# FJS



## Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

July 18, 2019



## FJS

### **Table of Contents**

1.0 Introduction	. 1
1.1 Study Purpose	. 1
1.2 Location of Study	. 1
2.0 Baseline Conditions	. 3
2.1 Existing Traffic Volumes and Level of Service	. 3
2.1.1 Average Annual Daily Traffic & Turning Movement Counts	. 3
2.2 Existing Conditions Safety	
2.3 Existing Roadway Cross-Sections	
2.4 Existing Utilities	
3.0 Future No-Build Traffic Conditions	-
3.1 2045 No-Build Traffic Conditions	
3.2 2045 No-Build Traffic Conditions with Alternative Network Improvements	11
4.0 Alternatives Analysis	
4.1 Alternative Identification and Screening	
4.1.1 Alternative 1 – At-Grade Intersection - Wildwood Drive Right-In/Right-Out	
4.1.2 Alternative 2 – Flyover Southbound to Eastbound	
4.1.3 Alternative 3 – Continuous Flow Intersection (North Leg)	
4.1.4 Alternative 4 – 2-Lane Roundabout	
4.1.5 Alternative 5 – Northbound Overpass	
4.1.6 Alternative 6 – Single Point Interchange	
4.1.7 Alternative 7A – At-Grade Intersection	
4.2 Network Improvements Evaluation	
4.3 Access Review	
4.4 Future Typical Roadway Sections	
4.4.1 Corral Drive to Wildwood Drive	
4.4.2 Wildwood Drive to Albertta Drive	
4.5 Public Outreach	
4.6 Estimated Construction Cost and Right-of-Way Impacts for Future Improvements	
5.0 Recommendations and Conclusions	36



## **List of Figures**

Figure 1. Sheridan Lake Road Study Corridor with Future Street Alternatives	2
Figure 2. Existing Traffic Volume and Level of Service	5
Figure 3A. Existing Urban Roadway Cross-Sections (Typical)	6
Figure 3B. Existing Rural Roadway Cross-Sections (Typical)	7
Figure 4. Utilities at Corral Drive and Sheridan Lake Road	
Figure 5. 2045 No-Build Volume & LOS	10
Figure 6. 2045 No-Build Volume & LOS: Les Hollers Way Alternative	13
Figure 7. 2045 No-Build Volume & LOS: Chapel Valley & Les Hollers Way Alternative	
Figure 8. Alternative 1 – At-Grade Intersection - Wildwood Drive Right-In/Right-Out	17
Figure 9. Alternative 2 – Flyover Southbound to Eastbound	18
Figure 10. Alternative 3 – Continuous Flow Intersection (North Leg)	19
Figure 11. Alternative 4 – 2-Lane Roundabout (Eliminated)	
Figure 12. Alternative 5 – Northbound Overpass (Eliminated)	21
Figure 13. Alternative 6 – Single Point Interchange (Eliminated)	22
Figure 14. Alternative 7A – At-Grade Intersection	
Figure 15. Alternative 1 – At-Grade Intersection (Corral Drive)	24
Figure 16. Alternative 1 – At-Grade Intersection (Dusnmore Road)	25
Figure 17. Alternative 7A – At-Grade Intersection (without Network Improvements)	29
Figure 18. Alternative 7B – At-Grade Intersection (without Network Improvements)	30
Figure 19. Alternative 8 – At-Grade Intersection (with Network Improvements)	31
Figure 20. Future Typical Roadway Cross-Section, Corral Drive to Wildwood Drive	32
Figure 21A. Future Typical Roadway Cross-Section, Rural Option	33
Figure 21B. Future Typical Roadway Cross-Section, Urban Option with Shared Lane	34
Figure 21C. Future Typical Roadway Cross-Section, Urban Option with Separated Path	34

### List of Tables

Table 1. Existing and Future AADT by Segment	9
Table 2. Number of Lanes Based on Traffic Volumes (courtesy SDDOT)	9
Table 3. 2045 No-Build Network Alternative Comparison	12
Table 4. Catron Boulevard Intersection Alternative Comparison Matrix	26
Table 5. Estimated Construction Cost and ROW Impacts	35
Table 6. Catron Boulevard Intersection Alternative Comparison Matrix with Alternative 8	36

### **List of Appendices**

Appendix A – Methods and Assumptions

- Appendix B Existing Conditions Traffic (Technical Memo 4)
- Appendix C Existing Conditions Safety and Access (Technical Memo 2)

Appendix D – Private Utility Review Memo and City Utility Maps

Appendix E – 2045 No-Build Traffic Analysis (Technical Memo 3)

Appendix F – 2045 No-Build Traffic Analysis with Alternative Network Improvements (Technical Memo 5)

- Appendix G Future Build Alternatives Traffic Evaluation (Technical Memo 6)
- Appendix H Access Review (Technical Memo 7)
- Appendix I Website Comment Summary

### Appendix J – Construction Cost Calculations for Future Improvements



## 1.0 Introduction

## 1.1 Study Purpose

Sheridan Lake Road is an arterial street near the southern municipal limits of Rapid City, South Dakota. When Sheridan Lake Road was reconstructed in 1995, it had an average daily traffic (ADT) volume of nearly 4,000 vehicles per day. Due to significant growth in and around this area, the current ADT is approximately 16,000 vehicles per day and expected to continue growing. Recent traffic and planning studies have shown that the intersections of Sheridan Lake Road / Catron Boulevard and Sheridan Lake Road / Corral Drive function at substandard levels of service during times of peak traffic. This is evidenced by traffic congestion during the morning commute to school and work. Continued growth of the area from housing and commercial development will further increase congestion without improvements to the roadway capacity. With limited ability to create additional north / south transportation routes, preserving right of way or widening Sheridan Lake Road to handle additional traffic is a great need for the City of Rapid City. This corridor study evaluates existing (year 2017) and future (year 2045) traffic conditions in order to develop roadway and intersection improvement concepts that will provide greater travel efficiency, safety and reliability for the users of Sheridan Lake Road. The methods and assumptions used for the analysis are included in Appendix A.

## 1.2 Location of Study

The study area is located at the southwest limits of Rapid City in western South Dakota as shown in Figure 1. The study limits include Sheridan Lake Road from Albertta Drive through Corral Drive, and Corral Drive from Sheridan Lake Road to Park Drive. Traffic data was collected at 10 intersections along the corridor. The study intersections are also shown in Figure 1 and include the following:

- Corral Drive / Park Drive
- Sheridan Lake Road / Corral Drive
- Sheridan Lake Road / Summerset Drive
- Sheridan Lake Road / Chateaux Ridge / Summerset Drive
- Sheridan Lake Road / Catron Boulevard
- Catron Boulevard / Bendt Drive
- Sheridan Lake Road / Wildwood Drive
- Sheridan Lake Road / Dunsmore Road
- Sheridan Lake Road / Tanager Drive / Croyle Avenue
- Sheridan Lake Road / Albertta Drive

A portion of the southern study area lies outside of the Rapid City municipal limits and is currently under the jurisdiction of Pennington County. This area is expected to be annexed into Rapid City in the future. Three Future Street Alternatives were also evaluated since future network improvements will likely be constructed as development continues to occur in the study area. The location of these Future Street segments are shown in Figure 1 and discussed in detail within the No-Build Traffic and Alternatives Analysis sections.





### SHERIDAN LAKE ROAD STUDY CORRIDOR WITH FUTURE STREET ALTERNATIVES

FIGURE 1



## 2.0 Baseline Conditions

## 2.1 Existing Traffic Volumes and Level of Service

### 2.1.1 Average Annual Daily Traffic & Turning Movement Counts

Average Annual Daily Traffic (AADT) volumes were provided by the City of Rapid City for portions of the corridor, as follows:

- Sheridan Lake Road, north of Corral Drive 11,200 vpd
- Corral Drive, west of Sheridan Lake Road 4,600 vpd
- Sheridan Lake Road, between Corral Drive and Catron Boulevard 16,000 vpd
- Catron Boulevard, east of Bendt Drive 11,700 vpd
- Sheridan Lake Road, between Catron Boulevard and Wildwood Drive 13,100 vpd
- Sheridan Lake Road, between Wildwood Drive and Dunsmore Road 12,600 vpd
- Dunsmore Road, south of Sheridan Lake Road 3,900
- Sheridan Lake Road, west of Dunsmore Road 11,400 vpd

Traffic turning movement counts were collected at the ten study intersections on September 19, 2017. Additional traffic counts were collected at the Sheridan Lake Road / Corral Drive and Sheridan Lake Road / Catron Boulevard intersections on December 12, 2017 after the opening of the new Black Hills Corporation Headquarters. Black Hills Corporation is located in the southwest quadrant of the Mount Rushmore Road (US16) / Catron Boulevard intersection. The intent of the second phase of traffic counts was to capture the effects of additional traffic generated by the new development.

The additional counts showed an increase in through-traffic on Catron Boulevard and Sheridan Lake Road north of Catron Boulevard. A slight increase in traffic using Corral Drive and Park Drive was also noted. A slight decrease in traffic was observed on Sheridan Lake Road south of Catron Boulevard. Slight decreases in level of service were observed at the intersections of Sheridan Lake Road / Catron Boulevard and Catron Boulevard / Bendt Drive in the AM peak hour. Other levels of service were unchanged.

Peak hour turning movement volumes are shown in Figure 2. The volumes represent conditions after the Black Hills Corporation opening. Technical memos documenting existing condition traffic before and after the Black Hills Corporation opening can be found in Appendix B.

The study area intersections were analyzed using Highway Capacity Software (HCS), the new peak hour turning volumes and the existing traffic controls. The resulting level of service (LOS), displayed in Figure 2, produced the following findings:

 Two of the signalized intersections (Sheridan Lake Road / Corral Drive, Sheridan Lake Road / Catron Boulevard) operate at level of service below current standards for the AM peak hour. The third signalized intersection in the study area (Sheridan Lake Road / Dunsmore Road) operates at acceptable peak hour levels of service. Long queues have also been noted at the signalized intersections, particularly during the AM peak hour.



## 2.2 Existing Conditions Safety

Crash records for the study area were obtained from the SDDOT online mapping tool for the years 2013-2017 (5 years). The crash data shows concentrations of crashes at several intersections in the corridor. A secondary concentration of crashes is evident in the area south of Wildwood Drive where Sheridan Lake road curves and is flanked by steep, forested property. Each of the crash concentrations is addressed below:

- Sheridan Lake Road / Corral Drive 7 crashes in 5 years. No clear trends were evident in the crash data, although 3 of the 7 occurred in snow-covered road conditions.
- Sheridan Lake Road / Catron Boulevard 21 crashes in 5 years. A pattern was
  discernable involving left-turning vehicles becoming involved in angle crashes with driver
  contributions including "failure to yield" and "disregard of traffic signal". The crash pattern
  appears to be related to the growth of Catron Boulevard as a crosstown route.
  Southbound drivers on Sheridan Lake Road wishing to turn left onto Catron Boulevard
  frequently encounter peak hour queues and congestion. Their reaction to this congestion
  is to use small gaps in oncoming traffic or push the left turn phase into subsequent
  yellow and red intervals, resulting in increased crash frequency. Adding capacity to this
  intersection through additional lanes and revised signalization will help to alleviate the
  crash problem.
- Sheridan Lake Road / Dunsmore Road 9 crashes in 5 years. The majority of the crashes involved angle incidents that occurred prior to signalization of the intersection. The occurrence of this crash type should reduce in the coming years due to the control provided by the traffic signal.
- Non-intersection area south of Wildwood Drive 21 crashes in 5 years. The crashes were scattered across a roadway segment a little less than a mile long and included run-off-road crashes and animal hits. The roadway in this area is a curving two-lane rural roadway with an asphalt surface. Crash incidence could be improved with lighting and a high-friction surface treatment, features that may be implemented as the area becomes more urbanized. The geometric layout in this area includes two reverse horizontal curves with a minimum radius of 650 feet. Depending on the actual superelevation at the curve, this equates to approximately a 45 mph design speed. The curves are signed with an advisory speed of 45 mph, but the adjacent roadway segments are relatively long tangent sections and driver expectation could be a contributing factor. Other approaches would include reducing the advisory speed to 40 mph or flattening the curvature when the road is reconstructed.

A technical memo documenting existing safety conditions with supporting information is included as Appendix C.



## 2.3 Existing Roadway Cross-Sections

Sheridan Lake Road is characterized by an urban roadway cross-section in the northern portion of the corridor and a rural cross-section in the south portion of the corridor. The transition between urban and rural occurs in the vicinity of the Wildwood Drive intersection. The urban roadway cross-section in the north portion of the corridor is constructed of Portland cement concrete and is in generally good condition. The rural cross-section in the south portion of the corridor is constructed of asphalt concrete and is in generally good condition. The rural cross-section in the south portion of the corridor is constructed of asphalt concrete and is in generally good condition, although slight rutting has been observed in the wheel tracks. Existing typical sections for the corridor are shown in Figures 3A and 3B.

The right-of-way for Sheridan Lake Road is variable throughout the study area. The urban section varies from about 80' to over 100', while the rural section varies from 66' to 100'.

The urban street portion of the corridor currently has a 5' sidewalk on the east side of the roadway and an 8' sidewalk on the west side of the roadway to address multi-use needs. The rural roadway portion of the corridor has wide shoulders which may be used by bicyclists and pedestrians. The Bicycle Fiscally Restrained Plan in the current RapidTRIP 2040 Plan includes these existing facilities in their current roles, enhanced with signing and marking.



FIGURE 3A. EXISTING URBAN ROADWAY CROSS-SECTIONS (TYPICAL)



Varies (100' Shown) Existing Rural 2-Lane

FIGURE 3B. EXISTING RURAL ROADWAY CROSS-SECTIONS (TYPICAL)

## 2.4 Existing Utilities

A cursory review of public and private utilities was conducted in order to identify any potential major conflicts with a future roadway reconstruction project.

The following utility companies provided a description of their facilities or included utility maps within the project area:

- SDN Communications
- Black Hills Corporation
- Vast Broadband
- Midcontinent Communications
- Montana Dakota Utilities

Critical private facilities in this corridor that were identified with the initial coordination include the MDU regulator station at the southwest corner of Corral Drive and Sheridan Lake Road and the 10" steel gas line (155 psi) that parallels Sheridan Lake Road beginning north of Corral Drive and continuing south through Catron Boulevard. The 10" gas line is on the west side of the roadway. Modification to the MDU facilities will have significant cost. Whether or not the City would bear this potential cost was not determined since right-of-way research and easement information was not collected as part of this study. Figure 4 shows some of the above ground utilities located along Corral Drive near Sheridan Lake Road. Additional detail and utility maps for private and public facilities can be found in Appendix D.



FIGURE 4. UTILITIES AT CORRAL DRIVE AND SHERIDAN LAKE ROAD

Significant City utilities along the study corridor include the following:

- Sanitary Sewer: 15"-18" sewer main along Sheridan Lake Road throughout study area
- Water: 2 pump stations (Well No. 11 Pumphouse and Southwest Booster Station) with 14" water main on Corral Drive; 12"-14" water main along Sheridan Lake Road between Corral Drive and Wildwood Drive; Well No. 12 Booster Pump on Catron Boulevard between Bendt Drive and Nugget Gulch Road
- Storm Sewer: 48" RCP crossing of Corral Drive near Park Drive; dual 54" RCP crossing of Sheridan Lake Road north of Corral Drive; triple 60" RCP driveway crossing and dual RCP Arch crossing of Sheridan Lake Road in front of Calvary Lutheran Church

## 3.0 Future No-Build Traffic Conditions

## 3.1 2045 No-Build Traffic Conditions

Future transportation needs in the Sheridan Lake Road corridor were determined by forecasting the travel demand in the horizon year (2045) and analyzing the capability of the future transportation network to handle the future transportation demand. Future traffic demand was determined using the travel demand model maintained by the Rapid City Area Metropolitan Planning Organization (MPO) and the City of Rapid City. The 2045 peak hour turning volumes and levels of service are shown in Figure 5. The existing and future annual daily traffic by Segment is shown in Table 1.

The capacity analysis shows that all the currently signalized intersections will require improvements to maintain desired traffic capacity by 2045. Minor intersections with stop sign-controlled approaches may also require selected improvements. High through-volumes on Sheridan Lake Road indicate that the roadway would benefit from additional lanes throughout the corridor. Expansion of the existing rural cross-section portion of the roadway to an urban cross-section will likely be needed before the planning horizon.

Table 2 is extracted from the SDDOT Road Design Manual (Table 15-10) and provides guidance for the estimated number of lanes required to accommodate the proposed traffic volumes. All Sheridan Lake Road segments are projected to require 4 lanes before 2045 with inclusion of a fifth, center turn lane where there is a high density of driveways.

Segment	2017 AADT	2045 AADT
Sheridan Lake Road, North of Corral Drive	11,200	20,700
Corral Drive, West of Sheridan Lake Road	4,600	7,600
Sheridan Lake Road, between Corral Drive & Catron Boulevard	16,000	29,600
Catron Boulevard, East of Bendt Drive	11,700	18,800
Sheridan Lake Road, Between Catron Boulevard & Wildwood Drive	13,100	24,200
Sheridan Lake Road, Between Wildwood Drive & Dunsmore Road	12,600	21,900
Dunsmore Road, South of Sheridan Lake Road	3,900	7,200
Sheridan Lake Road, West of Dunsmore Road	11,400	19,800

#### Table 1. Existing and Future AADT by Segment

#### Table 2. Number of Lanes Based on Traffic Volumes (courtesy SDDOT)

Total Number	Total Design Year ADT <sup>1</sup>								
of Lanes	Rural Level	Urban							
2	< 8,000	< 2,500							
3	2	2,500 to 16,000							
4	8,000 to 20,0003	3							
5	2	16,000 to 30,000							
6	> 20,0004	> 30,0004							

- <sup>1</sup> Construction/Reconstruction projects are designed based on a typical 20 year ADT projection beyond the anticipated year of project construction.
- <sup>2</sup> Continuous left turn lanes may be considered based on left turn volumes and/or when intersections and/or approaches are closely spaced together.
- <sup>3</sup> Undivided sections may be used if left turn movements are low and there is no crash history, otherwise consider installing a median or 5 lane section.
- <sup>4</sup> Medians should be used.





In addition to the true no-build scenario discussed in the previous section, three future street segments were incorporated into the MPO model in order to assess their potential impact on the Sheridan Lake Road study corridor. These segments are shown in Figure 1 and identified as:

- Future Arterial / Les Hollers Way Alternative
- Future Collector 1 / Chapel Valley Alternative
- Future Collector 2

The Future Arterial / Les Hollers Way Network Alternative adds a single link to the existing roadway network between Catron Boulevard and Sheridan Lake Road. A portion of Les Hollers Way was recently constructed as part of the Black Hills Corporation headquarters development. For this alternative, it is assumed that Les Hollers Way would continue west to Sheridan Lake Road from its current terminus on the south side of Catron Boulevard near Mount Rushmore Road (US16).

The Future Collector 1 / Chapel Valley Alternative adds two links to the existing roadway network. It includes the Les Hollers Way extension between Catron Boulevard and Sheridan Lake Road. It also includes a future collector street indirectly connecting Sheridan Lake Road with Jackson Boulevard. The collector would extend from the intersection of Sheridan Lake Road / Spring Canyon Trail and continue north to the Chapel Valley Subdivision with a connection at the existing Red Rock Canyon Road.

The Future Collector 2 Alternative was eliminated from consideration since it did not provide a benefit to the arterial network.

The 2045 peak hour turning volumes and levels of service for the 2 network improvement alternatives are shown in Figures 6 and 7.

The capacity analysis shows that signalized intersections on the Sheridan Lake Road corridor, operate at unacceptable levels of service with the identified arterial and collector street network improvements under 2045 traffic conditions. The signalized intersection level of service for the Alternative Network Improvements are summarized in Table 3.

Network Alternative	Study Intersection	ļ	AM	PM		
		LOS	DELAY	LOS	DELAY	
No-Build	Corral Drive / Sheridan Lake Road	F	227.6	F	209.7	
	Catron Boulevard / Sheridan Lake Road	F	216.2	F	116.8	
	Dunsmore Road / Sheridan Lake Road	D	44.5	В	18.8	
Les Hollers Way	Corral Drive / Sheridan Lake Road	F	218.3	F	206.6	
	Catron Boulevard / Sheridan Lake Road	F	248.9	F	116.0	
	Dunsmore Road / Sheridan Lake Road	E	57.4	В	17.2	
Chapel Valley & Les Hollers Way	Corral Drive / Sheridan Lake Road	E	68.0	D	43.4	
	Catron Boulevard / Sheridan Lake Road	D	48.3	С	20.7	
	Dunsmore Road / Sheridan Lake Road	F	87.2	С	25.3	

#### Table 3. 2045 No-Build Network Alternative Comparison

The level of service at signalized intersections demonstrates that both Network Alternatives are beneficial in reducing future volumes and providing relief to the Sheridan Lake Road Corridor. However, improvements to the Sheridan Lake Road Corridor are still necessary to accommodate 2045 traffic volumes at an acceptable level of service under these scenarios. The main benefit from implementing either scenario is the reduced footprint required for improvements at the Sheridan Lake Road / Catron Boulevard intersection in order to meet the future needs. This is described in further detail in the Alternatives Analysis section.

Technical Memos documenting the No-Build Analysis and Alternative Network Improvements Analysis can be found in Appendix E and Appendix F.





## 4.0 Alternatives Analysis

The traffic analysis conducted as part of the study revealed that all three signalized intersections within the study corridor require capacity improvements to meet future needs. The anticipated segment volumes within the corridor also indicate additional lane capacity will be needed as the area continues to develop. The general solution for the corridor to meet the future needs is to expand the current roadway to two through lanes in each direction and add turn lanes at the major intersections as needed. A number of conceptual layouts were developed for the Sheridan Lake Road / Catron Boulevard intersection due to large volumes of through and turning traffic at the intersection. Layouts were also developed for the intersections of Sheridan Lake Road / Corral Drive and Sheridan Lake Road / Dunsmore Road. In addition to these, the impact of implementing the future Network Improvements (Les Hollers Way) was also evaluated at the Sheridan Lake Road / Catron Boulevard intersection.

## 4.1 Alternative Identification and Screening

Seven initial intersection concepts were identified for the Sheridan Lake Road / Catron Boulevard Intersection in collaboration with City staff. These initial concepts were intended to address intersection needs under 2045 future No Build traffic conditions without consideration of future network improvements. These include the following:

### 4.1.1 Alternative 1 – At-Grade Intersection - Wildwood Drive Right-In/Right-Out

Conversion of Wildwood Drive to a right-in/right-out access and provision of dual southbound through and left turn lanes and dual northbound through lanes with a free right turn on Sheridan Lake Road. Provision of dual westbound left turn lanes and free right turn movement on Catron Boulevard approach. The resulting level of service for Alternative 1 is C/C (AM/PM).

### 4.1.2 Alternative 2 – Flyover Southbound to Eastbound

Provision for a grade separated "flyover" for southbound to eastbound left turns on Sheridan Lake Road, a southbound thru and thru/right lane, dual northbound through lanes, a northbound left turn lane, and free right turn on Sheridan Lake Road. Provision of dual left turn lanes, a through lane and free right turn for westbound Catron Boulevard and a left turn lane and a combined thru/right turn lane for eastbound Wildwood Drive. The resulting level of service for Alternative 2 is B/C (AM/PM).

### 4.1.3 Alternative 3 – Continuous Flow Intersection (North Leg)

Provision of continuous flow intersection on the north leg of Sheridan Lake Road intersection to accommodate southbound to eastbound left turns. The southbound intersection approach would also provide dual through lanes and a right turn lane, while the northbound approach would provide for dual through lanes and a free right turn. Westbound Catron Boulevard would contain dual left turns and a free right turn. Wildwood Drive would have full access. The resulting level of service for Alternative 3 is B/C (AM/PM).

### 4.1.4 Alternative 4 – 2-Lane Roundabout

Provision of 2-lane roundabout with dual lanes entering and exiting on Sheridan Lake Road and Catron Boulevard approaches and single lane entry/exit on Wildwood approach. The resulting level of service for Alternative 4 is F/F (AM/PM). Free right turns for the northbound (Sheridan Lake Road) and westbound (Catron Boulevard) approaches were also examined, but did not improve the level of service.

### 4.1.5 Alternative 5 – Northbound Overpass

Provision of 2-lane overpass (grade separated northbound through movement) with northbound free right turn, dual southbound left turns, a southbound through lane and southbound combined thru/right turn lane on Sheridan Lake Road. Westbound Catron Boulevard would contain dual left turns, a through lane, and a free right turn lane. The resulting level of service for Alternative 5 is B/B (AM/PM).

### 4.1.6 Alternative 6 – Single Point Interchange

Provision of grade separated northbound/southbound through movements on Sheridan Lake Road with dual southbound left turn lanes and a single northbound left turn lane at the interchange. The Catron Boulevard approach would provide a left turn lane and a through lane, and the Wildwood Drive approach would provide a left turn lane and through lane. All right turns would be accommodated via a merge/diverge "ramp" approach. The resulting level of service for Alternative 6 is B/C (AM/PM).

### 4.1.7 Alternative 7A – At-Grade Intersection

Alternative provides for an at-grade intersection without future arterial/collector network improvements being constructed. The southbound Sheridan Lake Road approach includes triple left turn lanes, a through lane, and a combined thru/right turn lane. The northbound approach includes a left turn lane, triple through lanes, and a free right turn lane. The westbound approach includes dual left turn lanes, a through lane, and free right turn lane and the eastbound approach includes a left turn lane and a combined thru/right turn lane. The resulting level of service for Alternative 7A is C/C (AM/PM).

Conceptual layouts were developed and the intersection configurations were evaluated for traffic operations. The traffic evaluation for build alternatives under future traffic conditions can be found in Appendix G. The conceptual layouts for these alternatives are included in Figures 8 through 16. Alternatives 4, 5, and 6 were eliminated after consideration of level of service, constructability, construction cost, impacts to access, and property impacts. The remaining alternatives 1, 2, 3 and 7A were recommended to be carried forward for further evaluation. Atgrade intersection layouts were also developed for the Sheridan Lake Road / Corral Drive and Sheridan Lake Road / Dunsmore Road intersections.



















LOS C/B [AM/PM]



Sheridan Lake Road Traffic Study



Alternative	Description	Meets Traffic Operational Goals	Multimodal Mobility	Driver Familiarity	Constructability	Construction Cost (\$ Millions)	Construction Cost	Right-of-Way Impacts (Acre)	Right-of-Way Impacts	Access Impacts	Score	Rank
1	At-Grade Intersection – Wildwood Drive Right-In/Right-Out	Yes	3	3	3	7.56	3	1.98	2	1	235	1
2	Flyover Southbound to Eastbound	Yes	3	2	1	21.19	1	2.83	1	1	130	4
3	Continuous Flow Intersection	Yes	2	1	2	10.13	2	3.22	1	2	165	3
7 <b>A</b>	At-Grade Intersection	Yes	2	2	3	10.60	2	2.92	1	3	205	2
*Onite ni	Relative		10	10	10	and "2"	25	un tiun au the	25	20		

#### Table 4. Catron Boulevard Intersection Alternative Comparison Matrix

\*Criteria were scored relatively with "1" representing the worst score and "3" representing the best.

#### Multimodal Mobility

All alternatives provide similar configurations for bicycle and pedestrian accessibility. Alternative 3 and 7A have longer routes for pedestrians crossing the intersection. Pedestrian crossings will be protected by the traffic signal with the exception of free right-turn movements.

#### **Driver Familiarity**

A typical at-grade intersection would have the highest score for driver familiarity due to the abundance of existing at-grade, signal controlled intersections. However, Alternative 7A was scored lower than Alternative 1 since it has triple left turn lanes on one approach leg. Alternative 2 was also scored lower since it has a flyover ramp in the middle of the roadway that could generate driver decision issues. Alternative 3 received the lowest score since there are currently no continuous flow intersections in South Dakota and the intersection itself is asymmetric with displaced left turn lanes on a single leg.



### **Constructability**

The at-grade intersections in Alternatives 1 and 7A will be the easiest to implement from a constructability perspective since they will allow better traffic maintenance during construction. Alternative 3 will be slightly more challenging with the raised medians that are required to guide traffic on the north leg. The raised embankment and bridge structure in Alternative 2 will be the most challenging of the alternatives due to the grade differences required in the middle of the roadway.

### **Construction Cost**

Construction costs were estimated for each alternative and are included in Appendix J. The alternatives were scored 3 (best) if the estimated construction cost was between 0 and \$10M. The alternatives were scored 2 if the estimated cost was between \$10M and \$20M. If the cost was greater than \$20M, the alterative was scored 1 (worst).

### Right-of-Way Impacts

Right of way impact scores were determined by estimating total area of right-of-way required to implement the alternative. The area was determined by overlaying the alternative footprint on the GIS parcel geodatabase for Pennington County (with a 1-foot offset). If the area was less than 1 acre, the alternative received a score of 3 (best). If it was between 1 and 2 acres, the alternative received a score of 2, and alternatives impacting more than 2 acres received a score of 1 (worst).

### Access Impacts

Alternatives 1 and 2 were scored lowest for access considerations. Alternative 1 changes the Wildwood Drive approach from full access to right-in-right-out access which impacts a number of residences. Alternative 2 impacts are associated with the raised embankments on Sheridan Lake Road and Catron Boulevard which will limit several driveway to right-in-right-out movements. Alternative 3 was discounted due to the raised medians required for the displaced left turn lanes which also limits access at several commercial driveways. Alternatives 1, 2 and 3 may require inclusion of u-turns at adjacent intersections to address the limitations to access associated with each alternative.

### Summary

Alternative 1 ranked highest in all categories except access. This is due to the conversion of the Wildwood Drive approach into a right-in-right-out access. There is an alternate route available for residents in the vicinity of the intersection that would provide full access to Sheridan Lake Road at a stop-controlled intersection approximately 2000-feet south of Catron Boulevard. Another option would be to provide a u-turn on Sheridan Lake Road, north and south of the intersection to accommodate access to Wildwood Drive.

Another important consideration are the Network Improvements discussed below that would allow for the elimination of some of the lanes required for the at-grade intersection. The reduced at-grade intersection would have a similar footprint to Alternative 1, but would maintain full access to Wildwood Drive. This configuration is preferable to Alternative 1, but will be dependent on the implementation of Les Hollers Way.

## 4.2 Network Improvements Evaluation

As previously discussed, the Network Improvement scenarios will have an impact on future traffic levels. There were two future street alignments (Les Hollers Way and Chapel Valley) that were incorporated into the future traffic models to gage the impacts on the Sheridan Lake Road corridor. Implementation of Les Hollers Way (creating another traffic link between Catron Boulevard and Sheridan Lake Road) has a significant impact on turn lane requirements at the Catron Boulevard intersection. Without Les Hollers Way, the intersection would require three northbound thru lanes and three southbound left turn lanes (additional lane requirements are indicated in Figure 17). With the implementation of Les Hollers Way, only two northbound through lanes and two southbound left turn lanes are required. The same intersection lane configuration would have a level of service of C/B (AM/PM) under future traffic conditions with Les Hollers Way or D/D (AM/PM) without Les Hollers Way. The impact of implementing Les Hollers Way is evidenced in Figures 17-19 with lane requirements and associated level of service. Build Alternative network improvements were not evaluated for Chapel Valley since it was determined to provide minimal benefit in addition to Les Hollers Way.

### 4.3 Access Review

An inventory of current access locations within the study corridor area was developed as part of the project. Each access point was evaluated to determine if it meets current standards or if improvements should be considered. Documentation of the access review can be found in Appendix H. Future traffic volumes generally do not require implementation of a median within the study corridor. However, installation of a median could be considered at major intersections to protect turn lanes and promote safe access.








## 4.4 Future Typical Roadway Sections

## 4.4.1 Corral Drive to Wildwood Drive

The future typical roadway section for Sheridan Lake Road between Corral Drive and Wildwood Drive will require two through lanes in each direction due to the volume of traffic through this area. The numerous driveways, intersecting roads and turn lane requirements suggest a center turn lane will be needed in addition. The proposed typical section for Sheridan Lake Road is shown in Figure 20. Pedestrian and bicycle traffic is accommodated with boulevard sidewalk on both sides of the roadway and a 10 foot wide path on one side. The proposed typical section will require approximately 100' right-of-way, excluding additional turn lane needs at major intersections.



FIGURE 20. FUTURE TYPICAL ROADWAY CROSS-SECTION, CORRAL DRIVE TO WILDWOOD DRIVE

#### 4.4.2 Wildwood Drive to Albertta Drive

The Sheridan Lake Road corridor south of Wildwood Drive carries a high volume of traffic, but is less developed than the section north of Wildwood Drive with fewer driveways and intersecting streets. For this reason a four lane section is recommended for this area instead of the five lane section discussed above. Several variations of the four lane section are considered including a rural section, urban section with shared bicycle lanes and an urban section with a side path. These typical roadway sections are shown in Figures 21A, 21B and 21C.

The rural option shown in Figure 21A is likely the lowest cost option. This provides four lanes to address traffic needs as well as a shoulder bicycle lane that would accommodate bicycle traffic. This portion of the corridor is identified as a "Pedestrian Gap" in the RapidTRIP 2040 Pedestrian Needs Plan with an identified sidewalk need on both sides of Sheridan Lake Road. A rural section does not directly address pedestrian needs.



FIGURE 21A. FUTURE TYPICAL ROADWAY CROSS-SECTION, RURAL OPTION

With the anticipated development and lower speed traffic, an urban roadway section for this area is likely. Two potential urban configurations are shown in Figures 21B and 21C. The difference between the two sections is based on how bicycle use will be accommodated. Figure 21B shows a widened outside lane to accommodate bicycle traffic while Figure 21C includes a side path. Both options include sidewalk to address pedestrian needs.



FIGURE 21B. FUTURE TYPICAL ROADWAY CROSS-SECTION, URBAN OPTION WITH SHARED LANE



FIGURE 21C. FUTURE TYPICAL ROADWAY CROSS-SECTION, URBAN OPTION WITH SEPARATED PATH

The urban section is also consistent with preliminary plans for the Pennington County project that will reconstruct Sheridan Lake Road between US385 and Albertta Drive. The County project includes a three lane urban section beginning at Albertta Drive and continuing west.

## 4.5 Public Outreach

As part of the Traffic Study, a website was established to communicate study information and allow feedback on the study alternatives. Approximately 1000 landowners within the study area corridor were notified of the website through a post card mailing. As a result of the mailing, 16 unique comments were received. Identified themes were as follows:

- Maintain full access at Wildwood Drive.
- Promote multi-modal (sidewalk and bicycle) use of the corridor.
- Residents experience difficulty making left turns from stop-controlled, side streets.
- Some residents who live south of Wildwood Drive prefer an overpass-type intersection at Catron Boulevard to expedite through traffic.
- Some residents who live north of Wildwood Drive prefer a neighborhood-feel that promotes slower traffic speeds and higher safety for pedestrians.
- School traffic is contributing to congestion and may be relieved with construction of a new school south of town.
- There is a safety concern related to children walking to school with current and expected traffic volumes at Corral Drive.

There were two comments requesting consideration of Restricted Crossing U-Turns (RCUT; also known as a J-Turn). This configuration eliminates conflict points for left turn maneuvers by changing it to a right turn maneuver followed by a u-turn. It typically includes a wide, raised median when implemented as an intersection alternative because of the need to accommodate truck turning. Travelers that want to make a left turn at an intersection would be forced to make a right turn and then complete a u-turn at a planned median opening. This option was not formally evaluated with the study. Additional information regarding the comments can be found in Appendix I.

# 4.6 Estimated Construction Cost and Right-of-Way Impacts for Future Improvements

Budgetary cost estimates and right-of-way impacts are summarized in Table 5 for the Sheridan Lake Road / Catron Boulevard intersection alternatives considered in this study. Cost estimates have also been developed for the Sheridan Lake Road / Corral Drive intersection alternative shown in Figure 15. Additional detail is included in Appendix J.

Alternative	Segment	Estimated Construction Cost (\$M)	Estimated Right-of-Way Impact (Acre)
1	Sheridan Lake Road / Catron Boulevard Intersection	7.56	1.98
2	Sheridan Lake Road / Catron Boulevard Intersection	21.19	2.83
3	Sheridan Lake Road / Catron Boulevard Intersection	10.13	3.22
7A	Sheridan Lake Road / Catron Boulevard Intersection	10.60	2.92
8	Sheridan Lake Road / Catron Boulevard Intersection	5.95	0.60
1	Sheridan Lake Road / Corral Drive Intersection	7.21	2.30

#### Table 5. Estimated Construction Cost and ROW Impacts

Section 4 provides a detailed comparison of alternatives for the Sheridan Lake Road / Catron Boulevard intersection. The Alternative Comparison Matrix (Table 4) ranked Alternative 1 as the best option where future network improvements, such as the Les Hollers Way extension, are not considered. Table 6 provides a comparison of Alternative 1 and Alternative 8, since Alternative 8 accounts for the Les Hollers Way extension. Alternative 8 (shown in Figure 19) is clearly favorable since it provides a lower cost / lower impact alternative and allows full access for Wildwood Drive. Implementation of Alternative 8 is recommended since the extension of Les Hollers Way to Sheridan Lake Road is part of the City's growth plan and Alternative 8 will meet the current and future traffic needs at the Sheridan Lake Road / Catron Boulevard intersection.

Alternative	Description	Meets Traffic Operational Goals	Multimodal Mobility	Driver Familiarity	Constructability	Construction Cost (\$ Millions)	Construction Cost	Right-of-Way Impacts (Acre)	Right-of-Way Impacts	Access Impacts	Score	Rank
1	At-Grade Intersection – Wildwood Drive Right-In/Right-Out	Yes	3	3	3	7.56	3	1.98	2	1	235	2
8	At-Grade Intersection	Yes	3	3	3	5.95	3	0.60	3	3	300	1
	Relative	Weight	10	10	10		25		25	20		

Table 6. Catron Boulevard Intersection Alternative Comparison Matrix with Alternative 8

\*Criteria were scored relatively with "1" representing the worst score and "3" representing the best.

Two construction projects are envisioned to provide necessary capacity improvements for Sheridan Lake Road:

- Sheridan Lake Road Springbrook Road to Summerset Drive (Corral Drive Int.)
- Sheridan Lake Road Summerset Drive to Esval Drive (Catron Boulevard Int.)

These projects are represented by the layouts shown in Figures 15 and 19. The associated construction cost estimates and estimated right-of-way impacts are included in Table 5.

# FJS

# Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix A

Methods and Assumptions



## Methods and Assumptions Document

Date:	Friday, October 06, 2017
Project:	Sheridan Lake Road Corridor Study
To:	Study Team Members
From:	HDR
Subject:	Methods and Assumptions Documentation

This Methods and Assumptions document was developed in preparation for the Methods and Assumptions Meeting held as part of the project kick-off meeting with representatives from the City of Rapid City, the Rapid City MPO, and HDR. This document is intended to serve as a historical record of the process, dates, and decisions made by the study team representatives for the **Sheridan Lake Road Corridor Study**.

## 1. Stakeholder Acceptance Page

Formal stakeholder acceptance was not required as part of the study since it typically applies to FHWA acceptance of the study Methods and Assumptions.

## 2 Introduction and Project Description

The City of Rapid City has retained HDR to conduct a study of the Sheridan Lake Road corridor in southern Rapid City. This document outlines the procedures to be used in the study.

## 2.1 Project Background and Understanding

Sheridan Lake Road has experienced considerable traffic growth in the past 20 years due to urban expansion in the study area. In addition, Sheridan Lake Road now serves as part of cross-town route, with connections to Catron Boulevard and other arterial roadways. The study will evaluate the current traffic operations, forecast future operational demand, and develop concepts to address congestion problems.

## 2.2 Location

The study corridor includes Sheridan Lake Road from Albertta Drive to Corral Drive and Corral Drive from Sheridan Lake Road to Park Drive. The corridor is shown in **Figure 1**.



Figure 1 – Study Area

#### 2.3 Need for Study

The corridor study will identify areas of existing and future traffic congestion and develop roadway improvement concepts to provide greater travel efficiency, safety and reliability.

#### Study Schedule

- August 2017 NTP
- September 2017 Data Gathering
- October 2017 Provide Methods and Assumptions document, Address Comments
- October 2017 Provide Existing Conditions Technical Memo
- November 2017 Provide Future No-Build Conditions Technical Memo
- December 2017 Alternatives Identification
- March 2018 Provide Alternatives Analysis Technical Memo
- April 2018 Provide Draft Study Report
- July 2018 Provide Final Study Report

### 2.4 Facilities Affected by the Study

The study corridor includes Sheridan Lake Road from Albertta Drive to Corral Drive and Corral Drive from Sheridan Lake Road to Park Drive. Intersections receiving specific analysis include:

- Corral Drive/Park Drive
- Sheridan Lake Road/Corral Drive
- Sheridan Lake Road/N. Summerset Drive
- Sheridan Lake Road/Chateaux Ridge/Summerset Drive
- Sheridan Lake Road/Catron Boulevard
- Catron Boulevard/Bendt Drive
- Sheridan Lake Road/Wildwood Drive
- Sheridan Lake Road/Dunsmore Road
- Sheridan Lake Road/Tanager Drive/Croyle Avenue
- Sheridan Lake Road/Albertta Drive

#### 2.5 **Previous Studies**

Two previous studies have overlapped into the corridor study area:

- Stony Creek Development Traffic Impact Study (2015)
- US 16/US 16B/Catron Blvd. Traffic Study, South Dakota Department of Transportation, City of Rapid City, Rapid City MPO (2016)
- Traffic Impact Analysis for the Black Hills Corporation Office Complex
- Chapel Valley Access and Route Alignment Study

The results of the previous studies will be reviewed and used as input to the current corridor study.

#### 2.6 Alternate Routes

The following future routes will be included in Future Build Scenarios for study analysis:

- Les Hollers to Sheridan Lake Road (arterial roadway)
- A north-south collector from Sheridan Lake Road at Spring Canyon Trail to SD 44 via Red Rock Canyon
- An east-west collector between Dunsmore Road and the north-south collector on the north side of the Red Rocks Development.

Recommendations for implementation of these alternate routes will be included in the study report.

### 2.7 Study Advisory Team Members

A Study Advisory Team has been formed to guide the study through completion. The Study Advisory Team is comprised of representative parties of the City of Rapid City and Rapid City MPO. Members of the Study Advisory Team are:

PARTICIPANT	AGENCY
Todd Peckosh	CORC
Dale Tech	CORC
Stacey Titus	CORC
Steve Frooman	CORC
Kip Harrington	CORC / MPO
Patsy Horton	CORC / MPO
Aaron Fagerness	HDR
Rick Laughlin	HDR

Additional team members may be added as the study progresses or agency representatives not included in the above list may be part of the study to provide material reviews on behalf of that agency.

#### 3. Analysis Years/Periods

Existing Conditions: 2017 Future No-Build Scenario: 2045 Future Build Scenario: 2045

## 4. Data Collection

Data collection will occur in two phases: 1) compile existing data inventory items, and 2) collect turning movement counts. The existing data inventory items include:

- Base mapping
- Aerial photography
- Traffic counts
- Crash data

Methods and Assumptions Memo Sheridan Lake Road Corridor Study

- Traffic and saturation flow studies
- Design standards, ordinances and guidelines
- Transit route mapping
- Truck and delivery routes
- Existing land use and land use plans

• Known historical properties and areas of environmental significance

New turning movement counts will be gathered at the following locations/periods:

- Corral Drive/Park Drive (12-hour)
- Sheridan Lake Road/Corral Drive (12-hour before and after BHC opening)
- Sheridan Lake Road/Summerset Drive (North) (4-hour)
- Sheridan Lake Road/Chateaux Ridge/Summerset Drive (4-hour)
- Sheridan Lake Road/Catron Boulevard (12-hour before and after BHC opening)
- Catron Boulevard/Bendt Drive (4-hour)
- Sheridan Lake Road/Wildwood Drive (4-hour)
- Sheridan Lake Road/Dunsmore Road (12-hour)
- Sheridan Lake Road/Tanager Drive/Croyle Avenue (4-hour)
- Sheridan Lake Road/Albertta Drive (4-hour)

#### 5. Traffic Forecasting and Volume Development

HDR will coordinate with the Rapid City MPO to develop year 2045 average daily traffic volumes. The MPO will conduct travel demand modeling and HDR will develop the model outputs to create balanced peak hour networks for analysis.

#### 6. Traffic Operations Analysis

Analysis of existing and proposed intersection operations will be conducted using HCM 6 software current addition. HCS 7 analysis reports will be provided in the study documentation and will serve as the basis for intersection analysis. Specific operational variables are listed below:

<u>Variables</u>

- Peak Hour Factor (PHF) use peak hour factors developed from turning movement counts for existing conditions. Use a default PHF of .90 for future year conditions.
- Saturation Flow Rate Saturation flow rates will be based on SDDOT recommendations.
- Right Turn on Red percentage right turn on red percentage will be based on sampling of actual operations.
- Heavy Vehicle Percentage Based on new turning movement counts.
- Phase Change Intervals Existing signal timing phase change intervals will be used in analyzing existing conditions. Future condition vehicle clearance times will be based on NCHRP 731 calculation methods.
- Existing signal timing pedestrian clearance times will be used in analyzing existing conditions. Future condition pedestrian clearance times will be based on MUTCD guidance.
- Speeds based on approach speed limits.

## 7. Safety and Access Issues

SDDOT crash data for the study area will be analyzed and safety problems within the study area will be identified. A period of 5 years will be used for this study.

Existing accesses will be inventoried and compared with access standards. Recommendations for disposition of existing access points and new access locations will be presented in the study documentation.

### 8. Selection of Measures of Effectiveness (MOE)

The effectiveness of traffic operations in the study area will be based on the appropriate level of service measurement. All signalized intersections will need to meet a minimum requirement of level of service C. Approach levels of service for signalized intersections will be balanced to the extent possible. Stop sign-controlled intersections may have a lower level of service as it is reported on the side street.

Measures of Effectiveness (MOE's) provided will include: level of service (LOS).

## 9. Data Provided

The following will be provided by the participating agencies to aid the consultant in performing the study:

- Existing crash data via SDDOT online mapping tool and City records
- Existing Signal Timing Data
- Available GIS data, including aerial photography
- Available traffic counts
- Previous traffic, operations and saturation flow studies
- Future roadway alignments for E-W arterial and N-S collector alternate routes
- Historic plans for Sheridan Lake Road corridor
- Existing design standards and ordinances
- Existing land use and land use plans
- Information on bicycle and pedestrian facilities, transit routes, truck routes

#### 10. Deviations/Justifications

No deviations from standards are currently known. If it is determined during the study that deviations are required, the methods and assumptions document will be amended prior to proceeding.

#### 11. Conclusion

All sections contained in this document will guide the traffic data collection and traffic assessment for this study.

#### 12. Appendices

The appendix includes the following:

• Methods and Assumptions Study Team Meeting Minutes

# **APPENDIX**

FS

## **Meeting Minutes**

Project:	Sheridan Lake Road Corridor Study	
Subject:	Methods and Assumptions meeting	
Date:	Tuesday, October 03, 2017	
Location:	City Hall	
Attendees:	Todd Peckosh, CORC	Stacey Titus, CORC
	Steve Frooman, CORC	Kip Harrington, CORC/MPO
	Patsy Horton, CORC/MPO	Aaron Fagerness, HDR
	Rick Laughlin, HDR	Stacia Slowey, HDR
	Dustin Hamilton, HDR	

A meeting was held October 3, 2017 at the CORC City Hall to review the draft Methods and Assumptions document and prepare for the Sheridan Lake Road Corridor Study. The following items were discussed:

- Section 2.4 an intersection will be added to the list for Sheridan Lake Road/North Summerset Drive. The intersection was counted as part of the data gathering and the additional data will be used to evaluate intersection operations.
- Section 2.5 Kip will provide two additional studies for review:
  - Traffic Impact Analysis for the Black Hills Corporation Office Complex
  - Chapel Valley Access and Route Alignment Study
- Add a Section to identify our intention to study three alternate routes:
  - Les Hollers to Sheridan Lake Road (arterial)
  - A north-south collector from Sheridan Lake Road at Spring Canyon Trail to SD 44 via Red Rock Canyon
  - An east-west collector between Dunsmore Road and the north-south collector on the north side of the Red Rocks Development
- Section 2.6 CORC will coordinate with representatives of Pennington County and the Rapid City School District regarding the study, rather than adding additional members to the Study Advisory Team.
  - School District coordination to include location, type and timing of new school and details of potential expansion of existing Southwest School
- Section 6 the text will be changed to indicate that the existing signal timings will be used for phase change intervals and pedestrian signal timing under existing conditions. Saturation flow rate to be based on State data.
- Section 7 the text will be changed to indicate that access management will be addressed in the same memo with safety analysis, and access management will be included in the study report.
- Section 8 the level of service goals will be set at LOS C, with LOS D acceptable when faced with tight constraints. Approach levels of service should be balanced to the extent possible.
- The study report will document recommendations for lane width and typical sections.

# FJS

# Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix B

Existing Conditions Traffic

## **Technical Memo**

Date:	Monday, February 26, 2018
Project:	Sheridan Lake Road Corridor Study
To:	Study Advisory Team
From:	Rick Laughlin
Subject:	Follow-up Existing Conditions Analysis

Additional turning movement vehicle counts were conducted after the opening of the Black Hills Corporation campus in late 2017, in accordance with the scope of services for the Sheridan Lake Corridor Study project. These counts were made on December 12, 2017 at the following intersections:

- Sheridan Lake Road/Corral Drive
- Sheridan Lake Road/Catron Boulevard

The existing conditions analysis (see Technical Memo #1) was updated with the follow-up traffic counts and the results are shown in **Figure 3A**.

The counts show an increase in through-traffic on Catron Boulevard and Sheridan Lake Road north of Catron Boulevard. A slight increase in traffic using Corral Drive and Park Drive was also noted. A slight decrease in traffic was observed on Sheridan Lake Road south of Catron Boulevard.

Slight decreases in level of service were observed at Sheridan Lake Road/Catron Boulevard and Catron Boulevard/Bendt Drive in the AM peak hour. Other levels of service were unchanged.

Peak hour traffic counts were also conducted at the Sheridan Lake Road/Muirfield Drive intersection to determine the volume of traffic relative to the adjacent intersections. The counts showed that more traffic is currently using Muirfield Drive than Tanager Drive. Copies of the peak hour traffic volume sheets are attached to the end of this memo.



## SLR/CORRAL FOLLOW-UP

Leg		Old St	ate Hwy	40		Old S	tate Hwy	40		С	orral Dr		
Direction		Sou	ithbound			No	rthbound	l					
Start Time	Right	Thru	U-Turn	App Total	Thru	Left	U-Turn	App Total	Right	Left	U-Turn	App Total	Int Total
2017-12-12 07:15:00	30	89	0	119	152	151	0	303	66	23	0	89	511
2017-12-12 07:30:00	53	98	0	151	192	169	0	361	106	54	0	160	672
2017-12-12 07:45:00	24	98	0	122	157	88	0	245	111	68	0	179	546
2017-12-12 08:00:00	5	110	0	115	107	23	0	130	63	22	0	85	330
Grand Total	112	395	0	507	608	431	0	1039	346	167	0	513	2059
% Approach	22.1%	77.9%	0.0%		58.5%	41.5%	0.0%		67.4%	32.6%	0.0%		
% Total	5.4%	19.2%	0.0%	24.6%	29.5%	20.9%	0.0%	50.5%	16.8%	8.1%	0.0%	24.9%	
PHF (7:15AM - 8:15AM)	0.528	0.898	0	0.839	0.792	0.638	0	0.72	0.779	0.614	0	0.716	0.766
Lights	107	385	0	492	602	424	0	1026	339	163	0	502	2020
% Lights	95.5%	97.5%	0.0%	97.0%	99.0%	98.4%	0.0%	98.7%	98.0%	97.6%	0.0%	97.9%	98.1%
Articulated Trucks	2	3	0	5	0	1	0	1	0	0	0	0	6
% Articulated Trucks	1.8%	0.8%	0.0%	1.0%	0.0%	0.2%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.3%
Buses and Single-Unit Trucks	3	7	0	10	6	6	0	12	7	4	0	11	33
% Buses and Single-Unit Trucks	2.7%	1.8%	0.0%	2.0%	1.0%	1.4%	0.0%	1.2%	2.0%	2.4%	0.0%	2.1%	1.6%

#### SLR/CORRAL FOLLOW-UP

Leg		Old State	e Hwy 40			Old State	e Hwy 40			Corr	al Dr		
Direction		South	bound			North	bound			Easth	bound		
Start Time	Right	Thru	U-Turn	App Total	Thru	Left	U-Turn	App Total	Right	Left	U-Turn	App Total	Int Total
2017-12-12 16:30:00	17	158	0	175	153	73	0	226	54	16	0	70	471
2017-12-12 16:45:00	27	164	0	191	162	81	0	243	49	11	0	60	494
2017-12-12 17:00:00	28	161	0	189	160	73	0	233	45	17	0	62	484
2017-12-12 17:15:00	12	76	0	88	175	99	0	274	42	27	0	69	431
Grand Total	84	559	0	643	650	326	0	976	190	71	0	261	1880
% Approach	13.1%	86.9%	0.0%		66.6%	33.4%	0.0%		72.8%	27.2%	0.0%		
% Total	4.5%	29.7%	0.0%	34.2%	34.6%	17.3%	0.0%	51.9%	10.1%	3.8%	0.0%	13.9%	
PHF (4:30PM - 5:30PM)	0.75	0.852	0	0.842	0.929	0.823	0	0.891	0.88	0.657	0	0.932	0.951
Lights	84	555	0	639	646	326	0	972	188	70	0	258	1869
% Lights	100.0%	99.3%	0.0%	99.4%	99.4%	100.0%	0.0%	99.6%	98.9%	98.6%	0.0%	98.9%	99.4%
Articulated Trucks	0	1	0	1	1	0	0	1	0	0	0	0	2
% Articulated Trucks	0.0%	0.2%	0.0%	0.2%	0.2%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%
Buses and Single-Unit Trucks	0	3	0	3	3	0	0	3	2	1	0	3	9
% Buses and Single-Unit Trucks	0.0%	0.5%	0.0%	0.5%	0.5%	0.0%	0.0%	0.3%	1.1%	1.4%	0.0%	1.1%	0.5%

#### SLR/CATRON FOLLOW-UP

Leg		Old	d State	Hwy 40				Catron E	Blvd			Old	State	Hwy 40				Wildwo	od Dr		
Direction		:	Southbo	ound				Westbo	und			1	Northbo	bund				Eastbo	bund		
Start Time	Right	Thru	Left	U-Turn	App Total	Right	Thru	Left	U-Turn	App Total	Right	Thru	Left	U-Turn	App Total	Right	Thru	Left	U-Turn	App Total	Int Total
2017-12-12 07:15:00	5	15	133	0	153	139	1	9	0	149	61	182	0	0	243	0	7	11	0	18	563
2017-12-12 07:30:00	17	26	132	0	175	146	0	12	0	158	73	160	0	0	233	0	23	20	0	43	609
2017-12-12 07:45:00	10	40	151	0	201	99	0	20	0	119	70	121	0	0	191	0	19	4	0	23	534
2017-12-12 08:00:00	2	32	129	0	163	79	0	20	0	99	54	56	0	0	110	0	3	0	0	3	375
Grand Total	34	113	545	0	692	463	1	61	0	525	258	519	0	0	777	0	52	35	0	87	2081
% Approach	4.9%	16.3%	78.8%	0.0%		88.2%	0.2%	11.6%	0.0%		33.2%	66.8%	0.0%	0.0%		0.0%	59.8%	40.2%	0.0%		
% Total	1.6%	5.4%	26.2%	0.0%	33.3%	22.2%	0.0%	2.9%	0.0%	25.2%	12.4%	24.9%	0.0%	0.0%	37.3%	0.0%	2.5%	1.7%	0.0%	4.2%	
PHF (7:15AM - 8:15AM)	0.5	0.706	0.902	0	0.861	0.793	0.25	0.763	0	0.831	0.884	0.713	0	0	0.799	0	0.565	0.438	0	0.506	0.854
Lights	34	112	529	0	675	458	1	61	0	520	258	511	0	0	769	0	52	34	0	86	2050
% Lights	100.0%	99.1%	97.1%	0.0%	97.5%	98.9%	100.0%	100.0%	0.0%	99.0%	100.0%	98.5%	0.0%	0.0%	99.0%	0.0%	100.0%	97.1%	0.0%	98.9%	98.5%
Articulated Trucks	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Articulated Trucks	0.0%	0.9%	0.2%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Buses and Single-Unit Trucks	0	0	15	0	15	5	0	0	0	5	0	8	0	0	8	0	0	1	0	1	29
% Buses and Single-Unit Trucks	0.0%	0.0%	2.8%	0.0%	2.2%	1.1%	0.0%	0.0%	0.0%	1.0%	0.0%	1.5%	0.0%	0.0%	1.0%	0.0%	0.0%	2.9%	0.0%	1.1%	1.4%

#### SLR/CATRON FOLLOW-UP

Leg		Olo	d State	Hwy 40				Catron	Blvd			0	ld State	Hwy 40				Wildwo	od Dr		
Direction		:	Southbo	ound				Westbo	und				Northbo	ound				Eastbo	ound		
Start Time	Right	Thru	Left	U-Turn	App Total	Right	Thru	Left	U-Turn	App Total	Right	Thru	Left	U-Turn	App Total	Right	Thru	Left	U-Turn	App Total	Int Total
2017-12-12 16:30:00	1	95	93	0	189	167	2	54	0	223	29	50	0	0	79	0	0	1	0	1	492
2017-12-12 16:45:00	4	87	103	0	194	167	3	71	0	241	22	54	1	0	77	0	3	5	0	8	520
2017-12-12 17:00:00	2	99	90	0	191	173	8	76	0	257	18	47	0	0	65	0	1	3	0	4	517
2017-12-12 17:15:00	4	52	65	0	121	168	4	79	0	251	36	45	1	0	82	0	4	4	0	8	462
Grand Total	11	333	351	0	695	675	17	280	0	972	105	196	2	0	303	0	8	13	0	21	1991
% Approach	1.6%	47.9%	50.5%	0.0%		69.4%	1.7%	28.8%	0.0%		34.7%	64.7%	0.7%	0.0%		0.0%	38.1%	61.9%	0.0%		
% Total	0.6%	16.7%	17.6%	0.0%	34.9%	33.9%	0.9%	14.1%	0.0%	48.8%	5.3%	9.8%	0.1%	0.0%	15.2%	0.0%	0.4%	0.7%	0.0%	1.1%	
PHF (4:30PM - 5:30PM)	0.688	0.841	0.852	0	0.896	0.975	0.531	0.886	0	0.946	0.729	0.907	0.5	0	0.924	0	0.5	0.65	0	0.656	0.957
Lights	11	332	345	0	688	672	17	279	0	968	103	194	2	0	299	0	7	13	0	20	1975
% Lights	100.0%	99.7%	98.3%	0.0%	99.0%	99.6%	100.0%	99.6%	0.0%	99.6%	98.1%	99.0%	100.0%	0.0%	98.7%	0.0%	87.5%	100.0%	0.0%	95.2%	99.2%
Articulated Trucks	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Articulated Trucks	0.0%	0.0%	0.3%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Buses and Single-Unit Trucks	0	1	5	0	6	3	0	1	0	4	2	2	0	0	4	0	1	0	0	1	15
% Buses and Single-Unit Trucks	0.0%	0.3%	1.4%	0.0%	0.9%	0.4%	0.0%	0.4%	0.0%	0.4%	1.9%	1.0%	0.0%	0.0%	1.3%	0.0%	12.5%	0.0%	0.0%	4.8%	0.8%

	HCS7 Two-Way	v Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	CORRAL/PARK
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/12/2018	East/West Street	CORRAL DRIVE
Analysis Year	2017	North/South Street	PARK DRIVE
Time Analyzed	AM EXISTING	Peak Hour Factor	0.68
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		



Major Street: East-West

Approach	1	Eacth	ound			Wost	oound			North	bound			South	bound	
	-	1														
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		1	0	1
Configuration		L	Т				Т	R						L		R
Volume, V (veh/h)		20	90				85	455						420		20
Percent Heavy Vehicles (%)		1												1		1
Proportion Time Blocked																
Percent Grade (%)														(	)	
Right Turn Channelized		N	lo			Y	es			Ν	lo			N	lo	
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.11												6.41		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.21												3.51		3.31
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		29												618		29
Capacity, c (veh/h)		1467												665		928
v/c Ratio		0.02												0.93		0.03
95% Queue Length, Q <sub>95</sub> (veh)		0.1												12.5		0.1
Control Delay (s/veh)		7.5												44.5		9.0
Level of Service, LOS		A												E		A
Approach Delay (s/veh)		. 1	.4											42	2.9	
Approach LOS	1														E	

## HCS7 Signalized Intersection Results Summary

	HCS	7 Sig	nalize	d In	tersect	tion R	lesu	ilts	Sun	nmar	у				
								lute		lan luf			1 1	1474t	ki L
General Information	v										ormatio	on	- 1	ل ل	4- X
Agency	HDR								ration,		0.25				
Analyst	RL				te Sep 2				а Тур -	e	Other				2
Jurisdiction	RAPID CITY		Time F		_	KISTING	j	PHI			0.77			W + E B	*
Urban Street	SHERIDAN LAKE	ROAD	Analys					L	alysis	Period	1> 7:0	00	<u>م</u>		*
Intersection	CORRAL DRIVE		File Na	ame	SLR-C	ORRAL	xus							<u> </u>	
Project Description	SLR CORRIDOR S	TUDY												<u>14147</u>	<u> 1</u>
Demand Informatio	n			EB	3		W	′B			NB			SB	
Approach Movemen			L	Т	R	L	1	l	R	L	Т	R	L	Т	R
Demand (v), veh/h			165		345					430	610			395	110
													_		<u> </u>
Signal Information		-			21	2									
Cycle, s 91.0		2		5	12	E.						<b>`</b> ] [ <sup>K</sup>	₽ 2	3	4
Offset, s 0	Reference Point	End	Green	29.0	25.0	20.0	0.0	)	0.0	0.0		•			
Uncoordinated Yes		On	Yellow		4.0	4.0	0.0		0.0	0.0			<b>N</b>		~
Force Mode Fixe	d Simult. Gap N/S	On	Red	1.5	1.5	2.0	0.0	)	0.0	0.0		5	6	7	8
Timer Results			EBL		EBT	WBI		\\\/	BT	NBI		NBT	SB	1	SBT
Assigned Phase			EDL	-	8	VVDI		VVI	ы	1	-	6	30		2
Case Number					9.0		-		_	1.0		4.0			7.3
Phase Duration, s					26.0		-			34.5		65.0			30.5
Change Period, (Y+	R <sub>c</sub> ) s				6.0		-		_	5.5		5.5			5.5
Max Allow Headway	· ·				4.3					5.1		4.0			4.0
Queue Clearance Ti					22.0					26.0	)	27.1			27.0
Green Extension Tim					0.0					3.0		0.0			0.0
Phase Call Probabili	· • ·				1.00					1.00	)	1.00	1		1.00
Max Out Probability					1.00					0.13	3	1.00			1.00
Movement Group R	aculto			EB			WE				NB			SB	
Movement Group R Approach Movement			L	Т	R	L	T	5	R	L		R	L	T	R
Assigned Movement			3	1	18	<u> </u>		-	ĸ	1	6	ĸ	<u> </u>	2	12
Adjusted Flow Rate			214		448				_	558	792			513	78
-											<u> </u>		<u> </u>		
	Flow Rate (s), veh/h/l	n	1688		1502					1701	1786			1758	1490
Queue Service Time			10.3		20.0			_		24.0	25.1			25.0	3.6
Cycle Queue Cleara	nce nime ( <i>g</i> c), s		10.3		20.0			_	_	24.0	25.1			25.0	3.6
Green Ratio ( $g/C$ ) Capacity ( $c$ ), veh/h			0.22		0.22			+	_	0.62 621	0.65 1167		<u> </u>	0.27 483	0.27 409
Volume-to-Capacity			0.578		1.357				_	0.900	0.679			1.062	0.190
	, ft/ln ( 95 th percentile)		193.6		919.2			+	_	462	326.8			656.5	57.9
	, veh/ln ( 95 th percentile)		7.6		36.2					18.3	13.0			25.6	2.3
	(RQ) (95 th percent		1.94		0.00				_	4.62	0.00			0.00	0.48
Uniform Delay ( d 1)			31.7		35.5					22.6	9.8			33.0	25.2
Incremental Delay (			2.2		179.3					11.4	1.6			58.3	0.2
Initial Queue Delay (			0.0		0.0					0.0	0.0			0.0	0.0
Control Delay ( d ), s	· ·		33.9		214.7					34.1	11.4			91.3	25.5
Level of Service (LO			C	F						C	В			F	C
	pproach Delay, s/veh / LOS			2	F	0.0				20.8		С	82.	6	F
	Intersection Delay, s/ven / LOS				69	9.3							E	l	
Multimodal Results				EB			WE				NB			SB	
Pedestrian LOS Sco			1.96		В	2.03	3	E	3	0.67	_	A	1.9		В
Bicycle LOS Score /	LOS				F					2.72	2	С	1.4	6	A

Copyright © 2018 University of Florida, All Rights Reserved.

