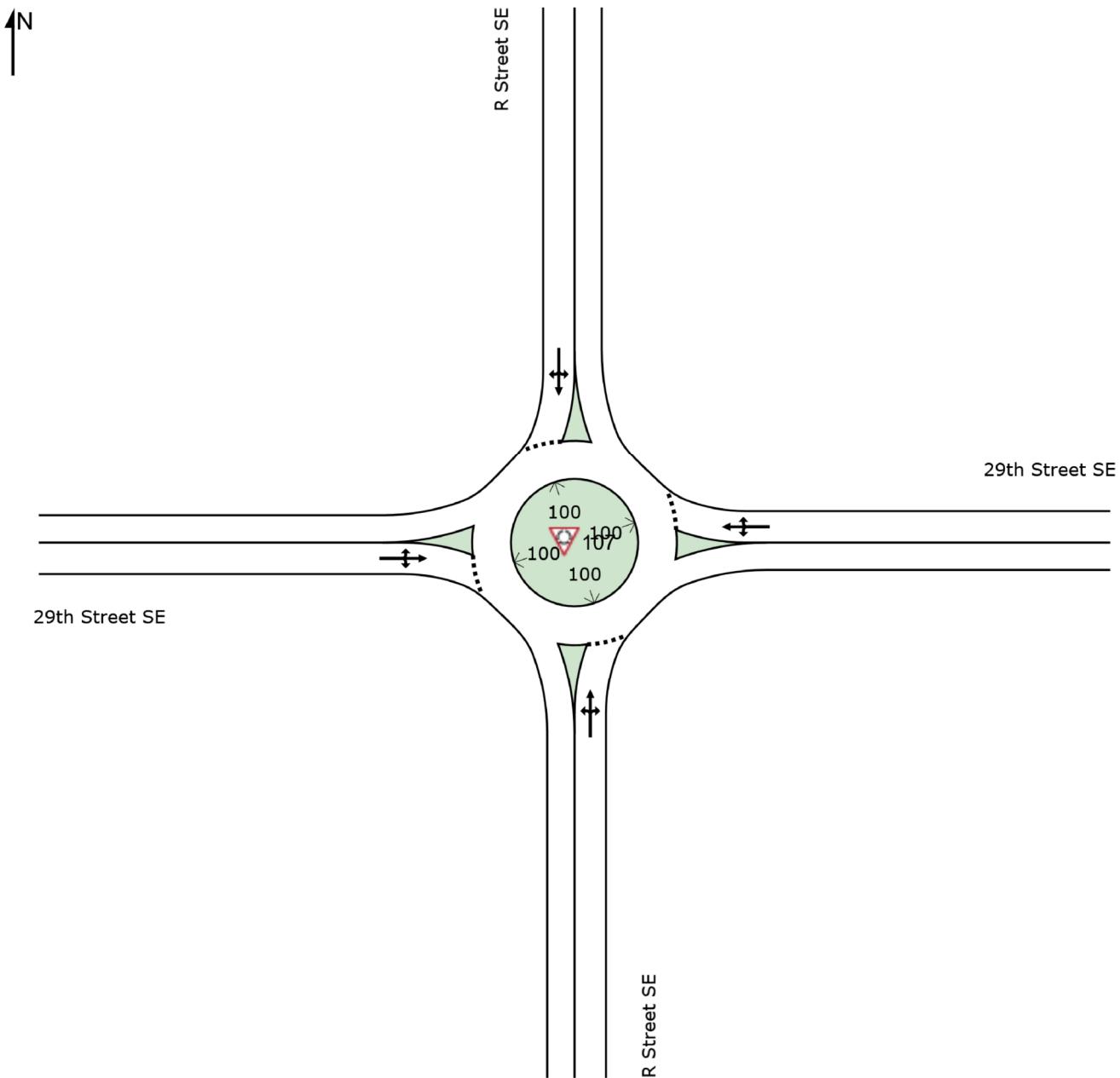
 Site: 107 [R Street SE/29th Street SE Alt 2-AM ]

New Site

Site Category: (None)

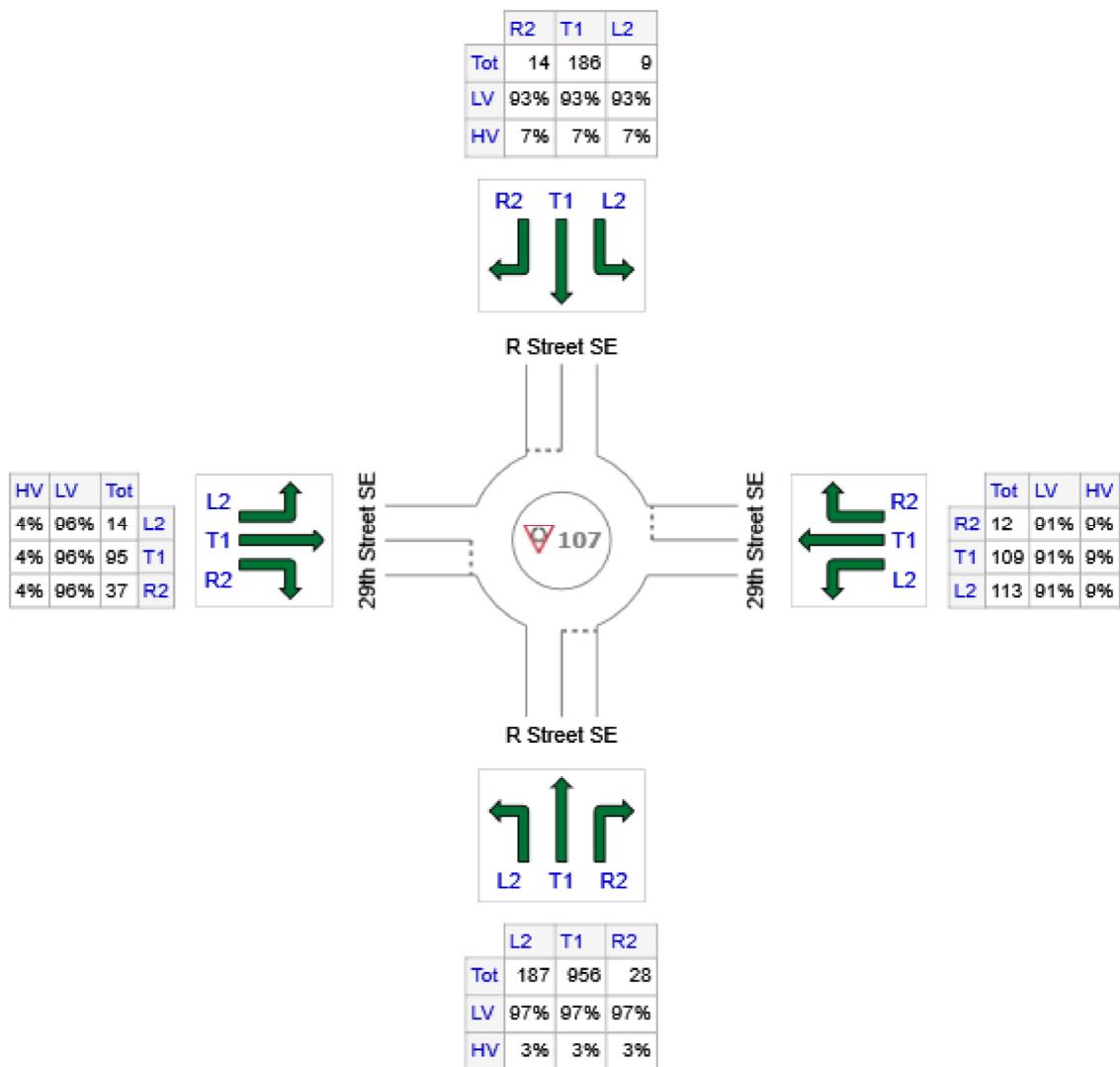
Roundabout

Site Layout



## Input Volumes

### Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: R Street SE	1171	1136	35
E: 29th Street SE	234	213	21
N: R Street SE	209	194	15
W: 29th Street SE	146	140	6
Total	1760	1683	77

**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Queued Upstr Signal	Extra Bunchin g
		ft	ft	ft	ft	°			ft	ft		%
South	R Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	29th Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	R Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	29th Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

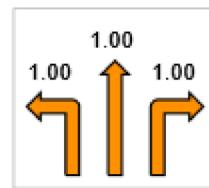
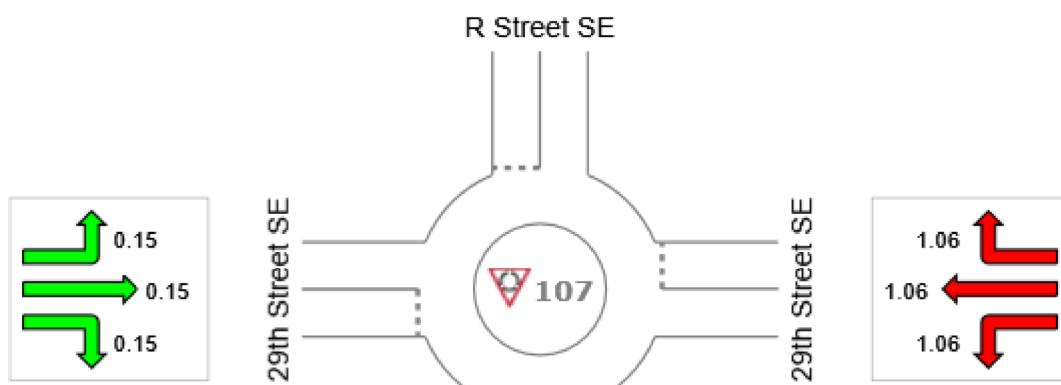
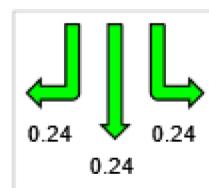
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

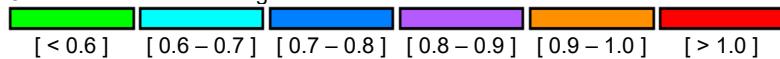
## Degree of Saturation

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	1.00	1.06	0.24	0.15	1.06



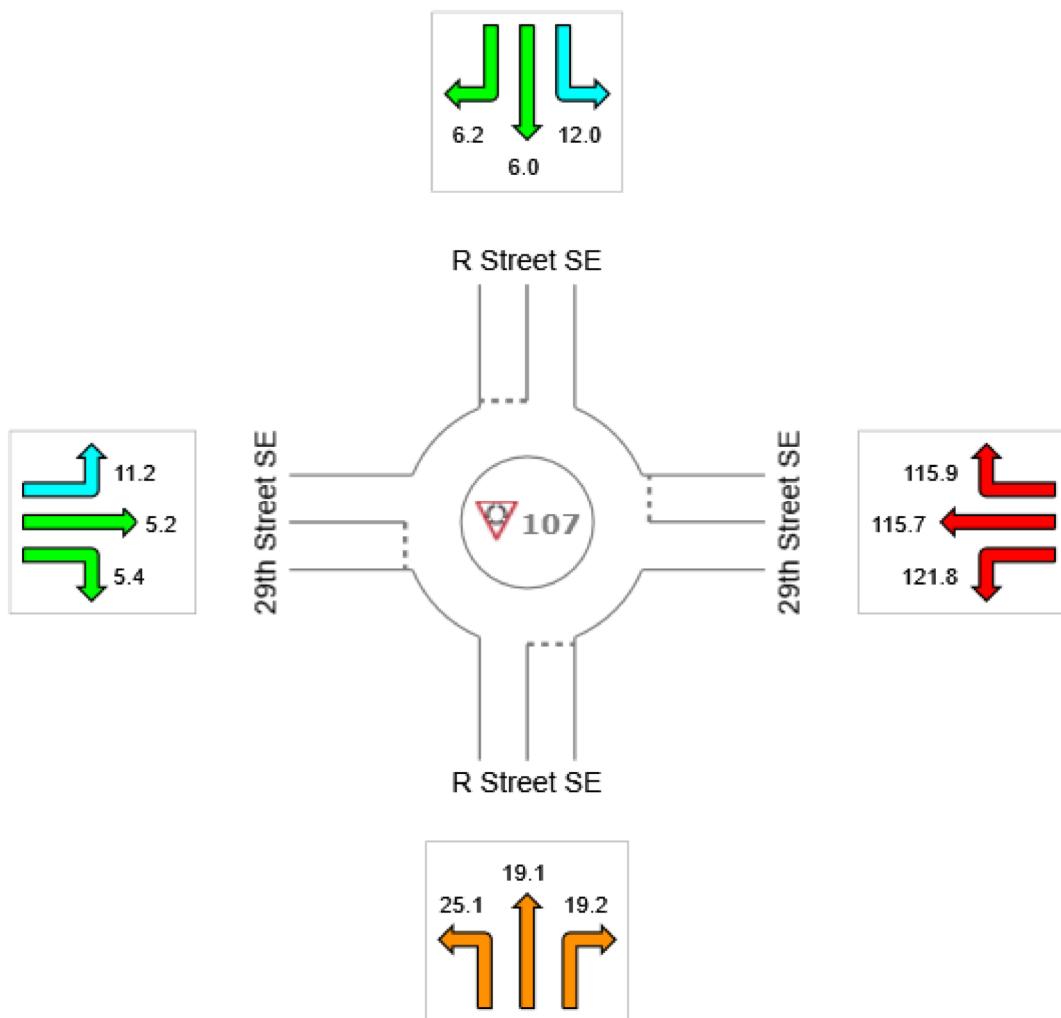
Colour code based on Degree of Saturation



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	20.0	118.7	6.3	5.8	30.3
LOS	C	F	A	A	C



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

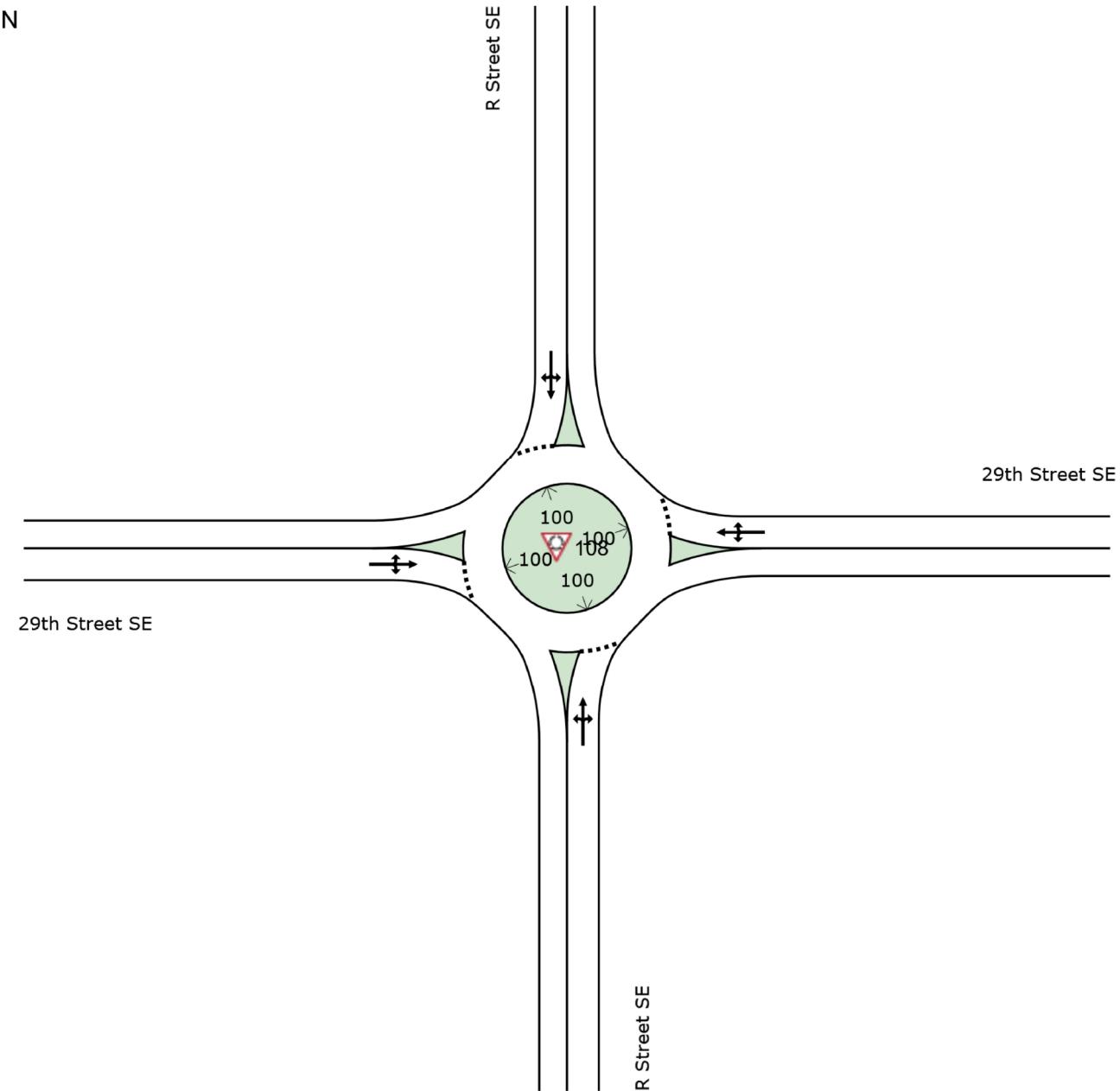
 Site: 108 [R Street SE/29th Street SE Alt 2-PM ]

New Site

Site Category: (None)

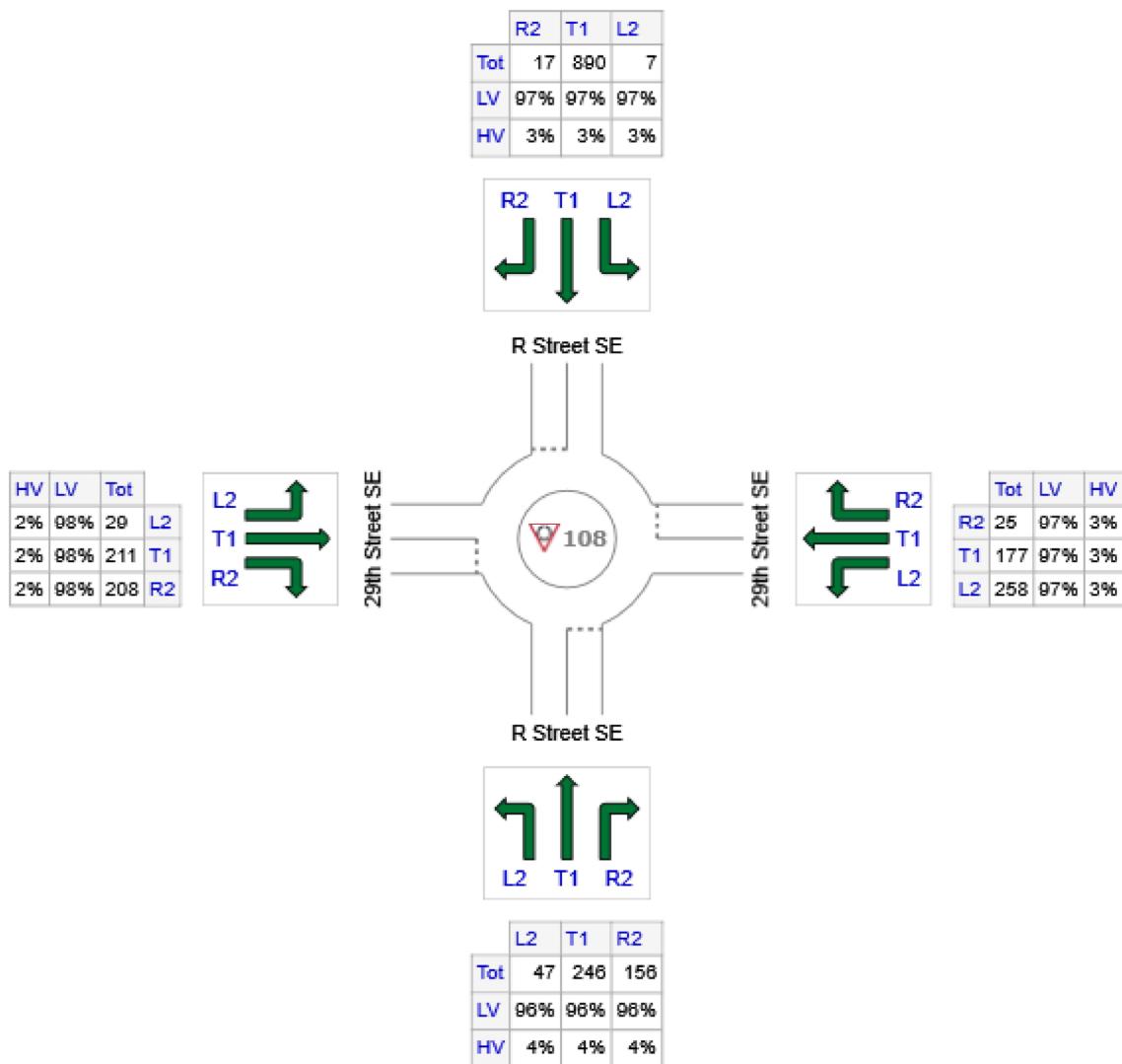
Roundabout

Site Layout



## Input Volumes

### Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: R Street SE	449	431	18
E: 29th Street SE	460	446	14
N: R Street SE	914	887	27
W: 29th Street SE	448	439	9
Total	2271	2203	68

**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Queued Upstr Signal	Extra Bunchin g
		ft	ft	ft	ft	°			ft	ft		%
South	R Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	29th Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	R Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	29th Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

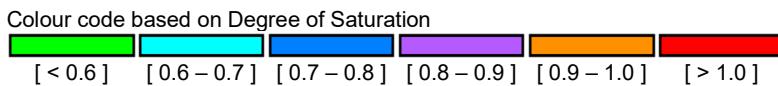
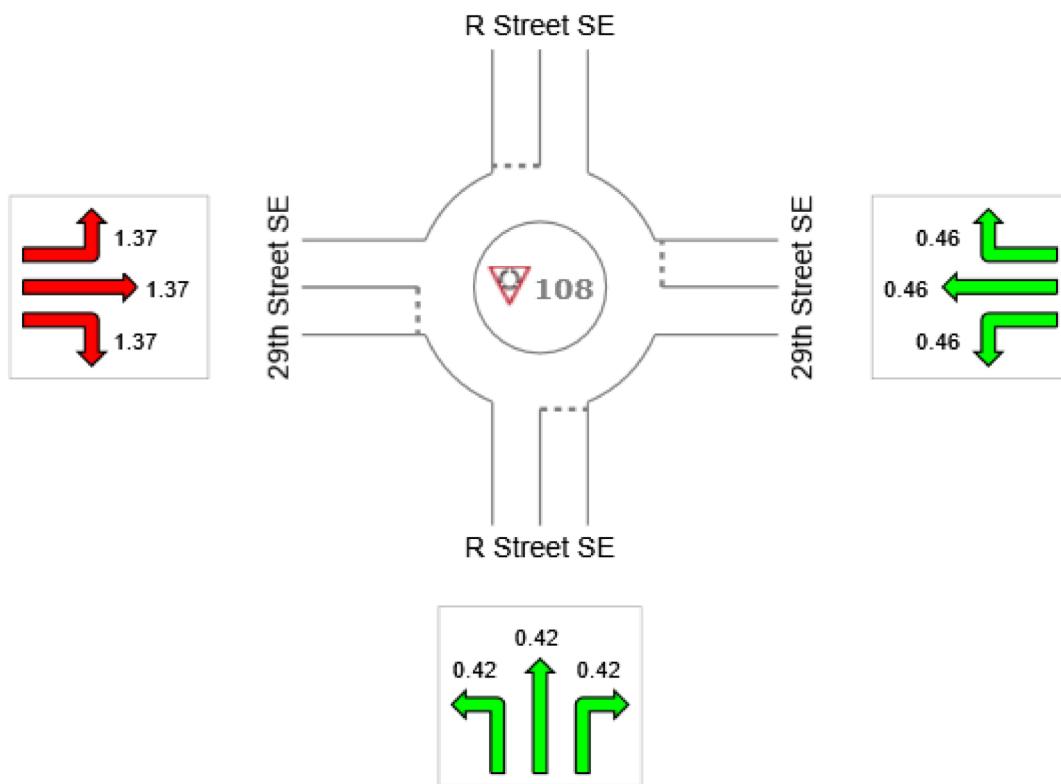
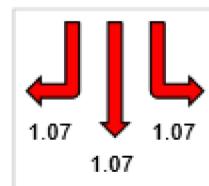
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

## Degree of Saturation

### All Movement Classes

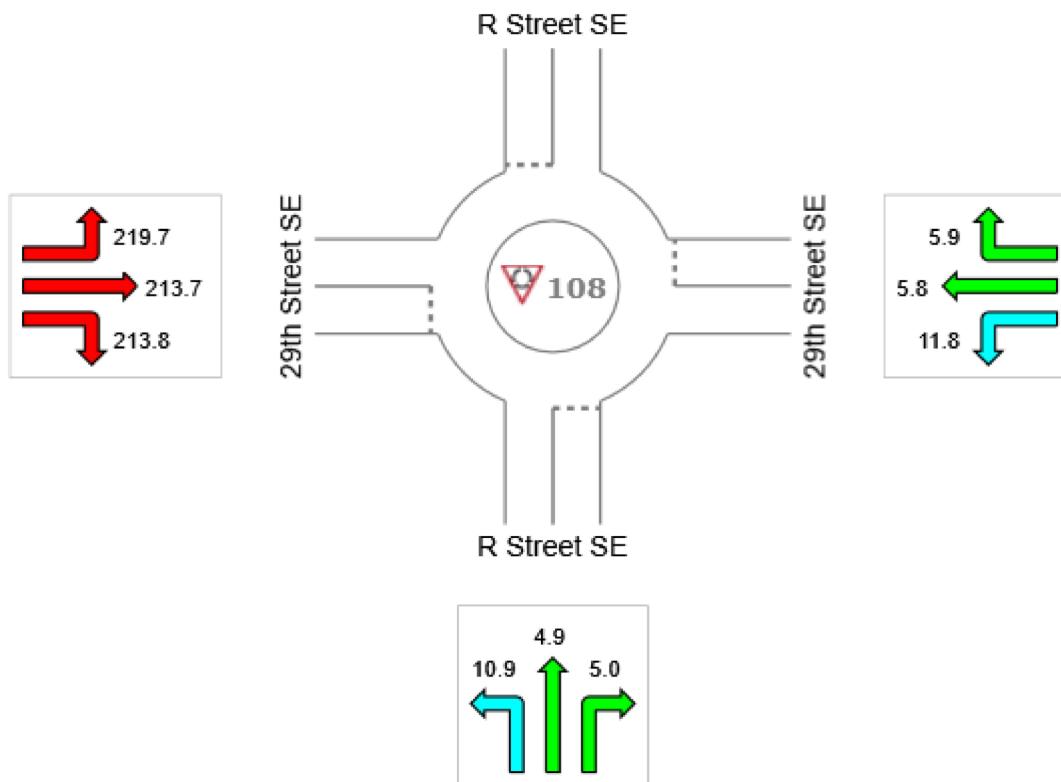
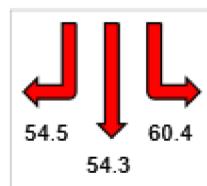
	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.42	0.46	1.07	1.37	1.37



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	5.5	9.1	54.4	214.1	67.1
LOS	A	A	D	F	E



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

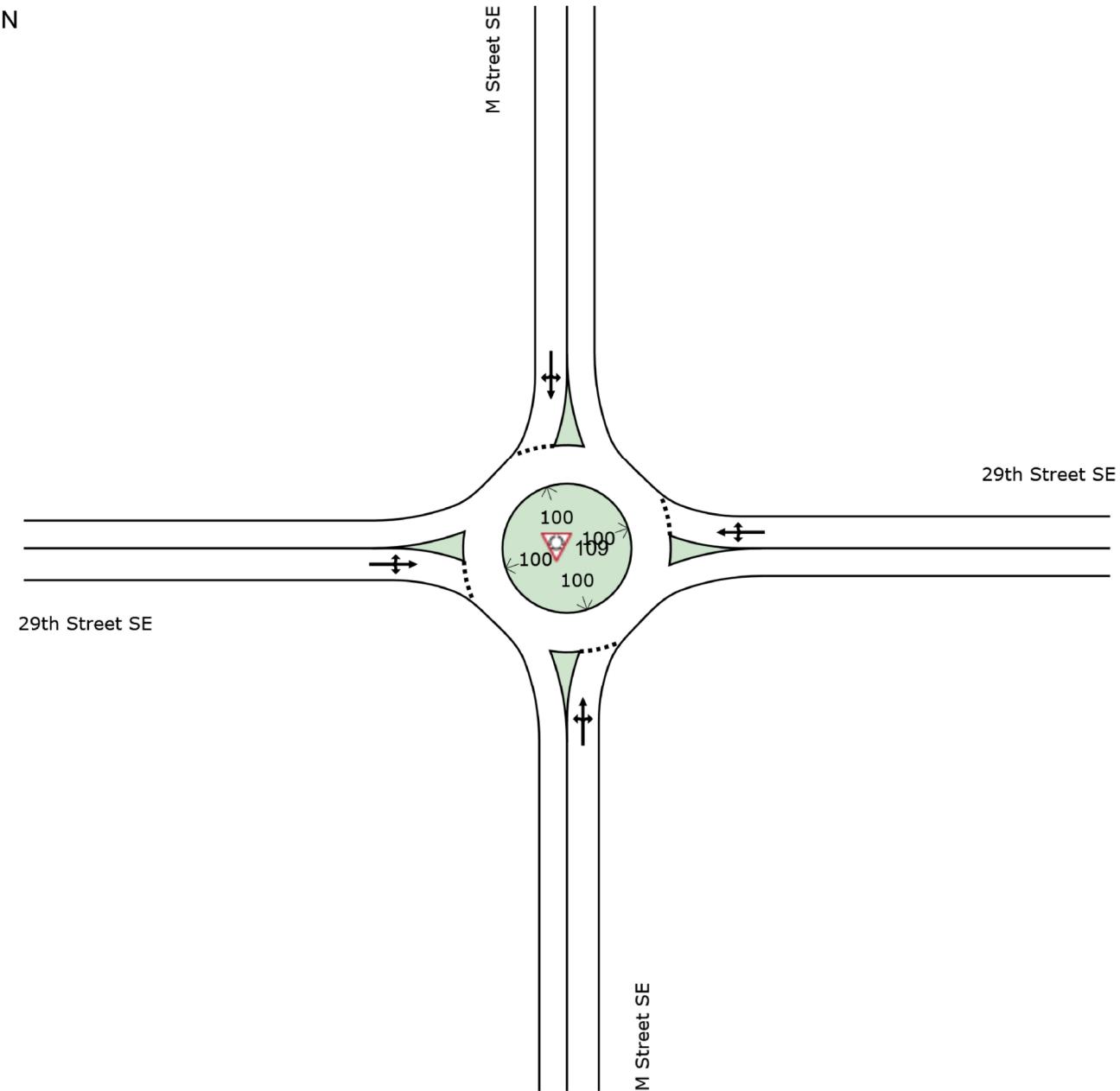
 Site: 109 [M Street SE/29th Street SE Alt 1-AM]

New Site

Site Category: (None)

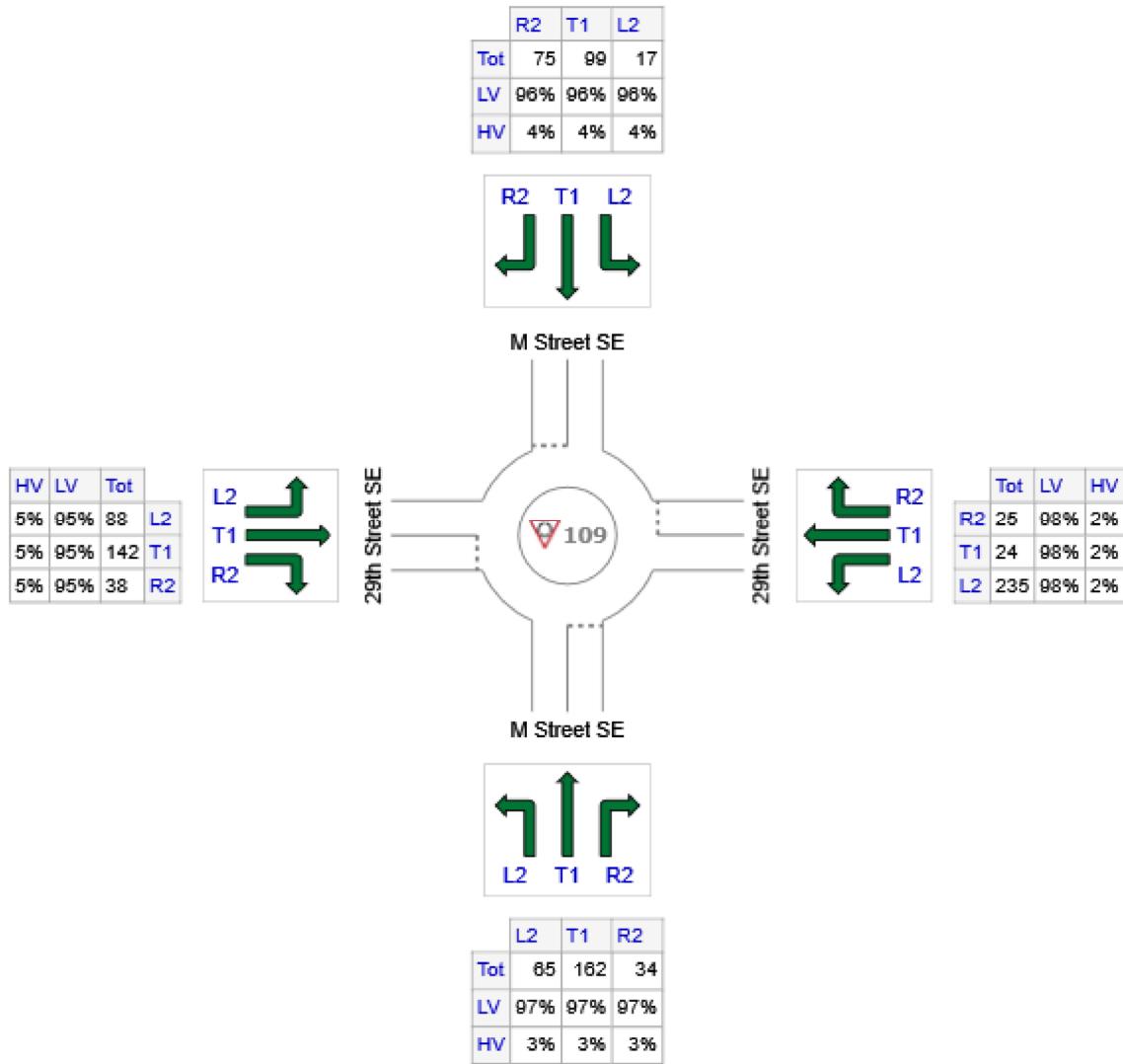
Roundabout

Site Layout



## Input Volumes

### Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: M Street SE	261	253	8
E: 29th Street SE	284	278	6
N: M Street SE	191	183	8
W: 29th Street SE	268	255	13
Total	1004	969	35

**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Queued Upstr Signal	Extra Bunchin g
		ft	ft	ft	ft	°			ft	ft		%
South	M Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	29th Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	M Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	29th Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

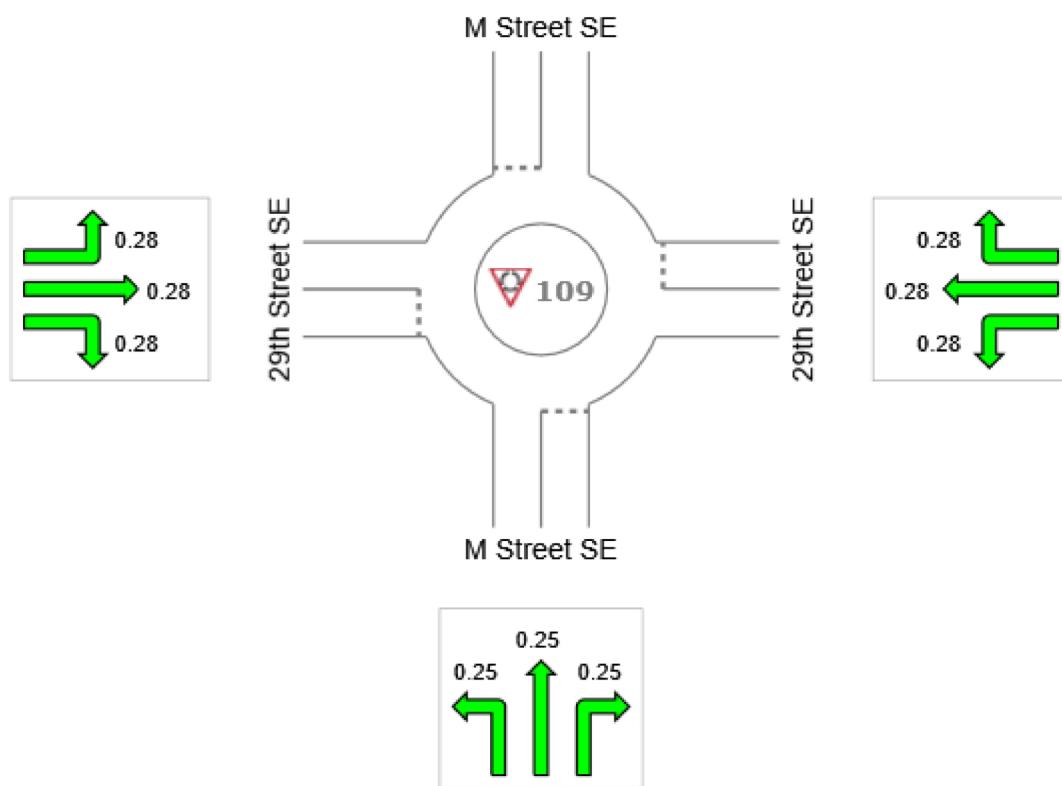
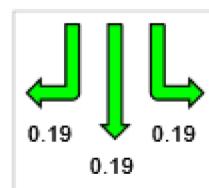
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

## Degree of Saturation

### All Movement Classes

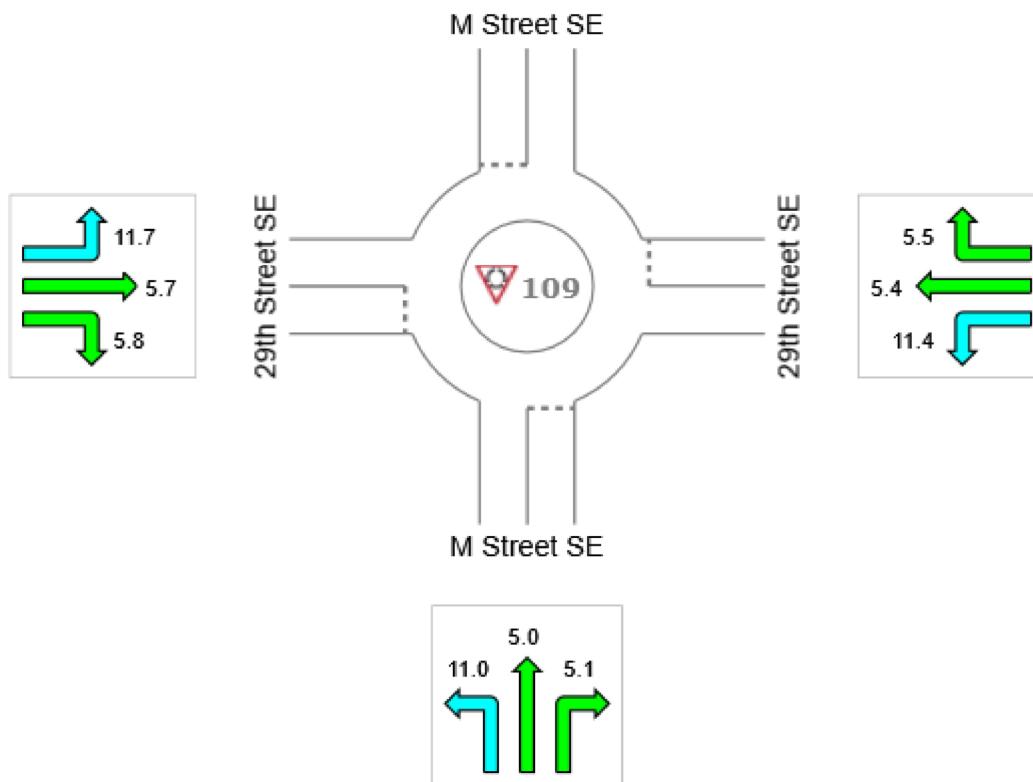
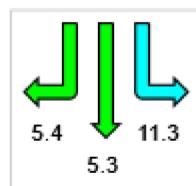
	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.25	0.28	0.19	0.28	0.28



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	6.5	10.3	5.9	7.7	7.8
LOS	A	B	A	A	A



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

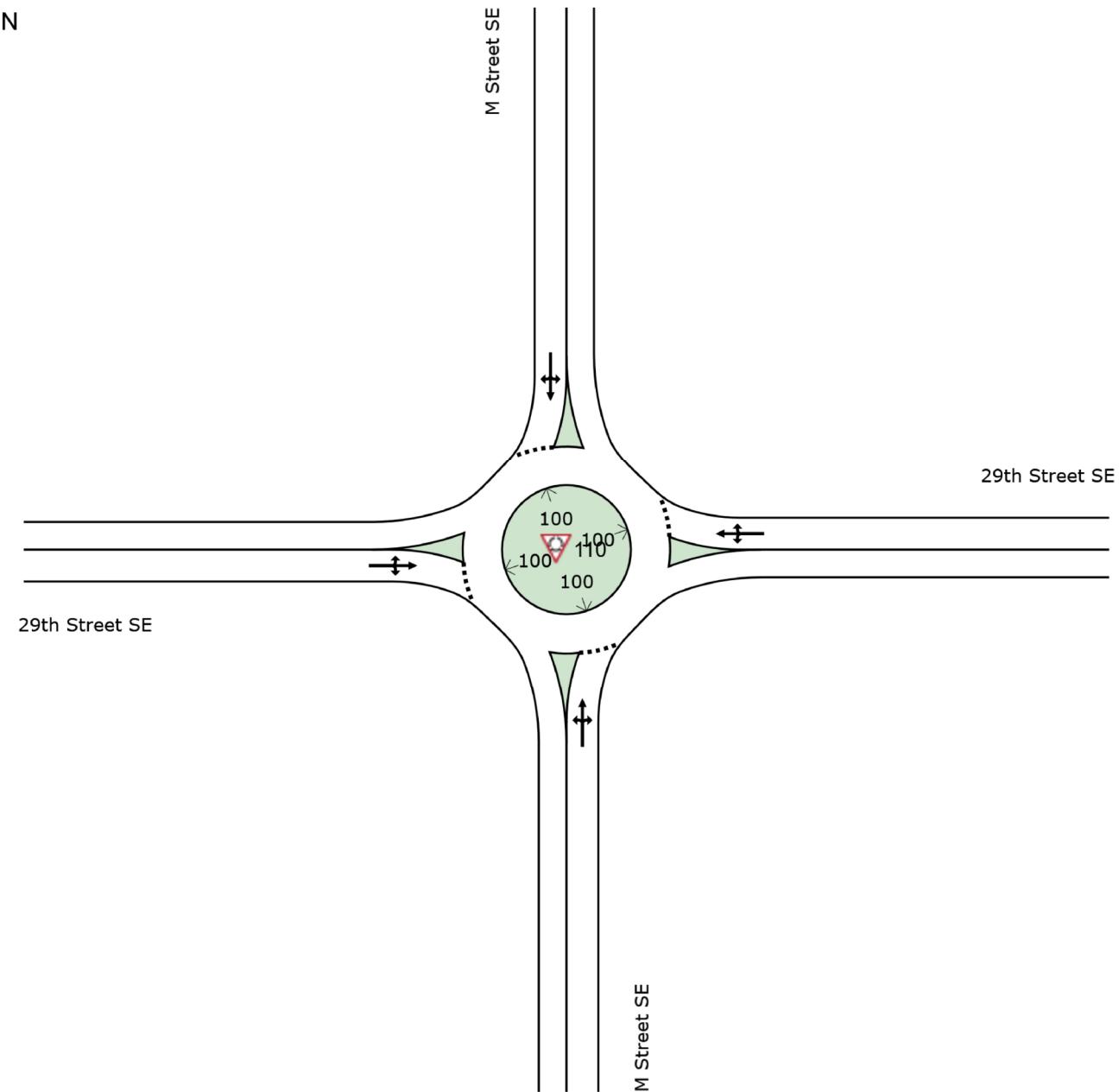
 Site: 110 [M Street SE/29th Street SE Alt 1-PM]