HCS7 Two-Way Stop-Control Report												
General Information Site Information												
Analyst	RL	Intersection	SHERIDAN LAKE/SUMMERSET									
Agency/Co.	HDR	Jurisdiction	RAPID CITY									
Date Performed	2/12/2018	East/West Street	SUMMERSET DRIVE									
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD									
Time Analyzed	AM EXISTING	Peak Hour Factor	0.81									
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25									
Project Description	SLR CORRIDOR STUDY											
Lawaa												



Major Street: North-South

					major	5110001110										
Vehicle Volumes and Ad	justme	nts														
Approach		Eastb	bound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U 1 2   0 0 1				4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	Т	
Volume, V (veh/h)						0		15			1025	5		10	730	
Percent Heavy Vehicles (%)						0		0						3		
Proportion Time Blocked																
Percent Grade (%)				°			0				·				°	
Right Turn Channelized	No No No									No						
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.40		6.20						4.13		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.23		
Delay, Queue Length, an	d Leve	l of S	ervice		<u>.</u>											
Flow Rate, v (veh/h)	Τ						19							12		
Capacity, c (veh/h)							208							542		
v/c Ratio							0.09							0.02		
95% Queue Length, Q <sub>95</sub> (veh)							0.3		0.1							
Control Delay (s/veh)							24.0		11.8							
Level of Service, LOS							С		B							
Approach Delay (s/veh)				-		- 24	4.0								.2	
Approach LOS					с											

	HCS7 Two-Way Sto	p-Control Report										
General Information Site Information												
Analyst	RL	Intersection	SHERIDAN LAKE/CHATEAUX									
Agency/Co.	HDR	Jurisdiction	RAPID CITY									
Date Performed	2/12/2018	East/West Street	CHATEAUX RIDGE									
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD									
Time Analyzed	AM EXISTING	Peak Hour Factor	0.81									
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25									
Project Description SLR CORRIDOR STUDY												



Major Street: No

Vehicle Volumes and Ad	justme	ents														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10 11 12 7 8 9 1U 1 2 3						3	4U	4	5	6				
Number of Lanes		0	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LTR				LTR			L		TR		L		TR
Volume, V (veh/h)		5	0	5		0	0	10		0	1015	5		30	690	10
Percent Heavy Vehicles (%)		0	0	0		0	0	0		1				3		
Proportion Time Blocked																
Percent Grade (%)			0				0									
Right Turn Channelized		No No								Ν	lo			Ν	lo	
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.11				4.13		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.21				2.23		
Delay, Queue Length, an	d Leve	l of S	ervice	,			<u>.</u>							<u>.</u>		
Flow Rate, v (veh/h)	Т		12				12			0				37		
Capacity, c (veh/h)			54				211			783				549		
v/c Ratio			0.23				0.06			0.00				0.07		
95% Queue Length, Q <sub>95</sub> (veh)			0.8				0.2			0.0				0.2		
Control Delay (s/veh)			89.8				23.1		9.6 12.0							
Level of Service, LOS	Í		F				С			A				В		
Approach Delay (s/veh)		8	9.8	-		23	3.1			0	.0			0	.5	
Approach LOS		F C														

## HCS7 Signalized Intersection Results Summary

		HUS	7 SIG	nalize		ersed		kesu	its Su	mmar	у				
General Inform	ation								Intersec	tion Inf	ormatic			47¢†	be la
L												on	- 1	16	
Agency		HDR			·				Duration		0.25		_1		R. B
Analyst		RL					27, 2017		Area Typ	be	Other				<u> </u>
Jurisdiction		RAPID CITY		Time F			XISTIN	G	PHF	<u> </u>	0.85			w+E 5	
Urban Street		SHERIDAN LAKE		-		r 2017			Analysis	Period	1> 7:0	00			e de la companya de l
Intersection		CATRON BOULEV		File Na	ame	SLR-	CATRO	N.xus					_ 1	<u> </u>	
Project Descrip	tion	SLR CORRIDOR S	TUDY											14147	7 17
Demand Inform	nation				EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Г	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			35	50	0	60	0	465	0	520	260	545	115	35
								<u> </u>					_		
Signal Informa	r			-	2115	R 21.5		3						x	- <del></del>
Cycle, s	159.4	Reference Phase	2			- 51	γŔ	R	E			1	2	3	4
Offset, s	0	Reference Point	End	Green	45.0	64.0	4.4	24	.0 0.0	0.0		1			
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.0	5.0	3.0	4.0	0.0	0.0			$\mathbf{\nabla}$		Ą
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	1.0	2.0	0.0	0.0		5	6	7	<b>Y</b> 8
Timer Results				ED		EDT			WBT	NB		NDT	0.01		CPT
Assigned Phase				EBI 3	-	EBT 8	WB		4	INB		NBT 6	SBL 5	-	SBT 2
Case Number	<b>5</b>			1.0		4.0			5.3			5.3	5 1.0		4.0
Phase Duration	-								30.0						
	•			8.4		38.4	-			<u> </u>	_	71.0	50.0		121.0
Change Period				4.0		6.0 5.3			6.0 5.3			7.0 5.1	5.0 5.1		7.0 5.1
Queue Clearan	- ·	·		5.2	$\rightarrow$	6.4	-	-	26.0			52.3	47.0		6.9
Green Extensio				0.0		2.8		-	0.0			4.6	0.0		7.2
Phase Call Pro		( <i>g</i> e), s				2.0				<u> </u>					
Max Out Proba	-			0.84		0.00			1.00 1.00   1.00 0.44		1.00		1.00		
Max Out Floba	onity			1.00	,	0.00			1.00			0.44	1.00	,	0.00
Movement Gro	oup Res	sults			EB	_		WE	3		NB			SB	_
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow I	Rate ( v	), veh/h		41	0		71	0	324	0	612	194	641	165	
-		w Rate (s), veh/h/l	n	1688	0		1355	178	_	1221	1772	1502	1674	1703	
Queue Service				3.2	0.0		7.4	0.0		0.0	50.3	14.2	45.0	4.9	1
Cycle Queue C	learance	e Time ( g c ), s		3.2	0.0		7.4	0.0	24.0	0.0	50.3	14.2	45.0	4.9	
Green Ratio ( g				0.19			0.15	0.15		0.40	0.40	0.40	0.70	0.72	
Capacity ( c ), v	,			305			249	269		45	711	603	587	1218	
Volume-to-Cap	acity Ra	tio (X)		0.135	0.000		0.283	0.00	0 0.494	0.000	0.860	0.322	1.093	0.135	
Back of Queue	( Q ), ft/	(In ( 95 th percentile)	)	63.4	0		118.6	0	354.3	0	819	233.8	1166.7	81.4	
Back of Queue	(Q), ve	eh/In ( 95 th percenti	ile)	2.5	0.0		4.7	0.0	14.1	0.0	32.2	9.2	45.6	3.2	
		RQ) (95 th percent		0.38	0.00		0.99	0.00	) 1.57	0.00	0.00	1.00	9.33	0.00	
Uniform Delay	(d1), s/	/veh		53.5			60.7	0.0	32.6	0.0	43.6	32.8	42.6	7.2	
Incremental De	lay ( <i>d</i> 2	), s/veh		0.2	0.0		0.9	0.0	0.8	0.0	12.9	1.4	64.9	0.2	
Initial Queue De	elay ( <i>d</i>	з), s/veh		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (	• • •			53.7			61.5	0.0	33.4	0.0	56.5	34.2	107.5	7.4	
Level of Service	, ,			D			E		С		E	С	F	Α	
Approach Delay	Approach Delay, s/veh / LOS			53.1		D	38.	5	D	51.′		D	87.0	)	F
Intersection De	lay, s/ve	h / LOS				6	2.6						E		
Multimodal Re		// 00			EB			WE			NB	<b>_</b>		SB	
Pedestrian LOS				2.28		B	1.9		B	2.39		B	1.87		B
Bicycle LOS So	ore / LC	15		0.65		А	1.14	4	A	1.82	<u> </u>	В	1.82		В

HCS7 Two-Way Stop-Control Report												
General Information Site Information												
Analyst	RL	Intersection	CATRON/BENDT									
Agency/Co.	HDR	Jurisdiction	RAPID CITY									
Date Performed	2/12/2018	East/West Street	CATRON BOULEVARD									
Analysis Year	2017	North/South Street	BENDT DRIVE									
Time Analyzed	AM EXISTING	Peak Hour Factor	0.89									
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25									
Project Description SLR CORRIDOR STUDY												



#### Vehicle Volumes and Adjustments

Venicle Volumes and Ad	Justme	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		1	1	0		1	1	0
Configuration		L	Т	TR		L	Т	TR		L		TR		L		TR
Volume, V (veh/h)		5	815	35		20	470	5		25	0	25		30	0	30
Percent Heavy Vehicles (%)		2				1				0	0	0		2	2	2
Proportion Time Blocked																
Percent Grade (%)										(	)			0		
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo			No		
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.14				4.12				7.50	6.50	6.90		7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.21				3.50	4.00	3.30		3.52	4.02	3.32
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		6				22				28		28		34		34
Capacity, c (veh/h)		1030				722				121		539		169		731
v/c Ratio		0.01				0.03				0.23		0.05		0.20		0.05
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1			0.8 0.2 0.7					0.1		
Control Delay (s/veh)		8.5				10.1			43.6 12.0 31.6 10.2					10.2		
Level of Service, LOS		A				В				E		В		D		В
Approach Delay (s/veh)		0	.0			0	.4			27	7.8			20	).9	
Approach LOS					D					С						

Copyright  $\ensuremath{\mathbb{C}}$  2018 University of Florida. All Rights Reserved.

HCS7 Two-Way Stop-Control Report												
General Information Site Information												
Analyst	RL	Intersection	SHERIDAN/WILDWOOD									
Agency/Co.	HDR	Jurisdiction	RAPID CITY									
Date Performed	2/12/2018	East/West Street	WILDWOOD DRIVE									
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD									
Time Analyzed	AM EXISTING	Peak Hour Factor	0.80									
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25									
Project Description	SLR CORRIDOR STUDY											
l anas												



Major Street: North-South

					inajoi	50,000,000	in boutin											
Vehicle Volumes and Ad	justme	nts																
Approach		Eastbound Westbound								North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6		
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1		
Configuration			LR							L	Т				Т	R		
Volume, V (veh/h)		10		0						5	770				170	5		
Percent Heavy Vehicles (%)		0		0						1								
Proportion Time Blocked																		
Percent Grade (%)			0															
Right Turn Channelized		Ν	10			Ν	lo			No No								
Median Type/Storage				Undi	vided													
Critical and Follow-up H	eadwa	ys																
Base Critical Headway (sec)		7.1		6.2						4.1								
Critical Headway (sec)		6.40		6.20						4.11								
Base Follow-Up Headway (sec)		3.5		3.3						2.2								
Follow-Up Headway (sec)		3.50		3.30						2.21								
Delay, Queue Length, an	d Leve	l of S	ervice	,														
Flow Rate, v (veh/h)			13							6								
Capacity, c (veh/h)			209							1356								
v/c Ratio			0.06							0.00								
95% Queue Length, Q <sub>95</sub> (veh)			0.2							0.0								
Control Delay (s/veh)			23.3						7.7									
Level of Service, LOS			С						A A .									
Approach Delay (s/veh)		2	3.3							. 0	.0							
Approach LOS		С																

## HCS7 Signalized Intersection Results Summary

		HCS	7 Sig	nalize	d Inte	ersec	tion R	lesu	Its Sur	nmar	У				
Concret Informed	41 o 10								Interec	tion Inf			1 1	1474¢†	ba L
General Informat	1/								Intersec		10	n	-	16	
Agency		HDR							Duration		0.25				1
Analyst		RL		-			7, 2017		Area Typ	e	Other			w∔e	<b>x</b>
Jurisdiction		RAPID CITY		Time F			XISTING		PHF		0.83			W + E S	÷
Urban Street		SHERIDAN LAKE F			is Year				Analysis	Period	1> 7:0	00			¥ K
Intersection		DUNSMORE ROAD		File Na	ame	SLR-E	DUNSM	ORE.>	us					*	
Project Descriptio	n	SLR CORRIDOR S	TUDY											╡↑фŸ	14
Demand Informa	ation				EB			WE	3		NB			SB	
Approach Movem	nent			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), veh	٦/h			5	525	105	30	10	0 40	20	15	60	190	60	5
					1	1 11:				_					
Signal Information	1	1		e	.₂ §	1215									$\mathbf{A}$
	82.7	Reference Phase	2		R	<u></u>	7					1	€ 2	3	4
Offset, s	0	Reference Point	End	Green	47.0	19.7	0.0	0.0		0.0			Ā		
<u> </u>	Yes	Simult. Gap E/W	On	Yellow		3.0	0.0	0.0		0.0			Y		<b>√</b>
Force Mode F	ixed	Simult. Gap N/S	On	Red	4.0	4.0	0.0	0.0	0.0	0.0		5	6	7	8
Timer Results			_	EBL		EBT	WB	1	WBT	NBI		NBT	SBI		SBT
Assigned Phase					-	2			6		-	8	50	-	4
Case Number						7.0			5.0			8.0			6.0
Phase Duration, s	2					7.0 56.0			56.0			26.7	-	_	26.7
Change Period, (						9.0			9.0			7.0			7.0
Max Allow Headw						4.0			4.0	<u> </u>		4.3			4.3
Queue Clearance		· ·				21.9			24.6			5.4			19.2
Green Extension			_			3.5			3.4		1.4				0.6
Phase Call Proba		(g - ), -				1.00			1.00			1.4			1.00
Max Out Probabil	-					0.01			0.02			0.00			1.00
	_														
Movement Group	-	ults		<u> </u>	EB			WB	1	<u> </u>	NB		<u> </u>	SB	
Approach Movem				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Moveme				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Ra	•				639	78	36	120	24		84		229	78	
-		w Rate (s), veh/h/li	n		1784	1514	782	1744			1549		1332	1734	
Queue Service Ti		•			0.0	2.0	2.7	2.7	0.6		0.0		13.8	3.0	
Cycle Queue Clea		e Time( <i>g</i> c ), s			19.9	2.0	22.6	2.7	0.6		3.4		17.2	3.0	
Green Ratio (g/C	,				0.57	0.57	0.57	0.57	_		0.24		0.24	0.24	
Capacity ( c ), veh					1057	859	343	990	839		426		351	414	
Volume-to-Capaci Back of Queue (	-	tio (X) In (95 th percentile)			0.604 280.9	0.091 25.3	0.105 23.2	0.122 40	2 0.029 7.6		0.198 58.7		0.653	0.189 57.2	
		h/ln ( 95 th percentile)			280.9	25.3 1.0	0.9	40	0.3		2.3		8.2	2.2	
· · · ·	<i>,</i> .	RQ) (95 th percent	,		0.00	0.51	0.9	0.00	_		0.00		0.2 1.82	0.00	
Uniform Delay ( d		,, ,	10)		12.0	8.1	19.6	8.3	7.9		25.3		32.1	25.1	
Incremental Delay					2.6	0.1	0.6	0.3	0.1		0.2		3.1	0.2	
Initial Queue Dela		,			0.0	0.2	0.0	0.0	0.0		0.2		0.0	0.2	
Control Delay ( d		•			14.6	8.4	20.3	8.6	7.9		25.5		35.2	25.3	
Level of Service (						A	C	A	A		C		D	C	1
	proach Delay, s/veh / LOS			13.9	B	B	10.8		B	25.5		С	32.7		С
	ntersection Delay, s/veh / LOS						3.7						B		
Multimodal Resu	Iultimodal Results				EB			WB			NB			SB	
Pedestrian LOS S	Score /	LOS		1.69		В	1.88	3	В	2.14	ł	В	1.98	3	В
Bicycle LOS Scor	re / LO	S		1.67		В	0.79	)	А	0.63	3	А	0.99	)	А

HCS7 Two-Way Stop-Control Report												
General Information Site Information												
Analyst	RL	Intersection	SHERIDAN/TANAGER/CROYLE									
Agency/Co.	HDR	Jurisdiction	RAPID CITY									
Date Performed	2/12/2018	East/West Street	SHERIDAN LAKE ROAD									
Analysis Year	2017	North/South Street	TANAGER DRIVE									
Time Analyzed	AM EXISTING	Peak Hour Factor	0.83									
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25									
Project Description	SLR CORRIDOR STUDY											
Lawas												



Major Street: East-West

Vehicle Volumes and Ad	justme	ents															
Approach	Eastbound				Westbound			Northbound				Southbound					
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0	
Configuration			LTR			LT		R			LTR				LTR		
Volume, V (veh/h)		0	520	0		10	105	10		0	0	20		95	0	0	
Percent Heavy Vehicles (%)		1				5				8	8	8		2	2	2	
Proportion Time Blocked																	
Percent Grade (%)									0 0								
Right Turn Channelized		No				Ν	10			Ν	lo		No				
Median Type/Storage		Undivided															
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2	
Critical Headway (sec)		4.11				4.15				7.18	6.58	6.28		7.12	6.52	6.22	
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3	
Follow-Up Headway (sec)		2.21				2.24				3.57	4.07	3.37		3.52	4.02	3.32	
Delay, Queue Length, ar	d Leve	l of S	ervice														
Flow Rate, v (veh/h)		0				12					24				114		
Capacity, c (veh/h)		1450				942					473				289		
v/c Ratio		0.00				0.01					0.05				0.40		
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.2				1.8		
Control Delay (s/veh)		7.5				8.9					13.0				25.3		
Level of Service, LOS		A				A					В				D		
Approach Delay (s/veh)		0.0			0.8			13.0				25.3					
Approach LOS										В				D			

Copyright  $\ensuremath{\mathbb{C}}$  2018 University of Florida. All Rights Reserved.

HCS7 Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	RL	Intersection	SHERIDAN/ALBERTTA							
Agency/Co.	HDR	Jurisdiction	RAPID CITY							
Date Performed	2/12/2018	East/West Street	SHERIDAN LAKE ROAD							
Analysis Year	2017	North/South Street	ALBERTTA DRIVE							
Time Analyzed	AM EXISTING	Peak Hour Factor	0.83							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	SLR CORRIDOR STUDY									
Lanos										



#### Major Street: East-West

Vehicle Volumes and Ad	justme	nts															
Approach	Eastbound				Westbound				Northbound				Southbound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0	
Configuration				TR		LT					LR						
Volume, V (veh/h)			470	5		15	90			0		50					
Percent Heavy Vehicles (%)						4				3		3					
Proportion Time Blocked																	
Percent Grade (%)										(	D						
Right Turn Channelized		No				Ν	lo		No				No				
Median Type/Storage		Undivided															
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)						4.1				7.1		6.2					
Critical Headway (sec)						4.14				7.13		6.23					
Base Follow-Up Headway (sec)						2.2				3.5		3.3					
Follow-Up Headway (sec)						2.24				3.53		3.33					
Delay, Queue Length, an	d Leve	l of S	ervice		<u>.</u>								<u>.</u>				
Flow Rate, v (veh/h)						18					60						
Capacity, c (veh/h)						990					519						
v/c Ratio						0.02					0.12						
95% Queue Length, Q <sub>95</sub> (veh)						0.1					0.4						
Control Delay (s/veh)						8.7					12.8						
Level of Service, LOS						A					В						
Approach Delay (s/veh)					1.4			12.8									
Approach LOS								В									
	Site Information																
--------------------	--	---															
RL	Intersection	CORRAL/PARK															
HDR	Jurisdiction	RAPID CITY															
2/12/2018	East/West Street	CORRAL DRIVE															
2017	North/South Street	PARK DRIVE															
PM EXISTING	Peak Hour Factor	0.91															
East-West	Analysis Time Period (hrs)	0.25															
SLR CORRIDOR STUDY																	
	HDR 2/12/2018 2017 PM EXISTING East-West	HDR     Jurisdiction       2/12/2018     East/West Street       2017     North/South Street       PM EXISTING     Peak Hour Factor       East-West     Analysis Time Period (hrs)															



Major Street: East-West

Vehicle Volumes and Ad	justme	ents														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		1	0	1
Configuration		L	Т				Т	R						L		R
Volume, V (veh/h)		10	40				110	300						220		25
Percent Heavy Vehicles (%)		2												1		1
Proportion Time Blocked																
Percent Grade (%)															0	
Right Turn Channelized		No Yes												Ν	lo	
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.12												6.41		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.22												3.51		3.31
Delay, Queue Length, an	d Leve	l of S	ervice	•												
Flow Rate, v (veh/h)		11												242		27
Capacity, c (veh/h)		1465												798		933
v/c Ratio		0.01												0.30		0.03
95% Queue Length, Q <sub>95</sub> (veh)		0.0												1.3		0.1
Control Delay (s/veh)		7.5												11.5		9.0
Level of Service, LOS		A												В		A
Approach Delay (s/veh)		1	.5	-		-	-			-	-	-	11.2			
Approach LOS													В			

	y HDR				tersec	tion F	lesi	ilts Su	ımmar	у				
í								_						
General Information	7								ction Inf	1/	on		/ 4 J, 4 ↓ . .] ]	
Agency			1					Duratio		0.25		_		the second se
Analyst	RL				ate Sep 2			Area Ty	ре	Other	-			4 2
Jurisdiction	RAPID CITY		Time F			XISTING	3	PHF		0.95			W∱E	∲ +
Urban Street	SHERIDAN LAKE F	ROAD	Analys	sis Ye	ar 2017			Analysi	s Period	1> 7:	00	7 4		7 7
Intersection	CORRAL DRIVE		File Na	ame	SLR-0	ORRA	L.xus						11	
Project Description	SLR CORRIDOR S	TUDY											\ <b>1</b> 1 <b>4</b> 1 <b>4</b> 1 <b>7</b>	74
Demand Information				E	3		W	/B		NB			SB	
Approach Movement			L	Т			-	- Г R	1	Т	R	L	T	R
Demand ( $v$ ), veh/h			70	<u> </u>	190	-			325	_	_	-	560	85
			10		100				020	000			000	00
Signal Information					21									
Cycle, s 60.7	Reference Phase	2		5	n I sn	ĸ					<mark>∖</mark> _≮	↓ Û	2	
Offset, s 0	Reference Point	End	Green	99	23.4	10.4	0.0	0.0	0.0		1	2	3	4
Uncoordinated Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	0.0			_		<b>ג</b> ל		~
Force Mode Fixed	Simult. Gap N/S	On	Red	1.5	1.5	2.0	0.0	).0 C	0.0		5	6	7	
The Deck			EDI		EDT			MDT			NDT	0.0		ODT
Timer Results			EBL		EBT	WB		WBT	NB		NBT	SB	<u> </u>	SBT
Assigned Phase			<u> </u>	_	8		$\rightarrow$		1		6	<u> </u>	$\rightarrow$	2
Case Number				_	9.0				1.0		4.0	<u> </u>		7.3
Phase Duration, s				$\rightarrow$	16.4				15.		44.3	<u> </u>		28.9
	nge Period, $(Y+R_c)$ , s			_	6.0		$\rightarrow$		5.5		5.5			5.5
	x Allow Headway ( MAH ), s			$\rightarrow$	4.3				5.1		4.0			4.0
Queue Clearance Tim					9.7		_		8.4		15.6			20.8
Green Extension Time	· • ·				0.7				1.5		3.8	<u> </u>	$\rightarrow$	2.5
Phase Call Probability				_	0.99		$\rightarrow$		1.0		1.00			1.00
Max Out Probability					0.03				0.0	9	0.48			0.13
Movement Group Re	sults			EB	3		WE	3		NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement			3		18				1	6			2	12
Adjusted Flow Rate (	v), veh/h		74		200				342	684			589	47
Adjusted Saturation Fl	•	n	1688		1502				1701	1786			1758	1490
Queue Service Time (			2.3		7.7				6.4	13.6			18.8	1.2
Cycle Queue Clearand	÷ :		2.3		7.7				6.4	13.6			18.8	1.2
Green Ratio (g/C)			0.17		0.17				0.58	0.64			0.39	0.39
Capacity (c), veh/h			290		258				459	1142			679	576
Volume-to-Capacity R	atio (X)		0.254		0.776				0.746				0.868	0.082
Back of Queue (Q), f	· · · ·	)	39.1		128.3			-	91.4	151.3			288.7	16.3
Back of Queue (Q), V			1.5		5.1				3.6	6.0			11.3	0.6
Queue Storage Ratio			0.39		0.00			+	0.91	0.00			0.00	0.14
Uniform Delay ( d 1), s		,	21.8		24.1			-	11.6	6.4			17.2	11.8
Incremental Delay ( d			0.5		5.0				3.4	0.9			3.8	0.1
	nitial Queue Delay ( $d_3$ ), s/veh				0.0				0.0	0.0			0.0	0.0
Control Delay ( d ), s/veh			0.0 22.3		29.1				15.0	7.3			21.0	11.9
Level of Service (LOS)			C		C				B	A			C	B
Approach Delay, s/veh / LOS			27.2	2	C	0.0			9.9		A	20.3		C
Intersection Delay, s/veh / LOS						5.8						B		
	-											В		
Multimodal Results				EB	3		WE	3		NB			SB	
Pedestrian LOS Score	e / LOS		1.94		В	2.00	)	В	0.6	5	А	1.9	3	В
Bicycle LOS Score / L	OS				F				2.1	8	В	1.54	4	В

Copyright © 2018 University of Florida, All Rights Reserved.

	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN LAKE/SUMMERSET
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/12/2018	East/West Street	SUMMERSET DRIVE
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM EXISTING	Peak Hour Factor	0.91
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lamas			

....



Major Street: North-South

Approach		Easth	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
	0	_			0	-							-			
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	T	
Volume, V (veh/h)						0		45			930	5		30	720	
Percent Heavy Vehicles (%)						0		0						1		
Proportion Time Blocked																
Percent Grade (%)						(	C									
Right Turn Channelized		No No								Ν	lo			N	lo	
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	vays														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.40		6.20						4.11		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.50		3.30						2.21		
Delay, Queue Length, an	d Leve	l of S	ervice	•												
Flow Rate, v (veh/h)							49							33		
Capacity, c (veh/h)							288							680		
v/c Ratio							0.17							0.05		
95% Queue Length, Q <sub>95</sub> (veh)							0.6							0.2		
Control Delay (s/veh)							20.1							10.6		
Level of Service, LOS					С								В			
Approach Delay (s/veh)		20.1												0	.4	
Approach LOS	1	 C					~									

	HCS7 Two-Way Sto	p-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN LAKE/CHATEAUX
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/12/2018	East/West Street	CHATEAUX RIDGE
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM EXISTING	Peak Hour Factor	0.89
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		•



Major Street. I

Vehicle Volumes and Adj	ustme	nts							Northly of Contribution											
Approach		Eastb	ound			West	oound			North	bound			South	bound					
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R				
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6				
Number of Lanes		0	1	0		0	1	0	0	1	1	0	0	1	1	0				
Configuration			LTR				LTR			L		TR		L		TR				
Volume, V (veh/h)		10	0	0		0	0	50		5	875	5		20	695	5				
Percent Heavy Vehicles (%)		0	0	0		0	0	0		1				1						
Proportion Time Blocked																				
Percent Grade (%)			0				0													
Right Turn Channelized		Ν	10			Ν	lo			Ν	lo			N	lo					
Median Type/Storage		Undivided																		
Critical and Follow-up He	eadwa	lways																		
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1						
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.11				4.11						
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2						
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.21				2.21						
Delay, Queue Length, an	d Leve	l of S	ervice																	
Flow Rate, v (veh/h)	Γ		11				56			6				22						
Capacity, c (veh/h)			45				303			837				703						
v/c Ratio			0.25				0.19			0.01				0.03						
95% Queue Length, Q <sub>95</sub> (veh)			0.8				0.7			0.0				0.1						
Control Delay (s/veh)			108.7				19.5			9.3				10.3						
Level of Service, LOS			F		С				A					В						
Approach Delay (s/veh)		108.7 19.5							0.1 0.3											
Approach LOS		F C																		

		HUS	7 SIG	nalize	ea in	tersed		tesi	iits ə	umma	ry				
General Inform	ation								Intere	ection In	formati	<u></u>		4 사 수 +	b L
	hation										N.	on	- 1	4 L	
Agency		HDR							Duratio		0.25				R.
Analyst		RL					28, 2017		Area T	уре	Othe	r	- <u>-</u>		<b>₹_</b>
Jurisdiction		RAPID CITY		Time F			XISTIN	G	PHF		0.96			w + E E	
Urban Street		SHERIDAN LAKE F		-		ar 2017				is Period	l 1>7:	00	1		\$ {
Intersection		CATRON BOULEV		File Na	ame	SLR-	CATRO	N.xus						<u> ነተ ሮ</u>	
Project Descrip	tion	SLR CORRIDOR S	TUDY											1414Y	
Demand Inform	nation				EB			V	/B		NB			SB	
Approach Move	ement			L	Т	R	L	-	T F	<b>λ</b> Γ	Т	R	L	Т	R
Demand (v), v	eh/h			15	10	0	280	1	5 67	<b>75</b> 0	195	105	350	335	10
											_				
Signal Informa		1	-	-	1215	R 21.5	2		$\geq$						₩ →
Cycle, s	83.6	Reference Phase	2			54	γŔ.	R	E			1			
Offset, s	0	Reference Point	End	Green	15.2			24		0 0.0	)	↑	-	5	~
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		5.0	3.0	4.					512		~
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	1.0	2.	0 0.	0 0.0	)	5	6	7	
Times Day 14						EDT	14/5					NDT	0.51		ODT
Timer Results				EBI	-	EBT	WB		WBT	NE	3L	NBT	SBI	-	SBT
Assigned Phase	e			3		8	-	-+	4	-		6	5		2
Case Number				1.0		4.0			5.3	_		5.3	1.0		4.0
Phase Duration		\ \		5.5		35.6 6.0			30.1	-		27.8	20.2		48.0
Change Period			4.0	4.0				6.0	_		7.0	5.0		7.0	
		(MAH), s				5.2		_	5.2	-	_	5.0	5.1		5.0
	arance Time ( g s ), s			2.5		2.3			21.9	-		10.1	14.7		12.5
Green Extensio		(ge), s				5.6			2.2			2.1	0.5		3.6
Phase Call Pro	-					1.00			1.00			1.00	1.00		1.00
Max Out Proba	bility			0.02		0.01						0.52	1.00	)	0.00
Movement Gro	oup Res	ults			EB			W	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow I	Rate ( v	), veh/h		16	0	1	292	16	469	) 0	203	63	365	0	<u> </u>
-		w Rate (s), veh/h/l	n	1688	0		1415	178				1502	1674	1744	
Queue Service				0.5	0.0		15.4	0.5	_		8.1	2.7	12.7	0.0	1
Cycle Queue C				0.5	0.0		15.5	0.5			8.1	2.7	12.7	0.0	
Green Ratio ( g				0.33			0.29	0.2	_		_	0.25	0.45	0.49	1
Capacity (c), v	,			510			494	514			442	374	568		<u> </u>
Volume-to-Cap		tio (X)		0.031	0.000	)	0.591	0.03	30 0.66	0 0.000	0.460	0.167	0.642	0.000	
		(In (95 th percentile)	)	8.9	0		222.1	9.7	270	7 0	167	46.6	212.5	0	
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)	0.4	0.0		8.8	0.4	l 10.	7 0.0	6.6	1.8	8.3	0.0	
		RQ) (95 th percent		0.05	0.00		1.85	0.0	0 1.2	0.00	0.00	0.20	1.70	0.00	
Uniform Delay	( d 1 ), s/	/veh		19.0			26.7	21.	4 17.	1 0.0	26.6	24.6	16.8		
Incremental De	lay ( <i>d</i> 2	), s/veh		0.0	0.0		1.9	0.0	) 2.3	0.0	3.4	1.0	2.5	0.0	
Initial Queue D	tial Queue Delay ( d ₃), s/veh			0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Control Delay ( d ), s/veh			19.0			28.6	21.	4 19.:	<b>3</b> 0.0	30.0	25.5	19.3		
Level of Service (LOS)			В			С	C	B		С	C	В			
Approach Delay, s/veh / LOS			18.4	1	В	22.	8	С	29	.0	С	17.2	2	В	
Intersection Delay, s/veh / LOS							21.4					С			
									_					07	
Multimodal Re		// 00			EB	-		WI		-	NB	<b>F</b>		SB	
Pedestrian LOS				2.17 B			1.9		B	2.44 B		1.89		B	
BICYCIE LOS SC	Score / LOS			0.53	5	A	1.7	/	В	0.9	0.93 A				В

	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	CATRON/BENDT
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/12/2018	East/West Street	CATRON BOULEVARD
Analysis Year	2017	North/South Street	BENDT DRIVE
Time Analyzed	PM EXISTING	Peak Hour Factor	0.86
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY	·	•



## Vehicle Volumes and Adjustments

Vehicle Volumes and Ad	justme	nts							Northbound Southbound								
Approach		Eastb	ound			West	oound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	1	2	0	0	1	2	0		1	1	0		1	1	0	
Configuration		L	Т	TR		L	Т	TR		L		TR		L		TR	
Volume, V (veh/h)		5	425	35		20	925	40		35	0	20		10	0	10	
Percent Heavy Vehicles (%)		1				1				0	0	0		0	0	0	
Proportion Time Blocked																	
Percent Grade (%)										(	0		0				
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo			Ν	lo		
Median Type/Storage				Undi	vided												
<b>Critical and Follow-up H</b>	eadwa	ys															
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9	
Critical Headway (sec)		4.12				4.12				7.50	6.50	6.90		7.50	6.50	6.90	
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3	
Follow-Up Headway (sec)		2.21				2.21				3.50	4.00	3.30		3.50	4.00	3.30	
Delay, Queue Length, an	d Leve	l of S	ervice	ı													
Flow Rate, v (veh/h)		6				23				41		23		12		12	
Capacity, c (veh/h)		624				1036				159		737		96		476	
v/c Ratio		0.01				0.02				0.26		0.03		0.12		0.02	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1				1.0		0.1		0.4		0.1	
Control Delay (s/veh)		10.8				8.6				35.4		10.0		47.8		12.7	
Level of Service, LOS		В			A				E		В		E		В		
Approach Delay (s/veh)		0	.1			0	.2			26	5.2		30.3				
Approach LOS									D D								

Copyright © 2018 University of Florida. All Rights Reserved.

	HCS7 Two-Way	y Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/WILDWOOD
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/12/2018	East/West Street	WILDWOOD DRIVE
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM EXISTING	Peak Hour Factor	0.88
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanas			



Major Street: North-South

Vehicle Volumes and Ad	justme	ents															
Approach		Eastb	ound			West	bound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1	
Configuration			LR							L	Т				Т	R	
Volume, V (veh/h)		5		0						0	295				605	10	
Percent Heavy Vehicles (%)		0		0						1							
Proportion Time Blocked																	
Percent Grade (%)			0														
Right Turn Channelized		Ν	10		Ν	lo			Ν	lo							
Median Type/Storage																	
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)		7.1		6.2						4.1							
Critical Headway (sec)		6.40		6.20						4.11							
Base Follow-Up Headway (sec)		3.5		3.3						2.2							
Follow-Up Headway (sec)		3.50		3.30						2.21							
Delay, Queue Length, an	d Leve	l of S	ervice														
Flow Rate, v (veh/h)			6							0							
Capacity, c (veh/h)			263							902							
v/c Ratio			0.02							0.00							
95% Queue Length, Q <sub>95</sub> (veh)			0.1							0.0							
Control Delay (s/veh)			19.0							9.0							
Level of Service, LOS			С							A							
Approach Delay (s/veh)		19	9.0							0	.0						
Approach LOS		С															

		HCS	7 Sig	nalize	d Inte	ersec	tion F	lesu	Its Sur	nmar	у				
	otion								Intersec	tion Inf	o rm otic			1 석 거 슏 忄	ba lu
General Inform											1	on	- 1	4 L	4- 3
Agency		HDR					0.0047		Duration,		0.25				N.
Analyst		RL			is Date		8, 2017		Area Typ	е	Other	•	- <u>-</u>		×
Jurisdiction		RAPID CITY		Time F			XISTING		PHF		0.86			W + E	• •
Urban Street		SHERIDAN LAKE F			sis Year				Analysis	Period	1> 7:0	00	<u>م</u>		2
Intersection		DUNSMORE ROAD		File Na	ame	SLR-E	DUNSM	ORE.x	us					*	
Project Descrip	tion	SLR CORRIDOR S	TUDY											14147	<u>14</u>
Demand Inform	nation				EB			WE	3		NB			SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v				0	190	20	55	415	_	45	20	40	65	5	5
Signal Informa	tion				a §	215							_		<b>X</b>
Cycle, s	74.7	Reference Phase	2		R		2					_	€ .	2	ктя
Offset, s	0	Reference Point	End	Green	-	10.7	0.0	0.0	0.0	0.0	_		X Z	3	~
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		3.0	0.0	0.0		0.0			7		512
Force Mode	Fixed	Simult. Gap N/S	On	Red	4.0	4.0	0.0	0.0	0.0	0.0		5	6	7	8
Timer Desult				<b>ED</b>		EDT						NDT	0.01		ODT
Timer Results				EBL	-	EBT	WB		WBT	NBI	-	NBT	SBI	-	SBT
Assigned Phase Case Number	e					2	<u> </u>	$\rightarrow$	6		_	8	<u> </u>		4
						7.0	<u> </u>	_	5.0			8.0	<u> </u>		6.0
Phase Duration		\ -				57.0	<u> </u>	$\rightarrow$	57.0	<u> </u>		17.7	<u> </u>	_	17.7
Change Period					_	9.0 4.0	<u> </u>		9.0 4.0			7.0 4.2	<u> </u>		7.0 4.2
Max Allow Head Queue Clearan				<u> </u>		4.0 5.8	<u> </u>	+	4.0	<u> </u>		4.Z	<u> </u>		4.2
Green Extensio						3.2	<u> </u>		3.2		_	0.3			0.3
Phase Call Pro		( <i>g</i> e), s				1.00	<u> </u>	+	3.2 1.00		_	0.4	<u> </u>		0.3
Max Out Proba	-					0.00			0.00			0.98	<u> </u>		0.98
	onity					0.00			0.00			0.01			0.21
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I	Rate ( v	), veh/h			0	12	64	483	87		105		76	12	
Adjusted Satura	ation Flo	w Rate ( s), veh/h/l	n		0	1514	1142	1744	1478		1558		1341	1613	
Queue Service	Time ( g	g s ), S			0.0	0.2	1.8	10.2	1.7		2.5		4.1	0.5	
Cycle Queue C	learance	e Time ( <i>g c</i> ), s			0.0	0.2	5.6	10.2	1.7		4.5		8.5	0.5	
Green Ratio ( g	ı/C)					0.64	0.64	0.64	0.64		0.14		0.14	0.14	
Capacity (c), v	/eh/h					973	772	1121	950		295		209	231	
Volume-to-Cap	acity Ra	tio (X)			0.000	0.012	0.083	0.431	0.092		0.354		0.362	0.050	
Back of Queue	( Q ), ft/	In ( 95 th percentile)			0	2.2	16.8	130.2	2 18		76.4		63.2	8.4	
		eh/In ( 95 th percenti	,		0.0	0.1	0.7	5.0	0.7		3.1		2.5	0.3	
Queue Storage	Ratio (	RQ) (95 th percent	ile)		0.00	0.04	0.22	0.00	0.10		0.00		0.55	0.00	
Uniform Delay	( d 1 ), s	/veh				4.8	6.6	6.6	5.1		29.3		33.2	27.6	
Incremental De	lay ( <i>d</i> 2	), s/veh			0.0	0.0	0.2	1.2	0.2		0.7		1.1	0.1	
Initial Queue De	elay ( <i>d</i>	з ), s/veh			0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (	-					4.8	6.8	7.8	5.3		30.0		34.3	27.7	
Level of Service	. ,					A	А	Α	Α		С		С	C	
Approach Delay	y, s/veh	/ LOS		5.8		А	7.4		А	30.0	)	С	33.4	1	С
Intersection De	lay, s/ve	h / LOS				11	1.4						В		
Multimodal Re		(1.00			EB	<b>D</b>		WB	-		NB	<b>D</b>		SB	<b>P</b>
Pedestrian LOS				1.66	_	B	1.86		B	2.21		B	1.94		B
Bicycle LOS Sc	ore / LC	15		0.87		А	1.53	5	В	0.66		A	0.63	5	A

Copyright © 2018 University of Florida, All Rights Reserved.

HCS7<sup>™</sup> Streets Version 7.4

	HCS7 Two-Wa	y Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/TANAGER/CROYLE
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/12/2018	East/West Street	SHERIDAN LAKE ROAD
Analysis Year	2017	North/South Street	TANAGER DRIVE
Time Analyzed	PM EXISTING	Peak Hour Factor	0.88
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanas			

. . ..



Major Street: East-West

Approach	T	Fasth	ound			West	oound			North	bound			South	bound	
	<u> </u>															
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume, V (veh/h)		0	175	0		15	355	95		0	0	10		25	0	0
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)										(	D			(	0	
Right Turn Channelized		Ν	lo			N	lo			N	lo			Ν	10	
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		0				17					11				28	
Capacity, c (veh/h)		1065				1386					847				380	
v/c Ratio		0.00				0.01					0.01				0.07	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.0				0.2	
Control Delay (s/veh)		8.4				7.6					9.3				15.3	
Level of Service, LOS		A				А					А				С	
Approach Delay (s/veh)		0	.0			0	.3			9	.3			. 15	5.3	
Approach LOS	1									ļ	4			(	С	

Copyright  $\ensuremath{\mathbb{C}}$  2018 University of Florida. All Rights Reserved.

	HCS7 Two-Way	Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/ALBERTTA
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/12/2018	East/West Street	SHERIDAN LAKE ROAD
Analysis Year	2017	North/South Street	ALBERTTA DRIVE
Time Analyzed	PM EXISTING	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		



#### Major Street: East-West

Vehicle Volumes and Ad	justme	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			155	5		60	295			5		20				
Percent Heavy Vehicles (%)						0				0		0				
Proportion Time Blocked																
Percent Grade (%)										(	D					
Right Turn Channelized		Ν	10			N	lo			Ν	lo			Ν	10	
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.10				7.10		6.20				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.20				3.50		3.30				
Delay, Queue Length, an	d Leve	l of S	ervice	•	<u> </u>											
Flow Rate, v (veh/h)						64					27					
Capacity, c (veh/h)						1420					705					
v/c Ratio						0.04					0.04					
95% Queue Length, Q <sub>95</sub> (veh)						0.1					0.1					
Control Delay (s/veh)						7.7					10.3					
Level of Service, LOS						A					В					
Approach Delay (s/veh)		-	-	-		1	.6	-		1(	).3			-	-	
Approach LOS										I	В					

## PHF CALCULATOR

LOCATION: SHERIDAN LAKE ROAD/MUIRFIELD DRIVE TIME: 7:15 AM - 8:15 AM

TIME PERIOD	1 6 6 7	SB THRU	DICUT	APPROACH TOTAL	LEFT	WB THRU	RIGHT	APPROACH TOTAL	LEFT	NB	RIGHT	APPROACH TOTAL		EB	RIGHT	APPROACH TOTAL	PERIOD TOTAL
		ΙΠΚυ	RIGHT	-	LEFI	INKU	RIGHT	TUTAL	LEFI	ΙΠΚΟ	RIGHT	TUTAL	LEFT	INKU	RIGHT	TUTAL	
7:15-7:30	34	0	1	35	1	14	3	18	0	0	0	0	2	148	0	150	203
7:30-7:45	43	0	2	45	0	13	3	16	0	0	0	0	0	132	0	132	193
7:45-8:00	44	0	5	49	0	27	11	38	0	0	0	0	1	85	0	86	173
8:00-8:15	20	0	3	23	0	13	6	19	0	0	0	0	1	49	0	50	92
MOVEMENT TOTAL	141	0	11		1	67	23		0	0	0		4	414	0		
APPROACH TOTAL		152				91				0				418			661
APPROACH PHF		0.78				0.60				#####				0.70	OVERA	LL PHF:	0.81
TRUCK PERCENT E	ΛςτΛΛ			0%													
INDON FERGENTE	A31/W	L01.		0 70													

TRUCK PERCENT NORTH/SOUTH:

0%

### PHF CALCULATOR

LOCATION: SHERIDAN LAKE ROAD/MUIRFIELD DRIVE TIME: 4:30 PM - 5:30 PM

TIME		SB		APPROACH		WB		APPROACH		NB		APPROACH		EB		APPROACH	PERIOD
PERIOD	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	TOTAL	LEFT	THRU	RIGHT	TOTAL	TOTAL
16:30-16:45	8	0	2	10	2	76	11	89	0	0	0	0	0	32	0	32	131
16:45-17:00	4	0	1	5	1	85	20	106	0	0	0	0	0	54	0	54	165
17:00-17:15	4	0	2	6	1	78	22	101	0	0	0	0	1	38	0	39	146
17:15-17:30	13	0	2	15	1	111	24	136	0	0	0	0	1	35	0	36	187
MOVEMENT TOTAL	29	0	7		5	350	77		0	0	0		2	159	0		
APPROACH TOTAL		36				432				0				161			629
APPROACH PHF		0.60				0.79				#####				0.75	OVERA	LL PHF:	0.84
TRUCK PERCENT E	AST/W	/EST:		0%													

TRUCK PERCENT NORTH/SOUTH:

0%

# **APPENDIX**

Technical Memo 1 - Existing Traffic Conditions (Original Submittal)

## **Technical Memo**

Date:	Tuesday, November 28, 2017
Project:	Sheridan Lake Road Corridor Study
To:	Study Advisory Team
From:	Rick Laughlin
Subject:	Existing Conditions Analysis

The City of Rapid City, in cooperation with the Rapid City Metropolitan Planning Organization (MPO), has retained HDR to study a portion of the Sheridan Lake Road corridor in southern Rapid City. The study area, shown in **Figure 1**, includes Sheridan Lake Road from Corral Drive to Albertta Drive and a small portion of Corral Drive. Intersections identified for specific analysis include:

- Corral Drive/Park Drive
- Sheridan Lake Road/Corral Drive
- Sheridan Lake Road/Summerset Drive
- Sheridan Lake Road/Chateaux Ridge/Summerset Drive
- Sheridan Lake Road/Catron Boulevard
- Catron Boulevard/Bendt Drive
- Sheridan Lake Road/Wildwood Drive
- Sheridan Lake Road/Dunsmore Road
- Sheridan Lake Road/Tanager Drive/Croyle Avenue
- Sheridan Lake Road/Albertta Drive

This memo describes the current corridor based on data gathering and analysis conducted by HDR during September and October, 2017.

#### **Geometrics**

Lane configurations were determined for the existing study area intersections. The intersections are listed below with the approach lane configurations (T=thru lane, L=left turn lane, R=right turn lane, TL=combined thru/left lane, TR=combined thru/right lane, LTR=combined left/thru/right lane, LR=combined left/right lane, LT=combined left/thru lane):

- Corral Drive/Park Drive
  - SB L, R
  - WB T, R
  - EB L, T



- Sheridan Lake Road/Corral Drive
  - SB T, R
  - NB L,T
  - EB L, R
- Sheridan Lake Road/Summerset Drive
  - o SB L, T
  - WB−LR
  - NB−TR
- Sheridan Lake Road/Chateaux Ridge/Summerset Drive
  - SB L, TR
  - WB−LTR
  - NB L, TR
  - o EB LTR
- Sheridan Lake Road/Catron Boulevard
  - SB L, TR
  - WB L, T, R
  - NB L, T, R
  - EB L, TR
- Catron Boulevard/Bendt Drive
  - SB L, TR
  - WB−L, T, TR
  - NB L, TR
  - EB L, T, TR
- Sheridan Lake Road/Wildwood Drive
  - o SB T, R
  - o NB L, T
  - o EB LR
- Sheridan Lake Road/Dunsmore Road
  - SB L, TR
  - WB L, T, R
  - o NB-LTR
  - EB LT, R
- Sheridan Lake Road/Tanager Drive/Croyle Avenue
  - o SB LTR
  - WB LT, R
  - NB LTR
  - o EB LTR
- Sheridan Lake Road/Albertta Drive
  - WB−LT
  - NB LR
  - o EB TR

hdrinc.com

703 Main Street, Suite 200, Rapid City, SD 57701 (605) 791-6100

3

FJS

#### **Typical Sections**

An urban roadway cross-section exists in the northern portion of the corridor and a rural cross-section exists in the south portion of the corridor, with the transition occurring in the vicinity of the Wildwood Drive intersection. Typical sections for the corridor are shown below.





Typical Section: Sheridan Lake Road - Wildwood Drive to Albertta Drive Existing Rural 2-Lane

#### Pavement Conditions

The urban roadway cross-section in the north portion of the corridor is constructed in Portland cement concrete and is in generally good condition. The rural cross-section in the south portion of the corridor is constructed of asphalt concrete and is in generally good condition, although slight rutting has been observed in the wheel tracks.

#### AADT & Turning Movement Counts

Average Annual Daily Traffic counts were provided by the City of Rapid City for portions of the corridor, as follows:

- Sheridan Lake Road, north of Corral Drive 11,200 vpd
- Corral Drive, west of Sheridan Lake Road 4,600 vpd
- Sheridan Lake Road, between Corral Drive and Catron Boulevard 16,000 vpd
- Catron Boulevard, east of Bendt Drive 11,700 vpd
- Sheridan Lake Road, between Catron Boulevard and Wildwood Drive 13,100 vpd
- Sheridan Lake Road, between Wildwood Drive and Dunsmore Road 12,600 vpd
- Dunsmore Road, south of Sheridan Lake Road 3,900
- Sheridan Lake Road, west of Dunsmore Road 11,400 vpd

Peak hour turning movement volumes are shown in **Figure 3**. Full turning movement count files have been provided electronically.

#### Traffic Operations

The study area intersections were analyzed using Highway Capacity Software (HCS), the new peak hour turning volumes and the existing traffic controls. The resulting level of service (LOS), displayed in **Figure 3**, produced the following findings:

- The signalized intersections (Sheridan Lake Road/Corral Drive, Sheridan Lake Road/Catron Boulevard, Sheridan Lake Road/Dunsmore Road) show acceptable peak hour levels of service, except for Sheridan Lake Road/Catron Boulevard during the AM peak hour. Long queues have also been noted at the signalized intersections, particularly during the AM peak hour.
- Several of the stop sign-controlled side street approaches have a low peak hour level of service. This, however, is fairly common on arterial roadways and is not necessarily a reason for additional lanes or changes in traffic control.

#### ITS Deployments

No ITS services are currently available in the corridor.

#### Transit Operations & Stop Locations

Rapid City fixed route transit services are currently not available in the corridor, although a special middle school tripper route serves students at Southwest Middle School adjacent to the corridor. Dial-a-Ride services are, however, available throughout the city.



#### **Bicycle and Pedestrian Accommodations**

The urban street portion of the corridor currently has an 8' multi-use off-street path on the west side of the roadway and regular sidewalk on the east side of the roadway. The rural roadway portion of the corridor has wide shoulders which may be used by bicyclists and pedestrians. The Bicycle Fiscally Restrained Plan in the current RapidTRIP 2040 Plan include these existing facilities in their current roles, enhanced with signing and marking.

#### Lighting

Street lighting exists on the urban street portion of the corridor, in compliance with the Rapid City Design Criteria. The rural roadway portion of the corridor has lighting only at the Dunsmore Road intersection.

#### Conformance with the current land development code (LDC)

Much of the corridor exists at the edge of the urbanized area where older rural residential developments are being infilled with new urban residential neighborhoods and neighborhood commercial uses. The rural residential developments frequently don't satisfy current development standards, but are grandfathered and must be accommodated as the city continues to grow.

#### Right of Way

The right-of-way for Sheridan Lake Road is variable throughout the study area. The urban section varies from about 80' to over 100', while the rural section varies from 66' to 100'.

#### Encroachments

No existing right-of-way encroachments were observed.

#### **Existing Utilities**

The following is a summary of known City and Public Utilities within the Study Corridor. Additional information will be developed as part of the study.

#### Sanitary Sewer

Corral Drive:

- 8" main along south side of road (EB) between Winestone Lane and Park Drive
- 8" to 10" main in boulevard along north side of road between Park Drive and Sheridan Lake Road

#### Sheridan Lake Road:

• 15" main in boulevard along east side of road from Corral Drive to 150' south of Summerset Drive

- 15" main along west side of road (SB) from 150' south of Summerset Drive to Wildwood Drive
- 18" main at edge of surfacing along west side of road (SB) from Wildwood Drive to 1/2 mile east of Dunsmore Road
- 15" main at edge of surfacing along west side of road (WB) from 1/2 mile east of Dunsmore Road to Muirfield Drive

#### Water

Corral Drive:

- 8" main along south side of road (EB) between Winestone Lane and Skyview Drive
- 14" main in boulevard and street along north side of road between Park Drive and Sheridan Lake Road; 200' of dual 14" mains on the east end of Corral Drive from Southwest Booster Station to Sheridan Lake Road.

#### Sheridan Lake Road:

- 14" main along east side of road from Corral Drive to 500' south of Summerset Drive
- 14" main reducing to 12" main along west side of road (SB) from 500' south of Summerset Drive to Wildwood Drive, generally in boulevard
- No water main between Wildwood Drive and Muirfield Drive
- 12" main at edge of surfacing along north side of road (WB) from Muirfield Drive to Tanager Drive

#### Storm Sewer

Corral Drive:

• 48" and 54" trunk line in boulevard along north side of roadway between Park Drive and Sheridan Lake Road

#### Sheridan Lake Road:

- 18" to 24" trunk line on east side of roadway between Summerset Drive (North) and Summerset Drive (South)
- Large culvert crossing 400' north of Catron Boulevard
- Other small diameter segments and culvert crossings
- Roadside ditch and culvert crossings beyond City limits

#### Private Utilities

Private utility facilities are present within the corridor. Additional utility coordination will be conducted as part of the study to identify major conflicts.

	HCS7 Two-Way Sto	p-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	CORRAL/PARK
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	9/27/2017	East/West Street	CORRAL DRIVE
Analysis Year	2017	North/South Street	PARK DRIVE
Time Analyzed	AM EXISTING	Peak Hour Factor	0.68
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		



Major Street: East-West

Vehicle Volumes and Ad	justmo	ents														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		1	0	1
Configuration		L	Т				Т	R						L		R
Volume, V (veh/h)		20	90				90	490						415		20
Percent Heavy Vehicles (%)		1												1		1
Proportion Time Blocked																
Percent Grade (%)														(	0	
Right Turn Channelized		Ν	lo			Y	es			Ν	lo			N	lo	
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.11												6.41		6.21
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.21												3.51		3.31
Delay, Queue Length, an	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)		29												610		29
Capacity, c (veh/h)		1459												660		920
v/c Ratio		0.02												0.92		0.03
95% Queue Length, Q <sub>95</sub> (veh)		0.1												12.3		0.1
Control Delay (s/veh)		7.5												43.9		9.0
Level of Service, LOS		A												E		A
Approach Delay (s/veh)		1	.4											42	2.3	
Approach LOS														I	E	

Copyright  $\ensuremath{\mathbb{C}}$  2017 University of Florida. All Rights Reserved.

HCS7™ TWSC Version 7.1

CORRAL-PARK.xtw

Generated: 10/16/2017 10:46:03 AM

		HCS 2	010 S	ignali	zed	Interse	ection	N Re	sults	s Si	umma	ary				
O an anal la (an	1!									()	a a la f				444.	N.L.
General Inforn	nation										-	ormatic	on		ŢŢ	
Agency		HDR		1					Durat			0.25				
Analyst		RL				te Sep 2			Area	Туре	;	Other		×		4 14
Jurisdiction		RAPID CITY		Time F			KISTING	; 	PHF			0.91			w + E 5	4
Urban Street		SHERIDAN LAKE	ROAD	Analys						sis F	Period	1> 7:0	00			4
Intersection		CORRAL DRIVE		File Na	ame	SLR-C	ORRA	xus	i						<u>1</u> †	
Project Descrip	tion	SLR CORRIDOR S	TUDY												14147	
Demand Inform	nation				EB	3		W	/B			NB			SB	
Approach Move	ement			L	Т	R	L	-	Г	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			155		350					460	695			335	120
					1			<u> </u>						_		
Signal Informa	1		1	_		21	2									
Cycle, s	75.3	Reference Phase	2		5	12 1 1	F.						<b>`</b> `	2	3	4
Offset, s	0	Reference Point	End	Green	20.0	) 18.3	20.0	0.	0 0	0.0	0.0		-			
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	-	4.0	4.0	0.		0.0	0.0			<b>N</b>		~
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	2.0	0.	0 0	0.0	0.0		5	6	7	8
Timer Results				EBL		EBT	WB		WBT	г	NBI		NBT	SBI		SBT
Assigned Phase	۵					8		-		+	1		6			2
Case Number	<u> </u>				+	9.0		-		+	1.0		4.0			7.3
Phase Duration				<u> </u>	-	26.0		-		+	25.5		49.3	<u> </u>		23.8
Change Period		a) 6				6.0				+	5.5	· · · ·	5.5			5.5
Max Allow Head		-		<u> </u>	-	4.3		-		-	5.1		4.0			4.0
Queue Clearan		·			-	21.2		-		+	16.8		25.6			17.2
Green Extensio				<u> </u>	-	0.0		-		-	3.1	· · ·	0.0			1.1
Phase Call Pro		(99),3			+	1.00		-		-	1.00		1.00	<u> </u>		1.00
Max Out Proba					-	1.00					0.01		1.00	<u> </u>		0.56
Movement Gro	-	sults			EB	1		WI	11			NB			SB	
Approach Move				L	Т	R	L	Т	F	2	L	Т	R	L	Т	R
Assigned Move				3		18					1	6			2	12
Adjusted Flow I		•		170		385					505	764			368	77
		ow Rate ( s ), veh/h/l	In	1681		1496					1697	1782			1748	1481
Queue Service				6.2		19.2					14.8	23.6			15.2	3.1
Cycle Queue C		e Time ( <i>g c</i> ), s		6.2		19.2					14.8	23.6			15.2	3.1
Green Ratio (g				0.27		0.27				4	0.54	0.58			0.24	0.24
Capacity (c), v				446		397				_	589	1037			426	361
Volume-to-Cap				0.382		0.969				_	0.858	0.736			0.865	0.213
		(In (95 th percentile)		107.3		395.9				_	235.3	317.6		<u> </u>	284	47.7
		eh/In (95 th percenti	-	4.2		15.6					9.3	12.7			11.4	1.9
		RQ) (95 th percent	tile)	1.07		0.00					2.33	0.00			0.00	0.40
Uniform Delay				22.6		27.4					14.2	11.5			27.3	22.8
Incremental De	- · ·			0.5		37.0					5.3	2.8			10.0	0.3
Initial Queue D		•		0.0		0.0					0.0	0.0			0.0	0.0
Control Delay (				23.2		64.4					19.5	14.3			37.3	23.0
Level of Service				C		E					B	В				C
Approach Delay				51.8		D	0.0				16.4		В	34.8	5	С
Intersection De	iay, s/ve	en / LOS 				28	3.6							С		
Multimodal Re	sults				EB			W	3			NB			SB	
Pedestrian LOS		/ LOS		2.3		В	2.4		В		0.7		A	2.3	11	В
Bicycle LOS Sc						F			_		2.6		В	1.2	_	A
		v of Florida, All Rights	Reserve	ad a			I 10™ Str	ante V	larsion	6.80				ed: 9/27/2		

Copyright © 2017 University of Florida, All Rights Reserved.

HCS 2010<sup>™</sup> Streets Version 6.80

Generated: 9/27/2017 3:15:27 PM

	HCS 2010 Two-Way S	top Control Summary F	Report
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN LAKE/SUMMERSET
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	9/27/2017	East/West Street	SUMMERSET DRIVE
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	AM EXISTING	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		•
Lanes		↓ 人 本 ト L U	
	1 4 <b>4 1 1</b>	т Г Ч Ф Х Ф Р Х Ф Ф Х	



## Vehicle Volumes and Adjustments

	1	E (1								NI 11				<u> </u>		_
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	Т	
Volume (veh/h)						0		65			1090	5		10	675	
Percent Heavy Vehicles						0		0						3		
Proportion Time Blocked																
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo			Ν	lo	
Median Type								Undi	vided							
Median Storage																
Delay, Queue Length, and	l Leve	l of Se	ervice													
Flow Rate (veh/h)							80							12		
Capacity							186							506		
v/c Ratio							0.43							0.02		
95% Queue Length							2.0							0.1		
Control Delay (s/veh)							38.1							12.3		
Level of Service (LOS)							E							В		
Approach Delay (s/veh)						38	3.1							0	.2	

#### Copyright © 2017 University of Florida. All Rights Reserved.

HCS 2010<sup>™</sup> TWSC Version 6.80 SLR-SUMMERSET.xtw

Generated: 9/27/2017 4:03:51 PM

	HCS 2010 Two-Way	y Stop Control Summary I	Report
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN LAKE/CHATEAUX
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	9/27/2017	East/West Street	CHATEAUX RIDGE
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	AM EXISTING	Peak Hour Factor	0.81
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			



## Vehicle Volumes and Adjustments

Venicie Volumes and Ad	,															
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LTR				LTR			L		TR		L		TR
Volume (veh/h)		5	0	5		0	0	45		0	1045	5		20	655	0
Percent Heavy Vehicles		0	0	0		0	0	0		1				3		
Proportion Time Blocked																
Right Turn Channelized		N	lo			N	lo			N	lo			N	lo	
Median Type								Undi	vided							
Median Storage																
Delay, Queue Length, ar	d Leve	l of Se	ervice													
Flow Rate (veh/h)			12				56			0				25		
Capacity			44				201			821				531		
v/c Ratio			0.27				0.28			0.00				0.05		
95% Queue Length			0.9				1.1			0.0				0.1		
Control Delay (s/veh)			114.7				29.7			9.4				12.1		
Level of Service (LOS)			F				D			А				В		
Approach Delay (s/veh)		11	4.7			29	9.7			0	.0			0	.4	P
Approach LOS			F			I	2									

Copyright © 2017 University of Florida. All Rights Reserved.

HCS 2010™ TWSC Version 6.80 SLR-CHATEAUX.xtw Generated: 9/27/2017 4:06:56 PM

General InformationAgencyHDRAnalystRLJurisdictionRAPID CITYUrban StreetSHERIDAN LAKE RIntersectionCATRON BOULEVA		Analys Time F	sis Dat	te Sep 2	2.0047		Intersec Duration,		ormatic	on	_	₄∠⇔↓ ∡Ĺ	be La
AgencyHDRAnalystRLJurisdictionRAPID CITYUrban StreetSHERIDAN LAKE R			sis Dat	te Sep 2	7 0047				10	//I	- 8	. L	
Analyst     RL       Jurisdiction     RAPID CITY       Urban Street     SHERIDAN LAKE R			sis Dat	te Sep 2	7 0047		Duration,				1000		
Jurisdiction RAPID CITY Urban Street SHERIDAN LAKE R							Area Typ		Other				t.
Urban Street SHERIDAN LAKE R			Dariad		XISTING		PHF	e	0.89		- <b>⊒</b> >	W¥E	
	$\Delta \Lambda D$			ar 2017	×131110		Analysis	Poriod	1> 7:0	0			÷
		File Na			CATRON		Allalysis	Fenou	127.0				e e
Project Description SLR CORRIDOR ST		File Na	ame	JOLK-	CAIRON	v.xus					_	<u>ገ</u> [[ ፈለቆዋ	1
Project Description SLR CORRIDOR ST	UDT												
Demand Information			EB			WE	3		NB			SB	
Approach Movement		L	Т	R	L	Т	R	L	Т	R	L	T	R
Demand (v), veh/h		35	50	0	60	10	) 475	0	540	240	480	150	30
			1 111	1.112		-		_	_				
Signal Information		Ĩ	215	nd 200	La		E.					7	-
Cycle, s 154.1 Reference Phase	2	-		- SA	rR -	R	E			1	2	3	4
Offset, s 0 Reference Point	End	Green		64.6	4.1	24.		0.0		Ĺ			
Uncoordinated Yes Simult. Gap E/W	On	Yellow	-	5.0	3.0	4.0		0.0		<u></u>	$\mathbf{\Psi}$	-	
Force Mode Fixed Simult. Gap N/S	On	Red	2.0	2.0	1.0	2.0	0.0	0.0		5	6	7	<b>Y</b> 8
Timer Results		EBI	_	EBT	WB	L	WBT	NBI	_	NBT	SBL	_	SBT
Assigned Phase		3		8	<u> </u>	_	4			6	5		2
Case Number		1.0		4.0			5.3			5.3	1.0		4.0
Phase Duration, s		8.1		38.1			30.0			71.6	44.4		116.0
Change Period, ( $Y+Rc$ ), s		4.0		6.0			6.0		_	7.0	5.0		7.0
Max Allow Headway ( <i>MAH</i> ), s		4.1		5.3			5.3			5.0	5.1		5.0
Queue Clearance Time ( $g_s$ ), s		5.0		6.0			26.0		_	48.6	37.4		7.6
Green Extension Time ( $g_e$ ), s		0.0		2.8			0.0			5.2	2.0		7.1
Phase Call Probability		0.81		1.00			1.00			1.00	1.00	,	1.00
Max Out Probability	_	1.00		0.00			1.00			0.27	0.54		0.00
			ED						NID			0.5	
Movement Group Results Approach Movement		L	EB T	R	L	WB T	R	L	NB T	R	L	SB T	R
Assigned Movement		3	8	18	7	4	14	1	6	16	5	2	12
Adjusted Flow Rate (v), veh/h		39	0	10	67	11	320	0	607	163	539	191	12
		1688	0		1358			1192		1502	1674	1721	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln Queue Service Time ( $g_s$ ), s						1786			1772				
Cycle Queue Clearance Time ( $g_s$ ), s		3.0 3.0	0.0		6.8 6.8	0.8 0.8	24.0 24.0	0.0	46.6 46.6	10.9 10.9	35.4 35.4	5.6 5.6	
Green Ratio $(g/C)$		0.20	0.0		0.16	0.8		0.0	0.42	0.42	0.69	0.71	
Capacity ( <i>c</i> ), veh/h		302			258	278	623	47	743	630	569	1218	
Volume-to-Capacity Ratio ( <i>X</i> )		0.130	0.000	)	0.261	0.040		0.000	0.816	0.259	0.948	0.157	1
Back of Queue (Q), ft/ln (95 th percentile)		58	0.000		107.9	17.1	352.4	0.000	749.4	187.7	804.5	95.2	
Back of Queue (Q), veh/ln (95 th percentile)	e)	2.3	0.0		4.3	0.7	14.0	0.0	29.5	7.4	31.4	3.7	
Queue Storage Ratio ( $RQ$ ) (95 th percentil	,	0.35	0.00		0.90	0.00		0.00	0.00	0.80	6.44	0.00	
Uniform Delay ( $d_1$ ), s/veh	,	51.1		-	57.8	55.3		0.0	39.5	29.1	37.1	7.4	
Incremental Delay ( <i>d</i> <sub>2</sub> ), s/veh		0.2	0.0		0.8	0.1	1.0	0.0	9.6	1.0	23.2	0.3	
Initial Queue Delay ( <i>d</i> 3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay ( <i>d</i> ), s/veh		51.3			58.5	55.3		0.0	49.1	30.1	60.2	7.7	
		D			E	E	C		D	С	E	A	
Level of Service (LOS)		50.6	3	D	39.4		D	45.1		D	46.5		D
Level of Service (LOS) Approach Delay, s/yeh / LOS		00.0					-				D		
Level of Service (LOS) Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS				4	4.7						-		
Approach Delay, s/veh / LOS				4	4.7						_		
Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS Multimodal Results			EB			WB			NB			SB	
Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS		2.28	11	4. 	4.7 1.97		В	2.39	1	B	1.87		В

Copyright © 2017 University of Florida, All Rights Reserved.

HCS7<sup>™</sup> Streets Version 7.4

Generated: 11/28/2017 10:17:02 AM

	1103	201														
General Information							Site	Inforn	natior	ı						
Analyst	RL						Inters	ection			CATR	ON/BEN	DT			_
Agency/Co.	HDR						Jurisd	liction			RAPII	O CITY				
Date Performed	9/27/2	2017					East/\	Nest Stre	eet		CATR	ON BOU	ILEVARD			
Analysis Year	2017						North	/South S	Street		BEND	T DRIVE				
Time Analyzed	AM E)	KISTING					Peak	Hour Fac	ctor		0.89					
Intersection Orientation	East-V	Vest					Analy	sis Time	Period (l	hrs)	0.25					
Project Description	SLR C	ORRIDO	R STUDY	(												
Lanes																
								4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4								
Vehicle Volumes and A	djustmei	nts				<u>ጉት</u> ምጥ i r Street: Ea	111		•							
Vehicle Volumes and A	۱djustmei		ound			r Street: Ea	111		•	North	bound			South	bound	
	<b>Adjustme</b>		ound			r Street: Ea	st-West	R	÷	North	bound	R	U	South	bound	F
Approach	<u> </u>	Eastb	_	R 3	Majo	r Street: Ea	t t r					<b>R</b> 9	U			-
Approach Movement	U	Eastb L	Т		Majo U	vr Street: Ea	bound	R		L	Т			L	Т	1
Approach Movement Priority	U 1U	Eastb L 1	T 2	3	U 4U	Westl	bound T 5	R 6		L 7	T 8	9	U	L 10	T 11	1
Approach Movement Priority Number of Lanes	U 1U	Eastb L 1 1	T 2 2	3	U 4U	Westl L 4	bound T 5 2	R 6 0		L 7 1	T 8	9	U	L 10 1	T 11	F 1. ( 7)
Approach Movement Priority Number of Lanes Configuration	U 1U	Eastb L 1 L L	T 2 2 T	3 0 TR	U 4U	Westl L 4 1 L	bound T 5 2 T	R 6 0 TR		L 7 1 L	T 8 1	9 0 TR		L 10 1 L	T 11 1	1 ( T 3
Approach Movement Priority Number of Lanes Configuration Volume (veh/h)	U 1U	Eastb L 1 L L 5	T 2 2 T	3 0 TR	U 4U	Westl VWestl 4 1 L 20	bound T 5 2 T	R 6 0 TR		L 7 1 L 25	T 8 1 0	9 0 TR 25		L 10 1 L 30	T 11 1 0	1 ( T
Approach Movement Priority Number of Lanes Configuration Volume (veh/h) Percent Heavy Vehicles	U 1U	Eastb L 1 L L 5 2	T 2 2 T	3 0 TR	U 4U	Westl L 4 1 L 20 1	bound T 5 2 T	R 6 0 TR		L 7 1 25 0	T 8 1 0	9 0 TR 25		L 10 1 L 30 2	T 11 1 0	1. () T  3)
Approach Movement Priority Number of Lanes Configuration Volume (veh/h) Percent Heavy Vehicles Proportion Time Blocked	U 1U	Eastb L 1 L L 5 2	T 2 2 T 730	3 0 TR	U 4U	Westl L 4 1 L 20 1	t t vest bound T 5 2 T 490	R 6 0 TR		L 7 1 25 0	T 8 1 0 0	9 0 TR 25		L 10 1 L 30 2	T 11 1 0 2	1 ( T 3

## Delay, Queue Length, and Level of Service

Flow Rate (veh/h)	6			22			28		28	34		34
Capacity	1010			784			139		579	177		719
v/c Ratio	0.01			0.03			0.20		0.05	0.19		0.05
95% Queue Length	0.0			0.1			0.7		0.2	0.7		0.1
Control Delay (s/veh)	8.6			9.7			37.2		11.5	30.1		10.3
Level of Service (LOS)	А			А			E		В	D		В
Approach Delay (s/veh)		0.1		0.	.4		24	1.4		20	).2	
Approach LOS							(	2		(	2	

Copyright  $\ensuremath{\mathbb{C}}$  2017 University of Florida. All Rights Reserved.