New Site

Site Category: (None)

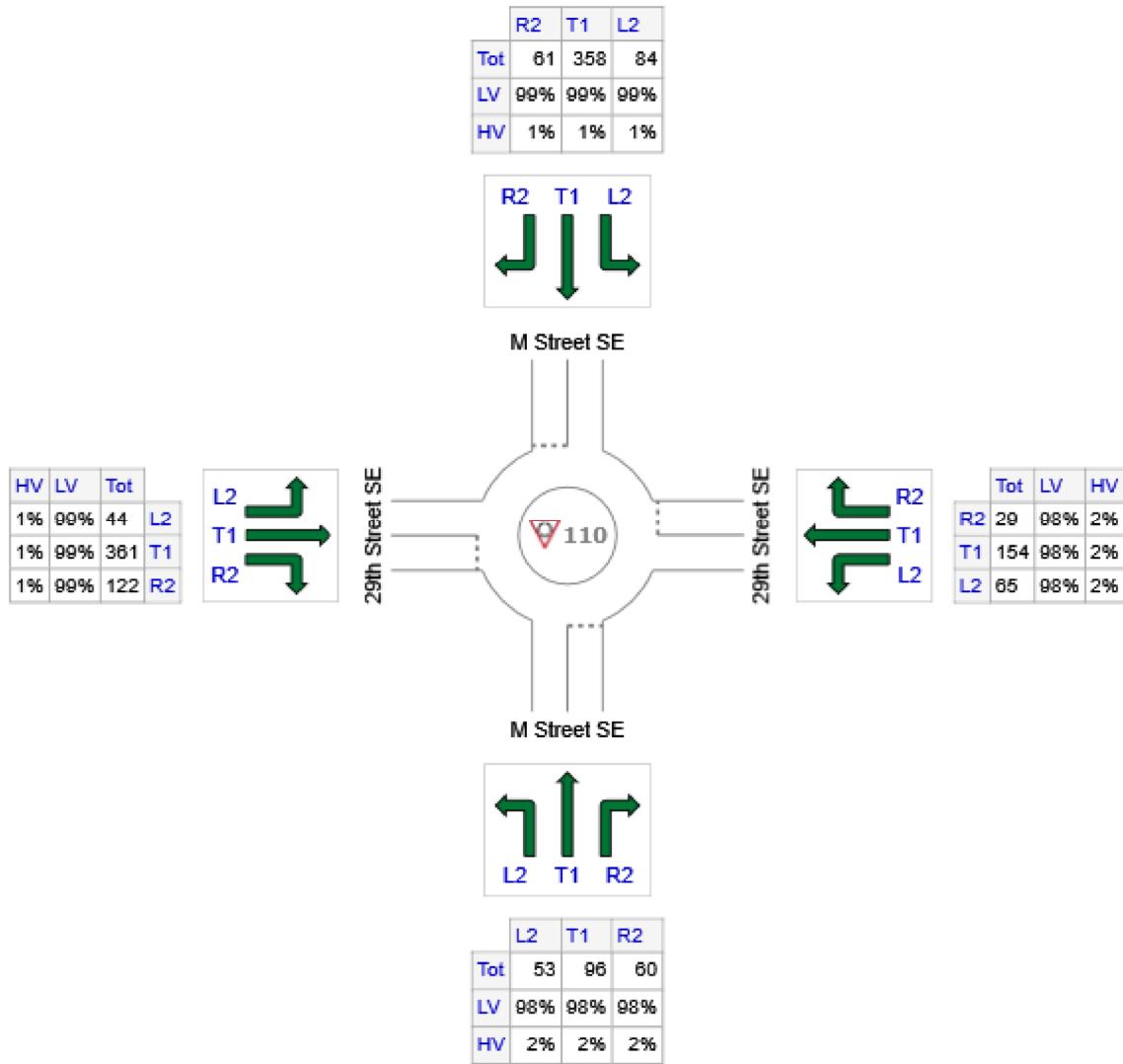
Roundabout

Site Layout



## Input Volumes

### Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: M Street SE	209	205	4
E: 29th Street SE	248	243	5
N: M Street SE	503	498	5
W: 29th Street SE	527	522	5
Total	1487	1468	19

**Roundabout Basic Parameters**

Location	Name	Central Island Diam	Circ Width	Insc Diam	Entry Radius	Entry Angle	Circ Lanes	Entry Lanes	Av.Entry Lane Width	App. Dist	Prop Queued Upstr Signal	Extra Bunchin g
		ft	ft	ft	ft	°			ft	ft		%
South	M Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
East	29th Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
North	M Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>
West	29th Street SE	100.00	18.00	136.0	90.0	30.0	1	1	15.00	1600.0	NA <sup>5</sup>	0.0 <sup>1</sup>

Roundabout Capacity Model: SIDRA Standard

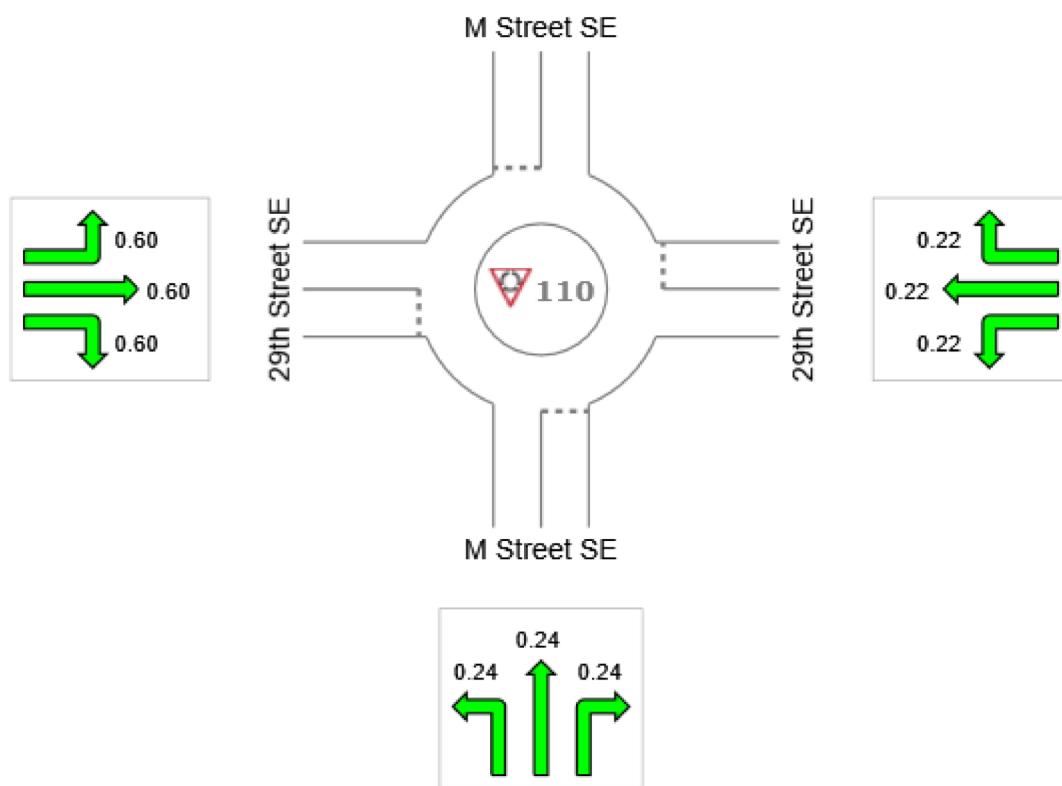
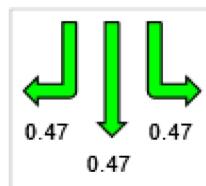
<sup>1</sup> Program option resulted in zero value (single Site analysis or unconnected Site in Network analysis).

<sup>5</sup> Not Applicable (single Site analysis or unconnected Site in Network analysis).

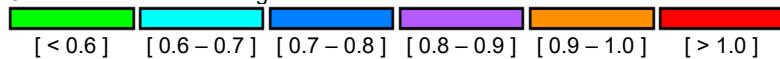
## Degree of Saturation

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.24	0.22	0.47	0.60	0.60



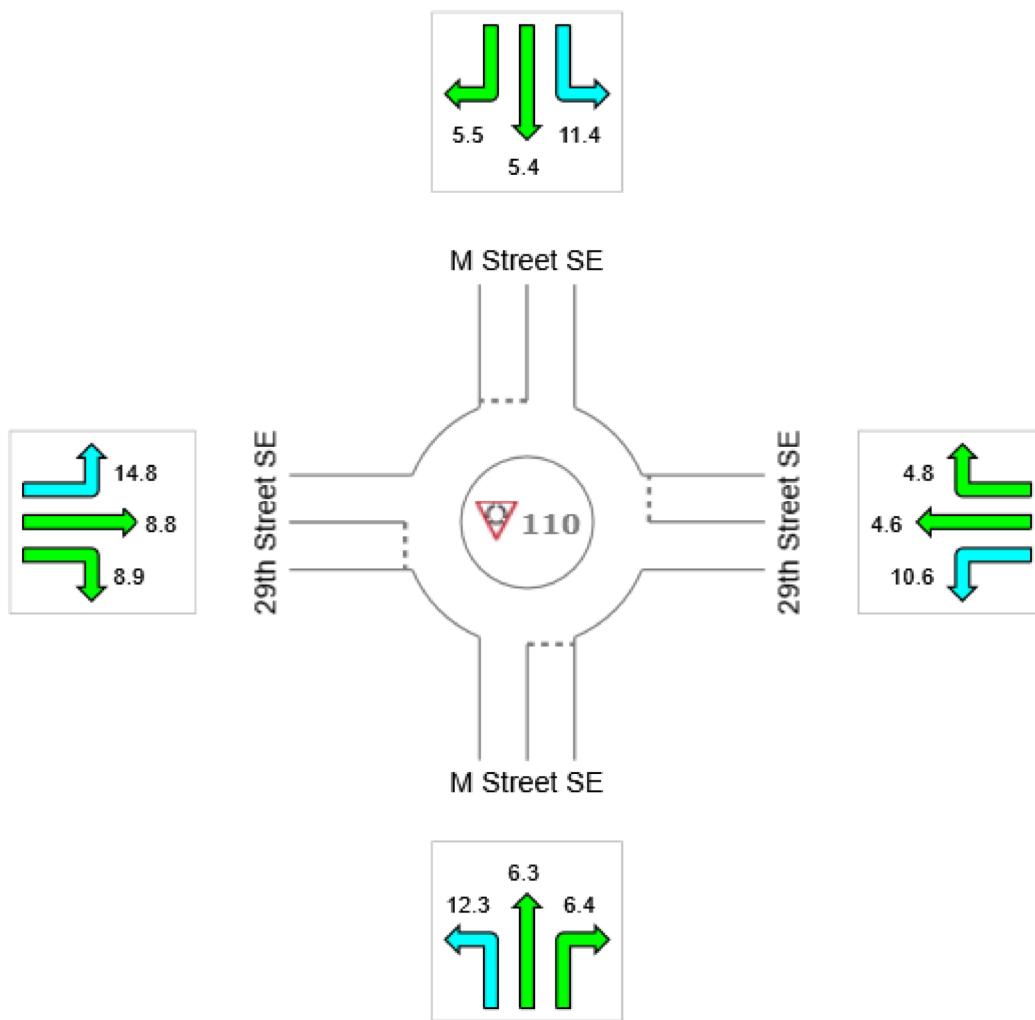
Colour code based on Degree of Saturation



## Delay (Control)

### All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	7.8	6.2	6.4	9.3	7.6
LOS	A	A	A	A	A



Colour code based on Level of Service



Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Organisation: FEHR AND PEERS | Created: Friday, August 16, 2019 1:43:52 PM

Project: N:\Marketing\Proposals\Proposals 2019\P19-1330\_Auburn Way South Corridor Improvements\R Street Work\Sidra\R-Street\_Analysis.sip8

## APPENDIX B – DRAINAGE STUDY

## DRAINAGE

Conceptual level stormwater design has been designed to meet City of Auburn requirements using the Department of Ecology (DOE) Stormwater Manual 2012 (SWM) with supplemental requirements specific to the City of Auburn. The project site is within two drainage basins with the high point located at approximately 33<sup>rd</sup> Street SE. See figures in the attached Appendix B. The project site south of 33<sup>rd</sup> Street SE flows south towards the White River. The portion of the project north of 33<sup>rd</sup> Street SE flows towards the north and eventually into the Green River.

The proposed project alternatives will widen R Street SE equally on both the east and west side with a center crown. The widening will be performed using a combination of full depth pavement replacement with additional sidewalk widening in some areas. The project will add approximately 0.22 acres of new impervious area in the White River Basin and 0.70 acres in the Green River Basin.

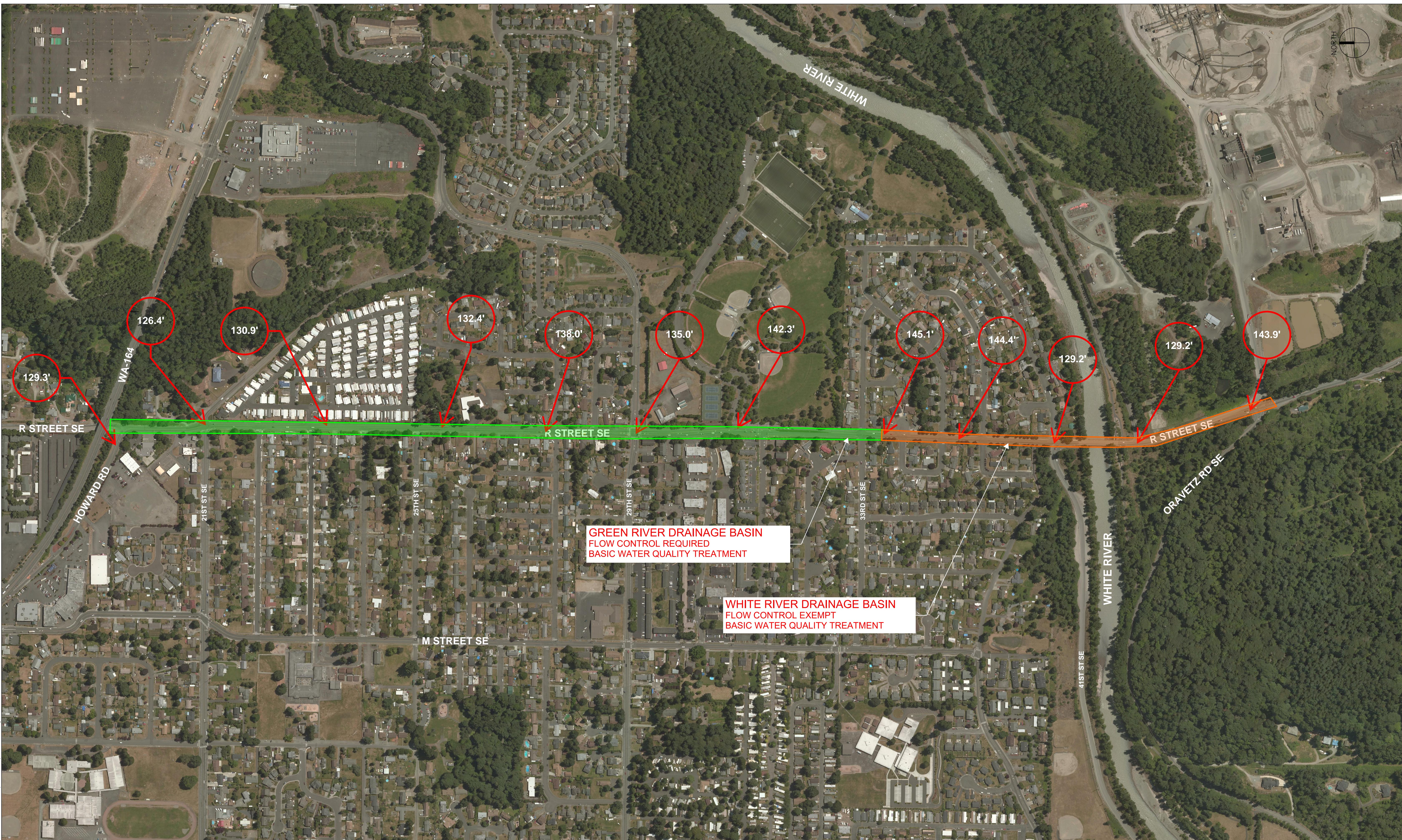
The DOE SWM was used to determine the minimum stormwater requirements for this project. The project creates over 5,000 square feet of new impervious area triggering all minimum requirements to be applied to all new hard surfaces including, LID, flow control and water quality requirements. The replaced roadway will not trigger flow control or water quality, due to the percentage of new impervious being less than 50% of the existing impervious area within the project. The White River is listed as a flow control exempt water body listed in Appendix I-E of the DOE SWM. Flow control will not be required for this basin. The Green River basin is not flow control exempt and will require flow control facilities.

Both basins will require water quality treatment for the new hard surfaces to meet minimum stormwater requirements. According to the DOW SWM, both the Green River and White River are listed as basic treatment water bodies in Appendix I-C.

The area of the project within the White River basin is constrained by limited right-of-way and has minimal locations to create a water quality treatment facility, such as bioretention, bioswales, or compost amended filter strips, which all require open space. Due to the limited right-of-way, the conceptual design utilizes a filter media cartridge system that will fit within a 48-inch catch basin. This option will allow for the treatment option to be placed in multiple locations and within the travel-path of R Street SE.

The Green River basin will meet the flow control and water quality treatment requirements by creating a wetpond or two smaller wetponds along the project corridor. This basin has several locations that provide opportunity to purchase real estate and utilize open spaces to provide stormwater treatment and flow control. The conceptual level wetpond will need approximately 27,400 cubic feet of storage volume to provide flow control and basic water quality treatment for this basin.

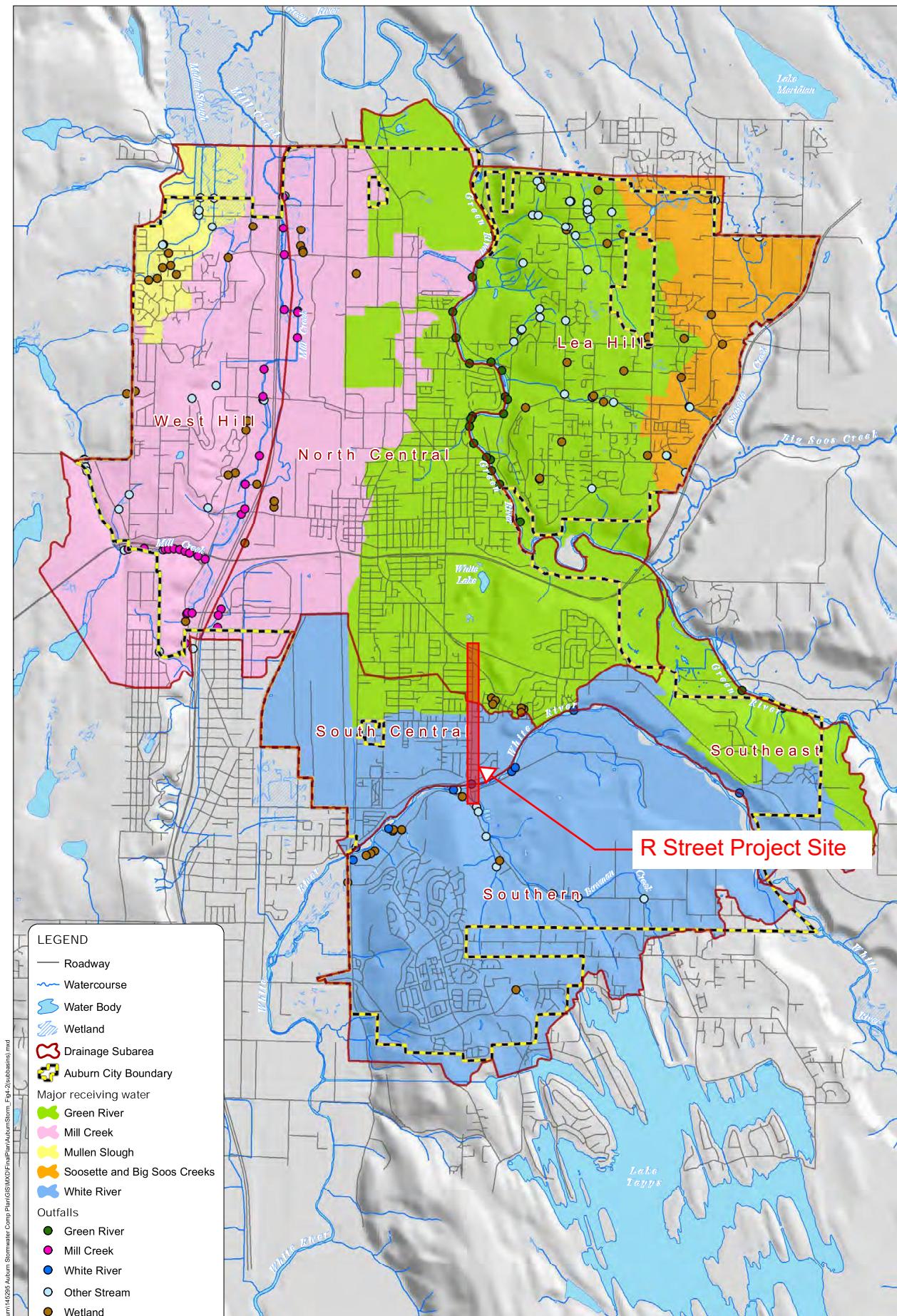
The conveyance system along R Street SE will need to be replaced and moved to the new gutter line to correlate with the widened roadway. Cost estimates have assumed 12-inch stormwater pipes on both sides of the roadway with catch basins spaced every 200 feet to collect runoff. However, this can have higher maintenance costs in the future to maintain two 12-inch mainlines. While one larger sized pipe could be used with various connections to CBs on the other side of the road, this would increase excavation and trenching costs with potential impacts to existing wet and dry utilities. Although this option has a higher up front construction cost and would be difficult to implement if the corridor was phased, it would have lower lifetime maintenance costs. A full drainage study is included in Appendix B.



**kpf**

**CITY OF AUBURN: R STREET SE AERIAL**

0 125 250 500  
1 inch = 250 feet



COMPREHENSIVE STORM DRAINAGE PLAN  
December 2015

Brown and Caldwell

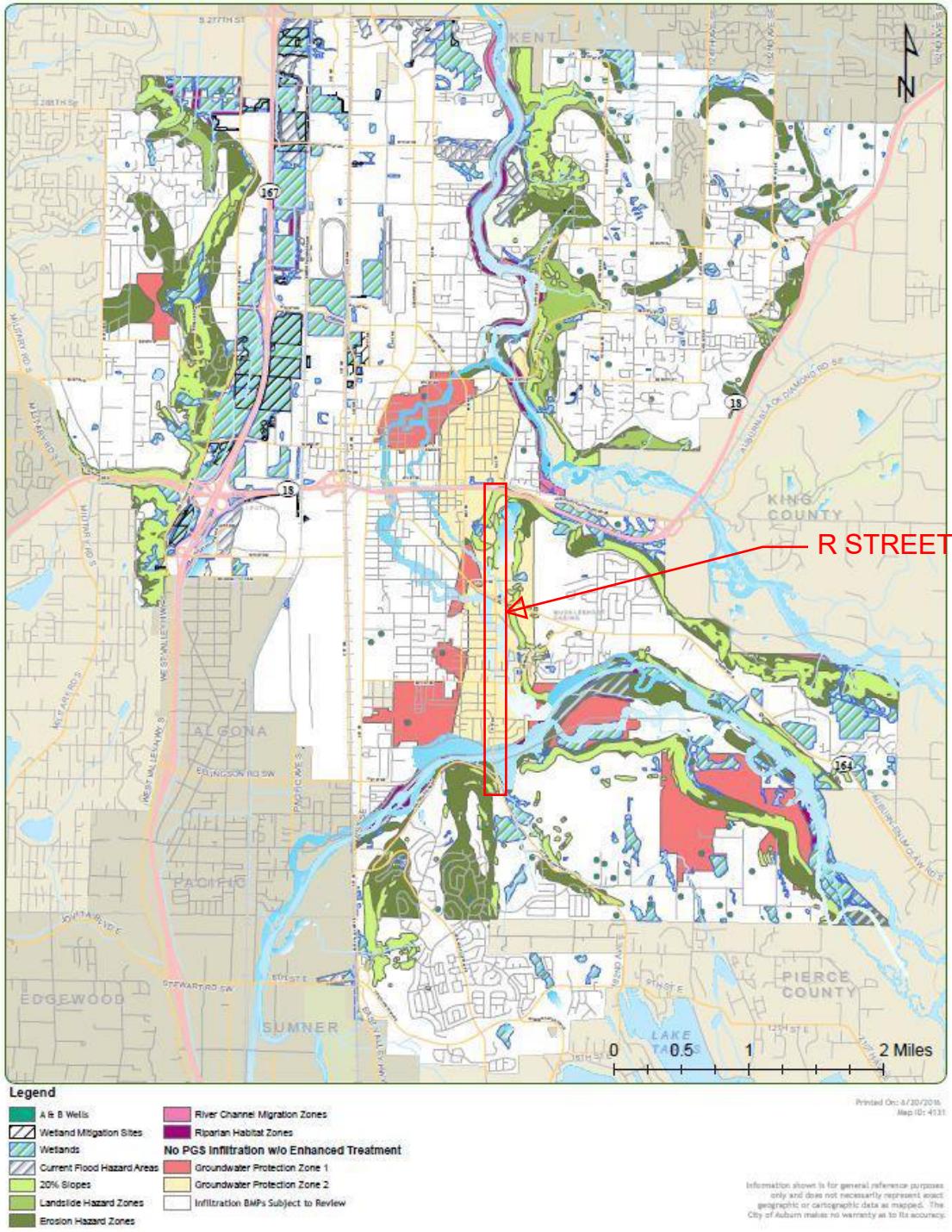
0 4,000 8,000  
1 inch = 4,000 feet



CITY OF  
**AUBURN**  
WASHINGTON

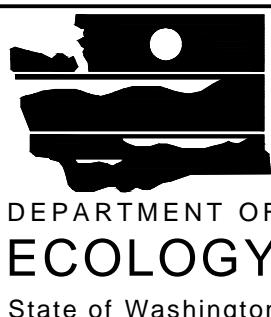
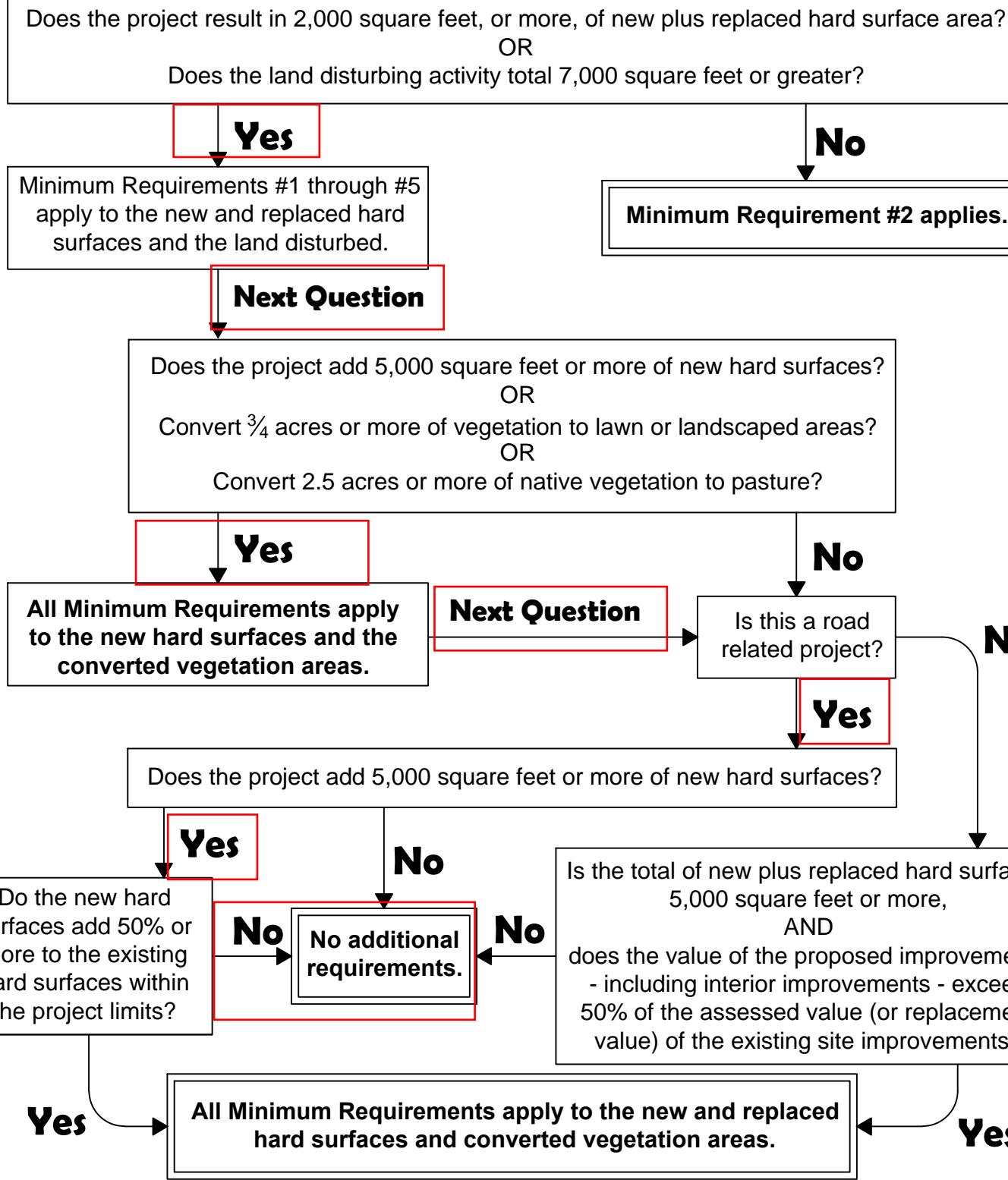
Figure 4-2  
Drainage Subareas for  
the City of Auburn  
Storm Drainage Utility

**City of Auburn  
LID Infiltration Infeasibility**



**Figure I- 1 Map of Infiltration Restriction Areas**

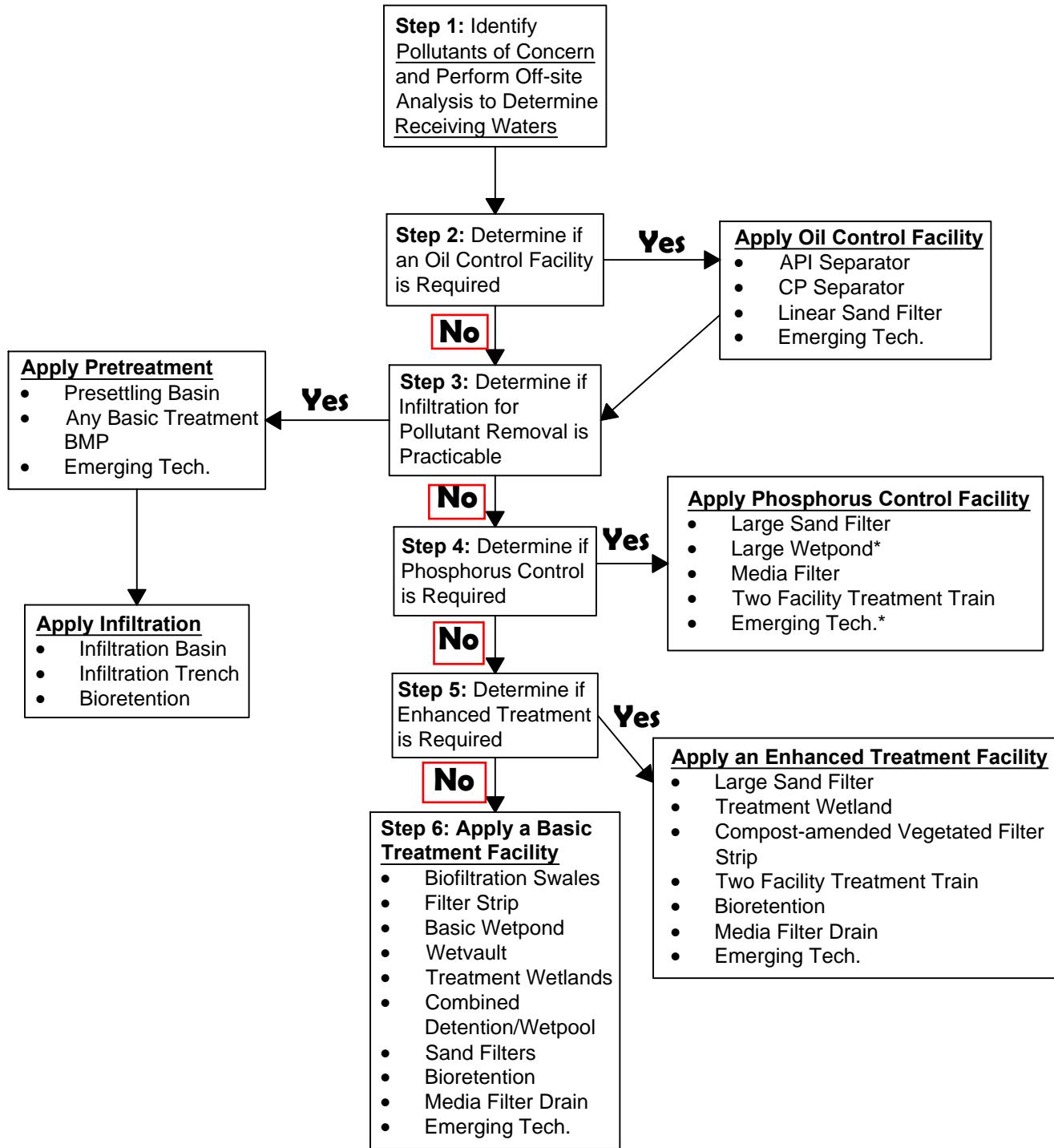
COA Supplemental Manual to the Ecology Stormwater Management Manual for Western Washington  
Volume I - Minimum Technical Requirements and Site Planning  
Version 1



**Figure I-2.4.2**  
**Flow Chart for Determining Requirements for Redevelopment**

Revised June 2015

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\*When **Phosphorus Control** and **Enhanced** treatment are required, the Large Wetpond and certain types of emerging technologies will not meet both types of treatment requirements. A different or an additional treatment facility will be required to meet Enhanced treatment.



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

**Figure V-2.1.1**  
**Treatment Facility Selection Flow Chart**

Revised December 2015

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## APPENDIX C – TRAFFIC WARRANT ANALYSIS

# Memorandum

Date: January 24, 2020

To: Sean Battle, PE - KPFF

From: Kara Hall & Chris Grgich, PE

**Subject: R Street Corridor Study Signal Warrant Analysis – DRAFT**

*SE19-0712*

---

## Background

As part of the R Street Corridor Study being completed for the City of Auburn, Fehr & Peers evaluated two intersections to determine if existing traffic volume at the intersections meet the thresholds for signal control, or if the thresholds would be met by growth expected to occur in the area.

The two intersections evaluated were R Street SE/21<sup>st</sup> Street SE and M Street SE/29<sup>th</sup> Street SE. While the Manual for Uniform Traffic Control Devices (MUTCD) lists nine warrants to be evaluated when determining if consideration for traffic signal control is warranted, three of the nine warrants were determined to be applicable for this assessment. The three warrants evaluated were:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour

Per the MUTCD, only one warrant must be met to justify consideration of installation of a traffic signal. However, meeting only one warrant does not always require the installation of a traffic signal.

## Data Collection

Traffic data used for this assessment was provided by the City of Auburn. Peak hour traffic volume counts, collected in 2018, were provided for both study intersections and 24-hour tube counts, collected in 2019, were provided for the following roadway segments:

1. 21<sup>st</sup> Street SE between D Street SE and M Street SE



2. 29<sup>th</sup> Street SE between A Street SE and M Street SE
3. R Street SE between 21<sup>st</sup> SE and 29<sup>th</sup> Street SE
4. R Street SE between 29<sup>th</sup> Street SE and 37<sup>th</sup> Street SE
5. Riverwalk Drive SE between Auburn Way S and Howard Road SE

As intersection counts provided were based on data collected in 2018 and were only for the AM and PM peak hours, the daily counts provided in the study area were used to extrapolate intersection counts collected in 2018 to be consistent with the 2019 24-hour counts collected.

## **Existing Conditions Signal Warrants**

The MUTCD provides guidance on what conditions warrant the consideration for installation of a traffic signal. The existing traffic volumes were analyzed using Highway Capacity Software 7 (HCS 7) Warrants to determine which warrants are met based on traffic data collected in 2019.

Criteria required to meet each signal warrant and the results for the study intersections are summarized below.

### **Warrant 1, Eight-Hour Vehicular Volumes**

Warrant 1, Eight-Hour Vehicular Volumes, requires that at least eight hours during the day exceed the minimum vehicular volume criteria given in Table 4C-1 in the MUTCD. Condition A of this warrant applies when consideration for a traffic signal is driven by the volume of intersecting traffic is high, while Condition B should be applied when the traffic volume on the major-street is high resulting in high delay on the minor-street.

Neither of the study intersections met this warrant under existing conditions.

### **Warrant 2, Four-Hour Vehicular Warrant**

Warrant 2, Four-Hour Vehicular Volume, is also intended for situations in which the volume of intersecting traffic is the primary reason for consideration of signal control. This warrant requires that for each of any four hours during the day, when vehicles per hour on the major-street approach and vehicles per hour on the higher-volume minor-street approach are plotted, they fall above the applicable line in Figure 4C-1 from the MUTCD.

Traffic volume at the R Street SE/21<sup>st</sup> Street SE intersection was found to meet Warrant 2. Under existing conditions, this condition is met between 8:00 AM and 9:00 AM and during consecutive hours between 3:00 PM and 6:00 PM.

The M Street SE/29<sup>th</sup> Street SE intersection as also found to meet Warrant 2. Under the existing conditions, the volume exceed the graphed values for six hours during the day, including four consecutive hours between 2:00 PM and 6:00 PM.



### **Warrant 3, Peak Hour**

Warrant 3, Peak Hour, considers locations where for one-hour during the day, high traffic volume on the major-street results in excessive delay for vehicles on the minor-street. Condition A for this warrant relies on the total stopped time delay experienced by the minor-street approach. Condition B for this warrant is based on the traffic volume on the major-street and higher-volume minor street approach. Condition B for the Peak Hour Warrant, states that when plotted, vehicles per hour for one hour for the major-street and higher-volume minor street, must fall above the corresponding line in Figure 4C-3 in the MUCTD.

Peak hour volumes at M Street SE/29<sup>th</sup> Street SE intersection meet the conditions for Warrant 3, Peak Hour under existing conditions.

### **Future Volumes**

To determine which warrants might be met by future traffic volume, traffic forecasts were developed for 2040. For this assessment a one percent per year growth rate was applied to the existing traffic volume to forecast growth between 2019 and 2040. This growth rate would result in a 33 percent increase in daily traffic volume from 2019 to 2040 at the study intersections.

### **2040 Signal Warrants**

Signal warrant completed for future data are helpful when determining when future improvements will be needed. It is not recommended to install traffic signals for expected future volumes. Instead, future volumes can be tied to expected development, or volumes can be monitored to inform the City when a future traffic signal will be needed. Traffic volume forecasted for 2040, was used to evaluate the following warrants, consistent with the analysis completed for existing conditions:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour

Findings for each warrant are summarized below.

#### **Warrant 1, Eight-Hour Vehicular Volumes**

With the expected increase in traffic volume by 2040, both study intersections are expected to meet Warrant 1 by 2040. At R Street SE/21<sup>st</sup> Street SE, 11 hours will meet the criteria for Condition B with future traffic volume. The M Street SE/29<sup>th</sup> Street SE intersection would meet Condition A for 12 hours of the day.



## **Warrant 2, Four-Hour Vehicular Warrant**

This warrant is also expected to be met at both study intersections in 2040, consistent with findings for existing conditions.

## **Warrant 3, Peak Hour**

By 2040, traffic volume both study intersections would meet Warrant 3. At both intersections Warrant 3 is expected to be met by Condition B, which states that signal control should be considered when the traffic volume on the major-street is likely to result in excessive delays on the minor street.

## **Conclusions**

Based on the findings of this assessment, it is recommended that the City consider installing traffic signal or other traffic control at both the R Street SE/21<sup>st</sup> Street and the M Street SE/29<sup>th</sup> Street SE intersections.

Consideration of traffic signal control is warranted at both intersections evaluated under existing conditions. At the R Street SE/21<sup>st</sup> Street intersection Warrant 2, Four-Hour Vehicular volume is met, while traffic volume at the M Street SE/29<sup>th</sup> Street SE intersection was found to meet Warrant 3, Peak Hour and Warrant 2.

While MUTCD does not recommend consideration for traffic control until traffic volume measured in the field is found to meet warrants as defined in the MUTCD, evaluation of the warrants under 2040 conditions confirms that as traffic continues to grow, additional warrants for signal control are likely to be met.

### **Attachments:**

**Attachment A:** Current Year (2019) Signal Warrant Analysis

**Attachment B:** Future Year (2040) Signal Warrant Analysis

Analyst: Daniel Dye  
 Agency: Fehr & Peers  
 Date: 1/10/2020  
 Project ID: SE19-0712  
 EW Street: 29th St SE

Intersection: M Street/29th Street  
 Jurisdiction: City of Auburn  
 Units: U.S. Customary  
 Analysis Year: 2018  
 NS Street: M St

---

General Information

---

Major St. Speed (mph): 25  
 Nearest Signal (ft): 0  
 Crashes per Yr: 0

Population: Not less than 10000  
 Coordinated Signal System: N

---

School Crossing

---

Students in Highest Hour: 0  
 Adequate Gaps in Period: 0  
 Minutes in Period: 0

---

Roadway Network

---

Two Major Routes: 0  
 Weekend Count: 0  
 5-yr Growth Factor: 0

## Geometry and Traffic

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	1	0	0	1	0
LaneUsage		LTR			LTR			LTR			LTR	

---

Results

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Warrant 1: Eight-Hour Vehicular Volume [ ]  
 1 A. Minimum Vehicular Volumes [ ]  
 1 B. Interruption of Continuous Traffic [ ]  
 1 80% Vehicular --and-- Interruption Volumes [ ]

Warrant 2: Four-Hour Vehicular Volume  
 2 A. Four-Hour Vehicular Volumes [X]

Warrant 3: Peak Hour [X]  
 3 A. Peak-Hour Conditions [ ]  
 3 B. Peak-Hour Vehicular Volume Hours Met [X]

Warrant 4: Pedestrian Volume [ ]  
 4 A. Four Hour Volumes [ ]  
 4 B. One-Hour Volumes [ ]

Warrant 5: School Crossing [ ]  
 5 A. Student Volumes [ ]  
 5 B. Gaps Same Period [ ]

Warrant 6: Coordinated Signal System  
 6 Degree of Platooning [ ]

Warrant 7: Crash Experience [ ]  
 7 A. Adequate trials of alternatives [ ]

#### 7 B. Reported crashes

[ ]

7 80% Volumes for Warrants 1A, 1B --or-- 4

[ X ]

## Warrant 8: Roadway Network

[ ]

### 8 A. Weekday Volume

[ ]

#### 8 B. Weekend Volume

[ ]

## Warrant 9: Grade Crossing

[ ]

#### 9 A. Grade Crossing within 140 ft --and--

[ ]

## 9 B. Peak-Hour Vehicular Volumes

[ ]

## Summary

	Major Hours	Minor Volume	Total Volume	Delay (Veh-hr)	1A 100%	1A 80%	1B 100%	1B 80%	2 100%	3A 100%	3B 100%
06-07	452	512	1176	0.0	No	Yes	No	No	Yes	No	Yes
07-08	439	209	800	0.0	No	Yes	No	No	No	No	No
08-09	504	428	1110	0.0	Yes	Yes	No	No	Yes	No	Yes
09-10	359	277	751	0.0	No	No	No	No	No	No	No
10-11	336	236	670	0.0	No	No	No	No	No	No	No
11-12	327	227	648	0.0	No	No	No	No	No	No	No
12-13	384	238	720	0.0	No	No	No	No	No	No	No
13-14	429	247	778	0.0	No	Yes	No	No	No	No	No
14-15	484	339	963	0.0	No	Yes	No	No	Yes	No	No
15-16	601	385	1146	0.0	Yes	Yes	No	Yes	Yes	No	Yes
16-17	621	403	1191	0.0	Yes	Yes	No	Yes	Yes	No	Yes
17-18	585	402	1154	0.0	Yes	Yes	No	No	Yes	No	Yes
Total	5521	3903	11107		4	8	0	2	6	0	5

### Traffic Volumes (vph)

Eastbound			Westbound			Northbound			Southbound		
L	T	R	L	T	R	L	T	R	L	T	R
25	211	71	38	90	17	53	98	61	85	365	62
70	114	30	18	188	19	52	130	27	13	79	60
28	235	80	42	100	19	45	82	51	71	305	52
20	168	57	30	71	13	29	53	33	46	197	34
19	157	53	28	67	12	25	45	28	39	168	29
18	153	52	27	65	12	24	43	27	38	161	28
22	179	61	32	76	14	25	45	28	40	169	29
24	200	68	36	85	16	26	47	29	41	176	30
27	226	76	41	96	18	35	65	40	56	242	41
34	281	95	50	119	22	40	74	46	64	274	47
35	290	98	52	123	23	42	77	48	67	287	49
33	273	92	49	116	22	42	77	48	67	286	49

## Pedestrian Volumes and Gaps (Per Hour)

Analyst: Daniel Dye  
 Agency: Fehr & Peers  
 Date: 1/10/2020  
 Project ID: SE19-0712  
 EW Street: 21st St SE

Intersection: R Street SE & 21st Street SE  
 Jurisdiction: City of Auburn  
 Units: U.S. Customary  
 Analysis Year: 2018  
 NS Street: R St SE

---

General Information

---

Major St. Speed (mph): 35  
 Nearest Signal (ft): 0  
 Crashes per Yr: 0

Population: Not less than 10000  
 Coordinated Signal System: N

---

School Crossing

---

Students in Highest Hour: 0  
 Adequate Gaps in Period: 0  
 Minutes in Period: 0

---

Roadway Network

---

Two Major Routes: 0  
 Weekend Count: 0  
 5-yr Growth Factor: 0

## Geometry and Traffic

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	1	0	0	1	0	0	1	0
LaneUsage		LT	R		LTR			LTR			LTR	

---

Results

---

Warrant 1: Eight-Hour Vehicular Volume [ ]  
 1 A. Minimum Vehicular Volumes [ ]  
 1 B. Interruption of Continuous Traffic [ ]  
 1 80% Vehicular --and-- Interruption Volumes [ ]

Warrant 2: Four-Hour Vehicular Volume  
 2 A. Four-Hour Vehicular Volumes [X]

Warrant 3: Peak Hour [ ]  
 3 A. Peak-Hour Conditions [ ]  
 3 B. Peak-Hour Vehicular Volume Hours Met [ ]

Warrant 4: Pedestrian Volume [ ]  
 4 A. Four Hour Volumes [ ]  
 4 B. One-Hour Volumes [ ]

Warrant 5: School Crossing [ ]  
 5 A. Student Volumes [ ]  
 5 B. Gaps Same Period [ ]

Warrant 6: Coordinated Signal System  
 6 Degree of Platooning [ ]

Warrant 7: Crash Experience [ ]  
 7 A. Adequate trials of alternatives [ ]

7 B. Reported crashes [ ]

7 80% Volumes for Warrants 1A, 1B --or-- 4 [X]

Warrant 8: Roadway Network [ ]

## 8 A. Weekday Volume [ ]

8 B. Weekend Volume [ ]

Warrant 9: Grade Crossing [ ]

9 A. Grade Crossing within 140 ft --and-- [ ]

9 B. Peak-Hour Vehicular Volumes [ ]

## Summary

Hours	Major	Minor	Total	Delay	1A	1A	1B	1B	2	3A	3B
	Volume	Volume	Volume	(Veh-hr)	100%	80%	100%	80%	100%	100%	100%
06-07	1645	80	1754	0.0	No	No	No	Yes	No	No	No
07-08	883	51	978	0.0	No	No	No	No	No	No	No
08-09	1241	137	1426	0.0	No	No	Yes	Yes	Yes	No	No
09-10	836	91	960	0.0	No	No	No	Yes	No	No	No
10-11	700	89	821	0.0	No	No	No	Yes	No	No	No
11-12	680	97	811	0.0	No	No	No	Yes	No	No	No
12-13	703	100	839	0.0	No	No	No	Yes	No	No	No
13-14	708	108	854	0.0	No	No	No	Yes	No	No	No
14-15	947	151	1151	0.0	No	No	Yes	Yes	No	No	No
15-16	1039	172	1272	0.0	No	Yes	Yes	Yes	Yes	No	No
16-17	1014	198	1282	0.0	No	Yes	Yes	Yes	Yes	No	No
17-18	1014	169	1242	0.0	No	Yes	Yes	Yes	Yes	No	No
Total	11410	1443	13390		0	3	5	11	4	0	0

### Traffic Volumes (vph)

Eastbound			Westbound			Northbound			Southbound		
L	T	R	L	T	R	L	T	R	L	T	R
4	24	52	2	8	19	52	386	2	75	1096	34
3	11	37	2	24	18	419	305	6	17	121	15
6	41	90	3	13	32	39	291	1	56	828	26
4	27	60	2	9	22	26	196	1	38	558	17
4	27	58	2	9	21	21	164	1	32	467	15
4	29	64	2	9	23	21	160	1	31	453	14
5	30	65	2	10	24	22	165	1	32	468	15
5	32	71	2	10	26	22	166	1	32	472	15
7	45	99	3	14	36	30	222	1	43	631	20
8	51	113	3	17	41	33	244	1	47	692	22
9	59	130	4	19	47	32	238	1	46	676	21
8	50	111	3	16	40	32	238	1	46	676	21

## Pedestrian Volumes and Gaps (Per Hour)

Analyst: Daniel Dye  
 Agency: Fehr & Peers  
 Date: 1/10/2020  
 Project ID: SE19-0712  
 EW Street: 29th St SE

Intersection: M Street/29th Street  
 Jurisdiction: City of Auburn  
 Units: U.S. Customary  
 Analysis Year: 2040  
 NS Street: M St

---

General Information

---

Major St. Speed (mph): 25  
 Nearest Signal (ft): 0  
 Crashes per Yr: 0

Population: Not less than 10000  
 Coordinated Signal System: N

---

School Crossing

---

Students in Highest Hour: 0  
 Adequate Gaps in Period: 0  
 Minutes in Period: 0

---

Roadway Network

---

Two Major Routes: 0  
 Weekend Count: 0  
 5-yr Growth Factor: 0

	Geometry and Traffic											
	Eastbound			Westbound			Northbound			Southbound		
No. Lanes	L	T	R	L	T	R	L	T	R	L	T	R
LaneUsage	0	1	0	0	1	0	0	1	0	0	1	0
	LTR			LTR			LTR			LTR		

---

Results

---

Warrant 1: Eight-Hour Vehicular Volume [X]  
 1 A. Minimum Vehicular Volumes [X]  
 1 B. Interruption of Continuous Traffic [ ]  
 1 80% Vehicular --and-- Interruption Volumes [ ]

Warrant 2: Four-Hour Vehicular Volume  
 2 A. Four-Hour Vehicular Volumes [X]

Warrant 3: Peak Hour [X]  
 3 A. Peak-Hour Conditions [ ]  
 3 B. Peak-Hour Vehicular Volume Hours Met [X]

Warrant 4: Pedestrian Volume [ ]  
 4 A. Four Hour Volumes [ ]  
 4 B. One-Hour Volumes [ ]

Warrant 5: School Crossing [ ]  
 5 A. Student Volumes [ ]  
 5 B. Gaps Same Period [ ]

Warrant 6: Coordinated Signal System  
 6 Degree of Platooning [ ]

Warrant 7: Crash Experience [ ]  
 7 A. Adequate trials of alternatives [ ]

## 7 B. Reported crashes

[ ]

7 80% Volumes for Warrants 1A, 1B --or-- 4

[ X ]

## Warrant 8: Roadway Network

[ ]

### 8 A. Weekday Volume

[ ]

## 8 B. Weekend Volume

[ ]

## Warrant 9: Grade Crossing

[ ]

#### 9 A. Grade Crossing within 140 ft --and--

[ ]

## 9 B. Peak-Hour Vehicular Volumes

[ ]

## Summary

	Major Hours	Minor Volume	Total Volume	Delay (Veh-hr)	1A 100%	1A 80%	1B 100%	1B 80%	2 100%	3A 100%	3B 100%
06-07	580	645	1500	0.0	Yes	Yes	No	No	Yes	No	Yes
07-08	560	265	1020	0.0	Yes	Yes	No	No	Yes	No	No
08-09	635	535	1400	0.0	Yes	Yes	No	Yes	Yes	No	Yes
09-10	460	355	970	0.0	No	Yes	No	No	Yes	No	No
10-11	430	300	860	0.0	No	Yes	No	No	Yes	No	No
11-12	420	290	830	0.0	No	Yes	No	No	No	No	No
12-13	490	305	925	0.0	No	Yes	No	No	Yes	No	No
13-14	540	315	990	0.0	Yes	Yes	No	No	Yes	No	No
14-15	615	430	1225	0.0	Yes	Yes	No	Yes	Yes	No	Yes
15-16	760	485	1450	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes
16-17	785	510	1510	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes
17-18	740	510	1465	0.0	Yes	Yes	No	Yes	Yes	No	Yes
Total	7015	4945	14145		8	12	2	5	11	0	6

### Traffic Volumes (vph)

Eastbound			Westbound			Northbound			Southbound		
L	T	R	L	T	R	L	T	R	L	T	R
35	265	90	50	115	25	70	125	80	110	455	80
90	145	40	25	235	25	65	165	35	20	100	75
35	295	100	55	125	25	60	105	65	90	380	65
25	210	75	40	90	20	40	70	45	60	250	45
25	200	70	35	85	15	35	60	35	50	210	40
25	195	65	35	85	15	30	55	35	50	205	35
30	225	80	40	95	20	35	60	35	50	215	40
30	250	85	45	110	20	35	60	40	55	220	40
35	285	95	55	120	25	45	85	50	70	305	55
45	350	120	65	150	30	50	95	60	80	345	60
45	365	125	65	155	30	55	100	60	85	360	65
45	340	115	65	145	30	55	100	60	85	360	65

## Pedestrian Volumes and Gaps (Per Hour)

Analyst: Daniel Dye  
 Agency: Fehr & Peers  
 Date: 1/10/2020  
 Project ID: SE19-0712  
 EW Street: 21st St SE

Intersection: R Street SE & 21st Street SE  
 Jurisdiction: City of Auburn  
 Units: U.S. Customary  
 Analysis Year: 2040  
 NS Street: R St SE

---

General Information

---

Major St. Speed (mph): 35  
 Nearest Signal (ft): 0  
 Crashes per Yr: 0

Population: Not less than 10000  
 Coordinated Signal System: N

---

School Crossing

---

Students in Highest Hour: 0  
 Adequate Gaps in Period: 0  
 Minutes in Period: 0

---

Roadway Network

---

Two Major Routes: 0  
 Weekend Count: 0  
 5-yr Growth Factor: 0

## Geometry and Traffic

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	1	0	0	1	0	0	1	0
LaneUsage		LT	R		LTR			LTR			LTR	

---

Results

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Warrant 1: Eight-Hour Vehicular Volume [X]  
 1 A. Minimum Vehicular Volumes [ ]  
 1 B. Interruption of Continuous Traffic [X]  
 1 80% Vehicular --and-- Interruption Volumes [ ]

Warrant 2: Four-Hour Vehicular Volume  
 2 A. Four-Hour Vehicular Volumes [X]

Warrant 3: Peak Hour  
 3 A. Peak-Hour Conditions [ ]  
 3 B. Peak-Hour Vehicular Volume Hours Met [X]

Warrant 4: Pedestrian Volume  
 4 A. Four Hour Volumes [ ]  
 4 B. One-Hour Volumes [ ]

Warrant 5: School Crossing  
 5 A. Student Volumes [ ]  
 5 B. Gaps Same Period [ ]

Warrant 6: Coordinated Signal System  
 6 Degree of Platooning [ ]

Warrant 7: Crash Experience  
 7 A. Adequate trials of alternatives [ ]

7 B. Reported crashes [ ]

7 80% Volumes for Warrants 1A, 1B --or-- 4 [X]

Warrant 8: Roadway Network [ ]

8 A. Weekday Volume [ ]

8 B. Weekend Volume [ ]

Warrant 9: Grade Crossing [ ]

9 A. Grade Crossing within 140 ft --and-- [ ]

9 B. Peak-Hour Vehicular Volumes [ ]

Summary													
	Major	Minor	Total	Delay (Veh-hr)	1A 100%	1A 80%	1B 100%	1B 80%	2	3A	3B		
Hours	Volume	Volume	Volume		No	No	Yes	Yes	Yes	100%	100%	100%	
06-07	2060	100	2200	0.0	No	No	Yes	Yes	Yes	No	No	No	
07-08	1115	70	1245	0.0	No	No	No	No	No	No	No	No	
08-09	1560	180	1805	0.0	No	Yes	Yes	Yes	Yes	No	No	Yes	
09-10	1055	115	1220	0.0	No	No	Yes	Yes	Yes	No	No	No	
10-11	885	115	1050	0.0	No	No	Yes	Yes	Yes	No	No	No	
11-12	860	125	1035	0.0	No	No	Yes	Yes	Yes	No	No	No	
12-13	890	135	1075	0.0	No	No	Yes	Yes	Yes	No	No	No	
13-14	895	140	1090	0.0	No	No	Yes	Yes	Yes	No	No	No	
14-15	1195	195	1460	0.0	No	Yes	Yes	Yes	Yes	No	No	No	
15-16	1310	220	1615	0.0	Yes	Yes	Yes	Yes	Yes	No	Yes		
16-17	1280	255	1625	0.0	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	
17-18	1280	215	1570	0.0	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	
Total	14385	1865	16990		3	5	11	11	6	0	4		

### Traffic Volumes (vph)

Eastbound			Westbound			Northbound			Southbound		
L	T	R	L	T	R	L	T	R	L	T	R
5	30	65	5	10	25	65	485	5	95	1365	45
5	15	50	5	30	25	525	380	10	25	155	20
10	55	115	5	20	40	50	365	5	70	1035	35
5	35	75	5	15	30	35	245	5	50	695	25
5	35	75	5	15	30	30	205	5	40	585	20
5	40	80	5	15	30	30	200	5	40	565	20
10	40	85	5	15	30	30	210	5	40	585	20
10	40	90	5	15	35	30	210	5	40	590	20
10	60	125	5	20	45	40	280	5	55	790	25
10	65	145	5	25	55	45	305	5	60	865	30
15	75	165	5	25	60	40	300	5	60	845	30
10	65	140	5	20	50	40	300	5	60	845	30

## Pedestrian Volumes and Gaps (Per Hour)

## APPENDIX D – COST ESTIMATE

**Table 1 – R St Corridor Alternatives Cost Summary**

	Replace Sidewalk and Pavement	Replace channelization	Replace Pavement and S/W as-needed
<b>Alternative 1</b>	\$6,060,400	\$5,447,605	\$5,667,963
<b>Alternative 2</b>	\$5,981,200	\$5,369,184	\$5,564,615
<b>Alternative 3</b>	\$6,180,400	\$5,593,375	\$5,713,677

**Table 2 - Intersection Alternatives Cost Summary**

	Signal ( 1 SB lane)	Signal (2 SB lanes)	Roundabout (Single Lane)	Roundabout (Multi- Lane)	Free Right and Stop Control
<b>Howard Rd (West Leg)/R</b>	N/A	N/A	N/A	N/A	\$137,523
<b>21<sup>st</sup>/R</b>	\$1,075,502	\$1,275,325	\$598,000	\$860,238	N/A
<b>29<sup>th</sup>/R</b>	\$905,351	\$1,089,496	\$1,007,730	\$1,190,128	N/A
<b>29<sup>th</sup>/M</b>	\$633,370	N/A	\$693,995	N/A	N/A

**Table 3 – R Street Project Sequencing**

Project	Sequence Order	Cost Estimate
29 <sup>th</sup> /R Intersection Improvements w/2 <sup>nd</sup> southbound lane from 22 <sup>nd</sup> to 33rd	1st	\$4,963,360
21 <sup>st</sup> /R and Howard Rd (west leg) /R Combined Improvements	2nd	\$1,360,921
R St Re-Channelization south of 33 <sup>rd</sup> Street SE to include two way left turn lane (w/o grind & overlay)	Any Order	\$587,025
R St Re-Channelization south of 33 <sup>rd</sup> Street SE to include two way left turn lane (w/grind & overlay)	Any Order	\$1,681,138

# CORRIDOR ALTERNATIVE 1



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Alternative 1  
By: JES  
Date: 1/20/2020

CORRIDOR 1 ALTERNATIVE- TWO SB LANES					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	4321	SY	\$25.00	\$108,030.56	
REMOVE CEMENT CONC. SIDEWALK	6301	SY	\$20	\$126,028.89	
PLANE/GRADE HMA	18001	SY	\$6.00	\$108,007.33	
CLEARING AND GRUBBING	0.46	ACRE	\$60,000	\$27,542.70	
CRUSHED SURFACING BASE COURSE	3560	TON	\$30.00	\$106,788.87	
HMA CL 1/2"	3915	TON	\$100.00	\$391,515.83	
CEMENT CONC. CURB AND GUTTER	12500	LF	\$35.00	\$437,500.00	
CEMENT CONC. SIDEWALK	6757	SY	\$60.00	\$405,400.00	
CEMENT CONC. ADA CURB RAMP	37	EA	\$2,000.00	\$74,000.00	
FENCING	1684	LF	\$40.00	\$67,360.00	
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	7400	LF	\$50.00	\$370,000.00	
CATCH BASIN TYPE 1	37	EA	\$2,500.00	\$92,500.00	
CATCH BASIN TYPE 2 48 IN. DIAM.	6	EA	\$4,000.00	\$24,000.00	
POND	27400	CF	\$8.00	\$219,200.00	
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	3996	CY	\$50.00	\$199,800.00	
FLOW CONTROL STRUCTURE	1	EA	\$5,000.00	\$5,000.00	
EMERGENCY SPILLWAY	1	LS	\$3,000.00	\$3,000.00	
CONNECTION TO DRAINAGE STRUCTURE	2	EA	\$1,500.00	\$3,000.00	
<b>STRUCTURE</b>					
RETAINING WALL	528	SF	\$120.00	\$63,360.00	
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	1	LS	\$8,000.00	\$8,000.00	
SWPPP PREPARATION AND MAINTENANCE	1	LS	\$5,000.00	\$5,000.00	
SPCC PLAN	1	LS	\$5,000.00	\$5,000.00	
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	1	LS	\$5,000.00	\$5,000.00	
PAVEMENT MARKING - LINE	24,000	LF	\$1.30	\$31,200.00	
PAVEMENT MARKING - SYMBOLS	50	EA	\$250.00	\$12,500.00	
ILLUMINATION	1	LS	\$10,000.00	\$10,000.00	
TRAFFIC SIGNAL	0	EA	\$350,000.00	\$0.00	
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	1	LS	\$5,000.00	\$5,000.00	
			<b>Hard Construction Sub-Total</b>	<b>\$2,913,734</b>	
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS	\$174,824.05	\$174,824.05	
TRAFFIC CONTOL	3%	LS	\$87,412.03	\$87,412.03	
SURVEYING	1%	LS	\$29,137.34	\$29,137.34	
CONSTRUCTION ADMIN	5%	LS	\$145,686.71	\$145,686.71	
			<b>Construction Sub-Total</b>	<b>\$3,350,794</b>	
<b>ROW ACQUISITION</b>					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	14215	SF	\$20.00	\$284,300.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	20934	SF	\$20.00	\$418,680.00	
			<b>R/W Sub-Total</b>	<b>\$702,980</b>	
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS	\$405,377.43	\$405,377.43	
DESGIN & PERMITTING	20%	LS	\$810,754.86	\$810,754.86	
			<b>Soft Cost Sub-Total</b>	<b>\$1,216,132</b>	
			<b>Subtotal</b>	<b>\$5,269,907</b>	
			<b>Contingency (15%)</b>	<b>\$790,486</b>	
			<b>Project Total</b>	<b>\$6,060,393</b>	



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Alternative 1  
By: JES  
Date: 1/20/2020

CORRIDOR 1 ALTERNATIVE- TWO SB LANES					
Sidewalk and overlay as-needed for southern end of corridor (33rd St. SE)					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	4321	SY	\$25.00	\$108,030.56	
REMOVE CEMENT CONC. SIDEWALK	4850	SY	\$20	\$96,994.44	
PLANE/GRADE HMA	18001	SY	\$6.00	\$108,007.33	
CLEARING AND GRUBBING	0.46	ACRE	\$60,000	\$27,542.70	
CRUSHED SURFACING BASE COURSE	3560	TON	\$30.00	\$106,788.87	
HMA CL 1/2"	3915	TON	\$100.00	\$391,515.83	
CEMENT CONC. CURB AND GUTTER	10077	LF	\$35.00	\$352,695.00	
CEMENT CONC. SIDEWALK	4850	SY	\$60.00	\$290,983.33	
CEMENT CONC. ADA CURB RAMP	37	EA	\$2,000.00	\$74,000.00	
FENCING	1684	LF	\$40.00	\$67,360.00	
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	7400	LF	\$50.00	\$370,000.00	
CATCH BASIN TYPE 1	37	EA	\$2,500.00	\$92,500.00	
CATCH BASIN TYPE 2 48 IN. DIAM.	6	EA	\$4,000.00	\$24,000.00	
POND	27400	CF	\$8.00	\$219,200.00	
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	3996	CY	\$50.00	\$199,800.00	
FLOW CONTROL STRUCTURE	1	EA	\$5,000.00	\$5,000.00	
EMERGENCY SPILLWAY	1	LS	\$3,000.00	\$3,000.00	
CONNECTION TO DRAINAGE STRUCTURE	2	EA	\$1,500.00	\$3,000.00	
<b>STRUCTURE</b>					
RETAINING WALL	528	SF	\$120.00	\$63,360.00	
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	1	LS	\$8,000.00	\$8,000.00	
SWPPP PREPARATION AND MAINTENANCE	1	LS	\$5,000.00	\$5,000.00	
SPCC PLAN	1	LS	\$5,000.00	\$5,000.00	
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	1	LS	\$5,000.00	\$5,000.00	
PAVEMENT MARKING - LINE	24,000	LF	\$1.30	\$31,200.00	
PAVEMENT MARKING - SYMBOLS	50	EA	\$250.00	\$12,500.00	
ILLUMINATION	1	LS	\$10,000.00	\$10,000.00	
TRAFFIC SIGNAL	0	EA	\$350,000.00	\$0.00	
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	1	LS	\$5,000.00	\$5,000.00	
				<b>Hard Construction Sub-Total</b>	<b>\$2,685,478</b>
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS	\$161,128.68	\$161,128.68	
TRAFFIC CONTROL	3%	LS	\$80,564.34	\$80,564.34	
SURVEYING	1%	LS	\$26,854.78	\$26,854.78	
CONSTRUCTION ADMIN	5%	LS	\$134,273.90	\$134,273.90	
				<b>Construction Sub-Total</b>	<b>\$3,088,300</b>
<b>ROW ACQUISITION</b>					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	14215	SF	\$20.00	\$284,300.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	20934	SF	\$20.00	\$418,680.00	
				<b>R/W Sub-Total</b>	<b>\$702,980</b>
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS	\$379,127.98	\$379,127.98	
DESIGN & PERMITTING	20%	LS	\$758,255.96	\$758,255.96	
				<b>Soft Cost Sub-Total</b>	<b>\$1,137,384</b>

Subtotal	\$4,928,664
Contingency (15%)	\$739,300
<b>Project Total</b>	<b>\$5,667,963</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Alternative 1  
By: JES  
Date: 1/20/2020

CORRIDOR 1 ALTERNATIVE- TWO SB LANES					
Channelization only change to southern end of corridor (33rd St. SE)					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	4321	SY	\$25.00	\$108,030.56	
REMOVE CEMENT CONC. SIDEWALK	4194	SY	\$20.00	\$83,873.33	
PLANE/GRADE HMA	13078	SY	\$6.00	\$78,470.67	
CLEARING AND GRUBBING	0.44	ACRE	\$60,000	\$26,165.29	
CRUSHED SURFACING BASE COURSE	3560	TON	\$30.00	\$106,788.87	
HMA CL 1/2"	3394	TON	\$100.00	\$339,380.03	
CEMENT CONC. CURB AND GUTTER	10077	LF	\$35.00	\$352,695.00	
CEMENT CONC. SIDEWALK	4850	SY	\$60.00	\$290,983.33	
CEMENT CONC. ADA CURB RAMP	21	EA	\$2,000.00	\$42,000.00	
FENCING	1684	LF	\$40.00	\$67,360.00	
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	7400	LF	\$50.00	\$370,000.00	
CATCH BASIN TYPE 1	37	EA	\$2,500.00	\$92,500.00	
CATCH BASIN TYPE 2 48 IN. DIAM.	6	EA	\$4,000.00	\$24,000.00	
POND	27400	CF	\$8.00	\$219,200.00	
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	3996	CY	\$50.00	\$199,800.00	
FLOW CONTROL STRUCTURE	1	EA	\$5,000.00	\$5,000.00	
EMERGENCY SPILLWAY	1	LS	\$3,000.00	\$3,000.00	
CONNECTION TO DRAINAGE STRUCTURE	2	EA	\$1,500.00	\$3,000.00	
<b>STRUCTURE</b>					
RETAINING WALL	528	SF	\$120.00	\$63,360.00	
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	1	LS	\$8,000.00	\$8,000.00	
SWPPP PREPARATION AND MAINTENANCE	1	LS	\$5,000.00	\$5,000.00	
SPCC PLAN	1	LS	\$5,000.00	\$5,000.00	
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	1	LS	\$5,000.00	\$5,000.00	
PAVEMENT MARKING - LINE	24,000	LF	\$1.30	\$31,200.00	
PAVEMENT MARKING - SYMBOLS	50	EA	\$250.00	\$12,500.00	
ILLUMINATION	1	LS	\$10,000.00	\$10,000.00	
TRAFFIC SIGNAL	0	EA	\$350,000.00	\$0.00	
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	1	LS	\$5,000.00	\$5,000.00	
<b>Hard Construction Sub-Total</b>					
					<b>\$2,557,307</b>
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS	\$153,438.42	\$153,438.42	
TRAFFIC CONTOL	3%	LS	\$76,719.21	\$76,719.21	
SURVEYING	1%	LS	\$25,573.07	\$25,573.07	
CONSTRUCTION ADMIN	5%	LS	\$127,865.35	\$127,865.35	
<b>Construction Sub-Total</b>					
					<b>\$2,940,903</b>
<b>ROW ACQUISITION</b>					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	14215	SF	\$20.00	\$284,300.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	20934	SF	\$20.00	\$418,680.00	
<b>R/W Sub-Total</b>					
					<b>\$702,980</b>
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS	\$364,388.31	\$364,388.31	
DESIGN & PERMITTING	20%	LS	\$728,776.63	\$728,776.63	
<b>Soft Cost Sub-Total</b>					
					<b>\$1,093,165</b>
<b>Subtotal</b>					
					<b>\$4,737,048</b>
<b>Contingency (15%)</b>					
					<b>\$710,557</b>
<b>Project Total</b>					
					<b>\$5,447,605</b>

## CORRIDOR DATA

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	155958	0.167	25993	963	1974
Full-depth	51145	0.500	25573	947	1942
CSBC	51145	0.917	46883	1736	3560
			Total	3915	

Pavement Site prep		
	sqft	sqyd
Planing/grinding	162011	18001
Remove full-depth	38891	4321
Total	18001	

Landscape		
	sqft	acres
Landscape restoration	2198	0.05
Clearing/grubbing	19996	0.46

Sidewalk		
	sqft	sqyd
Remove sidewalk	56713	6301
New conc sidewalk	60810	6757

Curb and gutter	
	lineal ft
Add curb	12500

Wall			
	lineal ft	height (ft)	sqft
Retaining wall	132	4	528

## CORRIDOR DATA- Chan only

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	114758	0.167	19126.33333	708	1452
Full-depth	51145	0.500	25572.5	947	1942
CSBC	51145	0.917	46882.91667	1736	3560
			Total	3394	

Pavement Site prep		
	sqft	sqyd
Planing/grinding	117706	13078
Remove full-depth	38891	4321
Total	13078	

Landscape		
	sqft	acres
Landscape restoration	2198	0.05
Clearing/grubbing	18996	0.44

Sidewalk		
	sqft	sqyd
Remove sidewalk	37743	4194
New conc sidewalk	43648	4850

Curb and gutter			
	lineal ft		
Add curb	10077		

Wall			
	lineal ft	height (ft)	sqft
Retaining wall	132	4	528

## CORRIDOR DATA- Pvmt and S/W as-needed

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	155958	0.167	25993	963	1974
Full-depth	51145	0.500	25573	947	1942
CSBC	51145	0.917	46883	1736	3560
			Total	3915	

Pavement Site prep		
	sqft	sqyd
Planing/grinding	162011	18001
Remove full-depth	38891	4321
Total	18001	

Landscape		
	sqft	acres
Landscape restoration	2198	0.05
Clearing/grubbing	18996	0.44

Sidewalk		
	sqft	sqyd
Remove sidewalk	37743	4194
New conc sidewalk	43648	4850

Curb and gutter	
	lineal ft
Add curb	10077

Wall			
	lineal ft	height (ft)	sqft
Retaining wall	132	4	528

# CORRIDOR ALTERNATIVE 2



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Alternative 2  
By: JES  
Date: 1/20/2020

CORRIDOR ALTERNATIVE 2 - TWO-WAY LEFT TURN LANE					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	4195	SY	\$25.00	\$104,872.22	
REMOVE CEMENT CONC. SIDEWALK	6307	SY	\$20.00	\$126,135.56	
PLANE/GRADE HMA	18108	SY	\$6.00	\$108,645.33	
CLEARING AND GRUBBING	0.36	ACRE	\$40,000	\$14,534.44	
CRUSHED SURFACING BASE COURSE	3440	TON	\$30.00	\$103,187.13	
HMA CL 1/2"	3836	TON	\$100.00	\$383,615.74	
CEMENT CONC. CURB AND GUTTER	12500	LF	\$35.00	\$437,500.00	
CEMENT CONC. SIDEWALK	7026	SY	\$60.00	\$421,546.67	
CEMENT CONC. ADA CURB RAMP	37	EA	\$2,000.00	\$74,000.00	
FENCING	1329	LF	\$40.00	\$53,160.00	
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	7400	LF	\$50.00	\$370,000.00	
CATCH BASIN TYPE 1	37	EA	\$2,500.00	\$92,500.00	
CATCH BASIN TYPE 2 48 IN. DIAM.	6	EA	\$4,000.00	\$24,000.00	
POND	27400	CF	\$8.00	\$219,200.00	
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	3996	CY	\$50.00	\$199,800.00	
FLOW CONTROL STRUCTURE	1	EA	\$5,000.00	\$5,000.00	
EMERGENCY SPILLWAY	1	LS	\$3,000.00	\$3,000.00	
CONNECTION TO DRAINAGE STRUCTURE	2	EA	\$1,500.00	\$3,000.00	
<b>STRUCTURE</b>					
RETAINING WALL	528	SF	\$120.00	\$63,360.00	
RETAINING WALL FILL	0	TON		\$0.00	
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	1	LS	\$8,000.00	\$8,000.00	
SWPPP PREPARATION AND MAINTENANCE	1	LS	\$5,000.00	\$5,000.00	
SPCC PLAN	1	LS	\$5,000.00	\$5,000.00	
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	1	LS	\$5,000.00	\$5,000.00	
PAVEMENT MARKING - LINE	24,000	LF	\$1.30	\$31,200.00	
PAVEMENT MARKING - SYMBOLS	50	EA	\$250.00	\$12,500.00	
ILLUMINATION	1	LS	\$10,000.00	\$10,000.00	
TRAFFIC SIGNAL	0	EA	\$350,000.00	\$0.00	
FLASHING BEACON CROSSING	0	EA	\$30,000.00	\$0.00	
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	1	LS	\$5,000.00	\$5,000.00	
			Hard Construction Sub-Total		\$2,888,757.08
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS	\$173,325.43	\$173,325.43	
TRAFFIC CONTOL	3%	LS	\$86,662.71	\$86,662.71	
SURVEYING	1%	LS	\$28,887.57	\$28,887.57	
CONSTRUCTION ADMIN	5%	LS	\$144,437.85	\$144,437.85	
			Construction Sub-Total		\$3,322,070.65
<b>ROW ACQUISITION</b>					
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	20934	SF	\$20.00	\$418,680.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	13002	SF	\$20.00	\$260,040.00	
			R/W Sub-Total		\$678,720.00
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS	\$400,079.06	\$400,079.06	
DESGIN & PERMITTING	20%	LS	\$800,158.13	\$800,158.13	
			Soft Cost Sub-Total		\$1,200,237.19

Subtotal	\$5,201,027.84
Contingency (15%)	\$780,154.18
<b>Project Total</b>	<b>\$5,981,182.02</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Alternative 2  
By: JES  
Date: 1/20/2020

CORRIDOR ALTERNATIVE 2 - TWO-WAY LEFT TURN LANE					
Channelization only change to southern end of corridor (33rd St. SE)					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA		4195	SY	\$25.00	\$104,872.22
REMOVE CEMENT CONC. SIDEWALK		4199	SY	\$20.00	\$83,980.00
PLANE/GRADE HMA		13185	SY	\$6.00	\$79,108.67
CLEARING AND GRUBBING		0.34	ACRE	\$40,000	\$13,616.16
CRUSHED SURFACING BASE COURSE		3440	TON	\$30.00	\$103,187.13
HMA CL 1/2"		3315	TON	\$100.00	\$331,479.94
CEMENT CONC. CURB AND GUTTER		10077	LF	\$35.00	\$352,695.00
CEMENT CONC. SIDEWALK		5119	SY	\$60.00	\$307,130.00
CEMENT CONC. ADA CURB RAMP		21	EA	\$2,000.00	\$42,000.00
FENCING		1329	LF	\$40.00	\$53,160.00
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.		7400	LF	\$50.00	\$370,000.00
CATCH BASIN TYPE 1		37	EA	\$2,500.00	\$92,500.00
CATCH BASIN TYPE 2 48 IN. DIAM.		6	EA	\$4,000.00	\$24,000.00
POND		27400	CF	\$8.00	\$219,200.00
GRAVEL BACKFILL FOR PIPE ZONE BEDDING		3996	CY	\$50.00	\$199,800.00
FLOW CONTROL STRUCTURE		1	EA	\$5,000.00	\$5,000.00
EMERGENCY SPILLWAY		1	LS	\$3,000.00	\$3,000.00
CONNECTION TO DRAINAGE STRUCTURE		2	EA	\$1,500.00	\$3,000.00
<b>STRUCTURE</b>					
RETAINING WALL		528	SF	\$120.00	\$63,360.00
RETAINING WALL FILL		0	TON		\$0.00
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL		1	LS	\$8,000.00	\$8,000.00
SWPPP PREPARATION AND MAINTENANCE		1	LS	\$5,000.00	\$5,000.00
SPCC PLAN		1	LS	\$5,000.00	\$5,000.00
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING		1	LS	\$5,000.00	\$5,000.00
PAVEMENT MARKING - LINE		24,000	LF	\$1.30	\$31,200.00
PAVEMENT MARKING - SYMBOLS		50	EA	\$250.00	\$12,500.00
ILLUMINATION		1	LS	\$10,000.00	\$10,000.00
TRAFFIC SIGNAL		0	EA	\$350,000.00	\$0.00
FLASHING BEACON CROSSING		0	EA	\$30,000.00	\$0.00
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION		1	LS	\$5,000.00	\$5,000.00
				Hard Construction Sub-Total	\$2,532,789.12
<b>MISC CONSTRUCTION</b>					
MOBILIZATION		6%	LS	\$151,967.35	\$151,967.35
TRAFFIC CONTOL		3%	LS	\$75,983.67	\$75,983.67
SURVEYING		1%	LS	\$25,327.89	\$25,327.89
CONSTRUCTION ADMIN		5%	LS	\$126,639.46	\$126,639.46
				Construction Sub-Total	\$2,912,707.49
<b>ROW ACQUISITION</b>					
CITY OF AUBURN FULL PARCEL TAKE - WETPOND		20934	SF	\$20.00	\$418,680.00
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE		0	SF	\$25.00	\$0.00
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE		13002	SF	\$20.00	\$260,040.00
				R/W Sub-Total	\$678,720.00
<b>SOFT COSTS</b>					
CITY ADMINISTRATION		10%	LS	\$359,142.75	\$359,142.75
DESGIN & PERMITTING		20%	LS	\$718,285.50	\$718,285.50
				Soft Cost Sub-Total	\$1,077,428.25
				Subtotal	\$4,668,855.73
				Contingency (15%)	\$700,328.36
				Project Total	\$5,369,184.09



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Client: City of Auburn  
Project: R Street Corridor Study  
Title: Alternative 2  
By: JES  
Date: 1/20/2020

CORRIDOR ALTERNATIVE 2 - TWO-WAY LEFT TURN LANE					
Sidewalk and overlay as-needed for southern end of corridor (33rd St. SE)					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA		4195	SY	\$25.00	\$104,872.22
REMOVE CEMENT CONC. SIDEWALK		4199	SY	\$20.00	\$83,980.00
PLANE/GRADE HMA		18108	SY	\$6.00	\$108,645.33
CLEARING AND GRUBBING		0.34	ACRE	\$40,000	\$13,616.16
CRUSHED SURFACING BASE COURSE		3440	TON	\$30.00	\$103,187.13
HMA CL 1/2"		3836	TON	\$100.00	\$383,615.74
CEMENT CONC. CURB AND GUTTER		10077	LF	\$35.00	\$352,695.00
CEMENT CONC. SIDEWALK		5119	SY	\$60.00	\$307,130.00
CEMENT CONC. ADA CURB RAMP		37	EA	\$2,000.00	\$74,000.00
FENCING		1329	LF	\$40.00	\$53,160.00
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.		7400	LF	\$50.00	\$370,000.00
CATCH BASIN TYPE 1		37	EA	\$2,500.00	\$92,500.00
CATCH BASIN TYPE 2 48 IN. DIAM.		6	EA	\$4,000.00	\$24,000.00
POND		27400	CF	\$8.00	\$219,200.00
GRAVEL BACKFILL FOR PIPE ZONE BEDDING		3996	CY	\$50.00	\$199,800.00
FLOW CONTROL STRUCTURE		1	EA	\$5,000.00	\$5,000.00
EMERGENCY SPILLWAY		1	LS	\$3,000.00	\$3,000.00
CONNECTION TO DRAINAGE STRUCTURE		2	EA	\$1,500.00	\$3,000.00
<b>STRUCTURE</b>					
RETAINING WALL		528	SF	\$120.00	\$63,360.00
RETAINING WALL FILL		0	TON		\$0.00
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL		1	LS	\$8,000.00	\$8,000.00
SWPPP PREPARATION AND MAINTENANCE		1	LS	\$5,000.00	\$5,000.00
SPCC PLAN		1	LS	\$5,000.00	\$5,000.00
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING		1	LS	\$5,000.00	\$5,000.00
PAVEMENT MARKING - LINE		24,000	LF	\$1.30	\$31,200.00
PAVEMENT MARKING - SYMBOLS		50	EA	\$250.00	\$12,500.00
ILLUMINATION		1	LS	\$10,000.00	\$10,000.00
TRAFFIC SIGNAL		0	EA	\$350,000.00	\$0.00
FLASHING BEACON CROSSING		0	EA	\$30,000.00	\$0.00
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION		1	LS	\$5,000.00	\$5,000.00
				Hard Construction Sub-Total	\$2,646,461.59
<b>MISC CONSTRUCTION</b>					
MOBILIZATION		6%	LS	\$158,787.70	\$158,787.70
TRAFFIC CONTOL		3%	LS	\$79,393.85	\$79,393.85
SURVEYING		1%	LS	\$26,464.62	\$26,464.62
CONSTRUCTION ADMIN		5%	LS	\$132,323.08	\$132,323.08
				Construction Sub-Total	\$3,043,430.83
<b>ROW ACQUISITION</b>					
CITY OF AUBURN FULL PARCEL TAKE - WETPOND		20934	SF	\$20.00	\$418,680.00
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE		0	SF	\$25.00	\$0.00
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE		13002	SF	\$20.00	\$260,040.00
				R/W Sub-Total	\$678,720.00
<b>SOFT COSTS</b>					
CITY ADMINISTRATION		10%	LS	\$372,215.08	\$372,215.08
DESGIN & PERMITTING		20%	LS	\$744,430.17	\$744,430.17
				Soft Cost Sub-Total	\$1,116,645.25
				Subtotal	\$4,838,796.07
				Contingency (15%)	\$725,819.41
				Project Total	\$5,564,615.48