HCS 2010<sup>™</sup> TWSC Version 6.80 CATRON-BENDT.xtw Generated: 9/27/2017 4:10:33 PM

	HCS 2010 Two-Way	Stop Control Summary F	Report
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/WILDWOOD
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	9/27/2017	East/West Street	WILDWOOD DRIVE
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	AM EXISTING	Peak Hour Factor	0.80
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY	i	•
Lanes			
	, L	1174717 1144717	



## Vehicle Volumes and Adjustments

Venicie Volumes and Auje	June															
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	1	1	0	0	0	1	1
Configuration			LR							L	Т				Т	R
Volume (veh/h)		10		0						5	770				205	5
Percent Heavy Vehicles		0		0						1						
Proportion Time Blocked																
Right Turn Channelized		N	lo			N	lo			N	lo			N	10	
Median Type								Undi	vided							
Median Storage																
Delay, Queue Length, and	Leve	l of Se	ervice													
Flow Rate (veh/h)			12							6						
Capacity			197							1308						
v/c Ratio			0.06							0.00						
95% Queue Length			0.2							0.0						
Control Delay (s/veh)			24.4							7.8						
Level of Service (LOS)			С							А						
Approach Delay (s/veh)		24	1.4			-	-			0	.0				-	

С

Approach LOS

HCS 2010™ TWSC Version 6.80 SLR-WILDWOOD.xtw Generated: 9/27/2017 4:13:17 PM

	HCS	7 Sig	nalize	d Inte	ersec	tion R	Resul	ts Sur	nmar	у				
• · · · · · · · · · · · · · · · · · · ·							1 -							
General Information	I							ntersect		1	on	_	4144) 1	₽ <u>6</u>
Agency	HDR		1					Duration,		0.25				N
Analyst	RL					7, 2017		Area Typ	e	Other				×_ 2
Jurisdiction	RAPID CITY		Time F			XISTING		PHF		0.83			Wੈ₽	
Urban Street	SHERIDAN LAKE		-		2017			Analysis	Period	1> 7:0	00	<u>_</u>		1
Intersection	DUNSMORE ROAI		File Na	ame	SLR-	DUNSM	ORE.xu	JS					*	
Project Description	SLR CORRIDOR S	TUDY										1	* 1 * * *	14
Demand Information				EB			WB			NB			SB	
Approach Movement			L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h			5	525	105	35	120	_	20	15	60	190	60	5
			1						<u> </u>					<u>i se s</u>
Signal Information		1	_	3	215							_		$\mathbf{k}$
Cycle, s 82.7	Reference Phase	2		R	§	2					1	€₂	3	<b>* † 3</b>
Offset, s 0	Reference Point	End	Green	_	19.7	0.0	0.0	0.0	0.0			<u> </u>		
Uncoordinated Yes	Simult. Gap E/W	On	Yellow	5.0	3.0	0.0	0.0	0.0	0.0			7		<b>√</b>
Force Mode Fixed	Simult. Gap N/S	On	Red	4.0	4.0	0.0	0.0	0.0	0.0		5	6	7	8
Timer Results			EBI		EBT	WB		WBT	NB		NBT	SBL		SBT
Assigned Phase				-	2	VVD		<u>кург</u> 6	IND	-	8	361		4
Case Number					7.0		+	5.0			8.0		_	6.0
Phase Duration, s			<u> </u>		56.0	<u> </u>		56.0			8.0 26.7	<u> </u>	+	26.7
Change Period, (Y+R			<u> </u>		9.0	<u> </u>		9.0			7.0	<u> </u>		7.0
Max Allow Headway (			-		4.0			9.0 4.0			4.3			4.3
Queue Clearance Tim	·				21.9			25.1			4.3 5.4			19.2
Green Extension Time					3.7			3.6		-	1.4			0.6
Phase Call Probability			<u> </u>		1.00			1.00			1.00			1.00
Max Out Probability			<u> </u>		0.01			0.02		_	0.00	<u> </u>		1.00
Max Out 1 Tobability					0.01			0.02			0.00			1.00
Movement Group Re	sults			EB			WB			NB	-		SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (	/ ), veh/h			639	78	42	145	36		84		229	78	
Adjusted Saturation Fl	ow Rate ( s ), veh/h/l	In		1784	1514	782	1744	1478		1549		1332	1734	
Queue Service Time (	g s ), s			0.0	2.0	3.2	3.2	0.9		0.0		13.8	3.0	
Cycle Queue Clearand	ce Time (gc), s			19.9	2.0	23.1	3.2	0.9		3.4		17.2	3.0	
Green Ratio (g/C)				0.57	0.57	0.57	0.57	0.57		0.24		0.24	0.24	
Capacity (c), veh/h				1057	859	343	990	839		426		351	414	<u> </u>
Volume-to-Capacity R				0.604	0.091	0.123	0.146			0.198		0.653	0.189	
Back of Queue (Q), f				280.9	25.3	27.4	48.9	11.6		58.7		209.7	57.2	
Back of Queue (Q), V	· · ·	-		11.1	1.0	1.1	1.9	0.4		2.3		8.2	2.2	
Queue Storage Ratio		uie)		0.00	0.51	0.37	0.00	0.06		0.00		1.82	0.00	
Uniform Delay ( <i>d</i> 1), s Incremental Delay ( <i>d</i>				12.0 2.6	8.1 0.2	19.8 0.7	8.4 0.3	7.9 0.1		25.3 0.2		32.1 3.1	25.1 0.2	
Initial Queue Delay ( d	·			2.0	0.2	0.7	0.3	0.1		0.2		0.0	0.2	
Control Delay ( d ), s/v	-			14.6	8.4	20.5	8.7	8.0		25.5		35.2	25.3	
				B	A	20.3 C	A	0.0 A		23.3 C		D	23.3 C	
Level of Service (LOS			13.9		B	10.9		В	25.5		С	32.7		C
Level of Service (LOS	1/105		10.8	,			,	0	20.0			32.7 B		0
Approach Delay, s/veh					1 >									
					18	5.5						-		
Approach Delay, s/veh				EB	18	5.5	WB			NB			SB	
Approach Delay, s/veh Intersection Delay, s/v	eh / LOS		1.69		B	1.88		В	2.14		B	1.98	1	В

Copyright © 2017 University of Florida, All Rights Reserved.

HCS7<sup>™</sup> Streets Version 7.4

Generated: 11/28/2017 10:20:26 AM

	HCS 2010 Two-Way S	Stop Control Summary F	Report
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/TANAGER/CROYLE
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	9/27/2017	East/West Street	SHERIDAN LAKE ROAD
Analysis Year	2017	North/South Street	TANAGER DRIVE
Time Analyzed	AM EXISTING	Peak Hour Factor	0.83
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY	·	•
Lanes			
	4 4 Y 4 4 Y	4 4 4 4 6 4 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	

 Image: Additional system

 Image: Additional system

 Major Street: East-West

Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume (veh/h)		0	520	0		10	125	10		0	0	20		95	0	0
Percent Heavy Vehicles		1				5				8	8	8		2	2	2
Proportion Time Blocked																
Right Turn Channelized		N	lo			Ν	lo			Ν	lo			Ν	lo	
Median Type								Undi	vided							
Median Storage																
Median Storage Delay, Queue Length, an	d Leve	of Se	ervice													_
5	d Leve	0 <b>of Se</b>	ervice			12					24				114	
Delay, Queue Length, an	d Leve		ervice			12 942					24 473				114 279	
Delay, Queue Length, an	d Leve	0	ervice													
Delay, Queue Length, an Flow Rate (veh/h) Capacity	d Leve	0 1421	ervice			942					473				279	
Delay, Queue Length, an Flow Rate (veh/h) Capacity v/c Ratio	d Leve	0 1421 0.00				942 0.01					473 0.05				279 0.41	
Delay, Queue Length, an         Flow Rate (veh/h)         Capacity         v/c Ratio         95% Queue Length	d Leve	0 1421 0.00 0.0				942 0.01 0.0					473 0.05 0.2				279 0.41 1.9	

Copyright  $\ensuremath{\mathbb{C}}$  2017 University of Florida. All Rights Reserved.

Approach LOS

HCS 2010<sup>™</sup> TWSC Version 6.80 SLR-TANAGER.xtw D Generated: 9/27/2017 4:16:38 PM

В

	HCS 2010 Two-Way Stop Control Summary Report												
General Information		Site Information											
Analyst	RL	Intersection	SHERIDAN/ALBERTTA										
Agency/Co.	HDR	Jurisdiction	RAPID CITY										
Date Performed	9/27/2017	East/West Street	SHERIDAN LAKE ROAD										
Analysis Year	2017	North/South Street	ALBERTTA DRIVE										
Time Analyzed	AM EXISTING	Peak Hour Factor	0.83										
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25										
Project Description	SLR CORRIDOR STUDY												
Lanes													
	14 4 4 4 F												

#### Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	bound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0		
Configuration				TR		LT					LR							
Volume (veh/h)			470	5		20	105			0		50						
Percent Heavy Vehicles						4				3		3						
Proportion Time Blocked																		
Right Turn Channelized		Ν	lo			N	lo			N	lo		No					
Median Type								Undi	vided									
Median Storage																		
Delay, Queue Length, a	nd Level	of Se	ervice															
Flow Rate (veh/h)																8		
						24					60							
Capacity						24 990					60 519							
Capacity v/c Ratio																		
						990					519							
v/c Ratio						990 0.02					519 0.12							
v/c Ratio 95% Queue Length						990 0.02 0.1					519 0.12 0.4							
v/c Ratio 95% Queue Length Control Delay (s/veh)						990 0.02 0.1 8.7	6			12	519 0.12 0.4 12.8 B							

Copyright © 2017 University of Florida. All Rights Reserved.

HCS 2010™ TWSC Version 6.80 SLR-ALBERTTA.xtw Generated: 9/27/2017 4:19:00 PM

	HCS7 Two-Way Stop-Control Report											
General Information		Site Information										
Analyst	RL	Intersection	CORRAL/PARK									
Agency/Co.	HDR	Jurisdiction	RAPID CITY									
Date Performed	9/28/2017	East/West Street	CORRAL DRIVE									
Analysis Year	2017	North/South Street	PARK DRIVE									
Time Analyzed	PM EXISTING	Peak Hour Factor	0.91									
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25									
Project Description	SLR CORRIDOR STUDY											



Major Street: East-West

Vehicle Volumes and Ad	justmo	ents																
Approach		Eastb	ound			West	bound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		1	0	1		
Configuration		L	Т				Т	R						L		R		
Volume, V (veh/h)		10	40				100	275						230		25		
Percent Heavy Vehicles (%)		2												1		1		
Proportion Time Blocked																		
Percent Grade (%)														(	0			
Right Turn Channelized		Ν	lo			Y	es			Ν	lo			N	lo			
Median Type/Storage				Undi	vided								·					
Critical and Follow-up H	eadwa	iys																
Base Critical Headway (sec)		4.1												7.1		6.2		
Critical Headway (sec)		4.12												6.41		6.21		
Base Follow-Up Headway (sec)		2.2												3.5		3.3		
Follow-Up Headway (sec)		2.22												3.51		3.31		
Delay, Queue Length, an	d Leve	el of S	ervic	e														
Flow Rate, v (veh/h)		11												253		27		
Capacity, c (veh/h)		1479												810		946		
v/c Ratio		0.01												0.31		0.03		
95% Queue Length, Q <sub>95</sub> (veh)		0.0												1.3		0.1		
Control Delay (s/veh)		7.5												11.5		8.9		
Level of Service, LOS		A												В		A		
Approach Delay (s/veh)		1	.5										11.2					
Approach LOS														I	В			

Copyright  $\ensuremath{\mathbb{C}}$  2017 University of Florida. All Rights Reserved.

HCS7™ TWSC Version 7.1

CORRAL-PARK.xtw

Generated: 9/28/2017 8:35:22 AM

		HCS	7 Sig	nalize	ed Ir	ntersec	tion R	lesi	ılts	Sun	nmar	У							
General Inform	nation								Into	read	tion Info	ormatic	20		1 4 1 4 4 +	F L			
	nation	HDR							<u> </u>	ation,		0.25			ŢŤ				
Agency		RL		Analys		ate Sep 2	0 2017					Other		-		K			
Analyst				Time F			8, 2017 XISTINO		PH	а Тур -	e	0.90			"Ì.	2			
Jurisdiction							AISTINC	2	<u> </u>		Dariad		0			+			
Urban Street		SHERIDAN LAKE	KUAD	Analys					1	alysis	Period	1> 7:(	0			r.			
Intersection		CORRAL DRIVE		File Na	File Name SLR-CORRAL.xus										ጎ †				
Project Descrip	otion	SLR CORRIDOR S	TUDY												14144				
Demand Infor	mation				EI	В		W	/B			NB			SB				
Approach Move	ement			L	Т	R	L	-	г	R	L	Т	R	L	Т	R			
Demand $(v)$ , v	/eh/h			65		205					275	525			710	100			
							- i												
Signal Informa	1/	[]				21	12												
Cycle, s	82.6	Reference Phase	2		5	n L sn	F.						<b>`</b>	2	3	4			
Offset, s	0	Reference Point	End	Green	12.	1 38.7	14.8	0.	0	0.0	0.0		-						
Uncoordinated	<u> </u>	Simult. Gap E/W	On	Yellow			4.0	0.		0.0	0.0			<b>N</b>	_	$\sim$			
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	2.0	0.	0	0.0	0.0		5	6	7	8			
Timer Results				EBL		EBT	WB		WE	BT	NBI		NBT	SBI		SBT			
Assigned Phas			-	8		-			1	-	6		-	2					
Case Number						9.0					1.0		4.0			7.3			
Phase Duration	าร					20.8					17.6	3	61.8			44.2			
Change Period		c) s			-	6.0		-			5.5		5.5			5.5			
Max Allow Hea		-				4.3		+			5.1		4.0			4.0			
Queue Clearar		· ·				14.2					10.9	)	14.8			37.8			
Green Extensio						0.6					1.1		4.5			0.8			
Phase Call Pro						1.00					1.00	)	1.00			1.00			
Max Out Proba	ability					0.44					0.20	)	0.49			1.00			
Mayamant Cr						2		10/1	ר ר						00				
Movement Gro	-	Suits			EE T	R	L	WE	<u> </u>	R	L	NB T	R	L	SB T	R			
Assigned Move				3		18	<u> </u>			K	1	6	IX.	<u> </u>	2	12			
Adjusted Flow		) veh/h		72		228				_	306	583			789	67			
-		ow Rate ( s ), veh/h/l	n	1688		1502				_	1701	1786			1758	1490			
Queue Service			11	3.0		12.2				_	8.9	12.8			35.8	2.1			
		e Time ( <i>g</i> <sub>c</sub> ), s		3.0		12.2				_	8.9	12.8			35.8	2.1			
Green Ratio ( g		e fille ( <i>g</i> ; ), 3		0.18		0.18			-		0.64	0.68		<u> </u>	0.47	0.47			
Capacity ( c ),	<b>.</b> .			302		268				_	361	1219		<u> </u>	825	699			
Volume-to-Cap		utio (X)		0.239		0.849				_	0.847	0.479		<u> </u>	0.957	0.095			
· · ·	· ·	/In ( 95 th percentile)		55.2		225.5					181.5	160.3			621.9	28.9			
		eh/In (95 th percenti		2.2		8.9				_	7.2	6.4			24.3	1.1			
		RQ) (95 th percent		0.55		0.00					1.82	0.00			0.00	0.24			
Uniform Delay				29.2	_	32.9					21.4	6.2			21.2	12.2			
Incremental De				0.4		13.1					10.3	0.2			20.8	0.1			
Initial Queue D				0.0		0.0					0.0	0.0			0.0	0.0			
Control Delay (		•		29.6		46.1					31.7	6.5			41.9	12.3			
Level of Servic				С		D					С	A			D	B			
	. ,			42.1		D	0.0				15.2		В	39.6	3	D			
Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS							9.4							C					
															-				
Multimodal Re					EE	3		W	3			NB			SB				
Pedestrian LOS				2.3		В	2.4		B	3	0.7		А	2.3		В			
Bicycle LOS So	icycle LOS Score / LOS					F					2.0		В	1.9		В			
Converight @ 2017	Universit	v of Florida All Rights	Pasarya	d			A Streets	Vorci	on 7 1	1			Conorat	ed: 9/28/2	0017 0.26				

Copyright © 2017 University of Florida, All Rights Reserved.

HCS7<sup>™</sup> Streets Version 7.1

Generated: 9/28/2017 8:36:22 AM

HCS7 Two-Way Stop-Control Report											
General Information		Site Information									
Analyst	RL	Intersection	SHERIDAN LAKE/SUMMERSET								
Agency/Co.	HDR	Jurisdiction	RAPID CITY								
Date Performed	9/28/2017	East/West Street	SUMMERSET DRIVE								
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD								
Time Analyzed	PM EXISTING	Peak Hour Factor	0.91								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	SLR CORRIDOR STUDY										



Major Street: North-South

justme	ents														
	Eastb	ound			West	bound			North	bound			South	bound	
U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
	10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
	0	0	0		0	0	0	0	0	1	0	0	1	1	0
						LR					TR		L	Т	
					0		25			775	5		40	875	
					0		0						1		
						0									
	N	lo			Ν	lo			Ν	lo			Ν	lo	
			Undi	vided											
eadwa	ys														
					7.1		6.2						4.1		
					6.40		6.20						4.11		
					3.5		3.3						2.2		
					3.50		3.30						2.21		
d Leve	el of S	ervice	e												
Τ						27							44		
						361							788		
						0.07							0.06		
						0.2							0.2		
						15.8							9.8		
						С							A		
	-		-	15.8						-		0.4			
	U           U	U     L       10     10       0     0       I     0       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I       I     I	U       L       T         U       I       T         I       10       11         I       0       0         I       0       0         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I         I       I       I	Eastbund           U         L         T         R           10         11         12           0         0         0         0           10         11         12           10         11         12           10         0         0         0           10         1         12         1           10         0         0         0         0           10         1         1         1         1           10         0         0         0         0         0           10         1         1         1         1         1         1           10         1         0         0         0         0         0           10         1         1         1         1         1         1         1           10         1         1         1         1         1         1         1           10         1         1         1         1         1         1         1           11         1         1         1         1         1         1         1	EastboundULTRU1011121010000111000010101112101000010	Eastbund       West         U       L       T       R       U       L         I       10       11       12       7         I       0       0       0       0       0         I       0       0       0       0       0         I       0       0       0       0       0         I       0       0       0       0       0         I       0       0       0       0       0         I       0       0       0       0       0         I       0       0       0       0       0         I       0       0       0       0       0         I       0       0       0       0       0         I       0       0       0       0       0         I       0       0       0       0       0       0         I       0       0       0       0       0       0       0         I       0       0       0       0       0       0       0       0       0       0       0	WestburdULTRULT101112101112100001000101112010000101112010111201011120101112010111201011120111211120111211121111111111111113111111111111111411111111111111141111111111111115111111111111 <td>Eastburd       Westburd         U       L       T       R       U       L       T       R         10       10       11       12       0       7       8       9         10       0       0       0       0       0       0       0         10       11       12       0       0       0       0       0         10       0       0       0       0       0       0       0       0         10       0       0       0       0       0       0       0       0         10       10       10       10       10       0       0       0       0         10       10       10       10       10       10       10       0       0         10       10       10       10       10       10       10       <t< td=""><td>Image: stype sty</td><td>Lat       T       R       U       L       T       R       U       L       T       R       U       L       T       R       U       I         10       11       12       7       8       9       1U       1         10       11       12       0       0       0       0       0       0       0       0         10       10       11       12       10       1       12       10       0       0       0       0       0       0       0         10       0</td><td>VertureVertureVertureULTRULTRULT101112107891U12101112107891U12101112100000112100000000011210111210000001121011121010101000011101112101010101010111011121010101010101110112111111<td< td=""><td>Lest         West         North           U         L         T         R         U         L         T         R         U         I         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         I         <t< td=""><td>Image: Factor index of the state of the state</td><td>Image: Serie of the serie</td><td>Image: Normal system       Image: Normal system       Image: Normal system       South-South</td></t<></td></td<></td></t<></td>	Eastburd       Westburd         U       L       T       R       U       L       T       R         10       10       11       12       0       7       8       9         10       0       0       0       0       0       0       0         10       11       12       0       0       0       0       0         10       0       0       0       0       0       0       0       0         10       0       0       0       0       0       0       0       0         10       10       10       10       10       0       0       0       0         10       10       10       10       10       10       10       0       0         10       10       10       10       10       10       10       0 <t< td=""><td>Image: stype sty</td><td>Lat       T       R       U       L       T       R       U       L       T       R       U       L       T       R       U       I         10       11       12       7       8       9       1U       1         10       11       12       0       0       0       0       0       0       0       0         10       10       11       12       10       1       12       10       0       0       0       0       0       0       0         10       0</td><td>VertureVertureVertureULTRULTRULT101112107891U12101112107891U12101112100000112100000000011210111210000001121011121010101000011101112101010101010111011121010101010101110112111111<td< td=""><td>Lest         West         North           U         L         T         R         U         L         T         R         U         I         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         I         <t< td=""><td>Image: Factor index of the state of the state</td><td>Image: Serie of the serie</td><td>Image: Normal system       Image: Normal system       Image: Normal system       South-South</td></t<></td></td<></td></t<>	Image: stype sty	Lat       T       R       U       L       T       R       U       L       T       R       U       L       T       R       U       I         10       11       12       7       8       9       1U       1         10       11       12       0       0       0       0       0       0       0       0         10       10       11       12       10       1       12       10       0       0       0       0       0       0       0         10       0	VertureVertureVertureULTRULTRULT101112107891U12101112107891U12101112100000112100000000011210111210000001121011121010101000011101112101010101010111011121010101010101110112111111 <td< td=""><td>Lest         West         North           U         L         T         R         U         L         T         R         U         I         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         I         <t< td=""><td>Image: Factor index of the state of the state</td><td>Image: Serie of the serie</td><td>Image: Normal system       Image: Normal system       Image: Normal system       South-South</td></t<></td></td<>	Lest         West         North           U         L         T         R         U         L         T         R         U         I         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         L         R         U         I <t< td=""><td>Image: Factor index of the state of the state</td><td>Image: Serie of the serie</td><td>Image: Normal system       Image: Normal system       Image: Normal system       South-South</td></t<>	Image: Factor index of the state	Image: Serie of the serie	Image: Normal system       Image: Normal system       Image: Normal system       South-South

Copyright  $\ensuremath{\mathbb{C}}$  2017 University of Florida. All Rights Reserved.

HCS7<sup>™</sup> TWSC Version 7.1

SLR-SUMMERSET.xtw

Generated: 9/28/2017 8:41:52 AM

	HCS7 Two-Way	Stop-Control Report										
General Information		Site Information										
Analyst	RL	Intersection	SHERIDAN LAKE/CHATEAUX									
Agency/Co.	HDR	Jurisdiction	RAPID CITY									
Date Performed	9/28/2017	East/West Street	CHATEAUX RIDGE									
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD									
Time Analyzed	PM EXISTING	Peak Hour Factor	0.89									
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25									
Project Description	SLR CORRIDOR STUDY											



Major Street: North-South

Vehicle Volumes and Ad	<b>,</b>								1				_					
Approach		Eastb	ound			West	oound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6		
Number of Lanes		0	1	0		0	1	0	0	1	1	0	0	1	1	0		
Configuration			LTR				LTR			L		TR		L		TR		
Volume, V (veh/h)		5	0	0		0	0	20		5	755	5		30	835	10		
Percent Heavy Vehicles (%)		0	0	0		0	0	0		1				1				
Proportion Time Blocked																		
Percent Grade (%)			0				C											
Right Turn Channelized		Ν	lo			Ν	lo			N	lo			N	lo			
Median Type/Storage				Undi	vided													
Critical and Follow-up H	eadwa	iys																
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1				
Critical Headway (sec)		7.10	6.50	6.20		7.10	6.50	6.20		4.11				4.11				
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2				
Follow-Up Headway (sec)		3.50	4.00	3.30		3.50	4.00	3.30		2.21				2.21				
Delay, Queue Length, an	d Leve	el of S	ervice	9														
Flow Rate, v (veh/h)			6				22			6				34				
Capacity, c (veh/h)			49				363			728				790				
v/c Ratio			0.12				0.06			0.01				0.04				
95% Queue Length, Q <sub>95</sub> (veh)			0.4				0.2			0.0				0.1				
Control Delay (s/veh)			88.2				15.6			10.0				9.8				
Level of Service, LOS			F				С					А						
Approach Delay (s/veh)		. 88	3.2		15.6					0.1					0.3			
Approach LOS			F				С											

Copyright  $\ensuremath{\mathbb{C}}$  2017 University of Florida. All Rights Reserved.

HCS7™ TWSC Version 7.1

SLR-CHATEAUX.xtw

Generated: 9/28/2017 8:44:15 AM

	HCS7 Signalized Intersection Results Summary																
General Inform	nation									Intersec	tion Inf	ormatio	מר		4 년 46 1	4 L	
	lation	HDR								Duration		0.25	<i></i>		44		
Agency		RL		Analys		te Sep	20	2017			, 	Other		-		۲ <u>ـ</u>	
Analyst Jurisdiction		RAPID CITY		Time F				, 2017 ISTING		Area Typ PHF		0.86		- <u>-</u>	"Ĩr	<b>~</b> ≱	
								STING			Dariad	1> 7:0	20			÷ م	
Urban Street		SHERIDAN LAKE		-		ar 2017				Analysis	Penoa	1>7.0	50			5	
Intersection	1	CATRON BOULEV		File Na	ame	SLR	-04	ATRON	v.xus						<u>ነ†ሰ</u>		
Project Descrip	tion	SLR CORRIDOR S	TUDY												1414Y		
Demand Inform	nation				EB	<u>;</u>			WE	3		NB			SB		
Approach Move	ement			L	Т	R		L	Т	R	L	Т	R	L	Т	R	
Demand (v), v	eh/h			10	5	0		280	25	565	0	190	110	395	415	25	
		tion								_							
Signal Informa	r			-	1215	. L 21.5	ы ы			£-					7	$\rightarrow$	
Cycle, s	81.4	Reference Phase	2			5	17	R		E			1	2	3	4	
Offset, s	0	Reference Point	End	Green	17.0			1.2	22.3	3 0.0	0.0		1				
Uncoordinated	Yes	Simult. Gap E/W	· · ·			5.0		3.0	4.0	0.0	0.0	_ `		$\nabla$	_		
Force Mode	Fixed	Simult. Gap N/S	Red	2.0	2.0		1.0	2.0	0.0	0.0	- 10	5	6	7	<b>Y</b> 8		
Timer Results				EBI		EBT		WBI		WBT	NBI		NBT	SBI		SBT	
Assigned Phase					-	8	T			4		_	6	5		2	
Case Number					-	4.0				5.3			5.3	1.0		4.0	
Phase Duration, s						4.0 33.4				28.3			26.0	22.0		48.0	
Change Period	-			5.2 4.0		33.4 6.0				6.0			7.0	5.0		7.0	
Max Allow Head				4.1		5.2				5.2			5.0	5.1		5.0	
Queue Clearan				2.4		2.2	╈			19.6			10.9		L	18.2	
Green Extensio				0.0		5.2	÷			2.7			2.7	18.4 0.0		4.8	
Phase Call Pro		(99), 3		0.0		1.00	╈			1.00				1.00		1.00	
Max Out Proba	-			0.01		0.00	t			0.68			1.00 0.70			0.05	
Movement Gro	-	sults		EB			╇	. 1	WB			NB		<u> </u>	SB		
Approach Move				L	Т	R	╋	L	Т	R		Т	R	L	Т	R	
Assigned Move		<u> </u>		3	8	18	+	7	4	14	1	6	16	5	2	12	
Adjusted Flow I				12	0	_	╋	326	29	395	0	221	76	459	500	<u> </u>	
		w Rate (s), veh/h/l	n	1688	0			1421	1786	_	898	1772	1502	1674	1747		
Queue Service				0.4	0.0		_	17.6	1.0	14.9	0.0	8.9	3.3	16.4	16.2		
Cycle Queue C		e Time ( <i>g c</i> ), s		0.4	0.0		_	17.6	1.0	14.9	0.0	8.9	3.3	16.4	16.2		
Green Ratio (g	,			0.31		-		0.27	0.27	0.48	0.23	0.23	0.23	0.47	0.50		
Capacity ( c ), v		tio (V)		474	0.00			477	489	730	88	413	350	581	879		
Volume-to-Capa	-	. ,		0.025		J	_	0.682	0.059		0.000	0.534	0.216	0.791	0.569		
		In (95 th percentile)		6.7	0		_	251.3	17.9	206.4	0	187	57.1	282	262.5		
		eh/In (95 th percenti	,	0.3	0.0		_	10.0	0.7	8.2	0.0	7.4	2.2	11.0	10.3	<u> </u>	
		RQ) (95 th percent	uie)	0.04	0.00			2.09	0.00	0.92	0.00	0.00	0.24	2.26	0.00		
Uniform Delay				19.4			╋	27.9	21.8	14.8	0.0	27.3	25.2	17.2	14.1	<u> </u>	
Incremental De		-		0.0	0.0		╇	3.3	0.1	0.9	0.0	4.9	1.4	7.7	2.7		
Initial Queue De		•		0.0	0.0		+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<u> </u>	
Control Delay (				19.5	<u> </u>		╇	31.2	21.9	15.7	0.0	32.2	26.6	24.9	16.7		
Level of Service				B			╋	C	С	B		С	C	C	В		
Approach Delay				19.0	J	B		22.7		С	30.8	5	С	20.6		С	
Intersection De	iay, s/ve	en / LOS				2	22.9	9						С			
Multimodal Re	sults				EB				WB			NB			SB		
	Pedestrian LOS Score / LOS				7	В	╋	1.93		В	2.44		В	1.89		В	
	Bicycle LOS Score / LOS					A	╈	1.73		B	0.98	_	A	2.07	_	В	
-	ICYCle LOS Score / LOS												Generated: 11/28/2017 10:21:54 AM				

Copyright © 2017 University of Florida, All Rights Reserved.

HCS7<sup>™</sup> Streets Version 7.4

Generated: 11/28/2017 10:21:54 AM
	HCS7 Two-Way St	op-Control Report							
General Information		Site Information							
Analyst	RL	Intersection	CATRON/BENDT						
Agency/Co.	HDR	Jurisdiction	RAPID CITY						
Date Performed	9/28/2017	East/West Street	CATRON BOULEVARD						
Analysis Year	2017	North/South Street	BENDT DRIVE						
Time Analyzed	PM EXISTING	Peak Hour Factor	0.86						
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25						
Project Description	SLR CORRIDOR STUDY								

### Lanes

. . ..



Major Street: East-West

Approach	- 	Facth	ound			Mast	oound		1	North	bound			Couth	bound	
	<u> </u>													1		
Movement	U	L	T	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		1	1	0		1	1	0
Configuration		L	Т	TR		L	Т	TR		L		TR		L		TR
Volume, V (veh/h)		5	470	35		20	825	40		35	0	20		10	0	10
Percent Heavy Vehicles (%)		1				1				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)										(	)		0			
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo		No			
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.12				4.12				7.50	6.50	6.90		7.50	6.50	6.90
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.50	4.00	3.30		3.50	4.00	3.30
Delay, Queue Length, an	d Leve	el of S	ervice	2												
Flow Rate, v (veh/h)		6				23				41		23		12		12
Capacity, c (veh/h)		691				990				160		708		111		519
v/c Ratio		0.01				0.02				0.26		0.03		0.11		0.02
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1				1.0		0.1		0.4		0.1
Control Delay (s/veh)		10.3				8.7				35.1		10.3		41.2		12.1
Level of Service, LOS		В				A				E		В		E		В
Approach Delay (s/veh)		0	.1			. 0	.2			- 26	5.1			. 20	5.6	
Approach LOS										[	)				D	

Copyright  $\ensuremath{\mathbb{C}}$  2017 University of Florida. All Rights Reserved.

HCS7<sup>™</sup> TWSC Version 7.1

CATRON-BENDT.xtw

Generated: 9/28/2017 8:52:09 AM

	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/WILDWOOD
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	9/28/2017	East/West Street	WILDWOOD DRIVE
Analysis Year	2017	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM EXISTING	Peak Hour Factor	0.88
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		

### Lanes



Major Street: North-South

Vehicle Volumes and Ad																	
Approach		Eastb	ound			West	oound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		0	0	0	0	1	1	0	0	0	1	1	
Configuration			LR							L	Т				Т	R	
Volume, V (veh/h)		5		0						0	295				685	10	
Percent Heavy Vehicles (%)		0		0						1							
Proportion Time Blocked																	
Percent Grade (%)			0														
Right Turn Channelized		Ν	10			Ν	lo			Ν	lo		No				
Median Type/Storage				Undi	vided												
Critical and Follow-up H	eadwa	iys															
Base Critical Headway (sec)		7.1		6.2						4.1							
Critical Headway (sec)		6.40		6.20						4.11							
Base Follow-Up Headway (sec)		3.5		3.3						2.2							
Follow-Up Headway (sec)		3.50		3.30						2.21							
Delay, Queue Length, an	d Leve	el of S	ervice	e													
Flow Rate, v (veh/h)			6							0							
Capacity, c (veh/h)			233							835							
v/c Ratio			0.03							0.00							
95% Queue Length, Q <sub>95</sub> (veh)			0.1							0.0							
Control Delay (s/veh)			20.9							9.3							
Level of Service, LOS			С							A							
Approach Delay (s/veh)		20	).9	-		-				0	.0						
Approach LOS			С														

### **HCS7 Signalized Intersection Results Summary**

		HCS	7 Sig	nalize	d Inte	ersec	tion R	lesul	ts Sur	nmar	у				
														4744	L I
General Inform									ntersect		N.	on	_		42 L
Agency		HDR				1			Duration,		0.25		-		K
Analyst		RL		-			8, 2017		rea Typ	e	Other				<b>₹_</b>
Jurisdiction		RAPID CITY		Time F			XISTING		PHF		0.86			₩ĴE	t t
Urban Street		SHERIDAN LAKE F			sis Year				nalysis	Period	1> 7:0	00	<u>ال</u>		¢.
Intersection		DUNSMORE ROAD		File Na	ame	SLR-E	DUNSM	ORE.x	JS					*	
Project Descrip	tion	SLR CORRIDOR S	TUDY											* 1 4 9	14
Demand Inform	mation				EB			WB			NB			SB	
Approach Move				L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), v				0	190	20	60	470		45	20	40	65	5	5
				Ű	100	20	00	110	100	10	20	10	00	Ũ	U
Signal Informa	ation				. 2	11.									
Cycle, s	74.7	Reference Phase	2		R		2						<b>A</b>	1	χΩ,
Offset, s	0	Reference Point	End	Green	_	10.7	0.0	0.0	0.0	0.0	_	1	M 2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		3.0	0.0	0.0	0.0	0.0			∽		512
Force Mode	Fixed	Simult. Gap N/S	On	Red	4.0	4.0	0.0	0.0	0.0	0.0			6	7	8
															0.5-5
Timer Results				EBL	-	EBT	WB	-	WBT	NB	-	NBT	SBI		SBT
Assigned Phas	e					2			6			8			4
Case Number						7.0			5.0			8.0			6.0
Phase Duration		```			_	57.0			57.0			17.7	<u> </u>		17.7
-	Change Period, (Y+R c), s Max Allow Headway (MAH), s					9.0			9.0			7.0	<u> </u>		7.0 4.2
	Max Allow Headway ( <i>MAH</i> ), s Queue Clearance Time ( g s ), s					4.0 5.8		+	4.0 14.2			4.2			4.2
Green Extensio				<u> </u>		3.7	<u> </u>		3.6			0.4			0.3
Phase Call Pro		( <i>ge</i> ), s				1.00			1.00			0.4			0.98
Max Out Proba	-					0.00			0.00			0.90			0.30
Max Out 1 100a	onity					0.00			0.00			0.01			0.21
Movement Gro	oup Res	ults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow	Rate ( v	), veh/h			0	12	70	547	110		105		76	12	
Adjusted Satur	ation Flo	w Rate ( s), veh/h/l	n		0	1514	1142	1744	1478		1558		1341	1613	
Queue Service	Time ( g	g s ), S			0.0	0.2	2.0	12.2	2.2		2.5		4.1	0.5	
Cycle Queue C	learance	e Time ( <i>g c</i> ), s			0.0	0.2	5.8	12.2	2.2		4.5		8.5	0.5	
Green Ratio ( g						0.64	0.64	0.64	0.64		0.14		0.14	0.14	
Capacity ( c ), v						973	772	1121	950		295		209	231	
Volume-to-Cap					0.000	0.012	0.090	0.488	0.116		0.354		0.362	0.050	
		In (95 th percentile)			0	2.2	18.4	156.6	23.1		76.4		63.2	8.4	
		h/ln (95 th percenti			0.0	0.1	0.7	6.1	0.9		3.1		2.5	0.3	
Queue Storage		RQ) (95 th percent	tile)		0.00	0.04	0.25	0.00	0.13		0.00		0.55	0.00	
					0.0	4.8	6.6	7.0	5.2		29.3		33.2	27.6	
Uniform Delay	ntal Delay(d ₂), s/veh				0.0	0.0	0.2	1.5	0.2		0.7		1.1	0.1	
Incremental De				- 1	0.0	0.0	0.0 6.9	0.0 8.5	0.0		0.0		0.0	0.0	
Incremental De Initial Queue D	elay ( d	•				10		0.0	5.4		30.0		34.3	///	1
Incremental De Initial Queue D Control Delay (	elay(d d), s/ve	•				4.8					<u> </u>		<u> </u>		
Incremental De Initial Queue D Control Delay ( Level of Service	elay(d d), s/ve e (LOS)	èh				A	A	А	Α	- 20.1	С		C	С	<u> </u>
Incremental De Initial Queue D Control Delay ( Level of Service Approach Dela	elay ( <i>d</i> <i>d</i> ), s/ve e (LOS) y, s/veh	/ LOS		5.8		A	A 7.8	А		30.0		С	33.4	С	C
Incremental De Initial Queue D Control Delay ( Level of Service	elay ( <i>d</i> <i>d</i> ), s/ve e (LOS) y, s/veh	/ LOS		5.8		A	A	А	Α	30.0				С	C
Incremental De Initial Queue D Control Delay ( Level of Service Approach Dela Intersection De	elay ( <i>d</i> <i>d</i> ), s/ve e (LOS) y, s/veh lay, s/ve	/ LOS		5.8	EB	A	A 7.8	А	Α	30.0	)		33.4	C	С
Incremental De Initial Queue D Control Delay ( Level of Service Approach Dela	elay ( <i>d</i> <i>d</i> ), s/ve e (LOS) y, s/veh lay, s/ve	h / LOS h / LOS		5.8	EB	A	A 7.8	A	Α	30.0	NB		33.4	C SB	C

Copyright © 2017 University of Florida, All Rights Reserved.

HCS7<sup>™</sup> Streets Version 7.4

Generated: 11/28/2017 10:23:55 AM

	HCS7 Two-W	/ay Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/TANAGER/CROYLE
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	9/28/2017	East/West Street	SHERIDAN LAKE ROAD
Analysis Year	2017	North/South Street	TANAGER DRIVE
Time Analyzed	PM EXISTING	Peak Hour Factor	0.88
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		

#### Lanes



#### Major Street: East-West

Vehicle Volumes and Ad	ljustm	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume, V (veh/h)		0	175	0		15	400	105		0	0	10		25	0	0
Percent Heavy Vehicles (%)		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Percent Grade (%)											0		0			
Right Turn Channelized		Ν	lo			Ν	lo		No				No			
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	ays														
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.10				4.10				7.10	6.50	6.20		7.10	6.50	6.20
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.20				2.20				3.50	4.00	3.30		3.50	4.00	3.30
Delay, Queue Length, ar	nd Leve	el of S	ervice	9												
Flow Rate, v (veh/h)		0				17					11				28	
Capacity, c (veh/h)		1009				1386					847				350	
v/c Ratio		0.00				0.01					0.01				0.08	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.0				0.3	
Control Delay (s/veh)		8.6				7.6					9.3				16.2	
Level of Service, LOS		A				A					A				С	
Approach Delay (s/veh)		. 0	.0			. 0	.3		9.3				16.2			
Approach LOS											4			(	C	

Copyright  $\ensuremath{\mathbb{C}}$  2017 University of Florida. All Rights Reserved.

HCS7<sup>™</sup> TWSC Version 7.1

SLR-TANAGER.xtw

Generated: 9/28/2017 9:00:16 AM

	HCS7 Two-Wa	ay Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/ALBERTTA
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	9/28/2017	East/West Street	SHERIDAN LAKE ROAD
Analysis Year	2017	North/South Street	ALBERTTA DRIVE
Time Analyzed	PM EXISTING	Peak Hour Factor	0.94
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		

#### Lanes



Major Street: East-West

Vehicle Volumes and Ad	ljustme	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			155	5		65	335			5		20				
Percent Heavy Vehicles (%)						0				0		0				
Proportion Time Blocked																
Percent Grade (%)										(	0					
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo		No			
Median Type/Storage				Undi	vided											
Critical and Follow-up H	leadwa	iys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.10				7.10		6.20				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.20				3.50		3.30				
Delay, Queue Length, ar	nd Leve	el of S	ervice	9		<u>.</u>										
Flow Rate, v (veh/h)						69					26					
Capacity, c (veh/h)						1420					690					
v/c Ratio						0.05					0.04					
95% Queue Length, Q <sub>95</sub> (veh)						0.2					0.1					
Control Delay (s/veh)						7.7					10.4					
Level of Service, LOS						A					В					
Approach Delay (s/veh)						1	.6			- 1(	).4				-	
Approach LOS										I	В					

Copyright  $\ensuremath{\mathbb{C}}$  2017 University of Florida. All Rights Reserved.

HCS7™ TWSC Version 7.1

SLR-ALBERTTA.xtw

Generated: 9/28/2017 9:02:32 AM

# FJS

# Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix C

Existing Conditions Safety and Access

# **Technical Memo**

Date:	Monday, November 06, 2017
Project:	Sheridan Lake Road Corridor Study
To:	Study Advisory Team
From:	Rick Laughlin
Subject:	Safety/Access – Existing Conditions

The City of Rapid City, in cooperation with the Rapid City Metropolitan Planning Organization (MPO), has retained HDR to study a portion of the Sheridan Lake Road corridor in southern Rapid City. The study area includes Sheridan Lake Road from Corral Drive to Albertta Drive and a small portion of Corral Drive.

This memo describes the crash records for the most recent 5-year period and identifies potential safety problems in the corridor. An access inventory is also presented for the corridor and existing access conditions are referenced to access management standards.

### Crash Records

Crash records for the study area were obtained from the SDDOT online mapping tool. The crash records covered the years 2013-2017. A map of crash locations and a summary of the crash records are attached to this memo.

### Safety Evaluation

The crash map shows concentrations of crashes at several intersections in the corridor. A secondary concentration of crashes is evident in the area south of Wildwood Drive where Sheridan Lake road curves and is flanked by steep, forested property. Each of the crash concentrations is addressed below:

- Sheridan Lake Road/Corral Drive 7 crashes in 5 years. No clear trends were evident in the crash data, although 3 of the 7 occurred in snow-covered road conditions.
- Sheridan Lake Road/Catron Boulevard 21 crashes in 5 years. A pattern was discernable involving left-turning vehicles becoming involved in angle crashes with driver contributions including "failure to yield" and "disregard of traffic signal." The crash pattern appears to be related to the growth of Catron Boulevard as a crosstown route. Southbound drivers on Sheridan Lake Road wishing to turn left onto Catron Boulevard frequently encounter peak hour queues and congestion. Their reaction to this congestion is to try to use small gaps in oncoming traffic or push the left turn phase into subsequent yellow and red intervals, resulting in increased crash frequency. Adding capacity to this intersection through additional lanes and revised signalization will help to alleviate the crash problem.

- Sheridan Lake Road/Dunsmore Road 9 crashes in 5 years. The majority of the crashes involved angle incidents that occurred prior to signalization of the intersection. The incidence of this crash type should fall in the coming years due to the control provided by the traffic signal.
- Non-intersection area south of Wildwood Drive 21 crashes in 5 years. The crashes were scattered across a roadway segment a little less than a mile long and included run-off-road crashes and animal hits. The roadway in this area is a curving two-lane rural roadway with an asphalt surface. Crash incidence could be improved with lighting and a high-friction surface treatment, features that may be implemented as the area becomes more urbanized.

#### Access Inventory

An inventory of all the access points throughout the corridor is summarized in the access inventory table and access location maps attached to this memo. Recommendations for each access point will be finalized through further analysis as the corridor study proceeds and will be included in later versions of the access inventory table. The completed table will then become an implementable access plan for the corridor.

### Access Standards and Evaluation

Design of roadways and other facilities in Rapid City are governed by the Design Criteria Manual. The Manual has a number of standards for access spacing, including:

- Minimum distance between intersections 125'
- Minimum signalized approach spacing 1200'
- Minimum corner clearance (arterial) 250' from signalized intersection, 150' from unsignalized intersection

The Manual also addresses the number of driveways allowable from residential, commercial and industrial uses.

The existing access points throughout the corridor have either been permitted or grandfathered because they pre-date the Manual. As property develops or re-develops, the property access will be reviewed for compliance with the Manual.

This study will consider alternatives for development of collector and arterial streets intersecting the corridor. Any recommended intersecting collector and arterial streets will drive access recommendations on Sheridan Lake Road to preserve the safety and efficiency of the collector and arterial street roadways in the study area.



Crash Map – Sheridan Lake Road Corridor

### CRASH RECORDS SUMMARY SHERIDAN LAKE ROAD CORRIDOR STUDY

	CORRAL/PARK													
	MANNER OF			ROAD		DRIVER								
DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER							
			NO CRASHES	IN DATABASE										
		:	SHERIDAN LAK	E RD/CORRAL										
	MANNER OF			ROAD		DRIVER								
DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER							
8/9/2013	BIKE	NON-INCAPACITATING	TURN RIGHT	(NONE)	DAY	(NONE)	CLOUDY							
10/4/2013	ANGLE	NO	TURN LEFT	SNOW	DAY	TOO FAST	SNOW							
2/1/2014	REAR-END	NON-INCAPACITATING	STOPPED	(NONE)	DAY	FAIL YIELD	CLEAR							
4/16/2014	1-VEHICLE	NO	TURN LEFT	(NONE)	DARK-LIGHTED	DWI	CLEAR							
12/28/2014	REAR-END	NO	STRAIGHT	SNOW	DARK-LIGHTED	TOO FAST	SNOW							
12/28/2014	1-VEHICLE	NO	TURN LEFT	SNOW	DARK-LIGHTED	TOO FAST	SNOW							
9/5/2017	REAR-END	NO	STRAIGHT	(NONE)	DAY	TOO CLOSE	CLEAR							
		SHERIC	DAN LAKE RD/	SUMMERSET NOR	TH									

	MANNER OF			ROAD		DRIVER	
DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER
5/3/2013	REAR-END	NO	STRAIGHT	(NONE)	DAY	FAIL YIELD	CLEAR
11/5/2015	REAR-END	NON-INCAPACITATING	STRAIGHT	(NONE)	DAY	TOO CLOSE	CLOUDY

	SHERIDAN LAKE RD/CHATEAUX						
	MANNER OF			ROAD		DRIVER	
DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER
12/20/2014	PEDESTRIAN	NON-INCAPACITATING	TURN LEFT	(NONE)	DARK-LIGHTED	(NONE)	
11/20/2015	ANGLE	NO	STRAIGHT	SNOW	DAY	TOO FAST	SNOW

SHERIDAN LAKE ROAD/CATRON							
	MANNER OF			ROAD		DRIVER	
DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER
3/4/2013	ANGLE	NO	TURN LEFT	(NONE)	DAY	IMPROPER TURN	CLEAR
7/12/2013	ANGLE	POSSIBLE	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLOUDY
8/9/2013	REAR-END	NO	STRAIGHT	(NONE)	DAY	(NONE)	CLEAR
8/21/2013	ANGLE	NON-INCAPACITATING	TURN RIGHT	(NONE)	DAY	DISREGARD SIGNAL	CLOUDY
8/30/2014	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
9/6/2014	ANGLE	NO	STRAIGHT	(NONE)	DAY	DISREGARD SIGNAL	CLEAR
4/6/2015	ANGLE	NO	STRAIGHT	SNOW	DARK-LIGHTED	DISREGARD SIGNAL	SNOW
5/1/2015	REAR-END	INCAPACITATING	STOPPED	(NONE)	DAY	TOO CLOSE	CLEAR
7/22/2015	REAR-END	NO	STOPPED	(NONE)	DAY	FAILURE TO YIELD	CLEAR
8/21/2015	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
11/6/2015	ANGLE	INCAPACITATING	STRAIGHT	(NONE)	DAY	DISREGARD SIGNAL	CLEAR
1/25/2016	ANGLE	NO	TURN LEFT	(NONE)	DARK-LIGHTED	FAILURE TO YIELD	CLEAR
2/5/2016	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
2/18/2016	REAR-END	NO	TURN RIGHT	(NONE)	DARK-LIGHTED	TOO CLOSE	CLEAR
4/7/2016	ANGLE	NO	TURN RIGHT	(NONE)	DAY	DISREGARD SIGNAL	CLEAR
8/5/2016	SIDESWIPE	NO	CHG LANE	(NONE)	DAY	SWERVING	CLOUDY
8/8/2016	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
9/14/2016	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
3/7/2017	ANGLE	NON-INCAPACITATING	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
7/6/2017	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
9/15/2017	REAR-END	POSSIBLE	STRAIGHT	(NONE)	DAY	TOO CLOSE	RAIN

		CATRON/BENDT						
I		MANNER OF			ROAD		DRIVER	
l	DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER
I	12/5/2014	ANGLE	POSSIBLE	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
ľ	11/4/2015	ANGLE	NON-INCAPACITATING	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLOUDY
I	1/9/2017	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR

	SHERIDAN LAKE RD/WILDWOOD						
	MANNER OF			ROAD		DRIVER	
DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER
5/20/2016	REAR-END	NO	STRAIGHT	(NONE)	DAY	TOO CLOSE	CLEAR
2/7/2017	ANGLE	NO	U-TURN	(NONE)	DAY	FAILURE TO YIELD	CLOUDY

	SHERIDAN LAKE ROAD/DUNSMORE						
	MANNER OF			ROAD		DRIVER	
DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER
5/20/2013	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLOUDY
10/8/2014	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
4/26/2015	ANGLE	NO	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	RAIN
7/14/2015	ANGLE	NO	TURN RIGHT	(NONE)	DAY	DISREGARD SIGNAL	CLEAR
9/15/2015	ANGLE	NO	STRAIGHT	(NONE)	DAY	FAILURE TO YIELD	CLOUDY
2/11/2016	ANGLE	NO	STRAIGHT	(NONE)	DARK	FAILURE TO YIELD	CLEAR
4/22/2016	ANGLE	INCAPACITATING	TURN LEFT	(NONE)	DAY	FAILURE TO YIELD	CLEAR
8/13/2016	REAR-END	POSSIBLE	STRAIGHT	(NONE)	DAY	SWERVING	CLEAR
3/3/2017	ANIMAL				DARK		CLEAR

	SHERIDAN LAKE ROAD/TANAGER						
	MANNER OF			ROAD		DRIVER	
DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER
7/18/2013	1-VEHICLE	NO	TURN LEFT	ANIMAL	DARK	RUN OFF ROAD	CLEAR
9/9/2014	REAR-END	NO	STRAIGHT	(NONE)	DAY	TOO CLOSE	RAIN
11/24/2015	ANIMAL				DARK		CLEAR

ſ	SHERIDAN LAKE RD/ALBERTTA							
		MANNER OF			ROAD		DRIVER	
	DATE	COLLISION	INJURY	MANEUVER	CONTRIBUTION	LIGHT	CONTRIBUTION	WEATHER
	11/5/2014	ANIMAL				DARK		CLEAR

# ACCESS INVENTORY AND RECOMMENDATION SHERIDAN LAKE ROAD

ACCESS	LOCATION			
NUMBER	(MILE)	SIDE	ACCESS IDENTIFICATION	RECOMMENDATION
1	0.00	RIGHT	ALBERTTA DRIVE	
2	0.05	LEFT	TANAGER DRIVE	
3	0.11	LEFT	RESIDENTIAL DRIVEWAY	
4	0.16	RIGHT	COMMERCIAL DRIVEWAY	
5	0.18	RIGHT	FIELD ENTRANCE	
6	0.23	RIGHT	OKPEALUK STREET	
7	0.37	LEFT	TANAGER DRIVE	
8	0.37	RIGHT	COYLE AVENUE	
9	0.42	RIGHT	COMMERCIAL DRIVEWAY	
10	0.52	LEFT	MUIRFIELD DRIVE	
11	0.57	LEFT	RESIDENTIAL DRIVEWAY	
12	0.59	RIGHT	FIELD ENTRANCE	
13	0.64	RIGHT	COMMERCIAL DRIVEWAY	
14	0.64	LEFT	FIELD ENTRANCE	
15	0.69	BOTH	DUNSMORE ROAD	
16	1.13		FIELD ENTRANCE	
17	1.13		FIELD ENTRANCE	
18	1.33	RIGHT	FIELD ENTRANCE	
19	1.53	RIGHT	FIELD ENTRANCE	
20	1.65	LEFT	RESIDENTIAL DRIVEWAY	
21	1.91	LEFT	RESIDENTIAL DRIVEWAY	
22	1.91	RIGHT	FIELD ENTRANCE	
23	2.16	RIGHT	FIELD ENTRANCE	
24	2.32	LEFT	WILDWOOD DRIVE	
25	2.42	LEFT	RESIDENTIAL DRIVEWAY	 
26	2.50		ESVAL DRIVE	
27	2.50		COMMERCIAL DRIVEWAY	
28	2.54		COMMERCIAL DRIVEWAY	
29	2.56		RESIDENTIAL DRIVEWAY	
30	2.60		FINCH PLACE	 
31	2.60		COMMERCIAL DRIVEWAY	
32	2.65		RESIDENTIAL DRIVEWAY	
33	2.70		WILDWOOD DRIVE	
34	2.70		CATRON BOULEVARD	¦ 
35	2.77		CHURCH	
36	2.77		COMMERCIAL DRIVEWAY	
37	2.89		SUNSHINE TRAIL	
38	2.93		CHATEAUX RIDGE	
39	2.93		SUMMERSET DRIVE	
40	3.01		RESIDENTIAL DRIVEWAY	i 
41	3.03		RESIDENTIAL DRIVEWAY	
42	3.04		RESIDENTIAL DRIVEWAY	·
43 44	3.08 3.14		SUMMERSET DRIVE	
			VISTA HILLS DRIVE	+
45	3.23 3.28		CORRAL DRIVE	k
46	5.20	LEFI	+	AL DRIVE ACCESS LISTED BELOW
47	0.00	RICHT		
47 48	0.09 0.21		SEVERSON STREET EASY STREET	i 
48 49	0.21		RESIDENTIAL DRIVEWAY	<u>+</u>
49 50	0.22		PARK DRIVE	k
50	0.20	NOFT		



Ζ







Ζ











Ζ

# FJS

# Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix D Private Utility Review and City Utility Maps



## Memo

Date:	Wednesday, August 01, 2018
Project:	Sheridan Lake Road Traffic Study
To:	Todd Peckosh / CORC
From:	HDR

Subject: Private Utility Review

The Sheridan Lake Road Traffic Study limits are shown in Figure 1 and includes the Sheridan Lake Road corridor between Corral Drive and Albertta Drive and the Corral Drive corridor between Park Drive and Sheridan Lake Road. As part of the traffic study, a high level review of public and private utilities was conducted in order to identify any potential major conflicts with a future roadway reconstruction project. This memo documents coordination conducted with private utilities.

The following utility companies provided a description of their facilities or included utility maps within the project area:

- SDN Communications (Paul Lowe)
- Black Hills Corporation (Rob Usera)
- Vast Broadband (Julie Burckhard)
- Midcontinent Communications (Terry Hofer)
- Montana Dakota Utilities (Kip Easton)

Critical facilities in this corridor that were identified with the initial coordination include the MDU regulator station at the southwest corner of Corral Drive and Sheridan Lake Road and the 10" steel gas line (155 psi) that parallels Sheridan Lake Road beginning north of Corral Drive and continuing south through Catron Boulevard. Modification of these facilities will have significant cost. Whether or not the City would bear this potential cost was not determined since right-of-way research and easement information was not collected as part of this study. Figure 2 shows some of the above ground utilities located along Corral Drive near Sheridan Lake Road.



FDS 🛞

SHERIDAN LAKE ROAD STUDY CORRIDOR WITH FUTURE STREET ALTERNATIVES

FIGURE 1

SHERIDAN LAKE ROAD TRAFFIC STUDY



Figure 2. Utilities at the southwest corner of Corral Drive and Sheridan Lake Road.

A summary of private facilities is included below. The utility maps are included at the end of this memo.

### SDN Communications

- Corral Drive north side of roadway from school to Sheridan Lake Road
- Sheridan Lake Road west side of roadway between Corral Drive and Catron Boulevard
- Catron Boulevard south side of roadway from Sheridan Lake Road and continuing east

### Black Hills Corporation

- Corral Drive Overhead Electric south side of roadway
- Sheridan Lake Road Underground Electric east side of roadway between Corral Drive and extending 300' south of Sunshine Trail
- Catron Boulevard north side of roadway beginning 400' east of Sheridan Lake Road (at drainageway) and continuing east

### Vast Broadband

- Corral Drive north side of roadway from Severson Street to Sheridan Lake Road
- Sheridan Lake Road east side of roadway from Corral Drive and continuing north
- Sheridan Lake Road 600' section on east side of roadway at Summerset Drive and continuing south (to drainageway)
- Sheridan Lake Road east side of roadway between Catron Boulevard and Esval Drive
- Sheridan Lake Road west/north side from Wildwood Drive to Croyle Avenue.
- Catron Boulevard south side of roadway from Sheridan Lake Road to Bendt Drive where it crosses to the north side
- Catron Boulevard north side of roadway beginning 400' east of Sheridan Lake Road (at drainageway) and continuing east

### **Midcontinent Communications**

- Corral Drive overhead on south side of roadway, underground crossing at Sheridan Lake Road
- Sheridan Lake Road underground on east side of roadway between Corral Drive and Sunshine Trail
- Sheridan Lake Road underground on east side of roadway between Catron Boulevard and Esval Drive
- Sheridan Lake Road underground on east/south side of roadway from Wildwood Drive continuing through Albertta Drive with crossings at Dunsmore Road, Muirfield Drive and Tanager Drive
- Catron Boulevard underground south side of roadway from Sheridan Lake Road and continuing east; crossing at Bendt Drive

### Montana Dakota Utilities

- Corral Drive Regulator station in the southwest quadrant of Corral Drive and Sheridan Lake Road
- Sheridan Lake Road 4" Steel and Poly from Corral Drive and continuing north; 10" intermediate pressure steel from Corral Drive and continuing north
- Sheridan Lake Road 4" poly and 10" intermediate pressure steel from Corral Drive and continuing south through Catron Boulevard; crossings at Corral Drive (2" poly), Summerset Drive (3" poly) and Catron Boulevard (4" poly).

Sheridan Lake Road Traffic Study Utility Coordination Maps

### Fagerness, Aaron

From:	Paul Lowe <paul.lowe@sdncommunications.com></paul.lowe@sdncommunications.com>
Sent:	Wednesday, July 25, 2018 11:01 AM
То:	Fagerness, Aaron
Subject:	RE: Sheridan Lake Road Project - Corral Drive to Albertta Drive

We have facilities going to the school on the north side of Corral then going south on the west side of Sheridan Lake Road and east on the south side of Catron-3x1.25 Inch Conduit with a fiber in one conduit-Thanks Paul

### Fagerness, Aaron

From:	Usera, Rob <rob.usera@blackhillscorp.com></rob.usera@blackhillscorp.com>
Sent:	Wednesday, July 25, 2018 2:58 PM
То:	Fagerness, Aaron
Cc:	Lewis, Brian
Subject:	FW: Sheridan Lake Road Project - Corral Drive to Albertta Drive
Attachments:	Sheridan Lake Road Study - Location Map.pdf; ATT00001.htm

#### Aaron,

Here is a general area of our facilities that may be impacted along that route. Let me know if you have any questions.





### Thanks Robert M. Usera

Manager of Utility Construction Planning Office: 605-721-2618 Mobile: 605-391-7587

From: Schwengler, Louie
Sent: Wednesday, July 25, 2018 12:22 PM
To: Usera, Rob <Rob.Usera@blackhillscorp.com>
Subject: Fwd: Sheridan Lake Road Project - Corral Drive to Albertta Drive

### **Fagerness**, Aaron

From: Sent: To: Subject: Attachments: Julie Burckhard <Julie.Burckhard@vastbroadband.com> Wednesday, July 25, 2018 3:50 PM Fagerness, Aaron RE: Sheridan Lake Road Project - Corral Drive to Albertta Drive SKM\_C364e18072503050.pdf

Hi Aaron,

I've attached a couple maps to give you a rough idea where Vast has underground plant. Also we do have plant on the pole lines in this area. I don't show those on the maps. If you need that information let me know. If you have questions feel free to email or call.

Thanks,

Julie Burckhard Construction Supervisor



809 Deadwood Avenue Rapid City, SD 57702 Tel: **605-716-3769** Cell: **605-415-0692** 





### Fagerness, Aaron

From: Sent: To: Subject: Attachments: Terry Hofer <Terry.Hofer@Midco.com> Thursday, July 26, 2018 11:23 AM Fagerness, Aaron RE: [EXTERNAL] - Sheridan Lake Road Project - Corral Drive to Albertta Drive Sheridan Lake Road.dwg

Here you go Anything in green is underground facility Anything in red is overhead facility. Let me know if you need anything else.



### Terry Hofer

CONSTRUCTION COORDINATOR III

Office: 605.791.7123 Terry.Hofer@Midco.com

Midco.com












#### **Fagerness**, Aaron

From:	Easton, Kip <kip.easton@mdu.com></kip.easton@mdu.com>
Sent:	Friday, July 27, 2018 11:45 AM
То:	Fagerness, Aaron
Subject:	FW: Sheridan Lake Road Project - Corral Drive to Albertta Drive
Attachments:	Sheridan Lk Rd - Corral to Catron - Page 1.pdf; Sheridan Lk Rd - Corral to Catron - Page
	2.pdf; Sheridan Lk Rd - Corral to Catron - Page 3.pdf; Sheridan Lk Rd - Corral to Catron -
	Page 4.pdf

Aaron,

I have included a few snap shots of our system from Corral Dr. to Catron Blvd. Page 1 will show our regulator station on the Southwest corner of Sheridan Lake Rd. and Corral Dr. The station is a very significant part of our infrastructure and will be difficult and expense to move or adjust. The following pages will show our distribution system to include medium pressure and intermediate pressure lines on Sheridan lake Rd.

A blue line will indicate a poly line and green will be a steel line, both will be marked with size, pressure class and vintage.

For example: 10" IP '91 in green would indicate a 10" steel line with intermediate pressure (155psi) and installed in 1991.

If I can be of further help let me know.

















SHERIDAN LAKE ROAD GIS - WATER MAP 3





FDS 🛞

## SHERIDAN LAKE ROAD GIS - WATER MAP 4





#### SHERIDAN LAKE ROAD TRAFFIC STUDY



























#### SHERIDAN LAKE ROAD TRAFFIC STUDY





SHERIDAN LAKE ROAD GIS - STORM SEWER MAP 4









# FJS

# Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix E

2045 No-Build Traffic Analysis

# **Technical Memo**

Date:	Monday, December 24, 2018
Project:	Sheridan Lake Road Corridor Study
To:	Study Advisory Team
From:	Dustin Hamilton
Subject:	2045 No-Build Conditions Analysis (updated)

Future transportation needs in the Sheridan Lake Road corridor have been determined by forecasting the travel demand in the horizon year (2045) and analyzing the capability of the existing transportation system to handle the future transportation demand. This memorandum documents the analysis of the existing roadways under 2045 traffic conditions (2045 No-Build scenario).

Future traffic demand was determined using the travel demand model maintained by the Rapid City MPO and the City of Rapid City. Link data for the 2013 and 2040 models were compared to determine link growth factors which were then adjusted by straight-line annual growth to determine growth factors to the 2045 horizon year. Those factors were used to create 2045 peak hour turning volumes. The turning volume forecasts were balanced to create a homogenous network for capacity analysis.

Each of the study area intersections were analyzed with 2045 forecast volumes using Highway Capacity Manual techniques, as implemented in the Highway Capacity Software (McTrans Center and FHWA).

The 2045 peak hour turning volumes and levels of service are shown in **Figure 4** and the capacity analysis output sheets are provided in the **Appendix**. Comparisons of the average annual daily traffic for segments of the study corridor are shown in **Table 1** under existing and forecast traffic conditions.

The capacity analysis shows that all the currently signalized intersections will require improvements to maintain desired traffic capacity by 2045. Minor intersections with stop sign-controlled approaches may also need selected improvements. High through-volumes on Sheridan Lake Road indicate that the roadway would benefit from additional lanes throughout the corridor. Expansion of the existing rural cross-section portion of the roadway to an urban cross-section will likely be needed before the planning horizon.

Alternatives for corridor improvement and alternative routes will be vetted during the next phase of the study process.



### TABLE 1 - EXISTING AND FUTURE AADT

SHERIDAN LAKE ROAD CORRIDOR STUDY

	2016	2045
SECTOR	AADT	AADT
SHERIDAN LAKE ROAD, NORTH OF CORRAL DRIVE	11,200	20,700
CORRAL DRIVE, WEST OF SHERIDAN LAKE ROAD	4,600	7,600
SHERIDAN LAKE ROAD, BETWEEN CORRAL & CATRON	16,000	29,600
CATRON BOULEVARD, EAST OF BENDT DRIVE	11,700	18,800
SHERIDAN LAKE ROAD, BETWEEN CATRON & WILDWOOD	13,100	24,200
SHERIDAN LAKE ROAD, BETWEEN WILDWOOD & DUNSMORE	12,600	21,900
DUNSMORE ROAD, SOUTH OF SHERIDAN LAKE ROAD	3,900	7,200
SHERIDAN LAKE ROAD, WEST OF DUNSMORE ROAD	11,400	19,800

# APPENDIX

**Capacity Analysis Output Sheets** 

hdrinc.com

HCS7 Two-Way Stop-Control Report											
General Information		Site Information									
Analyst	DH	Intersection	CORRAL/PARK								
Agency/Co.	HDR	Jurisdiction	RAPID CITY								
Date Performed	12/14/2018	East/West Street	CORRAL DRIVE								
Analysis Year	2045	North/South Street	PARK DRIVE								
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	SLR CORRIDOR STUDY	-									
Lanes											
2 4 t 1 4 4 5 6 6 7											
	↓ L										



Vehicle Volumes and Adj	ustme	nts															
Approach		Eastb	ound		Westbound					North	bound		Southbound				
Movement	U L T R			U L T R			U L T R				U L T R			R			
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		1	1	0		0	1	1	0	0	0	0	0	0	1	1	
Configuration		L	Т				Т	R							Т	R	
Volume (veh/h)		25	95				120	915							885	45	
Percent Heavy Vehicles (%)		2	3				3	3									
Proportion Time Blocked																	
Percent Grade (%)		(	0				0										
Right Turn Channelized					Yes								No				
Median Type   Storage				Undi	vided												
Critical and Follow-up Headways																	
Base Critical Headway (sec)		7.1	6.5				6.5	6.2									
Critical Headway (sec)		6.42	6.53				6.53	6.23									
Base Follow-Up Headway (sec)		3.5	4.0				4.0	3.3									
Follow-Up Headway (sec)		2.22	4.03				4.03	3.33									
Delay, Queue Length, and	d Leve	l of Se	ervice				<u>.</u>				<u>.</u>						
Flow Rate, v (veh/h)		28	106				133	1017									
Capacity, c (veh/h)		1563	248				231	1082									
v/c Ratio		0.02	0.43				0.58	0.94									
95% Queue Length, Q <sub>95</sub> (veh)		0.1	2.0				3.2	15.9									
Control Delay (s/veh)		7.3	29.9				39.8	34.6									
Level of Service (LOS)		A	D				E	D									
Approach Delay (s/veh)	25.2				35.2						-						
Approach LOS	D			E								F					

Copyright  $\ensuremath{\mathbb{C}}$  2018 University of Florida. All Rights Reserved.