**CORRIDOR DATA**

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	154890	0.167	25815	956	1960
Full-depth	49420	0.500	24710	915	1876
CSBC	49420	0.917	45302	1678	3440
Total					<b>3836</b>

Pavement Site prep		
	sqft	sqyd
Planing/grinding	162968	18108
Remove full-depth	37754	4195
Total		<b>18108</b>

Landscape		
	sqft	acres
Landscape restoration	26219	0.60
Clearing/grubbing	15828	0.36

Sidewalk		
	sqft	sqyd
Remove sidewalk	56761	6307
New conc sidewalk	63252	7026

Curb and gutter	
	lineal ft
Add curb	12500

Wall			
	lineal ft	height (ft)	soft
Retaining wall	132	4	528

**CORRIDOR DATA- chan only**

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	113690	0.167	18948	702	1439
Full-depth	49420	0.500	24710	915	1876
CSBC	49420	0.917	45302	1678	3440
Total					<b>3315</b>

Pavement Site prep		
	sqft	sqyd
Planing/grinding	118663	13185
Remove full-depth	37754	4195
Total		<b>13185</b>

Landscape		
	sqft	acres
Landscape restoration	26219	0.60
Clearing/grubbing	14828	0.34

Sidewalk		
	sqft	sqyd
Remove sidewalk	37791	4199
New conc sidewalk	46070	5119

Curb and gutter	
	lineal ft
Add curb	10077

Wall			
	lineal ft	height (ft)	soft
Retaining wall	132	4	528

**CORRIDOR DATA- overlay & s/w as-needed**

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	154890	0.167	25815	956	1960
Full-depth	49420	0.500	24710	915	1876
CSBC	49420	0.917	45302	1678	3440
Total					<b>3836</b>

Pavement Site prep		
	sqft	sqyd
Planing/grinding	162968	18108
Remove full-depth	37754	4195
Total		<b>18108</b>

Landscape		
	sqft	acres
Landscape restoration	26219	0.60
Clearing/grubbing	14828	0.34

Sidewalk		
	sqft	sqyd
Remove sidewalk	37791	4199
New conc sidewalk	46070	5119

Curb and gutter	
	lineal ft
Add curb	10077

Wall			
	lineal ft	height (ft)	soft
Retaining wall	132	4	528

# CORRIDOR ALTERNATIVE 3



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Alternative 3  
By: JES  
Date: 1/20/2020

CORRIDOR ALTERNATIVE 3- COMBINATION 2 SB LANES & TWLTL					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	4882	SY	\$25.00	\$122,041.67	
REMOVE CEMENT CONC. SIDEWALK	6301	SY	\$20	\$126,028.89	
PLANE/GRADE HMA	17304	SY	\$6.00	\$103,821.33	
CLEARING AND GRUBBING	0.51	ACRE	\$40,000	\$20,473.83	
CRUSHED SURFACING BASE COURSE	3829	TON	\$30.00	\$114,879.72	
HMA CL 1/2"	4011	TON	\$100.00	\$401,149.57	
CEMENT CONC. CURB AND GUTTER	14314	LF	\$35.00	\$500,990.00	
CEMENT CONC. SIDEWALK	6779	SY	\$60.00	\$406,753.33	
CEMENT CONC. ADA CURB RAMP	37	EA	\$2,000.00	\$74,000.00	
FENCING	1441	LF	\$40.00	\$57,640.00	
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	7400	LF	\$50.00	\$370,000.00	
CATCH BASIN TYPE 1	37	EA	\$2,500.00	\$92,500.00	
CATCH BASIN TYPE 2 48 IN. DIAM.	6	EA	\$4,000.00	\$24,000.00	
POND	27400	CF	\$8.00	\$219,200.00	
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	3996	CY	\$50.00	\$199,800.00	
FLOW CONTROL STRUCTURE	1	EA	\$5,000.00	\$5,000.00	
EMERGENCY SPILLWAY	1	LS	\$3,000.00	\$3,000.00	
CONNECTION TO DRAINAGE STRUCTURE	2	EA	\$1,500.00	\$3,000.00	
<b>STRUCTURE</b>					
RETAINING WALL	528	SF	\$120.00	\$63,360.00	
RETAINING WALL FILL	0	TON		\$0.00	
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	1	LS	\$8,000.00	\$8,000.00	
SWPPP PREPARATION AND MAINTENANCE	1	LS	\$5,000.00	\$5,000.00	
SPCC PLAN	1	LS	\$5,000.00	\$5,000.00	
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	1	LS	\$5,000.00	\$5,000.00	
PAVEMENT MARKING - LINE	24,000	LF	\$1.30	\$31,200.00	
PAVEMENT MARKING - SYMBOLS	50	EA	\$250.00	\$12,500.00	
ILLUMINATION	1	LS	\$10,000.00	\$10,000.00	
TRAFFIC SIGNAL	0	LS	\$350,000.00	\$0.00	
FLASHING BEACON CROSSING	0	EA	\$30,000.00	\$0.00	
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	1	LS	\$5,000.00	\$5,000.00	
			Hard Construction Sub-Total		\$2,989,338.34
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS	\$179,360.30	\$179,360.30	
TRAFFIC CONTOL	3%	LS	\$89,680.15	\$89,680.15	
SURVEYING	1%	LS	\$29,893.38	\$29,893.38	
CONSTRUCTION ADMIN	5%	LS	\$8,968.02	\$8,968.02	
			Construction Sub-Total		\$3,297,240.19
<b>ROW ACQUISITION</b>					
CITY OF AUBURN FULL PARCEL TAKE FOR WETPOND	20934	SF	\$20.00	\$418,680.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN PRIVATE PROPERTY TAKE	20905	SF	\$20.00	\$418,100.00	
			R/W Sub-Total		\$836,780.00
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS	\$413,402.02	\$413,402.02	
DESGIN & PERMITTING	20%	LS	\$826,804.04	\$826,804.04	
			Soft Cost Sub-Total		\$1,240,206.06
			Subtotal		\$5,374,226.25
			Contingency (15%)		\$806,133.94
			Project Total		\$6,180,360.19



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Alternative 3  
By: JES  
Date: 1/20/2020

### CORRIDOR ALTERNATIVE 3- COMBINATION 2 SB LANES & TWTL

Channelization only change to southern end of corridor (33rd St. SE)

ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	4882	SY		\$25.00	\$122,041.67
REMOVE CEMENT CONC. SIDEWALK	4194	SY		\$20	\$83,873.33
PLANE/GRADE HMA	12381	SY		\$6.00	\$74,284.67
CLEARING AND GRUBBING	0.49	ACRE		\$40,000	\$19,555.56
CRUSHED SURFACING BASE COURSE	3829	TON		\$30.00	\$114,879.72
HMA CL 1/2"	3490	TON		\$100.00	\$349,013.77
CEMENT CONC. CURB AND GUTTER	11891	LF		\$35.00	\$416,185.00
CEMENT CONC. SIDEWALK	4872	SY		\$60.00	\$292,336.67
CEMENT CONC. ADA CURB RAMP	21	EA		\$2,000.00	\$42,000.00
FENCING	1441	LF		\$40.00	\$57,640.00
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	7400	LF		\$50.00	\$370,000.00
CATCH BASIN TYPE 1	37	EA		\$2,500.00	\$92,500.00
CATCH BASIN TYPE 2 48 IN. DIAM.	6	EA		\$4,000.00	\$24,000.00
POND	27400	CF		\$8.00	\$219,200.00
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	3996	CY		\$50.00	\$199,800.00
FLOW CONTROL STRUCTURE	1	EA		\$5,000.00	\$5,000.00
EMERGENCY SPILLWAY	1	LS		\$3,000.00	\$3,000.00
CONNECTION TO DRAINAGE STRUCTURE	2	EA		\$1,500.00	\$3,000.00
<b>STRUCTURE</b>					
RETAINING WALL	528	SF		\$120.00	\$63,360.00
RETAINING WALL FILL	0	TON			\$0.00
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	1	LS		\$8,000.00	\$8,000.00
SWPPP PREPARATION AND MAINTENANCE	1	LS		\$5,000.00	\$5,000.00
SPCC PLAN	1	LS		\$5,000.00	\$5,000.00
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	1	LS		\$5,000.00	\$5,000.00
PAVEMENT MARKING - LINE	24,000	LF		\$1.30	\$31,200.00
PAVEMENT MARKING - SYMBOLS	50	EA		\$250.00	\$12,500.00
ILLUMINATION	1	LS		\$10,000.00	\$10,000.00
TRAFFIC SIGNAL	0	LS		\$350,000.00	\$0.00
FLASHING BEACON CROSSING	0	EA		\$30,000.00	\$0.00
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	1	LS		\$5,000.00	\$5,000.00
<b>Hard Construction Sub-Total</b>					<b>\$2,633,370.38</b>
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS		\$158,002.22	\$158,002.22
TRAFFIC CONTROL	3%	LS		\$79,001.11	\$79,001.11
SURVEYING	1%	LS		\$26,333.70	\$26,333.70
CONSTRUCTION ADMIN	5%	LS		\$7,900.11	\$7,900.11
<b>Construction Sub-Total</b>					<b>\$2,904,607.53</b>
<b>ROW ACQUISITION</b>					
CITY OF AUBURN FULL PARCEL TAKE FOR WETPOND	20934	SF		\$20.00	\$418,680.00
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF		\$25.00	\$0.00
CITY OF AUBURN PRIVATE PROPERTY TAKE	20905	SF		\$20.00	\$418,100.00
<b>R/W Sub-Total</b>					<b>\$836,780.00</b>
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS		\$374,138.75	\$374,138.75
DESIGN & PERMITTING	20%	LS		\$748,277.51	\$748,277.51
<b>Soft Cost Sub-Total</b>					<b>\$1,122,416.26</b>
Subtotal					<b>\$4,863,803.78</b>
Contingency (15%)					<b>\$729,570.57</b>
<b>Project Total</b>					<b>\$5,593,374.35</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Alternative 3  
By: JES  
Date: 1/20/2020

CORRIDOR ALTERNATIVE 3- COMBINATION 2 SB LANES & TWTL					
Sidewalk and overlay as-needed for southern end of corridor (33rd St. SE)					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	4882	SY		\$25.00	\$122,041.67
REMOVE CEMENT CONC. SIDEWALK	4194	SY		\$20	\$83,873.33
PLANE/GRADE HMA	17304	SY		\$6.00	\$103,821.33
CLEARING AND GRUBBING	0.49	ACRE		\$40,000	\$19,555.56
CRUSHED SURFACING BASE COURSE	3829	TON		\$30.00	\$114,879.72
HMA CL 1/2"	4011	TON		\$100.00	\$401,149.57
CEMENT CONC. CURB AND GUTTER	11891	LF		\$35.00	\$416,185.00
CEMENT CONC. SIDEWALK	4194	SY		\$60.00	\$251,620.00
CEMENT CONC. ADA CURB RAMP	37	EA		\$2,000.00	\$74,000.00
FENCING	1441	LF		\$40.00	\$57,640.00
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	7400	LF		\$50.00	\$370,000.00
CATCH BASIN TYPE 1	37	EA		\$2,500.00	\$92,500.00
CATCH BASIN TYPE 2 48 IN. DIAM.	6	EA		\$4,000.00	\$24,000.00
POND	27400	CF		\$8.00	\$219,200.00
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	3996	CY		\$50.00	\$199,800.00
FLOW CONTROL STRUCTURE	1	EA		\$5,000.00	\$5,000.00
EMERGENCY SPILLWAY	1	LS		\$3,000.00	\$3,000.00
CONNECTION TO DRAINAGE STRUCTURE	2	EA		\$1,500.00	\$3,000.00
<b>STRUCTURE</b>					
RETAINING WALL	528	SF		\$120.00	\$63,360.00
RETAINING WALL FILL	0	TON			\$0.00
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	1	LS		\$8,000.00	\$8,000.00
SWPPP PREPARATION AND MAINTENANCE	1	LS		\$5,000.00	\$5,000.00
SPCC PLAN	1	LS		\$5,000.00	\$5,000.00
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	1	LS		\$5,000.00	\$5,000.00
PAVEMENT MARKING - LINE	24,000	LF		\$1.30	\$31,200.00
PAVEMENT MARKING - SYMBOLS	50	EA		\$250.00	\$12,500.00
ILLUMINATION	1	LS		\$10,000.00	\$10,000.00
TRAFFIC SIGNAL	0	LS		\$350,000.00	\$0.00
FLASHING BEACON CROSSING	0	EA		\$30,000.00	\$0.00
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	1	LS		\$5,000.00	\$5,000.00
<b>Hard Construction Sub-Total</b>					<b>\$2,706,326.18</b>
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS		\$162,379.57	\$162,379.57
TRAFFIC CONTROL	3%	LS		\$81,189.79	\$81,189.79
SURVEYING	1%	LS		\$27,063.26	\$27,063.26
CONSTRUCTION ADMIN	5%	LS		\$8,118.98	\$8,118.98
<b>Construction Sub-Total</b>					<b>\$2,985,077.78</b>
<b>ROW ACQUISITION</b>					
CITY OF AUBURN FULL PARCEL TAKE FOR WETPOND	20934	SF		\$20.00	\$418,680.00
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF		\$25.00	\$0.00
CITY OF AUBURN PRIVATE PROPERTY TAKE	20905	SF		\$20.00	\$418,100.00
<b>R/W Sub-Total</b>					<b>\$836,780.00</b>
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS		\$382,185.78	\$382,185.78
DESIGN & PERMITTING	20%	LS		\$764,371.56	\$764,371.56
<b>Soft Cost Sub-Total</b>					<b>\$1,146,557.33</b>
Subtotal					<b>\$4,968,415.11</b>
Contingency (15%)					<b>\$745,262.27</b>
<b>Project Total</b>					<b>\$5,713,677.37</b>

**CORRIDOR DATA****HMA Class 1/2"**

	sqft	depth (ft)	cuft	cuyd	wt
Overlay	151946	0.17	25324	938	1923
Full-depth	55020	0.50	27510	1019	2089
CSBC	55020	0.92	50435	1868	3829
			<b>Total</b>	<b>4011.5</b>	

**Pavement Site prep**

	sqft	sqyd
Planing/grinding	155732	17304
Remove full-depth	43935	4882
<b>Total</b>	<b>17304</b>	

**Landscape**

	sqft	acres
Landscape restoration	37982	0.87
Clearing/grubbing	22296	0.51

**Sidewalk**

	sqft	sqyd
Remove sidewalk	56713	6301
New conc sidewalk	61013	6779

**Curb and gutter**

	lineal ft
Add curb	14314

**Wall**

	lineal ft	height (ft)	sqft
Retaining wall	132	4	528

**CORRIDOR DATA- chan only****HMA Class 1/2"**

	sqft	depth (ft)	cuft	cuyd	wt
Overlay	110746	0.17	18458	684	1401
Full-depth	55020	0.50	27510	1019	2089
CSBC	55020	0.92	50435	1868	3829
			<b>Total</b>	<b>3490</b>	

**Pavement Site prep**

	sqft	sqyd
Planing/grinding	111427	12381
Remove full-depth	43935	4882
<b>Total</b>	<b>12381</b>	

**Landscape**

	sqft	acres
Landscape restoration	37982	0.87
Clearing/grubbing	21296	0.49

**Sidewalk**

	sqft	sqyd
Remove sidewalk	37743	4194
New conc sidewalk	43851	4872

**Curb and gutter**

	lineal ft
Add curb	11891

**Wall**

	lineal ft	height (ft)	sqft
Retaining wall	132	4	528

**CORRIDOR DATA- overlay & s/w as-needed****HMA Class 1/2"**

	sqft	depth (ft)	cuft	cuyd	wt
Overlay	151946	0.17	25324	938	1923
Full-depth	55020	0.50	27510	1019	2089
CSBC	55020	0.92	50435	1868	3829
			<b>Total</b>	<b>4011.5</b>	

**Pavement Site prep**

	sqft	sqyd
Planing/grinding	155732	17304
Remove full-depth	43935	4882
<b>Total</b>	<b>17304</b>	

**Landscape**

	sqft	acres
Landscape restoration	37982	0.87
Clearing/grubbing	21296	0.49

**Sidewalk**

	sqft	sqyd
Remove sidewalk	37743	4194
New conc sidewalk	43851	4872

**Curb and gutter**

	lineal ft
Add curb	11891

**Wall**

	lineal ft	height (ft)	sqft
Retaining wall	132	4	528

# M STREET ALTERNATIVES



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

**Client:** City of Auburn  
**Project:** R Street Corridor Study  
**Title:** M Street  
**By:** JES  
**Date:** 1/24/2020

#### M STREET - SIGNALIZATION

ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	0	SY		\$25.00	\$0.00
REMOVE CEMENT CONC. SIDEWALK	0	SY		\$20.00	\$0.00
PLANE/GRADE HMA	0	SY		\$6.00	\$0.00
CLEARING AND GRUBBING	0	ACRE		\$40,000	\$0.00
CRUSHED SURFACING BASE COURSE	0	TON		\$30.00	\$0.00
HMA CL 1/2"	0	TON		\$100.00	\$0.00
CEMENT CONC. CURB AND GUTTER	0	LF		\$35.00	\$0.00
CEMENT CONC. SIDEWALK	40	SY		\$60.00	\$2,400.00
CEMENT CONC. ADA CURB RAMP	8	EA		\$2,000.00	\$16,000.00
FENCING	0	LF		\$40.00	\$0.00
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	0	LF		\$35.00	\$0.00
CATCH BASIN TYPE 1	0	EA		\$1,500.00	\$0.00
CATCH BASIN TYPE 2 48 IN. DIAM.	0	EA		\$4,000.00	\$0.00
WATER QUALITY	0	SF		\$2.50	\$0.00
DETENTION	0	CF		\$15.00	\$0.00
<b>STRUCTURE</b>					
RETAINING WALL	0	SF		\$120.00	\$0.00
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	0	LS		\$10,000.00	\$0.00
SWPPP PREPARATION AND MAINTENANCE	0	LS		\$5,000.00	\$0.00
SPCC PLAN	0	LS		\$5,000.00	\$0.00
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	0	LS		\$5,000.00	\$0.00
PAVEMENT MARKING - LINE	0	LF		\$1.30	\$0.00
PAVEMENT MARKING - SYMBOLS	0	EA		\$150.00	\$0.00
ILLUMINATION	0	LS		\$10,000.00	\$0.00
TRAFFIC SIGNAL	1	LS		\$350,000.00	\$350,000.00
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	0	LS		\$5,000.00	\$0.00
				<b>Hard Construction Sub-Total</b>	<b>\$368,400.00</b>

MISC CONSTRUCTION					
MOBILIZATION	6%	LS		\$22,104.00	\$22,104.00
TRAFFIC CONTROL	3%	LS		\$11,052.00	\$11,052.00
SURVEYING	1%	LS		\$3,684.00	\$3,684.00
CONSTRUCTION ADMIN	5%	LS		\$18,420.00	\$18,420.00
				<b>Construction Sub-Total</b>	<b>\$423,660.00</b>

ROW ACQUISITION					
CITY OF AUBURN PROPERTY VALUE	0	SF		\$20.00	\$0.00
				<b>R/W Sub-Total</b>	<b>\$0.00</b>

SOFT COSTS					
CITY ADMINISTRATION	10%	LS		\$42,366.00	\$42,366.00
DESIGN & PERMITTING	20%	LS		\$84,732.00	\$84,732.00
				<b>Soft Cost Sub-Total</b>	<b>\$127,098.00</b>

Subtotal	<b>\$550,758.00</b>
Contingency (15%)	<b>\$82,613.70</b>
<b>Project Total</b>	<b>\$633,371.70</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: M Street  
By: JES  
Date: 1/24/2020

**M STREET - ROUNDABOUT**

ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	1270	SY		\$25.00	\$31,761.11
REMOVE CEMENT CONC. SIDEWALK	658	SY		\$20.00	\$13,155.56
PLANE/GRADE HMA	2314	SY		\$6.00	\$13,883.33
CLEARING AND GRUBBING	0.08	ACRE		\$40,000	\$3,250.69
CRUSHED SURFACING BASE COURSE	897	TON		\$30.00	\$26,924.28
HMA CL 1/2"	758	TON		\$100.00	\$75,761.42
CEMENT CONC. CURB AND GUTTER	2114	LF		\$35.00	\$73,990.00
CEMENT CONC. SIDEWALK	721	SY		\$60.00	\$43,253.33
CEMENT CONC. ADA CURB RAMP	12	EA		\$2,000.00	\$24,000.00
FENCING	0	LF		\$40.00	\$0.00
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	400	LF		\$35.00	\$14,000.00
CATCH BASIN TYPE 1	8	EA		\$1,500.00	\$12,000.00
CATCH BASIN TYPE 2 48 IN. DIAM.	0	EA		\$4,000.00	\$0.00
<b>STRUCTURE</b>					
RETAINING WALL	0	SF		\$120.00	\$0.00
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	1	LS		\$10,000.00	\$10,000.00
SWPPP PREPARATION AND MAINTENANCE	1	LS		\$5,000.00	\$5,000.00
SPCC PLAN	1	LS		\$5,000.00	\$5,000.00
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	1	LS		\$5,000.00	\$5,000.00
PAVEMENT MARKING - LINE	4,250	LF		\$1.30	\$5,525.00
PAVEMENT MARKING - SYMBOLS	8	EA		\$150.00	\$1,200.00
ILLUMINATION	1	LS		\$10,000.00	\$10,000.00
TRAFFIC SIGNAL	0	EA		\$350,000.00	\$0.00
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	1	LS		\$5,000.00	\$5,000.00
					<b>Hard Construction Sub-Total</b>
					<b>\$378,705</b>
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS		\$22,722.28	\$22,722.28
TRAFFIC CONTOL	3%	LS		\$11,361.14	\$11,361.14
SURVEYING	1%	LS		\$3,787.05	\$3,787.05
CONSTRUCTION ADMIN	5%	LS		\$18,935.24	\$18,935.24
					<b>Construction Sub-Total</b>
					<b>\$435,510</b>
<b>ROW ACQUISITION</b>					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	1435	SF		\$20.00	\$28,700.00
					<b>R/W Sub-Total</b>
					<b>\$28,700</b>
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS		\$46,421.04	\$46,421.04
DESGIN & PERMITTING	20%	LS		\$92,842.09	\$92,842.09
					<b>Soft Cost Sub-Total</b>
					<b>\$139,263</b>
Subtotal					
\$603,473.56					
Contingency (15%)					
\$90,521.03					
Project Total					
\$693,994.60					

## CORRIDOR DATA

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### HMA Class 1/2"

	sqft	depth (ft)	cuft	cuyd	wt
Overlay	0	0.17	0	0	0
Full-depth	0	0.50	0	0	0
CSBC	0	0.92	0	0	0
			<b>Total</b>	<b>0</b>	

### Pavement Site prep

	sqft	sqyd
Planing/grinding	0	0
Remove full-depth	0	0
	<b>Total</b>	<b>0</b>

### Landscape

	sqft	acres
Landscape restoration	0	0.00
Clearing/grubbing	0	0.00

### Sidewalk

	sqft	sqyd
Remove sidewalk	0	0
New conc sidewalk	0	0

### Curb and gutter

	lineal ft
Add curb	0

### Wall

	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

## CORRIDOR W/ROUNDABOUTS DATA

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### HMA Class 1/2"

	sqft	depth (ft)	cuft	cuyd	wt
Overlay	21185	0.17	3531	131	268
Full-depth	12895	0.50	6448	239	490
CSBC	12895	0.92	11820	438	897
			<b>Total</b>	<b>758</b>	

### Pavement Site prep

	sqft	sqyd
Planing/grinding	20825	2314
Remove full-depth	11434	1270
	<b>Total</b>	<b>2314</b>

### Landscape

	sqft	acres
Landscape restoration	2531	0.06
Clearing/grubbing	3540	0.08

### Sidewalk

	sqft	sqyd
Remove sidewalk	5920	658
New conc sidewalk	6488	721

### Curb and gutter

	lineal ft
Add curb	2114

### Wall

	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

# SIGNALIZED INTERSECTION ALTERNATIVES



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Intersection costs  
By: JES  
Date: 1/20/2020

R ST SE & 29TH ST SE 1-SB LANE SIGNALIZED INTERSECTION					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	547	SY	\$25.00	\$13,666.67	
REMOVE CEMENT CONC. SIDEWALK	734	SY	\$20.00	\$14,688.89	
PLANE/GRADE HMA	2688	SY	\$6.00	\$16,130.00	
CLEARING AND GRUBBING	0.12	ACRE	\$60,000	\$7,272.73	
CRUSHED SURFACING BASE COURSE	371	TON	\$30.00	\$11,120.49	
HMA CL 1/2"	469	TON	\$100.00	\$46,909.57	
CEMENT CONC. CURB AND GUTTER	0	LF	\$35.00	\$0.00	
CEMENT CONC. SIDEWALK	805	SY	\$60.00	\$48,286.67	
CEMENT CONC. ADA CURB RAMP	9	EA	\$2,000.00	\$18,000.00	
FENCING	0	LF	\$40.00	\$0.00	
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	0	LF	\$50.00	\$0.00	
CATCH BASIN TYPE 1	0	EA	\$2,500.00	\$0.00	
CATCH BASIN TYPE 2 48 IN. DIAM.	0	EA	\$4,000.00	\$0.00	
POND	0	CF	\$8.00	\$0.00	
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	0	CY	\$50.00	\$0.00	
FLOW CONTROL STRUCTURE	0	EA	\$5,000.00	\$0.00	
EMERGENCY SPILLWAY	0	LS	\$3,000.00	\$0.00	
CONNECTION TO DRAINAGE STRUCTURE	0	EA	\$1,500.00	\$0.00	
<b>STRUCTURE</b>					
RETAINING WALL	0	SF	\$120.00	\$0.00	
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	0	LS	\$8,000.00	\$0.00	
SWPPP PREPARATION AND MAINTENANCE	0	LS	\$5,000.00	\$0.00	
SPCC PLAN	0	LS	\$5,000.00	\$0.00	
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	0	LS	\$5,000.00	\$0.00	
PAVEMENT MARKING - LINE	0	LF	\$1.30	\$0.00	
PAVEMENT MARKING - SYMBOLS	0	EA	\$250.00	\$0.00	
ILLUMINATION	0	LS	\$10,000.00	\$0.00	
TRAFFIC SIGNAL	1	EA	\$350,000.00	\$350,000.00	
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	0	LS	\$5,000.00	\$0.00	
				<b>Hard Construction Sub-Total</b>	<b>\$526,075.01</b>
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS	\$31,564.50	\$31,564.50	
TRAFFIC CONTROL	3%	LS	\$15,782.25	\$15,782.25	
SURVEYING	1%	LS	\$5,260.75	\$5,260.75	
CONSTRUCTION ADMIN	5%	LS	\$26,303.75	\$26,303.75	
				<b>Construction Sub-Total</b>	<b>\$604,986.26</b>
<b>ROW ACQUISITION</b>					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	30	SF	\$20.00	\$600.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	0	SF	\$20.00	\$0.00	
				<b>R/W Sub-Total</b>	<b>\$600.00</b>
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS	\$60,558.63	\$60,558.63	
DESIGN & PERMITTING	20%	LS	\$121,117.25	\$121,117.25	
				<b>Soft Cost Sub-Total</b>	<b>\$181,675.88</b>
				<b>Subtotal</b>	<b>\$787,262</b>
				<b>Contingency (15%)</b>	<b>\$118,089</b>
				<b>Project Total</b>	<b>\$905,351</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Intersection costs  
By: JES  
Date: 1/20/2020

R ST SE & 29TH ST SE 2-SB LANE SIGNALIZED INTERSECTION					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA		547	SY	\$25.00	\$13,666.67
REMOVE CEMENT CONC. SIDEWALK		734	SY	\$20	\$14,677.78
PLANE/GRADE HMA		2688	SY	\$6.00	\$16,130.00
CLEARING AND GRUBBING		0.12	ACRE	\$60,000	\$7,465.56
CRUSHED SURFACING BASE COURSE		652	TON	\$30.00	\$19,564.21
HMA CL 1/2"		640	TON	\$100.00	\$64,024.54
CEMENT CONC. CURB AND GUTTER		0	LF	\$35.00	\$0.00
CEMENT CONC. SIDEWALK		959	SY	\$60.00	\$57,566.67
CEMENT CONC. ADA CURB RAMP		8	EA	\$2,000.00	\$16,000.00
FENCING		0	LF	\$40.00	\$0.00
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.		0	LF	\$50.00	\$0.00
CATCH BASIN TYPE 1		0	EA	\$2,500.00	\$0.00
CATCH BASIN TYPE 2 48 IN. DIAM.		0	EA	\$4,000.00	\$0.00
POND		0	CF	\$8.00	\$0.00
GRAVEL BACKFILL FOR PIPE ZONE BEDDING		0	CY	\$50.00	\$0.00
FLOW CONTROL STRUCTURE		0	EA	\$5,000.00	\$0.00
EMERGENCY SPILLWAY		0	LS	\$3,000.00	\$0.00
CONNECTION TO DRAINAGE STRUCTURE		0	EA	\$1,500.00	\$0.00
<b>STRUCTURE</b>					
RETAINING WALL		0	SF	\$120.00	\$0.00
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL		0	LS	\$8,000.00	\$0.00
SWPPP PREPARATION AND MAINTENANCE		0	LS	\$5,000.00	\$0.00
SPCC PLAN		0	LS	\$5,000.00	\$0.00
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING		0	LS	\$5,000.00	\$0.00
PAVEMENT MARKING - LINE		0	LF	\$1.30	\$0.00
PAVEMENT MARKING - SYMBOLS		0	EA	\$250.00	\$0.00
ILLUMINATION		0	LS	\$10,000.00	\$0.00
TRAFFIC SIGNAL		1	EA	\$350,000.00	\$350,000.00
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION		0	LS	\$5,000.00	\$0.00
					<b>Hard Construction Sub-Total</b> <b>\$559,095.43</b>
<b>MISC CONSTRUCTION</b>					
MOBILIZATION		6%	LS	\$33,545.73	\$33,545.73
TRAFFIC CONTROL		3%	LS	\$16,772.86	\$16,772.86
SURVEYING		1%	LS	\$5,590.95	\$5,590.95
CONSTRUCTION ADMIN		5%	LS	\$27,954.77	\$27,954.77
					<b>Construction Sub-Total</b> <b>\$642,959.74</b>
<b>ROW ACQUISITION</b>					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE		4290	SF	\$20.00	\$85,800.00
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE		0	SF	\$25.00	\$0.00
CITY OF AUBURN FULL PARCEL TAKE - WETPOND		0	SF	\$20.00	\$0.00
					<b>R/W Sub-Total</b> <b>\$85,800.00</b>
<b>SOFT COSTS</b>					
CITY ADMINISTRATION		10%	LS	\$72,875.97	\$72,875.97
DESIGN & PERMITTING		20%	LS	\$145,751.95	\$145,751.95
					<b>Soft Cost Sub-Total</b> <b>\$218,627.92</b>

Subtotal	<b>\$947,388</b>
Contingency (15%)	<b>\$142,108</b>
<b>Project Total</b>	<b>\$1,089,496</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Intersection costs  
By: JES  
Date: 1/20/2020

R ST SE & 21ST ST SE 1-SB LANE SIGNALIZED INTERSECTION					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	407	SY	\$25.00	\$10,183.33	
REMOVE CEMENT CONC. SIDEWALK	900	SY	\$20.00	\$18,000.00	
PLANE/GRADE HMA	1956	SY	\$6.00	\$11,736.67	
CLEARING AND GRUBBING	0.10	ACRE	\$60,000	\$5,870.52	
CRUSHED SURFACING BASE COURSE	522	TON	\$30.00	\$15,659.72	
HMA CL 1/2"	516	TON	\$100.00	\$51,553.70	
CEMENT CONC. CURB AND GUTTER	0	LF	\$35.00	\$0.00	
CEMENT CONC. SIDEWALK	1240	SY	\$60.00	\$74,386.67	
CEMENT CONC. ADA CURB RAMP	8	EA	\$2,000.00	\$16,000.00	
FENCING	0	LF	\$40.00	\$0.00	
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	0	LF	\$50.00	\$0.00	
CATCH BASIN TYPE 1	0	EA	\$2,500.00	\$0.00	
CATCH BASIN TYPE 2 48 IN. DIAM.	0	EA	\$4,000.00	\$0.00	
POND	0	CF	\$8.00	\$0.00	
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	0	CY	\$50.00	\$0.00	
FLOW CONTROL STRUCTURE	0	EA	\$5,000.00	\$0.00	
EMERGENCY SPILLWAY	0	LS	\$3,000.00	\$0.00	
CONNECTION TO DRAINAGE STRUCTURE	0	EA	\$1,500.00	\$0.00	
<b>STRUCTURE</b>					
RETAINING WALL	0	SF	\$120.00	\$0.00	
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	0	LS	\$8,000.00	\$0.00	
SWPPP PREPARATION AND MAINTENANCE	0	LS	\$5,000.00	\$0.00	
SPCC PLAN	0	LS	\$5,000.00	\$0.00	
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	0	LS	\$5,000.00	\$0.00	
PAVEMENT MARKING - LINE	0	LF	\$1.30	\$0.00	
PAVEMENT MARKING - SYMBOLS	0	EA	\$250.00	\$0.00	
ILLUMINATION	0	LS	\$10,000.00	\$0.00	
TRAFFIC SIGNAL	1	EA	\$350,000.00	\$350,000.00	
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	0	LS	\$5,000.00	\$0.00	
				<b>Hard Construction Sub-Total</b>	<b>\$553,390.62</b>
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS	\$33,203.44	\$33,203.44	
TRAFFIC CONTROL	3%	LS	\$16,601.72	\$16,601.72	
SURVEYING	1%	LS	\$5,533.91	\$5,533.91	
CONSTRUCTION ADMIN	5%	LS	\$27,669.53	\$27,669.53	
				<b>Construction Sub-Total</b>	<b>\$636,399.21</b>
<b>ROW ACQUISITION</b>					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	4150	SF	\$20.00	\$83,000.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	0	SF	\$20.00	\$0.00	
				<b>R/W Sub-Total</b>	<b>\$83,000.00</b>
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS	\$71,939.92	\$71,939.92	
DESIGN & PERMITTING	20%	LS	\$143,879.84	\$143,879.84	
				<b>Soft Cost Sub-Total</b>	<b>\$215,819.76</b>

Subtotal	\$935,219
Contingency (15%)	\$140,283
<b>Project Total</b>	<b>\$1,075,502</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Intersection costs  
By: JES  
Date: 1/20/2020

R ST SE & 21ST ST SE 2-SB LANE SIGNALIZED INTERSECTION					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	482	SY	\$25.00	\$12,061.11	
REMOVE CEMENT CONC. SIDEWALK	833	SY	\$20	\$16,662.22	
PLANE/GRADE HMA	1939	SY	\$6.00	\$11,634.00	
CLEARING AND GRUBBING	0.18	ACRE	\$60,000	\$10,752.07	
CRUSHED SURFACING BASE COURSE	800	TON	\$30.00	\$24,011.57	
HMA CL 1/2"	659	TON	\$100.00	\$65,932.81	
CEMENT CONC. CURB AND GUTTER	0	LF	\$35.00	\$0.00	
CEMENT CONC. SIDEWALK	1191	SY	\$60.00	\$71,433.33	
CEMENT CONC. ADA CURB RAMP	8	EA	\$2,000.00	\$16,000.00	
FENCING	0	LF	\$40.00	\$0.00	
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	0	LF	\$50.00	\$0.00	
CATCH BASIN TYPE 1	0	EA	\$2,500.00	\$0.00	
CATCH BASIN TYPE 2 48 IN. DIAM.	0	EA	\$4,000.00	\$0.00	
POND	0	CF	\$8.00	\$0.00	
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	0	CY	\$50.00	\$0.00	
FLOW CONTROL STRUCTURE	0	EA	\$5,000.00	\$0.00	
EMERGENCY SPILLWAY	0	LS	\$3,000.00	\$0.00	
CONNECTION TO DRAINAGE STRUCTURE	0	EA	\$1,500.00	\$0.00	
<b>STRUCTURE</b>					
RETAINING WALL	0	SF	\$120.00	\$0.00	
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	0	LS	\$8,000.00	\$0.00	
SWPPP PREPARATION AND MAINTENANCE	0	LS	\$5,000.00	\$0.00	
SPCC PLAN	0	LS	\$5,000.00	\$0.00	
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	0	LS	\$5,000.00	\$0.00	
PAVEMENT MARKING - LINE	0	LF	\$1.30	\$0.00	
PAVEMENT MARKING - SYMBOLS	0	EA	\$250.00	\$0.00	
ILLUMINATION	1	LS	\$10,000.00	\$10,000.00	
TRAFFIC SIGNAL	1	EA	\$350,000.00	\$350,000.00	
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	0	LS	\$5,000.00	\$0.00	
					<b>Hard Construction Sub-Total</b>
					<b>\$588,487.12</b>
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS	\$35,309.23	\$35,309.23	
TRAFFIC CONTROL	3%	LS	\$17,654.61	\$17,654.61	
SURVEYING	1%	LS	\$5,884.87	\$5,884.87	
CONSTRUCTION ADMIN	5%	LS	\$29,424.36	\$29,424.36	
					<b>Construction Sub-Total</b>
					<b>\$676,760.18</b>
<b>ROW ACQUISITION</b>					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	8815	SF	\$20.00	\$176,300.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	0	SF	\$20.00	\$0.00	
					<b>R/W Sub-Total</b>
					<b>\$176,300.00</b>
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS	\$85,306.02	\$85,306.02	
DESIGN & PERMITTING	20%	LS	\$170,612.04	\$170,612.04	
					<b>Soft Cost Sub-Total</b>
					<b>\$255,918.05</b>

Subtotal	\$1,108,978
Contingency (15%)	\$166,347
<b>Project Total</b>	<b>\$1,275,325</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

Client: City of Auburn  
Project: R Street Corridor Study  
Title: Intersection costs  
By: JES  
Date: 1/20/2020

R ST AND HOWARD ROAD (WEST LEG) STOP-CONTROLLED INTERSECTION					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	131	SY	\$25.00	\$3,277.78	
REMOVE CEMENT CONC. SIDEWALK	478	SY	\$20.00	\$9,555.56	
PLANE/GRADE HMA	587	SY	\$6.00	\$3,523.33	
CLEARING AND GRUBBING	0.00	ACRE	\$60,000	\$0.00	
CRUSHED SURFACING BASE COURSE	87	TON	\$30.00	\$2,612.04	
HMA CL 1/2"	110	TON	\$100.00	\$11,006.73	
CEMENT CONC. CURB AND GUTTER	0	LF	\$35.00	\$0.00	
CEMENT CONC. SIDEWALK	478	SY	\$60.00	\$28,666.67	
CEMENT CONC. ADA CURB RAMP	8	EA	\$2,000.00	\$16,000.00	
FENCING	0	LF	\$40.00	\$0.00	
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	0	LF	\$50.00	\$0.00	
CATCH BASIN TYPE 1	0	EA	\$2,500.00	\$0.00	
CATCH BASIN TYPE 2 48 IN. DIAM.	0	EA	\$4,000.00	\$0.00	
POND	0	CF	\$8.00	\$0.00	
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	0	CY	\$50.00	\$0.00	
FLOW CONTROL STRUCTURE	0	EA	\$5,000.00	\$0.00	
EMERGENCY SPILLWAY	0	LS	\$3,000.00	\$0.00	
CONNECTION TO DRAINAGE STRUCTURE	0	EA	\$1,500.00	\$0.00	
<b>STRUCTURE</b>					
RETAINING WALL	0	SF	\$120.00	\$0.00	
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	0	LS	\$8,000.00	\$0.00	
SWPPP PREPARATION AND MAINTENANCE	0	LS	\$5,000.00	\$0.00	
SPCC PLAN	0	LS	\$5,000.00	\$0.00	
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	0	LS	\$5,000.00	\$0.00	
PAVEMENT MARKING - LINE	0	LF	\$1.30	\$0.00	
PAVEMENT MARKING - SYMBOLS	0	EA	\$250.00	\$0.00	
ILLUMINATION	0	LS	\$10,000.00	\$0.00	
TRAFFIC SIGNAL	0	EA	\$350,000.00	\$0.00	
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	1	LS	\$5,000.00	\$5,000.00	
					<b>Hard Construction Sub-Total</b> \$79,642.10
<b>MISC CONSTRUCTION</b>					
MOBILIZATION	6%	LS	\$4,778.53	\$4,778.53	
TRAFFIC CONTOL	3%	LS	\$2,389.26	\$2,389.26	
SURVEYING	1%	LS	\$796.42	\$796.42	
CONSTRUCTION ADMIN	5%	LS	\$3,982.11	\$3,982.11	
					<b>Construction Sub-Total</b> \$91,588.42
<b>ROW ACQUISITION</b>					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	20	SF	\$20.00	\$400.00	
					<b>R/W Sub-Total</b> \$400.00
<b>SOFT COSTS</b>					
CITY ADMINISTRATION	10%	LS	\$9,198.84	\$9,198.84	
DESGIN & PERMITTING	20%	LS	\$18,397.68	\$18,397.68	
					<b>Soft Cost Sub-Total</b> \$27,596.53

Subtotal	\$119,585
Contingency (15%)	\$17,938
<b>Project Total</b>	<b>\$137,523</b>

**R ST & 29TH (1)**

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	21036	0.167	3615	330	767
Full-depth	12036	0.500	3615	330	767
CSBC	5326	0.917	4882	381	371
Total	469				

**Pavement Site prep**

	soft	sqyd
Planing/grinding	24195	2688
Remove full-depth	4920	547
Total	2688	

**Landscape**

	sqft	acres
Landscape restoration	9257	0.21
Clearing/grubbing	5280	0.12

**Sidewalk**

	sqft	sqyd
Remove sidewalk	6610	734
New conc sidewalk	7243	805

Curb and gutter	lineal ft
Add curb	0

Wall	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

**R ST & 21ST (1)**

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	18240	0.167	3240	313	731
Full-depth	7500	0.500	3750	339	285
CSBC	7500	0.917	6875	555	522
Total	516				

**Pavement Site prep**

	soft	sqyd
Planing/grinding	17605	1956
Remove full-depth	3666	407
Total	1956	

**Landscape**

	sqft	acres
Landscape restoration	17705	0.41
Clearing/grubbing	4262	0.10

**Sidewalk**

	sqft	sqyd
Remove sidewalk	8100	900
New conc sidewalk	11158	1240

Curb and gutter	lineal ft
Add curb	0

Wall	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

**R ST & 29TH (2)**

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	22485	0.17	3748	339	285
Full-depth	12025	0.50	3725	339	285
CSBC	9370	0.92	8589	318	652
Total	640				

**Pavement Site prep**

	soft	sqyd
Planing/grinding	24195	2688
Remove full-depth	4920	547
Total	2688	

**Landscape**

	soft	acres
Landscape restoration	6268	0.14
Clearing/grubbing	5420	0.12

**Sidewalk**

	soft	sqyd
Remove sidewalk	6605	734
New conc sidewalk	8635	959

**Curb and gutter**

	lineal ft
Add curb	0

Wall	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

**R ST & 21ST (2)**

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	17803	0.17	2934	309	213
Full-depth	11500	0.50	5750	213	437
CSBC	11500	0.92	10542	390	800
Total	659				

**Pavement Site prep**

	soft	sqyd
Planing/grinding	17451	1939
Remove full-depth	4342	482
Total	1939	

**Landscape**

	soft	acres
Landscape restoration	6268	0.14
Clearing/grubbing	7806	0.18

**Sidewalk**

	soft	sqyd
Remove sidewalk	7498	833
New conc sidewalk	10715	1191

**Curb and gutter**

	lineal ft
Add curb	0

Wall	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

**R ST SE & HOWARD RD (WEST LEG)**

HMA Class 1/2"					
	sqft	depth (ft)	cuft	cuyd	wt
Overlay	4945	0.167	824	31	62.58
Full-depth	1251	0.500	626	23	47.49
CSBC	1251	0.917	1147	42	87.07
Total	110				

**Pavement Site prep**

	soft	sqyd
Planing/grinding	5285	587
Remove full-depth	1180	131
Total	587	

**Landscape**

	soft	acres
Landscape restoration	0	0.00
Clearing/grubbing	1	0.00

**Sidewalk**

	soft	sqyd
Remove sidewalk	4300	478
New conc sidewalk	4300	478

Curb and gutter	lineal ft
Add curb	0

Wall	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

# **ROUNDABOUT INTERSECTION ALTERNATIVES**



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

**Client:** City of Auburn  
**Project:** R Street Corridor Study  
**Title:** Roundabout Intersections  
**By:** JES  
**Date:** 1/20/2020

Subtotal	<b>\$867,608</b>
Contingency (15%)	<b>\$130,141</b>
<b>Project Total</b>	<b>\$997,749</b>



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**Client:** City of Auburn  
**Project:** R Street Corridor Study  
**Title:** Roundabout Intersections  
**By:** JES  
**Date:** 1/20/2020

R ST SE & 29TH ST SE MULTILANE ROUNDABOUT					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA		711	SY	\$25.00	\$17,763.85
REMOVE CEMENT CONC. SIDEWALK		734	SY	\$20	\$14,677.76
PLANE/GRADE HMA		2824	SY	\$6.00	\$16,944.00
CLEARING AND GRUBBING		0.17	ACRE	\$60,000	\$10,165.25
CRUSHED SURFACING BASE COURSE		1265	TON	\$30.00	\$37,938.25
HMA CL 1/2"		978	TON	\$100.00	\$97,753.36
CEMENT CONC. CURB AND GUTTER		0	LF	\$35.00	\$0.00
CEMENT CONC. SIDEWALK		1179	SY	\$60.00	\$70,733.33
CEMENT CONC. ADA CURB RAMP		13	EA	\$2,000.00	\$26,000.00
FENCING		0	LF	\$40.00	\$0.00
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.		0	LF	\$50.00	\$0.00
CATCH BASIN TYPE 1		0	EA	\$2,500.00	\$0.00
CATCH BASIN TYPE 2 48 IN. DIAM.		0	EA	\$4,000.00	\$0.00
POND		0	CF	\$8.00	\$0.00
GRAVEL BACKFILL FOR PIPE ZONE BEDDING		0	CY	\$50.00	\$0.00
FLOW CONTROL STRUCTURE		0	EA	\$55,000.00	\$0.00
EMERGENCY SPILLWAY		0	LS	\$3,000.00	\$0.00
CONNECTION TO DRAINAGE STRUCTURE		0	EA	\$1,500.00	\$0.00
<b>STRUCTURE</b>					
RETAINING WALL		0	SF	\$120.00	\$0.00
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL		0	LS	\$8,000.00	\$0.00
SWPPP PREPARATION AND MAINTENANCE		0	LS	\$5,000.00	\$0.00
SPCC PLAN		0	LS	\$5,000.00	\$0.00
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING		0	LS	\$5,000.00	\$0.00
PAVEMENT MARKING - LINE		0	LF	\$1.30	\$0.00
PAVEMENT MARKING - SYMBOLS		0	EA	\$250.00	\$0.00
ILLUMINATION		0	LS	\$10,000.00	\$0.00
TRAFFIC SIGNAL		0	EA	\$350,000.00	\$0.00
FLASHING BEACON CROSSING		0	EA		\$0.00
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION		0	LS	\$5,000.00	\$0.00

MISC CONSTRUCTION				Hard Construction Sub-Total	\$251,976
MOBILIZATION	6%	LS	\$17,518.56	\$17,518.56	
TRAFFIC CONTROL	3%	LS	\$8,759.28	\$8,759.28	
SURVEYING	1%	LS	\$2,919.76	\$2,919.76	
CONSTRUCTION ADMIN	5%	LS	\$14,598.80	\$14,598.80	

ROW ACQUISITION				R/M Sub Total	\$460,300
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	23015	SF	\$20.00	\$460,300.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	0	SF	\$20.00	\$0.00	

<b>SOFT COSTS</b>				
CITY ADMINISTRATION	10%	LS	\$79,607.23	\$79,607.23
DESGIN & PERMITTING	20%	LS	\$159,214.47	\$159,214.47
			<b>Soft Cost Sub-Total</b>	<b>\$238,822</b>

Subtotal	\$1,034,894
Contingency (15%)	\$155,234
<b>Project Total</b>	<b>\$1,190,128</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

**Client:** City of Auburn  
**Project:** R Street Corridor Study  
**Title:** Roundabout Intersections  
**By:** JES  
**Date:** 1/20/2020

R ST SE & 21ST ST SE SINGLE-LANE ROUNABOUT					
ITEM NO.	ITEM	QTY	UNIT	UNIT PRICE	COST
<b>ROADWAY</b>					
REMOVE FULL-DEPTH HMA	893	SY		\$25.00	\$22,333.33
REMOVE CEMENT CONC. SIDEWALK	748	SY		\$20	\$14,955.60
PLANE/GRADE HMA	1956	SY		\$6.00	\$11,736.67
CLEARING AND GRUBBING	0.17	ACRE		\$60,000	\$10,420.13
CRUSHED SURFACING BASE COURSE	959	TON		\$30.00	\$28,774.22
HMA CL 1/2"	752	TON		\$100.00	\$75,170.40
CEMENT CONC. CURB AND GUTTER	0	LF		\$35.00	\$0.00
CEMENT CONC. SIDEWALK	1073	SY		\$60.00	\$64,366.67
CEMENT CONC. ADA CURB RAMP	12	EA		\$2,000.00	\$24,000.00
FENCING	0	LF		\$40.00	\$0.00
<b>DRAINAGE/UTILITIES</b>					
SCHEDULE A STORM SEWER PIPE 12 IN. DIAM.	0	LF		\$50.00	\$0.00
CATCH BASIN TYPE 1	0	EA		\$2,500.00	\$0.00
CATCH BASIN TYPE 2 48 IN. DIAM.	0	EA		\$4,000.00	\$0.00
POND	0	CF		\$8.00	\$0.00
GRAVEL BACKFILL FOR PIPE ZONE BEDDING	0	CY		\$50.00	\$0.00
FLOW CONTROL STRUCTURE	0	EA		\$55,000.00	\$0.00
EMERGENCY SPILLWAY	0	LS		\$3,000.00	\$0.00
CONNECTION TO DRAINAGE STRUCTURE	0	EA		\$1,500.00	\$0.00
<b>STRUCTURE</b>					
RETAINING WALL	0	SF		\$120.00	\$0.00
<b>ENVIRONMENT</b>					
EROSION/WATER POLLUTION CONTROL	0	LS		\$8,000.00	\$0.00
SWPPP PREPARATION AND MAINTENANCE	0	LS		\$5,000.00	\$0.00
SPCC PLAN	0	LS		\$5,000.00	\$0.00
<b>TRAFFIC AND ILLUMINATION</b>					
PERMANENT SIGNING	0	LS		\$5,000.00	\$0.00
PAVEMENT MARKING - LINE	0	LF		\$1.30	\$0.00
PAVEMENT MARKING - SYMBOLS	0	EA		\$250.00	\$0.00
ILLUMINATION	0	LS		\$10,000.00	\$0.00
TRAFFIC SIGNAL	0	EA		\$350,000.00	\$0.00
<b>LANDSCAPING</b>					
LANDSCAPE RESTORATION	0	LS		\$5,000.00	\$0.00
Hard Construction Sub-Total					\$251,757

MISC CONSTRUCTION					
MOBILIZATION	6%	LS	\$15,105.42	\$15,105.42	
TRAFFIC CONTROL	3%	LS	\$7,552.71	\$7,552.71	
SURVEYING	1%	LS	\$2,517.57	\$2,517.57	
CONSTRUCTION ADMIN	5%	LS	\$12,587.85	\$12,587.85	
			Construction Sub-Total:		\$62,762.75

ROW ACQUISITION				
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	5524	SF	\$20.00	\$110,480.00
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	0	SF	\$20.00	\$0.00
		R/W Sub-Total		<b>\$110,480</b>

SOFT COSTS				
CITY ADMINISTRATION	10%	LS	\$40,000.06	\$40,000.06
DESGIN & PERMITTING	20%	LS	\$80,000.11	\$80,000.11
			Soft Cost Sub-Total	\$120,000

Subtotal	<b>\$520,001</b>
Contingency (15%)	<b>\$78,000</b>
<b>Project Total</b>	<b>\$598,001</b>



1601 Fifth Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822

**Client:** City of Auburn  
**Project:** R Street Corridor Study  
**Title:** Roundabout Intersections  
**By:** JES  
**Date:** 1/20/2020

#### R ST SE & 21ST ST SE MULTILANE ROUNDABOUT

MISC CONSTRUCTION				
MOBILIZATION	6%	LS	\$17,468.35	\$17,468.35
TRAFFIC CONTROL	3%	LS	\$8,734.17	\$8,734.17
SURVEYING	1%	LS	\$2,911.39	\$2,911.39
CONSTRUCTION ADMIN	5%	LS	\$14,556.96	\$14,556.96
			<b>Construction Sub-Total</b>	<b>\$324,910</b>

ROW ACQUISITION					
CITY OF AUBURN PRIVATE PROPERTY PARTIAL TAKE	12030	SF	\$20.00	\$240,600.00	
CITY OF AUBURN MIT PROPERTY PARTIAL TAKE	0	SF	\$25.00	\$0.00	
CITY OF AUBURN FULL PARCEL TAKE - WETPOND	0	SF	\$20.00	\$0.00	
				R/W Sub Total	\$240,600.00

SOFT COSTS				
CITY ADMINISTRATION		10%	LS	\$57,541.00
DESGIN & PERMITTING		20%	LS	\$115,082.00
		Soft Cost Sub-Total		\$172,623

Subtotal	<b>\$748,033</b>
Contingency (15%)	<b>\$112,205</b>
<b>Project Total</b>	<b>\$860,238</b>

### R ST SE & 29TH ST SE SINGLE-LANE ROUNDABOUT

#### HMA Class 1/2"

	sqft	depth (ft)	cuft	cuyd	wt
Overlay	21100	0.167	3517	130	267
Full-depth	10218	0.500	5109	189	388
CSBC	10218	0.917	9367	347	711
Total	655				

#### Pavement Site prep

	sqft	sqyd
Planing/grinding	24231	2692
Remove full-depth	8320	924
Total	2692	

#### Landscape

	sqft	acres
Landscape restoration	17705	0.41
Clearing/grubbing	4215	0.00

#### Sidewalk

	sqft	sqyd
Remove sidewalk	6651	739
New conc sidewalk	10042	1116

#### Curb and gutter

	lineal ft
Add curb	0

#### Wall

	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

### R ST SE & 29TH ST SE MULTILANE ROUNDABOUT

#### HMA Class 1/2"

	sqft	depth (ft)	cuft	cuyd	wt
Overlay	22739	0.17	3790	140	288
Full-depth	18170	0.50	9085	336	690
CSBC	18170	0.92	16656	617	1265
Total	978				

#### Pavement Site prep

	sqft	sqyd
Planing/grinding	25416	2824
Remove full-depth	6395	711
Total	2824	

#### Landscape

	sqft	acres
Landscape restoration	3450	0.08
Clearing/grubbing	7380	0.17

#### Sidewalk

	sqft	sqyd
Remove sidewalk	6605	734
New conc sidewalk	10610	1179

#### Curb and gutter

	lineal ft
Add curb	0

#### Wall

	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

### R ST SE & 21ST ST SE SINGLE-LANE ROUNDABOUT

#### HMA Class 1/2"

	sqft	depth (ft)	cuft	cuyd	wt
Overlay	18060	0.167	3010	111	229
Full-depth	13781	0.500	6891	255	523
CSBC	13781	0.917	12633	468	959
Total	752				

#### Pavement Site prep

	sqft	sqyd
Planing/grinding	17605	1956
Remove full-depth	8040	893
Total	1956	

#### Landscape

	sqft	acres
Landscape restoration	17705	0.41
Clearing/grubbing	7565	0.17

#### Sidewalk

	sqft	sqyd
Remove sidewalk	6730	748
New conc sidewalk	9655	1073

#### Curb and gutter

	lineal ft
Add curb	0

#### Wall

	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

#### HMA Class 1/2"

	sqft	depth (ft)	cuft	cuyd	wt
Overlay	17676	0.17	2946	109	224
Full-depth	19897	0.50	9949	368	755
CSBC	19897	0.92	18239	676	1385
Total	979				

#### Pavement Site prep

	sqft	sqyd
Planing/grinding	19941	2216
Remove full-depth	4130	459
Total	2675	

#### Landscape

	sqft	acres
Landscape restoration	2797	0.06
Clearing/grubbing	13971	0.32

#### Sidewalk

	sqft	sqyd
Remove sidewalk	7498	833
New conc sidewalk	10053	1117

#### Curb and gutter

	lineal ft
Add curb	0

#### Wall

	lineal ft	height (ft)	sqft
Retaining wall	0	4	0

# ROW QUANTITIES



### RIGHT-OF-WAY QUANTITY

ROW ACQUISITION

14,215 SF



Know what's below.  
Call before you dig.

				DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>	CHECKED BY <b>S. BATTLE</b>	APPROVED BY -	DATE -	SHEET
									C.01
NO.	DATE	BY	CHD.	APPR.	REVISION	CITY OF AUBURN WASHINGTON			
kpff 1601 5th Avenue, Suite 1600 Seattle, WA 98101 206.622.5822 www.kpff.com								R STREET CORRIDOR STUDY/CITY OF AUBURN AUBURN, WASHINGTON	
ALTERNATIVE 1 - ROW ACQUISITION									

SCALE:  
1" = 100'

**kpff**

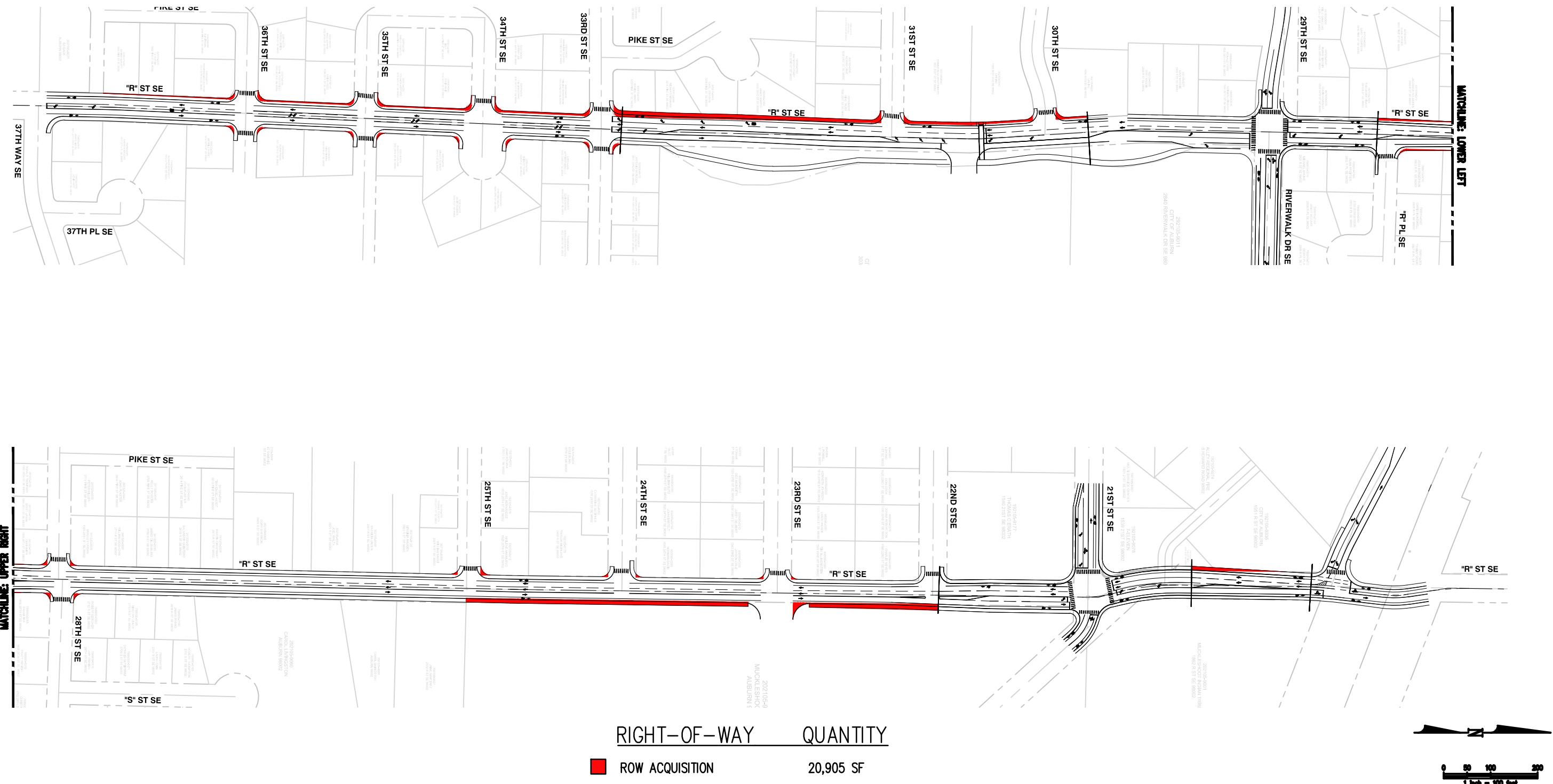


				DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>	CHECKED BY <b>S. BATTLE</b>	APPROVED BY —	DATE —	SHEET C.02
NO.	DATE	BY	CHD.	APPR.	REVISION	JOB No.: —	SCALE: 1" = 100'		
									R STREET CORRIDOR STUDY/CITY OF AUBURN AUBURN, WASHINGTON
									ALTERNATIVE 2 – ROW ACQUISITION

**kpff**

1601 5th Avenue, Suite 1600  
Seattle, WA 98101  
206.622.5822  
www.kpff.com





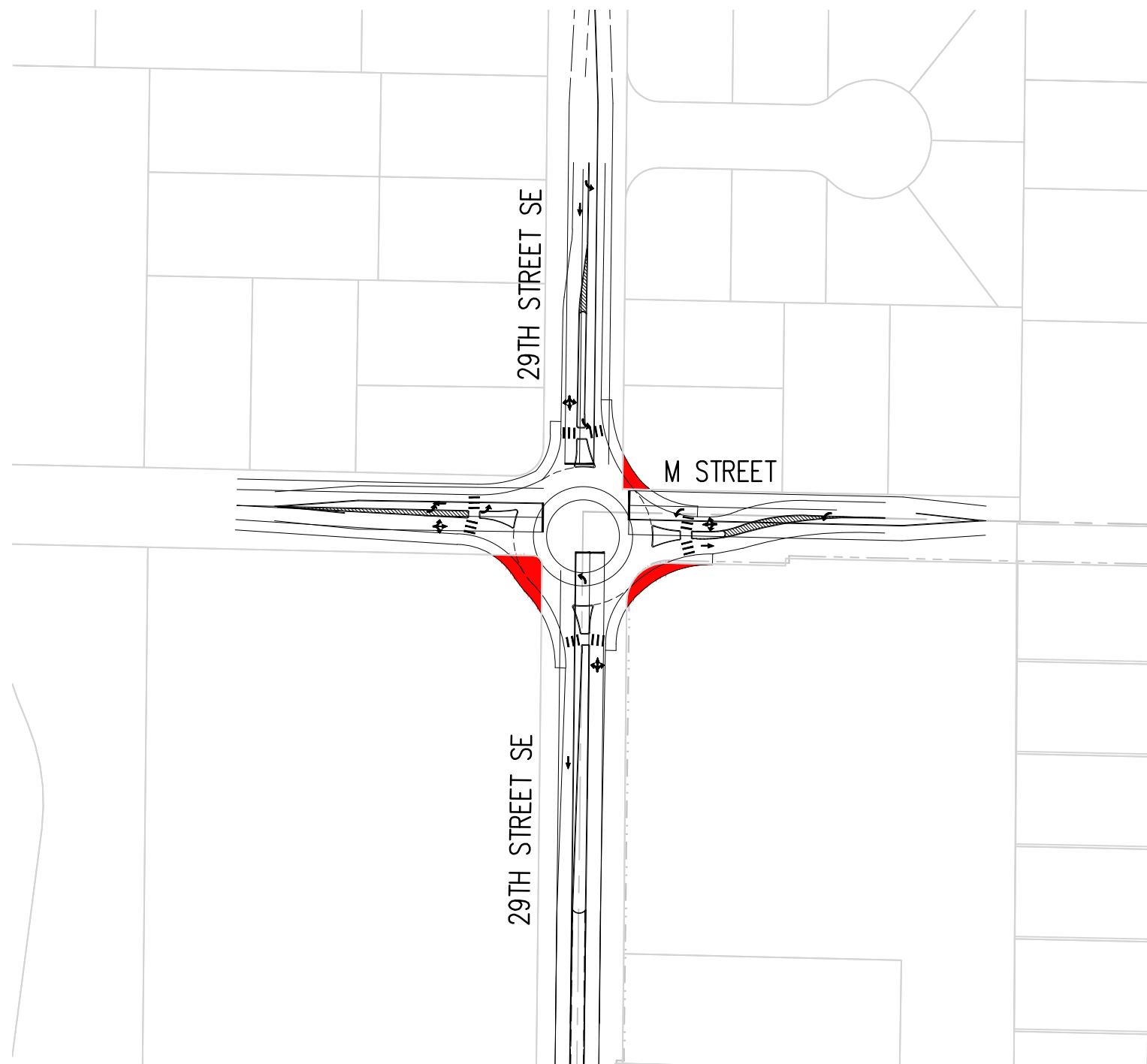
**RIGHT-OF-WAY QUANTITY**

 ROW ACQUISITION

20 905 SF



**Know what's below.  
Call before you dig.**



RIGHT-OF-WAY      QUANTITY

■ ROW ACQUISITION      1,435 SF

0 50 100 200  
1 inch = 100 feet



Know what's below.  
Call before you dig.

NO.	DATE	BY	CHD.	APPR.
REVISION				

DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>
CHECKED BY <b>S. BATTLE</b>	APPROVED BY —
DATE —	—
JOB No. : —	

**kpff**

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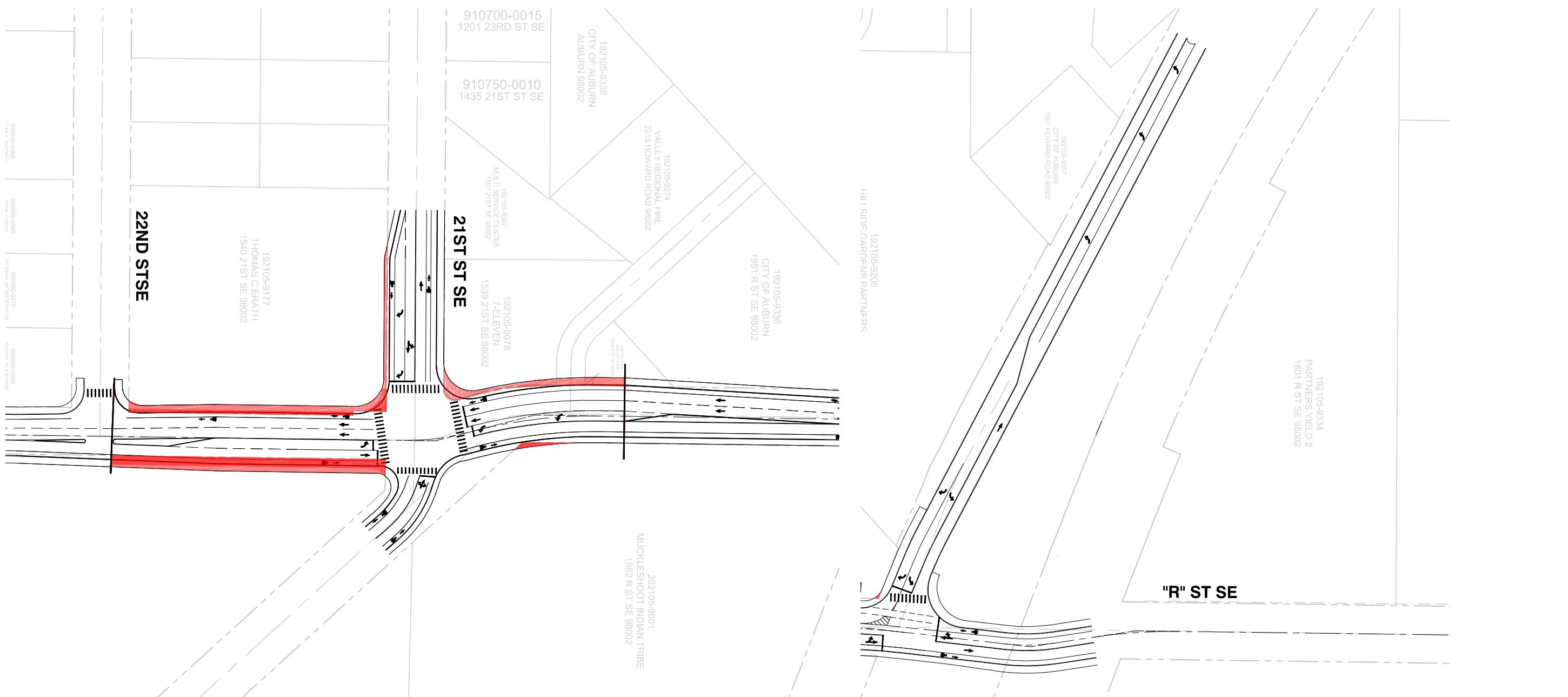


R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

M STREET ROUNDABOUT-  
ROW ACQUISITION

SHEET

C.04



21ST ST SE/HOWARD RD E AND R STREET  
SE 2-SB LANE SIGNALIZED ROW

<u>RIGHT-OF-WAY</u>	<u>QUANTITY</u>
---------------------	-----------------

HOWARD ROAD  
WEST LEG ROW

RIGHT-OF-WAY QUANTITY  
ROW ACQUISITION 15.5 SF



**Know what's below.  
Call before you dig.**

DRAWN BY	
<b>M. VU</b>	
CHECKED BY	
<b>S. BATTLE</b>	
DATE	
-	
J O B No. :	

APPROV

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# R STREET CORRIDOR STUDY/CITY OF AUBURN

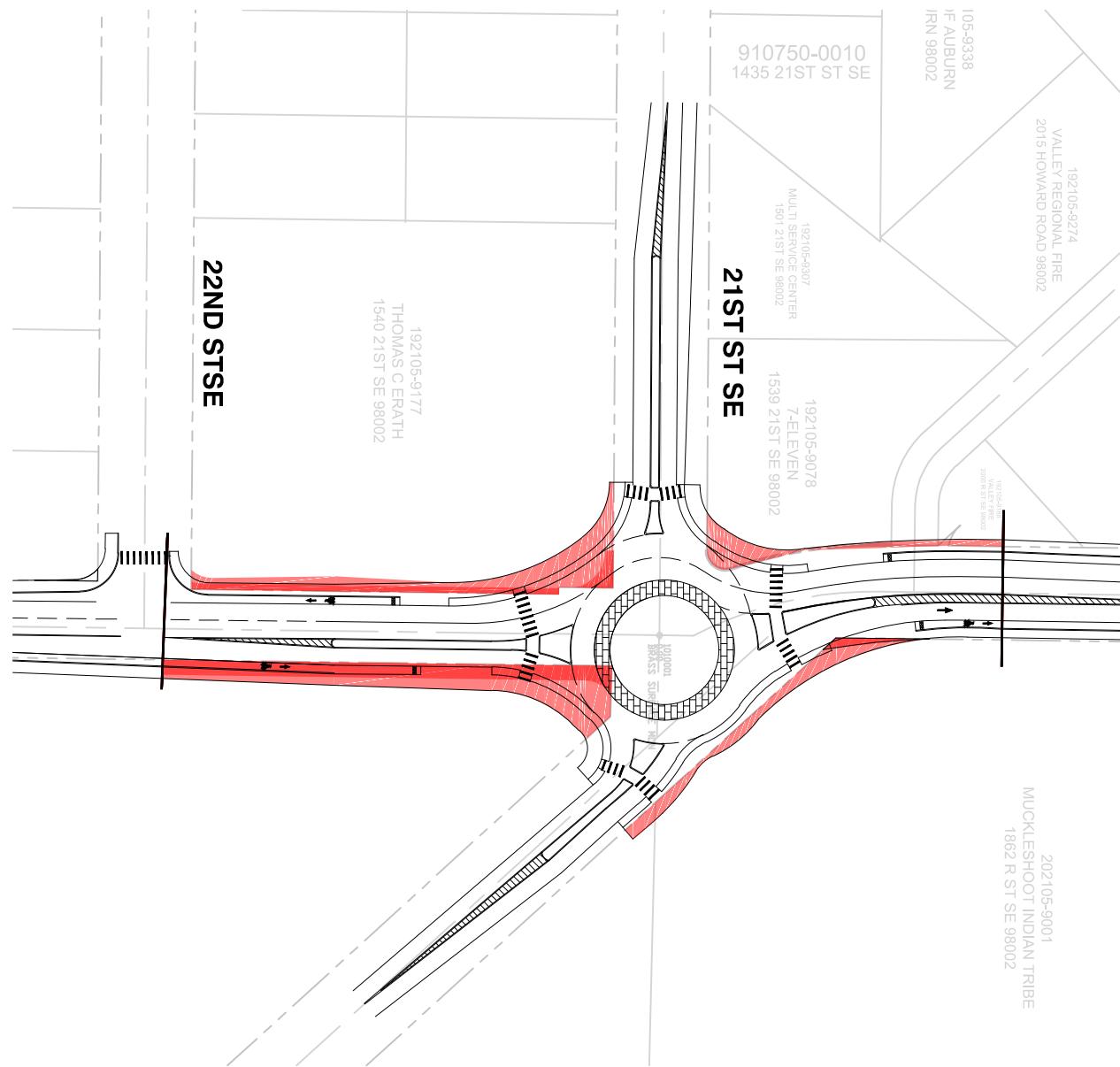
AUBURN, WASHINGTON

## INTERSECTION ROW ACQUISITION

SHEET

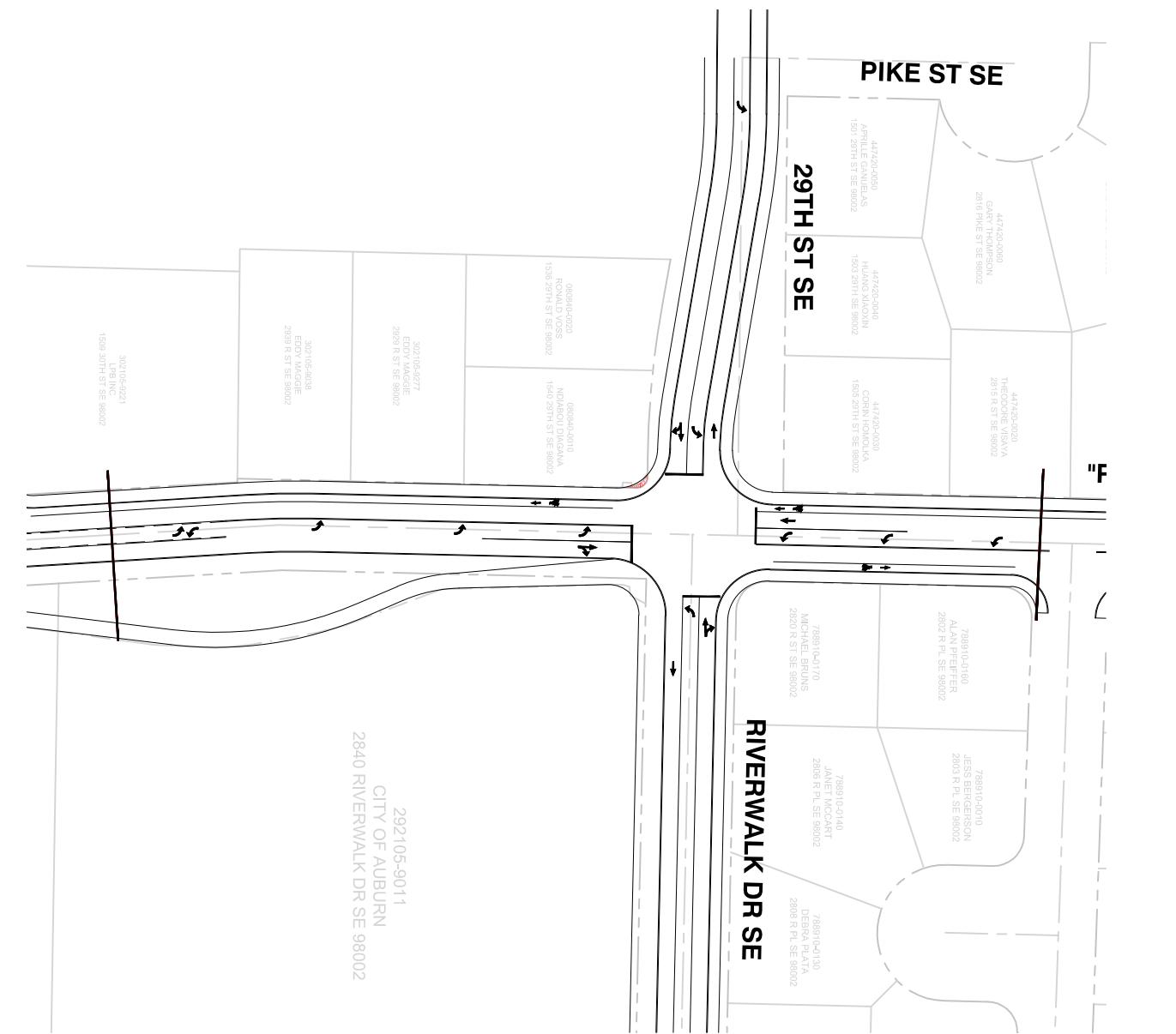
C.05





## 21ST STREET SE AND R STREET SE MULTILANE ROUNDABOUT ROW ACQUISITION

RIGHT-OF-WAY QUANTITY



## 29TH STREET SE AND R STREET SE 1-SB LANE SIGNALIZED ROW ACQUISITION

<u>RIGHT-OF-WAY</u>	<u>QUANTITY</u>
---------------------	-----------------



**Know what's below.**  
**Call before you dig.**

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	<b>M. VU</b>	
	CHECKED BY	A
	<b>S. BATTLE</b>	
	DAT	-
	J O B No. :	

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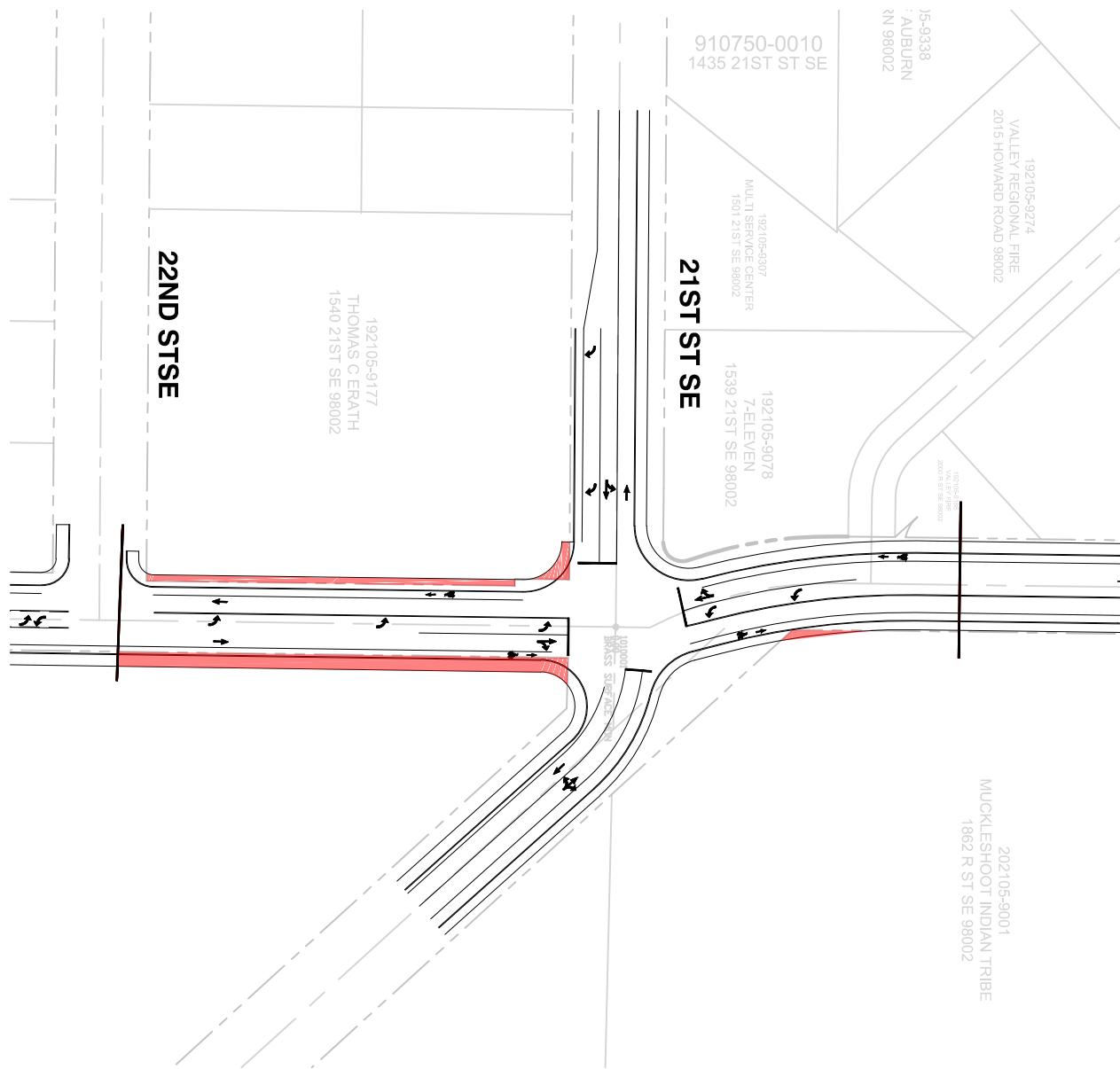
# R STREET CORRIDOR STUDY/CITY OF AUBURN

## AUBURN, WASHINGTON

INTERSECTION ROW ACQUISITION

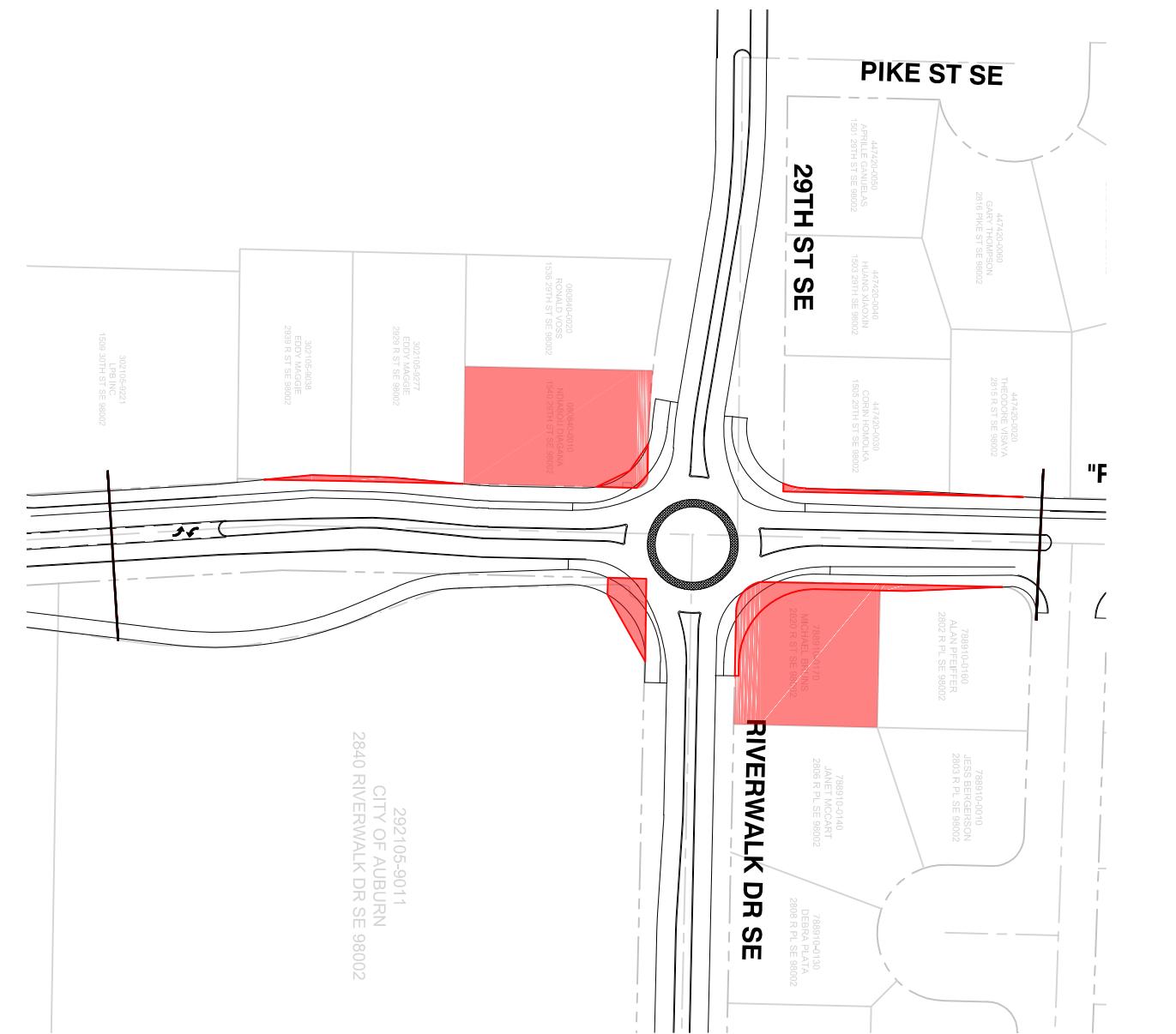
SHEET

C.07



21ST STREET SE AND R STREET SE  
1-SB LANE SIGNALIZED ROW ACQUISITION

RIGHT-OF-WAY      QUANTITY



## 29TH STREET SE AND R STREET SE SINGLE-LANE ROUNDABOUT ROW ACQUISITION

RIGHT-OF-WAY QUANTITY



**Know what's below.**  
**Call before you dig.**

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	<b>M. VU</b>	
	CHECKED BY	A
	<b>S. BATTLE</b>	
	DAT	-
	J O B No. :	



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10

The logo for the City of Auburn, Washington. It features the words "CITY OF" above "AUBURN" in a serif font, with "WASHINGTON" below it. The word "AUBURN" is in large, bold, all-caps letters. The entire word is set against a background of three stylized, grey, wavy horizontal lines. Small five-pointed stars are positioned above and below the "U" and "N" in "AUBURN".