### **HCS7 Signalized Intersection Results Summary**

		HCS	7 Sig	nalize	d In	tersec	tion R	lesi	ults s	Sun	nmar	y					
General Inform						Intor	react	ion Inf	ormatic			Jadada ↓ (	- 				
	lation	HDR						tersection Information uration, h 0.25					<u>,                                    </u>				
Agency		DH												R			
Analyst		<u> </u>	Analysis Date Oct 23, 2 Time Period AM			5, 2017		PHF					-	"Ĭr	2.4		
Jurisdiction						AM					Deried	0.90	0			*	
Urban Street SHERIDAN LAKE ROAD						r 2045 l			1	ysis	Period	1> 7:(	0				
Intersection		CORRAL DRIVE		File Na	le Name SLR-CORRAL.xus												
Project Description SLR CORRIDOR STUDY														ter i	14141	<u>7</u> [[[]]	
Demand Information			EB WB						NB		SB						
Approach Movement			L	Т	R	L		Т	R	L	Т	R	L	Т	R		
Demand ( $v$ ), veh/h			335		645					760	1215	5		735	275		
Signal Informa	10	Y		_		21	2										
Cycle, s	148.0	Reference Phase	2		51	- SA	K						Ĵ ′∣⊾₁	2	3	4	
Offset, s	0	Reference Point	End	Green	44.5	55.5	31.0	0.	0	0.0	0.0		•			-	
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	0.0			<b>vt</b>		~	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	2.0	0.	0	0.0	0.0		5	6	7		
					_			. 1		_							
Timer Results				EBI	-	EBT	WB	-	WB	T	NBL		NBT	SB		SBT	
Assigned Phas	е				$\rightarrow$	8		_			1		6			2	
Case Number					$\rightarrow$	9.0		_			1.0		4.0			7.3	
Phase Duration					37.0			_		_	50.0	) 1	111.0		_	61.0	
Change Period						6.0					5.5		5.5			5.5	
Max Allow Hea	2 1	,				4.2					5.1	-	4.0			4.0	
Queue Clearan		1 = 7				33.0					46.5	_				57.5	
Green Extension Time ( <i>g</i> e ), s					0.0					0.0		0.0		0.0			
Phase Call Probability					1.00					1.00		1.00			1.00		
Max Out Proba	bility					1.00					1.00	)	1.00			1.00	
Movement Gro	oup Res	sults		EB			WB				NB			SB			
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R	
Assigned Move	ement			3		18					1	6			2	12	
Adjusted Flow	Rate ( v	), veh/h		372		717					844	1350			817	206	
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	In	1688		1502					1688	1772			1772	1502	
Queue Service	Time ( g	g s ), S		31.0		31.0					44.5	105.5			55.5	14.7	
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		31.0		31.0					44.5	105.5			55.5	14.7	
Green Ratio ( g	ŋ∕C)			0.21		0.21					0.69	0.71			0.38	0.38	
Capacity ( c ), v	/eh/h			353		315					556	1263			664	563	
Volume-to-Cap	acity Ra	itio(X)		1.053		2.279					1.519	1.069			1.229	0.365	
Back of Queue	( Q ), ft	/In ( 95 th percentile	)	688.9		2516. 7					2171	1764			1633.8	233.4	
Back of Queue	(Q), V	eh/In ( 95 th percent	ile)	27.1		99.1					85.5	69.4			64.3	9.2	
	. ,	RQ) (95 th percen		6.89		0.00					21.71	0.00			0.00	1.94	
Uniform Delay		, , ,	,	58.5		58.5					45.8	21.3			46.3	33.5	
Incremental De	. ,			62.5		585.4					242.5	45.9			116.0	0.4	
Initial Queue Delay ( $d 3$ ), s/veh			0.0		0.0					0.0	0.0			0.0	0.0		
Control Delay ( <i>d</i> ), s/veh				121.0		643.9					288.3	67.1			162.2	33.9	
Level of Service (LOS)				F		F					F	F			F	С	
Approach Delay, s/veh / LOS			465.	1	F	0.0				152.		F	136	.4	F		
Intersection De	-					22			102.2					F			
Multimodal Re	sults				EB			W	В			NB			SB		
Pedestrian LOS	S Score	/ LOS		1.97	,	В	2.10	)	В		0.67	,	А	1.9	3	В	
Bicycle LOS So	core / LC	DS				F					4.11		D	2.1	7	В	
					al and												

Copyright © 2018 University of Florida, All Rights Reserved.
	HCS7 Two-Way Stop	o-Control Report								
General Information		Site Information								
Analyst	DH	Intersection	SHERIDAN LAKE/SUMMERSET							
Agency/Co.	HDR	Jurisdiction	RAPID CITY							
Date Performed	12/14/2018	East/West Street	SUMMERSET DRIVE							
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD							
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90							
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25							
Project Description	SLR CORRIDOR STUDY									
Lanes										



#### **Vehicle Volumes and Adjustments** Eastbound Approach Westbound Northbound Southbound U R U R U R L Т L т U L Т R L Т Movement Priority 12 7 1U 2 3 4U 4 5 10 11 8 9 1 6 Number of Lanes 0 0 0 0 1 0 0 0 1 0 0 1 1 0 LR ΤR Configuration L Т Volume (veh/h) 5 70 1905 5 15 1635 2 2 Percent Heavy Vehicles (%) 2 Proportion Time Blocked Percent Grade (%) 0 **Right Turn Channelized** Median Type | Storage Undivided **Critical and Follow-up Headways** Base Critical Headway (sec) 7.1 6.2 4.1 Critical Headway (sec) 6.42 6.22 4.12 Base Follow-Up Headway (sec) 3.5 3.3 2.2 Follow-Up Headway (sec) 3.52 3.32 2.22 Delay, Queue Length, and Level of Service Flow Rate, v (veh/h) 83 17 Capacity, c (veh/h) 28 256 0.07 v/c Ratio 2.97 10.0 0.2 95% Queue Length, $Q_{95}$ (veh) Control Delay (s/veh) 1181.1 20.0 Level of Service (LOS) F С Approach Delay (s/veh) 1181.1 0.2 Approach LOS F

HCS7 Two-Way Stop-Control Report											
General Information		Site Information									
Analyst	DH	Intersection	SHERIDAN LAKE/CHATEAUX								
Agency/Co.	HDR	Jurisdiction	RAPID CITY								
Date Performed	12/14/2018	East/West Street	CHATEAUX RIDGE								
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD								
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	SLR CORRIDOR STUDY										
Lanes											



Vehicle Volumes and Adj	ustme	nts														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LTR				LTR			L		TR		L		TR
Volume (veh/h)		5	0	5		5	0	50		0	1855	5		25	1340	5
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Percent Grade (%)			0				0									
Right Turn Channelized																
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.12	6.52	6.22		7.12	6.52	6.22		4.12				4.12		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.52	4.02	3.32		3.52	4.02	3.32		2.22				2.22		
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)			11				61			0				28		
Capacity, c (veh/h)			1				21			449				269		
v/c Ratio			11.37				2.95			0.00				0.10		
95% Queue Length, Q <sub>95</sub> (veh)			2.8				7.9			0.0				0.3		
Control Delay (s/veh)			10948. 1				1266.8			13.0				19.9		
Level of Service (LOS)			F				F			В				С		
Approach Delay (s/veh)		109	48.1			12	66.8			0	.0			C	.4	
Approach LOS			F				F									

	псэ	7 Sig	nalize	ea mu	ersec		test	iits St	imma	ry				
								Interes		f		1 0	I ad <sub>a</sub> J <sub>a</sub> aba ↓	b L
General Information										formati	on	- 1		** <i>'</i> *
Agency	HDR					4 0040		Duratio		0.25				R_
Analyst	DH		1		e Dec 1	4, 2018		Area Ty	/pe	Othe	r	×		~
Jurisdiction	RAPID CITY		Time F		AM			PHF	<u> </u>	0.90			w+e s	
Urban Street	SHERIDAN LAKE		-		r 2045			Analysi	s Perio	l 1> 7:	00			F 10
Intersection	CATRON BOULEV		File Na	ame	SLR-0	CATRON	V.xus					į	<u> </u>	
Project Description	SLR CORRIDOR S	TUDY											1 1 1 <del>1</del> 4 Y	TP (
Demand Information				EB			W	/B		NB			SB	
Approach Movement			L	T	R	L	1	- F R		T	R	L	T	R
Demand ( v ), veh/h			40	55	5	105	2			905	_	1025	280	45
(),					-								1	
Signal Information				215	22		<u> </u>							<u> </u>
Cycle, s 150.0	Reference Phase	2			- SA									
Offset, s 0	Reference Point	End	Green	55.0	58.0	19.0	0.0	D.0	) 0.			2	3	4
Uncoordinated Yes	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0				╲┖╴	<b>v</b> t		7
Force Mode Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	D.0	) 0.	)	5	6	7	
Timer Results			EBI	-	EBT	WB	L	WBT	N	3L	NBT	SBI	-	SBT
Assigned Phase					8		$\rightarrow$	4	-		6	5		2
Case Number					6.0		$\rightarrow$	5.0	-		6.3	1.0		4.0
Phase Duration, s				2			$\rightarrow$	25.0 6.0	-		65.0	60.0		125.0
Change Period, (Y+R	,			6.0					_		7.0	5.0		7.0
	Max Allow Headway ( MAH ), s				5.3		$\rightarrow$	5.3 21.0	-		5.0	5.1		5.0
Queue Clearance Time				8.0				-		60.0	57.0		9.7	
	Green Extension Time ( $g$ $_{e}$ ), s				4.6		0.0		-		0.0	0.0		14.6
Phase Call Probability					1.00		$\rightarrow$	1.00			1.00	1.00		1.00
Max Out Probability					0.51			1.00			1.00	1.00	)	0.00
Movement Group Res	sults			EB			WE	3		NB	_		SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement			3	8	18	7	4	14	1	6		5	2	12
Adjusted Flow Rate ( v	′), veh/h		44	67		117	22	678	6	1006		1139	339	1
Adjusted Saturation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1389	1746		1335	177	2 1502	2 1042	1772	1	1688	1746	1
Queue Service Time (	g s ), s		4.4	5.2		13.0	1.7	' 19.0	0.5	58.0		55.0	7.7	
Cycle Queue Clearanc	e Time ( <i>g c</i> ), s		6.0	5.2		18.2	1.7	' 19.0	0.5	58.0		55.0	7.7	
Green Ratio ( g/C )			0.13	0.13		0.13	0.1	3 0.49	0.39	0.39		0.77	0.79	
Capacity ( c ), veh/h			209	221		171	224	1 741	451	685		667	1374	
Volume-to-Capacity Ra	atio ( X )		0.213	0.301		0.683	0.09	9 0.91	5 0.01	2 1.468		1.708	0.247	
Back of Queue(Q), ft	/In ( 95 th percentile)	)	72.2	107.8		219.1	34.	8 851.	7 5.8	2530. 6		3261.6	108.6	
Back of Queue ( Q ), v	eh/In ( 95 th percent	ile)	2.8	4.2		8.6	1.4	33.5	0.2	99.6		128.4	4.3	
Queue Storage Ratio (	RQ) (95 th percent	tile)	0.44	0.00		1.83	0.0	0 3.79	0.03	0.00		26.09	0.00	
Uniform Delay ( d 1 ), s	/veh		60.6	59.5		67.8	57.	9 35.1	28.4	46.0		43.0	4.2	
Incremental Delay ( d 2	2), s/veh		0.7	1.1		11.8	0.3	3 16.2	0.0	218.4		325.0	0.1	
Initial Queue Delay ( d	з ), s/veh		0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay ( d ), s/v	eh		61.3	60.6		79.5	58.	2 51.3	28.4	264.4		368.0	4.4	
Level of Service (LOS)	evel of Service (LOS)			E		E	E	D	С	F		F	Α	
	pproach Delay, s/veh / LOS			)	Е	55.5	5	E	26	3.1	F	284.	6	F
Intersection Delay, s/ve	eh / LOS				21	6.2						F		
				_										
Multimodal Results				EB	-		WE			NB			SB	
Pedestrian LOS Score			2.22		B	1.99		B	2.		C	1.85		B
Bicycle LOS Score / LO	5		0.67		Α	1.84	+	В	1.	55	В	2.93	5	С

	HCS7 Two-Wa	y Stop-Control Report							
General Information		Site Information							
Analyst	DH	Intersection	CATRON/BENDT						
Agency/Co.	HDR	Jurisdiction	RAPID CITY						
Date Performed	12/14/2018	East/West Street	CATRON BOULEVARD						
Analysis Year	2045	North/South Street	BENDT DRIVE						
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90						
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25						
Project Description	SLR CORRIDOR STUDY								
Lanes									
Lanes									

Major Street: East-West

Vehicle Volumes and Adj	ustme	nts														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		1	1	0		1	1	0
Configuration		L	Т	TR		L	Т	TR		L		TR		L		TR
Volume (veh/h)	0	10	1430	50	0	40	965	10		35	5	25		35	5	40
Percent Heavy Vehicles (%)	2	2			2	2				2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)											0				0	
Right Turn Channelized																
Median Type   Storage		Undivided														
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.14				4.14				7.54	6.54	6.94		7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		11				44				39		33		39		50
Capacity, c (veh/h)		640				389				13		75		22		108
v/c Ratio		0.02				0.11				3.01		0.45		1.80		0.46
95% Queue Length, Q <sub>95</sub> (veh)		0.1				0.4				5.8		1.8		5.0		2.0
Control Delay (s/veh)		10.7				15.4				1495.9		87.4		760.7		64.2
Level of Service (LOS)		В				С			F F					F		F
Approach Delay (s/veh)		0	.1			0	.6			. 84	5.8		368.9			
Approach LOS									F F							

Copyright  $\ensuremath{\mathbb{C}}$  2018 University of Florida. All Rights Reserved.

HCS7 Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	DH	Intersection	SHERIDAN/WILDWOOD							
Agency/Co.	HDR	Jurisdiction	RAPID CITY							
Date Performed	12/14/2018	East/West Street	WILDWOOD DRIVE							
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD							
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90							
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25							
Project Description	SLR CORRIDOR STUDY		·							
Lanes										

Vehicle Volumes and Adju	ustme	nts															
Approach		Eastb	ound			West	ound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1	
Configuration			LR							L	Т				Т	R	
Volume (veh/h)		15		5						0	1305				375	15	
Percent Heavy Vehicles (%)		2		2						2							
Proportion Time Blocked																	
Percent Grade (%)		(	0														
Right Turn Channelized														Ν	lo		
Median Type   Storage				Undi	vided												
Critical and Follow-up He	eadwa	ys															
Base Critical Headway (sec)		7.1		6.2						4.1							
Critical Headway (sec)		6.42		6.22						4.12							
Base Follow-Up Headway (sec)		3.5		3.3						2.2							
Follow-Up Headway (sec)		3.52		3.32						2.22							
Delay, Queue Length, and	l Leve	l of Se	ervice														
Flow Rate, v (veh/h)			22							0							
Capacity, c (veh/h)			102							1125							
v/c Ratio			0.22							0.00							
95% Queue Length, Q <sub>95</sub> (veh)			0.8							0.0							
Control Delay (s/veh)			49.8							8.2							
Level of Service (LOS)			E							A							
Approach Delay (s/veh)		49	9.8	-						0.0							
Approach LOS			E														

Offset, s         0         Reference Point         End Green         S         111 Vellow         0         0.			HUS	7 Sig	nalize	ea int	ersec		kesu	its Sur	nmar	у					
Interference Plane         Interference Plane <th colspa<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>r</td><td></td><td></td><td></td><td></td><td>1 1</td><td>al laba l</td><td>6. I.</td></th>	<td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>r</td> <td></td> <td></td> <td></td> <td></td> <td>1 1</td> <td>al laba l</td> <td>6. I.</td>									r					1 1	al laba l	6. I.
Integration       RAPID ITY       Analysis Date       Dec 14, 2018       Area Type       Other       Diff         Jurisdiction       RAPID ITY       Time Period       AM       PHF       0, 50         Jurisdiction       DUISMORE ROAD       File Name       SLR CORRIDOR STUDY       Time Period       NB       SSR         Project Description       SLR CORRIDOR STUDY       EB       VI       R       L       T       R       R       R       R       R       R       R       R <td< td=""><td></td><td>nation</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1/</td><td>on</td><td>- 1</td><td>the second s</td><td></td></td<>		nation										1/	on	- 1	the second s		
Junsdiction       RAPID CITY       Time Period       AM       PHF       0.90         Jrban Street       SHERIDAN LAKE ROAD       Analysis Year       2045 NO BUILD       Analysis Period       1>700         Project Description       SLR CORRIDOR STUDY         Demand (v), veh/h       L       T       R       L       T <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td><td>R_</td></th<>												_				R_	
Jrihan Street       SHERIDAN LAKE ROAD       Analysis Year       2045 NO BUILD       Analysis Period       1>7:00       I <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>4, 2018</td> <td></td> <td>+ -</td> <td>e</td> <td></td> <td></td> <td></td> <td></td> <td>~_ <mark>}</mark></td>								4, 2018		+ -	e					~_ <mark>}</mark>	
Intersection       DUNSMORE ROAD       File Name       SLR-DUNSMORE xus       Note       Note       Note         Project Description       SLR CORRIDOR STUDY       SLR-DUNSMORE xus       Note															W + E B	÷	
Project Description         SLR CORRIDOR STUDY         Kell and the second state of t										-	Period	1> 7:0	00			7 7	
Demand Information         EB         WB         NB         SB           Approach Movement         L         T         R         L         T					File Na	ame	SLR-E	DUNSM	ORE.)	(us					*		
Approach Movement       L       T       R	Project Descrip	tion	SLR CORRIDOR S	TUDY										n n	4 1 4 Y	7 r	
Approach Movement       L       T       R	Demand Inform	nation				EB			W	3		NB			SB		
Demand (v), veh/h       10       895       155       55       240       85       30       25       125       285       85       10         Signal Information Cycle, s       110.0       Reference Point       Call       Call </td <td>Approach Move</td> <td>ement</td> <td></td> <td></td> <td>L</td> <td>ii</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td>	Approach Move	ement			L	ii	R	L	Т	R	L	Т	R	L	Т	R	
Signal Information Dycle. s         110.0         Reference Phase         2           Diffset, s         0         Reference Phase         2           Diffset, s         0         Reference Phase         2           Face Mode         Fixed         Simult. Gap EW         0           Fixed Simult. Gap EW         0         Red         14.0         4.0         0.0         0.0         0.0           Timer Results         EBL         EBT         WBL         WBT         NBL         NBT         SBL         SBL           Assigned Phase         2         VBL         6         8.0         6.0         7.0         5.0         8.0         6.0         7.0 <td></td> <td></td> <td></td> <td></td> <td>10</td> <td>895</td> <td>155</td> <td>55</td> <td>24</td> <td>0 85</td> <td>30</td> <td>25</td> <td>125</td> <td>285</td> <td>85</td> <td>10</td>					10	895	155	55	24	0 85	30	25	125	285	85	10	
Cycle.s         110.0         Reference Phase         2         2         2         2         2         2         2         3         0 </td <td></td> <td><u> </u></td> <td><u></u></td>															<u> </u>	<u></u>	
Offset, s       0       Reference Point       End Green (S.0.       So       3.11 (Procendinated)       0       0.0			1	1		₹	126							_		$\mathbf{A}$	
Incoordinated       Yes       Simult Gap E/W       On       Yes       Yes       Simult Gap E/W       On       Yes	Cycle, s	110.0		2		Ř	§∩	2						€, l	3	<b>∠↓</b> ¶	
Incoordinated       Yes       Simult. Gap.EW       On       Red       4.0       0.0 <th< td=""><td>Offset, s</td><td>0</td><td></td><td></td><td>Green</td><td>63.0</td><td>31.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td><td></td><td><u> </u></td><td>-</td><td></td></th<>	Offset, s	0			Green	63.0	31.0	0.0	0.0	0.0	0.0			<u> </u>	-		
Finer Results         EBL         EBT         WBL         WBT         NBL         NBT         SBL         SBT           Assigned Phase         2         6         8         4         4           Case Number         7.0         5.0         8.0         6.0           Phase Duration, s         7.0         5.0         8.0         6.0           Change Period, (Y+R c), s         9.0         7.0         7.0         7.0           Max Allow Headway (MAH), s         4.0         4.0         4.4         4.4           Queue Clearance Time (g : ), s         64.0         65.0         10.6         33.0           Green Extension Time (g : ), s         0.0         1.00         1.00         1.00         1.00           Max Out Probability         1.00         1.00         1.00         1.00         1.00           Movement Group Results         EB         WB         NB         SB         8           Assigned Movement         5         2         12         1         6         16         8         18         7         4         14           Adjusted Saturation Flow Rate (s), veh/h/in         1106         89         61         267         56         156	Uncoordinated			<u> </u>	Yellow	5.0	3.0	0.0	0.0	0.0	0.0					₩.	
Assigned Phase       2       6       8       4         Case Number       7.0       5.0       8.0       6.0         Phase Duration, s       72.0       72.0       38.0       38.0         Change Period, (Y+R c), s       9.0       9.0       7.0       7.0         Max Allow Headway (MAH), s       4.0       4.0       4.4       4.4         Queue Clearance Time (g *), s       64.0       65.0       10.6       33.0         Sreen Extension Time (g *), s       0.0       0.0       2.3       0.0         Phase Call Probability       1.00       1.00       1.00       1.00       1.00         Max Allow Headway (MAH), s       0.0       1.00       0.01       1.00       1.00         Assigned Movement       L       T       R       L       T       R       L       T       R         Assigned Movement       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T <td>Force Mode</td> <td>Fixed</td> <td>Simult. Gap N/S</td> <td>On</td> <td>Red</td> <td>4.0</td> <td>4.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td></td> <td>5</td> <td>6</td> <td>7</td> <td>8</td>	Force Mode	Fixed	Simult. Gap N/S	On	Red	4.0	4.0	0.0	0.0	0.0	0.0		5	6	7	8	
Assigned Phase       2       6       8       4         Case Number       7.0       5.0       8.0       6.0         Phase Duration, s       72.0       72.0       38.0       38.0         Change Period, (Y+R c), s       9.0       9.0       7.0       7.0         Max Allow Headway (MAH), s       4.0       4.0       4.4       4.4         Queue Clearance Time (g *), s       64.0       65.0       10.6       33.0         Sreen Extension Time (g *), s       0.0       0.0       2.3       0.0         Phase Call Probability       1.00       1.00       1.00       1.00       1.00         Max Allow Headway (MAH), s       0.0       1.00       0.01       1.00       1.00         Assigned Movement       L       T       R       L       T       R       L       T       R         Assigned Movement       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T <td></td>																	
Case Number       7.0       5.0       8.0       6.0         Phase Duration, s       72.0       72.0       72.0       38.0       38.0         Change Period, (Y+R_c), s       9.0       9.0       9.0       7.0       7.0       7.0         Wax Allow Headway (MAH), s       4.0       4.0       4.0       4.4       4.4         Queue Clearance Time (g *), s       64.0       65.0       10.6       33.0         Green Extension Time (g *), s       0.0       0.0       2.3       0.0         Phase Call Probability       1.00       1.00       1.00       1.00       1.00         Max Out Probability       1.00       1.00       0.01       1.00       1.00         Movement Group Results       EB       VB       1.00       0.01       1.00         Maysted Flow Rate (v), veh/h       1006       89       61       267       56       156       317       100         Adjusted Sturation Flow Rate (s), veh/h/in       1768       1502       566       1772       1502       116       1269       1754         Queue Clearance Time (g *), s       62.0       3.0       63.0       8.3       1.8       6.5       22.4       4.8					EBI			WBL			NB			SBL	-		
Phase Duration, s       72.0       72.0       38.0       38.0         Change Period, (Y+R c), s       9.0       9.0       9.0       7.0       7.0       7.0       7.0         Max Allow Headway (MAH), s       4.0       4.0       4.4       4.4       4.4       4.4         Queue Clearance Time (g e), s       64.0       65.0       10.6       33.0       .0.0         Green Extension Time (g e), s       0.0       0.0       2.3       0.0       .0.0         Phase Call Probability       1.00       1.00       1.00       0.01       1.00       1.00       1.00         Max Alowement       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       L       T       R       Agaigned Moxement       5       2       1       6       16       3       8       7       4       14         Adjusted Flow Rate (v), veh/h       1006       89       61       267       56       156       1516       12		e								-			-				
Change Period, $(Y+R_c)$ , s       9.0       9.0       9.0       7.0       7.0       7.0         Max Allow Headway (MAH), s       4.0       4.0       4.0       4.4       4.4         Daueu Clearance Time (g : ), s       64.0       65.0       10.6       33.0         Green Extension Time (g : ), s       0.0       0.0       2.3       0.0         Phase Call Probability       1.00       1.00       1.00       1.00       1.00         Max Aloused From Results       EB       WB       NB       SB       1.00         Movement Group Results       EB       WB       NB       SB       1.00       1.00         Movement Group Results       EB       WB       NB       SB       1.00       1.00       1.00         Adjusted Flow Rate (v), veh/h       1006       89       61       267       56       156       1317       100         Adjusted Saturation Flow Rate (s), veh/h/ln       1768       1502       566       1772       1502       1516       1269       1754         Queue Clearance Time (g c), s       22.00       3.0       1.0       8.3       1.8       1.5       2.2.4       4.8         Cycle Queue Clearance Time (g c), s       62.0 <td></td> <td></td> <td></td> <td></td> <td></td> <td colspan="2"></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>																	
Max Allow Headway ( <i>MAH</i> ), s       4.0       4.0       4.0       4.4       4.4         Queue Clearance Time ( $g \circ$ ), s       64.0       65.0       10.6       33.0         Green Extension Time ( $g \circ$ ), s       0.0       65.0       2.3       0.0         Phase Call Probability       1.00       1.00       2.3       0.0         Max Out Probability       1.00       1.00       0.01       1.00       1.00         Max Out Probability       1.00       1.00       0.01       1.00       1.00       1.00         Movement Group Results       E       VI       R       L       T       R       L       T       R       L       T       R       1.0       1.00       1.																	
Dueue Clearance Time ( $g \circ$ ), s       64.0       65.0       10.6       33.0         Green Extension Time ( $g \circ$ ), s       0.0       0.0       2.3       0.0         Phase Call Probability       1.00       1.00       1.00       1.00       1.00       1.00         Wax Out Probability       1.00       1.00       1.00       0.01       1.00       1.00         Max Out Probability       1.00       1.00       1.00       0.01       1.00																-	
Green Extension Time ( $g \circ$ ), s       0.0       2.3       0.0         Phase Call Probability       1.00		• • •															
Phase Call Probability       1.00																	
Max Out Probability1.001.000.011.001.00Movement Group Results $\baseline \baseline \base$			(ge), s						-+								
Movement Group Results         EB         WB         NB         SB           Approach Movement         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         L         T         R         A         14           Adjusted Flow Rate (v), veh/h         1006         89         61         266         1772         1502         1516         1269         1754           Queue Service Time (g c), s         62.0         3.0         63.0         8.3         1.8         8.6         31.0         4.8           Steen Ratio (g/C)         0.57         0.57         0.57         0.57         0.57         0.28         0.28         0.28         0.28         0.28         0.28         0.28         0.28         0.28         0.28         0.28         <									_								
Approach MovementLTRLTRLTRLTRLTRLTRLTRRLTRRLTRAssigned MovementAssigned Movement5212161638187414Adjusted Flow Rate (v), veh/h1006896126756156317100100Adjusted Saturation Flow Rate (s), veh/h/ln17681502566177215021516126917541209Queue Service Time (gs), s22.03.063.08.31.88.631.04.835661561563174.813566Screen Ratio (g/C)0.570.570.570.570.570.280.290.330.9790.2020.330.9790.2020.330.9790.2020.330.9790.2020.330.9790.2020.330.9790.2020.330.9790.2020.330.9790.2020.330.9790.2020.330.9790.2020.330.9790.2020.330.9790.2020.33<	Max Out Proba	bility					1.00			1.00			0.01			1.00	
Assigned Movement5212161638187414Adjusted Flow Rate ( $v$ ), veh/h10068961 $267$ 56156156317100100Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln17681502566 $1772$ 150215161269 $1754$ 1209 $1754$ 1209 $1754$ 1209 $1754$ 120917541209	Movement Gro	oup Res	ults			EB			WB			NB			SB		
Adjusted Flow Rate (v), veh/hIndice1006896126756Indice317100Adjusted Saturation Flow Rate (s), veh/h/ln1768150256617721502151612691754Queue Service Time (g s), s22.03.01.08.31.81.522.44.8Cycle Queue Clearance Time (g c), s62.03.063.08.31.88.631.04.8Green Ratio (g/C)0.570.570.570.570.280.280.28Capacity (c), veh/h1046860711015860467324494Volume-to-Capacity Ratio (X)0.9620.1030.8660.2630.0650.3330.9790.202Back of Queue (Q), tr/ln (95 th percentile)909.140.6131.5134.524.7150.8473.894Queue Storage Ratio (RQ) (95 th percentile)90.00.811.750.000.130.004.120.00Jniform Delay (d 1), s/veh23.210.755.011.810.431.445.930.1Control Delay (d 2), s/veh0.9239.9D28.7C31.990.030.3Level of Service (LOS)DDBFBBCFCApproach Delay, s/veh / LOS39.9D28.7C31.990.030.3Level of Service (LOS)DBFBBCFC <td>Approach Move</td> <td>ement</td> <td></td> <td></td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td>	Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Adjusted Saturation Flow Rate (s), veh/h/ln1768150256617721502151612691754Queue Service Time (gs), s22.03.01.08.31.81.522.44.8Cycle Queue Clearance Time (gc), s62.03.063.08.31.88.631.04.8Green Ratio (g/C)0.570.570.570.570.570.280.280.28Capacity (c), veh/h1046860711015860467324494Volume-to-Capacity Ratio (X)0.9620.1030.8660.2630.0650.3330.9790.202Back of Queue (Q), veh/ln (95 th percentile)909.140.6131.5134.524.7150.8473.894.6Back of Queue (Q), veh/ln (95 th percentile)35.81.65.25.31.05.918.73.7Queue Storage Ratio (RQ) (95 th percentile)0.000.811.750.000.110.004.120.00Juiform Delay (d 1), s/veh23.210.755.011.810.431.445.930.1Initial Queu Delay (d 3), s/veh29.9D28.7C31.990.030.3Level of Service (LOS)DBFBCFCApproach Delay, s/veh / LOS39.9D28.7C31.990.030.3Level of Service (LOS)A1.72B1.92.51.931.990.030.3 </td <td>Assigned Move</td> <td>ment</td> <td></td> <td></td> <td>5</td> <td>2</td> <td>12</td> <td>1</td> <td>6</td> <td>16</td> <td>3</td> <td>8</td> <td>18</td> <td>7</td> <td>4</td> <td>14</td>	Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14	
Queue Service Time ( $g_{s}$ ), s       22.0       3.0       1.0       8.3       1.8       I.5       22.4       4.8         Cycle Queue Clearance Time ( $g_{c}$ ), s       62.0       3.0       63.0       8.3       1.8       I.8       8.6       31.0       4.8         Green Ratio ( $g/C$ )       0.57       0.57       0.57       0.57       0.57       0.57       0.28       0.28       0.28       0.28         Capacity ( $c$ ), veh/h       1046       860       71       1015       860       467       324       494         Volume-to-Capacity Ratio ( $X$ )       0.962       0.103       0.866       0.263       0.065       0.333       0.979       0.202         Back of Queue ( $Q$ ), th/ln (95 th percentile)       90.91       40.6       131.5       134.5       24.7       150.8       473.8       94.6         Back of Queue ( $Q$ ), veh/ln (95 th percentile)       90.91       40.6       131.5       134.5       24.7       150.8       473.8       94.6         Queue Storage Ratio ( $RQ$ ) (95 th percentile)       90.91       0.00       0.81       1.75       0.00       0.13       0.00       4.12       0.00         Jniform Delay ( $d_2$ ), s/veh       23.2       10.7       55.0	Adjusted Flow F	Rate ( v	), veh/h			1006	89	61	267	56		156		317	100		
Queue Service Time ( $g_{s}$ ), s       22.0       3.0       1.0       8.3       1.8       I.5       22.4       4.8         Cycle Queue Clearance Time ( $g_{c}$ ), s       62.0       3.0       63.0       8.3       1.8       I.8       8.6       31.0       4.8         Green Ratio ( $g/C$ )       0.57       0.57       0.57       0.57       0.57       0.57       0.28       0.28       0.28       0.28         Capacity ( $c$ ), veh/h       1046       860       71       1015       860       467       324       494         Volume-to-Capacity Ratio ( $X$ )       0.962       0.103       0.866       0.263       0.065       0.333       0.979       0.202         Back of Queue ( $Q$ ), th/ln (95 th percentile)       90.91       40.6       131.5       134.5       24.7       150.8       473.8       94.6         Back of Queue ( $Q$ ), veh/ln (95 th percentile)       90.91       40.6       131.5       134.5       24.7       150.8       473.8       94.6         Queue Storage Ratio ( $RQ$ ) (95 th percentile)       90.91       0.00       0.81       1.75       0.00       0.13       0.00       4.12       0.00         Jniform Delay ( $d_2$ ), s/veh       23.2       10.7       55.0	Adjusted Satura	ation Flo	w Rate ( <i>s</i> ), veh/h/l	n		1768	1502	566	1772	2 1502		1516		1269	1754		
Green Ratio (g/C)       0.57       0.57       0.57       0.57       0.57       0.57       0.57       0.57       0.57       0.58       0.28       0.28       0.28         Capacity (c), veh/h       1046       860       71       1015       860       467       324       494         Volume-to-Capacity Ratio (X)       0.962       0.103       0.866       0.263       0.065       0.333       0.979       0.202         Back of Queue (Q), trl/n (95 th percentile)       909.1       40.6       131.5       134.5       24.7       150.8       473.8       94.6         Queue Storage Ratio (RQ) (95 th percentile)       35.8       1.6       5.2       5.3       1.0       5.9       18.7       3.7         Queue Storage Ratio (RQ) (95 th percentile)       0.00       0.81       1.75       0.00       0.13       0.00       4.12       0.00         Jniform Delay (d_1), s/veh       23.2       10.7       55.0       11.8       10.4       31.4       45.9       30.1         Initial Queue Delay (d_3), s/veh       9.2       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       <	Queue Service	Time ( g	g s ), S			22.0	3.0	1.0	8.3	1.8		1.5		22.4	4.8		
Capacity (c), veh/hIndexIndex86071Indis860467324494Volume-to-Capacity Ratio (X) $0.962$ $0.103$ $0.866$ $0.263$ $0.065$ $0.333$ $0.979$ $0.202$ Back of Queue (Q), th/ln (95 th percentile) $909.1$ $40.6$ $131.5$ $134.5$ $24.7$ $150.8$ $473.8$ $94.6$ Back of Queue (Q), veh/ln (95 th percentile) $35.8$ $1.6$ $5.2$ $5.3$ $1.0$ $5.9$ $18.7$ $3.7$ Queue Storage Ratio (RQ) (95 th percentile) $0.00$ $0.811$ $1.75$ $0.00$ $0.13$ $0.00$ $4.12$ $0.00$ Jniform Delay (d 1), s/veh $23.2$ $10.7$ $55.0$ $11.8$ $10.4$ $31.4$ $45.9$ $30.1$ Initial Queue Delay (d 3), s/veh $19.2$ $0.1$ $63.3$ $0.1$ $0.0$ $0.4$ $44.1$ $0.2$ Control Delay (d), s/veh $4.2.5$ $10.7$ $118.3$ $12.0$ $10.5$ $31.9$ $90.0$ $30.3$ Level of Service (LOS) $D$ $B$ $F$ $B$ $B$ $C$ $F$ $F$ $F$ Approach Delay, s/veh / LOS $39.9$ $V$ $28.7$ $C$ $31.9$ $C$ $75.7$ $F$ Pedestrian LOS Score / LOS $1.72$ $B$ $1.90$ $B$ $2.17$ $B$ $2.04$ $B$	Cycle Queue C	learance	e Time ( <i>g c</i> ), s			62.0	3.0	63.0	8.3	1.8		8.6		31.0	4.8		
Volume-to-Capacity Ratio (X)       0.962       0.103       0.866       0.263       0.065       0.333       0.979       0.202         Back of Queue (Q), ft/ln (95 th percentile)       909.1       40.6       131.5       134.5       24.7       150.8       473.8       94.6         Back of Queue (Q), veh/ln (95 th percentile)       35.8       1.6       5.2       5.3       1.0       5.9       18.7       3.7         Queue Storage Ratio (RQ) (95 th percentile)       0.00       0.81       1.75       0.00       0.13       0.00       4.12       0.00         Jniform Delay (d_1), s/veh       23.2       10.7       55.0       11.8       10.4       31.4       45.9       30.1         Initial Queue Delay (d_2), s/veh       0.0       0.	Green Ratio ( g	/C )				0.57	0.57	0.57	0.57	0.57		0.28		0.28	0.28		
Back of Queue (Q), ft/ln (95 th percentile)909.140.6131.5134.524.7150.8473.894.6473.894.6Back of Queue (Q), veh/ln (95 th percentile) $35.8$ 1.6 $5.2$ $5.3$ 1.0 $5.9$ 18.7 $3.7$ 120.00120.00120.00120.000.13 $0.00$ 0.04.12 $0.00$ 0.00.000.13 $0.00$ 0.04.12 $0.00$ 0.00.000.010.000.010.000.014.12 $0.00$ 0.010.000.010.000.010.010.014.120.000.01 </td <td>Capacity ( c ), v</td> <td>/eh/h</td> <td></td> <td></td> <td></td> <td>1046</td> <td>860</td> <td>71</td> <td>1015</td> <td>5 860</td> <td></td> <td>467</td> <td></td> <td>324</td> <td>494</td> <td></td>	Capacity ( c ), v	/eh/h				1046	860	71	1015	5 860		467		324	494		
Back of Queue (Q), veh/ln (95 th percentile) $35.8$ $1.6$ $5.2$ $5.3$ $1.0$ $5.9$ $18.7$ $3.7$ Queue Storage Ratio (RQ) (95 th percentile) $0.00$ $0.81$ $1.75$ $0.00$ $0.13$ $0.00$ $4.12$ $0.00$ Uniform Delay (d 1), s/veh $23.2$ $10.7$ $55.0$ $11.8$ $10.4$ $31.4$ $45.9$ $30.1$ ncremental Delay (d 2), s/veh $19.2$ $0.1$ $63.3$ $0.1$ $0.0$ $0.4$ $44.1$ $0.2$ nitial Queue Delay (d 3), s/veh $0.0$ $0.0$ $0.0$ $0.0$ $0.0$ $0.0$ $0.0$ $0.0$ $0.0$ $0.0$ $0.0$ Control Delay (d), s/veh $42.5$ $10.7$ $118.3$ $12.0$ $10.5$ $31.9$ $90.0$ $30.3$ $-20.4$ Level of Service (LOS)DBFBBCFC $75.7$ EApproach Delay, s/veh / LOS $39.9$ D $28.7$ C $31.9$ $C$ $75.7$ EMultimodal ResultsFedestrian LOS Score / LOS $1.72$ B $1.92$ B $2.17$ B $2.04$ B	Volume-to-Capa	acity Ra	itio (X)			0.962	0.103	0.866	0.26	3 0.065		0.333		0.979	0.202		
Queue Storage Ratio ( $RQ$ ) ( 95 th percentile)0.00.811.750.00.130.004.120.00Uniform Delay ( $d_1$ ), s/veh23.210.755.011.810.431.445.930.11ncremental Delay ( $d_2$ ), s/veh19.20.163.30.10.00.444.10.21nitial Queue Delay ( $d_3$ ), s/veh0.0 <td>Back of Queue</td> <td>( Q ), ft/</td> <td>In (95 th percentile)</td> <td>)</td> <td></td> <td>909.1</td> <td>40.6</td> <td>131.5</td> <td>134.</td> <td>5 24.7</td> <td></td> <td>150.8</td> <td></td> <td>473.8</td> <td>94.6</td> <td></td>	Back of Queue	( Q ), ft/	In (95 th percentile)	)		909.1	40.6	131.5	134.	5 24.7		150.8		473.8	94.6		
Jniform Delay (d 1), s/veh23.210.755.011.810.431.445.930.1ncremental Delay (d 2), s/veh19.20.163.30.10.00.444.10.2nitial Queue Delay (d 3), s/veh0.00.00.00.00.00.00.00.00.0Control Delay (d), s/veh42.510.7118.312.010.531.990.030.3Level of Service (LOS)DBFBBCFCApproach Delay, s/veh / LOS39.9D28.7C31.9C75.7EMultimodal ResultsEBFB1.90B2.17B2.04B	Back of Queue	( Q ), ve	eh/ln ( 95 th percenti	ile)		35.8	1.6	5.2	5.3	1.0		5.9		18.7	3.7		
ncremental Delay ( $d_2$ ), s/veh19.20.163.30.10.00.444.10.2nitial Queue Delay ( $d_3$ ), s/veh0.0	Queue Storage	Ratio (	RQ) (95 th percent	tile)		0.00	0.81	1.75	0.00	0.13		0.00		4.12	0.00		
nitial Queue Delay (d 3), s/vehImage: Constraint of the system of the syst	Uniform Delay (	( d 1 ), s	/veh			23.2	10.7	55.0	11.8	10.4		31.4		45.9	30.1		
Control Delay (d), s/veh42.510.7118.312.010.531.990.0 $30.3$ Level of Service (LOS)DBFBBCFCFCApproach Delay, s/veh / LOS39.9D $28.7$ C $31.9$ C $75.7$ EIntersection Delay, s/veh / LOS $44.5$ V $44.5$ V $31.9$ C $75.7$ EMultimodal ResultsE $54.7$ B $1.9$ B $2.17$ B $2.04$ B	Incremental De	lay ( <i>d</i> 2	), s/veh			19.2	0.1	63.3	0.1	0.0		0.4		44.1	0.2		
Level of Service (LOS)       D       B       F       B       B       C       F       C         Approach Delay, s/veh / LOS       39.9       D       28.7       C       31.9       C       75.7       E         Intersection Delay, s/veh / LOS       44.5	Initial Queue De	elay(d	з), s/veh			0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0		
Approach Delay, s/veh / LOS       39.9       D       28.7       C       31.9       C       75.7       E         ntersection Delay, s/veh / LOS       44.5       D <td>Control Delay (</td> <td>d ), s/ve</td> <td>eh</td> <td></td> <td></td> <td>42.5</td> <td>10.7</td> <td>118.3</td> <td>12.0</td> <td>10.5</td> <td></td> <td>31.9</td> <td></td> <td>90.0</td> <td>30.3</td> <td></td>	Control Delay (	d ), s/ve	eh			42.5	10.7	118.3	12.0	10.5		31.9		90.0	30.3		
Intersection Delay, s/veh / LOS       44.5       D         Multimodal Results       EB       WB       NB       SB         Pedestrian LOS Score / LOS       1.72       B       1.90       B       2.17       B       2.04       B	Level of Service	e (LOS)				D	В	F	В	В		С		F	С		
Multimodal Results         EB         WB         NB         SB           Pedestrian LOS Score / LOS         1.72         B         1.90         B         2.17         B         2.04         B	Approach Delay	Approach Delay, s/veh / LOS				)	D	28.7	7	С	31.9	9	С	75.7	7	Е	
Pedestrian LOS Score / LOS         1.72         B         1.90         B         2.17         B         2.04         B	Intersection Delay, s/veh / LOS						44	4.5						D			
Pedestrian LOS Score / LOS         1.72         B         1.90         B         2.17         B         2.04         B																	
			// 00									ii ii	_			_	
Bicycle LUS Score / LUS 2.29 B 1.12 A 0.74 A 1.18 A						_											
	BICYCIE LOS SC	ore / LC	15		2.29	1	В	1.12	<u>  </u>	A	0.74 A			1.18		A	

		Н	CS7	Two-	-Way	' Stop	o-Co	ntrol	Rep	ort						
General Information							Site	Inforr	natio	n						
Analyst	DH						Inters	ection			SHER	IDAN/TA	NAGER/	CROYLE		
Agency/Co.	HDR						Jurisd	iction			RAPI	D CITY				
Date Performed	12/14	4/2018					East/\	Nest Stre	eet		SHER	IDAN LA	KE ROAI	D		
Analysis Year	2045						North	/South S	Street		TANA	GER DR	VE			
Time Analyzed	AM 2	045 NO	BUILD				Peak	Hour Fac	ctor		0.90					
Intersection Orientation	East-	West					Analy	sis Time	Period (	(hrs)	0.25					
Project Description	SLR C	ORRIDC	R STUD	Y												
Lanes																
		A A A A A A A A A A A A A A A A A A A														
Vehicle Volumes and Adj	justme	nts														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume (veh/h)		5	895	5		20	240	20		5	0	30		135	0	5
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)											0				0	
Right Turn Channelized						Ν	10									
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.12				7.12	6.52	6.22		7.12	6.52	6.22
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32
Delay, Queue Length, an	d Leve	l of Se	ervice								-					
Flow Rate, v (veh/h)	1	6				22					39				156	
Capacity, c (veh/h)		1272				692					248				115	
v/c Ratio		0.00				0.03					0.16				1.35	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1					0.5				10.6	
Control Delay (s/veh)		7.8		0.1		10.4					22.2				274.4	
Level of Service (LOS)		A		A		В					С				F	
	-	-			-				-				-			

0.1

Approach Delay (s/veh)

Approach LOS

1.1

22.2

С

274.4

F

									Rep							
General Information							Site	Inforr	natior	า						_
Analyst	DH						Inters	ection			SHER	IDAN/AL	BERTTA			
Agency/Co.	HDR						Jurisd	iction			RAPIE	O CITY				
Date Performed	12/14	/2018					East/\	West Stre	et		SHER	IDAN LA	KE ROAI	D		
Analysis Year	2045						North	/South S	Street		ALBEI	RTTA DR	IVE			
Time Analyzed	AM 2	045 NO	BUILD				Peak	Hour Fac	tor		0.90					
Intersection Orientation	East-	Vest					Analy	sis Time	Period (	hrs)	0.25					
Project Description	SLR C	ORRIDO	OR STUD	Y												
Lanes																
					<u>ר</u> א	Y ∳Y1 or Street: Ea	st-West	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7								
Vehicle Volumes and Adjustments																
Approach			bound	_			bound	-			bound	-			bound	
Movement	U	L	T	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	40	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	C
Configuration			0.45	TR		LT	045				LR					
Volume (veh/h)			845	10		35	215			5		60			<u> </u>	
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)											0					
Dialet Tura Channalizad	1															
Right Turn Channelized				Undi	vidad											
Median Type   Storage	and wa			Undi	vided											_
Median Type   Storage Critical and Follow-up H	eadwa	ys	1	Undi	vided	4.1				7.1		6.2				
Median Type   Storage <b>Critical and Follow-up H</b> Base Critical Headway (sec)	eadwa	ys		Undi	vided	4.1				7.1		6.2				
Median Type   Storage <b>Critical and Follow-up H</b> Base Critical Headway (sec) Critical Headway (sec)	eadwa	ys		Undi	vided	4.12				7.12		6.22				
Median Type   Storage Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec)	eadwa	ys		Undi	vided	4.12 2.2				7.12 3.5		6.22 3.3				
Median Type   Storage Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec)					vided	4.12				7.12		6.22				
Median Type   Storage Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Delay, Queue Length, an			ervice		vided	4.12 2.2 2.22				7.12 3.5		6.22 3.3				
Median Type   Storage Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Delay, Queue Length, an Flow Rate, v (veh/h)			ervice		vided	4.12 2.2 2.22 39				7.12 3.5	72	6.22 3.3				
Median Type   Storage Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Delay, Queue Length, an Flow Rate, v (veh/h) Capacity, c (veh/h)			ervice		vided	4.12 2.2 2.22 39 722				7.12 3.5	289	6.22 3.3				
Median Type   Storage Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Delay, Queue Length, an Flow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio			ervice		vided	4.12 2.2 2.22 39 722 0.05				7.12 3.5	289 0.25	6.22 3.3				
Median Type   Storage Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Pollay, Queue Length, an Flow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio 95% Queue Length, Q <sub>95</sub> (veh)			ervice		vided	4.12 2.2 2.22 39 722 0.05 0.2				7.12 3.5	289 0.25 1.0	6.22 3.3				
Median Type   Storage <b>Critical and Follow-up H</b> Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) <b>Delay, Queue Length, an</b> Flow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio 95% Queue Length, Q <sub>95</sub> (veh) Control Delay (s/veh)			ervice		vided	4.12 2.2 2.22 39 722 0.05 0.2 10.3				7.12 3.5	289 0.25 1.0 21.5	6.22 3.3				
Median Type   Storage Critical and Follow-up H Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Delay, Queue Length, an Flow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio 95% Queue Length, Q <sub>95</sub> (veh)			ervice		vided	4.12 2.2 2.22 39 722 0.05 0.2 10.3 B				7.12 3.5 3.52	289 0.25 1.0	6.22 3.3				

	HCS7 Two-Way Stop	p-Control Report							
General Information		Site Information							
Analyst	DH	Intersection	CORRAL/PARK						
Agency/Co.	HDR	Jurisdiction	RAPID CITY						
Date Performed	12/14/2018	East/West Street	CORRAL DRIVE						
Analysis Year	2045	North/South Street	PARK DRIVE						
Time Analyzed	PM 2045 NO BUILD	Peak Hour Factor	0.90						
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25						
Project Description	SLR CORRIDOR STUDY								
Lanes									



#### **Vehicle Volumes and Adjustments** Approach Eastbound Westbound Northbound Southbound U R U U R L Т L т R U L Т R L т Movement 10 12 7 1U 2 4U Priority 11 8 9 1 3 4 5 6 0 Number of Lanes 1 1 0 0 1 1 0 0 0 0 0 1 1 Configuration L Т Т R Т R Volume (veh/h) 15 45 140 480 55 555 2 3 Percent Heavy Vehicles (%) 3 3 **Proportion Time Blocked** Percent Grade (%) 0 0 **Right Turn Channelized** Yes No Median Type | Storage Undivided **Critical and Follow-up Headways** Base Critical Headway (sec) 7.1 6.5 6.5 6.2 Critical Headway (sec) 6.42 6.53 6.53 6.23 3.5 4.0 3.3 Base Follow-Up Headway (sec) 4.0 Follow-Up Headway (sec) 2.22 4.03 4.03 3.33 Delay, Queue Length, and Level of Service Flow Rate, v (veh/h) 50 156 617 17 Capacity, c (veh/h) 1622 451 416 1082 0.01 v/c Ratio 0.11 0.37 0.57 0.0 0.4 1.7 3.7 95% Queue Length, Q<sub>95</sub> (veh) Control Delay (s/veh) 7.2 14.0 18.7 12.6 С Level of Service (LOS) А В В Approach Delay (s/veh) 12.3 13.9

Copyright © 2018 University of Florida. All Rights Reserved.

В

Approach LOS

В

С

	HCS	57 Sig	nalize	d In	tersect	tion R	lesi	ults	Sun	nmar	y				
General Information								Inte	oreact	ion Inf	ormatic	20		/ at <sub>a</sub> l <sub>a</sub> ats ( .	þa l <u>a</u>
	HDR								ration,	-	0.25	71		11	
Agency	DH		Analyz	in Det	Dee 1	4 0040					_				K.
Analyst					e Dec 1	4, 2018		PH	а Туре	e	Other		- <u>→</u>	"Ĭ.	
Jurisdiction			Time F		PM					Denied	0.90	20			¥ + +
Urban Street	SHERIDAN LAKE	ROAD	Analys						aiysis i	Period	1> 7:(	00			
Intersection	CORRAL DRIVE		File Na	ame	SLR-C	ORRAL	L.XUS	\$						<u> </u>	- 4
Project Description	SLR CORRIDOR S	TUDY												14147	r n
Demand Information				EB			V	VB			NB			SB	
Approach Movement			L	Т	R	L	<b>—</b>	Т	R	L	Т	R	L	Т	R
Demand ( v ), veh/h			155		370					440	1065	;		1450	255
													-		
Signal Information			_		21						R				
Cycle, s 150.0		2	-	51	12	Es.							2	3	4
Offset, s 0	Reference Point	End	Green		85.5	25.0	0.	0	0.0	0.0		-			
Uncoordinated Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	0.0			1	_	$\sim$
Force Mode Fixed	Simult. Gap N/S	On	Red	1.5	1.5	2.0	0.	0	0.0	0.0		5	6	7	<b>¥</b> 8
Timer Results			EBL	_	EBT	WBI	1	W	BT	NBI	_	NBT	SB	1	SBT
Assigned Phase				-	8					1	-	6			2
Case Number				-	9.0		$\rightarrow$			1.0		4.0			7.3
Phase Duration, s					31.0		-			28.0	) 1	119.0	<u> </u>		91.0
Change Period, ( Y+R	(a) s				6.0		$\rightarrow$			5.5		5.5			5.5
Max Allow Headway ( MAH ), s				-	4.3		$\rightarrow$			5.1		4.0	<u> </u>		4.0
Queue Clearance Time	·			-	27.0		$\rightarrow$			24.5		75.4			87.5
Green Extension Time	, = ,				0.0		$\rightarrow$			0.0		30.7	<u> </u>		0.0
Phase Call Probability	( = )			+	1.00		$\rightarrow$			1.00		1.00	<u> </u>		1.00
Max Out Probability					1.00				_	1.00		0.78			1.00
,															
Movement Group Re	sults			EB			W				NB			SB	
Approach Movement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Movement			3		18					1	6			2	12
Adjusted Flow Rate ( )	· ·		172		411					489	1183			1611	200
Adjusted Saturation FI	. ,	In	1688		1502					1688	1772			1772	1502
Queue Service Time (	- ,		14.2		25.0					22.5	73.4			85.5	9.9
Cycle Queue Clearand	ce Time ( <i>g</i>		14.2		25.0					22.5	73.4			85.5	9.9
Green Ratio ( g/C )			0.17		0.17					0.73	0.76			0.57	0.57
Capacity ( <i>c</i> ), veh/h			281		250					301	1341			1010	856
Volume-to-Capacity R	, ,		0.612		1.643					1.624	0.883			1.595	0.234
Back of Queue ( Q ), f	t/In ( 90 th percentile)	)	242.3		1160. 1					1317. 2	851.6			4187	146.1
Back of Queue ( Q ), v	veh/In ( 90 th percent	ile)	9.5		45.7					51.9	33.5			164.8	5.8
Queue Storage Ratio	(RQ)(90 th percen	tile)	2.42		0.00					13.17	0.00			0.00	1.22
Uniform Delay ( d 1 ), s	s/veh		58.0		62.5					55.6	13.4			32.3	16.0
Incremental Delay ( d	2 ), s/veh		3.9		306.5					295.4	7.2			272.5	0.1
Initial Queue Delay ( a			0.0		0.0					0.0	0.0			0.0	0.0
Control Delay ( d ), s/v	,		61.9		369.0					350.9	20.6			304.8	16.1
Level of Service (LOS	)		E		F					F	С			F	В
Approach Delay, s/veh	,		278.	4	F	0.0		H		117.:	2	F	272.	9	F
Intersection Delay, s/v					20	9.7							F		
Multimodal Results				EB			W	В			NB			SB	
Pedestrian LOS Score			1.97	'	В	2.08	3	E	3	0.66		А	1.9		В
Bicvcle LOS Score / L	/cle LOS Score / LOS				F					3.25	5	С	3.4	8	С

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	DH	Intersection	SHERIDAN LAKE/SUMMERSET
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	12/14/2018	East/West Street	SUMMERSET DRIVE
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM 2045 NO BUILD	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			



# Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	Т	
Volume (veh/h)						5		30			1475	10		60	1760	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)							0				·					
Right Turn Channelized																
Median Type   Storage				Undi	vided								4U         4         5           0         1         1           0         1         1         1           1         1         1         1         1           1         1         1         1         1           1         60         1760         1           2         2         1         1           1         2         1         1           1         2         1         1           1         1         1         1         1           1         2         1         1         1           1         4.12         1         1         1           2.22         1         1         1         1           2.22         1         1         1         1           1         2.22         1         1         1           1         67         1         1         1           1         0.17         1         1         1			
Critical and Follow-up He	eadwa	ys														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, and	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)							39							67		
Capacity, c (veh/h)							24							391		
v/c Ratio							1.63							0.17		
95% Queue Length, Q <sub>95</sub> (veh)							4.9							0.6		
Control Delay (s/veh)							660.4							16.1		
Level of Service (LOS)							F							С		
Approach Delay (s/veh)						66	0.4							0	.5	
Approach LOS							F							L         T           60         1760           2         1           4.1         1           4.12         1           2.2         1           301         2           4.12         1           2.2         1           391         1           0.17         1           0.17         1           10.17         1           10.17         1		

	HCS7 Two-Way Stor	p-Control Report	
General Information		Site Information	
Analyst	DH	Intersection	SHERIDAN LAKE/CHATEAUX
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	12/14/2018	East/West Street	CHATEAUX RIDGE
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM 2045 NO BUILD	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			



#### **Vehicle Volumes and Adjustments** Eastbound Approach Westbound Northbound Southbound U R U U L Т L т R U L Т R L т R Movement 12 7 1U 2 4U Priority 10 11 8 9 1 3 4 5 6 Number of Lanes 0 1 0 0 1 0 0 1 1 0 0 1 1 0 LTR LTR TR TR Configuration L L Volume (veh/h) 5 5 25 10 1450 1695 10 0 0 10 50 20 2 2 2 2 2 Percent Heavy Vehicles (%) 2 2 2 **Proportion Time Blocked** Percent Grade (%) 0 0 **Right Turn Channelized** Median Type | Storage Undivided **Critical and Follow-up Headways** Base Critical Headway (sec) 7.1 6.5 6.2 7.1 6.5 6.2 4.1 4.1 Critical Headway (sec) 7.12 6.52 6.22 7.12 6.52 6.22 4.12 4.12 3.5 4.0 3.3 3.5 4.0 3.3 2.2 2.2 Base Follow-Up Headway (sec) Follow-Up Headway (sec) 3.52 4.02 3.32 3.52 4.02 3.32 2.22 2.22 Delay, Queue Length, and Level of Service Flow Rate, v (veh/h) 17 33 11 56 Capacity, c (veh/h) 3 12 311 401 v/c Ratio 6.08 2.68 0.04 0.14 3.5 5.1 0.1 0.5 95% Queue Length, Q<sub>95</sub> (veh) Control Delay (s/veh) 4676.4 1377.0 17.0 15.4 F F С С Level of Service (LOS) Approach Delay (s/veh) 4676.4 1377.0 0.1 0.4 Approach LOS F F

		псэ	/ Sig	nalize	ea in	tersec		tesu	its Sur	nmar	у				
Concretinform								T	luterees	tion Inf				╺╡ <sub>┛</sub> ┦₃╘┿╸↓╷	ba Li
General Inforn	nation								Intersec		W.	n	- 1	ΨĻ	
Agency		HDR					4 0040		Duration		0.25				R_
Analyst		DH				e Dec 1			Area Typ	e	Other		<b>→</b>		
Jurisdiction		RAPID CITY		Time F			O BUILI		PHF	<u> </u>	0.90			w+t B	₩ 
Urban Street		SHERIDAN LAKE		-		ir 2045			Analysis	Period	1> 7:(	00			E C
Intersection		CATRON BOULEV		File Na	ame	SLR-	CATRO	V.xus						<u>1</u>	
Project Descrip	tion	SLR CORRIDOR S	TUDY										1	4 1 4 Y	
Demand Inform	nation				EB			W	3		NB			SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), v				10	5	5	470	50		5	335	+	865	785	45
					-				-						
Signal Informa	ation				215	R 21.5		<u> </u>							Ð-
Cycle, s	150.0	Reference Phase	2			51								2	×.
Offset, s	0	Reference Point	End	Green	51.0	32.0	49.0	0.0	0.0	0.0	_	1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0		0.0			st		~
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0		0.0		5	6	7	
Timer Results				EBI	-	EBT	WB	L	WBT	NB	L	NBT	SBL	-	SBT
Assigned Phase	e					8			4		_	6	5	$\rightarrow$	2
Case Number						6.0			5.0			6.3	1.0		4.0
Phase Duration						55.0			55.0			39.0	56.0		95.0
Change Period	•	,				6.0			6.0			7.0	5.0		7.0
	Max Allow Headway ( MAH ), s					5.2			5.2			5.0	5.1		5.0
Queue Clearan	ce Time	e ( g s ), s				6.1			51.0			33.4	53.0	)	66.7
Green Extensio	on Time	(g <sub>e</sub> ), s				14.5			0.0			0.0	0.0		9.1
Phase Call Pro	bability					1.00			1.00			1.00	1.00	)	1.00
Max Out Proba	bility					0.14			1.00			1.00	1.00	)	0.30
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	-			L	T	R	L	T	R	L	T	R	L	T	R
Assigned Move				3	8	18	7	4	14	1	6		5	2	12
Adjusted Flow I		), veh/h		11	11		522	56	844	6	372		961	900	
		ow Rate ( <i>s</i> ), veh/h/l	n	1348	1626	;	1403	1772		619	1772		1688	1762	
Queue Service				0.9	0.7		48.3	3.3	49.0	1.1	31.4		51.0	64.7	
Cycle Queue C				4.1	0.7		49.0	3.3	49.0	9.9	31.4		51.0	64.7	
Green Ratio ( g				0.33	0.33		0.33	0.33		0.21	0.21		0.57	0.59	
Capacity ( c ), v				459	531		500	579	_	144	378		626	1034	
Volume-to-Cap		tio (X)		0.024	<u> </u>		1.045	0.09		0.039	0.985		1.535	0.871	
· · ·	,	(In ( 95 th percentile)	)	13.3	12.8		912	65.4		8.5	642.4		2345.5		
		eh/In ( 95 th percenti		0.5	0.5		35.9	2.6	30.0	0.3	25.3		92.3	36.6	
	, ,	RQ) (95 th percent	,	0.08	0.00		7.60	0.00		0.05	0.00		18.76	0.00	
Uniform Delay			,	36.5	34.2	_	53.2	35.1	_	54.0	58.8		42.0	26.2	
Incremental De	· ,			0.0	0.0		52.4	0.1	6.9	0.2	42.1		248.9	8.4	
Initial Queue De	2 1	•		0.0	0.0	-	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Control Delay (		,		36.6	34.3		105.5	35.2	_	54.2	100.9		290.9	34.6	
Level of Service				D	C		F	D	C	D	F		230.3	C	
Approach Delay				35.4		D	55.8		E	100.		F	166.		F
Intersection De	-			00			6.3		_	100.	-		F		
	ay, 3/90						0.0						•		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS		/LOS		2.05		В	1.97		В	2.66		С	1.90		В
Bicycle LOS So	ore / LC	)S		0.52	2	А	2.83	3	С	0.96	3	А	3.56	;	D

	HCS7 Two-Way Sto	p-Control Report	
General Information		Site Information	
General InformationAnalystDHAgency/Co.HDRDate Performed12/14/2018Analysis Year2045Time AnalyzedPM 2045 NO BUILDIntersection OrientationEast-WestProject DescriptionSLR CORRIDOR STUDYanes		Intersection	CATRON/BENDT
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	12/14/2018	East/West Street	CATRON BOULEVARD
Analysis Year	2045	North/South Street	BENDT DRIVE
Time Analyzed	PM 2045 NO BUILD	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			
	A A A A A A A A A A A A A A A A A A A		

Vehicle Volumes and Adj	ustme	nts														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		1	1	0		1	1	0
Configuration		L	Т	TR		L	Т	TR		L		TR		L		TR
Volume (veh/h)	0	10	975	70	0	35	1590	60		40	5	25		15	5	15
Percent Heavy Vehicles (%)	2	2			2	2				2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)										(	)			(	)	
Right Turn Channelized																
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.14				4.14				7.54	6.54	6.94		7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		11				39				44		33		17		22
Capacity, c (veh/h)		329				597				15		59		9		39
v/c Ratio		0.03				0.07				2.88		0.56		1.95		0.57
95% Queue Length, Q <sub>95</sub> (veh)		0.1				0.2				6.3		2.3		3.1		2.0
Control Delay (s/veh)		16.3				11.4				1357.9		125.4		1286.2		180.5
Level of Service (LOS)		С				В				F		F		F		F
Approach Delay (s/veh)		0	.2			0	.2			82	9.7			65	4.3	
Approach LOS										F	F			I	=	

Copyright  $\ensuremath{\mathbb{C}}$  2018 University of Florida. All Rights Reserved.

.

. . . . . .

	HCS7 Two-Way Stc	p-Control Report	
General Information		Site Information	
Analyst	DH	Intersection	SHERIDAN/WILDWOOD
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	12/12/2018	East/West Street	WILDWOOD DRIVE
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM 2045 NO BUILD	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			
Vehicle Volumes and A	djustments		

venicie volumes and Adj	usune															
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1
Configuration			LR							L	Т				Т	R
Volume (veh/h)		10		5						5	515				1245	15
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%)		(	0													
Right Turn Channelized														Ν	10	
Median Type   Storage				Undi	vided											
Critical and Follow-up He	eadwa	ys														
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.42		6.22						4.12						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.52		3.32						2.22						
Delay, Queue Length, and	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)			17							6						
Capacity, c (veh/h)			86							488						
v/c Ratio			0.19							0.01						
95% Queue Length, Q <sub>95</sub> (veh)			0.7							0.0						
Control Delay (s/veh)			56.8							12.5						
Level of Service (LOS)			F							В						
Approach Delay (s/veh)		56	5.8							0	.1			-	-	
Approach LOS			F													

			1 SIG	nalize	aint	ersec	uon R	kesu	its Sur	nmar	У				
General Inform	nation								Intersec	tion Inf	ormatic			┙┵┶╸↓	له لړ
		HDR							Duration		0.25	71		44	
Agency		DH		Analyz	ia Data	Dec 1	4 0040				_				K.
Analyst							4, 2018		Area Typ PHF	e	Other		<b>→</b> - <b>4</b>	"Ĭ.	
Jurisdiction				Time F		PM				Devie	0.90	20		"j.	
Urban Street		SHERIDAN LAKE					NO BUI		Analysis	Period	1> 7:(	0			5
Intersection		DUNSMORE ROAD		File Na	ame	SLR-L	DUNSM	ORE.	kus					**	t- 1
Project Descrip	tion	SLR CORRIDOR S	TUDY											। ╡↑\$P\$Y	, <b>M</b>
Demand Inform	nation				EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			5	355	30	90	90	5 255	75	35	75	90	10	10
Signal Informa	tion				5	_21.5									
Cycle, s	73.3	Reference Phase	2		28		_						<b>Z</b>	. I	$\Phi$
Offset, s	0	Reference Point	End		Fi -		2					1	<b>Y</b> 2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Green		12.0	0.0	0.0		0.0	_		$\mathbf{A}$		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow Red	4.0	3.0 4.0	0.0	0.0		0.0		5	6	7	Y
	i ixeu		On		U.F.	<del>.</del>	0.0	0.0	0.0	0.0					
Timer Results				EBI	-	EBT	WB	L	WBT	NB	L	NBT	SBL		SBT
Assigned Phase	e					2			6			8			4
Case Number						7.0			5.0			8.0			6.0
Phase Duration	, s					54.3			54.3			19.0			19.0
Change Period,	, ( Y+R a	c ), S				9.0		-	9.0			7.0			7.0
Max Allow Headway ( <i>MAH</i> ), s						4.0			4.0			4.2			4.2
Queue Clearan	ce Time	( g s ), s				38.1			38.7			9.8			14.0
Green Extensio	n Time	(g e ), s				6.5			6.3			0.2			0.0
Phase Call Prob	bability					1.00			1.00			1.00			1.00
Max Out Proba	bility					0.44			0.46			1.00			1.00
Movement Gro	oup Res	ults			EB			WB	;		NB			SB	
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow F		), veh/h			400	17	100	1006	6 161		172		100	17	<u> </u>
-	•	w Rate ( <i>s</i> ), veh/h/l	n		1755	1502	990	1772			1523		1308	1672	
Queue Service					0.0	0.3	4.2	36.7	3.4		6.2		4.0	0.6	<u> </u>
Cycle Queue C		- ,			36.1	0.3	13.4	36.7			7.8		12.0	0.6	
Green Ratio ( g					0.62	0.62	0.62	0.62	_		0.16		0.16	0.16	
Capacity ( c ), v	/eh/h				1137	930	587	1098	3 930		321		170	273	
Volume-to-Capa	acity Ra	tio (X)			0.352	0.018	0.170	0.91	6 0.173		0.536		0.590	0.061	
Back of Queue	( Q ), ft/	'In ( 95 th percentile)			96.6	3.2	34.4	457.	3 33.9		131		92.6	11.4	
Back of Queue	( Q ), ve	eh/ln ( 95 th percenti	le)		3.8	0.1	1.4	18.0	1.3		5.2		3.6	0.5	
Queue Storage	Ratio (	RQ) (95 th percent	tile)		0.00	0.06	0.46	0.00	0.18		0.00		0.80	0.00	
Uniform Delay (	( d 1 ), s/	/veh			6.9	5.4	10.5	12.3	6.0		28.9		35.3	26.0	
Incremental De		•			0.2	0.0	0.1	9.8	0.1		1.8		5.3	0.1	
Initial Queue De					0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (		eh			7.1	5.4	10.6	22.1	_		30.7		40.6	26.1	
Level of Service	. ,				Α	A	В	С	A		С		D	С	
Approach Delay				7.0		А	19.2	2	В	30.7	7	С	38.6	j	D
Intersection Del	lay, s/ve	h / LOS				18	3.8						В		
Navia:					50			14/5						0.5	
Multimodal Re		11.08		4.00	EB	P	4.0-	WB		0.0	NB	P	4.05	SB	B
Pedestrian LOS				1.68 1.18		B A	1.87 2.58		B C	2.2	_	B	1.95	_	B
	cycle LOS Score / LOS				,	A	2.50	, I	U	0.77		A	0.68	,	A

		Н	CS7	Two	-Way	' Stop	o-Co	ntrol	Rep	ort						
General Information							Site	Inforr	natio	n						
Analyst	DH						Inters	ection			SHER	IDAN/TA	NAGER/	CROYLE		
Agency/Co.	HDR						Jurisd	iction			RAPIE	D CITY				
Date Performed	12/14	4/2018					East/\	Nest Stre	eet		SHER	IDAN LA	KE ROAI	D		
Analysis Year	2045						North	/South S	Street		TANA	GER DRI	VE			
Time Analyzed	PM 2	045 NO	BUILD				Peak	Hour Fac	ctor		0.90					
Intersection Orientation	East-	West					Analy	sis Time	Period (	hrs)	0.25					
Project Description	SLR C	ORRIDO	R STUD	Y												
Lanes																
				741 <u>7445</u> 0	<u>1</u> 4	or Street: Ea	st-West	1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4								
Vehicle Volumes and Adj	ustme	nts														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0
Configuration			LTR			LT		R			LTR				LTR	
Volume (veh/h)		5	340	5		25	810	155		5	0	15		35	0	5
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)											0				0	
Right Turn Channelized						N	lo									
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.12				7.12	6.52	6.22		7.12	6.52	6.22
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		6				28					22				44	
Capacity, c (veh/h)		650				1174					284				128	
v/c Ratio		0.01				0.02					0.08				0.35	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1					0.3				1.4	
Control Delay (s/veh)		10.6		0.1		8.1					18.7				47.3	
Level of Service (LOS)		В		A		A					С				E	
	1				1											

Copyright  $\ensuremath{\mathbb{C}}$  2018 University of Florida. All Rights Reserved.

0.3

Approach Delay (s/veh)

Approach LOS

0.5

47.3

Е

18.7

С

		F	ICS7	Two	Way	Stop	o-Co	ntrol	Rep	ort						
General Information		_					Site	Inforr	natio	n						_
Analyst	DH						Inters	ection			SHER	IDAN/AL	BERTTA			
Agency/Co.	HDR						Jurisd	liction			RAPIE	D CITY				
Date Performed	12/14	/2018					East/\	Nest Str	eet		SHER	IDAN LA	KE ROA	D		
Analysis Year	2045						North	/South	Street		ALBEI	RTTA DR	IVE			
Time Analyzed	PM 2	045 NO	BUILD				Peak	Hour Fac	ctor		0.90					
Intersection Orientation	East-\	Nest					Analy	sis Time	Period (	hrs)	0.25					
Project Description	SLR C	ORRIDO	OR STUD	Y												
Lanes																
					<u>ר</u> א	۲۲ معرف معرف معرف معرف معرف معرف معرف معرف	st-West	174 PY 1								
Vehicle Volumes and Ad	justme															
Approach		East	oound				bound			North	bound			South	bound	
Movement	U	L	T	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			325	5		105	715			5		25				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)										(	0					
Right Turn Channelized																
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				7.12		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, an	d Leve	l of S	ervice	•												
Flow Rate, v (veh/h)						117					33					
Capacity, c (veh/h)						1191					361					
v/c Ratio						0.10					0.09					
95% Queue Length, Q <sub>95</sub> (veh)						0.3					0.3					
Control Delay (s/veh)						8.4					16.0					
Level of Service (LOS)						A					С					
Approach Delay (s/veh)						2	.3			16	5.0					

# FJS

# Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix F

2045 No-Build Traffic Analysis

with Alternative Network Improvements



# **Technical Memo**

Date:	Monday, December 24, 2018
Project:	Sheridan Lake Road Corridor Study
To:	Study Advisory Team
From:	Dustin Hamilton

Subject: 2045 No-Build Conditions with Alternative Network Improvements (updated)

Future transportation needs in the Sheridan Lake Road corridor have been determined by forecasting the travel demand in the horizon year (2045) and analyzing the capability of the future transportation network to handle the future transportation demand. This memorandum documents the analysis of the existing Sheridan Lake Road corridor under 2045 traffic conditions with selected arterial and collector network improvements (2045 No-Build scenario – with Alternative Network Improvements).

Future traffic demand was determined using the travel demand model maintained by the Rapid City Metropolitan Planning Organization (MPO) and the City of Rapid City. Link data for the 2013 and 2040 models were compared to determine link growth factors which were then adjusted by straight-line annual growth to determine growth factors to the 2045 horizon year. Those factors were used to create 2045 peak hour turning volumes. The turning volume forecasts were balanced to create a homogenous network for capacity analysis.

Each of the Sheridan Lake Road study area intersections were analyzed with 2045 forecast volumes using Highway Capacity Manual techniques, as implemented in the Highway Capacity Software (McTrans Center and FHWA) for Alternative Network Improvements associated with Collector 1 and Les Hollers Way. Collector 1 includes a future street from the intersection of Sheridan Lake Road and Spring Canyon Trail, north to the Chapel Valley Subdivision with a connection at the existing Red Rock Canyon Road. The Les Hollers Way extension would continue west to Sheridan Lake Road from its current terminus just west of Catron Boulevard. The Collector 1 scenario also includes the Les Hollers Way extension. The two Alternative Network Improvements are depicted in **Figure 1**. Future Collector 2, as depicted in Figure 1, was not analyzed as it does not provide benefit to the arterial network.

The 2045 peak hour turning volumes and levels of service are shown for each existing Sheridan Lake Road intersection based upon the identified Network Alternative Improvements in **Figure 2 (no network improvements)**, **Figure 3 (Collector 1/Les Hollers)**, and **Figure 4 (Les Hollers)**. The intersection capacity analysis output sheets are provided in the **Appendix**.

The capacity analysis shows that signalized intersections on the Sheridan Lake Road corridor, operate at unacceptable levels of service with the identified arterial and collector street network improvements under 2045 traffic conditions. The signalized intersection level of service for the Alternative Network Improvements are summarized as follows:

hdrinc.com 703 Main Street, Suite 200, Rapid City, SD 57701 (605) 791-6100

SLR CORRIDOR STUDY									
Network Alternative	Sheridan Lake Road Intersection	LOS	DELAY	LOS	DELAY				
	Corral Drive/Sheridan Lake Road	E	68.0	D	43.4				
Collector 1/Les Hollers Way	Catron Boulevard/Sheridan Lake Road	D	48.3	C	20.7				
	Dunsmore Road/Sheridan Lake Road	F	87.2	С	25.3				
	Corral Drive/Sheridan Lake Road	F	218.3	F	206.6				
Les Hollers Way	Catron Boulevard/Sheridan Lake Road	F	248.9	F	116.0				
	Dunsmore Road/Sheridan Lake Road	E	57.4	В	17.2				
	Corral Drive/Sheridan Lake Road	F	227.6	F	209.7				
No Build	Catron Boulevard/Sheridan Lake Road	F	216.2	F	116.8				
	Dunsmore Road/Sheridan Lake Road	D	<mark>4</mark> 4.5	В	18.8				

# 2045 NO-BUILD NETWORK ALTERNATIVE COMPARISON

The intersection level of service analysis identifies that building Collector 1/Les Hollers Way reduces future volumes and provides some relief to the Sheridan Lake Road Corridor. However, improvements to the Sheridan Lake Road Corridor are still necessary to accommodate 2045 traffic volumes at an acceptable level of service. Sheridan Lake Road Alternatives will be developed and will be analyzed in subsequent phases of the Sheridan Lake Road Corridor Study.

hdrinc.com





# **FUTURE STREET ALTERNATIVES**

FIGURE 1 SHERIDAN LAKE ROAD TRAFFIC STUDY







SHERIDAN LAKE ROAD TRAFFIC STUDY

# **APPENDIX**

**Capacity Analysis Output Sheets** 

COLLECTOR 1

HCS7 Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	RL	Intersection	SHERIDAN/ALBERTTA							
Agency/Co.	HDR	Jurisdiction	RAPID CITY							
Date Performed	2/14/2018	East/West Street	SHERIDAN LAKE ROAD							
Analysis Year	2045	North/South Street	ALBERTTA DRIVE							
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	SLR CORRIDOR STUDY									
Lanas										



Vehicle Volumes and Adjustments																
Approach			ound			West	ound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	T	R	U	L	T	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration	-	-		TR	-	LT					LR			-		-
Volume, V (veh/h)			995	10		40	210			5		55				
Percent Heavy Vehicles (%)						2				2	_	2				
Proportion Time Blocked																
Percent Grade (%)										(	)					
Right Turn Channelized		Ν	10			N	0			N	lo			Ν	١o	
Median Type/Storage																
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				7.12		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)	T					44					67					
Capacity, c (veh/h)						625					227					
v/c Ratio						0.07					0.29					
95% Queue Length, Q <sub>95</sub> (veh)						0.2					1.2					
Control Delay (s/veh)						11.2					27.3					
Level of Service, LOS																
Approach Delay (s/veh)						2	.6			27	7.3					
Approach LOS	1								i	Г	)					

		HUS	7 Sig	nalize	a int	ersec	tion F	kesi	lits a	Sun	nmar	y				
									I .							T T
General Inform	nation	1									-	ormatio	on		474†	4× 4
Agency		HDR		Ú.					Dura			0.25				
Analyst		RL				e Feb 1	4, 2018		Area		e	Other		_ →×		~_ ⊱
Jurisdiction		RAPID CITY		Time F		AM			PHF 0.90					*-*	W TE	
Urban Street		SHERIDAN LAKE F	ROAD	Analys	sis Yea	r 2045 COLL	NO BUI .ECTOR		Anal	ysis l	Period	1> 7:(	00	7	5 4 4	The second se
Intersection	Intersection CATRON BOULEVARD						CATRO	N.xus	5						1     1 4 1 4 1 1	ħ [*
Project Descrip	tion	SLR CORRIDOR S	TUDY										1			
Demand Inform	nation				EB			V	/B			NB			SB	
Approach Move	ement			L	Т	R	L	-	Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			40	55	5	35	1	5	725	0	215	95	780	95	50
				10							<u> </u>			_		
Signal Informa			1		214	< 21.5	2		, ⊱						7	- <del></del>
Cycle, s	123.4	<u></u>	2			50	۶Ŕ	R					1	-	<b>-</b>	
Offset, s	0	Reference Point	End	Green	53.0	20.1	3.9			0.0	0.0	_	↑	-	5	
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		5.0	3.0	4.		0.0	0.0	_ \	╮┗	<b>NT</b> 2		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	1.0	2.	0	0.0	0.0		5	6	7	
Timer Results			_	EBL		EBT	WB	1	WB	ιT	NBI		NBT	SBL		SBT
Assigned Phase	<u></u>			3	-	8			4				6	5	-	2
Case Number	5			1.0		4.0		-+	5.3	2			5.3	1.0		4.0
Phase Duration	6			7.9		38.2		-	30.3	_			27.1	58.0		85.1
Change Period,				4.0		6.0		-	6.0				7.0	5.0		7.0
Max Allow Head						5.3		-					5.0	5.0		5.0
Queue Clearan		· ·				5.6			5.3 23.9					55.0		6.0
Green Extensio								-	0.5				18.1 2.1			2.6
Phase Call Prol		( <i>g</i> e), s		0.0 0.78		4.2	<u> </u>	-	1.00	_			2.1 1.00	0.0		1.00
Max Out Proba				0.78		0.01		-	1.00				0.05	1.00		0.00
	onity			0.58		0.01			1.00	0			0.05	1.00		0.00
Movement Gro	oup Res	sults			EB			W	В			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			3	8	18	7	4	1	14	1	6	16	5	2	12
Adjusted Flow F	Rate ( v	/), veh/h		44	67		39	17	′ 4	.83	0	239	61	867	139	1
-		ow Rate (s), veh/h/l	n	1688	1746		1335	177	2 15	502	1250	1772	1502	1688	1699	1
Queue Service				2.5	3.6		3.0	0.9		1.9	0.0	16.1	4.4	53.0	4.0	
Cycle Queue C				2.5	3.6		3.0	0.9		1.9	0.0	16.1	4.4	53.0	4.0	
Green Ratio ( g				0.25	0.26		0.20	0.2		.63	0.16	0.16	0.16	0.61	0.63	
Capacity ( c ), v	,			377	456		321	34		41	58	289	245	821	1076	1
Volume-to-Capa		atio (X)		0.118	0.146		0.121	0.04		514	0.000	0.826		1.056	0.129	
		/In (95 th percentile)	)	47.6	70.9		45.3	19	_	34.8	0	310.2	76.1	1039.2	64.9	
		eh/In (95 th percenti		1.9	2.8		1.8	0.7		1.2	0.0	12.2	3.0	40.9	2.6	
		RQ) (95 th percent		0.29	0.00		0.38	0.0		.27	0.00	0.00	0.32	8.31	0.00	
Uniform Delay (				36.1	35.0		41.0	40.	1 12	2.7	0.0	49.9	45.0	26.4	9.0	1
Incremental De				0.1	0.2		0.2	0.1		).6	0.0	8.3	0.7	47.2	0.1	
	eue Delay ( <i>d</i> 3 ), s/veh				0.0		0.0	0.0		).0	0.0	0.0	0.0	0.0	0.0	
	control Delay ( d ), s/veh				35.2		41.2	40.	_	3.3	0.0	58.3	45.8	73.6	9.1	
	evel of Service (LOS)				D		D	D	_	В		E	D	F	Α	
Approach Delay, s/veh / LOS			D 35.6		D	16.2		В		55.7	7	E	64.7	L	E	
	Intersection Delay, s/ven/ LOS						8.3							D		
Multimodal Re	Iultimodal Results				EB			W	B		N		NB		SB	
Pedestrian LOS		/LOS		2.19		В	1.97		В		2.55			1.88	1	В
Bicycle LOS Sc				0.67		A	1.38		A		0.98		A	2.15		B
				0.01			1.50				0.00					-

HCS7 Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	RL	Intersection	SHERIDAN LAKE/CHATEAUX							
Agency/Co.	HDR	Jurisdiction	RAPID CITY							
Date Performed	2/14/2018	East/West Street	CHATEAUX RIDGE							
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD							
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90							
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25							
Project Description	SLR CORRIDOR STUDY									



#### Vehicle Volumes and Adjustments

venicle volumes and Adj	ustme	ints														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	1	1	0	0	1	1	0
Configuration			LTR				LTR			L		TR		L		TR
Volume, V (veh/h)		5	0	5		5	0	50		5	965	10		35	915	5
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Percent Grade (%)		(	D				0									
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo			Ν	10	
Median Type/Storage				Undi	vided											
Critical and Follow-up He	adwa	ys														
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1		
Critical Headway (sec)		7.12	6.52	6.22		7.12	6.52	6.22		4.12				4.12		
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2		
Follow-Up Headway (sec)		3.52	4.02	3.32		3.52	4.02	3.32		2.22				2.22		
Delay, Queue Length, and	d Leve	l of S	ervice													
Flow Rate, v (veh/h)			11				61			6				39		
Capacity, c (veh/h)			43				156			679				644		
v/c Ratio			0.26				0.39			0.01				0.06		
95% Queue Length, Q <sub>95</sub> (veh)			0.9				1.7			0.0				0.2		
Control Delay (s/veh)			114.1				42.2			10.3				11.0		
Level of Service, LOS			F				E			В				В		
Approach Delay (s/veh)		11	4.1			42	2.2			0	.1			0	.4	
Approach LOS			F				E									

_	HCS	7 Sig	nalize	d In	tersect	tion R	lesi	ılts	Sun	nmar	У					
General Information								Inte	ersect	ion Inf	ormatio	on		4	すてなけ	4 L
Agency	HDR								ration,		0.25				7†	
Analyst	RL		Analys	is Da	te Feb 14	4 2018			a Typ		Othe	r		4		► 1
Jurisdiction	RAPID CITY		Time F			4, 2010		PH		<u> </u>	0.90			**	w‡e	2 \$
Urban Street	SHERIDAN LAKE	RUAD					IO BUILD Analysis							4 F		→ ∵
Olban Street		NOAD	Analys			ECTOR			arysis	renou		00				
Intersection	CORRAL DRIVE		File Na	ame		CORRAL		<u></u>						<b>N</b>	়ি ] বিশকপ	Þ 7
Project Description	SLR CORRIDOR S	STUDY														
Demand Information	1			EB	3		W	/B			NB				SB	
Approach Movement	•		1	Т	R	L	10	г	R		Т	F	र	L	T	R
Demand (v), veh/h			320	<u> </u>	550		+		1	430	650		<u> </u>	_	415	195
			520		550					-50	030				413	135
Signal Information					21		1						Т			
Cycle, s 121.6	8 Reference Phase	2	1	8		E						$\mathbf{\mathbf{N}}$	4			
Offset, s 0	Reference Point	End	Croon			20.0	0.0	0	0.0	0.0		1		2	3	4
Uncoordinated Yes	Simult. Gap E/W	On	Green Yellow		4.0	39.0 4.0	0.0		0.0	0.0	-		ĸ	<b>↑</b>		
Force Mode Fixed	-	On	Red	1.5	1.5	2.0	0.0		0.0	0.0		5		6	7	$\prec$
		1		Î												
Timer Results			EBL	-	EBT	WBI	L	W	'BT	NBI	-	NBT		SBL		SBT
Assigned Phase					8					1		6				2
Case Number					9.0					1.0		4.0				7.3
Phase Duration, s					45.0					34.5	5	76.6				42.1
Change Period, (Y+F	₹c), s				6.0					5.5		5.5				5.5
Max Allow Headway (	· ·				4.2					5.1		4.0				4.0
Queue Clearance Tim	ne ( <i>g</i> s ), s				41.0					27.4	1	36.7				31.9
Green Extension Time	e ( g e ), s				0.0					1.5		5.9				4.8
Phase Call Probability					1.00					1.00	)	1.00				1.00
Max Out Probability					1.00					0.67	7	0.00				0.22
Manager 1 October D				50			14/5	2			ND		-		00	
Movement Group Re	esuits		<u> </u>	EB			WE	3	<b>D</b>		NB		+		SB	
Approach Movement				Т	R	L	Т	+	R	L	Т	R	-		Т	R
Assigned Movement	> 1.0		3		18			_		1	6		+		2	12
Adjusted Flow Rate (			356		611			_		478	722		_		461	117
Adjusted Saturation F		In	1688		1502			_		1688	1772		_		1772	1502
Queue Service Time			22.0		39.0			_		25.4	34.7	-	_		29.9	7.2
Cycle Queue Clearan	ice lime ( $g_c$ ), s		22.0		39.0			_		25.4	34.7	-	-		29.9	7.2
Green Ratio $(g/C)$			0.32		0.32			_	_	0.56	0.58	<u> </u>	-		0.30	0.30
Capacity ( c ), veh/h	Datia ( X)		541		482					513	1036				534	452
Volume-to-Capacity R		\	0.657		1.269					0.932	0.697	-			0.864	0.258
Back of Queue (Q),	ivin ( 95 th percentile	)	362		1210. 9					471.2	496				510.6	118.9
Back of Queue (Q),	veh/In (95 th percent	ile)	14.3		47.7					18.5	19.5				20.1	4.7
Queue Storage Ratio	(RQ) (95 th percen	tile)	3.62		0.00					4.71	0.00				0.00	0.99
Uniform Delay ( d 1),	s/veh		35.5		41.3					29.1	17.7				40.1	32.2
Incremental Delay ( a	1 2 ), s/veh		2.9		136.5					21.3	1.5				9.1	0.3
Initial Queue Delay (	· · ·		0.0		0.0					0.0	0.0				0.0	0.0
Control Delay (d), s/			38.4		177.8					50.4	19.3				49.2	32.5
Level of Service (LOS	,		D		F					D	В				D	C
Approach Delay, s/ve	h / LOS		126.	5	F	0.0				31.6	6	С		45.8		D
Intersection Delay, s/	veh / LOS				68	3.0							Е			
				EB			WE	3			NB				SB	
Multimodal Results						**L	-							55		
Multimodal Results Pedestrian LOS Score	e / LOS		1.97		В	2.09	,	E	3	0.69	T	Α		1.93		В

		HCS	7 Sig	nalize	d Int	ersec	tion F	lesu	ts Sur	nmar	у					
<b>a</b>														1 4 7 49 1		
General Inform	nation								Intersect		V	on		4 L		
Agency		HDR							Duration,		0.25				R.	
Analyst		RL				e Feb 1	4, 2018		Area Typ	e	Other				<b>~</b> _≽	
Jurisdiction		RAPID CITY		Time F		AM			PHF		0.90		*	w	+ ↓ ↓	
Urban Street		SHERIDAN LAKE F	ROAD	Analys	is Yea		NO BUI ECTOR		Analysis	Period	1> 7:0	00	24		Tr A	
Intersection		DUNSMORE ROAD	C	File Na	ame		DUNSM		us					۳ ۱۹۱۹۳	7 4	
Project Descript	tion	SLR CORRIDOR S	TUDY													
Demand Inform	nation				EB			WE	3		NB			SB		
Approach Move	ment			L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Demand $(v)$ , v				10	1020	_	70	23		35	30	110	350	110	10	
				1												
Signal Informa			1		3								_		$\mathbf{k}$	
Cycle, s	136.0	Reference Phase	2		BR	1 sa	2					_	€ .	2	к†я	
Offset, s	0	Reference Point	End	Green	-	42.0	0.0	0.0	0.0	0.0	_		X Z	3	4	
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		3.0	0.0	0.0	0.0	0.0			7		512	
Force Mode	Fixed	Simult. Gap N/S	On	Red	4.0	4.0	0.0	0.0	0.0	0.0		5	6	7	8	
Timer Results				EBL		EBT	WB		WBT	NB	L	NBT	SBI		SBT	
Assigned Phase					-	2		-	6	112	_	8			4	
Case Number	5					7.0			5.0			8.0		_	6.0	
Phase Duration	<u></u>					87.0			87.0		_	49.0	<u> </u>		49.0	
Change Period,	•			<u> </u>		9.0	<u> </u>		9.0		_	49.0 7.0	<u> </u>	$\rightarrow$	7.0	
Max Allow Head		-				4.1			9.0 4.1			4.4			4.4	
Queue Clearan		· ·			+	80.0		+	80.0			13.7			44.0	
Green Extensio						0.0			0.0			2.9			0.0	
Phase Call Prot						1.00			1.00			1.00			1.00	
Max Out Probal						1.00			1.00			0.00			1.00	
Movement Gro	un Res	aults			EB			WB			NB			SB		
Approach Move	-			L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14	
Adjusted Flow F		) veh/h			1144		78	261	61	-	144		389	128		
	· ·	ow Rate ( s ), veh/h/l	n		1768	_	497	1772			1429		1288	1758		
Queue Service					31.4	5.9	0.0	10.0	2.5		4.4		30.3	7.4		
Cycle Queue Cl					78.0	5.9	78.0	10.0	2.5		11.7		42.0	7.4		
Green Ratio ( g					0.57	0.57	0.57	0.57	0.57		0.31		0.31	0.31		
Capacity (c), v	eh/h				1041	861	53	1016	861		475		340	543		
Volume-to-Capa	acity Ra	tio (X)			1.100	0.161	1.469	0.257	0.071		0.304		1.145	0.235		
Back of Queue	( Q ), ft/	(In ( 95 th percentile)	)		1641. 3	87.2	276.4	174.1	36.2		173.1		779.8	149.2		
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)		64.6	3.4	10.9	6.9	1.4		6.8		30.7	5.9		
Queue Storage	Ratio (	RQ) (95 th percent	tile)		0.00	1.74	3.69	0.00	0.20		0.00		6.78	0.00		
Uniform Delay (					29.9	13.6	68.0	14.5	12.9		36.3		55.2	35.0		
Incremental Del	lay ( d 2	), s/veh			59.3	0.1	288.9	0.1	0.0		0.4		94.2	0.2		
Initial Queue De					0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0		
Control Delay (	d ), s/ve	eh			89.3	13.7	356.9	14.6	12.9		36.7		149.5	35.3		
Level of Service					F	В	F	В	В		D		F	D		
Approach Delay	· /	/ LOS		81.1		F	80.9	9	F	36.7	7	D	121.	2	F	
	ntersection Delay, s/veh / LOS					8	7.2						F			
Multimodal Re	sulte				EB			WB			NB			SB		
Pedestrian LOS		/105		1.74		В	1.91		В	2.18 B		2.05	I	В		
Bicycle LOS Sc				2.61		C	1.15		A	0.73		A	1.34		A	
				2.01		5	1.10		Λ	0.10			1.0-			

Copyright  $\ensuremath{\textcircled{o}}$  2018 University of Florida, All Rights Reserved.

HCS7 Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	RL	Intersection	SHERIDAN LAKE/SUMMERSET							
Agency/Co.	HDR	Jurisdiction	RAPID CITY							
Date Performed	2/14/2018	East/West Street	SUMMERSET DRIVE							
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD							
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90							
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25							
Project Description	SLR CORRIDOR STUDY									



Major Street: North-South

Vehicle Volumes and Ad	Justine								_								
Approach		Eastb	ound			West	oound			North	bound		Southbound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	1	1	0	
Configuration							LR					TR		L	Т		
Volume, V (veh/h)						5		70			1010	10		15	950		
Percent Heavy Vehicles (%)						2		2						2			
Proportion Time Blocked																	
Percent Grade (%)							0										
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo			Ν	lo		
Median Type/Storage				Undi	vided												
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)						7.1		6.2						4.1			
Critical Headway (sec)						6.42		6.22						4.12			
Base Follow-Up Headway (sec)						3.5		3.3						2.2			
Follow-Up Headway (sec)						3.52		3.32						2.22			
Delay, Queue Length, an	d Leve	l of S	ervice														
Flow Rate, v (veh/h)							83							17			
Capacity, c (veh/h)							193							616			
v/c Ratio							0.43							0.03			
95% Queue Length, Q <sub>95</sub> (veh)							2.0							0.1			
Control Delay (s/veh)							37.1							11.0			
Level of Service, LOS					E								В				
Approach Delay (s/veh)					37.1								0.2				
Approach LOS							E										

HCS7 Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	RL	Intersection	SHERIDAN/TANAGER/CROYLE							
Agency/Co.	HDR	Jurisdiction	RAPID CITY							
Date Performed	2/14/2018	East/West Street	SHERIDAN LAKE ROAD							
Analysis Year	2045	North/South Street	TANAGER DRIVE							
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	SLR CORRIDOR STUDY									
Lanas	· · · · ·									



Major Street: East-West

Vehicle Volumes and Ad	justme	ents															
Approach	Eastbound				Westbound			Northbound				Southbound					
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0	
Configuration			LTR			LT		R			LTR				LTR		
Volume, V (veh/h)		5	1040	5		20	240	20		5	0	20		175	0	5	
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2	
Proportion Time Blocked																	
Percent Grade (%)								0 0									
Right Turn Channelized		No				Ν	10			Ν	lo		No				
Median Type/Storage		Undivided															
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2	
Critical Headway (sec)		4.12				4.12				7.12	6.52	6.22		7.12	6.52	6.22	
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3	
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32	
Delay, Queue Length, an	d Leve	l of S	ervice	•													
Flow Rate, v (veh/h)		6				22					28				200		
Capacity, c (veh/h)		1272				601					184				91		
v/c Ratio		0.00				0.04					0.15				2.21		
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1					0.5				17.9		
Control Delay (s/veh)		7.8				11.2					28.0				654.0		
Level of Service, LOS		A				В					D				F		
Approach Delay (s/veh)		0.1				1.2			28.0				654.0				
Approach LOS										D				F			

Copyright  $\ensuremath{\mathbb{C}}$  2018 University of Florida. All Rights Reserved.

HCS7 Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	RL	Intersection	SHERIDAN/WILDWOOD							
Agency/Co.	HDR	Jurisdiction	RAPID CITY							
Date Performed	2/14/2018	East/West Street	WILDWOOD DRIVE							
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD							
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90							
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25							
Project Description	SLR CORRIDOR STUDY									



Major Street: North-South

					major	51000.110	in boutin										
Vehicle Volumes and Ad	justme	nts															
Approach		Eastbound			Westbound				Northbound				Southbound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1	
Configuration			LR							L	Т				Т	R	
Volume, V (veh/h)		10		0						5	300				130	5	
Percent Heavy Vehicles (%)		2		2						2							
Proportion Time Blocked																	
Percent Grade (%)		0															
Right Turn Channelized		No				No			No				No				
Median Type/Storage		Undivided							<u> </u>								
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)		7.1		6.2						4.1							
Critical Headway (sec)		6.42		6.22						4.12							
Base Follow-Up Headway (sec)		3.5		3.3						2.2							
Follow-Up Headway (sec)		3.52		3.32						2.22							
Delay, Queue Length, an	d Leve	l of S	ervice	,													
Flow Rate, v (veh/h)	T		11							6							
Capacity, c (veh/h)			536							1430							
v/c Ratio			0.02							0.00							
95% Queue Length, Q <sub>95</sub> (veh)			0.1							0.0							
Control Delay (s/veh)			11.9							7.5							
Level of Service, LOS			В							A							
Approach Delay (s/veh)		11.9								0.1							
Approach LOS		В															
	HCS7 Two-Way S	Stop-Control Report															
--	--------------------	----------------------------	--------------	--	--	--	--	--	--								
General Information		Site Information															
Analyst	RL	Intersection	CATRON/BENDT														
Agency/Co.	HDR	Jurisdiction	RAPID CITY														
Date Performed	CATRON BOULEVARD																
Analysis Year	2045	North/South Street	BENDT DRIVE														
Time Analyzed         AM 2045 NO BUILD         Peak Hour Factor         0.90																	
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25														
Project Description	SLR CORRIDOR STUDY																



### Vehicle Volumes and Adjustments

Approach		Eastbound Westbound Northbound									Couth	bound				
				_				_				_		1		_
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		1	1	0		1	1	0
Configuration		L	Т	TR		L	Т	TR		L		TR		L		TR
Volume, V (veh/h)		10	865	55		30	710	10		30	0	30		35	5	35
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)										(	D			1	0	
Right Turn Channelized		Ν	lo			N	lo			Ν	lo			Ν	10	
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	adways														
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.14				4.14				7.54	6.54	6.94		7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		11				33				33		33		39		44
Capacity, c (veh/h)		819				675				73		508		95		292
v/c Ratio		0.01				0.05				0.46		0.07		0.41		0.15
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.2				1.8		0.2		1.7		0.5
Control Delay (s/veh)		9.5				10.6				90.8		12.6		67.3		19.5
Level of Service, LOS		A				В				F		В		F		С
Approach Delay (s/veh)		. 0	.1			0	.4			51	L.7			4:	1.8	
Approach LOS											F				E	

	HCS7 Two-Way Stop-Control Report											
General Information		Site Information										
Analyst	RL	Intersection	CORRAL/PARK									
Agency/Co.	HDR	Jurisdiction	RAPID CITY									
Date Performed	2/14/2018	East/West Street	CORRAL DRIVE									
Analysis Year	2045	North/South Street	PARK DRIVE									
Time Analyzed	AM 2045 NO BUILD	Peak Hour Factor	0.90									
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25									
Project Description	SLR CORRIDOR STUDY											



Major Street: East-West

Approach		Eastbound				West	oound			North	bound			South	bound	
Movement	U	L	T	R	U	L	Т	R	U	L	T	R	U	L	T	R
Priority	10	1	2	3	4U	4	5	6		7	8	9	0	10	11	12
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		10	0	12
	0	L	T	0	0	0	T	R		0	0	0		L	0	R
Configuration														_		
Volume, V (veh/h)		20	100				100	525						770		20
Percent Heavy Vehicles (%)	<u> </u>	2												2		2
Proportion Time Blocked																
Percent Grade (%)												(	)			
Right Turn Channelized		No Yes No								No						
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	ways														
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.12												6.42		6.22
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.22												3.52		3.32
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		22												856		22
Capacity, c (veh/h)		1478												711		942
v/c Ratio		0.02												1.20		0.02
95% Queue Length, Q <sub>95</sub> (veh)		0.0												29.1		0.1
Control Delay (s/veh)		7.5												125.3		8.9
Level of Service, LOS		A											F A			А
Approach Delay (s/veh)		1	.2											12	2.3	
Approach LOS	1								F							

	HCS7 Two-Way	Stop-Control Report								
General Information		Site Information								
Analyst	RL	Intersection	SHERIDAN/ALBERTTA							
Agency/Co. HDR Jurisdiction RAPID CITY										
Date Performed     2/14/2018     East/West Street     SHERIDAN LAKE ROAD										
Analysis Year	2045	North/South Street	ALBERTTA DRIVE							
Time Analyzed     PM 2045 NO BUILD     Peak Hour Factor     0.90										
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	SLR CORRIDOR STUDY									
Lanas										



#### Major Street: East-West

Vehicle Volumes and Ad	justme	nts														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			350	10		125	655			5		20				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)										(	0					
Right Turn Channelized		٩	10			Ν	10			Ν	lo		No			
Median Type/Storage		Und														
Critical and Follow-up H	eadwa	ways														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				7.12		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, an	d Leve	l of S	ervice		<u>.</u>		<u>.</u>							<u>.</u>		
Flow Rate, v (veh/h)	Τ					139					28					
Capacity, c (veh/h)						1158					317					
v/c Ratio						0.12					0.09					
95% Queue Length, Q <sub>95</sub> (veh)						0.4					0.3					
Control Delay (s/veh)						8.5					17.4					
Level of Service, LOS					A					С						
Approach Delay (s/veh)			-	-		2	.8		17.4							
Approach LOS										(	С					

		HCS	7 Sig	nalize	ed In	tersec		kesu	Its Sur	nmar	У				
	. et le m								Interes	tion Inf				4 사 야 수	la L
General Inform									Intersec		U.	on	- 1	4	
Agency		HDR					4 0040		Duration	-	0.25				K
Analyst		RL				e Feb 1			Area Typ	e	Other	ſ	- <u>-</u>		×
Jurisdiction		RAPID CITY		Time F	Period		O BUILI ECTOR		PHF		0.90			w + E B	1
Urban Street		SHERIDAN LAKE I	ROAD	Analys	sis Yea	r 2045			Analysis	Period	1> 7:	00		5 t c	· ·
Intersection		CATRON BOULEV	ARD	File Na	ame	SLR-0	CATRO	N.xus					1	4149	14
Project Descrip	tion	SLR CORRIDOR S	TUDY												
Demand Inform	nation				EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Т	· R	L L	Т	R	L	Т	R
Demand (v), v				10	5	0	110	4		0	80	45	645	170	40
				10						<u> </u>			_		
Signal Informa			1		1215	R 21.5	a	3						X	<b>—</b>
Cycle, s	104.1	Reference Phase	2			50	rR -	R	E.			1	2	3	4
Offset, s	0	Reference Point	End	Green	40.7	15.0	1.4	25	.0 0.0	0.0		t			
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		5.0	3.0	4.0		0.0		<b>`</b>	$\mathbf{\nabla}$	-	
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	1.0	2.0	0.0	0.0		5	6	7	<b>Y</b> 8
Timer Results				EBI	-	EBT	WB	L	WBT	NB	-	NBT	SBI	-	SBT
Assigned Phase	e			3		8			4			6	5		2
Case Number				1.0		4.0			5.3			5.3	1.0		4.0
Phase Duration	, S			5.4		36.4			31.0			22.0	45.7	7	67.7
Change Period,	, ( Y+R	c ), S		4.0		6.0			6.0			7.0	5.0		7.0
Max Allow Head	dway(/	MAH ), s		4.1		5.3			5.3			5.0	5.1		5.0
Queue Clearan	ce Time	e ( g s ), s		2.5		2.2			26.0			6.7	36.2	2	8.2
Green Extensio	n Time	(ge), s		0.0		5.6			0.0			1.8	4.5		1.9
Phase Call Prol	bability				7	1.00			1.00		1.00		1.00	)	1.00
Max Out Proba	bility			0.01		0.02			1.00			0.00	0.14	1	0.00
Meyement Cre					FD				)		ND			CD	
Movement Gro	-	suits			EB T	R	<u> </u>	WE	1		NB T	R		SB T	D
Approach Move Assigned Move						_		Т 4	R				E		R
		() yeb/b		3	8	18	7	<u> </u>	14	1	6	16	5	2	12
Adjusted Flow F	· ·	ow Rate ( s ), veh/h/l	n	11 1688	1626		122 1410	44 1772	578 2 1502	0 1165	89 1772	28 1502	717	217 1732	
Queue Service				0.5	0.0	'	7.5	2.0	_	0.0	4.7	1.7	34.2	6.2	
		e Time ( g c ), s		0.5	0.0	-	7.5	2.0	_	0.0	4.7	1.7	34.2	6.2	
Green Ratio (g		e fille ( <i>g c</i> ), s		0.3	0.0		0.24	0.24	_	0.0	0.14	0.14	0.55	0.2	
Capacity ( c ), v				392	0.57		408	426		69	255	216	859	1010	
Volume-to-Capa		atio (X)		0.028	0.000	)	0.300	0.10		0.000	0.348		0.835	0.214	
		/In ( 95 th percentile)	)	9.2	0.000		116.9	39.6		0.000	95.3	28.7	484.3	100.4	
		eh/In ( 95 th percentile)		0.4	0.0		4.6	1.6		0.0	3.8	1.1	19.1	4.0	
	· ·	RQ) (95 th percent		0.06	0.00		0.97	0.00		0.00	0.00	0.12	3.87	0.00	
Uniform Delay (				27.8	0.00		32.9	30.8		0.0	40.1	38.8	18.4	10.3	
Incremental De				0.0	0.0		0.6	0.2	_	0.0	1.2	0.4	5.5	0.1	
Initial Queue De		-		0.0	0.0		0.0	0.0	_	0.0	0.0	0.0	0.0	0.0	<u> </u>
Control Delay (				27.8	0.0		33.5	31.0		0.0	41.3	39.2	23.9	10.5	
Level of Service				С		-	С	С	B		D	D	C	В	
Approach Delay	. ,			27.3	3	С	17.3	<u> </u>	B	40.8		D	20.8		С
Intersection De							0.7						С		
Multimodal Re	sults				EB			WE	3		NB			SB	
Pedestrian LOS	Score	/ LOS		2.15	5	В	1.96	3	В	2.63	3	С	1.89	)	В
Bicycle LOS Sc	ore / LC	DS		0.52	2	А	1.72	2	В	0.68	3	А	2.03	3	В

	HCS7 Two-Way	y Stop-Control Report							
General Information		Site Information							
Analyst	RL	Intersection	SHERIDAN LAKE/CHATEAUX						
Agency/Co.	HDR	Jurisdiction	RAPID CITY						
Date Performed     2/14/2018     East/West Street     CHATEAUX RIDGE									
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD						
Time Analyzed	PM 2045 NO BUILD	Peak Hour Factor	0.90						
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25						
Project Description	SLR CORRIDOR STUDY	· · · ·							



#### Vehicle Volumes and Adjustments

venicle volumes and Adj	ustme	ints				Westbound Northbound Southbound											
Approach		Eastb	ound			West	bound										
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	1	0	0	1	1	0	0	1	1	0	
Configuration			LTR				LTR			L		TR		L		TR	
Volume, V (veh/h)		5	0	5		5	0	20		10	935	10		50	845	15	
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2			
Proportion Time Blocked																	
Percent Grade (%)		(	D				0										
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo			Ν	lo		
Median Type/Storage				Undi	vided									·			
Critical and Follow-up He	eadwa	ys															
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1			
Critical Headway (sec)		7.12	6.52	6.22		7.12	6.52	6.22		4.12				4.12			
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2			
Follow-Up Headway (sec)		3.52	4.02	3.32		3.52	4.02	3.32		2.22				2.22			
Delay, Queue Length, and	d Leve	l of S	ervice	)													
Flow Rate, v (veh/h)			11				28			11				56			
Capacity, c (veh/h)			55				112			719				663			
v/c Ratio			0.20				0.25			0.02				0.08			
95% Queue Length, Q <sub>95</sub> (veh)			0.7				0.9			0.0				0.3			
Control Delay (s/veh)			85.5				47.6			10.1				10.9			
Level of Service, LOS			F				E			В				В			
Approach Delay (s/veh)		. 85	5.5			47	7.6			0	.1			. 0	.6		
Approach LOS			F				E										

		HCS	7 Sig	nalize	d Int	ersec	tion R	lesi	ults	Sun	nmar	y				
General Inform	nation								Inte	ersect	ion Infe	ormatio	on		1 4 Y 4 + 1	4 L
Agency		HDR								ration,		0.25	<i></i>		ΥĻ	
Analyst		RL		Analys	is Date	e Feb 14	4 2018			a Typ		Other		14		K.
Jurisdiction		RAPID CITY		Time P		PM	1, 2010		PH		<u> </u>	0.90			w‡e	2-
Urban Street		SHERIDAN LAKE	ROAD	Analys			NO BUII				Period	1> 7:0	າດ			+ *
olban olicet			NO/ND	/ lindiy5	15 1001		ECTOR			aryoio	Chiou	127.	00			
Intersection		CORRAL DRIVE		File Na	ame	SLR-C	CORRAL	L.xus	;			I			1414Y	17
Project Descript	tion	SLR CORRIDOR S	TUDY													
Demond Inform	n et le m						-	10	/D		1	ND			CD	
Demand Inform					EB		+	r	/B T	Р		NB		_	SB	
Approach Move				L	Т	R	L	+-	Г	R	L	T	R	L	T	R
Demand (v), v	en/n			135		260	de la compañía de la comp				340	640			710	165
Signal Informa	tion					21				1				J		
Cycle, s	128.1	Reference Phase	2	1	54	- SA	E						<b>`</b>   ■	1		
Offset, s	0	Reference Point	End	Green	1 11	59.5	26.9	0.0	0	0.0	0.0	_	1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	0.0	_		<b>st</b>		7
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	2.0	0.		0.0	0.0		5	6	7	≺ ∗
				T								ï				
Timer Results				EBL		EBT	WBI	L	W	BT	NBI	-	NBT	SB	L	SBT
Assigned Phase	Э					8	<u> </u>	$\rightarrow$			1	_	6	-		2
Case Number				<u> </u>	_	9.0	<u> </u>	$\rightarrow$			1.0	<u> </u>	4.0			7.3
Phase Duration		\ \		<u> </u>	_	32.9	<u> </u>	$\rightarrow$			30.2	2	95.2		$\rightarrow$	65.0
Change Period,		-		<u> </u>	_	6.0	┣───	$\rightarrow$			5.5		5.5			5.5
Max Allow Head		· · ·		<u> </u>		4.2	<u> </u>	$\rightarrow$			5.1		4.0		$\rightarrow$	4.0
Queue Clearan				<u> </u>	_	26.1	<u> </u>	$\rightarrow$			24.1		27.8			57.1
Green Extensio		( <i>g</i> e), s		<u> </u>		0.8	<u> </u>	$\rightarrow$			0.6		8.6			2.0
Phase Call Prot	-			<u> </u>		1.00 0.77	┣───	-		_	1.00		1.00	+		1.00 0.92
Max Out Probal	onity					0.77					1.00	)	0.00			0.92
Movement Gro	oup Res	ults			EB			W	В			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			3		18					1	6			2	12
Adjusted Flow F	Rate ( v	), veh/h		150		289					378	711			789	111
Adjusted Satura	ation Flo	ow Rate ( s ), veh/h/l	In	1688		1502					1688	1772			1772	1502
Queue Service	Time (	g s ), S		9.9		24.1					22.1	25.8			55.1	5.5
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		9.9		24.1					22.1	25.8			55.1	5.5
Green Ratio (g				0.21		0.21					0.67	0.70			0.46	0.46
Capacity ( c ), v				355		315					405	1241			823	697
Volume-to-Capa	-			0.423		0.916					0.933	0.573			0.959	0.159
		(In (95 th percentile)	-	190.2		420					528.5	351.8			907	87.2
	· /	eh/In (95 th percent	,	7.5		16.5					20.8	13.9			35.7	3.4
		RQ) (95 th percent	tile)	1.90		0.00					5.28	0.00			0.00	0.73
Uniform Delay (				43.9		49.5					39.4	9.6		-	33.1	19.8
Incremental De	• •			0.8		25.3					26.8	0.6			20.9	0.1
Initial Queue De	• •			0.0		0.0					0.0	0.0			0.0	0.0
Control Delay (		eh		44.7		74.8					66.1	10.3			54.0	20.0
Level of Service		(1.00		D		E					E	В			D	В
Approach Delay				64.5		E	0.0				29.6	j	С	49.	8	D
Intersection Del	iay, s/ve	en / LOS				43	3.4							D		
Multimodal Re	sulte				EB			WE	B			NB			SB	
Pedestrian LOS		/LOS		1.97	1	В	2.06		E	3	0.67		A	1.9		В
	20010					_					0.01					

		HCS	S7 Sig	nalize	d Int	ersec	tion F	kesu	Its Sur	nmar	y				
	otion								Interect	ion Inf				4444	ba L
General Inform	nation								Intersect		W	on	- 1	ιĻ	4- <u>3</u>
Agency		HDR			·		4 0040		Duration,		0.25				R. R.
Analyst		RL				Feb 1	4, 2018		Area Typ	e	Other			w	×_ 2
Jurisdiction		RAPID CITY		Time F		PM			PHF	<u> </u>	0.90			м+е 6	
Urban Street		SHERIDAN LAKE I	ROAD	Analys	sis Year		NO BUI ECTOR		Analysis	Period	1> 7:0	00			к к
Intersection		DUNSMORE ROAI	ס	File Na	ame		DUNSM		us					* जनकार	12 1
Project Descrip	tion	SLR CORRIDOR S												<u>, , , , , , , , , , , , , , , , , , , </u>	
, ,		μ													
Demand Inform	nation				EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			5	370	40	115	91	0 300	85	35	75	120	10	10
	tion					1 11:				_	_				
Signal Informa Cycle, s	114.2	Reference Phase	2	c	1.2 8	12							~		$\mathbf{\Psi}$
Offset, s	0	Reference Point	End		F	11	7					1	<b>Y</b> 2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Green		25.7	0.0	0.0		0.0	_		<b>A</b>		•
Force Mode	Fixed	Simult. Gap N/S	On	Yellow Red	4.0	3.0	0.0	0.0		0.0	_	5	Y	7	· Y
Force wode	Fixed	Simult. Gap N/S	On	Rea	4.0	4.0	0.0	0.0	0.0	0.0		5	6	1	8
Timer Results				EBI		EBT	WB	L	WBT	NB		NBT	SBI		SBT
Assigned Phase	е		_			2		-	6			8			4
Case Number	-					7.0			5.0			8.0			6.0
Phase Duration	. S					81.6			81.6			32.7			32.7
Change Period		c). S				9.0			9.0			7.0		+	7.0
Max Allow Head						4.0			4.0			4.3			4.3
	ance Time ( $g_s$ ), s					59.6			67.1			13.7			24.5
Green Extensio						9.4			8.5			1.1			0.7
Phase Call Pro		(90),0				1.00			1.00			1.00			1.00
Max Out Proba						0.15			0.27		_	0.00			0.33
	ý														
Movement Gro	-	sults			EB	1		WB			NB			SB	11
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I	,	· ·			417	28	128	1011	_		183		133	17	
-		ow Rate (s), veh/h/	In		1656	1502	975	1772			1506		1308	1672	
Queue Service					1.3	0.8	14.1	56.0	_		9.8		11.0	0.9	
		e Time ( <i>g c</i> ), s			57.6	0.8	65.1	56.0			11.7		22.5	0.9	
Green Ratio (g	-				0.64	0.64	0.64	0.64			0.22		0.22	0.22	
Capacity (c), v					1064	935	225	1103			401	<u> </u>	236	391	
Volume-to-Capa			<u> </u>		0.392	0.030	0.567	0.916			0.457		0.566	0.043	
		/In (95 th percentile)			198.6	10.4	155	730.3			198.6 7.8		171.1	16.4	
		eh/In (95 th percent RQ) (95 th percent			7.8 0.00	0.4	6.1 2.07	28.8 0.00			0.00		6.7 1.49	0.6	
Uniform Delay			lile)		10.5	8.1	44.8	18.5			37.1		46.9	33.1	
Incremental De					0.2	0.0	2.2	8.1	0.1		0.8		2.1	0.0	
Initial Queue De		· · · · · · · · · · · · · · · · · · ·			0.2	0.0	0.0	0.0	0.0	_	0.0		0.0	0.0	
Control Delay (					10.7	8.1	47.0	26.7			37.9		49.1	33.1	
Level of Service					B	A	D	C	A		D		D	C	
Approach Delay	. ,			10.6		B	26.0		C	37.9		D	47.3		D
Intersection De	•			10.0			5.3	-		01.0			с С		
	,, <i></i> ,					_	-						- -		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS	S Score	/ LOS		1.70	)	В	1.89	9	В	2.30	)	В	1.96	6	В
Bicycle LOS Sc	ore / LC	DS		1.22	2	А	2.70	)	С	0.79	)	А	0.74	1	А

HCS7 Two-Way Stop-Control Report											
	Site Information										
RL	Intersection	SHERIDAN LAKE/SUMMERSET									
HDR	Jurisdiction	RAPID CITY									
2/14/2018	East/West Street	SUMMERSET DRIVE									
2045	North/South Street	SHERIDAN LAKE ROAD									
PM 2045 NO BUILD	Peak Hour Factor	0.90									
North-South	Analysis Time Period (hrs)	0.25									
SLR CORRIDOR STUDY											
	RL       HDR       2/14/2018       2045       PM 2045 NO BUILD       North-South	Site Information       RL     Intersection       HDR     Jurisdiction       2/14/2018     East/West Street       2045     North/South Street       PM 2045 NO BUILD     Peak Hour Factor       North-South     Analysis Time Period (hrs)									



Major Street: North-South

					major												
Vehicle Volumes and Ad	justme	ents															
Approach		Eastb	oound			West	oound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	1	1	0	
Configuration							LR					TR		L	Т		
Volume, V (veh/h)						5		30			950	10		65	905		
Percent Heavy Vehicles (%)						2		2						2			
Proportion Time Blocked																	
Percent Grade (%)							0										
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo		No				
Median Type/Storage				Undi	vided												
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)						7.1		6.2						4.1			
Critical Headway (sec)						6.42		6.22						4.12			
Base Follow-Up Headway (sec)						3.5		3.3						2.2			
Follow-Up Headway (sec)						3.52		3.32						2.22			
Delay, Queue Length, an	d Leve	l of S	ervice		<u>.</u>									<u>.</u>			
Flow Rate, v (veh/h)	Τ						39							72			
Capacity, c (veh/h)							155							653			
v/c Ratio							0.25							0.11			
95% Queue Length, Q <sub>95</sub> (veh)							0.9							0.4			
Control Delay (s/veh)							35.9							11.2			
Level of Service, LOS					E								В				
Approach Delay (s/veh)							5.9						0.8				
Approach LOS							E										

	HCS7 Two-Way S	Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/TANAGER/CROYLE
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/14/2018	East/West Street	SHERIDAN LAKE ROAD
Analysis Year	2045	North/South Street	TANAGER DRIVE
Time Analyzed	PM 2045 NO BUILD	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lawas			

. . ..



Major Street: East-West

Vehicle Volumes and Ad	justme	ents																	
Approach		Eastb	ound			West	oound			North	bound			South	bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R			
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0			
Configuration			LTR			LT		R			LTR				LTR				
Volume, V (veh/h)		5	360	5		30	770	205		5	0	10		45	0	5			
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2			
Proportion Time Blocked																			
Percent Grade (%)										0 0									
Right Turn Channelized		Ν	10			N	lo			No No									
Median Type/Storage				Undi	vided														
Critical and Follow-up H	eadwa	ys																	
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2			
Critical Headway (sec)		4.12				4.12				7.12	6.52	6.22		7.12	6.52	6.22			
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3			
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32	3.52 4.02 3.32						
Delay, Queue Length, an	d Leve	l of S	ervice																
Flow Rate, v (veh/h)		6				33					17				56				
Capacity, c (veh/h)		644				1152					228				127				
v/c Ratio		0.01				0.03					0.07				0.44				
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1					0.2				1.9				
Control Delay (s/veh)		10.6				8.2					22.0				53.8				
Level of Service, LOS		В				A					С				F				
Approach Delay (s/veh)		0	.3			0	.7	-	22.0					53.8					
Approach LOS											С				F				

	HCS7 Two-Wa	y Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	SHERIDAN/WILDWOOD
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/14/2018	East/West Street	WILDWOOD DRIVE
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM 2045 NO BUILD	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY	÷	



Major Street: North-South

Vehicle Volumes and Ad	justme	ents																	
Approach		Eastb	ound			West	oound			North	bound			South	bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R			
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6			
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1			
Configuration			LR							L	Т				Т	R			
Volume, V (veh/h)		5		0						0	120				275	5			
Percent Heavy Vehicles (%)		2		2						2									
Proportion Time Blocked																			
Percent Grade (%)			0																
Right Turn Channelized		Ν	10			Ν	lo		No No										
Median Type/Storage				Undi	vided														
Critical and Follow-up H	eadwa	ys																	
Base Critical Headway (sec)		7.1		6.2						4.1									
Critical Headway (sec)		6.42		6.22						4.12									
Base Follow-Up Headway (sec)		3.5		3.3						2.2									
Follow-Up Headway (sec)		3.52		3.32						2.22									
Delay, Queue Length, an	d Leve	l of S	ervice	•						<u> </u>									
Flow Rate, v (veh/h)			6							0									
Capacity, c (veh/h)			575							1249									
v/c Ratio			0.01							0.00									
95% Queue Length, Q <sub>95</sub> (veh)			0.0							0.0									
Control Delay (s/veh)			11.3							7.9									
Level of Service, LOS			В						A										
Approach Delay (s/veh)		1:	1.3							. 0	.0								
Approach LOS		В																	

	HCS7 Two-Way	y Stop-Control Report	
General Information		Site Information	
Analyst	RL	Intersection	CATRON/BENDT
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	2/14/2018	East/West Street	CATRON BOULEVARD
Analysis Year	2045	North/South Street	BENDT DRIVE
Time Analyzed	PM 2045 NO BUILD	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		



#### Vehicle Volumes and Adjustments

Vehicle Volumes and Ad	justme	ents																
Approach		Eastb	ound			West	oound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	1	2	0	0	1	2	0		1	1	0		1	1	0		
Configuration		L	Т	TR		L	Т	TR		L		TR		L		TR		
Volume, V (veh/h)		10	630	55		30	965	60		40	5	20		10	0	10		
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2		
Proportion Time Blocked																		
Percent Grade (%)										(	C				0			
Right Turn Channelized		Ν	lo			Ν	lo			No No								
Median Type/Storage				Undi	vided													
Critical and Follow-up Headways																		
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9		
Critical Headway (sec)		4.14				4.14				7.54	6.54	6.94		7.54	6.54	6.94		
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3		
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32		
Delay, Queue Length, an	d Leve	l of S	ervice															
Flow Rate, v (veh/h)		11				33				44		28		11		11		
Capacity, c (veh/h)		609				847				101		214		67		465		
v/c Ratio		0.02				0.04				0.44		0.13		0.17		0.02		
95% Queue Length, Q <sub>95</sub> (veh)		0.1				0.1				1.9		0.4		0.6		0.1		
Control Delay (s/veh)		11.0				9.4				66.3		24.3		69.6		12.9		
Level of Service, LOS		В				А				F		С		F		В		
Approach Delay (s/veh)		0	.2			0	.3			50	).2		41.3					
Approach LOS											F				E			

HCS7 Two-Way	y Stop-Control Report	
	Site Information	
RL	Intersection	CORRAL/PARK
HDR	Jurisdiction	RAPID CITY
2/14/2018	East/West Street	CORRAL DRIVE
2045	North/South Street	PARK DRIVE
PM 2045 NO BUILD	Peak Hour Factor	0.90
East-West	Analysis Time Period (hrs)	0.25
SLR CORRIDOR STUDY		
	RL         HDR         2/14/2018         2045         PM 2045 NO BUILD         East-West	RL       Intersection         HDR       Jurisdiction         2/14/2018       East/West Street         2045       North/South Street         PM 2045 NO BUILD       Peak Hour Factor         East-West       Analysis Time Period (hrs)

....



Major Street: East-West

Vehicle Volumes and Ad	justme	ents																
Approach		Eastb	ound			West	bound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		1	0	1		
Configuration		L	Т				Т	R						L		R		
Volume, V (veh/h)		10	45				80	425						350		30		
Percent Heavy Vehicles (%)		2												2		2		
Proportion Time Blocked																		
Percent Grade (%)														(	0			
Right Turn Channelized		Ν	lo			Y	es			Ν	10			Ν	10			
Median Type/Storage		Undivided																
Critical and Follow-up H	eadwa	ys																
Base Critical Headway (sec)		4.1												7.1		6.2		
Critical Headway (sec)		4.12												6.42		6.22		
Base Follow-Up Headway (sec)		2.2												3.5		3.3		
Follow-Up Headway (sec)		2.22												3.52		3.32		
Delay, Queue Length, an	d Leve	l of S	ervice															
Flow Rate, v (veh/h)		11												389		33		
Capacity, c (veh/h)		1505												823		969		
v/c Ratio		0.01												0.47		0.03		
95% Queue Length, Q <sub>95</sub> (veh)		0.0												2.6		0.1		
Control Delay (s/veh)		7.4												13.2		8.8		
Level of Service, LOS		A												В		A		
Approach Delay (s/veh)		1	.3	-		-	-	-			-	-	12.9					
Approach LOS									В									

LES HOLLERS WAY

	HCS7 Two-Way	Stop-Control Report										
General Information		Site Information										
Analyst	DH	Intersection	CORRAL/PARK									
Agency/Co.	HDR	Jurisdiction	RAPID CITY									
Date Performed	12/14/2018	East/West Street	CORRAL DRIVE									
Analysis Year	2045	North/South Street	PARK DRIVE									
Time Analyzed	AM 2045 NO BUILD - LHW	Peak Hour Factor	0.90									
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25									
Project Description	SLR CORRIDOR STUDY											
Lanes												



Vehicle Volumes and Adj	ustme	nts																
Approach		Eastk	ound			West	oound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6		
Number of Lanes		1	1	0		0	1	1	0	0	0	0	0	0	1	1		
Configuration		L	Т				Т	R							Т	R		
Volume (veh/h)		25	95				115	865							865	45		
Percent Heavy Vehicles (%)		2	3				3	3										
Proportion Time Blocked																		
Percent Grade (%)			0				0											
Right Turn Channelized						Y	es		No									
Median Type   Storage		Undivided																
Critical and Follow-up H	eadwa																	
Base Critical Headway (sec)		7.1	6.5				6.5	6.2										
Critical Headway (sec)		6.42	6.53				6.53	6.23										
Base Follow-Up Headway (sec)		3.5	4.0				4.0	3.3										
Follow-Up Headway (sec)		2.22	4.03				4.03	3.33										
Delay, Queue Length, an	d Leve	l of S	ervice															
Flow Rate, v (veh/h)		28	106				128	961										
Capacity, c (veh/h)		0	255				239	1082										
v/c Ratio			0.41				0.54	0.89										
95% Queue Length, Q <sub>95</sub> (veh)			1.9				2.9	12.9										
Control Delay (s/veh)			28.7				36.3	27.5										
Level of Service (LOS)	Í		D				E	D										
Approach Delay (s/veh)						28	3.5				-			-	-	6		
Approach LOS																		

		HCS	7 Sig	nalize	d Int	tersect	tion R	lesi	ults	s Sun	nmar	У					
General Inform	nation								Int	torsoct	tion Inf	ormatio	n		اي	╡╲╬╪╸┼╷	þa ly
	lation	HDR								uration,		0.25	, , , , , , , , , , , , , , , , , , , ,	-		11	
Agency				A	:- D-4	- D 1	4 0040					_		_	*		R.
Analyst		DH				e Dec 1	4, 2018			еа Тур	e	Other			* 		
Jurisdiction		RAPID CITY		Time F		AM		_	PH			0.90				W + E B	<del>₹</del>
Urban Street		SHERIDAN LAKE F	ROAD	Analys	sis Yea	r 2045 I LHW	NO BUI	LD -	An	nalysis	Period	1> 7:0	00	-		5.4	
Intersection		CORRAL DRIVE		File Na	ame	SLR-C	ORRAI	LH	Ŵ.x	us		A			۳)	치 수 약 1	۳ <sub>1</sub> ۲
Project Descrip	tion	SLR CORRIDOR S	TUDY														
Demand Inform	nation				EB			V	٧B			NB				SB	
Approach Move	ement			L	Т	R	L	· ·	Т	R	L	Т	F	र	L	Т	R
Demand (v), v	eh/h			340		620					680	1290				795	300
Signal Informa	tion				1	21				1			1	-			
Cycle, s	150.0	Reference Phase	2	-			2							4			
Offset, s	0	Reference Point			1 51		2						1	•	2	3	4
	-		End	Green		61.5	32.0	0.		0.0	0.0						
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	-	4.0	4.0	0.		0.0	0.0	_		5		-	$\prec$
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	2.0	0.	0	0.0	0.0		5	-	6	7	<b>¥</b> 8
Timer Results				EBL	_	EBT	WB	L	V	VBT	NBI	L	NBT		SBL		SBT
Assigned Phase	ssigned Phase					8					1		6				2
Case Number						9.0					1.0		4.0				7.3
Phase Duration, s						38.0					45.0	) 1	12.0				67.0
Change Period,	( Y+R	c ), S				6.0					5.5		5.5			+	5.5
Max Allow Head	•	·				4.2					5.1		4.0			-	4.0
Queue Clearan	ce Time	e ( g s ), s				34.0					41.5	5 1	108.5				63.5
Green Extensio	n Time	(g <sub>e</sub> ), s				0.0					0.0		0.0				0.0
Phase Call Prol	bability					1.00					1.00	)	1.00				1.00
Max Out Proba	bility					1.00					1.00	)	1.00				1.00
Movement Gro	oup Res	sults			EB			W	В			NB		Т	_	SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R		L	Т	R
Assigned Move	ment			3		18					1	6				2	12
Adjusted Flow F	Rate ( v	), veh/h		378		689			T		756	1433				883	233
Adjusted Satura	ation Flo	w Rate ( <i>s</i> ), veh/h/l	n	1688		1502					1688	1772				1772	1502
Queue Service	Time ( g	g s ), s		32.0		32.0					39.5	106.5				61.5	16.3
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		32.0		32.0					39.5	106.5				61.5	16.3
Green Ratio ( g	/C)			0.21		0.21					0.69	0.71				0.41	0.41
Capacity ( <i>c</i> ), v	/eh/h			360		320					492	1258				726	616
Volume-to-Capa	acity Ra	itio(X)		1.049		2.150					1.534	1.139				1.216	0.379
Back of Queue	( Q ), ft/	/In ( 95 th percentile)	)	700.2		2364. 7			Τ		1985. 8	2177. 8		Т		1730.8	251.9
Back of Queue	(Q), ve	eh/In ( 95 th percenti	le)	27.6		93.1					78.2	85.7				68.1	9.9
		RQ) (95 th percent	· ·	7.00		0.00					19.86	0.00				0.00	2.10
Uniform Delay (	( d 1 ), s	/veh		59.0		59.0					48.7	21.8				44.3	30.9
Incremental De	lay ( <i>d</i> 2	), s/veh		60.9		528.0					250.6	72.8				109.5	0.4
	nitial Queue Delay ( d ȝ ), s/veh			0.0		0.0					0.0	0.0				0.0	0.0
	Control Delay ( <i>d</i> ), s/veh			119.9		587.0					299.3	94.5				153.8	31.3
Level of Service (LOS)			F		F					F	F				F	С	
Approach Delay, s/veh / LOS			421.	6	F	0.0				165.	2	F		128.2	2	F	
Intersection Delay, s/veh / LOS						21	8.3							F			
Multimodal Re	sults				EB			W	В			NB		S			
Pedestrian LOS		/LOS		1.97	-	В	2.10			В	0.67		A		1.93		В
Bicycle LOS Sc						F					4.10		D		2.33		B

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	DH	Intersection	SHERIDAN LAKE/SUMMERSET
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	12/14/2018	East/West Street	SUMMERSET DRIVE
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	AM 2045 NO BUILD-LHW	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			



Vehicle Volumes and Adju	istme	nts					
Approach		Eastb	ound			Westb	0
Movement	U	L	Т	R	U	L	

Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	Т	
Volume (veh/h)						5		65			1905	5		15	1400	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized																
Median Type   Storage				Undi	vided											
Critical and Follow-up He	adwa	ys														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, and	Leve	l of Se	ervice													
Flow Rate, v (veh/h)							78							17		
Capacity, c (veh/h)							34							256		
v/c Ratio							2.30							0.07		
95% Queue Length, Q <sub>95</sub> (veh)							8.8							0.2		
Control Delay (s/veh)							846.7							20.0		
Level of Service (LOS)							F							C		
Approach Delay (s/veh)						84	6.7							0	.2	
Approach LOS	F 6101															

		o Control Doport	
	HCS7 Two-Way Sto		
General Information		Site Information	
Analyst	DH	Intersection	SHERIDAN LAKE/CHATEAUX
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	12/14/2018	East/West Street	CHATEAUX RIDGE
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	AM 2045 NO BUILD-LHW	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			



Approach		Eastb	ound			West	bound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6		
Number of Lanes		0	1	0		0	1	0	0	1	1	0	0	1	1	0		
Configuration			LTR				LTR			L		TR		L		TR		
Volume (veh/h)		5	0	5		5	0	50		0	1855	5		25	1375	5		
Percent Heavy Vehicles (%)		2	2	2		2	2	2		2				2				
Proportion Time Blocked																		
Percent Grade (%)			0				0											
Right Turn Channelized																		
Median Type   Storage				Undi	vided													
Critical and Follow-up H	eadwa	ys																
Base Critical Headway (sec)		7.1	6.5	6.2		7.1	6.5	6.2		4.1				4.1				
Critical Headway (sec)		7.12	6.52	6.22		7.12	6.52	6.22		4.12				4.12				
Base Follow-Up Headway (sec)		3.5	4.0	3.3		3.5	4.0	3.3		2.2				2.2				
Follow-Up Headway (sec)		3.52	4.02	3.32		3.52	4.02	3.32		2.22				2.22				
Delay, Queue Length, an	d Leve	l of Se	ervice															
Flow Rate, v (veh/h)	Τ		11				61			0				28				
Capacity, c (veh/h)			1				20			434				269				
v/c Ratio			12.16				3.10			0.00				0.10				
95% Queue Length, Q <sub>95</sub> (veh)			2.8				8.0			0.0				0.3				
Control Delay (s/veh)			11733. 4				1352.3			13.3				19.9				
Level of Service (LOS)			F				F			В				С				
Approach Delay (s/veh)		117	33.4			135	52.3			0	.0		0.4					
Approach LOS			F				F											