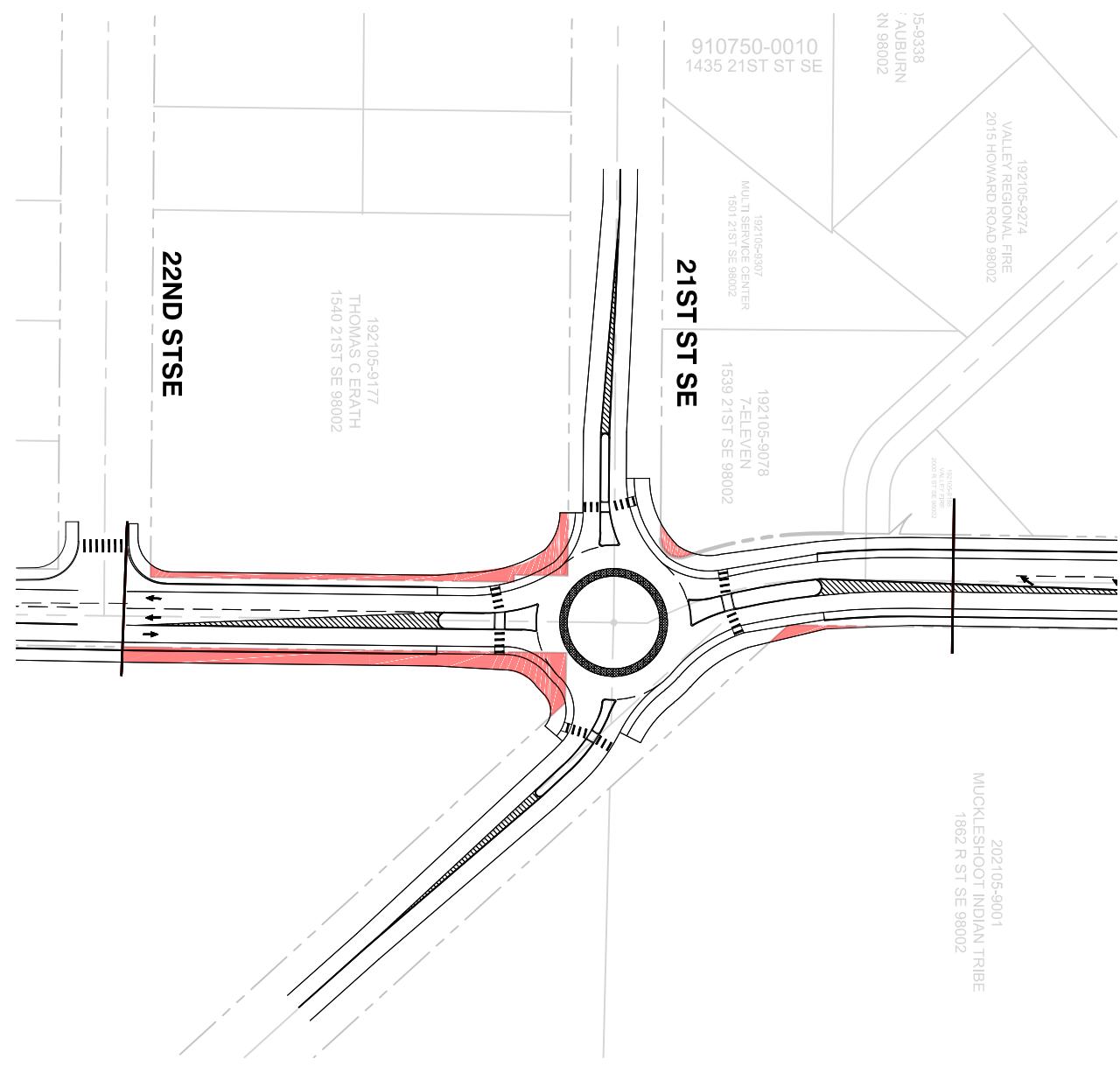
# R STREET CORRIDOR STUDY/CITY OF AUBURN

AUBURN, WASHINGTON

# INTERSECTION ROW ACQUISITION

SHEET

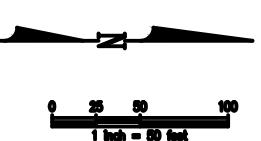
C.08



21ST STREET SE AND R STREET SE  
SINGLE-LANE ROUNDABOUT ROW ACQUISITION

RIGHT-OF-WAY      QUANTITY

■ ROW ACQUISITION      5.524 SF



NO.	DATE	BY	CHD.	APPR.
				REVISION

DRAWN BY  
**M. YU**  
CHECKED BY  
**S. BATTLE**  
DATE  
JOB No.: -

DESIGNED BY  
**J. SHINN**  
APPROVED BY  
-  
DATE  
-

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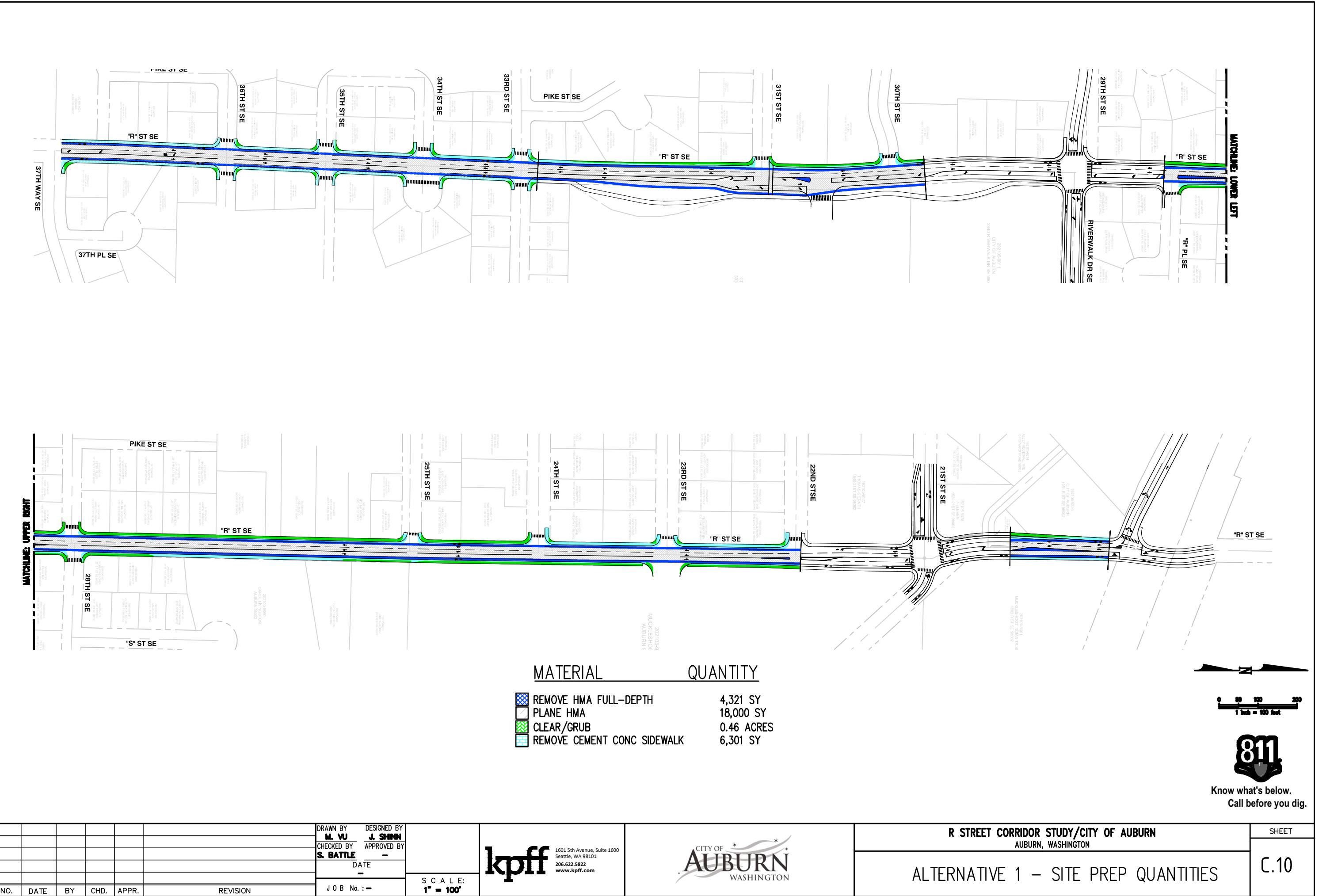
R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

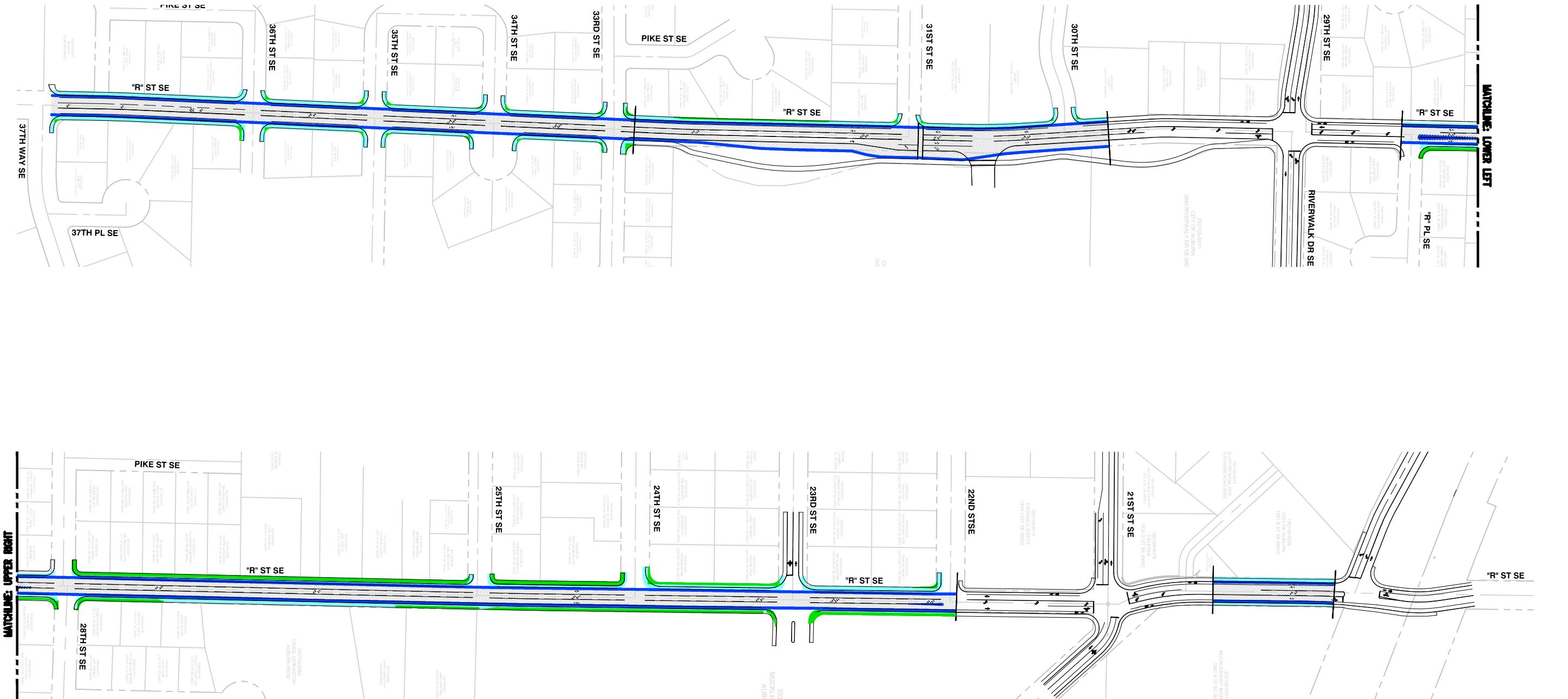
INTERSECTION ROW ACQUISITION

SHEET

C.09

# **SITE PREP QUANTITIES**





MATERIAL      QUANTITY

- |                             |            |
|-----------------------------|------------|
| REMOVE HMA FULL-DEPTH       | 5,550 SY   |
| PLANE HMA                   | 23,235 SY  |
| CLEAR/GARB                  | 0.45 ACRES |
| REMOVE CEMENT CONC SIDEWALK | 8,100 SY   |

0 50 100 200  
1 inch = 100 feet



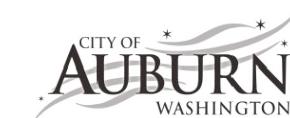
Know what's below.  
Call before you dig.

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				CHECKED BY <b>S. BATTLE</b>	APPROVED BY -	
					DATE -	
					JOB No.: -	
NO.	DATE	BY	CHD.	APPR.	REVISION	

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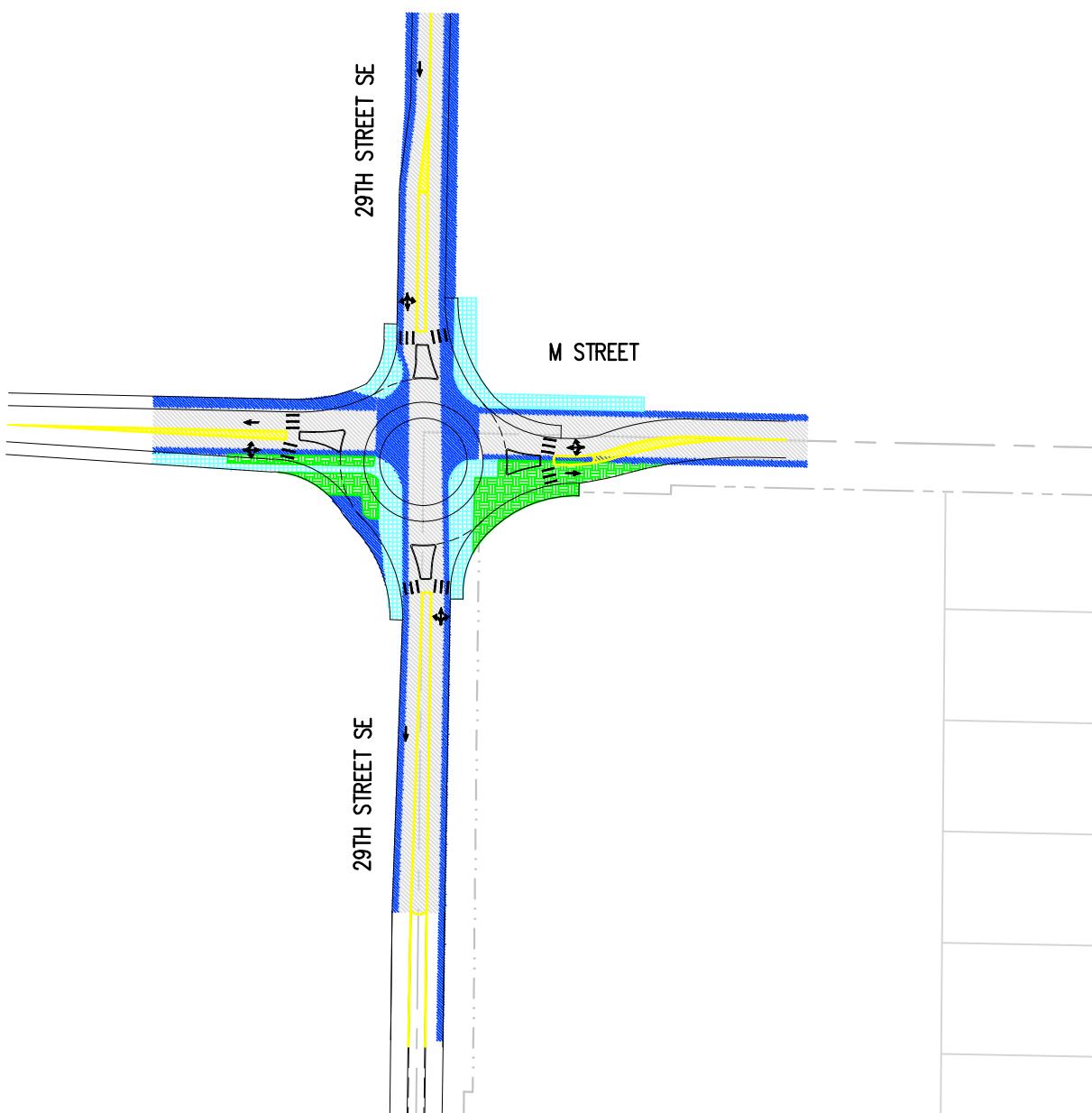


R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 2 – SITE PREP QUANTITIES

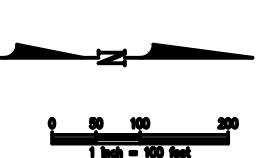
SHEET  
C.11





MATERIAL      QUANTITY

■ REMOVE HMA FULL-DEPTH	1,270 SY
■ PLANE HMA	2,314 SY
■ CLEAR/GRUB	0.08 ACRES
■ REMOVE CEMENT CONC SIDEWALK	721 SY



Know what's below.  
Call before you dig.

NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY  
**M. YU**  
CHECKED BY  
**S. BATTLE**  
DESIGNED BY  
**J. SHINN**  
APPROVED BY  
—  
DATE  
—  
JOB No.: —

SCALE:  
1" = 50'

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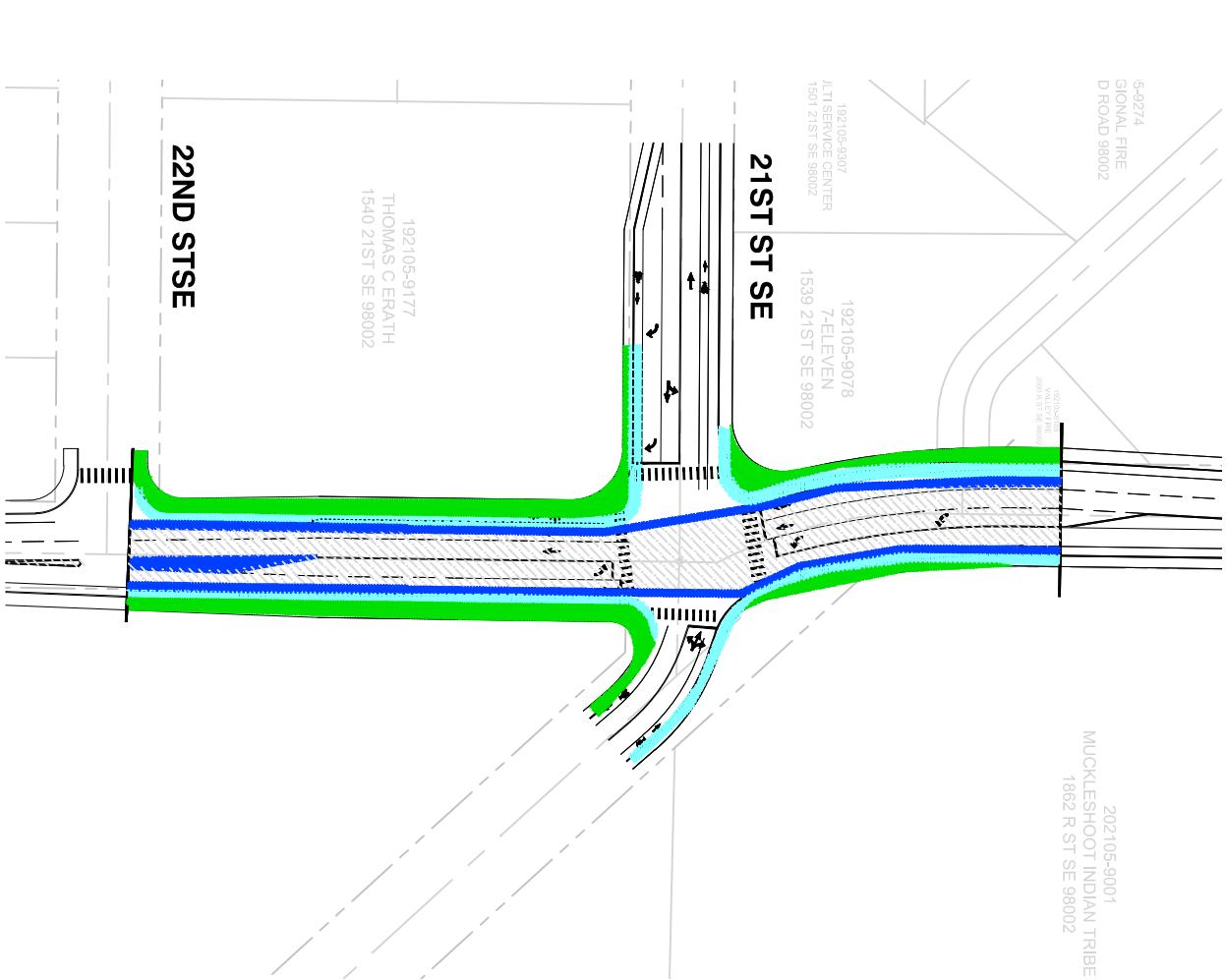


R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

M STREET ROUNDABOUT –  
SITE PREP QUANTITIES

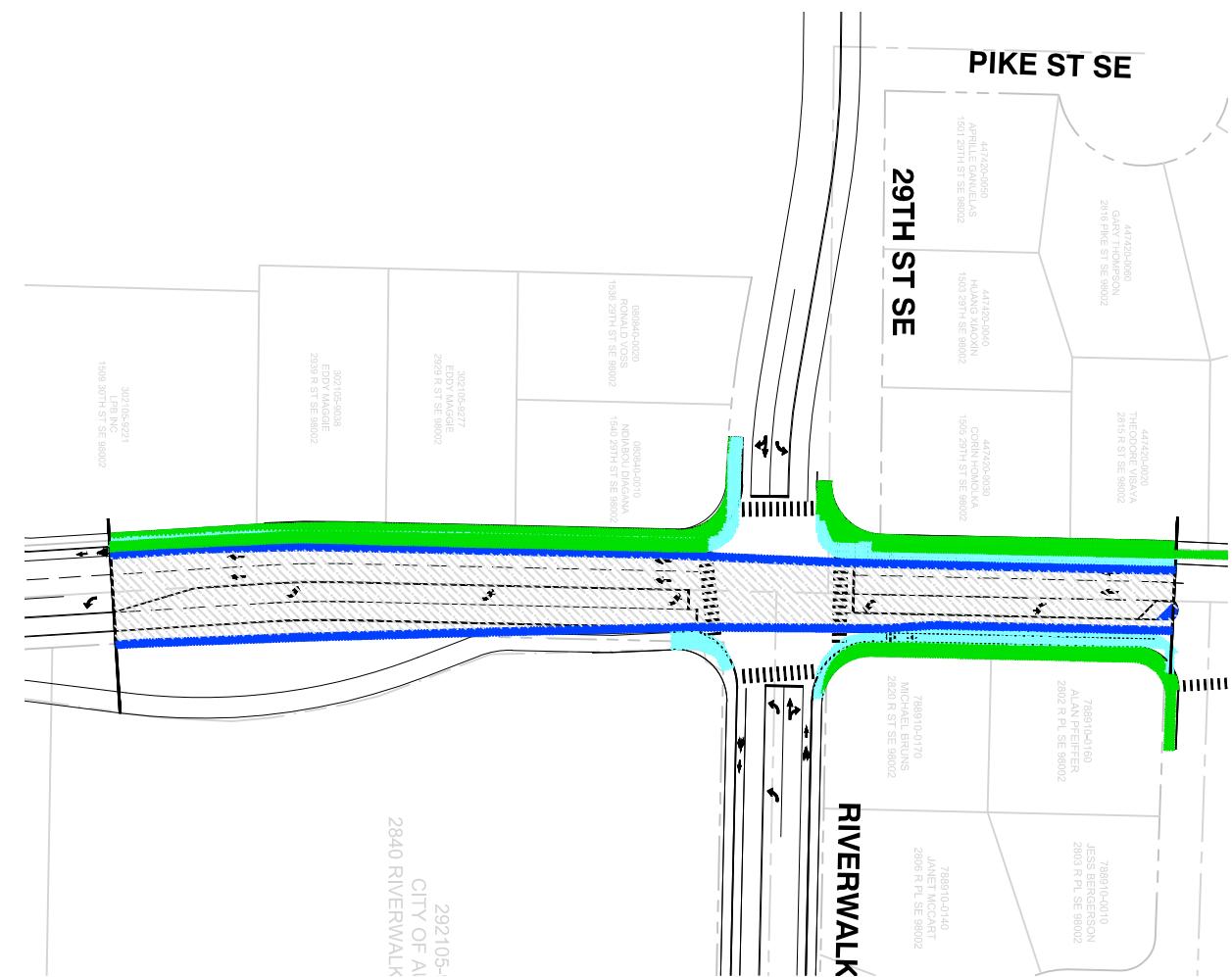
SHEET

C.13



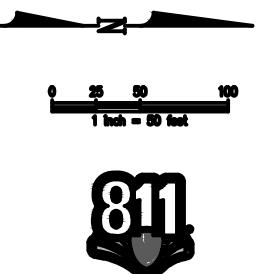
## SITE PREP QUANTITIES R ST SE AND 21ST ST SE 2-SB LANE SIGNALIZED INTERSECTION

MATERIAL	QUANTITY
REMOVE HMA FULL-DEPTH	482 SY
PLANE HMA	1,939 SY
CLEAR/GRUB	0.18 ACRES
REMOVE CEMENT CONC SIDEWALK	833 SY



SITE PREP QUANTITIES  
R ST SE AND 29TH ST SE  
2-SB LANE SIGNALIZED INTERSECTION

<u>MATERIAL</u>	<u>QUANTITY</u>
REMOVE HMA FULL-DEPTH	547 SY
PLANE HMA	2,688 SY
CLEAR/GRUB	0.12 ACRES
REMOVE CEMENT CONC SIDEWALK	734 SY



**Know what's below.  
Call before you dig.**

DRAWN BY <b>M. VU</b>	DESIGNED BY <b>J. SHINN</b>
CHECKED BY <b>S. BATTLE</b>	APPROVED BY —
DATE —	
S C A L E <b>1" = 50'</b>	
J O B N o . : —	

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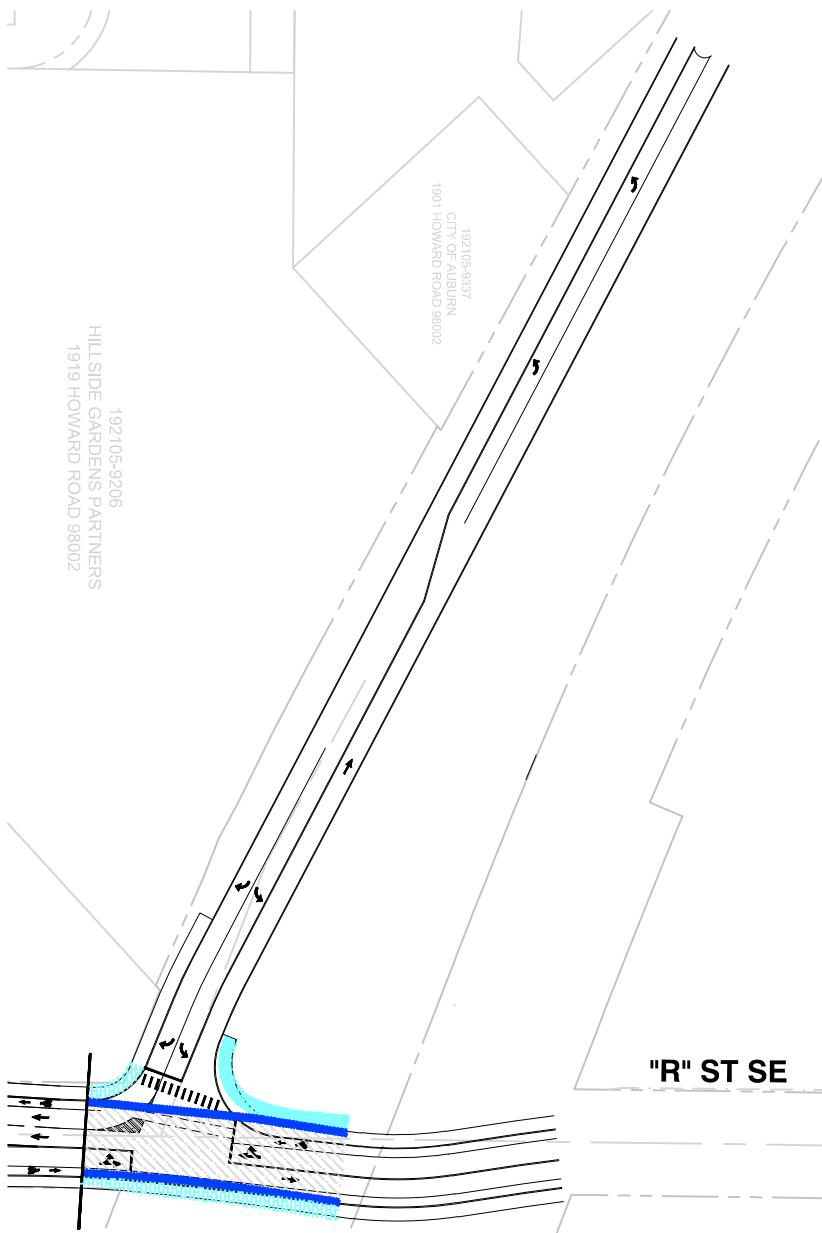


# R STREET CORRIDOR STUDY/CITY OF AUBURN

## AUBURN, WASHINGTON

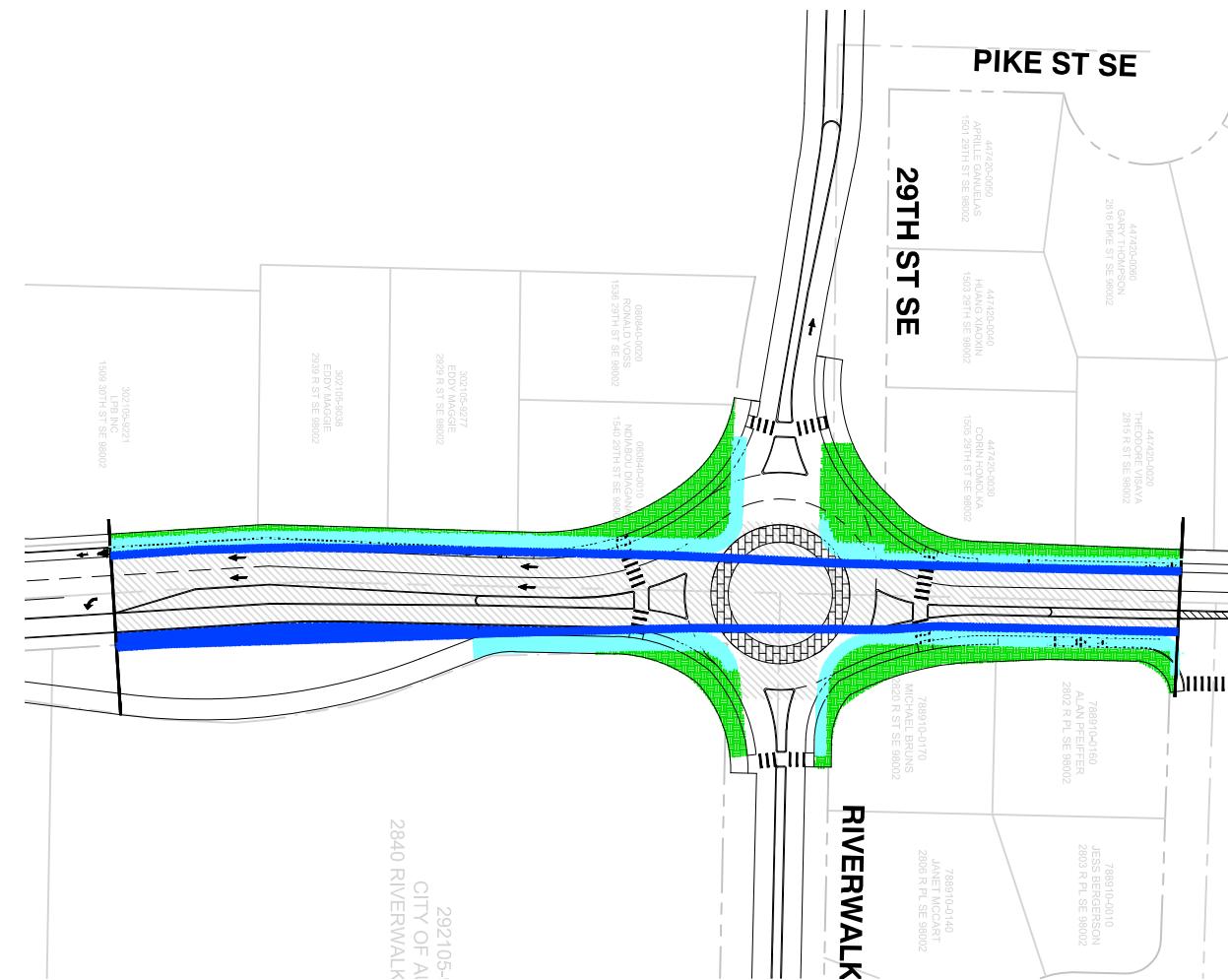
## INTERSECTION SITE PREP QUANTITIES

SHEET  
C.14



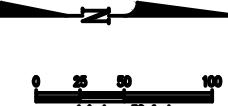
SITE PREP QUANTITIES  
HOWARD ROAD AND R ST SE

MATERIAL	QUANTITY
REMOVE HMA FULL-DEPTH	131 SY
PLANE HMA	587 SY
CLEAR/GRUB	0.0 ACRES
REMOVE CEMENT CONC SIDEWALK	85 SY



SITE PREP QUANTITIES  
R ST SE AND 29TH ST SE  
MULTILANE ROUNDABOUT INTERSECTION

MATERIAL	QUANTITY
REMOVE HMA FULL-DEPTH	711 SY
PLANE HMA	2,824 SY
CLEAR/GRUB	0.17 ACRES
REMOVE CEMENT CONC SIDEWALK	734 SY



Know what's below.  
Call before you dig.

NO.	DATE	BY	CHD.	APPR.
				REVISION

DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>
CHECKED BY <b>S. BATTLE</b>	APPROVED BY -
DATE -	
S. C. L. E.: 1° = 50'	
J O B N o . : -	

**kpff**

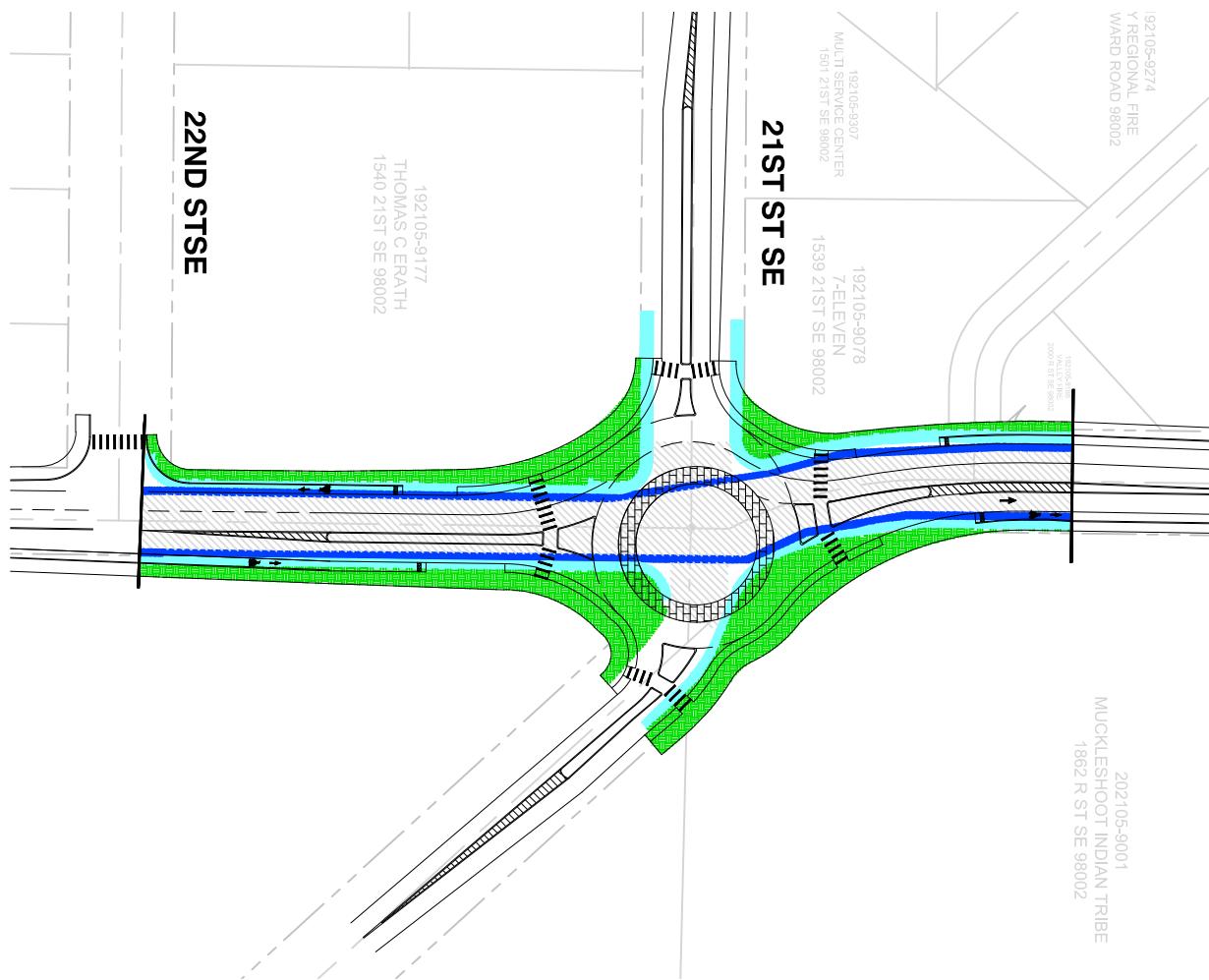
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AUBURN, WASHINGTON

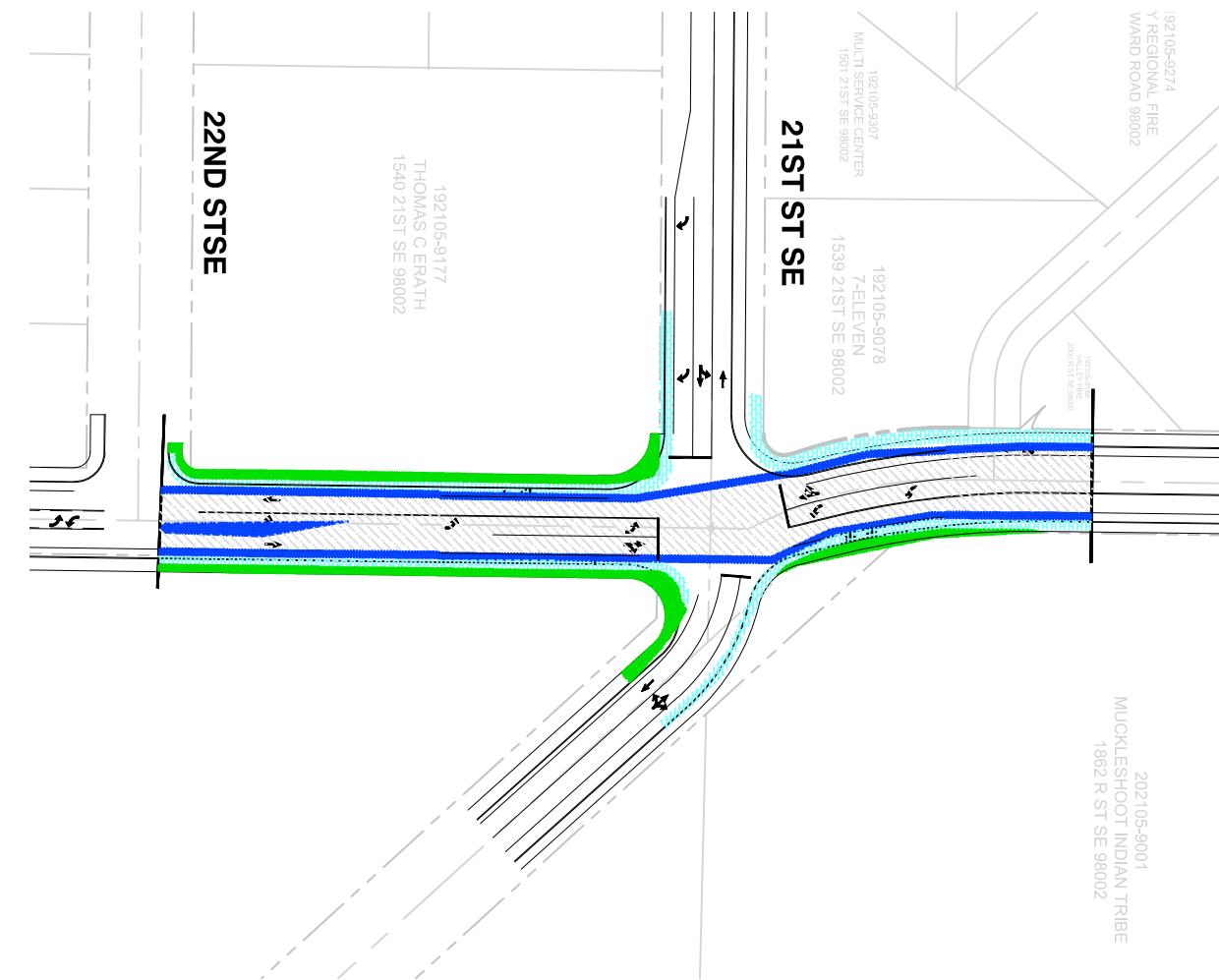
INTERSECTION SITE PREP QUANTITIES

SHEET  
C.15



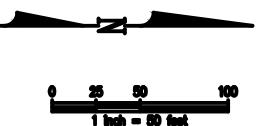
SITE PREP QUANTITIES  
R ST SE AND 21ST ST SE  
MULTILANE ROUNDABOUT INTERSECTION