Project Description       SLR CORRIDOR STUDY       EB       WB       NB       SB       SB         Approach Movement       L       T       R       R       R       R       R       R       R       R       R       R       R       R       R       R       R			HCS	S7 Sig	nalize	ed Int	tersec	tion F	kesι	ilts Su	mmar	у			_	_
Analysis         DH         Analysis         Daradon, h	0	<i>c</i> .								1.4	() I (			1 0	al Laba I	b I
Analysis       DH       Analysis       Date       Area       PHF       0.90         Urban Street       SHERIDAN LAKE ROAD       Analysis Yeart       0.90       1> 7.00       1> 7.00         Intersection       CATRON BOLLEVARD       File Name       SLR-CATRON-HUW.xus       Imme Project Description       SLR-CATRON-HUW.xus       Imme Project Description       SLR-CATRON-HUW.xus       Imme Project Description       SLR-CATRON-HUW.xus       Imme Project Description       Imme Project Description       SLR-CATRON-HUW.xus       Imme Project Description       Imme Project Description       SLR-CATRON-HUW.xus       Imme Project Description		nation											on		the second s	12 V
Jurisdiction       RAPID CITY       Time Period       Am       PHF       0.90       0.90         Uhan Street       SHERIDAN LAKE ROAD       Analysis Year       2045 NO BUILD.       Analysis Period       1> 7:00         Intersection       CATRON BOULEVARD       File Name       SLR-CATRON-LHW.xus        Image: Common Street       <														_		K
Utham Street       SHERIDAN LAKE ROAD       Analysis Year       2045 ND BUILD. LHW       Analysis Period       >> 7:00         Intersection       CATRON BOULEVARD       File Name       SUR-CATRON-LHW.xus       Image: Surger	-							4, 2018		·	be		•			- <sup>2</sup>
Intersection         CATRON BOULEVARD         File Name         SLR-CATRON-HW.sus         N							_								W + E B	
Project Description       SLR CORRIDOR STUDY       EB       WB       NB       SB       SB         Appraach Movement       L       T       R       R       L       T       R       R       R       R       R       R       R       R	Urban Street		SHERIDAN LAKE I	ROAD	Analys	sis Yea		NO BUI	LD-	Analysis	Period	1> 7:0	00	2 M	5.4	
Demand information         L         T         R	Intersection		CATRON BOULEV	ARD	File Na	ame	SLR-0	CATRO	N-LH\	W.xus				5	* 1 <del>*</del> *	1 T
Approach Movement       L       T       R	Project Descript	tion	SLR CORRIDOR S	TUDY												
Demand ( v ), veh/h         40         55         5         20         20         820         5         1000         1030         3100           Signal Information Cycle, s         150.0         Reference Phase         2           Offset, s         0         Reference Point         End           Orccordinate/ Vallow         Vs         Simult. Gap EW         On         Ref         2.0         2.0         0.0 <td>Demand Inform</td> <td>nation</td> <td></td> <td></td> <td></td> <td>EB</td> <td></td> <td></td> <td>W</td> <td>′B</td> <td></td> <td>NB</td> <td></td> <td></td> <td>SB</td> <td></td>	Demand Inform	nation				EB			W	′B		NB			SB	
Signal information         Cycle, s         150.0         Reference Point         End           Uncoordinated         Yes         Smutt. Gap E/W         On         Ref         <	Approach Move	ment			L	Т	R	L	1	r R	L	Т	R	L	Т	R
Cycle, s       150.0       Reference Phase       2       C       61.0       19.0       0.	Demand (v), v	eh/h			40	55	5	20	2	0 820	5	1000	)	1030	310	45
Cycle, s       150.0       Reference Phase       2       Creen       52.0       61.0       19.0       0.0       0.0       0.0         Fixed       Simult. Gap LW       On       Reference Phase       EBL       EBT       WBL       WBT       NBT       SBL       Fixed         Assigned Phase       EBL       EBL       EBT       WBL       WBT       NBT       SBL       Fixed       SBL       Fixed       SBL       SBL       Fixed       SBL					lír									_		
Offset, s       0       Reference Point       End       Green       1       N       0       0.0 <td>-</td> <td></td> <td></td> <td></td> <td></td> <td>1215</td> <td>&lt; 215</td> <td>3 4</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td>K  </td> <td></td> <td>- <del></del></td>	-					1215	< 215	3 4	4					K		- <del></del>
Uncoordinated         Yes         Simult. Gap E/W         On         Green         52.0         61.0         19.0         0	-		ļ		-		- SA	"R"					1	2	3	<b>K</b>
Force Mode       Fixed       Simult. Gap N/S       On       Next       20       2.0       2.0       0.0 <th< td=""><td></td><td></td><td></td><td></td><td>Green</td><td>52.0</td><td>61.0</td><td>19.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td><td>1</td><td></td><td></td><td></td></th<>					Green	52.0	61.0	19.0	0.0	0.0	0.0		1			
Timer Results       EBL       EBL       WBL       WBT       NBL       NBT       SBL       Assigned Phase       Case Number       6.0       5.0       6.3       1.0         Phase Duration, s       6.0       5.0       25.0       25.0       6.8.0       57.0       1.00       7.0       1.00       7.0			· · · · · · · · · · · · · · · · · · ·											1		
Assigned Phase       Image: Second Sec	Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	0.0	0.0		5	6	7	
Assigned Phase       Image: Second Phase S	Timer Results				EBI	_	EBT	WB	L	WBT	NB	L	NBT	SBL		SBT
Case Number       6.0       5.0       6.3       1.0         Phase Duration, s       25.0       25.0       25.0       68.0       57.0         Change Period, (Y+R c), s       6.0       5.3       5.3       5.0       5.1       0         Max Allow Headway (MAH), s       5.3       5.3       5.3       5.0       5.1       0       0.0		e														2
Phase Duration, s       Call       25.0       Call       25.0       Call       6.0       Call       6.0       Call       7.0       5.0         Max Allow Headway (MAH), s       Call       5.3       Call       6.0       Call       6.0       7.0       5.0	<u> </u>					-	-		$\rightarrow$							4.0
Change Period, $(Y+R_c)$ , s       6.0 $$ 6.0 $$ 7.0       5.0         Max Allow Headway (MAH), s       5.3       5.3       5.3       5.3       5.0       5.1       0         Green Extension Time $(g_e)$ , s       8.0       21.0 $$ 63.0       64.0       0.0         Phase Call Probability       1.00 <td< td=""><td></td><td>. S</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td><u> </u></td><td></td><td></td><td></td><td></td><td>125.0</td></td<>		. S									<u> </u>					125.0
Max Allow Headway (MAH), s5.35.35.35.05.19.1Queue Clearance Time (g s), s8.021.00.063.054.09.0		ange Period,(Y+ <i>R</i> c ), s							$\rightarrow$							7.0
Queue Clearance Time (g s), sR.0Z1.0Image Clearance Time (g s), sR.0R.0Z1.0Image Clearance Time (g s), sR.0 </td <td></td> <td colspan="4">x Allow Headway ( <i>MAH</i> ), s</td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>5.0</td>		x Allow Headway ( <i>MAH</i> ), s							-							5.0
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $									$\rightarrow$						, – – –	10.7
Phase Call Probability       1.00      <		· · · ·						<u> </u>	-		-					18.9
Max Out ProbabilityImage: Control of the procentile of the			(90),0		<u> </u>				$\rightarrow$		<u> </u>					1.00
Movement Group Results       L       T       R       L       L       T       R       L       T <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.01</td>									-							0.01
Approach MovementLTRLTRLTRLTRLTRLTRLTRLTRLTAsigned Movement3818741416C52Adjusted Flow Rate (v), veh/h4467C22225726111111443723723130177215021010177216881746Queue Service Time (g s), s4.45.2C3.31.719.00.561.052.08.7Cycle Queue Clearance Time (g c), s6.05.2C7.51.719.00.561.052.08.7Green Ratio (g/C)0.130.130.130.130.130.410.410.410.410.770.79Capacity (c), veh/h0.2130.331712247114597.1633137Volume-to-Capacity Ratio (X)0.2130.310.09865195.62.44138.812.2Back of Queu (Q), th/ln (95 th percentile)7.217.480.00.011.541.541.35.24.8Queue Storage Ratio (RQ) (95 th percentile)0.40.000.00.010.000.00.00.01.35.24.44.3Incremental Delay (d 2), s/veh0.010.00.00.00.00.00.00.00.00.0<	-	,														
Assigned Movement       3       8       18       7       4       14       1       6       5       2         Adjusted Flow Rate (v), veh/h       44       67       22       22       572       6       1111       1144       372         Adjusted Saturation Flow Rate (s), veh/h/ln       1389       1746       1335       1772       1502       1010       1772       1688       1748         Queue Service Time (g s), s       6.0       5.2       2.3       1.7       19.0       0.5       61.0       52.0       8.7         Cycle Queue Clearance Time (g c), s       6.0       5.2       7.5       1.7       19.0       0.5       61.0       52.0       8.7         Green Ratio (g/C)       0.13       0.13       0.13       0.13       0.47       0.41       0.41       0.77       0.79         Capacity (c), veh/h       209       221       171       224       711       459       721       633       1375         Volume-to-Capacity Ratio (X)       0.213       0.301       0.13       0.99       0.85       0.012       1.542       1.88       0.27         Back of Queue (Q), ft/ln (95 th percentile)       72.2       107.8       1.4       <	Movement Gro	up Res	sults			EB			WE	3		NB			SB	
Adjusted Flow Rate (v), veh/h       44       67       22       22       572       6       1111       1144       372         Adjusted Saturation Flow Rate (s), veh/h/ln       1389       1746       1335       1772       1502       1010       1772       1688       1748         Queue Service Time (g s), s       4.4       5.2       0       2.3       1.7       19.0       0.5       61.0       52.0       8.7         Cycle Queue Clearance Time (g c), s       6.0       5.2       0       7.5       1.7       19.0       0.5       61.0       0.7       0.79         Capacity (c), veh/h       209       221       0.13       0.13       0.47       0.41       0.41       0.77       0.79         Capacity (c), veh/h       209       221       171       224       711       459       721       633       137         Volume-to-Capacity Ratio (X)       0.213       0.301       0.130       0.99       0.805       0.012       1.542       1.88       0.27         Back of Queue (Q), th/ln (95 th percentile)       72.2       107.8       36.7       34.8       651.9       5.6       2940       1335.2       4.8         Queue Storage Ratio (RQ) (95 th percentile) <td>Approach Move</td> <td>ment</td> <td></td> <td></td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td> <td>L</td> <td>Т</td> <td>R</td>	Approach Move	ment			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Adjusted Saturation Flow Rate (s), veh/h/ln       1389       1746       1335       1772       1502       1010       1772       1688       1748         Queue Service Time (g s), s       4.4       5.2       2.3       1.7       19.0       0.5       61.0       52.0       8.7         Cycle Queue Clearance Time (g c), s       6.0       5.2       7.5       1.7       19.0       0.5       61.0       52.0       8.7         Green Ratio (g/C)       0.13       0.13       0.13       0.13       0.47       0.41       0.41       0.41       0.77       0.79         Capacity (c), veh/h       209       221       171       224       711       459       721       633       1375         Volume-to-Capacity Ratio (X)       0.213       0.301       0.70       0.79       0.805       0.012       1.542       1.808       0.27         Back of Queue (Q), th/ln (95 th percentile)       72.2       107.8       36.7       34.8       651.9       5.6       2.94       133.5       135.2       4.8         Queue Storage Ratio (RQ) (95 th percentile)       2.8       4.2       1.4       1.4       2.57       3.6       2.6.5       4.4.4       3.9         Inform Delay (d	Assigned Move	ment			3	8	18	7	4	14	1	6		5	2	12
Queue Service Time (g s), s       4.4       5.2       C       2.3       1.7       19.0       0.5       61.0       52.0       8.7         Cycle Queue Clearance Time (g c), s       6.0       5.2       7.5       1.7       19.0       0.5       61.0       52.0       8.7         Green Ratio (g/C)       0.13       0.13       0.13       0.13       0.13       0.13       0.41       0.41       0.41       0.77       0.79         Capacity (c), veh/h       209       221       0       171       224       711       459       721       633       1375         Volume-to-Capacity Ratio (X)       0.213       0.301       0.130       0.99       0.805       0.012       1.542       0       434.8       122.7         Back of Queue (Q), th/ln (95 th percentile)       72.2       107.8       36.7       34.8       651.9       5.6       2940       343.8       122.7         Back of Queue (Q), veh/ln (95 th percentile)       2.8       4.2       1.4       1.4       2.57       0.2       11.5       135.2       4.8         Queue Storage Ratio (RQ) (95 th percentile)       0.44       0.00       0.31       0.00       2.90       0.03       0.00       2.7.48 <t< td=""><td>Adjusted Flow F</td><td>Rate ( <i>v</i></td><td>), veh/h</td><td></td><td>44</td><td>67</td><td></td><td>22</td><td>22</td><td>572</td><td>6</td><td>1111</td><td></td><td>1144</td><td>372</td><td></td></t<>	Adjusted Flow F	Rate ( <i>v</i>	), veh/h		44	67		22	22	572	6	1111		1144	372	
Cycle Queue Clearance Time (g c), s6.05.27.51.719.00.561.052.08.7Green Ratio (g/C)0.130.130.130.130.130.140.410.410.770.79Capacity (c), veh/h2092211712247114597216331375Volume-to-Capacity Ratio (X)0.2130.3010.3010.1990.8050.0121.5421.8080.277Back of Queue (Q), tf/ln (95 th percentile)72.2107.836.734.8651.95.629403434.8122.7Back of Queue (Q), veh/ln (95 th percentile)2.84.21.41.425.70.2115.7135.24.8Queue Storage Ratio (RQ) (95 th percentile)0.440.0000.310.002.900.030.0027.480.00Uniform Delay (d 1), s/veh60.659.562.957.933.626.544.544.44.3Incremental Delay (d 2), s/veh0.71.163.458.240.726.629.53414.24.5Level of Service (LOS)EEEDCF363.454.25Intersection Delay, s/veh / LOS60.9EEDCF313.65Intersection Delay, s/veh / LOS60.9EEDCF313.65Intersection Delay, s/veh / LOS60.9EEDCF	Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	In	1389	1746		1335	177	2 1502	1010	1772		1688	1748	
Green Ratio (g/C)       0.13       0.13       0.13       0.13       0.13       0.41       0.41       0.41       0.77       0.79         Capacity (c), veh/h       209       221       171       224       711       459       721       633       1375         Volume-to-Capacity Ratio (X)       0.213       0.301       0.130       0.099       0.805       0.012       1.542       1.808       0.277         Back of Queue (Q), ft/ln (95 th percentile)       7.2       107.8       36.7       34.8       651.9       5.6       2.940       343.8       122.7         Back of Queue (Q), veh/ln (95 th percentile)       2.8       4.2       1.4       1.4       25.7       0.2       11.57       135.2       4.8         Queue Storage Ratio (RQ) (95 th percentile)       0.44       0.0       0.31       0.00       2.90       0.03       0.00       27.4       0.00         Uniform Delay (d_1), s/veh       60.6       59.5       62.9       57.9       33.6       26.5       44.5       44.4       4.3         Incremental Delay (d_2), 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       <	Queue Service	Time ( g	g s ), S		4.4	5.2		2.3	1.7	19.0	0.5	61.0		52.0	8.7	
Capacity (c), veh/h209221In171224711459721Image: formal system in the sy	Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		6.0	5.2		7.5			0.5	61.0		52.0	8.7	
Volume-to-Capacity Ratio (X)0.2130.301m0.1300.090.8050.0121.542m1.8080.273Back of Queue (Q), ft/ln (95 th percentile)72.2107.836.734.8651.95.629403434.8122.7Back of Queue (Q), veh/ln (95 th percentile)2.84.21.41.42.570.211.57135.24.8Queue Storage Ratio (RQ) (95 th percentile)0.440.001.11.42.900.030.02.900.030.027.480.00Uniform Delay (d_1), s/veh60.659.51.162.957.933.626.544.544.44.3Incremental Delay (d_2), s/veh0.71.11.40.00.00.02.000.002.0036.936.980.1Initial Queue Delay (d_3), s/veh0.00.00.00.00.00.00.00.00.00.00.00.0Control Delay, s/veh / LOSEEEDCF313.6414.24.5Approach Delay, s/veh / LOS60.9F42.1D29.029.029.031.31.05Intersection Delay, s/veh / LOSEEDCF313.654.44.5Intersection Delay, s/veh / LOS60.9F42.1D29.05531.35Intersection Delay, s/veh / LOSEEEDCF	,	,			0.13			0.13			0.41	0.41		0.77	0.79	
Back of Queue (Q), ft/ln (95 th percentile)72.2 $107.8$ $36.7$ $34.8$ $651.9$ $5.6$ $294$ $3434.8$ $122.7$ Back of Queue (Q), veh/ln (95 th percentile) $2.8$ $4.2$ $1.4$ $1.4$ $25.7$ $0.2$ $115.7$ $135.2$ $4.8$ Queue Storage Ratio (RQ) (95 th percentile) $0.44$ $0.0$ $0.31$ $0.0$ $2.90$ $0.03$ $0.0$ $15.7$ $135.2$ $4.4.4$ $4.3$ Inform Delay ( $d_{1}$ ), s/veh $60.6$ $59.5$ $62.9$ $57.9$ $33.6$ $26.5$ $44.5$ $44.4$ $4.3$ Incremental Delay ( $d_{2}$ ), s/veh $0.7$ $1.1$ $0.0$ $0.5$ $0.3$ $7.1$ $0.0$ $25.8$ $369.8$ $0.1$ Initial Queue Delay ( $d_{3}$ ), s/veh $0.0$						<u> </u>									1375	
Back of Queue (Q), veh/ln (95 th percentile)2.84.2Image: Normal and the constraint of the cons	•	-	. ,			<u> </u>	_			_		-			0.271	
Queue Storage Ratio ( RQ ) ( 95 th percentile)0.440.00Image: Constraint of the constraint of t		. ,	, , ,			<u> </u>	3	36.7							<u> </u>	
Uniform Delay (d 1), s/veh60.6 $59.5$ 62.9 $57.9$ $33.6$ $26.5$ $44.5$ $44.4$ $4.3$ Incremental Delay (d 2), s/veh0.7 $1.1$ 0.5 $0.3$ $7.1$ $0.0$ $25.8$ $369.8$ $0.1$ Initial Queue Delay (d 3), s/veh0.0 $0.0$ 0.0 $0.0$ </td <td></td> <td>. ,</td> <td>, .</td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td><u> </u></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		. ,	, .			<u> </u>			<u> </u>	_						
Incremental Delay ( $d_2$ ), s/veh0.71.10.50.37.10.0250.8369.80.1Initial Queue Delay ( $d_3$ ), s/veh0.0				tile)	0.44	0.00		0.31						27.48	0.00	
Initial Queue Delay (d 3), s/veh0.0																
Control Delay (d), s/veh       61.3       60.6       m       63.4       58.2       40.7       26.6       295.3       414.2       4.5         Level of Service (LOS)       E       E       Image: Control Delay, s/veh / LOS       E       E       E       D       C       F       A         Approach Delay, s/veh / LOS       60.9       E       42.1       Image: Control Delay, s/veh / LOS       F       313.6       A         Intersection Delay, s/veh / LOS       E       E       E       F       A       A         Multimodal Results       E       E       F       F       A			•		0.7	1.1		0.5	0.3	7.1	0.0	250.8		369.8	0.1	
Level of Service (LOS)       E       E       E       D       C       F       A         Approach Delay, s/veh / LOS       60.9       E       42.1       D       294.0       F       313.6         Intersection Delay, s/veh / LOS       E       248.9       E       F       A         Multimodal Results       EE       E       F       A	• • •					<u> </u>									<u> </u>	
Approach Delay, s/veh / LOS         60.9         E         42.1         D         294.0         F         313.6           Intersection Delay, s/veh / LOS         248.9										2 40.7						
Intersection Delay, s/veh / LOS 248.9 F Multimodal Results EB WB NB SB																
Multimodal Results     EB     WB     NB     SB			60.9	)			1	D	294.	.0	F	313.	6	F		
	Intersection Delay, s/veh / LOS						24	8.9						F		
	Multiment						14/5	>		ND			0.5			
			0.00	11	P	4.04			0.5	11	<u> </u>	4.05	ii ii	P		
		edestrian LOS Score / LOS														В
Bicycle LOS Score / LOS         0.67         A         1.51         B         2.00         B         2.99	DICYCIE LOS SC	ore / LC	13		0.67		A	1.5		В	2.00	J	В	2.99	,	С

	HCS7 Two-	Way Stop-Control	Report	
General Information		Site Inform	nation	
Analyst	DH	Intersection	CATRON/BE	NDT
Agency/Co.	HDR	Jurisdiction	RAPID CITY	
Date Performed	12/14/2018	East/West Stre	eet CATRON BO	ULEVARD
Analysis Year	2045	North/South	Street BENDT DRIV	Έ
Time Analyzed	AM 2045 NO BUILD-LHW	Peak Hour Fac	ctor 0.90	
Intersection Orientation	East-West	Analysis Time	Period (hrs) 0.25	
Project Description	SLR CORRIDOR STUDY			
Lanes				
	J 4 4 4 4 4	JAIAAA AU AU A A A A A A A A A A A A A A		
Vehicle Volumes and A	Adjustments			
Approach	Eastbound	Westbound	Northbound	Southbound

Approach		Eastb	ound			West	ound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	1	2	0		1	1	0		1	1	0
Configuration		L	Т	TR		L	Т	TR		L		TR		L		TR
Volume (veh/h)	0	10	1070	60	0	30	795	10		35	5	25		35	5	30
Percent Heavy Vehicles (%)	2	2			2	2				2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)										(	)			(	C	
Right Turn Channelized																
Median Type   Storage				Undi	vided											
Critical and Follow-up He																
Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.14				4.14				7.54	6.54	6.94		7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32
Delay, Queue Length, and	Leve	l of Se	ervice													
Flow Rate, v (veh/h)		11				33				39		33		39		39
Capacity, c (veh/h)		754				550				43		165		58		192
v/c Ratio		0.01				0.06				0.91		0.20		0.66		0.20
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.2				3.6		0.7		2.8		0.7
Control Delay (s/veh)		9.8				12.0				254.8		32.3		146.4		28.4
Level of Service (LOS)		А				В				F		D		F		D
Approach Delay (s/veh)		0	.1			0	.4			15	2.1			87	7.4	
Approach LOS										I	F				F	

		Н	CS7	Two-	-Way	Stop	o-Co	ntrol	Rep	ort						
General Information							Site	Inforr	natio	n						
Analyst	DH						Inters	ection			SHER	DAN/W	ILDWOC	D		
Agency/Co.	HDR						Jurisd	liction			RAPIC	CITY				
Date Performed	12/14	/2018					East/	Nest Stre	eet		WILD	NOOD [	DRIVE			
Analysis Year	2045						North	/South S	Street		SHER	DAN LA	ke roai	C		
Time Analyzed	AM 2	045 NO	BUILD-L	HW			Peak	Hour Fac	ctor		0.90					
Intersection Orientation	North	n-South					Analy	sis Time	Period (	hrs)	0.25					
Project Description	SLR C	ORRIDO	R STUD	(												
Lanes																
				$\frac{141}{\lambda}$	٩٦ Major	רוֹם רוֹם Street: Nor	th-South	141245								
Vehicle Volumes and A	djustme	nts														
Approach		Eastb	ound		West	bound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1

Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1
Configuration			LR							L	Т				т	R
Volume (veh/h)		15		5						5	1045				325	10
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%)		(	C													
Right Turn Channelized														Ν	lo	
Median Type   Storage				Undi	vided											
Critical and Follow-up He	adwa	ys														
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.42		6.22						4.12						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.52		3.32						2.22						
Delay, Queue Length, and	Leve	l of Se	ervice													
Flow Rate, v (veh/h)			22							6						
Capacity, c (veh/h)			160							1185						
v/c Ratio			0.14							0.00						
95% Queue Length, Q <sub>95</sub> (veh)			0.5							0.0						
Control Delay (s/veh)			31.1							8.1						

Level of Service (LOS)

Approach Delay (s/veh)

Approach LOS

D

31.1

D

А

0.0

		HCS	/ Sig	nalize	d Int	ersec	tion R	kesu	its Si	ımm	nary	/				
Concernation									lunt-						╵╺╡╺┼╸┿╸↓	In L
General Inform	nation										i Info	ormatio	n	- 1		A* 4
Agency		HDR							Duratic			0.25				K
Analyst		DH					4, 2018		Area T	уре		Other				<ul> <li></li> <li><!--</td--></li></ul>
Jurisdiction		RAPID CITY		Time P		AM			PHF			0.90		*	W = E	+ 
Urban Street		SHERIDAN LAKE F	ROAD	Analys	is Year	2045 LHW	NO BUI	LD -	Analys	is Peri	iod	1> 7:0	00	۲ ۲	-t-	¥
Intersection		DUNSMORE ROAL	C	File Na	ime	SLR-D	DUNSM	ORE-	_HW.xu	IS					ነ 1 1 ቀ ነሳ	<u>*</u>
Project Descrip	tion	SLR CORRIDOR S	TUDY													
Demand Inform	nation				EB			W	B			NB		1	SB	
Approach Move	ement			L	Т	R	L	Т	R	2	L	Т	R	L	Т	R
Demand ( v ), v				10	925	155	60	21			30	25	165	285	85	10
				16			-			جنع					in the second	ر میں اور
Signal Informa			1		a 🗧	126								_		$\mathbf{A}$
Cycle, s	100.0	Reference Phase	2		Ë °	1 St	2							€ ,	3	<b>x † a</b>
Offset, s	0	Reference Point	End	Green	54.0	30.0	0.0	0.0	0.0	<del>,   ,</del>	0.0			S I	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	5.0	3.0	0.0	0.0	0.0	0	0.0					×17
Force Mode	Fixed	Simult. Gap N/S	On	Red	4.0	4.0	0.0	0.0	0.0	)	0.0		5	6	7	8
Timer Results			_	EBL		EBT	WB	L	WBT	T	NBL	_	NBT	SBI	_	SBT
Assigned Phase	e					2			6				8			4
Case Number						7.0			5.0				8.0			6.0
Phase Duration	. S		_			63.0		-	63.0				37.0			37.0
Change Period,		c). S				9.0		+	9.0			_	7.0			7.0
-	Allow Headway ( MAH ), s					4.1			4.1				4.4			4.4
	<u> </u>					56.0		-	56.0	+			12.2			32.0
	ueue Clearance Time ( $g s$ ), s reen Extension Time ( $g e$ ), s					0.0			0.0				2.5			0.0
Phase Call Prol	bability					1.00			1.00				1.00			1.00
Max Out Proba	bility					1.00			1.00			(	0.02			1.00
Movement Gro	oup Res	sults			EB			WB	,			NB			SB	
Approach Move	-			L	Т	R	L	Т	R		L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	16		3	8	18	7	4	14
Adjusted Flow F	Rate ( v	), veh/h			1039	89	67	233	56			200		317	100	1
-	· · ·	w Rate ( s ), veh/h/l	n		1768	1502	549	1772		2		1519		1219	1754	<u> </u>
Queue Service		( <i>//</i>			19.1	2.9	0.0	7.0	1.8	_	-	0.9		19.8	4.2	
Cycle Queue C		- ,			54.0	2.9	54.0	7.0	1.8			10.2		30.0	4.2	
Green Ratio ( g	,				0.54	0.54	0.54	0.54	0.54	ł		0.30		0.30	0.30	
Capacity ( c ), v	/eh/h				991	811	72	957	811			498		313	526	
Volume-to-Capa	acity Ra	itio(X)			1.048	0.110	0.926	0.24	4 0.06	9		0.402		1.012	0.190	
Back of Queue	( Q ), ft/	/In ( 95 th percentile)	)		1086. 1	39.4	146.8	111.8	3 24			174.3		469.4	82.4	
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)		42.8	1.6	5.8	4.4	0.9			6.9		18.5	3.2	
Queue Storage	Ratio (	RQ) (95 th percent	tile)		0.00	0.79	1.96	0.00	0.13	3		0.00		4.08	0.00	
Uniform Delay (	· ,				24.0	11.2	50.0	12.2				28.1		42.4	26.0	
Incremental De	lay ( <i>d</i> 2	), s/veh			42.0	0.1	80.7	0.1	0.0			0.5		53.9	0.2	
nitial Queue Delay ( <i>d</i> ₃ ), s/veh					0.0	0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Control Delay (	Control Delay ( d ), s/veh				66.0	11.3	130.7	12.3	11.0	)		28.6		96.3	26.2	
Level of Service	. ,				F	В	F	В	В			С		F	С	
Approach Delay, s/veh / LOS				61.7		Е	34.3	3	С		28.6		С	79.5	5	Е
Intersection De	Intersection Delay, s/veh / LOS					57	7.4							E		
Multimodal Re	Multimodal Results							WB				NB			SB	
manumoadine	Pedestrian LOS Score / LOS				EB										-	
						В	1.90	)	В		2.17		B	2.03	3	В

		Н	CS7	Two-	Way	Stop	o-Co	ntrol	Rep	ort						
General Information	_	_	_	_	_	_	Site	Inforr	natio	n	_	_	_	_	_	_
Analyst	DH							ection			SHER	IDAN/TA				
Agency/Co.	HDR						Jurisd					D CITY		CROTEL		
Date Performed		/2018						Nest Stre	eet			IDAN LA		<u>ר</u>		
Analysis Year	2045	72010						/South S								
Time Analyzed		045 NO		н₩				Hour Fac			0.90					
Intersection Orientation	East-								Period (	hrs)	0.25					
Project Description				v			Analy			1113)	0.23					
Lanes	<b>B</b>															
Vehicle Volumes and Adj Approach Movement Priority	U U 1U		oound T 2	¶ ¶ 4 ↔ ↑ ↑ ↑ ↑ ↑		↔ ↔ or Street: Ea Westl		R 6	U	North L 7	bound T 8	R	U	South L 10	bound T 11	R 12
											-	-				
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0
Configuration	-		LTR			LT	0.1.0	R	<u> </u>		LTR			405	LTR	
Volume (veh/h)	-	5	925	5		20	210	20		5	0	30		135	0	5
Percent Heavy Vehicles (%)		2				2			<u> </u>	2	2	2		2	2	2
Proportion Time Blocked																
Percent Grade (%)	<u> </u>										0				0	
Right Turn Channelized						Ν	lo									
Median Type   Storage				Undi	vided											
Critical and Follow-up Ho	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.12				4.12				7.12	6.52	6.22		7.12	6.52	6.22
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32
Delay, Queue Length, and	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		6				22					39				156	
Capacity, c (veh/h)		1308				672					240				114	
v/c Ratio		0.00				0.03					0.16				1.36	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1					0.6				10.6	
Control Delay (s/veh)		7.8		0.1		10.5					22.9				278.0	
Level of Service (LOS)		A		Α		В					С				F	
Approach Delay (s/veh)		0	.1			1	.2			22	2.9			27	8.0	
						· · ·										

Approach LOS

F

С

		ŀ	ICS7	Two	-Way	' Stop	o-Co	ntrol	Rep	ort						
General Information		_					Site	Inforr	natio	n			_			_
Analyst	DH							ection			SHER	IDAN/AI	BERTTA			
Agency/Co.	HDR						Jurisc	liction								
Date Performed	12/14	4/2018					East/	Nest Stre	eet		SHER	IDAN LA	KE ROA	D		
Analysis Year	2045							/South S			ALBE	RTTA DR	IVE			
Time Analyzed	AM 2	045 NO	BUILD-L	.HW				Hour Fac			0.90					
Intersection Orientation	East-	West					Analy	sis Time	Period (	hrs)	0.25					
Project Description	SLR C	CORRIDO	OR STUD	Y												
Lanes																
				<u> </u>	7 4	۲ ۲ or Street: Ea	st-West	ስካቁ ቅጥ 1								
Vehicle Volumes and Adj	justme															
Approach		Eastbound Westbound Northbound Southbound														
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	T	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					<u> </u>
Volume (veh/h)			875	10		35	185			5		60				<u> </u>
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)											0					
Right Turn Channelized																
Median Type   Storage				Undi	ivided											
<b>Critical and Follow-up H</b>	eadwa	ys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				7.12		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)	T					39					72					
Capacity, c (veh/h)						702					278					
v/c Ratio						0.06					0.26					
	-					0.2					1.0					
95% Queue Length, Oss (veh)					1											-
95% Queue Length, Q <sub>95</sub> (veh)						10.4					22.4					
Control Delay (s/veh)						10.4 В					22.4 C					
						В	.2			22						

General Information		Site Information	
Analyst	DH	Intersection	CORRAL/PARK
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	12/14/2018	East/West Street	CORRAL DRIVE
Analysis Year	2045	North/South Street	PARK DRIVE
Time Analyzed	PM 2045 NO BUILD-LHW	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			
		UU442 ↓↓↓ ↓↓↓ ↓↓ ↓ ↓ ↓ ↓	

A 가 해 해 가 다 가 가 Major Street: North-South

Vehicle Volumes and Ad	justme	nts														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		0	1	1	0	0	0	0	0	0	1	1
Configuration		L	Т				Т	R							Т	R
Volume (veh/h)		15	45				135	555							445	55
Percent Heavy Vehicles (%)		2	3				3	3								
Proportion Time Blocked																
Percent Grade (%)			0				0									
Right Turn Channelized						Y	es							١	١o	
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		7.1	6.5				6.5	6.2								
Critical Headway (sec)		6.42	6.53				6.53	6.23								
Base Follow-Up Headway (sec)		3.5	4.0				4.0	3.3								
Follow-Up Headway (sec)		2.22	4.03				4.03	3.33								
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		17	50				150	617								$\square$
Capacity, c (veh/h)		0	475				438	1082								
v/c Ratio			0.11				0.34	0.57								
95% Queue Length, Q <sub>95</sub> (veh)			0.4				1.5	3.7								
Control Delay (s/veh)			13.5				17.4	12.6								
Level of Service (LOS)			В				С	В								
Approach Delay (s/veh)						- 13	3.6									
Approach LOS	1						В									

		HCS	7 Sig	nalize	d Int	tersect	tion R	esi	ilts	Sun	nmar	У					_
Conorol Inform	otion								Inte		ion Inf	o recotio			يا ط يايوه	• L b•	U
General Inform	nation										-	ormatic	on	_		+ +=	
Agency		HDR							<u> </u>	ration,		0.25		-7			R.
Analyst		DH				e Dec 1	4, 2018			еа Туре	<del>)</del>	Other					
Jurisdiction		RAPID CITY		Time P		PM			PH			0.90		*_~-			∲ ←
Urban Street		SHERIDAN LAKE I	ROAD	Analys	is Yea	r  2045 I LHW	NO BUII	_D -	Ana	alysis I	Period	1> 7:0	00	r 1			2
Intersection		CORRAL DRIVE		File Na	ame		ORRAI	xus							<u></u> <u></u> ↑	   	٢
Project Descript	tion	SLR CORRIDOR S	TUDY														
Demand Inform	nation				EB			V	/B			NB			SI	В	
Approach Move	ment			L	Т	R	L	T -	Г	R	L	Т	R	L	Т		R
Demand ( v ), v				150		340					415	1075			150		275
				1	1			11		I							
Signal Informa						21	a						<b>.</b> .				
Cycle, s	150.0	Reference Phase	2		51	- <u>S</u> A	E.						<b>`</b> _ '	· <b>↓</b> 2		3	4
Offset, s	0	Reference Point	End	Green	20.5	87.5	25.0	0.	0	0.0	0.0		-				
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	4.0	0.	0	0.0	0.0			<b>\</b>			2
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	2.0	0.	0	0.0	0.0		5	6		7	8
Timer Results				EBL		EBT	WBI		W	/BT	NBI		NBT	S	BL	5	BT
Assigned Phase	<u> </u>				-	8		-			1		6	-			2
Case Number	<i>.</i>					9.0	<u> </u>	$\rightarrow$			1.0		4.0	-	$\rightarrow$		7.3
Phase Duration	<u> </u>					31.0		+		_	26.0		4.0	+	+		3.0
Change Period,		-) c				6.0		$\rightarrow$			5.5	, <u> </u>	5.5	-	$\rightarrow$		5.0 5.5
Max Allow Head		•			-	4.3		+			5.1		4.0	+			4.0
Queue Clearan	• •	,				27.0		+			22.5	5	77.5	+	$\rightarrow$		9.5
Green Extensio		, = ,				0.0					0.0		30.6				0.0
Phase Call Prot						1.00		1			1.00	)	1.00			1	.00
Max Out Proba	bility					1.00					1.00	)	0.84			1.	.00
Movement Gro	un Res	sults			EB			W	3			NB			SE	3	
Approach Move	-			L	T	R	L	T		R	L	T	R	L	T	- -	R
Assigned Move				3		18			+		1	6		-	2	+	12
Adjusted Flow F		), veh/h		167		378					461	1194			166		222
-		ow Rate ( <i>s</i> ), veh/h/l	n	1688		1502					1688	1772		-	177		1502
Queue Service		. ,		13.7		25.0					20.5	75.5			87.		10.9
Cycle Queue Cl		- /		13.7		25.0			+		20.5	75.5			87.		10.9
Green Ratio ( g				0.17		0.17					0.73	0.76			0.5	8	0.58
Capacity ( c ), v	eh/h			281		250					279	1341			103	i4	876
Volume-to-Capa	acity Ra	itio (X)		0.593		1.509					1.655	0.891			1.61	12	0.254
Back of Queue	( Q ), ft/	/In ( 90 th percentile)	)	233.9		999.9					1264. 9	877.6			4376	5.1	156
Back of Queue	(Q), ve	eh/In ( 90 th percent	ile)	9.2		39.4			+		9 49.8	34.6	-		172	.3	6.1
	<b>(</b> . , ,	RQ) (90 th percent		2.34		0.00					12.65	0.00			0.0		1.30
Uniform Delay (		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		57.8		62.5					56.1	13.6			31.	3	15.3
Incremental Del	ncremental Delay ( $d \neq j$ , s/ven					248.9					310.2	7.8			280	.1	0.2
Initial Queue De	nitial Queue Delay ( d ȝ ), s/veh					0.0					0.0	0.0			0.0	)	0.0
Control Delay (	d ), s/ve	eh		61.1		311.4					366.3	21.5			311	.4	15.4
Level of Service	e (LOS)			E		F					F	С			F		В
Approach Delay	/, s/veh	/LOS		234.8	3	F	0.0				117.	5	F	27	6.6		F
Intersection Del	ay, s/ve	eh / LOS				20	6.6							F			
Multimodal Re	sulte				EB			W	2			NB			SE	2	
Pedestrian LOS		/1.05		1.97		В	2.08			B	0.66	1	A	1	90		В
Bicycle LOS Sc				1.97		F	2.00	,	-		3.22		C		90 60		D
Dicycle LOG 30											0.22	-	0	J.			5

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	DH	Intersection	SHERIDAN LAKE/SUMMERSET
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	12/14/2018	East/West Street	SUMMERSET DRIVE
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM 2045 NO BUILD - LHW	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			



Vehicle Volumes and Ad	justme	nts														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	Т	
Volume (veh/h)						5		30			1460	10		60	1780	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized																
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)	Τ						39							67		
Capacity, c (veh/h)							24							397		
v/c Ratio							1.63							0.17		
95% Queue Length, Q <sub>95</sub> (veh)							4.9							0.6		
Control Delay (s/veh)							661.3							15.9		
Level of Service (LOS)							F							С		
Approach Delay (s/veh)						66	51.3							. 0	.5	
Approach LOS							F									

	HCS7 Two-Way Sto	p-Control Report	
General Information		Site Information	
Analyst	DH	Intersection	SHERIDAN LAKE/CHATEAUX
Agency/Co.	HDR	Jurisdiction	RAPID CITY
Date Performed	12/14/2018	East/West Street	CHATEAUX RIDGE
Analysis Year	2045	North/South Street	SHERIDAN LAKE ROAD
Time Analyzed	PM 2045 NO BUILD - LHW	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	SLR CORRIDOR STUDY		
Lanes			



#### **Vehicle Volumes and Adjustments** Eastbound Approach Westbound Northbound Southbound U R U U L Т L т R U L Т R L т R Movement 12 7 1U 2 4U Priority 10 11 8 9 1 3 4 5 6 Number of Lanes 0 1 0 0 1 0 0 1 1 0 0 1 1 0 LTR LTR TR TR Configuration L L Volume (veh/h) 5 5 25 10 1435 1715 10 0 0 10 50 20 2 2 2 2 2 Percent Heavy Vehicles (%) 2 2 2 **Proportion Time Blocked** Percent Grade (%) 0 0 **Right Turn Channelized** Median Type | Storage Undivided **Critical and Follow-up Headways** Base Critical Headway (sec) 7.1 6.5 6.2 7.1 6.5 6.2 4.1 4.1 Critical Headway (sec) 7.12 6.52 6.22 7.12 6.52 6.22 4.12 4.12 3.5 4.0 3.3 3.5 4.0 3.3 2.2 2.2 Base Follow-Up Headway (sec) Follow-Up Headway (sec) 3.52 4.02 3.32 3.52 4.02 3.32 2.22 2.22 Delay, Queue Length, and Level of Service Flow Rate, v (veh/h) 17 33 11 56 Capacity, c (veh/h) 3 12 305 407 v/c Ratio 6.10 2.71 0.04 0.14 3.5 5.1 0.1 0.5 95% Queue Length, Q<sub>95</sub> (veh) Control Delay (s/veh) 4688.7 1390.6 17.2 15.2 F F С С Level of Service (LOS) Approach Delay (s/veh) 4688.7 1390.6 0.1 0.4 Approach LOS F F

General Information														
General information								Intersed	tion Inf	ormatic			at 1/2 at 1	ել
Agonov	HDR									0.25	DU		44	
Agency			Analyz	ie Det		4 2010		Duration		O.25 Other				t.
Analyst	DH RAPID CITY				e Dec 1			Area Ty PHF	be	0.90			W TE	
Jurisdiction			Time F		LHW		J-					1 44 147 14 1 44 147 14 1 4		
Urban Street	SHERIDAN LAKE F				r 2045			Analysis	Period	1> 7:0	00		51	
Intersection	CATRON BOULEV		File Na	ame	SLR-0	CATRON	V.xus					ň	***	<u>۲</u>
Project Description	SLR CORRIDOR S	TUDY												
Demand Information				EB			W	В		NB		1	SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), veh/h			10	5	5	40	4		5	475	1	775	895	55
			10				1					_	<u> </u>	
Signal Information				215	< 21.5	3 4	4					K		⋺
Cycle, s 146.3		2	-		§↑	"R"					1	2	3	4
Offset, s 0	Reference Point	End	Green	51.0	32.0	45.3	0.0	0.0	0.0		1			
Uncoordinated Yes	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0		0.0			「 「 」	_	<b>-</b> € .
Force Mode Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	) 0.0	0.0		5	6	7	<b>Y</b> 8
Timer Results			EBI	_	EBT	WB	L	WBT	NB	L	NBT	SBL	_	SBT
Assigned Phase					8			4			6	5		2
Case Number					6.0			5.0			6.3	1.0		4.0
Phase Duration, s					51.3			51.3			39.0	56.0	)	95.0
Change Period, (Y+R	? c ), S				6.0			6.0			7.0	5.0		7.0
Max Allow Headway (	,				5.3			5.3			5.0	5.1		5.0
Queue Clearance Tim	· ·				5.8			42.5			34.0	53.0	)	85.0
Green Extension Time	, = ,				6.6			2.8			0.0	0.0		2.4
Phase Call Probability	, = ,				1.00			1.00			1.00	1.00	)	1.00
Max Out Probability					0.00			0.85			1.00	1.00	)	1.00
						_								
Movement Group Re	sults			EB		<u> </u>	WE		<u> </u>	NB	5		SB	
Approach Movement				Т	R	L	Т	R	L	T	R	L	Т	R
Assigned Movement	· · · · · · · · · · · · · · · · · · ·		3	8	18	7	4	14	1	6		5	2	12
Adjusted Flow Rate ( Adjusted Saturation F	, ·	n	11 1355	11 1626		44 1403	50 177	672 2 1502	6 546	528 1772		861 1688	1033 1760	
Queue Service Time (	, ,	11	0.9	0.7		3.3	2.9	_	1.5	32.0		51.0	83.0	
Cycle Queue Clearan	• /		3.8	0.7		4.0	2.9		28.4	32.0		51.0	83.0	
Green Ratio ( $g/C$ )	ce mile ( <i>g c</i> ), s		0.31	0.31	-	0.31	0.31		0.22	0.22		0.58	0.60	
Capacity ( <i>c</i> ), veh/h			442	504		477	549	_	68	387		637	1058	
Volume-to-Capacity R	atio (X)		0.025	0.022	,	0.093	0.09			1.362		1.351	0.976	
Back of Queue (Q), f	, ,		13.2	12.8		52.9	58.8		9.8	1266			1242.1	
Back of Queue (Q),	, , ,		0.5	0.5		2.1	2.3		0.4	49.8		69.6	48.9	
Queue Storage Ratio	<u>, , ,</u>	,	0.08	0.00		0.44	0.00		0.06	0.00		14.15	0.00	
Uniform Delay ( $d_1$ ),		,	37.2	35.1	1	36.5	35.9		68.9	57.2		41.0	28.2	
Incremental Delay ( d			0.0	0.0		0.1	0.1	_	0.7	178.9		168.2	22.1	
Initial Queue Delay ( d	,		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay ( d ), s/			37.2	35.1		36.6	36.0		69.7	236.1		209.2	50.3	
Level of Service (LOS			D	D		D	D	В	E	F		F	D	
Approach Delay, s/veł	,		36.2		D	19.8		B	234.		F	122.		F
Intersection Delay, s/v						6.0						F		
Multimodal Results				EB			WE	3		NB			SB	
Pedestrian LOS Score			2.05		В	1.97	/	В	2.66		С	1.90		В
Bicycle LOS Score / L	05		0.52	2	А	1.75	5	В	1.22	2	А	3.61		D

		Н	CS7	Two-	Way	Stop	o-Co	ntrol	Rep	ort						
General Information							Site	Inforr	natio	ı						
Analyst	DH						Inters	ection			CATR	ON/BEN	DT			
Agency/Co.	HDR						Jurisd	liction			RAPIE	O CITY				
Date Performed	12/14	/2018					East/\	Nest Stre	eet		CATR	ON BOU	LEVARD			
Analysis Year	2045						North	/South S	Street		BEND	T DRIVE				
Time Analyzed	PM 2	045 NO	BUILD -	LHW			Peak	Hour Fac	tor		0.90					
Intersection Orientation	East-	Vest					Analy	sis Time	Period (	hrs)	0.25					
Project Description	SLR C															
Lanes																
	Lanes															
Vehicle Volumes and Adju	ıstme	nts														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12

Critical and Follow-up He	adwa	ys											
Base Critical Headway (sec)		4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
Critical Headway (sec)		4.14			4.14			7.54	6.54	6.94	7.54	6.54	6.94
Base Follow-Up Headway (sec)		2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
Follow-Up Headway (sec)		2.22			2.22			3.52	4.02	3.32	3.52	4.02	3.32
Delay, Queue Length, and	l Leve	l of Se	ervice										
Flow Rate, v (veh/h)		11			33			56		33	17		22
Capacity, c (veh/h)		600			762			72		204	56		146
v/c Ratio		0.02			0.04			0.77		0.16	0.30		0.15
95% Queue Length, Q <sub>95</sub> (veh)		0.1			0.1			3.7		0.6	1.0		0.5
Control Delay (s/veh)		11.1			9.9			145.2		26.1	94.1		34.0
Level of Service (LOS)		В			А			F		D	F		D
Approach Delay (s/veh)		0	.1		0	.3		10	0.5		59	9.7	
Approach LOS								I				F	

Copyright © 2018 University of Florida. All Rights Reserved.

Number of Lanes

Configuration

Volume (veh/h)

Percent Heavy Vehicles (%)

Proportion Time Blocked Percent Grade (%)

Right Turn Channelized

Median Type | Storage

L

Т

TR

Undivided

L

Т

TR

L

TR

L

TR

		Н	CS7	Two-	Way	Stop	o-Co	ntrol	Rep	ort						
General Information							Site	Inforr	natio	n						
Analyst	DH						Inters	ection			SHERI	DAN/W	ILDWOC	D		
Agency/Co.	HDR						Jurisd	liction			RAPIC	CITY				
Date Performed	12/12	/2018					East/\	Nest Stre	eet		WILD	NOOD [	DRIVE			
Analysis Year	2045						North	/South S	Street		SHER	DAN LA	ke roai	C		
Time Analyzed	PM 20	045 NO I	BUILD -	LHW			Peak	Hour Fac	tor		0.90					
Intersection Orientation	North	-South					Analy	sis Time	Period (	hrs)	0.25					
Project Description	SLR C	ORRIDO	R STUD	(												
Lanes																
				74455		ጉ ተ ተ ተጥ Street: Nor	th-South	1417420								
Vehicle Volumes and Adju	istme	nts														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1

		-					-	-				-	-		-	
Number of Lanes		0	1	0		0	0	0	0	1	1	0	0	0	1	1
Configuration			LR							L	Т				Т	R
Volume (veh/h)		10		5						5	495				925	15
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%)		(	C													
Right Turn Channelized														N	lo	
Median Type   Storage				Undi	vided											
Critical and Follow-up He	adwa	ys														
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.42		6.22						4.12						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.52		3.32						2.22						
Delay, Queue Length, and	Leve	l of Se	ervice													
Flow Rate, v (veh/h)			17							6						
Capacity, c (veh/h)			146							666						
v/c Ratio			0.11							0.01						
95% Queue Length, Q <sub>95</sub> (veh)			0.4							0.0						
Control Delay (s/veh)			32.8							10.5						
Level of Service (LOS)			D							В						
Approach Delay (s/veh)		32	2.8							0	.1					
Approach LOS		[	)													

		HCS	7 Sig	nalize	d Int	ersec	tion F	lesi	ilts S	Sum	mary	/					
				Intersection Information									1 0	┙╣┵╛┾╷	L.I.		
General Inform				-			P* 4										
Agency HDR										Duration, h 0.25						R.	
Analyst DH				Analysis Date Dec								Other				~_ ×	
Jurisdiction		RAPID CITY		Time F		PM	PHF				0.90				W 🛔 E		
Urban Street		SHERIDAN LAKE	ROAD	Analysis Year 20			NO BUILD - Analysis			sis P	eriod	1> 7:0	00	1 x4		T C	
Intersection DUNSMORE ROAD				File Name SLR-DUNSMORE.x											্য ব ↑ ক ফ •	20	
Project Description SLR CORRIDOR STUDY														1 "			
, ,			-														
Demand Information					EB							NB					
Approach Movement					Т	R	L	L T				Т	R	L	R		
Demand ( v ), veh/h					385	30	115	8	70 2	255	75	35	75	90	10	10	
Signal Informa	tion				5		1						1			_	
Cycle, s	70.7	Reference Phase	2			215								<b>X</b>	. I.	$\mathbf{V}$	
Offset, s	0	Reference Point	End		F	<u> </u>						1		<b>Y</b> 2	3	4	
Uncoordinated	Yes	Simult. Gap E/W	On	Green		12.0	0.0	0.		0.0	0.0	_		Ð_			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow Red	4.0	3.0 4.0	0.0	0.		).0 ).0	0.0	_	5	¥ 6	7	Y	
Force Mode	Fixed	Sinuit. Gap N/S	OII	Reu	4.0	4.0	0.0	0.	0 10	1.0	0.0		5	0	1		
Timer Results	_			EBI	_	EBT	WB	L	WBT	-	NBL	_	NBT	SBL		SBT	
Assigned Phase	е					2			6				8			4	
Case Number						7.0			5.0				8.0			6.0	
Phase Duration, s						51.7			51.7			-	19.0		1		
Change Period,	, ( Y+R	c ), S				9.0			9.0				7.0			7.0	
Max Allow Headway ( <i>MAH</i> ), s									4.0				4.2		4		
Queue Clearance Time ( $g_s$ ), s									35.6			9.4		14			
Green Extension Time ( g e ), s						9.3			7.0				0.3			0.0	
Phase Call Probability						1.00			1.00				1.00			1.00	
Max Out Proba	bility					0.05			0.36				1.00			1.00	
Mayamant Cra	un Dee				ГР			\^/I	- -	-		ND			CD.		
Movement Gro	-	Suits			EB T	R	L	WI T	R	,	1	NB T	R		SB T	R	
				L		12	1				2				4		
Assigned Move Adjusted Flow F		) yeb/b		5	2	12		6 96	16 7 16		3	8 172	18	7	4	14	
-		,	In		433 1762	1502	128 960	177				1525		100 1308	1672	<u> </u>	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln Queue Service Time ( $g s$ ), s					0.0	0.3	5.7	33.	_			5.7		4.6	0.6		
		- /			9.1	0.3	14.8	33.				7.4		12.0	0.6		
Cycle Queue Clearance Time ( $g_c$ ), s Green Ratio ( $g/C$ )					0.60	0.60	0.60	0.6				0.17		0.17	0.0		
Capacity ( $c$ ), veh/h					1116	907	558	107	_			335		187	284		
Volume-to-Capacity Ratio ( <i>X</i> )					0.388	0.018	0.229	0.90				0.515		0.533	0.059	<u> </u>	
Back of Queue (Q), ft/ln (95 th percentile)					107.1	3.1	45.3	411				122.3		84.4	10.8		
Back of Queue (Q), while of the percentile)					4.2	0.1	1.8	16.				4.8		3.3	0.4		
		RQ) (95 th percent			0.00	0.06	0.60	0.0				0.00		0.73	0.00		
Uniform Delay ( $d_1$ ), s/veh					7.3	5.6	11.2	12.				27.3		33.4	24.6		
Incremental Delay ( <i>d</i> <sub>2</sub> ), s/veh					0.2	0.0	0.2	7.9	) 0.	1		1.4		2.9	0.1		
Initial Queue Delay ( <i>d</i> ₃ ), s/veh					0.0	0.0	0.0	0.0	) 0.	0		0.0		0.0	0.0		
Control Delay (					7.6	5.6	11.4	20.	1 6.	3		28.7		36.3	24.7		
Level of Service	. ,				Α	Α	В	С	A			С		D	С		
Approach Delay				7.5		А		17.5 B			28.7		С		34.6 C		
Intersection De	lay, s/ve	eh / LOS				17	7.2							В			
Multiment	a							1.4.4	~						0.5		
Multimodal Re Pedestrian LOS		/1.08		1.60	EB	В	1.0-	WB 1.87 B			2 2 7	NB	В	1.05	SB	В	
Bicycle LOS Sc				1.68		A	2.56		C	+	2.27			1.95 0.68			
	1.23	,		2.30		U		0.77		A	0.00	,	A				

		Н	CS7	Two-	-Way	Stor	o-Co	ntr <u>ol</u>	Rep	or <u>t</u> _								
General Information	_	_	_	_				_	natio	_	_	_	_	_		_		
Analyst DH								ection		1								
Agency/Co.	HDR							liction			SHERIDAN/TANAGER/CROYLE							
Date Performed 12/14/2018								West Stre	oot									
Analysis Year 2045								/South S				SHERIDAN LAKE ROAD						
Time Analyzed         PM 2045 NO BUILD - LHW								,										
Intersection Orientation	BUILD -		Peak Hour Factor Analysis Time Period (hrs)							0.90								
Project Description	East-		יחו ודא ס	/			Analy		Fellou (	1115)	0.23							
Lanes	JLKC		N 310D	1														
						. <b></b>												
				24174460		The street: Ea	t t i	4 4 2 4 4 5 6 6										
Vehicle Volumes and Adj	ustme	nts																
Approach		Eastb	ound			West	bound			North	bound			Southbound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	0	1	0	0	0	1	1		0	1	0		0	1	0		
Configuration			LTR			LT		R			LTR				LTR			
Volume (veh/h)		5	370	5		25	775	155		5	0	15		35	0	5		
Percent Heavy Vehicles (%)		2				2				2	2	2		2	2	2		
Proportion Time Blocked																		
Percent Grade (%)											0				0			
Right Turn Channelized							No											
Median Type   Storage				Undi	vided													
Critical and Follow-up He	eadwa	ys																
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2		
Critical Headway (sec)		4.12				4.12				7.12	6.52	6.22		7.12	6.52	6.22		
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3		
Follow-Up Headway (sec)		2.22				2.22				3.52	4.02	3.32		3.52	4.02	3.32		
Delay, Queue Length, and	d Leve	l of Se	ervice															
Flow Rate, v (veh/h)		6				28					22				44			
Capacity, c (veh/h)		672				1141					282				130			
v/c Ratio		0.01				0.02					0.08				0.34			
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1					0.3				1.4			
Control Delay (s/veh)		10.4		0.1		8.2					18.8				46.6			
Level of Service (LOS)		В		A		A					С				E			
Approach Delay (s/veh)		0	.2			0	.5			18	8.8		46.6					
	<u>                                      </u>																	

Approach LOS

Е

С

					,		_	_	Rep	_									
General Information	Site Information																		
Analyst DH						Intersection							SHERIDAN/ALBERTTA						
Agency/Co.	HDR						Jurisd	iction			RAPID CITY								
Date Performed	12/14	/2018				East/West Street							SHERIDAN LAKE ROAD						
Analysis Year	2045						North	/South S	Street	ALBERTTA DRIVE									
Time Analyzed PM 2045 NO BUILD - LHW						Peak Hour Factor 0.90													
Intersection Orientation East-West							Analy	sis Time	Period (	hrs)	0.25								
Project Description																			
Lanes																			
					<u></u> 14	Y Y T or Street: Eas	st-West	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1											
Vehicle Volumes and Adj																			
Approach			bound			West					bound				bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R			
Priority	10	1	2	3	40	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	C			
			1	TR															
Configuration						LT					LR								
Volume (veh/h)			355	10		105	680			5	LR	25							
Volume (veh/h) Percent Heavy Vehicles (%)			355				680			5	LR	25 2							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked			355			105	680			2									
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%)			355			105	680			2	LR								
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized			355	10		105	680			2									
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage			355	10	vided	105	680			2									
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage	eadwa	ys	355	10	vided	105	680			2									
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage <b>Critical and Follow-up He</b> Base Critical Headway (sec)	eadwa	ys	355	10	vided	105 2 4.1	680			2		2							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage Critical and Follow-up He Base Critical Headway (sec) Critical Headway (sec)	eadwa	ys	355	10	vided	105	680			2		2							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage <b>Critical and Follow-up He</b> Base Critical Headway (sec)	eadwa	ys	355	10	vided	105 2 4.1	680			2		2							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage Critical and Follow-up He Base Critical Headway (sec) Critical Headway (sec)	eadwa	ys	355	10	vided	105 2 4.1 4.12	680			2 ( 7.1 7.12		2 6.2 6.22							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage Critical and Follow-up Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec)				Undi	vided	105 2 4.1 4.12 2.2	680			2 ( 7.1 7.12 3.5		2 6.2 6.22 3.3							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage Critical and Follow-up Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec)				Undi		105 2 4.1 4.12 2.2	680			2 ( 7.1 7.12 3.5		2 6.2 6.22 3.3							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage Critical and Follow-up He Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Delay, Queue Length, and				Undi		105 2 4.1 4.12 2.2 2.22				2 ( 7.1 7.12 3.5		2 6.2 6.22 3.3							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage Critical and Follow-up He Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Delay, Queue Length, and Flow Rate, v (veh/h)				Undi		105 2 4.1 4.12 2.2 2.22 1117				2 ( 7.1 7.12 3.5	33	2 6.2 6.22 3.3							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage Critical and Follow-up He Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec)				Undi		105 2 4.1 4.12 2.2 2.22 1117 1152				2 ( 7.1 7.12 3.5	33 353	2 6.2 6.22 3.3							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage <b>Critical and Follow-up He</b> Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) <b>Delay, Queue Length, and</b> Flow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio				Undi		105 2 4.1 4.12 2.2 2.22 1117 1152 0.10				2 ( 7.1 7.12 3.5	33 353 0.09	2 6.2 6.22 3.3							
Volume (veh/h) Percent Heavy Vehicles (%) Proportion Time Blocked Percent Grade (%) Right Turn Channelized Median Type   Storage Critical and Follow-up He Base Critical Headway (sec) Critical Headway (sec) Base Follow-Up Headway (sec) Follow-Up Headway (sec) Follow-Up Headway (sec) Follow-Up Headway (sec) Follow-Up Actional (sec) Plow Rate, v (veh/h) Capacity, c (veh/h) v/c Ratio 95% Queue Length, Q <sub>95</sub> (veh)				Undi		105 2 4.1 4.12 2.22 2.22 1117 1152 0.10 0.3				2 ( 7.1 7.12 3.5	33 353 0.09 0.3	2 6.2 6.22 3.3							

# FJS

# Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix G

Future Build Alternatives Traffic

# **Technical Memo**

Date:	Wednesday, January 23, 2019
Project:	Sheridan Lake Road Corridor Study
To:	Study Advisory Team
From:	Dustin Hamilton
Subject:	2045 Build Conditions Analysis (Updated)

Future transportation needs in the Sheridan Lake Road corridor have been determined by forecasting the travel demand in the horizon year (2045) and analyzing the capability of potential improvements to the transportation system to handle the future transportation demand. This memorandum documents the analysis of options necessary to carry traffic volumes under 2045 traffic conditions (2045 Build scenario) without additional network improvements. Selected scenarios were also evaluated with the Les Hollers Way network improvement.

Future traffic demand was determined using the travel demand model maintained by the Rapid City Metropolitan Planning Organization (MPO) and the City of Rapid City. Link data for the 2013 and 2040 models were compared to determine link growth factors which were then adjusted by straight-line annual growth to determine growth factors to the 2045 horizon year. Those factors were used to create 2045 peak hour turning volumes. The turning volume forecasts were balanced to create a homogenous network for capacity analysis.

The Sheridan Lake Road/Catron Boulevard, Sheridan Lake Road/Corral Drive, and Sheridan Lake Road/Dunsmore Road intersections were analyzed with 2045 forecast volumes using Highway Capacity Manual techniques, as implemented in the Highway Capacity Software (McTrans Center and FHWA) for options to adequately handle the forecast 2045 traffic at minimum level of service (LOS) threshold of LOS "C". Due to HCS limitations, free movements (i.e. free right turn lanes, flyovers, or overpasses) are not included in the HCS model and if manually incorporated, the average intersection delay would likely decrease.

### 2045 Build Alternatives – Sheridan Lake Road/Catron Boulevard Intersection

A total of eight (8) alternatives were evaluated using the 2045 traffic volumes for the Sheridan Lake Road/Catron Boulevard intersection. The eight (8) alternatives are:

#### Alternative 1 – At-Grade Intersection - Wildwood Drive Right-In/Right-Out

Conversion of Wildwood Drive to a right-in/right-out access and provision of dual southbound through and left turn lanes and dual northbound through lanes with a free right turn on Sheridan Lake Road. Provision of dual westbound left turn lanes and free right turn movement on Catron Boulevard approach. Alternative 1 is depicted in **Figure 1**.

The resulting level of service for Alternative 1 is C/C (AM/PM).
#### Alternative 2 – Flyover Southbound to Eastbound

Provision for a grade separated "flyover" for southbound to eastbound left turns on Sheridan Lake Road, a southbound thru and thru/right lane, dual northbound through lanes, a northbound left turn lane, and free right turn on Sheridan Lake Road. Provision of dual left turn lanes, a through lane and free right turn for westbound Catron Boulevard and a left turn lane and a combined thru/right turn lane for eastbound Wildwood Drive. Alternative 2 is depicted in **Figure 2**.

The resulting level of service for Alternative 2 is B/C (AM/PM).

#### Alternative 3 – Continuous Flow Intersection (North Leg)

Provision of continuous flow intersection on the north leg of Sheridan Lake Road intersection to accommodate southbound to eastbound left turns. The southbound intersection approach would also provide dual through lanes and a right turn lane, while the northbound approach would provide for dual through lanes and a free right turn. Westbound Catron Boulevard would contain dual left turns and a free right turn. Wildwood Drive would be a right-in/right-out approach. Alternative 3 is depicted in **Figure 3**.

The resulting level of service for Alternative 3 is B/C (AM/PM).

#### Alternative 4 – 2-Lane Roundabout

Provision of 2-lane roundabout with dual lanes entering and exiting on Sheridan Lake Road and Catron Boulevard approaches and single lane entry/exit on Wildwood approach. Alternative 4 is depicted in **Figure 4**.

The resulting level of service for Alternative 4 is **F/F** (AM/PM). Free right turns for the northbound (Sheridan Lake Road) and westbound (Catron Boulevard) approaches were also examined, but did not improve the level of service.

#### Alternative 5 – Northbound Overpass

Provision of 2-lane overpass (grade separated northbound through movement) with northbound free right turn, dual southbound left turns, a southbound through lane and southbound combined thru/right turn lane on Sheridan Lake Road. Westbound Catron Boulevard would contain dual left turns, a through lane, and a free right turn lane. Eastbound Wildwood Drive would contain a left turn lane and combined thru/right turn lane. Alternative 5 is depicted in **Figure 5**.

The resulting level of service for Alternative 5 is **B/B** (AM/PM).

#### Alternative 6 – Single Point Interchange

Provision of grade separated northbound/southbound through movements on Sheridan Lake Road with dual southbound left turn lanes and a single northbound left turn lane at the interchange. The Catron Boulevard approach would provide a left turn lane and a through lane, and the Wildwood Drive approach would provide a left turn lane and through lane. All right turns would be accommodated via a merge/diverge "ramp" approach. Alternative 6 is depicted in **Figure 6**.

The resulting level of service for Alternative 6 is B/C (AM/PM).

hdrinc.com 703 Main Street, Suite 200, Rapid City, SD 57701 (605) 791-6100

#### Alternative 7A – At-Grade Intersection (without Future Roadways)

Alternative provides for an at-grade intersection without future arterial/collector network improvements being constructed. The southbound Sheridan Lake Road approach includes triple left turn lanes, a through lane, and a combined thru/right turn lane. The northbound approach includes a left turn lane, triple through lanes, and a free right turn lane. The westbound approach includes dual left turn lanes, a through lane, and free right turn lane and the eastbound approach includes a left turn lane and a combined thru/right turn lane. The westbound approach includes dual left turn lanes, a through lane, and free right turn lane and the eastbound approach includes a left turn lane and a combined thru/right turn lane. Alternative 7A is depicted in **Figure 7A**.

The resulting level of service for Alternative 7A is C/C (AM/PM).

#### Alternative 8 – At-Grade Intersection (with Future Roadways)

Alternative provides for an at grade intersection with future arterial/collector network improvements being constructed. The future network improvements are depicted in "Future Street Alternatives" - **Figure 11**. The southbound Sheridan Lake Road approach provides dual left turn lanes and a combined thru/right turn lane. The northbound approach includes a left turn lane, dual through lanes, and a free right turn lane. The westbound approach includes dual left turn lanes, a through lane, and a free right turn lane and the eastbound approach includes a left turn lane and a combined thru/right turn lane. Alternative 8 is depicted in **Figure 8**.

The resulting level of service for Alternative 8 is C/B (AM/PM).

# 2045 Build Alternatives – Sheridan Lake Road/Corral Drive/Park Drive Intersections

Improvements to the Sheridan Lake Road/Corral Drive intersection and Corral Drive/Park Drive intersection were also evaluated for improvements using the 2045 traffic volumes.

#### Alternative 1 - Corral Drive and Park Drive

Provide at-grade intersection improvements at Sheridan Lake Road to include two southbound through lanes and a right turn lane, dual northbound left turn lanes and dual northbound through lanes, and eastbound left turn lane and an eastbound free right turn lane on the Corral Drive approach. Reconfigure Corral Drive/Park Drive intersection to allow for through traffic on Park Drive and provide a "T" intersection of Corral Drive into Park Drive. The proposed improvements for Corral Drive/Park Drive are depicted in **Figure 9**.

The resulting level of service for the Sheridan Lake Road/Corral Drive intersection improvements is **C/C** (AM/PM). This intersection was also analyzed with the future Les Hollers Way network improvement in place and the resulting level of service for the Les Hollers Way scenario was **C/C** (AM/PM).

#### 2045 Build Alternatives – Sheridan Lake Road/Dunsmore Road Intersection

The Sheridan Lake Road/Dunsmore Road intersection was also evaluated for improvements using the 2045 traffic volumes.

#### Alternative 1 – Sheridan Lake Road/Dunsmore Road

Alternative provides for an at-grade intersection with dual through lanes, a left turn lane and a right turn lane on the eastbound and westbound Sheridan Lake Road approaches, a dual left turn and a combined

thru/right turn on the southbound Dunsmore Road approach, and a left turn, thru, and right turn lane for the northbound Dunsmore Road approach. The proposed improvements for the Sheridan Lake Road/Dunsmore Road are depicted in **Figure 10**.

The resulting level of service for the Sheridan Lake Road/Dunsmore Road intersection improvements is **C/B** (AM/PM). This intersection was also analyzed with the future Les Hollers Way network improvement in place and the resulting level of service for the Les Hollers Way scenario was **C/B** (AM/PM).

The 2045 Build Alternatives level of service results are summarized as follows:

# 2045 BUILD ALTERNATIVE COMPARISON

# SLR CORRIDOR STUDY

			AM		PM
OPTION	DESCRIPTION	LOS	DELAY	LOS	DELAY
1	WILDWOOD RI/RO	С	31.9	С	23.4
2	SB TO EB FLYOVER	В	11.4	С	30.9
3	CONTINUOUS FLOW	В	<mark>13.1</mark>	С	23.1
4	ROUNDABOUT	F	235.0	F	106.3
5	NB OVERPASS	В	11.4	B	12.9
6	SPUI	В	11.9	C	22.7
7	AT-GRADE (NO ALT. ROUTES)	С	33.5	С	25.1
8	AT-GRADE (ALT. ROUTES)	С	34.8	B	16.1
9	CORRAL AT-GRADE	С	30.7	С	23.7
10	DUNSMORE AT-GRADE	С	22.8	В	14.0

The analysis reports are included in the Appendix for reference.

### Additional Considerations to 2045 Build Alternatives Analysis

After consideration of level of service, constructability/cost, impact to access, and needed property acquisition, Alternatives 4, 5, and 6 were removed from further consideration.

Additionally, modifications to Alternative 7 was examined as follows:

#### Alternative 7B – At-Grade Intersection (without Future Roadways) – Reduced Lanes

Alternative 7A was further examined with reduced lanes on Sheridan Lake Road and provides for an atgrade intersection without future arterial/collector network improvements being constructed. The southbound Sheridan Lake Road approach provides dual left turn lanes and a combined thru/right turn lane. The northbound approach includes a left turn lane, dual through lanes, and a free right turn lane. The westbound approach includes dual left turn lanes, a through lane, and a free right turn lane and the eastbound approach includes a left turn lane and a combined thru/right turn lane. results in a downgrade of level of service from C (33.5 sec delay) to D (42.7 sec delay) in the AM and downgrade from level of service C (25.1 sec delay) to a level of service D (42.9 sec delay) in the PM.

Alternative modification does not meet minimum level of service requirement.

#### **Preferred Alternatives**

Based upon the operational analysis the following alternatives will be carried forward for further consideration:

#### Sheridan Lake Road/Catron Boulevard Intersection

- Alternative 1 At-grade Wildwood Right-In/Right-Out
- Alternative 2 Flyover Southbound to Eastbound
- Alternative 3 Continuous Flow (North Leg)
- Alternative 7 At Grade Intersection (without Future Roadways)
- Alternative 8 At Grade Intersection (with Future Roadways Les Hollers Way)

#### Sheridan Lake Road/Corral Drive/Park Drive

• Alternative 1 – Corral Drive and Park Drive

#### Sheridan Lake Road/Dunsmore Road Intersection

• Alternative 1 – Sheridan Lake Road/Dunsmore Road























# APPENDIX

**Capacity Analysis Output Sheets** 

hdrinc.com

# SHERIDAN LAKE ROAD/CATRON BOULEVARD

# ALTERNATIVE 1 – AT-GRADE - WILDWOOD RIGHT-IN/RIGHT-OUT

		HCS	7 Sig	nalize	d Int	ersed	tion F	kesu	Its S	um	mary	/				_
General Inform								1	lutere		a na lunfa	ormatic		l u	nt hate t	la L
											-	1	on	-	ιιί	And in case of the local division of the loc
Agency		HDR				<b>_</b>	44 0040		Durati			0.25				R_
Analyst		DH					14, 2018		Area	Гуре		Other			W + E	← <del>}</del>
Jurisdiction		RAPID CITY		Time F		AM			PHF			0.90			w+E B	÷ ↓ ↓
Urban Street		SHERIDAN LAKE F					OPTION		Analy			1> 7:0	00			T C
Intersection		CATRON BOULEV		File Na	ame	SLR-	CATRO	N-WB	Slip R	ight.	xus			_ 1	<u>††</u>	
Project Descrip	tion	SLR CORRIDOR S	TUDY											n in	4 1 4 Y	P (
Demand Inform	nation				EB			W	3			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h						125	0				945		1025	280	
	<b>4</b> 1 o 10				1 11				-							
	signed Phase lse Number ase Duration, s lange Period, ( Y+R c ), s			-	142	$\downarrow \downarrow$	1 5									
	cle, s       79.2       Reference Phase       2         iset, s       0       Reference Point       Er         coordinated       Yes       Simult. Gap E/W       0         rce Mode       Fixed       Simult. Gap N/S       0         mer Results       signed Phase       s       s         signed Phase       se Number       ase Duration, s       ange Period, (Y+R c), s         ax Allow Headway (MAH), s       s       s			-		1							1	2	3	4
				Green		26.7	5.5	0.0		0.0	0.0					
		· · · · · · · · · · · · · · · · · · ·		Yellow		5.0	3.5 1.5	0.0		0.0 0.0	0.0			T <sub>6</sub>	-	
	Fixed		On	Red	2.0	2.0	1.5	0.0	0	.0	0.0		5	0	7	8
Timer Results				EBL	_	EBT	WB	L	WBT	·	NBL	_	NBT	SBL	_	SBT
Assigned Phase	е								4				6	5		2
Case Number									10.0				8.3	2.0		4.0
Phase Duration	I, S								10.5				33.7	35.1		68.8
Change Period	, ( Y+R (	c ), S							5.0				7.0	5.0		7.0
Max Allow Head	ax Allow Headway ( <i>MAH</i> ), s ueue Clearance Time ( <i>g</i> s ), s								5.1				5.0	5.1		5.0
Queue Clearan	ueue Clearance Time ( $g_s$ ), s								5.3				25.7	28.2	2	3.8
Green Extensio	een Extension Time ( g e ), s								0.5				1.0	1.9		12.6
Phase Call Pro	ase Call Probability								0.95				1.00	1.00		1.00
Max Out Proba	ax Out Probability								0.02				1.00	1.00		0.01
Movement Gro	ax Out Probability				EB			WB				NB			SB	
Approach Move	-			L	Т	R	L	T	R	2	L	Т	R	L	Т	R
Assigned Move							7	4	+			6		5	2	
Adjusted Flow I		), veh/h				1	139	0	-			1050		1139	311	
		w Rate ( <i>s</i> ), veh/h/l	n				1639	1772	2			1687		1639	1687	
Queue Service							3.3	0.0				23.7		26.2	1.8	
Cycle Queue C		- /					3.3	0.0				23.7		26.2	1.8	
Green Ratio ( g							0.07	0.07				0.34		0.38	0.78	
Capacity ( c ), v	/eh/h						226	122				1137		1244	2630	
Volume-to-Cap	acity Ra	itio (X)					0.614	0.00	2			0.924		0.916	0.118	
		(In ( 95 th percentile)					62.3	0				402.7		411.3	12.1	
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)				2.5	0.0				15.9		16.2	0.5	
Queue Storage	Ratio (	RQ) (95 th percent	tile)				0.06	0.00				0.00		0.69	0.00	
							35.9	0.0				25.3		23.4	2.1	
	niform Delay ( d 1 ), s/veh cremental Delay ( d 2 ), s/veh						3.8	0.0				12.4		10.4	0.0	
	itial Queue Delay ( d ȝ ), s/veh						0.0	0.0				0.0		0.0	0.0	
	ontrol Delay ( d ), s/veh						39.7	0.0				37.7		33.8	2.2	
	evel of Service (LOS)						D					D		С	A	
	pproach Delay, s/veh / LOS			0.0			39.7	7	D		37.7		D	27.0		С
Intersection De	tersection Delay, s/veh / LOS					3	1.9							С		
Multimodal Ba	culto				EB			WB				NB			SB	
		/1.05		2.40		В	2.49		В	-	2.71		С	1.31		A
				2.40	,	U	0.16	_	A	+	1.19		A	1.67	_	B
	odal Results ian LOS Score / LOS LOS Score / LOS						0.10	-			1.13			1.07		

	HCS	or Sig	nalize	a inte	ersec		kesu	Its Su	mmar	у				
General Information								Intersec	tion Inf	ormotic			Ial <sub>a</sub> da↓,	له الد
	HDR									0.25	DU	- 1	.↓↓↓↓	And in case of the local division of the loc
Agency			Austra	in Data	0.4.0	0 0047		Duration				- <u>-</u>		R.
Analyst						3, 2017		Area Typ	be	Other			W + E	+ N
Jurisdiction			Time F		PM			PHF		0.90	20		W T L	
Urban Street	SHERIDAN LAKE					OPTION		Analysis		1> 7:(	00			1 1 1
Intersection	CATRON BOULEV		File Na	ame	SLR-0	CAIRON	N W W	B Slip Ri	ght.xus				11	
Project Description	SLR CORRIDOR S	STUDY										n In	। ¤1 ↑ ¤4• ¥* ′	
Demand Informatio	n			EB			W	B		NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), veh/h						520	0			345		865	765	1
			1				i, a	_				_	i and	i and
Signal Information		r	_											
	et, s 0 Reference Point Er coordinated Yes Simult. Gap E/W 0 ce Mode Fixed Simult. Gap N/S 0 er Results igned Phase e Number se Duration, s inge Period, (Y+R c), s c Allow Headway (MAH), s eue Clearance Time (g s), s				$\uparrow \uparrow$	E E					1	2	3	4
		End	Green	31.3	18.8	19.5	0.0	0.0	0.0					
		On	Yellow	3.0	5.0	3.5	0.0	0.0	0.0			1		
Force Mode Fixe	d Simult. Gap N/S	On	Red	2.0	2.0	1.5	0.0	0.0	0.0		5	6	7	8
There B 11					FDT	14/15		MOT	A LID		NIDT	0.51		ODT
			EBL	-	EBT	WB		WBT	NB	L	NBT	SBI		SBT
								4			6	5		2
			<u> </u>	_		<u> </u>	_	10.0	<u> </u>		8.3	2.0		4.0
						<u> </u>	_	24.5			25.8	36.3		62.1
- ,						<u> </u>		5.0	<u> </u>	_	7.0	5.0		7.0
	ueue Clearance Time ( $g_s$ ), s					<u> </u>	_	5.1	<u> </u>	_	5.0	5.1		5.0
	ieue Clearance Time ( g s ), s een Extension Time ( g e ), s					<u> </u>	_	16.4			10.7	25.0		12.6
	een Extension Time ( g e ), s ase Call Probability			_		<u> </u>	$\rightarrow$	3.1	<u> </u>		8.1	6.3		10.6
	ase Call Probability						_	1.00			1.00	1.00		1.00
Max Out Probability	ax Out Probability							0.12			0.21	0.17		0.00
Movement Group R	ax Out Probability ovement Group Results			EB			WB	;		NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement						7	4			6		5	2	
Adjusted Flow Rate (	<i>v</i> ), veh/h					578	0	<u> </u>		383		961	850	<u> </u>
-	Flow Rate ( s ), veh/h/l	In				1639	1772	2		1687		1639	1687	<u> </u>
Queue Service Time						14.4	0.0			8.7		23.0	10.6	<u> </u>
Cycle Queue Cleara	,					14.4	0.0			8.7		23.0	10.6	
Green Ratio ( g/C )						0.23	0.23	;		0.22		0.36	0.64	
Capacity ( <i>c</i> ), veh/h						738	399	_		732		1185	2147	
Volume-to-Capacity I	Ratio ( X )					0.783	0.00			0.524		0.811	0.396	1
	ft/In ( 95 th percentile)	)				242.7	0			157.1		342	143.5	
	veh/ln (95 th percent	,				9.6	0.0			6.2		13.5	5.6	
	· · ·					0.24	0.00			0.00		0.57	0.00	
Uniform Delay ( d 1 )	ueue Storage Ratio ( <i>RQ</i> ) (95 th percentile) niform Delay ( <i>d</i> 1), s/veh					31.6	0.0			30.0		25.0	7.7	
	niform Delay ( d 1 ), s/veh cremental Delay ( d 2 ), s/veh					2.7	0.0			0.8		2.7	0.2	
	cremental Delay ( d ₂ ), s/veh itial Queue Delay ( d ₃ ), s/veh					0.0	0.0			0.0		0.0	0.0	
	ontrol Delay ( <i>d</i> ), s/veh					34.3	0.0			30.8		27.7	7.8	
Level of Service (LO						С				С		С	Α	1
	evel of Service (LOS) oproach Delay, s/veh / LOS		0.0			34.3	3	С	30.	8	С	18.4		В
	pproach Delay, s/veh / LOS itersection Delay, s/veh / LOS				23	3.4						С		
Intersection Delay, s/	tersection Delay, s/veh / LOS													
Intersection Delay, s	ultimodal Results													
Intersection Delay, s/ Multimodal Results				EB			WB			NB			SB	
	re / LOS		2.26		В	2.50	11	B	2.8	1	С	1.35	11	A

# SHERIDAN LAKE ROAD/CATRON BOULEVARD

# ALTERNATIVE 2 – FLYOVER SB TO EB

hdrinc.com

		HUS	7 Sig	nalize	ea in	tersec	tion F	kesu	its 5	um	imar	y				
Concerct Inform								1	lutere	a a 41	a na luafi				┙┵┶╸↓	b. L.
General Inform	nation											ormatic	on	- 1	44	** ×
Agency		HDR							Durati			0.25				K
Analyst		RL				e Oct 2	3, 2017		Area 7	Гуре		Other				→ <mark>→</mark> →
Jurisdiction		RAPID CITY		Time F		AM			PHF			0.90			W + E B	
Urban Street		SHERIDAN LAKE F		-		ır 2045			Analy		eriod	1> 7:0	00	- T		¥
Intersection		CATRON BOULEV		File Na	ame	SLR-	CATRON	N - Fir	nal.xus						<u>111</u>	
Project Descrip	tion	SLR CORRIDOR S	TUDY												I A 1 4 Y	
Demand Inform	nation				EB			W	B			NB			SB	
Approach Move	ement			L	Т	R	L	Т	-	R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			40	55	5	105	2	о —		5	905			280	45
	le, s45.4Reference Phaseeet, s0Reference PointEcoordinatedYesSimult. Gap E/WCce ModeFixedSimult. Gap N/SC							1								
	nal Informationcle, s45.4Reference Phaseset, s0Reference PointEcoordinatedYesSimult. Gap E/WCce ModeFixedSimult. Gap N/SCher Resultssigned Phasese Numberase Duration, s						- a +									
Cycle, s	mand ( $v$ ), veh/hgnal Informationcle, s45.4Reference Phaseset, s0Reference PointEcoordinatedYesSimult. Gap E/W0cree ModeFixedSimult. Gap N/S0rer ResultsSimult. Gap N/S0signed PhaseseSimult. Gap N/S0see Numberase Duration, sange Period, ( $Y+R c$ ), sxx Allow Headway ( $MAH$ ), seue Clearance Time ( $g s$ ), sse					, ₽	R						1	2	3	4
Offset, s	cle, s45.4Reference Phaseset, s0Reference PointEcoordinatedYesSimult. Gap E/WCce ModeFixedSimult. Gap N/SCHer Resultssigned Phasese Numberange Period, (Y+R c), sx Allow Headway (MAH ), s				20.5	3.9	4.1	0.0	) 0	.0	0.0					
Uncoordinated			On	Yellow		3.5	3.5	0.0		.0	0.0			<b>オ</b>		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	1.5	1.5	0.0	)  0	.0	0.0		5	6	7	<b>Y</b> 8
Timor Populto				EBI		EBT	WB	1	WBT		NBI		NBT	SB		SBT
	<u> </u>			EDI	-	8	7		4	+	INDI	-	6	30	-	2
-	5				$\rightarrow$	6.3	2.0		4.0	+			6.0			8.0
						9.1	8.9	_	17.9	+			27.5			27.5
	•					5.0	5.0		5.0	╈		-	7.0			7.0
-	ax Allow Headway ( <i>MAH</i> ), s				-	5.0	5.0	_	5.0	+			5.0			5.0
	ueue Clearance Time ( $g_s$ ), s				-	3.6	3.5		2.4	+			12.6			6.1
	ieue Clearance Time ( g s ), s een Extension Time ( g e ), s					0.4	0.1		0.6				7.9			9.3
						0.81	0.77		0.96	+			1.00			1.00
						0.01	1.00		0.00				0.38			0.22
	,															
Movement Gro	-	ults			EB			WE	17			NB			SB	
Approach Move				L	Т	R	L	Т	R	_	L	Т	R	<u> </u>	Т	R
Assigned Move				3	8	18	7	4			1	6			2	12
Adjusted Flow F		•		44	67		117	22			6	1006			171	168
		ow Rate ( <i>s</i> ), veh/h/l	n	1389	1746	i	1639	177	_		1042	1687			1772	1721
Queue Service		- ,		1.4	1.6		1.5	0.4	_		0.2	10.6			4.1	2.7
Cycle Queue C		e Time ( <i>g c</i> ), s		1.4	1.6		1.5	0.4		_	4.2	10.6			4.1	2.7
Green Ratio ( g				0.09	0.09		0.08	0.28		_	0.45	0.45			0.45	0.45
Capacity ( c ), v				283	157		278	504			535	1522			799	776
Volume-to-Capa		. ,		0.157	0.426		0.419	0.04			0.010	0.661			0.214	0.216
	, ,	In (95 th percentile)		18.4	30.9		25.1	6.1			1.3	124.3			32.7	31.9
		eh/In ( 95 th percenti		0.7	1.2		1.0	0.2	_		0.0	4.9			1.3	1.3
		RQ) (95 th percent	tile)	0.18	0.00	-	0.03	0.00	_		0.01	0.00			0.00	0.00
Uniform Delay (	· ,			19.4	19.6		19.7	11.8	3		9.3	9.7			7.6	7.6
		•		0.4	2.6		1.4	0.1			0.0	0.7			0.2	0.2
	cremental Delay ( <i>d</i> <sub>2</sub> ), s/veh itial Queue Delay ( <i>d</i> <sub>3</sub> ), s/veh			0.0	0.0		0.0	0.0	_		0.0	0.0			0.0	0.0
	ontrol Delay ( <i>d</i> ), s/veh			19.8	22.2		21.1	11.8	3	_	9.3	10.5			7.8	7.8
	evel of Service (LOS)			В	С	<u> </u>	С	В			A	В			A	A
	oproach Delay, s/veh / LOS			21.2	2	С	19.7	7	В		10.4		В	7.8		A
Intersection De	tersection Delay, s/veh / LOS					1	1.4							В		
Multimedal De	oulto				FP			10/5	,						<b>CD</b>	
Multimodal Re Pedestrian LOS		/1.05		2.53	EB	С	2.12	WE	B	-	2.50	NB	В	1.87	SB	В
Bicycle LOS Sc				0.67	_	A	0.16		A	+	2.50		A	0.77	_	A
				0.07		~	0.10		A		1.10		Π	0.71		Λ

	HC3	or Sig	nalize	ea in	terse	ction	Res	uits	s Sur	nmar	У				
Conoral Informatio	•								to 1000	tion Inf	o rmo oti c		1	┦┫┵╅╸╽╵	be L
General Information	v.									tion Inf		on	- 1	4	· ×
Agency	HDR					10.004			uration,		0.25				R.
Analyst	DH				te Dec	19, 201	8		rea Typ	e	Other	-			← <mark>}</mark>
Jurisdiction	RAPID CITY		Time F		PM				HF		0.90			W + E B	↓ ↓ ↓
Urban Street	SHERIDAN LAKE		Analys			5 OPTIC			nalysis	Period	1> 7:(	00	ار الا		T T
Intersection	CATRON BOULEV		File Na	ame	SLR	-CATRO	DN - F	INA	L.xus					<u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	
Project Description	SLR CORRIDOR S	STUDY												1 ላ ተቀጥ	1
Demand Informatio	n			EB			V	VB			NB			SB	
Approach Movement	t		L	Т	R	L		т	R	L	Т	R	L	Т	R
Demand ( v ), veh/h			10	5	5	47	0 9	50		5	335		1	785	55
			li.											بسعف	<u> </u>
Signal Information		r		21		$\leftarrow$ a	$\leftarrow$								←
		2		- M		Æ.						1	•	3	4
Offset, s 0	proach Movement mand ( $v$ ), veh/h gnal Information cle, s 47.5 Reference Phase set, s 0 Reference Point E coordinated Yes Simult. Gap E/W 0 rce Mode Fixed Simult. Gap N/S 0 rce Mode Fixed Simult. Gap N/S 0 mer Results signed Phase se Number ase Duration, s ange Period, ( $Y+R c$ ), s x Allow Headway ( $MAH$ ), s eue Clearance Time ( $g c$ ), s eue Clearance Time ( $g c$ ), s ase Call Probability x Out Probability werment Group Results				7.0	3.2	0.	.0	0.0	0.0	_	· ·	_		
	set, s       0       Reference Point       End         coordinated       Yes       Simult. Gap E/W       C         cce Mode       Fixed       Simult. Gap N/S       C         mer Results       signed Phase       Simult. Gap N/S       C         see Number       ase Duration, s       ange Period, (Y+R c), s       x         x Allow Headway (MAH), s       eue Clearance Time (g s), s       s			21.3 / 5.0	3.5	3.5	0.		0.0	0.0			<b>v</b>		<u> </u>
Force Mode Fixe	d Simult. Gap N/S	On	Red	2.0	0.5	1.5	0.	.0	0.0	0.0		5	6	7	Y 8
					595				NET			NET			0.57
			EBI		EBT	_	BL	V	NBT	NBI	-	NBT	SB	<u> </u>	SBT
-					8				4			6		$\rightarrow$	2
			<u> </u>		6.3	2			4.0			6.0		$\rightarrow$	8.0
	<u> </u>		<u> </u>		8.2	11			19.2			28.3	<u> </u>	$\rightarrow$	28.3
			<u> </u>	_	5.0	4			5.0	<u> </u>		7.0	<u> </u>	$\rightarrow$	7.0
	ieue Clearance Time ( $g$ s), s				5.0 2.4	5		_	5.0 3.1		_	5.0 16.0	<u> </u>	$\rightarrow$	5.0 15.6
	ieue Clearance Time ( g s ), s een Extension Time ( g e ), s				0.2				0.3	<u> </u>		5.3	<u> </u>	$\rightarrow$	5.4
	een Extension Time ( <i>g</i> <sub>e</sub> ), s ase Call Probability				0.2	0			0.3 1.00			1.00	<u> </u>	$\rightarrow$	1.00
	ase Call Probability				0.04	1.			0.00			0.65	<u> </u>		0.62
	x Out Probability				0.00	1.	0	U	5.00			0.05		and the second	0.02
Movement Group R	lesults			EB			W	В			NB			SB	
Approach Movement	t		L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Movement			3	8	18	7	4			1	6			2	12
Adjusted Flow Rate	( <i>v</i> ), veh/h		11	11		522	56	3		6	372			459	452
Adjusted Saturation	Flow Rate ( <i>s</i> ), veh/h/l	In	1348	1626	3	163	) 177	72		612	1687			1772	1745
Queue Service Time	(gs), s		0.4	0.3		7.0	1.	1		0.4	3.3			13.6	9.2
Cycle Queue Cleara	nce Time ( <i>g c</i> ), s		0.4	0.3		7.0	1.	1		14.0	3.3			13.6	9.2
Green Ratio ( g/C )			0.07	0.07		0.15	0.3	80		0.45	0.45			0.45	0.45
Capacity ( c ), veh/h			243	110		483	53	0		250	1513			794	782
Volume-to-Capacity	Ratio ( X )		0.046	0.10	1	1.08	2 0.1	05		0.022	0.246			0.578	0.578
Back of Queue (Q)	, ft/In ( 95 th percentile)	)	4.9	5.4		283.	1 16	.3		2.1	38.7			121.5	117.9
. , ,	, veh/ln ( 95 th percent	,	0.2	0.2		11.1	0.	6		0.1	1.5			4.8	4.7
	o(RQ)(95 th percen		0.05	0.00		0.38	0.0	0		0.01	0.00			0.00	0.00
Uniform Delay(d 1)	, s/veh		20.8	20.8		20.3	12	.0		16.9	8.1			9.8	9.8
	niform Delay ( d 1 ), s/veh ncremental Delay ( d 2 ), s/veh			0.6		64.7		-		0.1	0.1			0.9	1.0
	cremental Delay ( <i>d</i> ₂ ), s/veh itial Queue Delay ( <i>d</i> ȝ ), s/veh			0.0		0.0	0.	-		0.0	0.0			0.0	0.0
	ontrol Delay ( <i>d</i> ), s/veh			21.4		85.0	12	.2		16.9	8.2			10.7	10.7
	evel of Service (LOS)			С		F	В			В	Α			В	В
	pproach Delay, s/veh / LOS			2	С	78	.0		E	8.4		A	10.7	7	В
	Itersection Delay, s/ven / LOS					30.9							С		
Multimodal Results				EB			W	В			NB			SB	
Pedestrian LOS Sco			2.39		В	2.			В	2.59		С	1.88		В
Bicycle LOS Score /			0.52		А		77		A	0.73	2	А	1.24	1	А

Copyright © 2018 University of Florida, All Rights Reserved.

# SHERIDAN LAKE ROAD/CATRON BOULEVARD ALTERNATIVE 3 – CONTINUOUS FLOW INTERSECTION (NORTH LEG)

	×
N N	<u>↓</u>
	  ¢
<b>7</b>	<b>₹</b> •
† †	
<u>ካ ተ የ</u> ምቁት በ ከ	1
SB	
R L T	R
280	45
	<u> </u>
t	
5 6 7	
BT SBL SE	BT
5 0.1	.0
0 0.0	0
	_
SB	
R L T	R
2	12
179 <sup>·</sup>	174
	1808
	3.2
5.6	3.2
0.76 0	0.76
	1379
	).126
	26.8
	1.1
	0.00
	4.0
	0.2
	0.0
	4.2
	Α
	4
В	
SB	
1.85 B	3
0.78 A	
	R       L       T       A         R       L       T       A         1       2 $280$ A         5 $22$ $380$ A         5       SBL       SBL       SB         6 $77$ $380$ A         0 $380$ $970$ $390$ 0 $390$ $970$ $390$ $390$ 0 $390$ $970$ $390$ $390$ 0 $390$ $970$ $390$ $390$ 0 $390$ $390$ $390$ $390$ 0 $390$ $390$ $390$ $390$ 0 $19000$ $19000$ $390$ $390$ 0 $19000$ $1179$ $390$ $390$ 0 $1110$ $00.00$ $300$ <

Copyright © 2019 University of Florida, All Rights Reserved.

		HCS	7 Sig	nalize	ed In	tersec	tion F	kesu	lts Sur	mmar	у				
General Inform	nation								Intersec	tion Inf	ormatic	20		ا مايارية ا	ել
Agency	nation								Duration		0.25	<i>/</i> //		44	
				Analys		te 1/2/20	010				Other				r.
Analyst Jurisdiction				Time F			019		Area Typ PHF		0.92			"N	4
Urban Street		Sheridan Lake Roa	4			ar 2019			Analysis	Doriod	1> 7:0	0			
Intersection		Catron Boulevard	u	File Na			Cotrop	1	Copy PM.		1-1.0	0			
	tion			File Na	ame	JSLK-	Callon	JFI - C	ору Ри.	xus			- 4	<b>† †</b> । ব † कम्प	to a
Project Descrip	buon	OPTION 3 - CFI 20	45 PIVI												
Demand Inform	mation				EB	;		W	В		NB		T	SB	_
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			10	5	5	470	50	)		335	1		785	45
										_					
	t, s 0 Reference Point E ordinated No Simult. Gap E/W 0 Mode Fixed Simult. Gap N/S 0 r Results ned Phase Number e Duration, s ge Period, (Y+R c), s Allow Headway (MAH), s e Clearance Time (g s), s				1	7	_ <	-	$\leftarrow$						
Cycle, s	al Information         , s       120.0       Reference Phase         t, s       0       Reference Point       E         brdinated       No       Simult. Gap E/W       O         Mode       Fixed       Simult. Gap N/S       O         r       Results       Independent of the set of th					P. 4	۲ <sup>•</sup>	R				1	2	<b>~</b> 3	4
Offset, s	s120.0Reference Phase, s0Reference PointEordinatedNoSimult. Gap E/W0ModeFixedSimult. Gap N/S0Resultsned PhaseNumbere Duration, sge Period, ( $Y+R c$ ), sIllow Headway ( $MAH$ ), se Clearance Time ( $g s$ ), sExtension Time ( $g e$ ), s			Green	78.8	1.8	11.9	5.5	0.0	0.0					
Uncoordinated		<u> </u>	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0			1		
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	1.5	1.5	0.0	0.0		5	6	7	
Timer Results				EBL		EBT	WB		WBT	NB		NBT	SBI		SBT
Assigned Phas				3	-	8	7	-	4		-	6		-	2
Case Number				2.0		4.0	2.0		4.0			8.0			8.0
	າ. ຣ			7.3		11.0	24.7		28.4			84.3			84.3
		c) s		5.5		5.5	5.5	_	5.5			5.5			5.5
-	x Allow Headway ( <i>MAH</i> ), s			3.1		3.1	3.1	_	3.1			0.0			0.0
	eue Clearance Time ( $g$ s ), s			2.7		2.7	19.1		4.9						
	· - · ·			0.0		0.1	0.1	_	0.1			0.0			0.0
	een Extension Time ( $g_e$ ), s ase Call Probability				)	0.92	1.00	)	1.00						
Max Out Proba					)	0.00	1.00	)	0.00						
	·				EB		<u> </u>	WB			NB			SB	
				L	T	R		T	R	L	T	R	L	T	R
Assigned Move		<u> </u>		3	8	18	7	4		<u> </u>	6		<u> </u>	2	12
Adjusted Flow	· · ·	•		11	11		511	54		<u> </u>	984			461	452
-		w Rate ( <i>s</i> ), veh/h/l	n	1810	1743		1757	1900	)	<u> </u>	1809		<u> </u>	1900	1863
Queue Service		_ ,		0.7	0.7		17.1	2.9		<u> </u>	15.4		<u> </u>	19.1	13.4
-		e Time ( <i>g c</i> ), s		0.7	0.7		17.1	2.9			15.4			19.1	13.4
Green Ratio (g				0.02	0.05	,	0.16	0.19	_	<u> </u>	0.66			0.66	0.66
Capacity ( c ),				28	80	-	563	363	_		2374			1247	1223
Volume-to-Cap		/In ( 50 th percentile)		0.395 8.8	0.13 8	5	0.908	0.15		<u> </u>	0.414			0.370	0.370
	. ,	eh/In ( 50 th percentie)		0.0	0.3		8.8	1.3	·		5.8		<u> </u>	5.5	5.4
	. ,	RQ) ( 50 th percent		0.4	0.00		0.00	0.00			0.00			0.00	0.00
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		58.5	54.9	_	49.5	40.4	_		9.7			9.6	9.6
-	form Delay ( d 1 ), s/veh			3.4	0.3		17.8	0.1	-		0.5			0.8	0.8
	remental Delay ( <i>d</i> ₂ ), s/veh ial Queue Delay ( <i>d</i> ₃ ), s/veh			0.0	0.0		0.0	0.0	-		0.0			0.0	0.0
	tial Queue Delay ( d ȝ ), s/veh ontrol Delay ( d ), s/veh			61.9	55.2	_	67.3	40.5			10.2			10.4	10.4
	vel of Service (LOS)			E	E		E	D			B			B	B
	pproach Delay, s/veh / LOS			58.6		E	64.8		E	10.2	<u> </u>	В	10.4		B
	tersection Delay, s/ven / LOS						3.1						С		
	-														
Multimodal Re	sults				EB			WB			NB			SB	
				2.15		В	2.14		В	2.07	7	В	1.88	3	В
Bicycle LOS So	elay ( <i>d</i> ), s/veh Gervice (LOS) Delay, s/veh / LOS on Delay, s/veh / LOS			0.52	2	А	1.42	2	А	0.79	9	А	1.23	3	А

Copyright © 2019 University of Florida, All Rights Reserved.

# SHERIDAN LAKE ROAD/CATRON BOULEVARD

# ALTERNATIVE 4 – ROUNDABOUT (2 LANE)

				HCS	7 Ro	unda	bo	uts R	epor	t						
General Information	1	_			_		Site	Infor	matio	n			_	_	_	
Analyst	DH						Inte	rsection			SLR/CA	TRON	_	_		
Agency or Co.	HDR						E/W	/ Street N	lame		CATRO	N BLVD				
Date Performed	12/17	/2018					N/S	Street N	ame		SHERIC	an lake	ROAD	)		
Analysis Year	2045						Ana	lysis Tim	e Period (	(hrs)	0.25					
Time Analyzed	AM C	PTION 4	Ļ				Peal	k Hour Fa	actor		0.90					
Project Description	SHER	IDAN LA	KE ROAE	CORRID	OR STUI	ΟY	Juris	sdiction			RAPID	CITY				
Volume Adjustments	s and s	Site C	haract	teristic	s											
Approach		E	B			WE	3		T	N	В				SB	
Movement	U	L	Т	R	U	L	Т	R	U	L	т	R	U	L	Т	R
Number of Lanes (N)	0	0	1	0	0	1	1	0	0	0	2	0	0	0	2	0
Lane Assignment			Ľ	ΓR	L			TR		LT	TR		Ľ	Т		TR
Volume (V), veh/h	0	40	55	5	0	105	20	915	0	5	905	410	0	1025	280	45
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Flow Rate (VPCE), pc/h	Right-Turn Bypass				0	120	23	1047	0	6	1036	469	0	1173	320	52
Right-Turn Bypass						Nor	ne			No	ne			Ν	lone	
Conflicting Lanes	-					2			1	2	!				1	
Pedestrians Crossing, p/h			0			0				C	)				0	
Critical and Follow-U	Jp Hea	adway	/ Adju	stmen	t											
Approach				EB				WB			NB		Т		SB	
Lane			Left	Right	Bypas	s Lef	t	Right	Bypass	Left	Right	Bypass	i Le	eft	Right	Bypass
Critical Headway (s)				4.3276		4.645	53 -	4.3276		4.6453	4.3276		4.5	436	4.5436	
Follow-Up Headway (s)				2.5352		2.666	67	2.5352		2.6667	2.5352		2.5	352	2.5352	
Flow Computations,	Capad	ity ar	nd v/c	Ratios	5											
Approach	_		_	EB				WB	_		NB	_	Т		SB	
Lane			Left	Right	Bypas	s Lef	t	Right	Bypass	Left	Right	Bypass	i Le	eft	Right	Bypass
Entry Flow (ve), pc/h				115		120	)	1070		710	801		11	73	372	
Entry Volume veh/h				112		117	7	1039		689	778		11	39	361	
Circulating Flow (v <sub>c</sub> ), pc/h				1613				1088			1282		$\square$		149	
Exiting Flow (v <sub>ex</sub> ), pc/h				1705				81			2129		$\top$		446	
Capacity (c <sub>pce</sub> ), pc/h				360		496	5	563		415	478		12	40	1240	
Capacity (c), veh/h				350		482	2	547		403	464		12	.04	1204	
v/c Ratio (x)				0.32		0.24	4	1.90		1.71	1.68		0.	95	0.30	
Delay and Level of S	ervice			-						-	-					
Approach				EB				WB			NB		Т		SB	
Lane						s Lef	t	Right	Bypass	Left	Right	Bypass	i Le	eft	Right	Bypass
Lane Control Delay (d), s/veh						11.7	1	430.0		354.1	335.5		33	3.3	5.8	
Lane LOS						В		F		F	F		[	D	А	
95% Queue, veh				1.3		0.9	,	67.3		42.0	45.6		17	7.0	1.3	
Approach Delay, s/veh				16.6				387.7			344.3				26.6	
Approach LOS				С				F			F				D	
Intersection Delay, s/veh   LO	S					235.0							F			

Copyright © 2018 University of Florida. All Rights Reserved.

HCS T Roundabouts Version 7.5 2045 AM OPTION 4.xro Generated: 12/19/2018 11:10:03 AM

				HCS	7 Ro	undal	boı	uts R	eport	:						
General Information							Site	Infor	matio	n			_	_		
Analyst	DH						Inter	section			SLR/CA	TRON				
Agency or Co.	HDR						E/W	Street N	ame		CATRO	N BLVD				
Date Performed	12/17	/2018					N/S S	Street Na	ame		SHERID	AN LAKE	ROAD			
Analysis Year	2045						Analy	ysis Time	e Period (	hrs)	0.25					
Time Analyzed	PM O	PTION 4					Peak	Hour Fa	ctor		0.90					
Project Description	SHER	IDAN LA	KE ROAE	O CORRID	OR STU	ΟY	Juris	diction			RAPID	CITY				
Volume Adjustments	and	Site C	haract	teristic	s											
Approach		E	B			WB			T	N	B				SB	
Movement	U	L	Т	R	U	L	т	R	U	L	т	R	U	L	Т	R
Number of Lanes (N)	0	0	1	0	0	1	1	0	0	0	2	0	0	0	2	0
Lane Assignment			Ľ	ΓR	L		-	TR		LT	TR		LT			TR
Volume (V), veh/h	0	10	5	5	0	470	50	1125	0	5	335	185	0	865	785	55
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Flow Rate (VPCE), pc/h	11	6	6	0	538	57	1288	0	6	383	212	0	990	898	63	
Right-Turn Bypass		No	one			Non	e			No	ne			N	lone	
Conflicting Lanes			2			2				2					1	
Pedestrians Crossing, p/h			0			0				C	1				0	
Critical and Follow-U	Јр Неа	adway	/ Adju	stmen	t											
Approach				EB				WB			NB		Τ		SB	
Lane			Left	Right	Bypas	s Left		Right	Bypass	Left	Right	Bypass	Le	ft	Right	Bypass
Critical Headway (s)				4.3276		4.645	3 4	1.3276		4.6453	4.3276		4.54	- 36	4.5436	
Follow-Up Headway (s)				2.5352		2.666	7 2	2.5352		2.6667	2.5352		2.53	52	2.5352	
Flow Computations,	Capad	ity ar	nd v/c	Ratios	5											<u> </u>
Approach				EB		Τ		WB			NB		Τ		SB	
Lane			Left	Right	Bypas	s Left		Right	Bypass	Left	Right	Bypass	Le	ft	Right	Bypass
Entry Flow (v <sub>e</sub> ), pc/h				23		538		1345		282	319		99	0	961	
Entry Volume veh/h				22		522		1306		274	309		96	1	933	
Circulating Flow (v <sub>c</sub> ), pc/h				2426				400			1007				601	
Exiting Flow (v <sub>ex</sub> ), pc/h				1208				126			1682				1442	
Capacity (c <sub>pce</sub> ), pc/h				181		934		1011		535	603		82	2	822	
Capacity (c), veh/h				175		907		981		519	586		79	8	798	
v/c Ratio (x)				0.13		0.58		1.33		0.53	0.53		1.2	20	1.17	
Delay and Level of S	ervice	,														
Approach				EB				WB			NB		Γ		SB	
Lane			Left	Right	Bypas	s Left		Right	Bypass	Left	Right	Bypass	Le	ft	Right	Bypass
Lane Control Delay (d), s/veh				24.1		12.1		171.0		17.1	15.5		123	3.1	109.5	
Lane LOS				С		В		F		С	С		F		F	
95% Queue, veh				0.4		3.8		50.3		3.1	3.1		31	.8	29.0	
Approach Delay, s/veh				24.1				125.6			16.2				116.4	
Approach LOS				С				F			С				F	
Intersection Delay, s/veh   LO	S		s Reserve			106.3							F			

Copyright © 2018 University of Florida. All Rights Reserved.

Generated: 12/19/2018 11:53:24 AM

# SHERIDAN LAKE ROAD/CATRON BOULEVARD

# **ALTERNATIVE 5 – NB OVERPASS**

		HCS	/ Sig	nalize	ed In	ersec	tion F	kesl	lits	Sun	nmar	y			_	
General Inform	ation								Inte	oreoct	tion Inf	ormatic			╺╡ <sub>┛</sub> ┙╸↓╷	la la
	lation	HDR							<u> </u>	ration,		0.25			4444	of the Conception of the Party
Agency		DH		Analys	ie Det		7 0040					_				K_
Analyst		L		1		e Dec 1	7,2010			ea Typ	e	Other		- 	, Ť.	← <u>}</u>
Jurisdiction				Time F		AM		1.5	PH		Denied	0.90	20			¥ ↓ ↓
Urban Street		SHERIDAN LAKE		-		r 2045			11		Period	1> 7:0	00			× 5
Intersection		CATRON BOULEV		File Na	ame	SLR-0	CATRO	N Fina	al.xu	IS					<u>1</u>	
Project Descrip	tion	SLR CORRIDOR S	TUDY											1	≠1 1 ≠4* <sup>6</sup> 1 <sup>#</sup> 1	r r
Demand Inform	nation				EB			W	/B			NB			SB	
Approach Move	ement			L	Т	R	L	-	Г	R	L	Т	R	L	T	R
<u> </u>				40	55	5	105	2	20		5	0		1025	280	45
															in a state	
Signal Informa	e, s 48.3 Reference Phase 2 t, s 0 Reference Point En ordinated Yes Simult. Gap E/W C e Mode Fixed Simult. Gap N/S C <b>r Results</b> r Results e Duration, s rge Period, (Y+R c), s				21.		(	_								
Cycle, s	et, s0Reference PointEpordinatedYesSimult. Gap E/WCe ModeFixedSimult. Gap N/SCer ResultsSimult. Gap N/SCen NumberSimult. Gap N/SSimult. Gap N/Sse Duration, sSimult. Gap N/SSimult. Gap N/Sfige Period, (Y+R c), sAllow Headway (MAH), sSimult. Gap N/Sue Clearance Time ( $g s$ ), sSimult. Gap N/SSimult. Gap N/Sen Extension Time ( $g e$ ), sSimult. Gap N/SSimult. Gap N/Sse Call ProbabilitySimult. Gap N/SSimult. Gap N/S				- S1	, e	TR (						_  ⊾↓	2	3	
Offset, s	t, s 0 Reference Point E ordinated Yes Simult. Gap E/W 0 e Mode Fixed Simult. Gap N/S 0 r Results ined Phase Number e Duration, s ge Period, (Y+R c), s Allow Headway (MAH), s ie Clearance Time (g s), s			Green	23.2	4.0	4.2	0.	0	0.0	0.0			2	3	
Uncoordinated	Yes	· · · · · · · · · · · · · · · · · · ·	On	Yellow		3.5	3.5	0.	0	0.0	0.0			<b>v</b>		Ζ
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	1.5	1.5	0.	0	0.0	0.0		5	6	7	
Timer Results				EBI	-	EBT	WB	L		/BT	NBI	-	NBT	SBL		SBT
Assigned Phase	e					8	7			4			6			2
Case Number						6.3	2.0	_		.0			6.0			6.0
						9.2	9.0	_		3.1			30.2			30.2
-		•				5.0	5.0	_		.0			7.0			7.0
	• • •					5.0	5.1			.0			5.0		$\rightarrow$	5.0
	eue Clearance Time ( $g_s$ ), s en Extension Time ( $g_e$ ), s					3.8	3.6	_		.4			4.9			14.8
	en Extension Time ( g e ), s					0.4	0.1			.6			11.0			8.4
Phase Call Prol	se Call Probability					0.83	0.79	9		97			1.00			1.00
Max Out Proba	•					0.01	1.00	)	0.	00			0.25			0.49
Movement Gro	x Out Probability vement Group Results				EB			W	3			NB			SB	
Approach Move	-	uita		L	Т	R	L	T	, 	R	L	T	R	L	T	R
Assigned Move				3	8	18	7	4	+		1	6		5	2	12
Adjusted Flow F		) veh/h		44	67	10	117	22		_	6	0		1139	171	168
-		ow Rate ( s ), veh/h/l	n	1389	1746		1639	177	_	_	1042	1772		1639	1772	1721
Queue Service		. ,	11	1.5	1.8		1.6	0.4	_	_	0.1	0.0		12.8	2.7	2.7
Cycle Queue C		· ·		1.5	1.8		1.6	0.4	_	_	2.9	0.0		12.8	2.7	2.7
Green Ratio ( g		e fille ( <i>g</i> c), s			0.09			0.2			0.48	0.0				
Capacity ( c ), v	,			0.09	151		0.08 269	482			0.48 590			0.48 1870	0.48	0.48
Volume-to-Capa		tio (X)		269	<u> </u>				_			850			850	825
· · ·		In ( 95 th percentile)		0.165	0.442	·	0.434	0.04	_		0.009	0.000		0.609	0.201 33.4	0.204
	. ,	eh/ln ( 95 th percentie)			1.3			0.3	_	_		0			<u> </u>	
		RQ) ( 95 th percenti		0.8	<u> </u>		1.1				0.0			5.9 0.43	1.3 0.00	1.3
		, , ,	liie)	0.20	0.00		0.07	0.0				0.00				0.00
Uniform Delay (	. ,			20.8	21.0		21.1	13.	_		8.1	0.0		9.9	7.2	7.2
Incremental De		,		0.4	2.9		1.6	0.1			0.0	0.0		0.5	0.2	0.2
	tial Queue Delay ( d ȝ ), s/veh			0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0	0.0
	ontrol Delay ( <i>d</i> ), s/veh			21.2	23.8		22.7	13.	U		8.1	0.0		10.3	7.4	7.4
	vel of Service (LOS)			C	C		C	B			A			B	A	A
	pproach Delay, s/veh / LOS			22.8	5	C	21.		(	C	8.1		A	9.7		Α
Intersection De	iay, s/ve	en / LOS				1	1.4							B		
Multimodal Re	sulte				EB			W	2			NB			SB	
Pedestrian LOS		/1.05		2.36	-	В	2.29			B	2.67	11	С	1.87		В
Bicycle LOS Sc				0.67		A	0.16			A	0.17		A	1.71		B
				0.07		7	0.10			•	0.17		Λ	1.71		U

		HCS	/ Sig	nalize	ed int	ersec	tion F	kesu	its S	Sur	nmar	У				
General Inform	ation								Intor		tion Inf	ormatic			ad =77adar ↑ ↑	bi lu
	ation											1/	n	- 0	4444	The second second
Agency		HDR			·		7 0040		Durat			0.25		_7		R_
Analyst							17, 2018		Area	Тур	e	Other		- <del>,</del>		↓ ↓
Jurisdiction				Time F		PM			PHF		<b>D</b> : 1	0.90		₹ <b>~</b>	8	
Urban Street		SHERIDAN LAKE					OPTION			/sis	Period	1> 7:0	00			5
Intersection		CATRON BOULEV		File Na	ame	SLR-	CATRO	N Fina	I.xus						<u>1</u> †	
Project Descript	lion	SLR CORRIDOR S	TUDY												4 1 4 1 1	<u>r</u> r
Demand Inform	nation				EB			W	В			NB			SB	
Approach Move	ment			L	Т	R	L	Т	-	R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			10	5	5	470	5	D C		5	0		865	785	55
	ach Movementach Movementand ( $v$ ), veh/hI Informations50.4Reference Phases0Reference PointImportantedYesSimult. Gap E/WModeFixedSimult. Gap N/SModeFixedSimult. Gap N/SResultsmed PhaseNumberDuration, sye Period, ( $Y+R c$ ), sllow Headway ( $MAH$ ), se Clearance Time ( $g s$ ), s															
r	and Informationbach Movementand ( $v$ ), veh/hal Informational Informationa, s50.4Reference Phaseat, s0Reference PointbordinatedYesSimult. Gap E/WordinatedYesSimult. Gap N/SordinatedYesSimult. Gap N/Sa ModeFixedSimult. Gap N/SordinatedYesSimult. Gap N/SordinatedFixedSimult. Gap N/SordinatedYesSimult. Gap N/SordinatedFixedSimult. Gap N/SordinatedFixedSimult. Gap N/SordinatedFixedSimult. Gap N/SordinatedFixedSimult. Gap N/SordinatedSimult. Gap N/SOrdinateordinatedFixedSimult. Gap N/SordinatedSimult. Gap N/SOrdinateordinatedSimult. Gap N/SOrdinateordinatedSimult. Gap N/SSimult. Gap N/SordinatedSimult. Gap N/SSimult. Gap N/SordinatedSimult. Gap N/SSimult. Gap N/SordinatedSimult. Gap N/SSimult. Gap N/Sordinated				205											
Cycle, s	al Informatione, s50.4Reference Phaseet, s0Reference PointEbordinatedYesSimult. Gap E/WCe ModeFixedSimult. Gap N/SCer ResultsGenerationGenerationGenerationgned PhaseGenerationGenerationGeneratione NumberGenerationGenerationGenerationGenerationSGenerationGenerationGenerationSGenerationGenerationGenerationSGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGut ProbabilityGut ProbabilityGut ProbabilityGenerationGenerationGenerationGenerationGenerationGenerationGut ProbabilityGut ProbabilityGut ProbabilityGut ProbabilityGut ProbabilityGut ProbabilityGenerationGenerationGenerationGenerationGenerationGenerationGut ProbabilityGut ProbabilityGut ProbabilityGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGenerationGener				l St		'R'						1	2	3	4
Offset, s	al Information         a, s       50.4       Reference Phase       2         t, s       0       Reference Point       E         ordinated       Yes       Simult. Gap E/W       C         e Mode       Fixed       Simult. Gap N/S       C         r Results       Ined Phase       Ined Phase       Ined Phase         Number       e       Duration, s       ge Period, (Y+R c), s         Allow Headway (MAH), s       Ine Clearance Time (g s), s       Ine Call Probability         Out Probability       Out Probability       Ine Call Probability			Green		8.0	3.3	0.0		0.0	0.0					
Uncoordinated	Mode       Fixed       Simult. Gap N/S       O         r Results       Image: Comparison of the second se			Yellow		3.5	3.5	0.0		0.0	0.0			<b>村</b>		$\rightarrow$
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	1.5	1.5	0.0	) [(	0.0	0.0		5	6	7	<b>Y</b> 8
Timor Posults				EBI		EBT	WB	1	WB	т	NBI	_	NBT	SBI		SBT
	<u>ــــــــــــــــــــــــــــــــــــ</u>			CDI	-	8	7	-	<u>vvь</u> 4	-	INDL	-	6	JOD		2
Case Number	,					6.3	, 1.0		4.0	_			6.0		_	6.0
-	6					8.3	13.0		21.3	_			29.0			29.0
						5.0	5.0		5.0				7.0	<u> </u>		7.0
-	Allow Headway ( <i>MAH</i> ), s					5.0	5.1		5.0	_			5.0			5.0
	eue Clearance Time ( $g_s$ ), s				-	2.4	9.0		3.1	_			12.2		_	13.3
	en Extension Time ( g e ), s					0.2	0.0		0.3	_			9.3			8.8
					-	0.66	1.00	_	1.00	_			1.00	<u> </u>	_	1.00
						0.00	1.00		0.00				0.70	<u> </u>	_	0.73
Max Out 1105a	•					0.00	1.00	<b>,</b>	0.00	,			0.10			0.10
	-	ults			EB			WE	11			NB	1		SB	
Approach Move	ment			L	Т	R	L	Т	F	२	L	Т	R	L	Т	R
Assigned Move	ment			3	8	18	7	4			1	6		5	2	12
Adjusted Flow F	Rate( <i>v</i>	), veh/h		11	11		522	56			6	0		961	459	452
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1348	1626		1639	177	2		612	1772		1639	1772	1745
Queue Service	Time ( g	gs), s		0.4	0.3		7.0	1.1			0.3	0.0		11.3	9.9	9.9
Cycle Queue Cl	earance	e Time ( <i>g c</i> ), s		0.4	0.3		7.0	1.1			10.2	0.0		11.3	9.9	9.9
Green Ratio ( g	/C )			0.07	0.07		0.26	0.32	2		0.44	0.44		0.44	0.44	0.44
Capacity ( <i>c</i> ), v	eh/h			232	107		974	574			291	776		1720	776	764
Volume-to-Capa	acity Ra	tio(X)		0.048	0.104	-	0.536	0.09	7		0.019	0.000		0.559	0.592	0.592
	. ,	In ( 95 th percentile)		5.3	5.8		102.9	16.8	3		2	0		143.6	138.5	134.4
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)	0.2	0.2		4.1	0.7			0.1	0.0		5.7	5.5	5.4
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.05	0.00		0.26	0.00	)		0.00	0.00		0.41	0.00	0.00
Uniform Delay (	d 1 ), s	/veh		22.2	22.1		16.3	11.9	)		14.6	0.0		11.1	10.7	10.7
Incremental Del	ay ( <i>d</i> 2	), s/veh		0.1	0.6		0.8	0.1			0.0	0.0		0.4	1.0	1.1
Initial Queue De	cremental Delay ( <i>d</i> ₂ ), s/veh tial Queue Delay ( <i>d</i> ₃ ), s/veh			0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0	0.0
Control Delay (	ontrol Delay ( <i>d</i> ), s/veh			22.3	22.7		17.0	12.0	)		14.7	0.0		11.5	11.8	11.8
Level of Service	vel of Service (LOS)			С	С		В	В			В			В	В	В
Approach Delay	pproach Delay, s/veh / LOS			22.5	5	С	16.5	5	В		14.7	/	В	11.7		В
Intersection Del	tersection Delay, s/ven / LOS					1	2.9							В		
Multimodal Re					EB			WE				NB			SB	
Pedestrian LOS				2.23		В	2.28		В		2.76		С	1.88		В
Bicycle LOS Sc	ore / LC	)S		0.52	2	А	0.77	7	A		0.35		A	2.03	)	В

# SHERIDAN LAKE ROAD/CATRON BOULEVARD ALTERNATIVE 6 – SINGLE POINT INTERCHANGE

	HCS	7 SIG	nalize	ea int	tersec	tion F	lesi		Sun	nmar	y				
Concret Informatio	-							linter		lian Inf			1 0	I at _t_ata ↓	h L
General Informatio	1									tion Info	1/	on	- 1	ιί	4- X
Agency	HDR							Dura			0.25				
Analyst	DH		-		e Dec 1	7, 2018		Area		е	Other				
Jurisdiction	RAPID CITY		Time F		AM			PHF			0.90		<del>`</del> ₹	W + E B	
Urban Street	SHERIDAN LAKE I		-		r 2045				-	Period	1> 7:0	00			1 1 1
Intersection	CATRON BOULEV		File Na	ame	2045	AM OP1	TION	6.xus	;					<u>1</u> †	22
Project Description	SLR CORRIDOR S	STUDY											ľ	। ╡↑┿Ÿ	17 1
Demand Information	on			EB			W	′B			NB			SB	
Approach Movemen	nt		L	Т	R	L	1		R	L	Т	R	L	Т	R
Demand ( v ), veh/h			40	55		105	2	0		5	0		1025	0	
			1	1		ų.							_	i and a state	in a second
Signal Information	Y		e	14		- <u></u> - 2									
Cycle, s 46.		2		1 SA								1	2	3	4
Offset, s 0		End	Green		3.9	4.0	0.0	)	0.0	0.0					
Uncoordinated Ye		On	Yellow		3.5	3.5	0.0		0.0	0.0			<b>村</b>		4
Force Mode Fixe	ed Simult. Gap N/S	On	Red	2.0	1.5	1.5	0.0	)	0.0	0.0		5	6	7	8
Timer Results			EBI		EBT	WB		WB	ST I	NBI		NBT	SBL		SBT
Assigned Phase			COL		8	7		4	, 1	INDL	-	6	301		2
Case Number					6.3	1.0		4.0				6.0			6.0
Phase Duration, s					9.0	8.9	_	17.9				28.5			28.5
Change Period, (Y-	+R c) s				5.0	5.0		5.0	_			7.0		-	7.0
- ,	ax Allow Headway ( <i>MAH</i> ), s				5.0	5.1		5.0	_			5.0			5.0
	ueue Clearance Time ( $g_s$ ), s				3.6	4.7		2.5	_			2.1			14.7
	een Extension Time ( $g_e$ ), s				0.4	0.0		0.5	_			9.0			6.8
	ase Call Probability				0.81	0.78		0.9				1.00			1.00
Max Out Probability	ase Call Probability x Out Probability				0.01	1.00	_	0.0	_			0.09			0.33
Movement Group F				EB			WE	17	<b>D</b>		NB	D		SB	
Approach Movemen			L	Т	R	L	T	+	R	L	T	R	L	T	R
Assigned Movemen			3	8		7	4	+-	_	1	6		5	2	──
Adjusted Flow Rate			44	61		117	22	_	_	6	0		1139	0	—
	Flow Rate (s), veh/h/l	In	1389	1662		1688	165	_		1688	1656		1639	1656	—
Queue Service Time			1.4	1.6		2.7	0.5	_	_	0.1	0.0		12.7	0.0	—
Cycle Queue Cleara	ance lime ( $g_c$ ), s		1.4	1.6		2.7	0.5	_		0.1	0.0		12.7	0.0	──
Green Ratio ( <i>g/C</i> ) Capacity ( <i>c</i> ), veh/h			0.09	0.09 145		0.21 366	0.20 461			0.46 937	0.46 768		0.46	0.46 768	
Volume-to-Capacity			276 0.161	0.423	2	0.318	0.04	_		937 0.006	0.000		0.623	0.000	
	, ft/ln ( 95 th percentile)		19.1	29.6		42.1	6.5			0.006	0.000		147.4	0.000	
	), veh/ln ( 95 th percentile)		0.8	1.2		42.1	0.3	_		0.0	0.0		5.8	0.0	
	io ( <i>RQ</i> ) ( 95 th percent	,	0.8	0.00		0.14	0.0			0.00	0.00		0.33	0.00	
Uniform Delay ( d 1	· / · ·		20.0	20.1		15.6	12.3	_		6.7	0.00		10.1	0.0	
			0.4	2.8		0.7	0.1	_		0.0	0.0		0.5	0.0	
	cremental Delay ( d ₂ ), s/veh itial Queue Delay ( d ȝ ), s/veh			0.0		0.0	0.0	_		0.0	0.0		0.0	0.0	<u> </u>
	itial Queue Delay ( <i>d</i> ₃ ), s/veh ontrol Delay ( <i>d</i> ), s/veh			22.9		16.3	12.3	_		6.7	0.0		10.6	0.0	
	ontrol Delay ( <i>d</i> ), s/veh evel of Service (LOS)			C		B	B			A	5.5		B		<u> </u>
· ·	evel of Service (LOS) pproach Delay, s/veh / LOS			3	С	15.7		В		6.7		A	10.6	;	В
	pproach Delay, s/veh / LOS ntersection Delay, s/veh / LOS					1.9							B		
Intersection Delay.	tersection Delay, s/veh / LOS									1					
Intersection Delay, s															
Intersection Delay, s Multimodal Results				EB			WE	3			NB			SB	
	S		2.17		В	2.12		3 B		2.50	11	В	1.87		В

Copyright © 2018 University of Florida, All Rights Reserved.

General Information										tion Inf	k	****	be l <u>e</u>		
Agency HDR									Duratior			∔ և և			
Analyst DH				Analys	e Dec 1							_* _*		100 K	
Jurisdiction RAPID CITY				Analysis Date Dec Time Period PM			1,2010		PHF		0.90			w‡e	
Urban Street SHERIDAN LAKE ROAD							16	Analysis	Period	1> 7:00		4 14		*	
Intersection CATRON BOULEVARD				Analysis Year 20 File Name 20							1- 1.0				
Project Description SLR CORRIDOR STUDY					File Name 2045 PM OPTION 6.xus									 ব ↑ ক প	* (*
Project Descrip	lion	SER CORRIDOR 3	TUDT												
Demand Information				EB			V		B		NB				
Approach Movement			L	Т	R	L		R	L	Т	R	L	Т	R	
Demand ( v ), veh/h			10	5		470	5	0	5	0		865	0		
				li.										<u> </u>	
Signal Informa	Ir 1				1 15	a e	_								←
Cycle, s	62.0	Reference Phase	2		- SA	. K	7					1	2	3	4
Offset, s	0	Reference Point	End	Green	21.8	22.0	1.3	0.0	0.0	0.0			_		
Uncoordinated	Yes Simult. Gap E/W On		<u> </u>	Yellow 5.0		3.5	3.5	0.0	0.0	0.0			<b>v</b>		<u> </u>
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	1.5	1.5	0.0	0.0	0.0		5	6	7	8
					1										
Timer Results				EBI	-	EBT	WB		WBT	NBI	-	NBT	SBL	-	SBT
Assigned Phas	е					8			4			6			2
Case Number					10.0		$\rightarrow$	10.0			6.0			6.0	
Phase Duration, s					6.3	<u> </u>	$\rightarrow$	27.0	<u> </u>		28.8		28.8		
Change Period, ( Y+R c ), s						5.0			5.0			7.0		7.	
Max Allow Headway ( <i>MAH</i> ), s						5.0				5.1		5.0		5.0	
Queue Clearance Time ( $g s$ ), s						2.4			20.0			2.1		18.0	
Green Extension Time ( <i>g</i> e ), s						0.0			2.0	<u> </u>	6.8				3.8
Phase Call Pro	-					0.25	<u> </u>		1.00	<u> </u>		1.00			1.00
Max Out Proba	bility					0.00			0.64			0.07			0.66
Movement Gro	oup Res	ults			EB			WE	3		NB			SB	
Approach Move				L	T	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				3	8		7	4		1	6		5	2	
Adjusted Flow Rate ( $v$ ), veh/h								6	0		961	0	<u> </u>		
Adjusted Flow Rate ( v ), ven/h Adjusted Saturation Flow Rate ( s ), veh/h/ln				11	6	1	522	56			U U				
-		, ,	n	11 1688	6 1657		522 1688	56 166	3	1688	1656				
Adjusted Satura	ation Flo	w Rate ( <i>s</i> ), veh/h/l	n	1688	1657		1688	166		1688 0.1	1656 0.0		1639	1656	
Adjusted Satura Queue Service	ation Flo Time(g	w Rate( <i>s</i> ), veh/h/l g s), s	n	1688 0.4	1657 0.2		1688 18.0	166 1.4		0.1	0.0		1639 16.0	1656 0.0	
Adjusted Satur Queue Service Cycle Queue C	ation Flo Time(g learance	w Rate( <i>s</i> ), veh/h/l g s), s	n	1688 0.4 0.4	1657 0.2 0.2		1688 18.0 18.0	166 1.4 1.4		0.1 0.1	0.0 0.0		1639 16.0 16.0	1656 0.0 0.0	
Adjusted Satura Queue Service Cycle Queue C Green Ratio ( g	ation Flo Time(g learance I/C)	w Rate( <i>s</i> ), veh/h/l g s), s	n	1688 0.4 0.4 0.02	1657 0.2 0.2 0.02		1688 18.0 18.0 0.35	166 1.4 1.4 0.3	5	0.1 0.1 0.35	0.0 0.0 0.35		1639 16.0 16.0 0.35	1656 0.0 0.0 0.35	
Adjusted Satura Queue Service Cycle Queue C Green Ratio ( g Capacity ( c ), v	ation Flo Time ( g learance t/C ) veh/h	w Rate(s), veh/h/l g s), s e Time(g c), s	<u>n</u>	1688 0.4 0.4 0.02 34	1657 0.2 0.2 0.02 33		1688 18.0 18.0 0.35 598	166 1.4 1.4 0.3 589	5 )	0.1 0.1 0.35 709	0.0 0.0 0.35 582		1639 16.0 16.0	1656 0.0 0.0 0.35 582	
Adjusted Satura Queue Service Cycle Queue C Green Ratio ( <u>c</u> Capacity ( <u>c</u> ), v Volume-to-Cap	ation Flc Time ( <u>c</u> learance t/C ) veh/h acity Ra	w Rate ( <i>s</i> ), veh/h/l g s ), s e Time ( <i>g c</i> ), s tio ( <i>X</i> )		1688 0.4 0.4 0.02 34 0.326	1657 0.2 0.2 0.02 33 0.166		1688 18.0 18.0 0.35 598 0.874	166 1.4 1.4 0.3 589 0.09	5 9 4	0.1 0.1 0.35	0.0 0.0 0.35		1639 16.0 16.0 0.35 1385 0.694	1656 0.0 0.0 0.35	
Adjusted Satura Queue Service Cycle Queue C Green Ratio ( g Capacity ( c ), v Volume-to-Cap Back of Queue	ation Flc Time ( <u>c</u> learance t/C ) /eh/h acity Ra ( Q ), ft/	w Rate ( <i>s</i> ), veh/h/l <i>g s</i> ), s e Time ( <i>g c</i> ), s tio ( <i>X</i> ) ln ( 95 th percentile)	)	1688 0.4 0.4 0.02 34 0.326 10.3	1657 0.2 0.2 0.02 33 0.166 4.8		1688 18.0 18.0 0.35 598 0.874 308.7	166 1.4 1.4 0.33 589 0.09 21.	5 5 4 1	0.1 0.35 709 0.008 2	0.0 0.0 0.35 582 0.000 0		1639 16.0 16.0 0.35 1385 0.694 237.6	1656 0.0 0.35 582 0.000 0	
Adjusted Satura Queue Service Cycle Queue C Green Ratio ( g Capacity ( c ), v Volume-to-Cap Back of Queue Back of Queue	ation Flo Time ( g learance t/C ) /eh/h acity Ra ( Q ), ft/ ( Q ), ve	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) ln (95 th percentile) eh/ln (95 th percenti	) ile)	1688 0.4 0.4 0.02 34 0.326 10.3 0.4	1657 0.2 0.2 33 0.166 4.8 0.2		1688 18.0 18.0 0.35 598 0.874 308.7 12.2	166 1.4 0.3 589 0.09 21. 0.8	5 5 4 1	0.1 0.35 709 0.008 2 0.1	0.0 0.35 582 0.000 0 0.0		1639 16.0 16.0 0.35 1385 0.694 237.6 9.4	1656 0.0 0.35 582 0.000 0 0.0	
Adjusted Satura Queue Service Cycle Queue C Green Ratio (g Capacity (c), v Volume-to-Cap Back of Queue Back of Queue Queue Storage	ation Flo Time ( <u>c</u> learance t/C ) veh/h acity Ra ( Q ), ft/ ( Q ), ve Ratio (	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) ln (95 th percentile) eh/ln (95 th percenti RQ) (95 th percent	) ile)	1688 0.4 0.02 34 0.326 10.3 0.4 0.21	1657 0.2 0.2 33 0.166 4.8 0.2 0.00		1688 18.0 18.0 0.35 598 0.874 308.7 12.2 0.88	166 1.4 0.33 589 0.09 21. 0.8 0.00	5   6   7   7   7   7   7   7   7   7	0.1 0.35 709 0.008 2 0.1 0.00	0.0 0.35 582 0.000 0 0.0 0.0		1639 16.0 16.0 0.35 1385 0.694 237.6 9.4 0.53	1656 0.0 0.35 582 0.000 0 0.00 0.00	
Adjusted Satura Queue Service Cycle Queue C Green Ratio (g Capacity (c), v Volume-to-Cap Back of Queue Back of Queue Queue Storage Uniform Delay	ation Flo Time ( $g$ learance 1/C) veh/h acity Ra ( $Q$ ), ft/ ( $Q$ ), ve Ratio ( ( $d_1$ ), s/	w Rate ( $s$ ), veh/h/l gs), s e Time ( $g$ c), s tio ( $X$ ) ln (95 th percentile) eh/ln (95 th percenti RQ) (95 th percent	) ile)	1688 0.4 0.02 34 0.326 10.3 0.4 0.21 30.0	1657 0.2 0.2 0.02 33 0.166 4.8 0.2 0.00 29.9		1688 18.0 18.0 0.35 598 0.874 308.7 12.2 0.88 18.7	166 1.4 1.4 0.3 589 0.09 21. 0.8 0.00 13.4	5 5 4 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.1 0.35 709 0.008 2 0.1 0.00 13.1	0.0 0.35 582 0.000 0 0.00 0.00 0.00		1639 16.0 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2	1656 0.0 0.35 582 0.000 0 0 0.0 0.00 0.00	
Adjusted Satura Queue Service Cycle Queue C Green Ratio (g Capacity (c), v Volume-to-Cap Back of Queue Back of Queue Queue Storage Uniform Delay Incremental De	ation Flo Time ( $\underline{c}$ learance t/C) veh/h acity Ra ( $Q$ ), ft/ ( $Q$ ), ve Ratio ( ( $d_1$ ), s/ lay ( $d_2$	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) In (95 th percentile) eh/ln (95 th percenti RQ) (95 th percent /veh ), s/veh	) ile)	1688           0.4           0.02           34           0.326           10.3           0.4           0.21           30.0           7.7	1657 0.2 0.02 33 0.166 4.8 0.2 0.00 29.9 3.3		1688           18.0           18.0           0.35           598           0.874           308.7           12.2           0.88           18.7           10.5	166 1.4 0.3 589 0.09 21. 0.8 0.00 13.4 0.1	3       5       5       6       7 <t< td=""><td>0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.00</td><td>0.0 0.35 582 0.000 0.0 0.0 0.0 0.00 0.0</td><td></td><td>1639 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3</td><td>1656 0.0 0.35 582 0.000 0 0.0 0.0 0.00 0.0</td><td></td></t<>	0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.00	0.0 0.35 582 0.000 0.0 0.0 0.0 0.00 0.0		1639 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3	1656 0.0 0.35 582 0.000 0 0.0 0.0 0.00 0.0	
Adjusted Satura Queue Service Cycle Queue C Green Ratio (g Capacity (c), v Volume-to-Cap Back of Queue Back of Queue Queue Storage Uniform Delay Incremental De Initial Queue D	ation Flo Time ( $\underline{c}$ learance t/C) veh/h acity Ra ( $Q$ ), ft/ ( $Q$ ), ve Ratio ( ( $d_1$ ), s/ elay ( $d_2$	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) In (95 th percentile) eh/ln (95 th percenti RQ) (95 th percent /veh ), s/veh 3), s/veh	) ile)	1688           0.4           0.02           34           0.326           10.3           0.4           0.21           30.0           7.7           0.0	1657 0.2 0.02 33 0.166 4.8 0.2 0.00 29.9 3.3 0.0		1688           18.0           18.0           0.35           598           0.874           308.7           12.2           0.88           18.7           10.5           0.0	166 1.4 0.3 589 0.09 21. 0.8 0.00 13.4 0.1 0.1	5 4 1 2 4 1 1 1 1 1 1 1 1 1 1 1 1 1	0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.0 0.0	0.0 0.35 582 0.000 0.0 0.0 0.00 0.00 0.0		1639 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3 0.0	1656 0.0 0.35 582 0.000 0 0.0 0.0 0.0 0.0 0.0 0.0	
Adjusted Satura Queue Service Cycle Queue C Green Ratio ( g Capacity ( c ), v Volume-to-Cap Back of Queue Back of Queue Queue Storage Uniform Delay Incremental De Initial Queue D Control Delay (	ation Flo Time ( $\underline{c}$ learance t/C) veh/h acity Ra ( $Q$ ), tt/ ( $Q$ ), ve Ratio ( ( $d_1$ ), s/ elay ( $d_2$ elay ( $d_2$	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) In (95 th percentile) eh/ln (95 th percenti RQ) (95 th percent /veh ), s/veh 3), s/veh	) ile)	1688           0.4           0.02           34           0.326           10.3           0.4           0.21           30.0           7.7	1657 0.2 0.2 33 0.166 4.8 0.2 0.00 29.9 3.3 0.0 33.2		1688           18.0           18.0           0.35           598           0.874           308.7           12.2           0.88           18.7           10.5           0.0           29.3	166 1.4 0.3 58 0.09 21. 0.8 0.00 13.4 0.1 0.0 13.4	5 4 1 2 4 1 1 1 1 1 1 1 1 1 1 1 1 1	0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.0 0.0 13.1	0.0 0.35 582 0.000 0.0 0.0 0.0 0.00 0.0		1639 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3 0.0 19.5	1656 0.0 0.35 582 0.000 0 0.0 0.0 0.00 0.0	
Adjusted Satura Queue Service Cycle Queue C Green Ratio (g Capacity (c), v Volume-to-Cap Back of Queue Back of Queue Back of Queue Queue Storage Uniform Delay Incremental De Initial Queue D Control Delay ( Level of Service	ation Flo Time ( $\underline{g}$ learance I/C) veh/h acity Ra ( $Q$ ), ft/ ( $Q$ ), ve Ratio ( ( $d_1$ ), s/ elay ( $d_2$ elay ( $d_2$ elay ( $d_3$ elay ( $d_4$ ) elay ( $d_5$ )	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) In (95 th percentile) eh/ln (95 th percenti RQ) (95 th percent /veh ), s/veh $g_s$ ), s/veh eh	) ile)	1688 0.4 0.02 34 0.326 10.3 0.4 0.21 30.0 7.7 0.0 37.7 D	1657 0.2 0.02 33 0.166 4.8 0.2 0.00 29.9 3.3 0.0 33.2 C		1688 18.0 0.35 598 0.874 308.7 12.2 0.88 18.7 10.5 0.0 29.3 C	166 1.4 1.4 0.33 588 0.09 21. 0.8 0.00 13.4 0.1 0.0 0.1 3.4 8	3       5       6       4       1 <t< td=""><td>0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.0 13.1 B</td><td>0.0 0.35 582 0.000 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td><td></td><td>1639 16.0 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3 0.0 19.5 B</td><td>1656 0.0 0.35 582 0.000 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td><td></td></t<>	0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.0 13.1 B	0.0 0.35 582 0.000 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0		1639 16.0 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3 0.0 19.5 B	1656 0.0 0.35 582 0.000 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	
Adjusted Satura Queue Service Cycle Queue C Green Ratio (g Capacity (c), v Volume-to-Cap Back of Queue Back of Queue Back of Queue Queue Storage Uniform Delay Incremental De Initial Queue D Control Delay ( Level of Service Approach Dela	ation Flo Time ( $\underline{c}$ learance t/C) veh/h acity Ra ( $Q$ ), ft/ ( $Q$ ), ve Ratio ( ( $d_1$ ), s/ elay ( $d_2$ elay ( $d_2$ elay ( $d_3$ elay ( $d_2$ elay ( $d_3$ ), s/ve e (LOS) y, s/veh	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) In (95 th percentile) eh/ln (95 th percenti RQ) (95 th percenti Q) (95 th percent /veh ), s/veh $g_3$ ), s/veh eh	) ile)	1688           0.4           0.02           34           0.326           10.3           0.4           0.21           30.0           7.7           0.0           37.7	1657 0.2 0.02 33 0.166 4.8 0.2 0.00 29.9 3.3 0.0 33.2 C	D	1688 18.0 18.0 0.35 598 0.874 308.7 12.2 0.88 18.7 10.5 0.0 29.3 C 27.8	166 1.4 1.4 0.33 588 0.09 21. 0.8 0.00 13.4 0.1 0.0 0.1 3.4 8	5 4 1 2 4 1 1 1 1 1 1 1 1 1 1 1 1 1	0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.0 0.0 13.1	0.0 0.35 582 0.000 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0		1639 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3 0.0 19.5 B 19.5	1656 0.0 0.35 582 0.000 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	B
Adjusted Satura Queue Service Cycle Queue C Green Ratio (g Capacity (c), v Volume-to-Cap Back of Queue Back of Queue Back of Queue Queue Storage Uniform Delay Incremental De Initial Queue D Control Delay ( Level of Service	ation Flo Time ( $\underline{c}$ learance t/C) veh/h acity Ra ( $Q$ ), ft/ ( $Q$ ), ve Ratio ( ( $d_1$ ), s/ elay ( $d_2$ elay ( $d_2$ elay ( $d_3$ elay ( $d_2$ elay ( $d_3$ ), s/ve e (LOS) y, s/veh	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) In (95 th percentile) eh/ln (95 th percenti RQ) (95 th percenti Q) (95 th percent /veh ), s/veh $g_3$ ), s/veh eh	) ile)	1688 0.4 0.02 34 0.326 10.3 0.4 0.21 30.0 7.7 0.0 37.7 D	1657 0.2 0.02 33 0.166 4.8 0.2 0.00 29.9 3.3 0.0 33.2 C	D	1688 18.0 0.35 598 0.874 308.7 12.2 0.88 18.7 10.5 0.0 29.3 C	166 1.4 1.4 0.33 588 0.09 21. 0.8 0.00 13.4 0.1 0.0 0.1 3.4 8	3       5       6       4       1 <t< td=""><td>0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.0 13.1 B</td><td>0.0 0.35 582 0.000 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td><td></td><td>1639 16.0 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3 0.0 19.5 B</td><td>1656 0.0 0.35 582 0.000 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td><td></td></t<>	0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.0 13.1 B	0.0 0.35 582 0.000 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0		1639 16.0 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3 0.0 19.5 B	1656 0.0 0.35 582 0.000 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	
Adjusted Satura Queue Service Cycle Queue C Green Ratio (g Capacity (c), v Volume-to-Cap Back of Queue Back of Queue Back of Queue Queue Storage Uniform Delay Incremental De Initial Queue D Control Delay ( Level of Service Approach Dela	ation Flo Time ( $\underline{c}$ learance I/C) veh/h acity Ra ( $Q$ ), ft/ ( $Q$ ), ve Ratio ( ( $d_1$ ), s/ elay ( $d_2$ elay ( $d_2$ elay ( $d_3$ d), s/ve e (LOS) y, s/veh lay, s/veh	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) In (95 th percentile) eh/ln (95 th percenti RQ) (95 th percenti Q) (95 th percent /veh ), s/veh $g_3$ ), s/veh eh	) ile)	1688 0.4 0.02 34 0.326 10.3 0.4 0.21 30.0 7.7 0.0 37.7 D	1657 0.2 0.02 33 0.166 4.8 0.2 0.00 29.9 3.3 0.0 33.2 C	D	1688 18.0 18.0 0.35 598 0.874 308.7 12.2 0.88 18.7 10.5 0.0 29.3 C 27.8	166 1.4 1.4 0.33 588 0.09 21. 0.8 0.00 13.4 0.1 0.0 0.1 3.4 8	Image: state	0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.0 13.1 B	0.0 0.35 582 0.000 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0		1639 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3 0.0 19.5 B 19.5	1656 0.0 0.35 582 0.000 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	
Adjusted Satura Queue Service Cycle Queue C Green Ratio ( g Capacity ( c ), v Volume-to-Cap Back of Queue Back of Queue Back of Queue Queue Storage Uniform Delay Incremental De Initial Queue D Control Delay ( Level of Service Approach Dela	ation Flo Time ( $g$ learance I/C) veh/h acity Ra ( $Q$ ), ft/ ( $Q$ ), ve Ratio ( ( $d_1$ ), s/ve elay ( $d_2$ elay ( $d_2$ elay ( $d_3$ elay ( $d_4$ elay ( $d_2$ elay ( $d_3$ elay ( $d_4$ esults	w Rate ( $s$ ), veh/h/l $g_s$ ), s e Time ( $g_c$ ), s tio ( $X$ ) In (95 th percentile) eh/ln (95 th percenti RQ) (95 th percent /veh ), s/veh $g_s$ ), s/veh eh / LOS h / LOS	) ile)	1688 0.4 0.02 34 0.326 10.3 0.4 0.21 30.0 7.7 0.0 37.7 D	1657 0.2 0.02 33 0.166 4.8 0.2 0.00 29.9 3.3 0.0 33.2 C 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 2 2 2 2 3 3 3 2 2 2 2 3 3 3 2 2 3 3 3 2 2 3	D	1688 18.0 18.0 0.35 598 0.874 308.7 12.2 0.88 18.7 10.5 0.0 29.3 C 27.8	166 1.4 1.4 0.33 589 0.09 21. 0.8 0.00 13.4 0.1 0.0 13.4 B 3 WE	Image: state	0.1 0.35 709 0.008 2 0.1 0.00 13.1 0.0 13.1 B	0.0       0.35       582       0.000		1639 16.0 0.35 1385 0.694 237.6 9.4 0.53 18.2 1.3 0.0 19.5 B 19.5	1656 0.0 0.35 582 0.000 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	

Copyright © 2018 University of Florida, All Rights Reserved.