MATERIAL	QUANTITY
REMOVE HMA FULL-DEPTH	459 SY
PLANE HMA	2,216 SY
CLEAR/GRUB	0.32 ACRES
REMOVE CEMENT CONC SIDEWALK	833 SY



SITE PREP QUANTITIES  
R ST SE AND 21ST ST SE  
1-SB LANE SIGNALIZED INTERSECTION

MATERIAL	QUANTITY
REMOVE HMA FULL-DEPTH	407 SY
PLANE HMA	1,956 SY
CLEAR/GRUB	0.10 ACRES
REMOVE CEMENT CONC SIDEWALK	900 SY



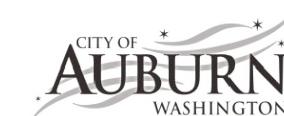
Know what's below.  
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NO.	DATE	BY	CHD.	APPR.
				REVISION

DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>
CHECKED BY <b>S. BATTLE</b>	APPROVED BY -
DATE -	
S. C. A. L. E.: 1" = 50'	
J O B N o . : -	

**kpff**

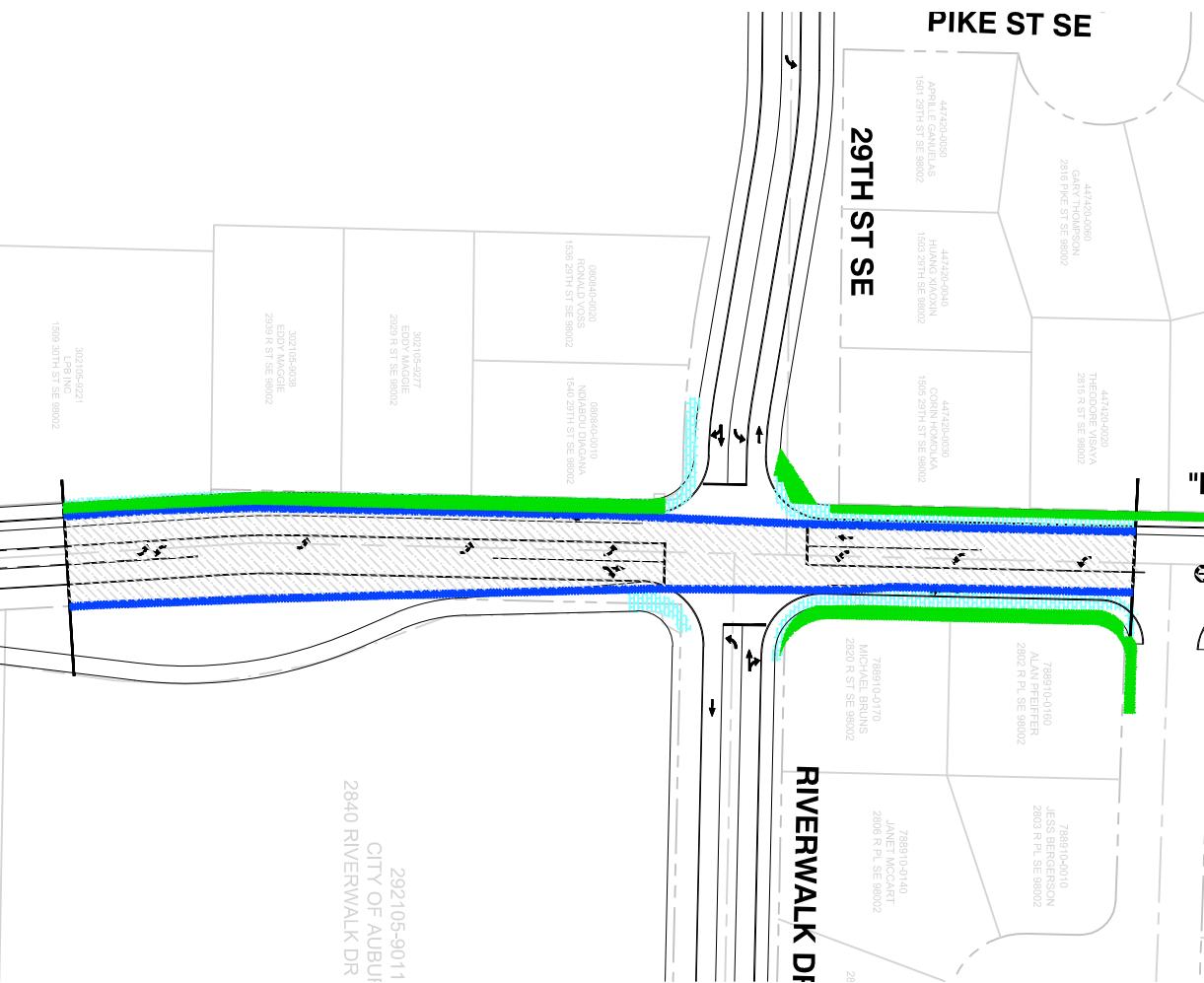
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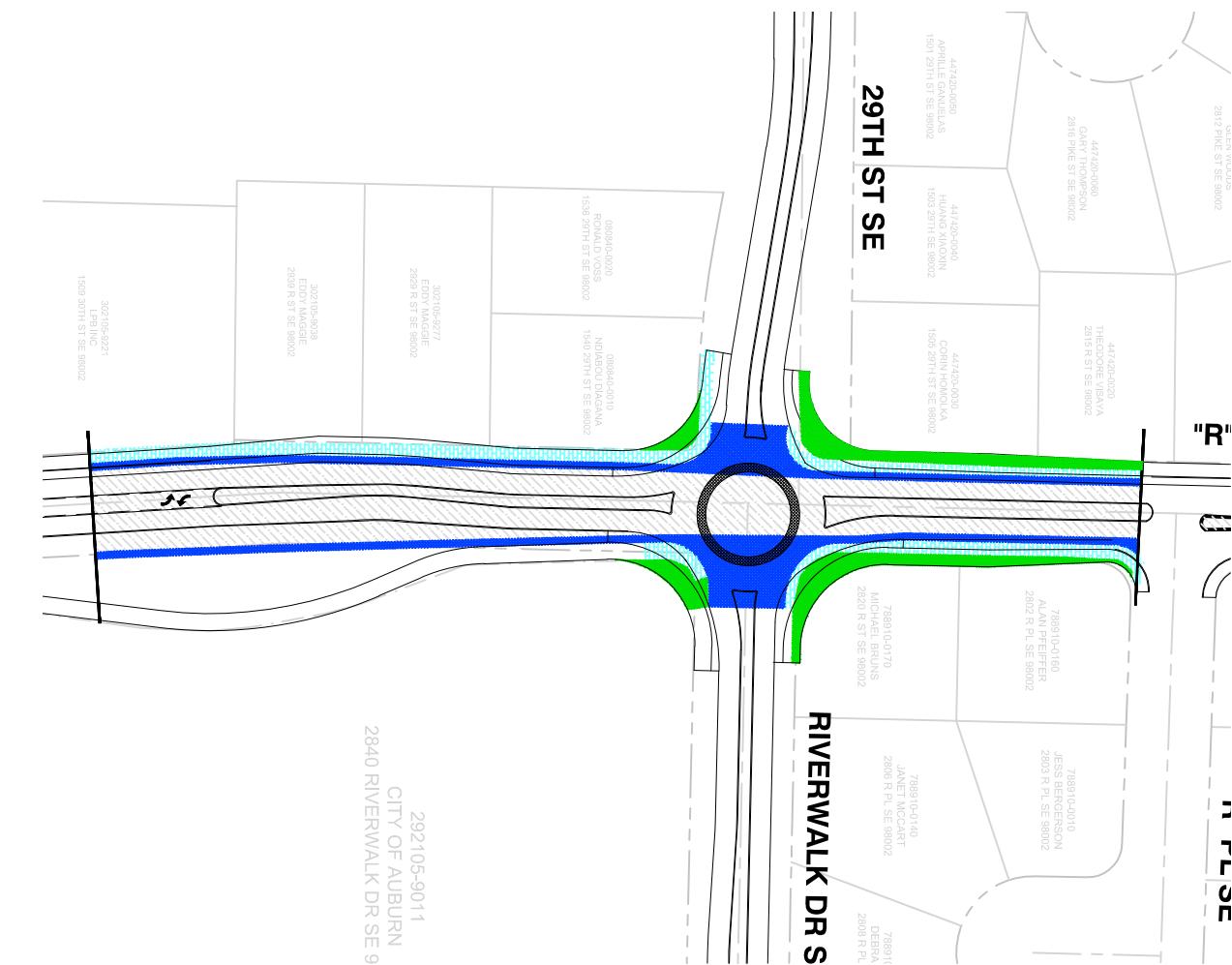
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AUBURN, WASHINGTON

INTERSECTION SITE PREP QUANTITIES

SHEET  
C.16



MATERIAL	QUANTITY
REMOVE HMA FULL-DEPTH	547 SY
PLANE HMA	2,688 SY
CLEAR/GRUB	0.12 ACRES
REMOVE CEMENT CONC SIDEWALK	734 SY



MATERIAL	QUANTITY
REMOVE HMA FULL-DEPTH	924 SY
PLANE HMA	2,692 SY
CLEAR/GRUB	0.10 ACRES
REMOVE CEMENT CONC SIDEWALK	739 SY

Know what's below.  
Call before you dig.



NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>
CHECKED BY <b>S. BATTLE</b>	APPROVED BY -
DATE -	
JOB No.: -	

SCALE:  
1" = 50'



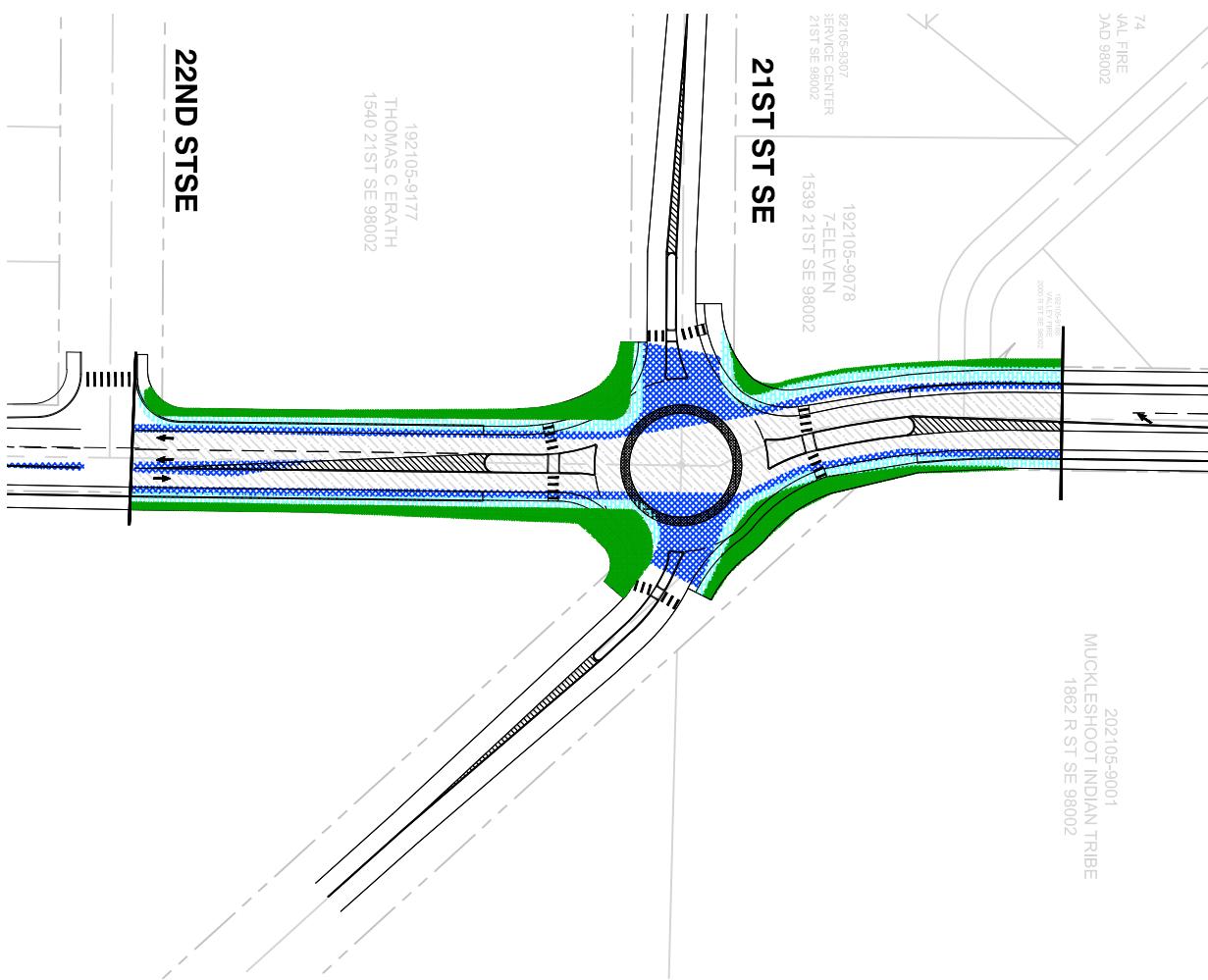
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R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

INTERSECTION SITE PREP QUANTITIES

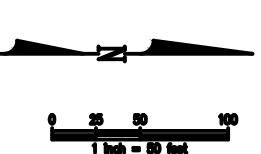
SHEET  
**C.17**



**SITE PREP QUANTITIES  
R ST SE AND 21ST ST SE  
SINGLE LANE ROUNDABOUT INTERSECTION**

MATERIAL	QUANTITY
----------	----------

REMOVE HMA FULL-DEPTH	893 SY
PLANE HMA	1,956 SY
CLEAR/GRUB	0.17 ACRES
REMOVE CEMENT CONC SIDEWALK	750 SY



811  
Know what's below.  
Call before you dig.

NO.	DATE	BY	CHD.	APPR.
				REVISION

DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>
CHECKED BY <b>S. BATTLE</b>	APPROVED BY -
DATE -	
JOB No.: -	

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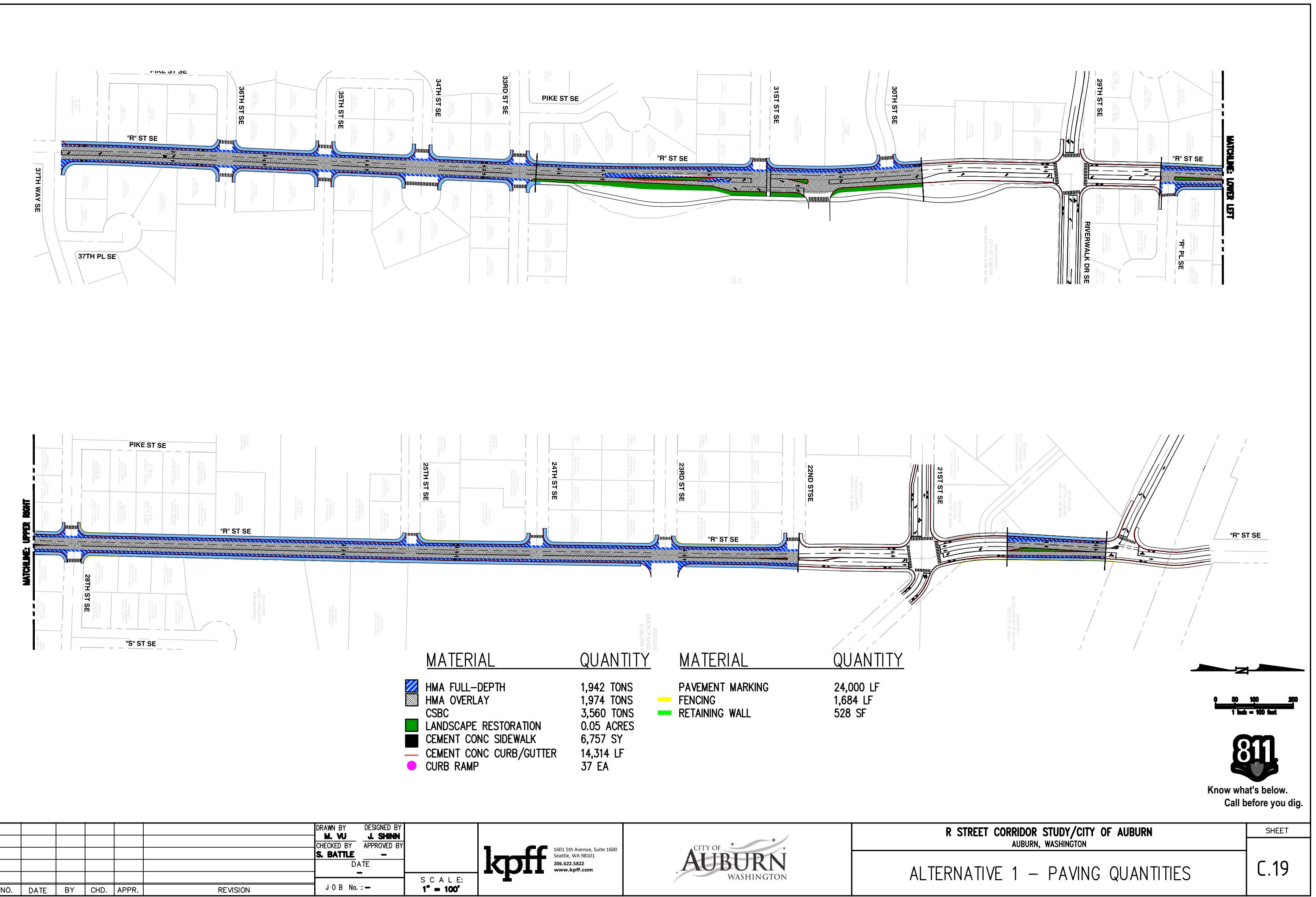
R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

INTERSECTION SITE PREP QUANTITIES

SHEET

C.18

# **PAVING QUANTITIES**





## MATERIAL

## QUANTITY

MATERIAL

### QUANTITY

- A legend box containing six entries, each with a colored square icon and text: HMA FULL-DEPTH (blue), HMA OVERLAY (gray), CSBC (white), LANDSCAPE RESTORATION (green), CEMENT CONC SIDEWALK (black), and CEMENT CONC CURB/GUTTER/CURB RAMP (red/pink).

- PAVEMENT MARKING  
FENCING  
RETAINING WALL**

The logo for the City of Auburn, Washington. It features the words "CITY OF" above "AUBURN" in a stylized, bold font. "AUBURN" is particularly prominent with large, sweeping, italicized letters. Below "AUBURN" is the word "WASHINGTON". The entire wordmark is set against a background of three curved, light-grey swooshes. Small five-pointed stars are positioned above and below the swooshes.

DRAWN BY		
<b>M. VU</b>		
CHECKED BY		A
<b>S. BATTLE</b>		DAT
		-
J O B No. :		

**kpff** 1601 5th Avenue,  
Seattle, WA 98101  
**206.622.5822**  
[www.kpff.com](http://www.kpff.com)

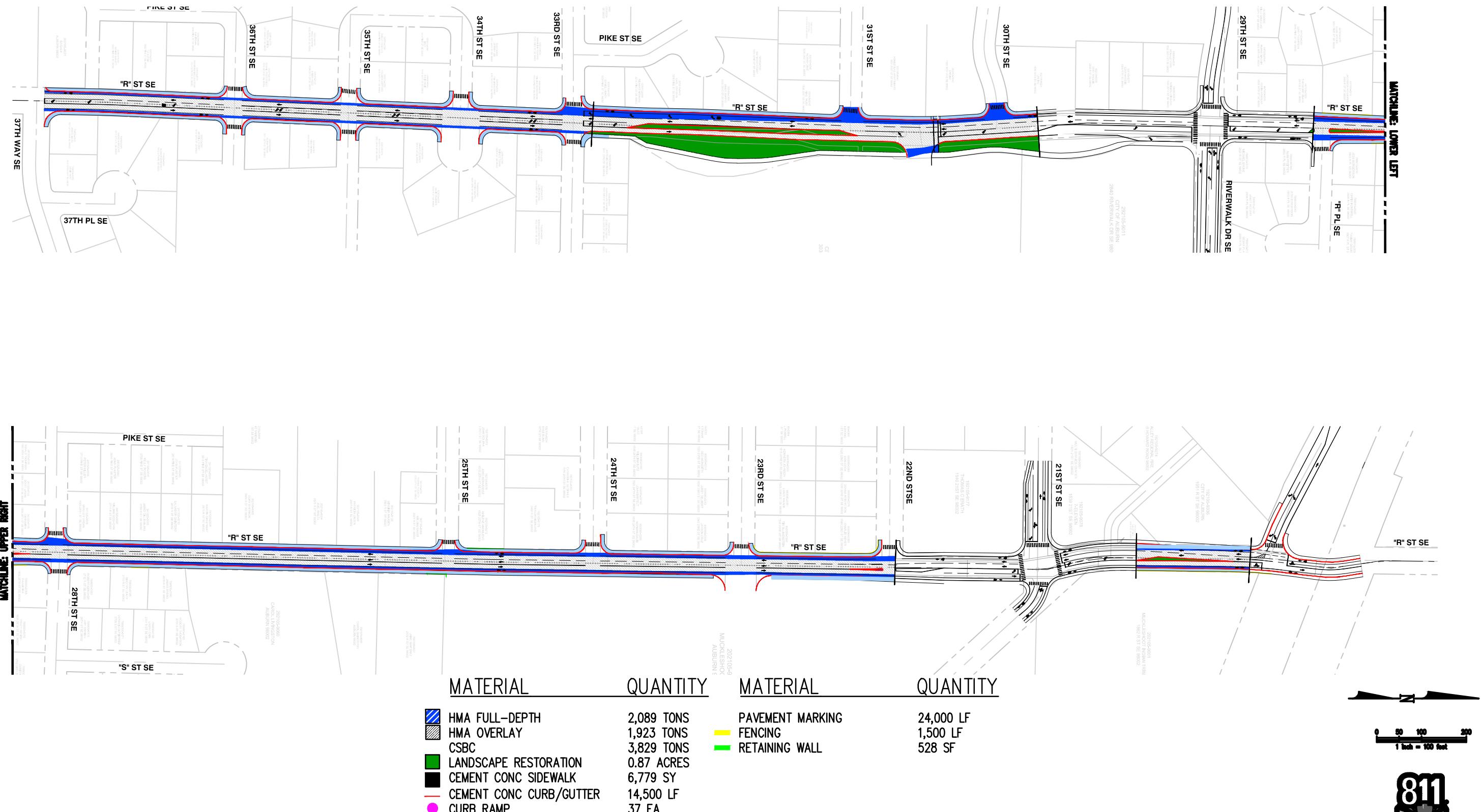
The logo for the City of Auburn, Washington. It features the word "CITY OF" above "AUBURN" in a serif font, with "WASHINGTON" below it in a smaller sans-serif font. The letters "AUBURN" are stylized with decorative swooshes and stars at the ends.

## R STREET CORRIDOR STUDY/CITY OF AUBURN AUBURN, WASHINGTON

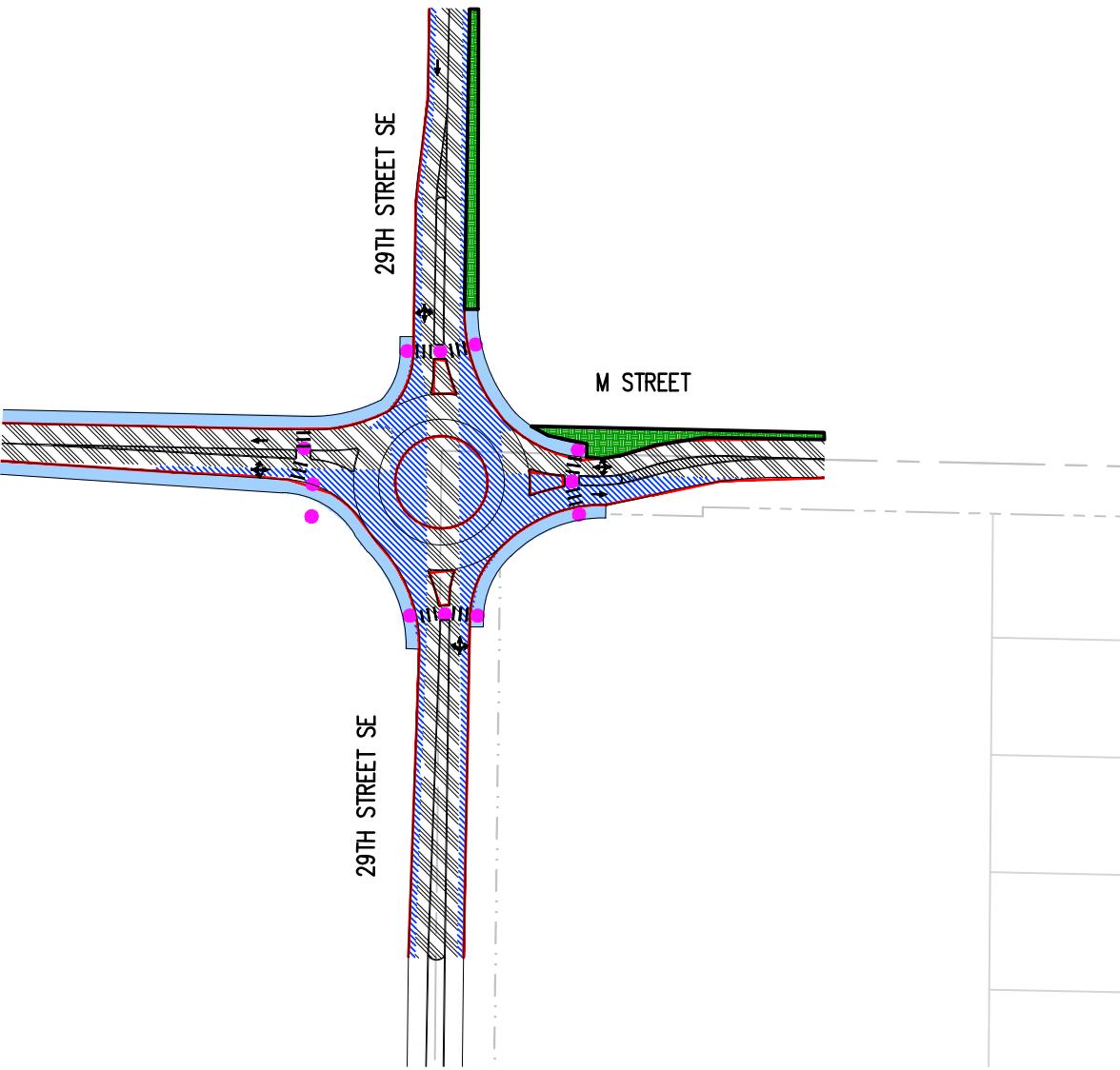
## ALTERNATIVE 2 – PAVING QUANTITIES

SHEET

C.20



**Know what's below.  
Call before you dig.**



MATERIAL

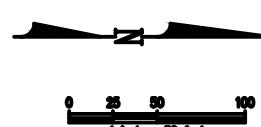
HMA FULL-DEPTH	490 TONS
HMA OVERLAY	268 TONS
CSBC	897 TONS
LANDSCAPE RESTORATION	0.08 ACRES
CEMENT CONC SIDEWALK	658 SY
CEMENT CONC CURB/GUTTER	2,115 LF
CURB RAMP	8 EA

QUANTITY

MATERIAL

PAVEMENT MARKING	2,250 LF
------------------	----------

QUANTITY



Know what's below.  
Call before you dig.

NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY  
**M. YU**  
DESIGNED BY  
**J. SHINN**  
CHECKED BY  
**S. BATTLE**  
APPROVED BY  
-  
DATE  
-  
JOB No.: -

SCALE:  
1" = 50'

**kpff**

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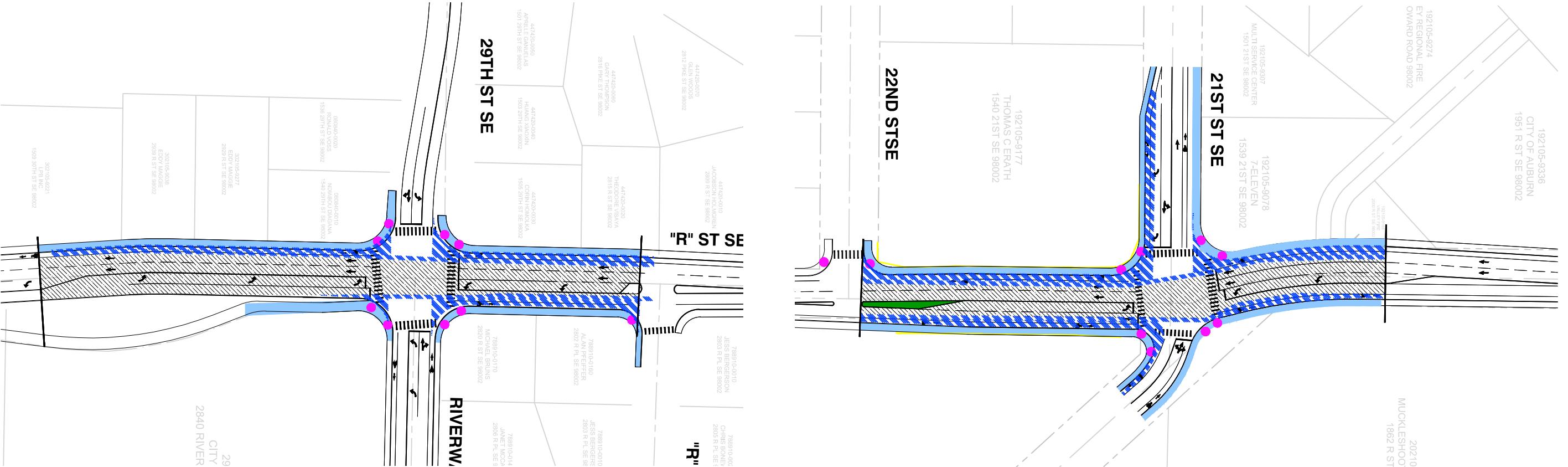


R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

M STREET ROUNDABOUT –  
PAVING QUANTITIES

SHEET

C.22



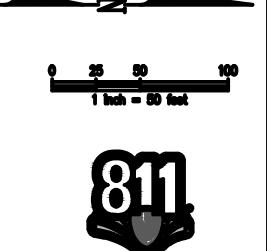
R ST SE AND 29TH STREET SE  
2-SB LANE SIGNALIZED INTERSECTION  
PAVING QUANTITIES

MATERIAL	QUANTITY
HMA FULL-DEPTH	356 TONS
HMA OVERLAY	285 TONS
CSBC	652 TONS
LANDSCAPE RESTORATION	N/A ACRES
CEMENT CONC SIDEWALK	959 SY
CEMENT CONC CURB/GUTTER	N/A LF
CURB RAMP	9 EA

R ST SE AND 21ST STREET SE  
2-SB LANE SIGNALIZED INTERSECTION  
PAVING QUANTITIES

MATERIAL	QUANTITY
HMA FULL-DEPTH	437 TONS
HMA OVERLAY	223 TONS
CSBC	800 TONS
LANDSCAPE RESTORATION	N/A ACRES
CEMENT CONC SIDEWALK	1,191 SY
CEMENT CONC CURB/GUTTER	N/A LF
CURB RAMP	9 EA

Know what's below.  
Call before you dig.



NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>
CHECKED BY <b>S. BATTLE</b>	APPROVED BY -
DATE -	
S C A L E: 1" = 50'	
J O B N o . : -	

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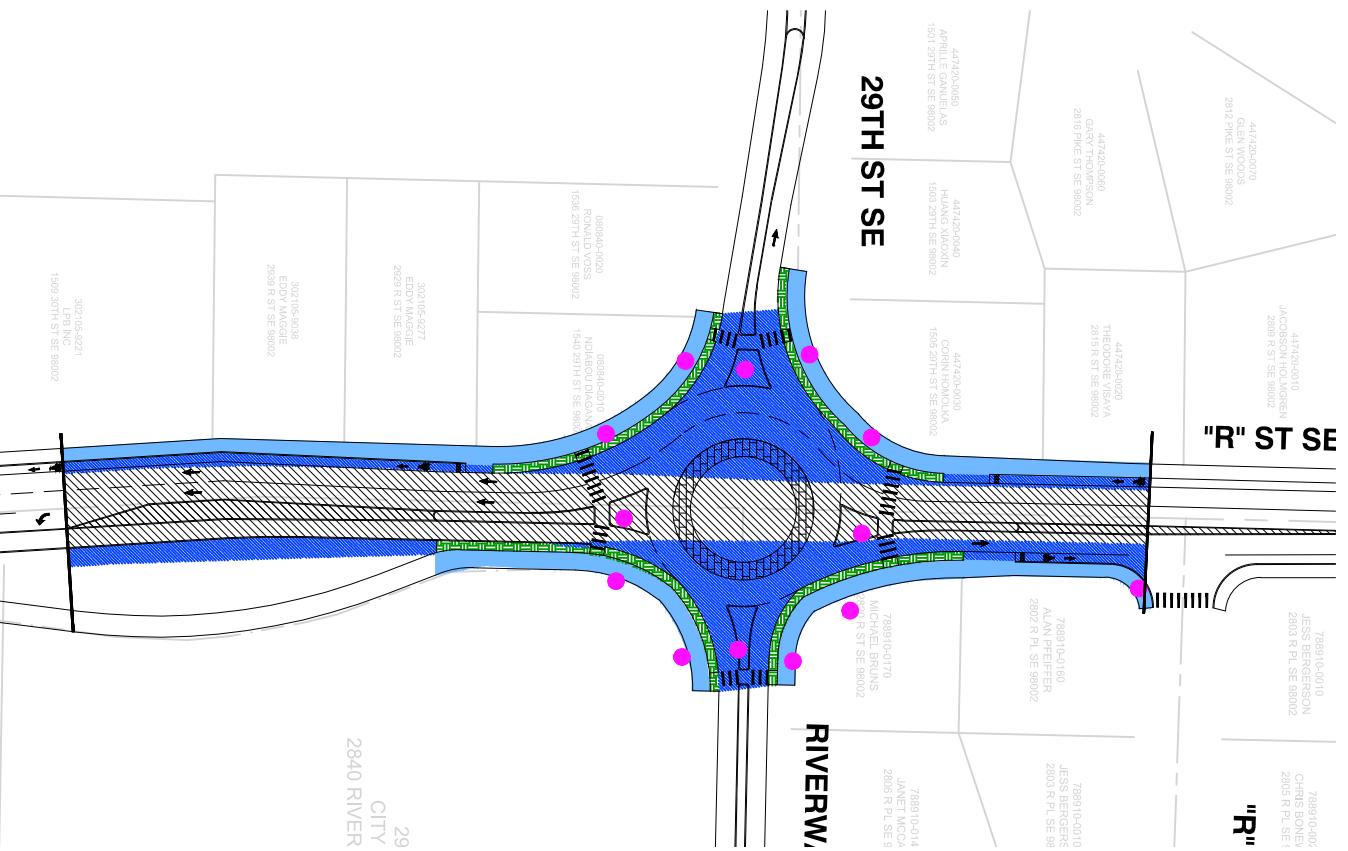
R STREET CORRIDOR STUDY/CITY OF AUBURN

AUBURN, WASHINGTON

INTERSECTION PAVING QUANTITIES

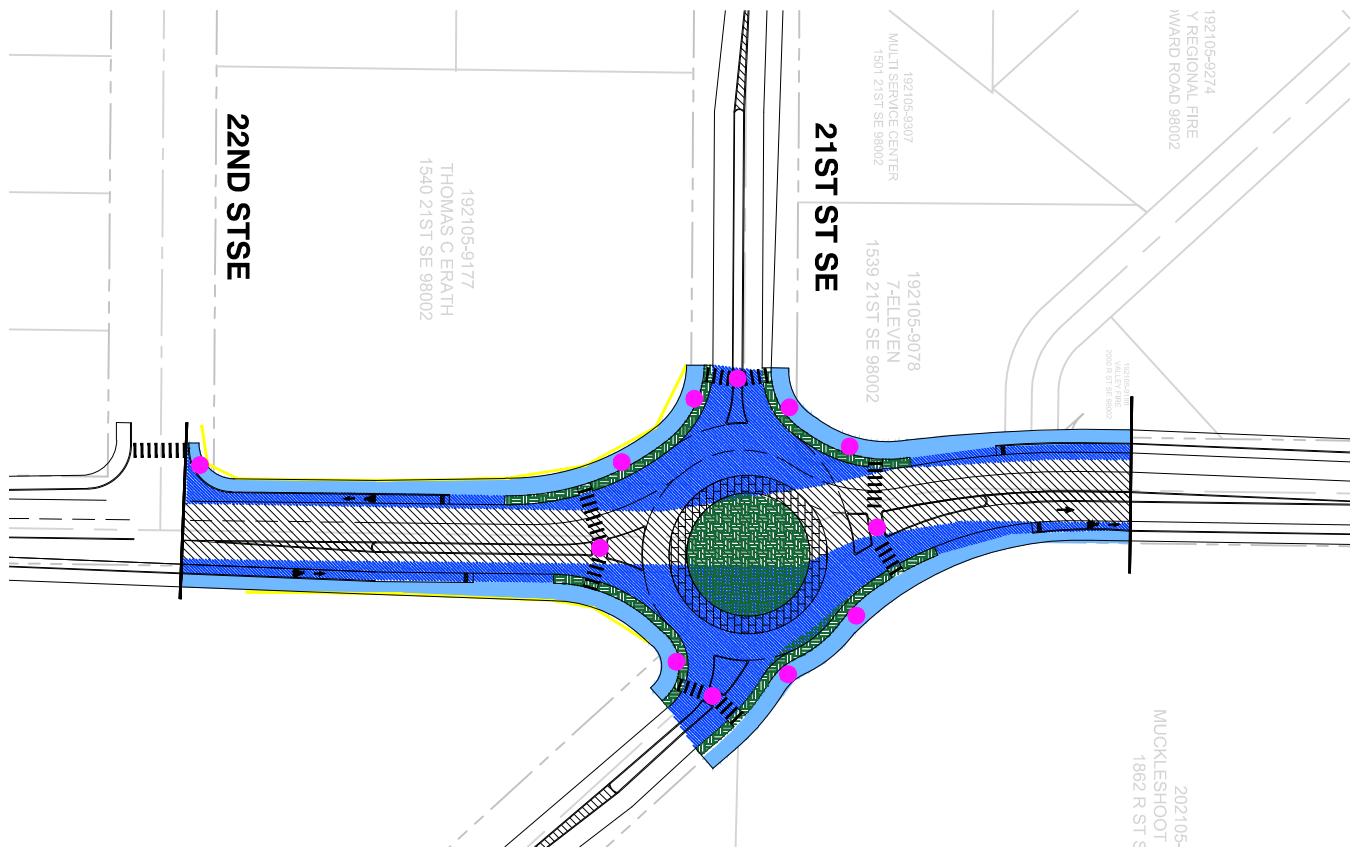
SHEET

C.23



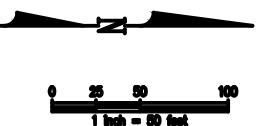
R ST SE AND 29TH STREET SE  
MULTILANE ROUNDABOUT INTERSECTION  
PAVING QUANTITIES

MATERIAL	QUANTITY
HMA FULL-DEPTH	690 TONS
HMA OVERLAY	288 TONS
CSBC	1,265 TONS
LANDSCAPE RESTORATION	N/A ACRES
CEMENT CONC SIDEWALK	1,179 SY
CEMENT CONC CURB/GUTTER	N/A LF
CURB RAMP	13 EA



R ST SE AND 21ST STREET SE  
MULTILANE ROUNDABOUT INTERSECTION  
PAVING QUANTITIES

<u>MATERIAL</u>	<u>QUANTITY</u>
HMA FULL-DEPTH	755 TONS
HMA OVERLAY	224 TONS
CSBC	1,385 TONS
LANDSCAPE RESTORATION	N/A ACRES
CEMENT CONC SIDEWALK	1,117 SY
CEMENT CONC CURB/GUTTER	N/A LF
CURB RAMP	12 EA



**Know what's below.  
Call before you dig.**

DRAWN BY <b>M. WU</b>	DESIGNED BY <b>J. SHINN</b>	
CHECKED BY <b>S. BATTLE</b>	APPROVED BY —	
DATE —		
J O B No. : —		S C A L E <b>1" = 50'</b>



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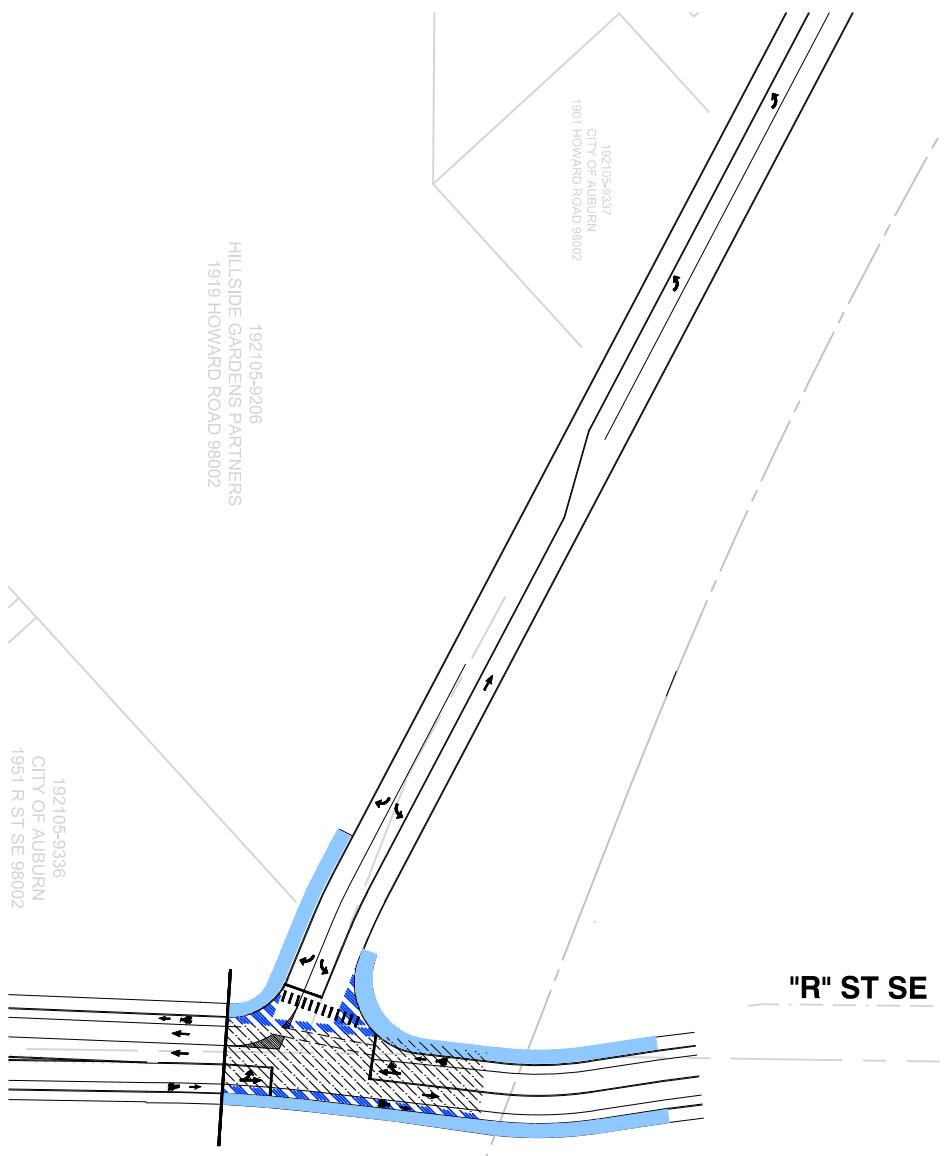


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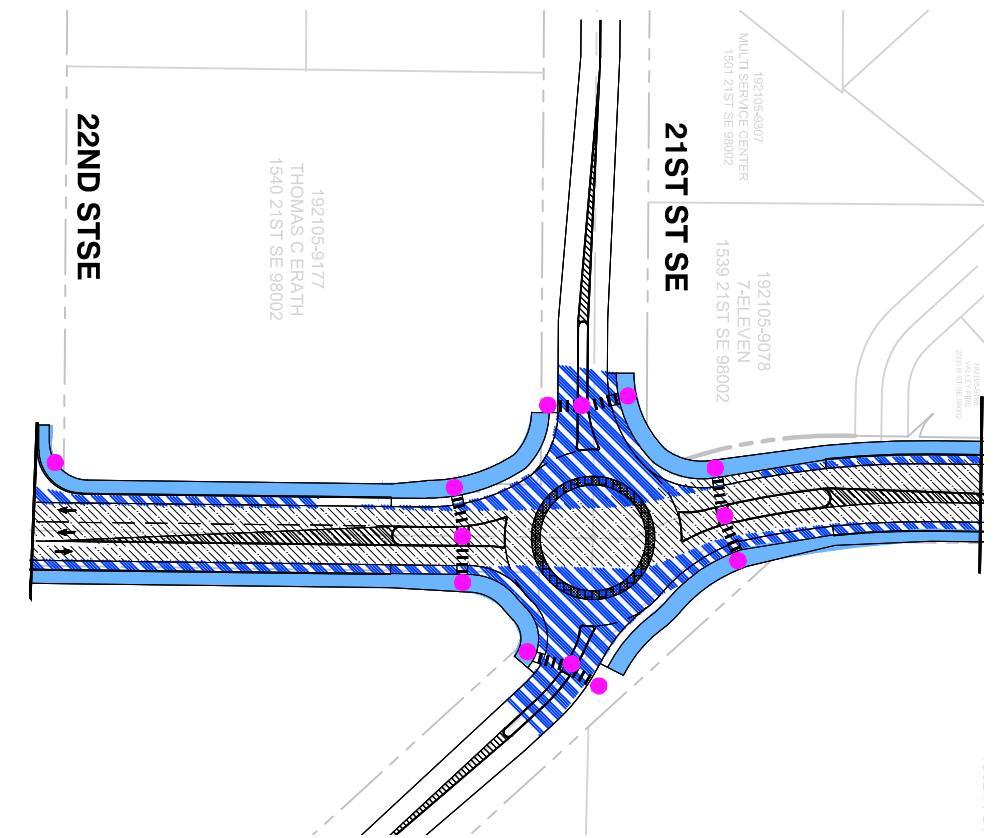
SHEET

C.24



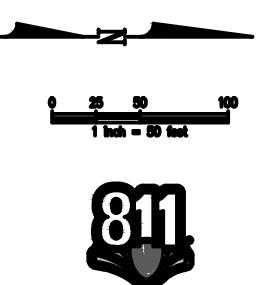
HOWARD ROAD AND R ST SE  
INTERSECTION  
PAVING QUANTITIES

MATERIAL	QUANTITY
HMA FULL-DEPTH	63 TONS
HMA OVERLAY	48 TONS
CSBC	87 TONS
LANDSCAPE RESTORATION	N/A ACRES
CEMENT CONC SIDEWALK	478 SY
CEMENT CONC CURB/GUTTER	N/A LF
CURB RAMP	2 EA



R ST SE AND 21ST STREET SE  
SINGLE LANE ROUNDABOUT INTERSECTION  
PAVING QUANTITIES

MATERIAL	QUANTITY
HMA FULL-DEPTH	523 TONS
HMA OVERLAY	228 TONS
CSBC	960 TONS
LANDSCAPE RESTORATION	N/A ACRES
CEMENT CONC SIDEWALK	1,073 SY
CEMENT CONC CURB/GUTTER	N/A LF
CURB RAMP	12 EA



NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>
CHECKED BY <b>S. BATTLE</b>	APPROVED BY -
DATE -	-
DATE -	-
JOB No. :-	SCALE: 1" = 50'

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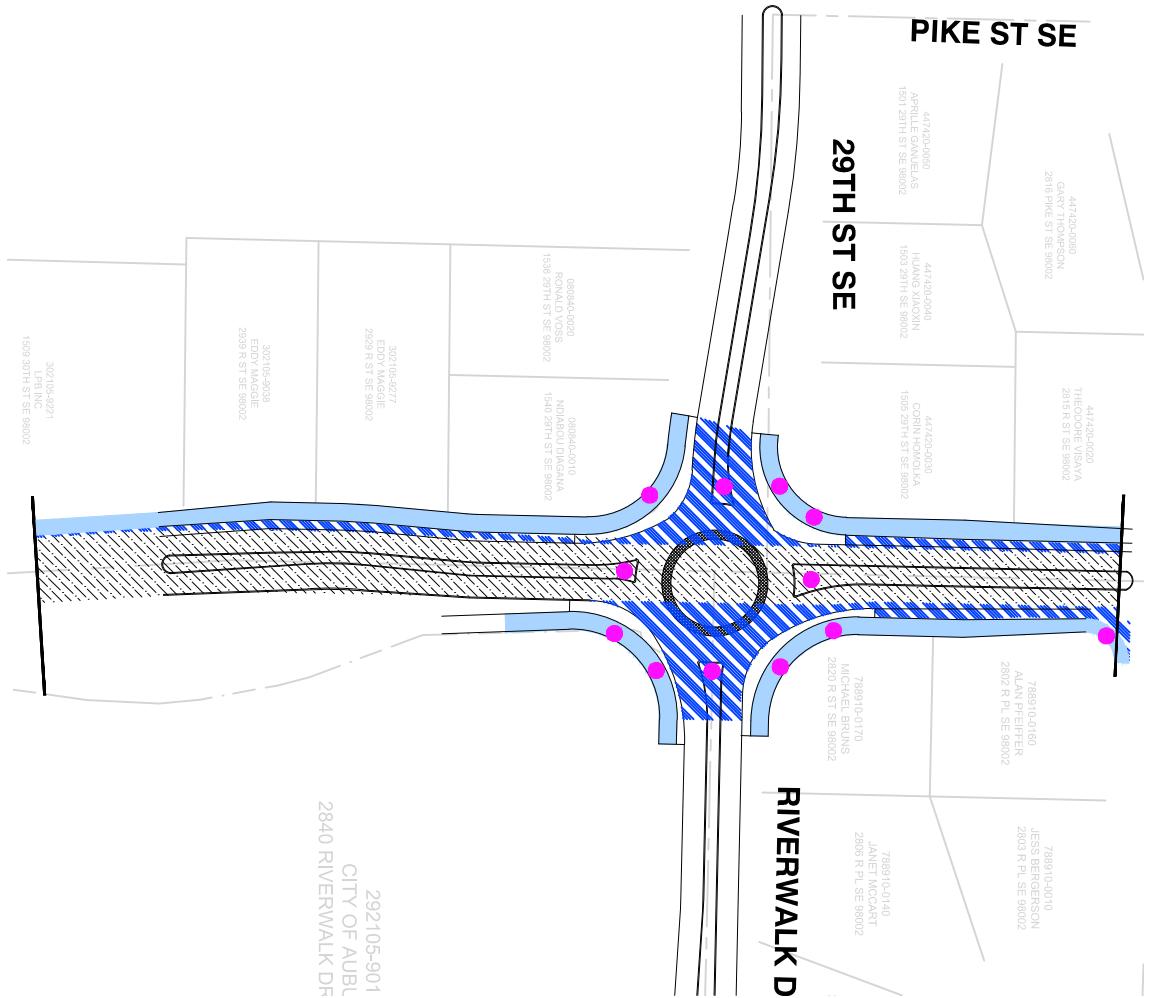
R STREET CORRIDOR STUDY/CITY OF AUBURN

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INTERSECTION PAVING QUANTITIES

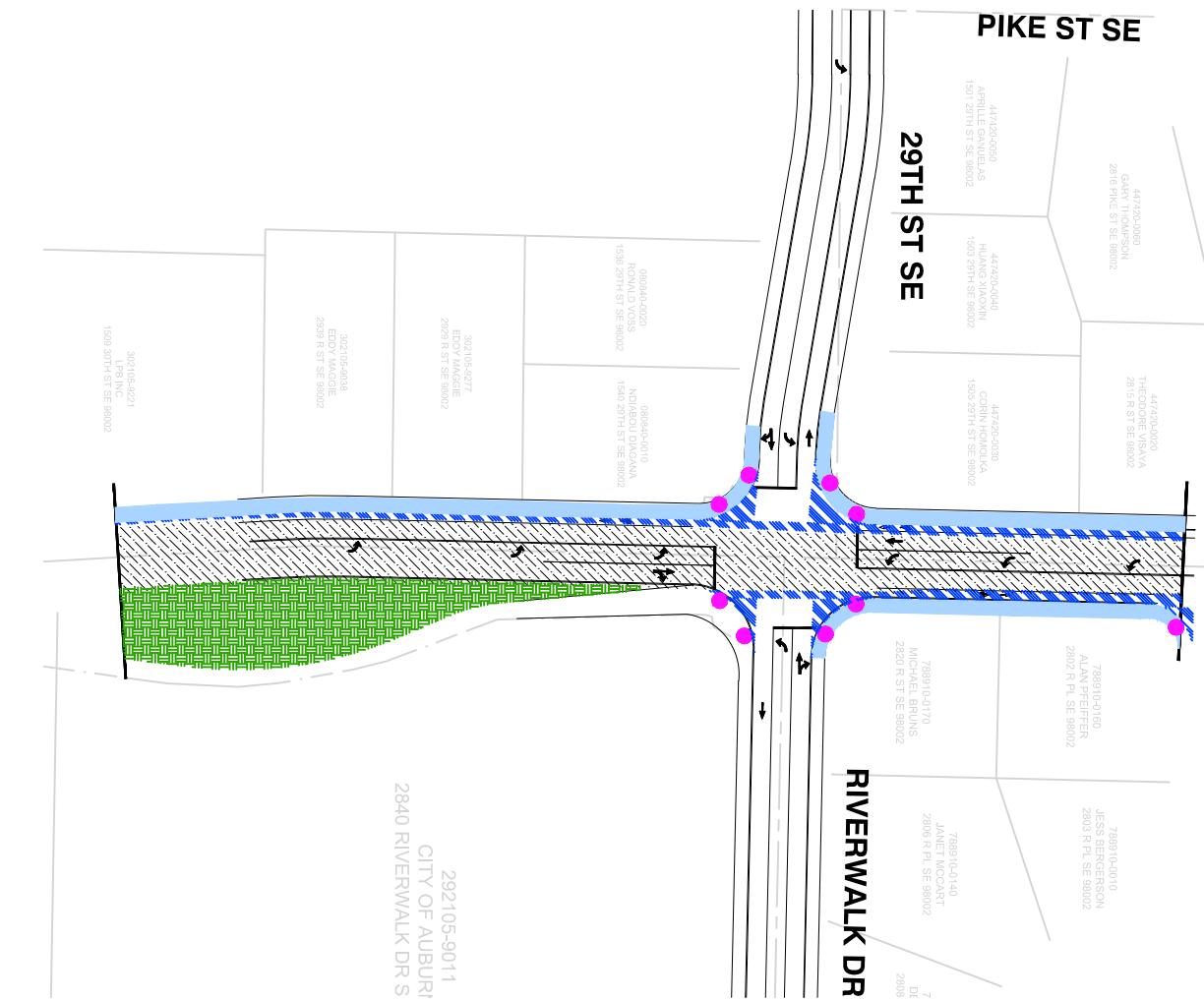
SHEET

C.25



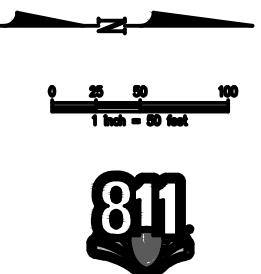
R ST AND 29TH ST SE  
SINGLE LANE ROUNDABOUT INTERSECTION  
PAVING QUANTITIES

MATERIAL	QUANTITY
HMA FULL-DEPTH	388 TONS
HMA OVERLAY	267 TONS
CSBC	711 TONS
LANDSCAPE RESTORATION	N/A ACRES
CEMENT CONC SIDEWALK	1,116 SY
CEMENT CONC CURB/GUTTER	N/A LF
CURB RAMP	12 FA



R ST AND 29TH ST SE  
1-SB LANE SIGNALIZED INTERSECTION  
PAVING QUANTITIES

<u>MATERIAL</u>	<u>QUANTITY</u>
HMA FULL-DEPTH	202 TONS
HMA OVERLAY	267 TONS
CSBC	371 TONS
LANDSCAPE RESTORATION	N/A ACRES
CEMENT CONC SIDEWALK	805 SY
CEMENT CONC CURB/GUTTER	N/A LF
CURB RAMP	9 FA



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<hr/>	
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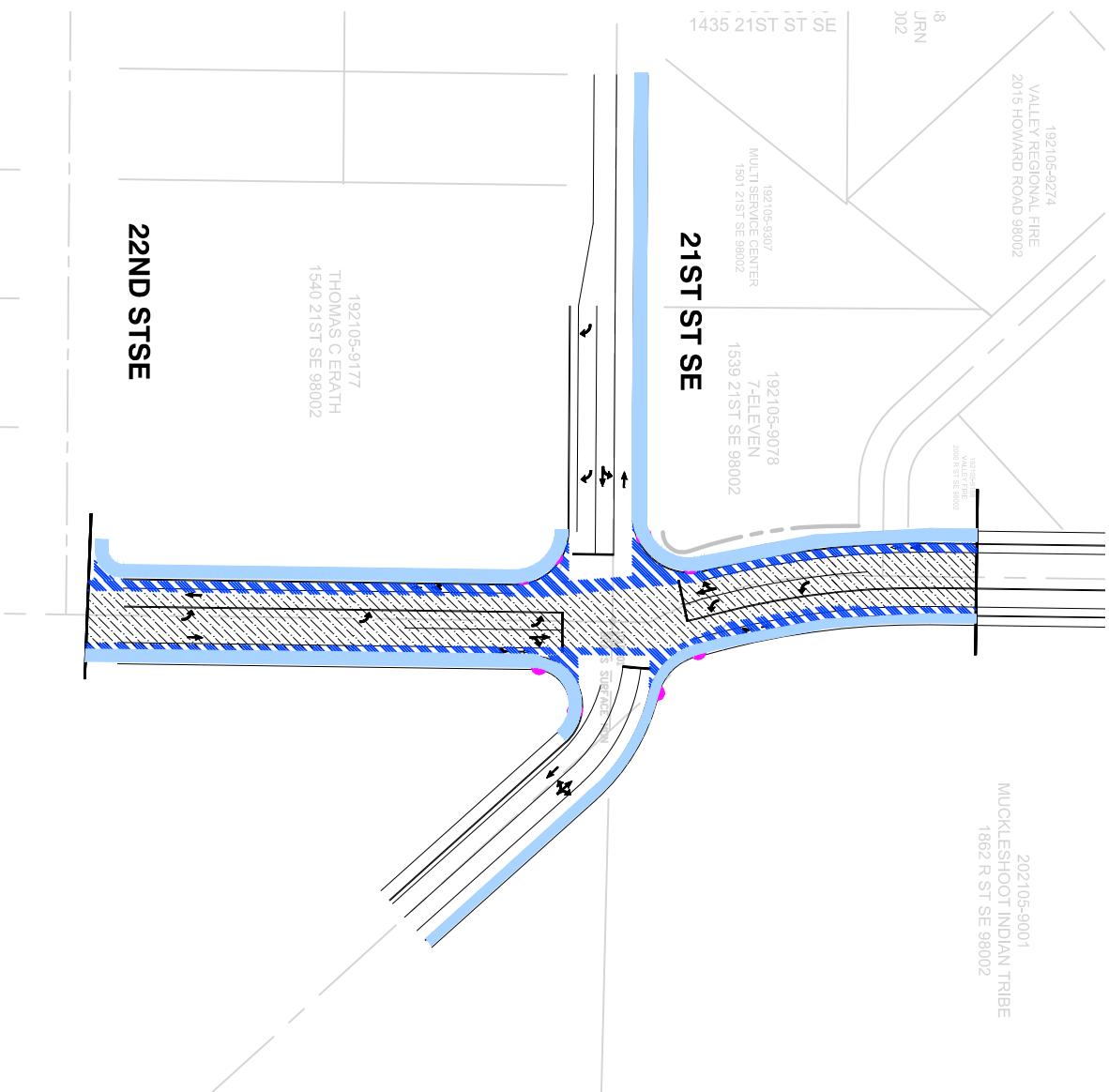


# R STREET CORRIDOR STUDY/CITY OF AUBURN AUBURN, WASHINGTON

## INTERSECTION PAVING QUANTITIES

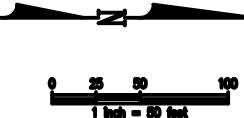
SHEET

C.26



R ST AND 21ST ST SE  
1-SB LANE SIGNALIZED INTERSECTION  
PAVING QUANTITIES

MATERIAL	QUANTITY
HMA FULL-DEPTH	285 TONS
HMA OVERLAY	231 TONS
CSBC	522 TONS
LANDSCAPE RESTORATION	N/A ACRES
CEMENT CONC SIDEWALK	1,240 SY
CEMENT CONC CURB/GUTTER	N/A LF
CURB RAMP	8 EA

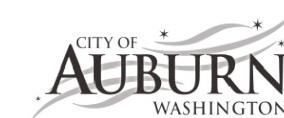


NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>
CHECKED BY <b>S. BATTLE</b>	APPROVED BY -
DATE -	
JOB No.: -	SCALE: 1" = 50'

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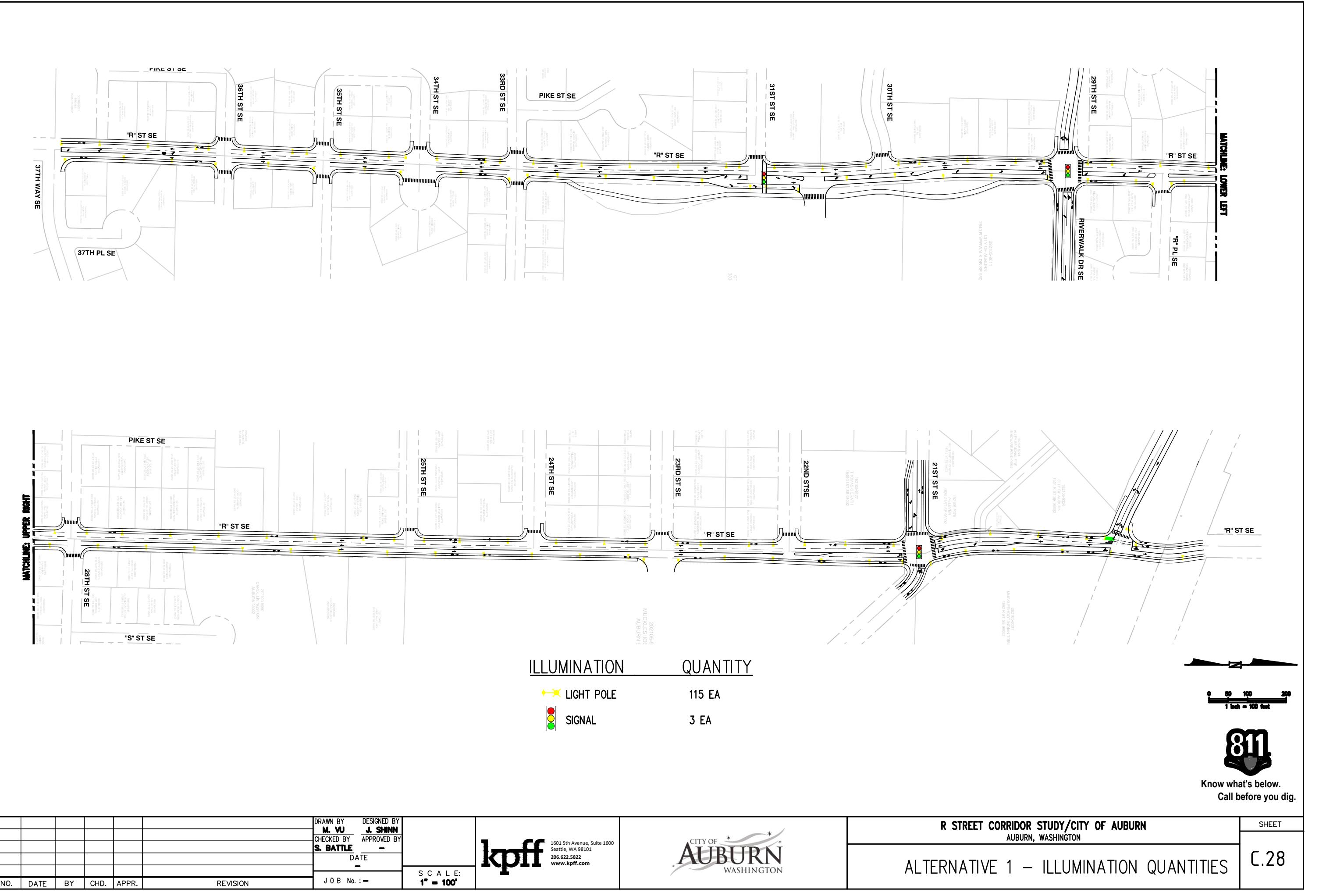
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AUBURN, WASHINGTON

INTERSECTION PAVING QUANTITIES

SHEET

C.27

# ILLUMINATION QUANTITIES





## ILLUMINATION QUANTITY

LIGHT POLE

115 EA

SIGNAL

3 EA



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					DATE -	
					SCALE: 1" = 100'	
				J O B N o . : -		
NO.	DATE	BY	CHD.	APPR.	REVISION	

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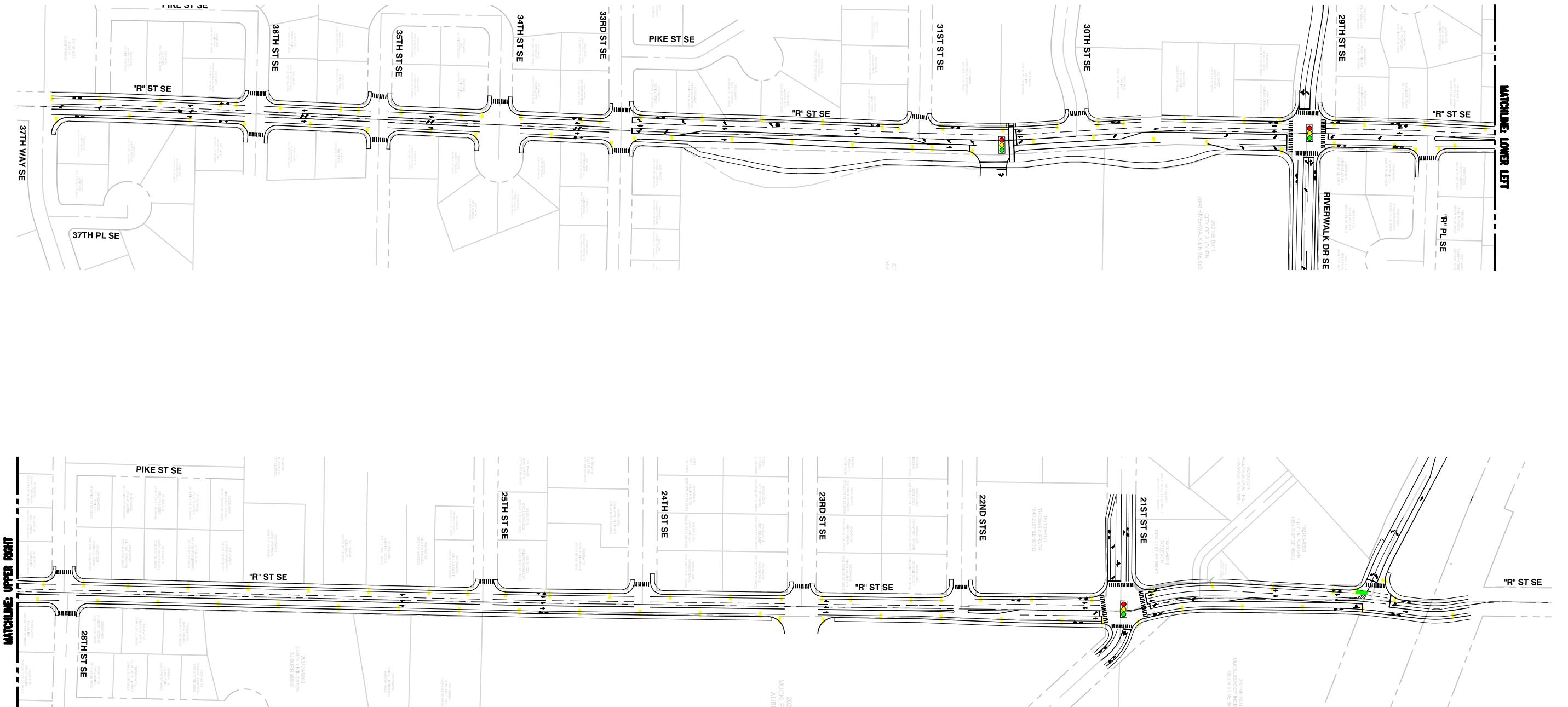


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ALTERNATIVE 2 – ILLUMINATION QUANTITIES

SHEET

C.29



## ILLUMINATION QUANTITY

LIGHT POLE

115 EA

SIGNAL

3 EA



Know what's below.  
Call before you dig.

				DRAWN BY <b>M. YU</b>	DESIGNED BY <b>J. SHINN</b>	
				CHECKED BY <b>S. BATTLE</b>	APPROVED BY -	
				DATE -		
				SCALe: 1" = 100'		
NO.	DATE	BY	CHD.	APPR.	REVISION	J O B N o . : -

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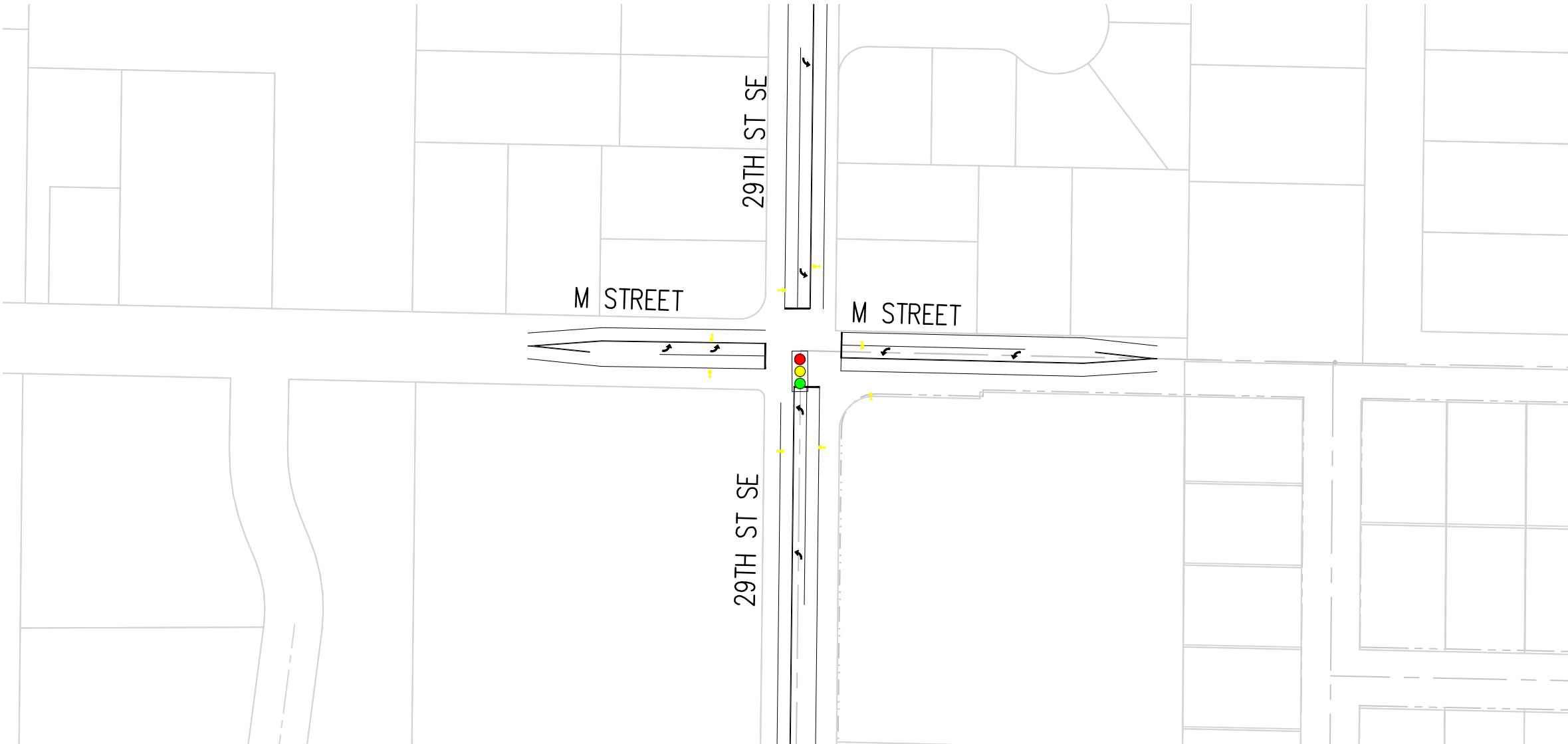


R STREET CORRIDOR STUDY/CITY OF AUBURN  
AUBURN, WASHINGTON

ALTERNATIVE 3 – ILLUMINATION QUANTITIES

SHEET

C.30



ILLUMINATION      QUANTITY

◆◆◆ LIGHT POLE

8 EA

◆◆◆ SIGNAL

1 EA



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	DATE —			
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NO. DATE BY CHD. APPR.	REVISION			

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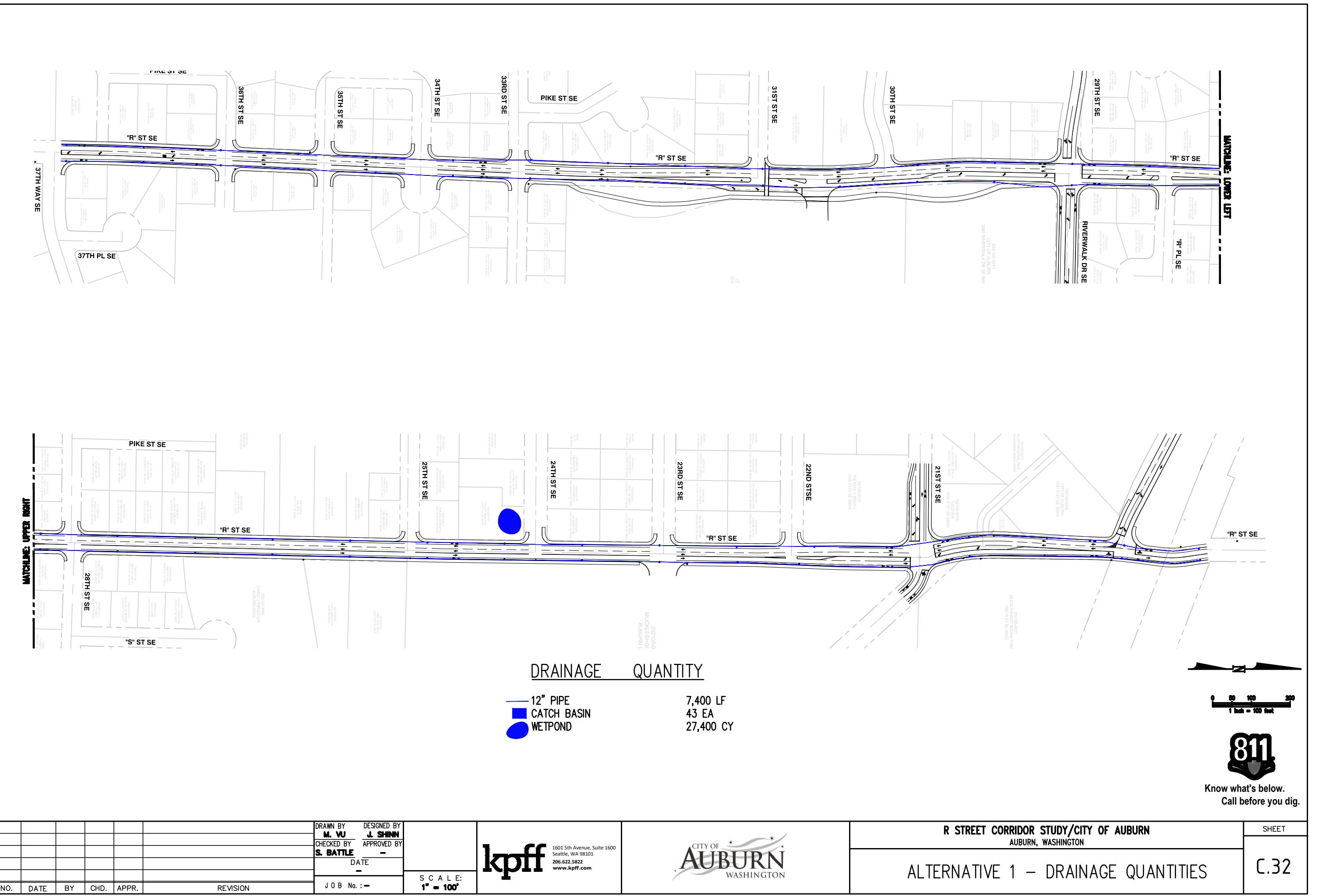
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AUBURN, WASHINGTON

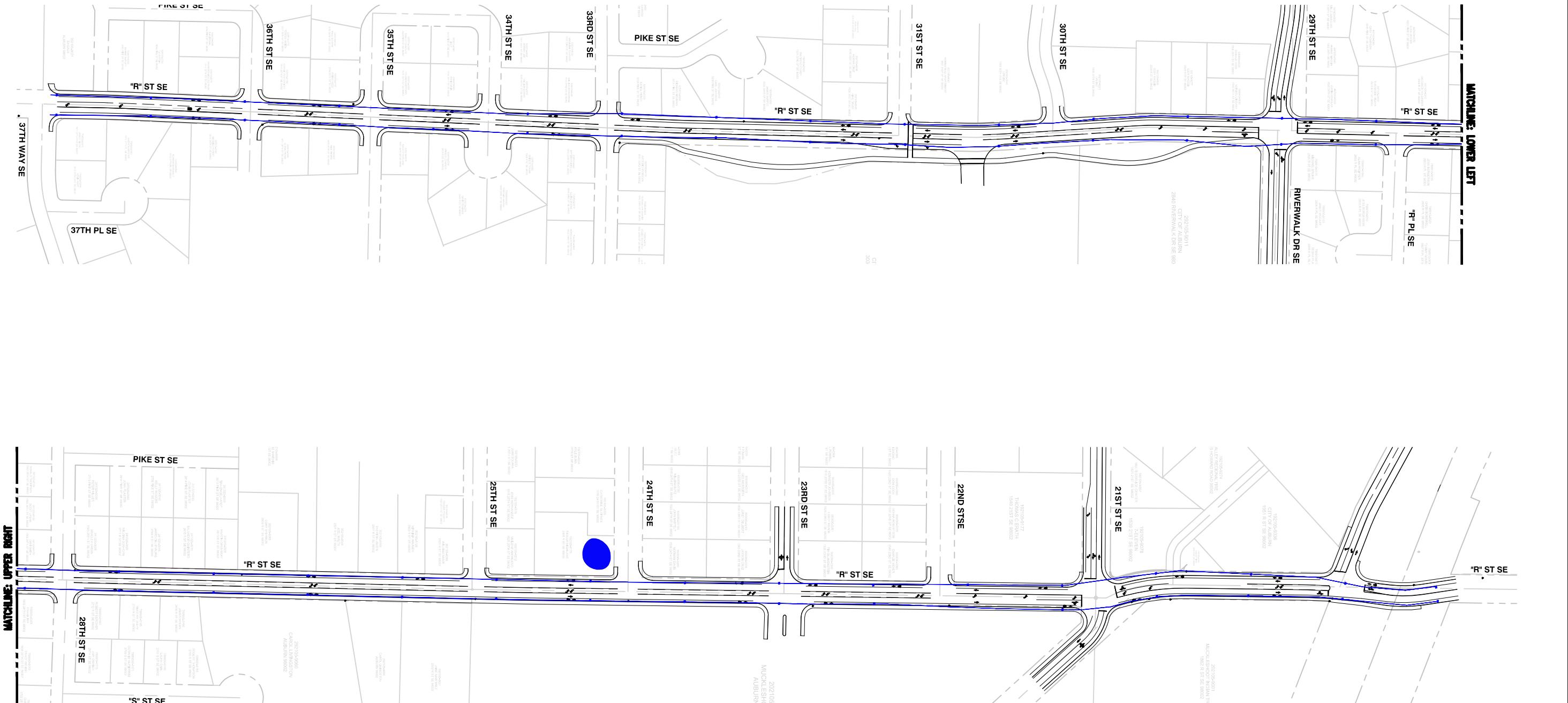
ALTERNATIVE 3 – ILLUMINATION QUANTITIES

SHEET

C.31

# DRAINAGE QUANTITIES





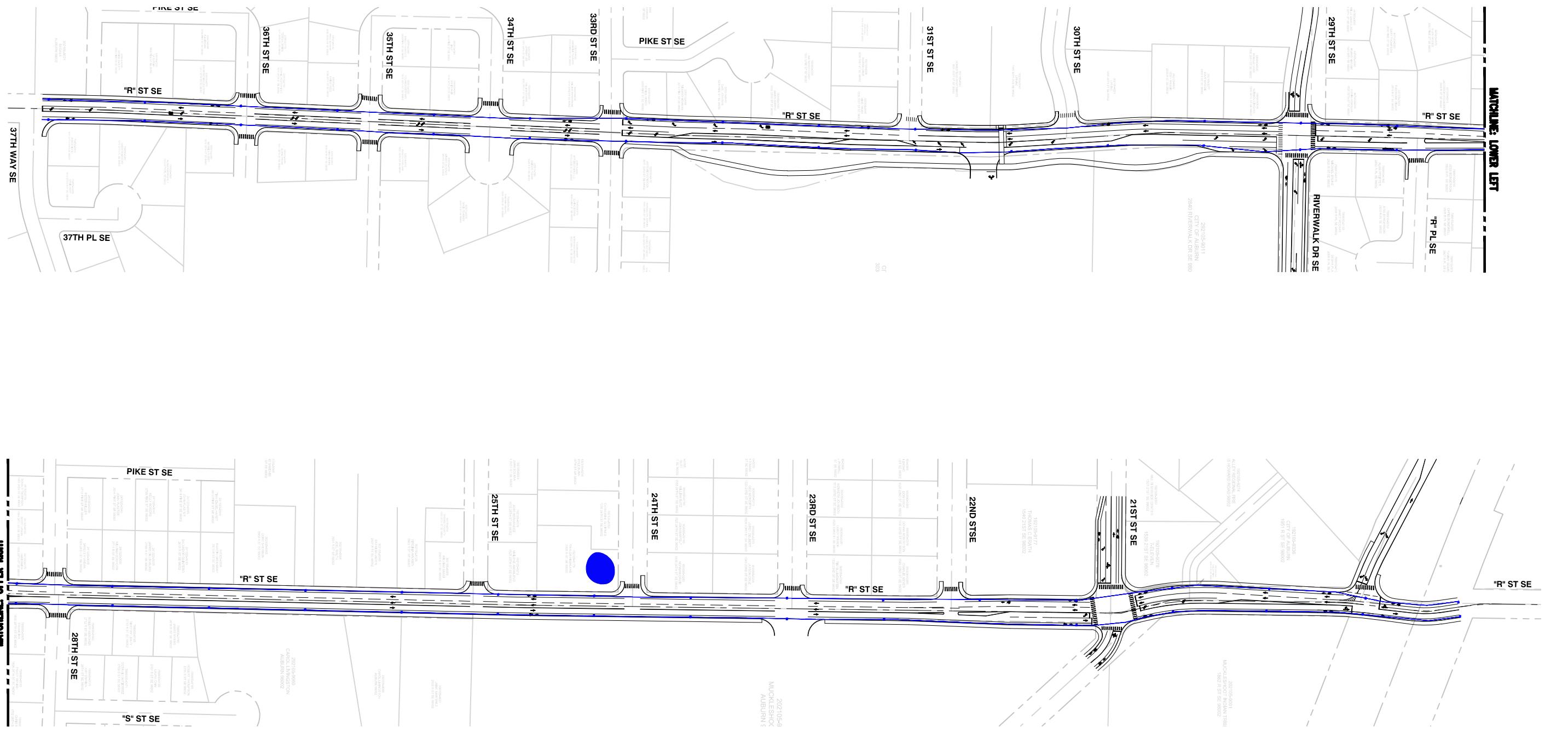
## DRAINAGE QUANTITY

— 12" PIPE      7,400 LF  
 ■ CATCH BASIN      43 EA  
 ● WETPOND      27,400 CY



Know what's below.  
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## DRAINAGE QUANTITY

**12" PIPE  
CATCH BASIN  
WETPOND**

7,400 LF  
43 EA  
27,400 CY



**Know what's below.  
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<b>S. BATTLE</b>		
		DAT
		-
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## AUBURN, WASHINGTON

### ALTERNATIVE 3 – DRAINAGE QUANTITIES

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C.34