# SHERIDAN LAKE ROAD/CATRON BOULEVARD ALTERNATIVE 7 – AT-GRADE WITHOUT FUTURE ROADWAYS (TRIPLE SB LEFTS/TRIPLE NB THRUS)

hdrinc.com

703 Main Street, Suite 200, Rapid City, SD 57701 (605) 791-6100

FC

HCS7 Signalized Intersection Results Summary																	
Conorol Info	nation							Int	01000	ion Inf		at 24ats + .	be la				
General Information									Intersection Information					- 1	4144	L.	
Agency HDR				Analysia Data Das 1			Duration								R_		
Analyst DH			Analysis Date Dec 7						Area Type			Other					
Jurisdiction RAPID CITY			Time Period AM				PHF			0.90 1> 7:0			w t t				
Urban Street SHERIDAN LAKE ROAD						5 OPTION 7			Analysis Period			00			E C		
Intersection CATRON BOULEVARD Project Description SLR CORRIDOR STUDY				File Na	File Name 2045 AM OPTION 7.xus									_	<u> 1111</u>		
Project Descrip												1 1 44 Y	r r				
Demand Information					EB		1		NB		NB		SB				
Approach Movement			L	Т	R	L	-	Г	R	L	Т	R	L	Т	R		
Demand ( v ), veh/h			40	55	5	105	2	0		5	905	1	1025	280	45		
				1													
Signal Informa		1	r	-	216	21		3	-	-						←	
Cycle, s	65.3	Reference Phase 2			12		Ŕ		1			2	3	4			
Offset, s	0	Reference Point	End	Green	15.0	20.3	4.4	4.0	6	0.0	0.0						
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	5.0	3.5	3.	5	0.0	0.0			<b>1</b>		A	
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.5	2.0	1.5	1.	5	0.0	0.0		5	6	7	<b>Y</b> 8	
											ODT						
Timer Results			EBL		EBT	WB		WBT		NBL		NBT	SBL		SBT		
Assigned Phase	J					8	7		4				6	5		2	
Case Number				$ \longrightarrow $		6.3	2.0	_	4.0			_	6.3	2.0		4.0	
Phase Duration, s					9.6	9.4		19.0				27.3	<u> </u>		46.3		
Change Period, (Y+R c), s					5.0	5.0			5.0			7.0	4.0		7.0		
Max Allow Head	- 1	·				5.0	5.1	_	_	5.0		5.		5.1		5.0	
Queue Clearan		, = ,				4.4	4.2		2.7			13.8		17.0		4.8	
Green Extensio		(ge), s				0.4	0.0		0.6			6.5		0.0		11.0	
Phase Call Probability					0.91	0.88		0.99			1.00 0.54		1.00		1.00		
Max Out Proba	onity					0.01	1.00	.00 0.00				0.54	1.00		0.05		
Movement Gro	oup Res	ults			EB			WE	3			NB			SB		
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R	
Assigned Move	ment			3	8	18	7	4			1	6		5	2	12	
Adjusted Flow F	Rate( <i>v</i>	), veh/h		44	67		117	22			6	1006		1139	171	168	
Adjusted Satura	Adjusted Saturation Flow Rate ( s ), veh/h/ln		1389	1746		1639	177	2		1042	1609		1639	1772	1721		
Queue Service Time ( g s ), s		2.0	2.4		2.2	0.7	'		0.2	11.8		15.0	2.8	2.8			
Cycle Queue Clearance Time ( $g c$ ), s		2.0	2.4		2.2	0.7	7		0.2	11.8		15.0	2.8	2.8			
Green Ratio(g/C)			0.07	0.07		0.07	0.2	1		0.31	0.31		0.23	0.60	0.60		
Capacity ( <i>c</i> ), veh/h			207	122		221	379	9		435	1503		1129	1068	1037		
Volume-to-Capacity Ratio ( <i>X</i> )			0.214			0.528	0.05			0.013	0.669		1.008	0.160	0.162		
Back of Queue (Q), ft/In (95 th percentile)			30.4	51.2		41.4	11.	_		2.4	182.2		329.4	34.7	33.9		
Back of Queue (Q), veh/In (95 th percentile)			1.2	2.0		1.6	0.5			0.1	7.2		13.0	1.4	1.4		
Queue Storage Ratio ( RQ ) ( 95 th percentile)			0.30	0.00		0.10	0.0			0.01	0.00		0.55	0.00	0.00		
Uniform Delay ( <i>d</i> 1), s/veh			29.2	29.4	<u> </u>	29.4	20.4			15.6	19.5		25.1	5.7	5.7		
Incremental Delay ( <i>d</i> <sub>2</sub> ), s/veh			0.7	5.4		2.8	0.1			0.0	0.8		28.8	0.1	0.1		
Initial Queue Delay ( d 3 ), s/veh			0.0	0.0	<u> </u>	0.0	0.0	_		0.0	0.0		0.0	0.0	0.0		
Control Delay ( <i>d</i> ), s/veh			29.9	34.7		32.2	20.	5		15.6	20.4		54.0	5.8	5.8		
Level of Service				C	C	C	C	C			B	С		F	A	A	
Approach Delay, s/veh / LOS			32.8	3	30.3 C			С	20.3	3	С	42.9 D					
Intersection De	33.5										С						
Multimodel De	eulte				ED							ND					
Multimodal Results Pedestrian LOS Score / LOS			EB 2.70 C		С	2.73		/B C		2.85	NB	С	SB 1.86		В		
Bicycle LOS Sc				0.67		A	0.16			A	0.93		A	1.80		B	
	0.07		7	0.10			/1	0.90	,	Π	1.71		U				
		псэ	7 SIG	nalize	ea in	ersec		tesu	IIIS	Sun	nmar	У					
-------------------	---	-------------------------------	----------	-----------------	----------	-------------	-------------	------	--------------	---------	---------	---------	------	-----------------------	-------------	-------------	
O	4!								late		lan luf			1 0	at "Y*t> ↑	b.L.	
General Inforn	nation											ormatic	on	- 1	4111	Ļ	
Agency		HDR				-				ration,		0.25				R	
Analyst		DH				e Dec 1	7, 2018			а Тур	e	Other		_→		←	
Jurisdiction		RAPID CITY		Time F		PM			PH			0.90		*	W∓E	- - -	
Urban Street		SHERIDAN LAKE F	ROAD	Analys	sis Yea	r 2045					Period	1> 7:0	00	7		*₹ ⊮	
Intersection		CATRON BOULEV		File Na	ame	2045	PM OP	TION	7.xu	s					5111		
Project Descrip	tion	SLR CORRIDOR S	TUDY											ň	↑ ↑ ↓ ↑ ↓ ↑	<u>۲</u>	
Demand Inform	notion							W	0			ND			SB		
Approach Move				L	EB T	R	L		1	R	L	NB T	R	L	T	R	
				10	5	5	470			ĸ	5	335		865	785	55	
Demand ( v ), v	en/n			10	5	5	470	5			Ð	335		005	700	55	
Signal Informa	ation				21	21											
Cycle, s	68.1	Reference Phase	2	1	1642			72	$\leftarrow$	1							
Offset, s	0	Reference Point	End		<u> </u>	<u> </u>		Ň				_	1	2	3	4	
Uncoordinated	Yes	Simult. Gap E/W	On	Green Yellow		15.0 5.0	12.7 3.5	3.9		0.0	0.0	— L		-+			
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.5	2.0	1.5	1.5		0.0	0.0	_	5	<b>N</b> <sub>6</sub>	7		
			<b>U</b>		5.0		1.0		-		0.0						
Timer Results				EBI	L	EBT	WB	L	W	BT	NBI	_	NBT	SBL	-	SBT	
Assigned Phas	е					8	7		4	1			6	5		2	
Case Number						6.3	2.0	-	4.	.0			6.3	2.0		4.0	
Phase Duration	n. s					8.9	17.7	_	26				22.0	19.5		41.5	
Change Period		c). S				5.0	5.0	_	5.				7.0	4.0		7.0	
-	ax Allow Headway ( <i>MAH</i> ), s					5.0	5.1		5.	_			5.0	5.1		5.0	
	ax Allow Headway ( <i>MAH</i> ), s Jeue Clearance Time ( <i>g</i> s ), s					2.5	12.5		3.				6.4	14.8	3	13.7	
Green Extensio		, = ,				0.2	0.2		0.	_			7.9	0.8		9.5	
Phase Call Pro		(90),0				0.77	1.00	_	1.0				1.00	1.00		1.00	
Max Out Proba				<u> </u>		0.00	1.00		0.0	_			0.28	1.00		0.09	
	2					0.00			0.10				0.20				
Movement Gro	oup Res	sults			EB			WE	3			NB			SB		
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R	
Assigned Move	ment			3	8	18	7	4			1	6		5	2	12	
Adjusted Flow I	Rate( <i>v</i>	), veh/h		11	11		522	56			6	372		961	459	452	
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1348	1626		1639	177	2		612	1609		1639	1772	1745	
Queue Service	Time ( g	g s ), S		0.5	0.4		10.5	1.5			0.5	4.4		12.8	11.7	11.7	
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		0.5	0.4	1	10.5	1.5			0.5	4.4		12.8	11.7	11.7	
Green Ratio ( g	ı/C)	i		0.06	0.06	1	0.19	0.32	2		0.22	0.22		0.23	0.51	0.51	
Capacity ( c ), v	/eh/h			182	92		611	561			241	1064		1121	899	885	
Volume-to-Cap		itio(X)		0.061	0.121		0.855	0.09	9		0.023	0.350		0.857	0.511	0.511	
· · · ·	· ·	/In (95 th percentile)	)	7.9	8.4		210	25.9			3.1	71.3		226.2	176.7	171.4	
		eh/In ( 95 th percenti		0.3	0.3		8.3	1.0			0.1	2.8		8.9	7.0	6.9	
	, ,	RQ) (95 th percent	,	0.08	0.00		0.52	0.00			0.01	0.00		0.38	0.00	0.00	
Uniform Delay		,, ,		30.5	30.5		26.8	16.4	_		20.9	22.4		25.2	11.1	11.1	
Incremental De	· ,			0.2	0.8		11.4	0.1			0.1	0.3		6.7	0.6	0.7	
Initial Queue D	2 1	,		0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0	0.0	
	ontrol Delay ( <i>d</i> ), s/veh						38.2	16.5			20.9	22.7		31.9	11.8	11.8	
	evel of Service (LOS)					1	D	В	+		C	C		C	В	B	
Approach Dela				C 31.0		С	36.1			)	22.7		С	22.1		C	
Intersection De	-			51.0			5.1				,			C		-	
														-			
Multimodal Re	sults				EB			WE	3			NB			SB		
	edestrian LOS Score / LOS					С	2.72		C	;	2.95	1	С	1.88		В	
				2.56 0.52		A	0.77		A	_	0.65		A	2.03		В	
,	cycle LOS Score / LOS					-											

# SHERIDAN LAKE ROAD/CATRON BOULEVARD ALTERNATIVE 8 – AT-GRADE WITH FUTURE ROADWAYS

hdrinc.com

							, 10111					,				
General Inform	nation								In	tersect	tion Inf	ormatio	on	2	4 4 4	be la
Agency		HDR							<u> </u>	uration,		0.25			466	
Analyst		DH		Analys	sis Dat	e Dec	17, 2018	}		еа Тур		Other		4		بر ج
Jurisdiction		RAPID CITY		Time F		AM	,		PH			0.90			w∔€	+ 
Urban Street		SHERIDAN LAKE	ROAD	Analys		r 2045	OPTIO	N 8	<u> </u>	nalysis	Period	1> 7:(	00	4		→ *
Intersection		CATRON BOULEV		File N			AM OP			•					5++	E C
Project Descrip	tion	SLR CORRIDOR S		1					• •				-	- 1	*1 + + + + + + + + + + + + + + + + + + +	t d
Demand Inform					EB			V	/B			NB			SB	
Approach Move	ement			L	Т	R	L	-	Т	R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			40	55	5	20	2	20		5	1000		1030	310	55
										-	_					
Signal Informa	r			-	1216	21		2								7
Cycle, s	107.2		2	-		5		č					1	2	3	4
Offset, s	0	Reference Point	End	Green	41.7	39.8	8.3	0.	0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		5.0	4.0	0.		0.0	0.0			<b>村</b>		4
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	1.5	0.	0	0.0	0.0		5	6	7	<b>¥</b> 8
Timer Results				EBI		EBT	WB		1/	VBT	NB		NBT	SBL		SBT
Assigned Phase	۵			CDI		8	VVD	, <b>_</b>	V	<u>чы</u> 4			6	5	-	2
Case Number						6.0			Ĺ	4 6.0			6.3	2.0		4.0
Phase Duration	s					13.8	-	-		3.8			0.3 46.8	46.7		93.5
Change Period		c) s				5.5	-	-+		5.5			7.0	5.0		7.0
	ax Allow Headway ( <i>MAH</i> ), s					5.0	-	-		5.0			5.0	5.1		5.0
	ax Allow Headway ( <i>MAH</i> ), s ueue Clearance Time ( <i>g</i> s ), s					6.6		-	_	7.7			35.1	37.2	,	7.9
Green Extensio		1 = 7				0.5		-		0.6			4.7	4.5		14.9
Phase Call Pro		(90),0				0.99		-		).99	<u> </u>		1.00	1.00		1.00
Max Out Proba	-					0.02				0.00			0.88	0.76		0.01
Movement Gro	· ·	sults			EB			WI	10			NB			SB	
Approach Move				L	Т	R	L	Т	$\rightarrow$	R	L	Т	R	L	Т	R
Assigned Move				3	8	18	7	4	$\rightarrow$		1	6		5	2	12
Adjusted Flow I		,		44	67		22	22	-		6	1111		1144	383	<u> </u>
-		ow Rate ( <i>s</i> ), veh/h/l	n	1389	1746		1335	177			1000	1687		1639	1740	
Queue Service		- ,		3.3	3.9		1.7	1.3	-		0.4	33.1		35.2	5.9	<u> </u>
Cycle Queue C		e Time ( <i>g c</i> ), s		4.6	3.9		5.7	1.3	-		0.4	33.1		35.2	5.9	
Green Ratio (g	· ·			0.08	0.08		0.08	0.0			0.37	0.37		0.39	0.81	
Capacity ( c ), v				158	135		121	13	-		438	1252		1273	1403	
Volume-to-Capa		· · ·		0.281	0.494	_	0.183				0.013	0.887		0.899	0.273	<u> </u>
	. ,	In (95 th percentile)		54.2	83.3		27.7	26.	-		4	514.2		528.7	57	
		eh/In (95 th percent	,	2.1	3.3		1.1	1.0	-		0.2	20.2		20.8	2.2	
-		RQ) (95 th percent	ule)	0.54	0.00		0.07	0.0	-		0.01	0.00		0.76	0.00	
Uniform Delay	· ,			48.4	47.5		50.2	46.	-		21.3	31.6		30.8	2.6	
Incremental De	• •			1.4 0.0	3.9 0.0		1.0	3.0			0.0	7.7		8.2	0.1	
	itial Queue Delay ( $d_3$ ), s/veh						0.0	0.0	-		0.0	0.0		0.0	0.0	
Control Delay (				49.7	51.4		51.2	47.			21.3	39.3		39.0	2.7	
Level of Service	. ,			D 50.7			D 40	D			C			D 20.0	A	<u> </u>
	pproach Delay, s/veh / LOS					D	49.			D	39.2		D	29.9		С
	ntersection Delay, s/veh / LOS					č	4.8							С		
Multimodal Re	ultimodal Results							W	B			NB			SB	
	edestrian LOS Score / LOS					В	2.3		_	В	2.5		С	1.83		В
				2.23 0.67		A	0.0			A	1.3	_	A	3.01	_	C
210,010 200 00	ycle LOS Score / LOS						0.0	-			1.00			0.01		

			Ŭ								,				
General Inform	nation								Intersed	tion Inf	ormatio	on		┙╡┵╪┿╸↓╶	يد ا
Agency		HDR							Duration	ı, h	0.25			444	
Analyst		DH		Analys	sis Da	te Dec 1	7, 2018		Area Ty		Other		4		
Jurisdiction		RAPID CITY		Time F					PHF		0.90			W HE	- <b>↓</b> ↓
Urban Street		SHERIDAN LAKE	ROAD			ar 2045	OPTION	N 8	Analysis	Period	1> 7:(	00	4		→ *
Intersection		CATRON BOULEV		File N				I	3 w Les I					5 + +	r
Project Descrip	tion	SLR CORRIDOR S												। <b>च</b> ↑ क भ	* 1*
Demand Inform	mation				EB			W	В		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), v	/eh/h			10	5	5	40	4	5	5	475		775	895	55
								1	1						
Signal Informa	10	Y.	1	_	215	21	3 4								+
Cycle, s	63.4	Reference Phase	2			51	'R'	311				1	2	3	4
Offset, s	0	Reference Point	End	Green	21.1	19.9	4.4	0.0	0.0	0.0					
Uncoordinated	<u> </u>	Simult. Gap E/W	On	Yellow		5.0	4.0	0.0		0.0			1		4
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	0.0	0.0		5	6	7	<b>Y</b> 8
Timer D						FDT	14/5		MOT	NE		NDT	0.51		ODT
Timer Results				EBI	-	EBT	WB	L	WBT	NB		NBT	SBI	-	SBT
Assigned Phas	e					8			4			6	5		2
Case Number Phase Duratior						6.0 10.4		_	6.0 10.4	-		6.3 26.9	2.0 26.1		4.0 53.0
				<u> </u>	+	6.0	<u> </u>	$\rightarrow$	6.0	<u> </u>		7.0	5.0		7.0
-	ange Period, ( <i>Y+R c</i> ), s x Allow Headway ( <i>MAH</i> ), s				-	5.0		-	5.0			5.0	5.0		5.0
					+	4.2		$\rightarrow$	4.3	<u> </u>		10.1	17.1		26.7
	eue Clearance Time ( g s ), s een Extension Time ( g e ), s				-	0.4		-	0.4			9.9	4.0		15.1
Phase Call Pro		( <i>g</i> e), s			+	0.4		$\rightarrow$	0.4	<u> </u>		1.00	1.00		1.00
Max Out Proba	-					0.07		-	0.07			0.60	0.47		0.26
Max Out 100a	onity					0.00			0.00			0.00	0.41	and an	0.20
Movement Gro	oup Res	sults			EB			WB	;		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				3	8	18	7	4		1	6		5	2	12
Adjusted Flow	Rate( <i>v</i>	), veh/h		11	11		44	50		6	528		861	1033	
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	In	1355	1626	3	1403	1772	2	546	1687		1639	1760	
Queue Service				0.5	0.4		1.9	1.7		0.4	8.1		15.1	24.7	
Cycle Queue C	learanc	e Time ( <i>g c</i> ), s		2.2	0.4		2.3	1.7		0.4	8.1		15.1	24.7	
Green Ratio ( g				0.07	0.07	_	0.07	0.07		0.31	0.31		0.33	0.73	
Capacity ( c ), v				170	112		201	122		285	1061		1091	1278	
Volume-to-Cap	,	· · ·		0.065		9	0.221	0.41	-	0.019	0.497		0.789	0.809	
		In (95 th percentile)		7.4	7.4		29.6	35.5	_	2.4	128.1		232	208.8	
		eh/In (95 th percent		0.3	0.3		1.2	1.4		0.1	5.0		9.1	8.2	<u> </u>
		RQ) (95 th percent	tile)	0.07	0.00	_	0.07	0.00		0.01	0.00		0.39	0.00	
Uniform Delay	, ,			29.3	27.7		28.8	28.3	5	15.1	17.7		19.1	5.8	<u> </u>
Incremental De	2 1	,		0.2	0.5		0.8	3.1		0.0	0.5		2.8	2.7	
	itial Queue Delay ( $d$ 3), s/veh					_	0.0	0.0	_	0.0	0.0		0.0	0.0	
	ontrol Delay ( <i>d</i> ), s/veh						29.6	31.4		15.1	18.2		22.0	8.5	
	evel of Service (LOS)						C			B	В		C	A	
	Approach Delay, s/veh / LOS ntersection Delay, s/veh / LOS					C	30.5	5	С	18.1		В	14.6	)	В
Intersection De	iay, s/ve	en / LOS				1	6.1						В		
Multimodal Ba	sulte				EB			WB			NB			SB	
	ultimodal Results edestrian LOS Score / LOS					В	2.32		B	2.50		В	1.83		В
				2.2 <sup>2</sup>		A	0.13		A	0.87		A	3.61		D
2.0,00 200 00	cycle LOS Score / LOS					~	0.10	-		0.01			0.0		2

Copyright © 2018 University of Florida, All Rights Reserved.

HCS<sup>™</sup> Streets Version 7.5

# SHERIDAN LAKE ROAD/CORRAL DRIVE/PARK DRIVE

# ALTERNATIVE 1 – CORRAL DRIVE/PARK DRIVE

hdrinc.com

		1105	7 Siy	nanze	u III	lersec		1631	uns	Sun	iiiiai	у				
General Inform	nation								Int	ersect	tion Inf	ormatic	on	k	╡┵┿┊	þa l <u>a</u>
Agency	lution	HDR							<u> </u>	iration,		0.25			_1 † †	
Analyst		DH		Analys	sis Dat	te Dec 2	2018			ea Typ		Other		 		۲. ۲.
Jurisdiction		RAPID CITY		Time F		AM			PH			0.90			w‡e	》 令
Urban Street		SHERIDAN LAKE		Analys			CORRA	J 1			Period	1> 7:0	00	4		
Intersection		CORRAL DRIVE		File Na			AM CO		11	-				- <mark>- </mark>		r
Project Descrip	tion	SLR CORRIDOR S	TUDY		ame	2040			_ 1 _			3 1010	10.703	-	<b>ब ↑</b> क फ	۲. ۲. ۲
		OEI CONTRIDUCTO	TODT													
Demand Inform	nation				EB			٧	VB			NB			SB	
Approach Move	ement			L	Т	R	L		Т	R	L	Т	R	L	Т	R
Demand ( <i>v</i> ), v	eh/h			335	0						760	1215			735	275
	4!			1											_	
Signal Informa		Defense Dhase	0	-		21						R				
Cycle, s	83.9 0	Reference Phase Reference Point	2 End	-	1 51	î I ∩							1	2	3	4
Offset, s	-		End	Green			20.6	0.		0.0	0.0	_				
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	-	4.0	4.0	0.		0.0	0.0	_	_	T.		<b>_</b>
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	1.5	2.0	0.	U	0.0	0.0		5	6	7	8
Timer Results				EBI		EBT	WB	L	W	/BT	NBI		NBT	SBI		SBT
Assigned Phase	e					8					1		6			2
Case Number						10.0					2.0		4.0			7.3
Phase Duration	. S					26.6					26.0		57.4			31.4
Change Period,		c ), S				6.0					4.0		5.5			5.5
-	ax Allow Headway ( <i>MAH</i> ), s					4.1					5.1		4.0			4.0
	ax Allow Headway ( <i>MAH</i> ), s ueue Clearance Time ( <i>g</i> s ), s					19.9					23.5	5	23.4			20.5
Green Extensio		, _ ,				0.6					0.0		14.4			5.3
Phase Call Prol						1.00					1.00	)	1.00			1.00
Max Out Proba	bility					0.62					1.00	)	0.27			0.86
Movement Gro	oup Res	ults			EB			W	В			NB			SB	
Approach Move	-			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move				3	8						1	6			2	12
Adjusted Flow F	Rate ( v	), veh/h		372	0						844	1350			817	206
Adjusted Satura	ation Flo	w Rate ( <i>s</i> ), veh/h/l	n	1688	1800	)					1639	1687			1687	1502
Queue Service	Time ( g	g s ), s		17.9	0.0						21.5	21.4			18.5	9.2
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		17.9	0.0						21.5	21.4			18.5	9.2
Green Ratio ( g	/C)			0.25	0.25						0.26	0.62			0.31	0.31
Capacity ( c ), v	/eh/h			414	441						859	2085			1040	463
Volume-to-Capa	acity Ra	tio(X)		0.900	0.000	0					0.983	0.648			0.786	0.444
Back of Queue	( Q ), ft/	In ( 95 th percentile)	)	345.3	0						419	269.7			301.5	143.1
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)	13.6	0.0						16.5	10.6			11.9	5.6
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.92	0.00						0.42	0.00			0.00	0.36
Uniform Delay (	. ,			30.7	0.0						30.8	10.2			26.5	23.3
Incremental De		•		16.9	0.0						26.5	0.7			3.6	0.7
	nitial Queue Delay ( d ȝ ), s/veh				0.0						0.0	0.0			0.0	0.0
	ontrol Delay ( <i>d</i> ), s/veh				0.0						57.3	10.9			30.1	23.9
	evel of Service (LOS)										E	В			С	С
	Approach Delay, s/veh / LOS				3	D	0.0				28.7	7	С	28.9	)	С
Intersection De	lay, s/ve	eh / LOS				3	0.7							С		
Multiment	a				EB			1.4.4	D						0.0	
	Iultimodal Results					P	0.4	W		D	4.05	NB	Δ	0.44	SB	D
	destrian LOS Score / LOS				7	B A	2.44	+		В	1.35 2.30		A B	2.11 1.33		B
	icycle LOS Score / LOS					A					2.30	,	D	1.33	,	A

		1100	n olg	nanzo	a m	lei sec		1031	unta	Jour	innar <sub>.</sub>	y				
General Inform	nation								Int	tersect	tion Inf	ormatic	on		┙┥┙╸↓	be l <u>e</u>
Agency		HDR							<u> </u>	iration,		0.25			5++	
Analyst		DH		Analys	sis Dat	e Dec 2	0 2018			ea Typ		Other		 		بر 4
Jurisdiction		RAPID CITY		Time F		AM	0, 2010		PH		•	0.90		- <mark>→</mark> •	w‡e	}- ∳
Urban Street		SHERIDAN LAKE		Analys			CORRA	1 1		nalysis	Period	1> 7:0	00			++ *
Intersection		CORRAL DRIVE		File N			AM COF		1	-						
Project Descrip	tion	SLR CORRIDOR S	עמווד		ame	20437			_ / -	W Les	TIONEIS	101510	5.845	- 4	╡┼╪┯┯	1× 1*
T Toject Descrip	lion	SER CORRECT	TUDT													
Demand Inform	nation				EB			٧	VB			NB			SB	
Approach Move	ement			L	Т	R	L	· ·	Т	R	L	Т	R	L	Т	R
Demand ( <i>v</i> ), v	eh/h			340	0						680	1290			795	300
				li-			-				-			_		
Signal Informa				-		21	2					R				
Cycle, s	84.6	Reference Phase	2	-	1 51	t n	P							2	3	4
Offset, s	0	Reference Point	End	Green	21.5	26.7	21.0	0.	0	0.0	0.0		•			
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	0.0			1	_	<b>_</b>
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.0	1.5	2.0	0.	0	0.0	0.0		5	6	7	8
Timer Results				EBI		EBT	WB	1	10	VBT	NBI		NBT	SB		SBT
Assigned Phase				EDI		8	VVD		V	VDI	1	-	6	30		2
Case Number	e				+	10.0	<u> </u>	$\rightarrow$		_	2.0		4.0	<u> </u>		7.3
Phase Duration						27.0	<u> </u>	$\rightarrow$		_	2.0		4.0 57.6	<u> </u>		32.2
	· · · · · · · · · · · · · · · · · · ·			<u> </u>		6.0	<u> </u>				4.0		5.5	<u> </u>		5.5
-	nange Period, ( Y+R c ), s ax Allow Headway ( <i>MAH</i> ), s			<u> </u>		4.1	<u> </u>	$\rightarrow$		_	4.0 5.1		4.0			4.0
	ax Allow Headway ( <i>MAH</i> ), s ueue Clearance Time ( <i>g</i> s ), s					20.4		$\rightarrow$		_	20.9		4.0 26.0			22.5
Green Extensio		, _ ,				0.6	<u> </u>	$\rightarrow$			0.5		20.0 15.2			4.1
Phase Call Pro		( <i>g</i> e), s			$\rightarrow$	1.00	<u> </u>	$\rightarrow$		_	1.00		1.00			1.00
Max Out Proba						0.76	<u> </u>	$\rightarrow$			1.00		0.38			0.96
	onity					0.70					1.00	, ,	0.50			0.50
Movement Gro	oup Res	sults			EB			W	В			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Move	ment			3	8						1	6			2	12
Adjusted Flow I	Rate( <i>v</i>	), veh/h		378	0						756	1433			883	233
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1688	1800						1639	1687			1687	1502
Queue Service		- ,		18.4	0.0						18.9	24.0			20.5	10.7
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		18.4	0.0						18.9	24.0			20.5	10.7
Green Ratio ( g	/C)			0.25	0.25						0.25	0.62			0.32	0.32
Capacity ( c ), v	/eh/h			418	446						832	2079			1063	473
Volume-to-Cap		· · ·		0.903	<u> </u>						0.909	0.689			0.831	0.493
Back of Queue	( Q ), ft/	In ( 95 th percentile)	)	355	0						339	299.8			335.4	166
Back of Queue	( Q ), ve	eh/In ( 95 th percenti	ile)	14.0	0.0						13.3	11.8			13.2	6.5
Queue Storage	Ratio (	RQ) (95 th percent	tile)	0.95	0.00						0.34	0.00			0.00	0.41
Uniform Delay	( d 1 ), s	/veh		30.8	0.0						30.6	10.8			26.9	23.5
Incremental De	lay ( <i>d</i> 2	), s/veh		17.7	0.0						13.6	0.9			5.4	0.8
Initial Queue D	elay ( <i>d</i>	з), s/veh		0.0	0.0						0.0	0.0			0.0	0.0
Control Delay (	ontrol Delay ( <i>d</i> ), s/veh				0.0						44.2	11.8			32.3	24.3
Level of Service	evel of Service (LOS)										D	В			С	С
Approach Dela	pproach Delay, s/veh / LOS				5	D	0.0				23.0	)	С	30.6	3	С
Intersection De				27	7.9							С				
			EB													
	lultimodal Results							W				NB			SB	
	destrian LOS Score / LOS				7	В	2.44	1		В	1.35		A	2.1		В
Bicycle LOS So	cycle LOS Score / LOS					А					2.29	)	В	1.4	1	A

		103	7 Oly	nanze	u ini			1631	uns	Sun	innai :	y				
General Informat	tion								Inte	ersect	ion Inf	ormatio	on		4	þa l <u>a</u>
Agency		HDR								ration,		0.25	211		$\downarrow \downarrow \downarrow$	
Analyst		DH		Analys	sie Dat		20, 2018			a Typ		Other		 		۲. ۲.
Jurisdiction		RAPID CITY		Time F		PM	.0, 2010		PH	• •	<u> </u>	0.90			w‡e	}_ ♦
Urban Street		SHERIDAN LAKE F		Analys			CORRA	1 1			Period	1> 7:0	20			← *
Intersection		CORRAL DRIVE	10AD	File Na			PM COI		_1							5
Project Descriptio		SLR CORRIDOR S	עמווד		ame	2045		NNAL		U Les	TIONEIS	101310	5.xu5	_	ेोोॉ चttarv	te d'
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	SER CORRIDOR S	1001													
Demand Informa	tion				EB			V	VB			NB			SB	
Approach Movem	ent			L	Т	R	L		Т	R	L	Т	R	L	Т	R
Demand ( v ), veh	ı/h			155	0						440	1065	;		1450	255
				li.												<u></u>
Signal Information	17					21	2									
	23.0	Reference Phase	2		1 50	·I ↑	. F⇒						<u></u> ┣╹	2	3	4
Offset, s	0	Reference Point	End	Green	20.8	71.5	14.7	0.	0	0.0	0.0		•		-	
	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	0.0			1		
Force Mode F	ixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.	0	0.0	0.0		5	6	7	8
<b>T D K</b>				EDI	_	EDT				DT	ND	_	NDT	0.01		0.D.T.
Timer Results				EBI	-	EBT	WB		VV	BT	NBL		NBT	SB	-	SBT
Assigned Phase					-+	8		$\rightarrow$		_	1	+	6		_	2
Case Number				<u> </u>		10.0		$\rightarrow$		_	2.0		4.0	<u> </u>	_	7.3
Phase Duration, s		<b>`</b>		<u> </u>		20.7	<u> </u>			_	24.8	5 1	02.4	<u> </u>	_	77.5
	nange Period, ( Y+ <i>R c</i> ), s ax Allow Headway ( <i>MAH</i> ), s			<u> </u>		6.0				_	4.0		6.0	<u> </u>	_	6.0
	ax Allow Headway ( <i>MAH</i> ), s ieue Clearance Time ( <i>g</i> s ), s					4.1		$\rightarrow$		_	5.1		4.0			4.0
		, = ,		<u> </u>		14.3		$\rightarrow$		_	19.9		16.4			49.1
Green Extension		(ge), s				0.4	<u> </u>	$\rightarrow$		_	0.9		33.0	<u> </u>		22.4
Phase Call Proba				<u> </u>		1.00				_	1.00		1.00	<u> </u>		1.00
Max Out Probabili	ity					0.01					1.00		0.10			0.44
Movement Group	p Res	ults			EB			W	В			NB			SB	
Approach Movem	ent			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Moveme	ent			3	8						1	6			2	12
Adjusted Flow Ra	ite ( v	), veh/h		172	0						489	1183			1611	200
Adjusted Saturation	on Flo	w Rate ( <i>s</i> ), veh/h/l	n	1688	1800						1639	1687			1687	1502
Queue Service Tir	me ( g	1 s ), S		12.3	0.0						17.9	14.4			47.1	7.9
Cycle Queue Clea	arance	e Time ( <i>g c</i> ), s		12.3	0.0						17.9	14.4			47.1	7.9
Green Ratio ( g/C	;)			0.12	0.12						0.17	0.78			0.58	0.58
Capacity ( c ), veh	n/h			201	215						555	2643			1961	873
Volume-to-Capaci	ity Rat	tio (X)		0.856	0.000						0.880	0.448			0.821	0.229
Back of Queue ( 0	Q ), ft/l	In ( 95 th percentile)	)	244.2	0						329.4	171.1			618.2	117
Back of Queue ( 0	Q ), ve	h/ln ( 95 th percenti	ile)	9.6	0.0						13.0	6.7			24.3	4.6
Queue Storage R	atio (	RQ) (95 th percent	tile)	0.70	0.00						0.33	0.00			0.00	0.29
Uniform Delay(d	1 ), s/	veh		53.2	0.0						49.9	4.5			20.7	12.4
Incremental Delay	y ( d 2	), s/veh		10.1	0.0						13.7	0.1			2.1	0.1
Initial Queue Dela	itial Queue Delay ( $d_3$ ), s/veh				0.0						0.0	0.0			0.0	0.0
Control Delay ( d	ontrol Delay ( <i>d</i> ), s/veh				0.0						63.6	4.6			22.7	12.6
Level of Service (	evel of Service (LOS)										E	Α			С	В
Approach Delay, s	pproach Delay, s/veh / LOS				3	E	0.0				21.8	3	С	21.6	6	С
Intersection Delay	ntersection Delay, s/veh / LOS						3.7							С		
	ultimodal Results							W				NB			SB	
	destrian LOS Score / LOS				3	В	2.43	3	E	3	1.32		A	2.08		В
Bicvcle LOS Scor	cycle LOS Score / LOS					A					1.87		В	1.98	3	В

	nee	r olg	manze	a m	erset		1031	anto	oun	ma	y				
General Information								Inte	ersect	ion Inf	ormatic	n		at _1_ at + .	be l <u>u</u>
Agency	HDR								ration,		0.25			711	
Analyst	DH		Analys	sis Dat	e Dec 2	0 2018			a Typ		Other		- <u>-</u>		۲. ۲.
Jurisdiction	RAPID CITY		Time F		PM			PH	• •		0.90		-	W F E	↓ ◆
Urban Street	SHERIDAN LAKE		Analys			CORRA	1 1			Period	1> 7:0	00			+ ₩
Intersection	CORRAL DRIVE		File Na			PM COI							┥ݿ┻┓┨		r - r
Project Description	SLR CORRIDOR S				2010			_ 1 **	2001		101010.	Auo	-	A↑ 4+ Y <sup>1</sup>	۲ r
1 Tojeot Description	OEI CONTRIDOI CO	TODT													
Demand Information				EB			٧	VB			NB			SB	
Approach Movement			L	T	R	L		Т	R	L	T	R	L	Т	R
Demand ( v ), veh/h			150	0						415	1075			1500	275
				1											
Signal Information		-	-		21	La									
Cycle, s 124.3		2		1 51	t t	$\rightarrow$							2	3	4
Offset, s 0	Reference Point	End	Green		73.8	14.4	0.		0.0	0.0					
Uncoordinated Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	0.		0.0	0.0			1	_	4
Force Mode Fixed	Simult. Gap N/S	On	Red	0.0	2.0	2.0	0.	0	0.0	0.0		5	6	7	8
Timer Results			EBI		EBT	WB		\٨/	вт	NBI		NBT	SBL		SBT
Assigned Phase			EDI	-	8	VVD		vv	ы	1	-	6	361	-	2
Case Number			<u> </u>	-	10.0	<u> </u>	$\rightarrow$		_	2.0		4.0	<u> </u>		7.3
Phase Duration, s			<u> </u>	-	20.4		$\rightarrow$		_	2.0		4.0 03.9	<u> </u>		79.8
			<u> </u>		6.0	<u> </u>	-+			4.0		6.0	<u> </u>		6.0
	aange Period, ( Y+ <i>R c</i> ), s ax Allow Headway ( <i>MAH</i> ), s				4.1		-+		_	4.0 5.1		4.0	<u> </u>		4.0
	ax Allow Headway ( <i>MAH</i> ), s Jeue Clearance Time ( g s ), s				14.0		$\rightarrow$			19.1		4.0 16.5			51.3
Green Extension Time	1 = 7		<u> </u>		0.4		-+		_	1.0		35.5	<u> </u>		22.4
Phase Call Probability	( <i>g</i> e), s		<u> </u>		1.00		$\rightarrow$			1.00		1.00	<u> </u>		1.00
Max Out Probability					0.00		-		_	1.00		0.12	<u> </u>		0.50
Max Out 1 Tobability					0.00					1.00		0.12			0.00
Movement Group Res	sults			EB			W	В			NB			SB	
Approach Movement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Movement			3	8						1	6			2	12
Adjusted Flow Rate (v	′), veh/h		167	0						461	1194			1667	222
Adjusted Saturation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1688	1800						1639	1687			1687	1502
Queue Service Time (	g s ), s		12.0	0.0						17.1	14.5			49.3	8.8
Cycle Queue Clearanc	e Time ( <i>g c</i> ), s		12.0	0.0						17.1	14.5			49.3	8.8
Green Ratio ( g/C )			0.12	0.12						0.16	0.79			0.59	0.59
Capacity ( c ), veh/h			195	208						531	2658			2003	891
Volume-to-Capacity Ra	· · ·		0.853	<u> </u>						0.869	0.449			0.832	0.249
Back of Queue (Q), ft	, , ,		239.9	0						314.1	169.6			642.4	129.2
Back of Queue (Q), v	· ·	,	9.4	0.0						12.4	6.7			25.3	5.1
Queue Storage Ratio (	,,	tile)	0.69	0.00						0.31	0.00			0.00	0.32
Uniform Delay ( <i>d</i> 1 ), s			53.9	0.0						50.8	4.3			20.3	12.0
Incremental Delay ( d 2			10.0 0.0	0.0						12.4	0.1			2.4	0.1
	itial Queue Delay ( d ȝ ), s/veh									0.0	0.0			0.0	0.0
	ontrol Delay ( <i>d</i> ), s/veh									63.2	4.5			22.7	12.2
Level of Service (LOS)	· · ·									E	Α			С	В
Approach Delay, s/veh		64.0	)	Е	0.0				20.8	3	С	21.4		С	
Intersection Delay, s/ve	eh / LOS				2	3.1							С		
				EB										05	
Multimodal Results							W			1.00	NB		-	SB	
	destrian LOS Score / LOS				B A	2.43	5	E	3	1.32		A	2.08		B
BICYCIE LUS Score / LC	cycle LOS Score / LOS									1.85		В	2.05		В

**ALTERNATIVE 1** 

SHERIDAN LAKE ROAD/DUNSMORE ROAD

hdrinc.com

703 Main Street, Suite 200, Rapid City, SD 57701 (605) 791-6100

FC

								,				
General Information						Intersec	tion Inf	ormatio	on	k	at _t_st> ↓ .	þa l <u>a</u>
Agency HDR						Duration	. h	0.25			444	
Analyst DH	Analys	sis Date	Dec 2	0, 2018		Area Typ	e	Other				. 4
Jurisdiction RAPID CITY	Time F		AM P			PHF		0.83			w∔€	↓ ↓
Urban Street SHERIDAN LAKE ROAD		sis Year				Analysis	Period	1> 7:(	00			÷
Intersection DUNSMORE ROAD	File N			DUNSM		045 AM					5+2	<u> </u>
Project Description SLR CORRIDOR STUDY	1		1			0.07.00				- 1	   4 1 <del>4</del> 1 1	7 4
Demand Information		EB			WE	3		NB			SB	
Approach Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), veh/h	10	895	155	55	240	) 85	30	25	125	285	85	10
		1 -				1	-					
Signal Information	-	1 8	<b>=</b> _2 §	1212	424							
Cycle, s 64.8 Reference Phase 2			R		2	12					3	4
Offset, s 0 Reference Point End	Green	4.2	25.0	8.7	7.0	0.0	0.0			<u>-</u> <u>⊼</u>		
Uncoordinated Yes Simult. Gap E/W On	Yellow	3.5	5.0	3.5	3.0	0.0	0.0			V		<b>√</b>
Force Mode Fixed Simult. Gap N/S On	Red	0.5	2.0	0.5	2.0	0.0	0.0		5	6	7	8
			EDT			MDT			NIDT	0.51		ODT
Timer Results	EBI	-	EBT	WB		WBT	NBI		NBT	SBL	-	SBT
Assigned Phase			2	1	_	6			8	7		4
Case Number	<u> </u>	_	5.3	1.0		3.0			5.3	2.0		4.0
Phase Duration, s	<u> </u>		32.0	8.2		40.2			12.0	12.7		24.6
Change Period, (Y+R c), s	<u> </u>		7.0	4.0		7.0			5.0	4.0		5.0
Max Allow Headway ( <i>MAH</i> ), s	<u> </u>		3.9	3.0 3.4		3.9			4.3	3.3		4.3 5.2
Queue Clearance Time $(g_s)$ , s	<u> </u>	_	20.5 2.8	0.0		5.0 7.7	<u> </u>		7.0 0.0	8.6 0.0		0.9
Green Extension Time (g e), s			2.8	0.0		1.00				1.00		1.00
Phase Call Probability Max Out Probability			0.93	1.00		0.06			1.00 1.00	1.00		0.00
			0.93	1.00	,	0.00			1.00	1.00	,	0.00
Movement Group Results		EB			WB			NB			SB	
Approach Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	12	1078	139	66	289	78	36	30	120	343	114	
Adjusted Saturation Flow Rate ( s ), veh/h/ln	1107	1700	1514	1661	1660	1478	1298	1800	1525	1626	1725	
Queue Service Time ( $g_s$ ), s	0.4	18.5	4.0	1.4	3.0	1.3	1.7	1.0	5.0	6.6	3.2	
Cycle Queue Clearance Time ( $g c$ ), s	0.4	18.5	4.0	1.4	3.0	1.3	1.7	1.0	5.0	6.6	3.2	
Green Ratio ( g/C )	0.39	0.39	0.39	0.48	0.51	0.65	0.11	0.11	0.11	0.13	0.30	
Capacity ( <i>c</i> ), veh/h	538	1312	584	270	1700	954	251	194	164	434	522	
Volume-to-Capacity Ratio ( X )	0.022	0.822	0.237	0.245	0.170		0.144	0.156	0.734	0.791	0.219	
Back of Queue (Q), ft/In (95 th percentile)	4.5	280	57.3	18.4	39.1	12	22.5	18.7	107.9	136.9	57.2	
Back of Queue (Q), veh/In (95 th percentile)	0.2	11.1	2.3	0.7	1.5	0.5	0.9	0.7	4.3	5.3	2.2	
Queue Storage Ratio ( RQ ) ( 95 th percentile)	0.00	0.00	0.29	0.12	0.00	0.12	0.00	0.00	0.00	0.37	0.00	
Uniform Delay ( d 1 ), s/veh	12.4	17.9	13.5	12.8	8.5	4.3	26.5	26.2	28.0	27.2	16.9	
Incremental Delay ( <i>d</i> ₂ ), s/veh	0.1	5.9	1.0	0.2	0.2	0.2	0.3	0.4	15.5	8.1	0.2	
Initial Queue Delay ( <i>d</i> ₃ ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay ( <i>d</i> ), s/veh	12.4	23.8	14.4	13.0	8.7	4.5	26.8	26.6	43.6	35.3	17.1	
Level of Service (LOS)	В	С	В	В	A	A	С	С	D	D	В	
Approach Delay, s/veh / LOS	22.6	6	С	8.6		А	37.6	6	D	30.7	7	С
Intersection Delay, s/veh / LOS		_	22	2.8						С	_	
Multimodal Results		EB	_		WB	_		NB	_		SB	_
Pedestrian LOS Score / LOS	2.12		B	2.07		B	2.47		B	2.48		B
Bicycle LOS Score / LOS	1.50	)	В	0.85		A	0.80	)	A	1.24		A

		J								,				
General Information							1	ntersec	tion Inf	ormatic	on	k	444,	þa l <u>a</u>
Agency HDR								Duration	, h	0.25			466	
Analyst DH			Analys	sis Date	Dec 2	0, 2018		Area Typ	e	Other				₹
	O CITY		Time F		AM PI			PHF		0.83		*	W TE	
	IDAN LAKE F	ROAD	<u></u>	sis Year				Analysis	Period	1> 7:0	00			÷ ₹
	MORE ROAD		File Na			DUNSM	1	045 AM					5+2	<u> </u>
	ORRIDOR S				1			• • • • • • • • • •			••••	- 1	· · · · · · · · · · · · · · · · · · ·	<u>*</u>
Demand Information				EB			WE			NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( <i>v</i> ), veh/h			10	925	155	60	210	85	30	25	165	285	85	10
			li.					-						
Signal Information			-	1 8	<b>=</b> .a §	귀재의	420							
	ence Phase	2			R		5	12			1		3	4
	ence Point	End	Green	4.4	25.0	8.7	7.0	0.0	0.0			<u>-</u> <u>⊼</u>		
	t. Gap E/W	On	Yellow	3.5	5.0	3.5	3.0	0.0	0.0			Y		$\nabla$
Force Mode Fixed Simul	t. Gap N/S	On	Red	0.5	2.0	0.5	2.0	0.0	0.0		5	6	7	8
					EDT	14/5		MOT			NIDT	0.51		ODT
Timer Results			EBI	-	EBT	WB		WBT	NBI		NBT	SBL	-	SBT
Assigned Phase			<u> </u>	_	2	1		6	<u> </u>		8	7	_	4
Case Number					5.3	1.0		3.0			5.3	2.0		4.0
Phase Duration, s				_	32.0	8.4		40.4			12.0	12.7		24.7
Change Period, $(Y+R_c)$ , s	ange Period, ( <i>Y+R c</i> ), s ix Allow Headway ( <i>MAH</i> ), s				7.0	4.0		7.0			5.0	4.0		5.0
· · · · · · · · · · · · · · · ·	· · · ·				3.9	3.0		3.9			4.3	3.3	_	4.3
, = ,	eue Clearance Time ( $g$ s), s				21.5	3.5		4.6			9.0	8.7		5.2
Green Extension Time ( $g_e$ ),	S		<u> </u>	_	2.2	0.0		7.8	<u> </u>		0.0	0.0		1.1
Phase Call Probability					1.00	0.73		1.00			1.00	1.00		1.00
Max Out Probability					1.00	1.00	)	0.05			1.00	1.00	)	0.01
Movement Group Results				EB			WB			NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/	h		12	1114	139	72	253	78	36	30	169	343	114	
Adjusted Saturation Flow Rate	e ( <i>s</i> ), veh/h/l	n	1144	1700	1514	1661	1660	1478	1298	1800	1525	1626	1725	
Queue Service Time ( $g$ s), s			0.4	19.5	4.0	1.5	2.6	1.3	1.7	1.0	7.0	6.7	3.2	
Cycle Queue Clearance Time	(gc),s		0.4	19.5	4.0	1.5	2.6	1.3	1.7	1.0	7.0	6.7	3.2	
Green Ratio ( g/C )			0.38	0.38	0.38	0.48	0.51	0.65	0.11	0.11	0.11	0.13	0.30	
Capacity ( <i>c</i> ), veh/h			550	1307	582	264	1703	955	250	194	164	434	522	
Volume-to-Capacity Ratio (X	,		0.022	0.853	0.238	0.274	0.149	0.082	0.144	0.156	1.028	0.792	0.219	
Back of Queue ( Q ), ft/ln ( 95	th percentile)		4.5	298.6	57.7	20.2	33.7	12	22.6	18.8	159.4	137.7	57.5	
Back of Queue ( Q ), veh/ln (	95 th percenti	le)	0.2	11.8	2.3	0.8	1.3	0.5	0.9	0.8	6.4	5.4	2.2	
Queue Storage Ratio ( RQ ) (	95 th percent	ile)	0.00	0.00	0.29	0.13	0.00	0.12	0.00	0.00	0.00	0.37	0.00	
Uniform Delay ( <i>d</i> 1), s/veh			12.5	18.3	13.6	13.3	8.3	4.3	26.6	26.3	29.0	27.3	16.9	
Incremental Delay ( d 2 ), s/ve			0.1	7.2	1.0	0.2	0.2	0.2	0.3	0.4	77.7	8.2	0.2	
Initial Queue Delay ( d 3 ), s/v	itial Queue Delay ( d z ), s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay ( d ), s/veh	ontrol Delay ( <i>d</i> ), s/veh					13.5	8.5	4.5	26.9	26.7	106.7	35.5	17.2	
Level of Service (LOS)	· · ·					В	Α	A	С	С	F	D	В	
Approach Delay, s/veh / LOS	pproach Delay, s/veh / LOS				С	8.6		А	84.2	2	F	30.9	)	С
Intersection Delay, s/veh / LO				28	3.8						С			
Multimodal Results							WB			NB			SB	
Pedestrian LOS Score / LOS			2.12		В	2.07		В	2.47		В	2.48		В
Bicycle LOS Score / LOS			1.53	3	В	0.82	2	A	0.88	3	A	1.24	-	A

		J								,				
General Information							1	ntersec	tion Inf	ormatio	on	2	***	₽ L
Agency	HDR							Duration	, h	0.25			4 4 4	
Analyst	RL		Analys	sis Date	e Sep 2	7. 2017		Area Typ		Other		4_4		
Jurisdiction	RAPID CITY		Time F		PM PI			PHF		0.83		<b>→</b>	W E	
Urban Street	SHERIDAN LAKE	ROAD		sis Year				Analysis	Period	1> 7:0	00			÷ ۲
Intersection	DUNSMORE ROAI		File Na			DUNSM		045 PM				- <mark></mark>	5 4 2	
Project Description	SLR CORRIDOR S							040110		Tiolicio	1010	- 5	1     1 1 4 4 1 1 1	<del>ار</del> بر
		TODI												
Demand Information				EB			WB			NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( <i>v</i> ), veh/h			5	355	30	90	905	255	75	30	75	90	10	10
			1	1										
Signal Information		r	-	1	∃ a È	1215	~					_		$\mathbf{A}$
Cycle, s 63.2	Reference Phase	2		2	TR "	°l_s≞	2					€₂	3	<b>K J X</b>
Offset, s 0	Reference Point	End	Green	5.1	24.0	6.3	6.7	0.0	0.0			<u> </u>		
Uncoordinated Yes	Simult. Gap E/W	On	Yellow		5.0	3.0	3.0	0.0	0.0					~ <b>*1</b> >
Force Mode Fixed	Simult. Gap N/S	On	Red	0.5	2.0	2.0	2.0	0.0	0.0		5	6	7	8
			1						1		_	7		
Timer Results			EBI	-	EBT	WB		WBT	NBI	_	NBT	SBL		SBT
Assigned Phase					2	1		6			8		$\rightarrow$	4
Case Number					5.3	1.0		3.0			9.0			10.0
Phase Duration, s					31.0	9.1		40.1			11.7			11.3
Change Period, ( Y+R					7.0	4.0		7.0			5.0			5.0
	x Allow Headway ( <i>MAH</i> ), s				3.9	3.0		3.9			4.2			4.3
	eue Clearance Time ( $g$ s), s				8.1	4.2		16.7			5.1			4.0
Green Extension Time	(g e ), s				7.3	0.0		7.4			0.1			0.1
Phase Call Probability					1.00	0.85	5	1.00			0.96			0.90
Max Out Probability					0.32	1.00	)	0.31			1.00			1.00
Movement Group Res	sults			EB			WB			NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( v	′), veh/h		6	428	0	108	1090	283	90	36	60	108	24	
Adjusted Saturation Flo	ow Rate ( s ), veh/h/l	In	525	1700	1514	1661	1660	1478	1714	1800	1525	1626	1613	
Queue Service Time (			0.5	5.6	0.0	2.2	14.7	5.6	3.1	1.2	2.3	2.0	0.9	1
Cycle Queue Clearanc	e Time ( <i>g</i> <sub>c</sub> ), s		6.1	5.6	0.0	2.2	14.7	5.6	3.1	1.2	2.3	2.0	0.9	
Green Ratio ( g/C )			0.38	0.38	0.38	0.49	0.52	0.62	0.11	0.11	0.11	0.10	0.10	1
Capacity ( <i>c</i> ), veh/h			267	1292	575	523	1740	922	183	192	163	325	161	
Volume-to-Capacity Ra	atio (X)		0.023	0.331	0.000	0.207	0.627	0.307	0.494	0.188	0.370	0.334	0.149	
Back of Queue (Q), ft	. ,	)	2.9	84	0	27.9	190.9		58.7	22	38.2	35.2	15.7	
Back of Queue (Q), v	, , ,		0.1	3.3	0.0	1.1	7.4	2.1	2.3	0.9	1.5	1.4	0.6	<u> </u>
Queue Storage Ratio (		,	0.00	0.00	0.00	0.28	0.00	0.18	0.00	0.00	0.00	0.10	0.00	
Uniform Delay ( <i>d</i> 1), s			16.0	13.9	0.0	9.2	10.6	5.5	26.6	25.7	26.2	26.5	26.0	<u> </u>
Incremental Delay ( d 2			0.2	0.7	0.0	0.1	1.7	0.9	2.1	0.5	1.4	0.6	0.4	
Initial Queue Delay ( d	·		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<u> </u>
	ontrol Delay ( <i>d</i> ), s/veh					9.3	12.4	6.4	28.7	26.2	27.6	27.1	26.4	<u> </u>
Level of Service (LOS)	• • •					A	B	A	C	C	C	C	C	1
· · · · ·	pproach Delay, s/veh / LOS					11.0		В	27.9		C	26.9		С
			14.6		B 14	1.0						<u>В</u>		
Intersection Delay s/ve			I			🗸						_		
Intersection Delay, s/ve														
Intersection Delay, s/ve Multimodal Results				EB			WB			NB			SB	
	/LOS		2.12	1	В	2.07	1	B	2.48	1	В	2.48		В

General Information							ntersec	tion Inf	ormatio	on	2	4 Ja¢a ↓ . 	la la
Agency HDR						1	Duration,	, h	0.25			4 4 4	
Analyst RL		Analys	sis Date	e Sep 2	7, 2017		Area Typ	e	Other		4		
Jurisdiction RAPID CITY		Time F	Period	PM PI	EAK		PHF		0.83			W	÷
Urban Street SHERIDAN LA	KE ROAD	Analys	sis Year	· 2045			Analysis	Period	1> 7:(	00	14 14		
Intersection DUNSMORE R	OAD	File Na	ame	SLR-D	DUNSM	1	045 PM		lollers 1	0151		5 t d	×
Project Description SLR CORRIDO	R STUDY	я									1	। च ↑ ф \^ । च ↑ ф \^	۳ <u>)</u> ۲
Demand Information			EB		_	WE	,		NB			SB	
Approach Movement		L		R	1 .		R			R	L	 	R
		5	385	30	115			75	30	85	90	10	10
Demand ( v ), veh/h		Э	300	- 30	115	870	255	75	30	65	90	10	10
Signal Information			7	6		5							1
Cycle, s 63.6 Reference Pha	se 2	1	E E	<u>=</u> 2 €							<u> </u>	I	$\Phi$
Offset, s 0 Reference Poir				Ň	1	4				1	2	3	4
Uncoordinated Yes Simult. Gap E/		Green Yellow		24.0 5.0	6.3 3.0	6.8 3.0	0.0	0.0			$\rightarrow$	L	<b>*</b> **
Force Mode Fixed Simult. Gap N/		Red	0.5	2.0	2.0	2.0	0.0	0.0		5	6	7	Y
			10.0			0	0.0	0.0					
Timer Results		EBI	_	EBT	WB	L	WBT	NBI		NBT	SBL		SBT
Assigned Phase				2	1		6			8			4
Case Number				5.3	1.0		3.0			9.0			10.0
Phase Duration, s				31.0	9.5		40.5			11.8		_	11.3
Change Period, ( Y+R c ), s				7.0	4.0		7.0			5.0			5.0
Max Allow Headway ( MAH ), s				3.9	3.0		3.9			4.2			4.3
Queue Clearance Time ( g s ), s				8.3	4.9		15.9			5.2			4.0
Green Extension Time ( g e ), s				7.2	0.0		7.5			0.1			0.1
Phase Call Probability				1.00	0.91	1	1.00			0.97			0.90
Max Out Probability				0.32	1.00	)	0.28			1.00			1.00
Movement Group Results			EB			WB			NB			SB	
Approach Movement		L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement		5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h		6	464	0	139	1048	283	90	36	72	108	24	
Adjusted Saturation Flow Rate ( s ), vel	n/h/ln	547	1700	1514	1661	1660	1478	1714	1800	1525	1626	1613	
Queue Service Time (gs), s		0.5	6.3	0.0	2.9	13.9	5.6	3.2	1.2	2.8	2.0	0.9	
Cycle Queue Clearance Time (g c), s		4.9	6.3	0.0	2.9	13.9	5.6	3.2	1.2	2.8	2.0	0.9	
Green Ratio(g/C)		0.38	0.38	0.38	0.49	0.53	0.63	0.11	0.11	0.11	0.10	0.10	
Capacity ( c ), veh/h		282	1283	571	511	1748	925	183	192	163	323	160	
Volume-to-Capacity Ratio (X)		0.021	0.361	0.000	0.271	0.600	0.306	0.494	0.188	0.444	0.335	0.150	
Back of Queue ( Q ), ft/In ( 95 th percer		2.8	94.4	0	36.6	180.9	55.9	59.1	22.2	47	35.5	15.8	
Back of Queue ( Q ), veh/ln ( 95 th perc		0.1	3.7	0.0	1.4	7.0	2.2	2.4	0.9	1.9	1.4	0.6	
Queue Storage Ratio ( RQ ) ( 95 th per	centile)	0.00	0.00	0.00	0.37	0.00	0.19	0.00	0.00	0.00	0.10	0.00	
Uniform Delay ( <i>d</i> 1 ), s/veh		15.4	14.3	0.0	9.5	10.4	5.5	26.8	25.9	26.6	26.7	26.2	
Incremental Delay ( d 2 ), s/veh		0.1	0.8	0.0	0.1	1.5	0.9	2.1	0.5	1.9	0.6	0.4	
Initial Queue Delay ( <i>d</i> ₃ ), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay ( <i>d</i> ), s/veh		15.5	15.1	0.0	9.6	12.0	6.4	28.8	26.4	28.5	27.3	26.6	
Level of Service (LOS)		В	В		Α	В	A	С	С	С	С	С	
Approach Delay, s/veh / LOS		15.1	1	В	10.7	7	В	28.3	3	С	27.2	2	С
Intersection Delay, s/veh / LOS				14	1.1						В		
Multimodal Results			EB	_		WB	-		NB	_		SB	-
Pedestrian LOS Score / LOS		2.12		B	2.07		В	2.48		B	2.48	_	B
Bicycle LOS Score / LOS		0.88	5	A	1.70	)	В	0.82	2	A	0.71		A

# SHERIDAN LAKE ROAD/CATRON BOULEVARD ALTERNATIVE 7B

At-Grade Intersection (without Future Roadways) – Reduced Lanes

			i sig	nalize		ersec	uon F	kesu	115 30	mmar	У				
Concretinform								_	Interes	ation luf				┙┩┹┱┿╸↓	IN LL
General Inform	nation									ction Inf	W	on	- 1	466	
Agency		HDR		A	:- D-4	- D 1	7 0040		Duration		0.25	-	7		R. A
Analyst		DH				e Dec 1	7, 2018		Area Ty	pe	Other				
Jurisdiction				Time F		AM			PHF	<b>D</b> : 1	0.90			8	
Urban Street		SHERIDAN LAKE				r 2045		1		8 Period	1> 7:0	00			The second se
Intersection		CATRON BOULEV		File Na	ame	2045	AM OP	IION 7	B.xus					<u>1</u> ††	
Project Descrip	tion	SLR CORRIDOR S	TUDY											N 1 4 Y	1 1
Demand Inform	nation				EB			W	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand ( v ), v	eh/h			40	55	5	105	20	,	5	905		1025	280	45
Signal Informa					215	21			4						
Cycle, s	102.2	Reference Phase	2				2 P	TR.				<b>  K_</b> _	₽ 2	2	4
Offset, s	0	Reference Point	End	Green	37.5	32.6	5.0	6.0	0.0	0.0			2	5	
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		5.0	3.5	3.5	0.0				<b>v</b>		2
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.5	2.0	1.5	1.5	0.0	0.0		5	6	7	<b>Y</b> 8
							1								
Timer Results				EBI	-	EBT	WB	L	WBT	NB	L	NBT	SBI		SBT
Assigned Phase	e					8	7		4			6	5		2
Case Number						6.3	2.0		4.0		_	6.3	2.0		4.0
Phase Duration	•					11.0	10.0		21.0	<u> </u>		39.6	41.5		81.1
-	nange Period, ( Y+R c ), s ax Allow Headway ( <i>MAH</i> ), s					5.0	5.0		5.0			7.0	4.0		7.0
	ax Allow Headway ( <i>MAH</i> ), s Jeue Clearance Time ( g s ), s					5.0	5.1		5.0	<u> </u>		5.0	5.1		5.0
		, = ,		<u> </u>		5.8	5.6		3.1	-		31.5	36.4		8.7
Green Extensio		(ge),s				0.3	0.0		0.6		_	1.1	1.1		12.2
Phase Call Pro				<u> </u>		0.98	0.96		1.00			1.00	1.00		1.00
Max Out Proba	DIIITY					0.06	1.00	)	0.00			1.00	1.00	)	0.01
Movement Gro	oup Res	ults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			3	8	18	7	4		1	6		5	2	12
Adjusted Flow I	Rate( <i>v</i>	), veh/h		44	67		117	22		6	1006		1139	339	
Adjusted Satura	ation Flo	ow Rate ( <i>s</i> ), veh/h/l	n	1389	1746		1639	1772	2	1042	1687		1639	1746	
Queue Service	Time ( g	g s ), S		3.2	3.8		3.6	1.1		0.4	29.5		34.4	6.7	
Cycle Queue C	learance	e Time ( <i>g c</i> ), s		3.2	3.8		3.6	1.1		0.4	29.5		34.4	6.7	
Green Ratio ( g	/C)			0.06	0.06		0.05	0.16		0.32	0.32		1.10	0.73	
Capacity ( c ), v	/eh/h			152	103		160	278		403	1077		1204	1267	
Volume-to-Cap		. ,		0.292	0.647	'	0.727	0.080		0.014			0.946	0.267	
	. ,	(In ( 95 th percentile)		51.9	86.3		82.1	21.8		4.2	498.2		549.8	88.1	
	, ,	eh/In ( 95 th percenti	,	2.0	3.4		3.2	0.9		0.2	19.6		21.6	3.5	
		RQ) (95 th percent	tile)	0.52	0.00		0.21	0.00		0.02	0.00		0.92	0.00	
Uniform Delay	. ,			46.7	47.0		47.9	36.8		23.8	33.7		31.3	4.8	
Incremental De	2 1	•		1.5 0.0	9.3 0.0		16.4	0.2		0.0	14.2		14.8	0.2	
	nitial Queue Delay ( d ȝ ), s/veh						0.0	0.0		0.0	0.0		0.0	0.0	<u> </u>
	ontrol Delay ( d ), s/veh					<u> </u>	64.4	37.0		23.8	47.9		46.2	4.9	
	evel of Service (LOS) pproach Delay, s/veh / LOS						E	D	<u> </u>	С	D		D	A	
	-			53.1		D	60.0	ו	E	47.8	8	D	36.7		D
Intersection De	lay, s/ve	eh / LOS				42	2.7						D		
Multimodel De	culto				EB						ND			<b>CD</b>	
	lultimodal Results					С	2.33	WB	В	2.7	NB	С	1.85	SB	В
	edestrian LOS Score / LOS				7	A	0.16		A	1.10		A	2.93		C
	icycle LOS Score / LOS					A	0.10		Λ	1.10		Α	2.30	,	0

Copyright © 2018 University of Florida, All Rights Reserved.

HCS™ Streets Version 7.5

		HUS	7 SIG	nalize	ea in	tersec		kesui	ts 5u	mmar	у				
	4!									4:			1 1	I at Later t ,	b. L.
General Information									Intersection Information				- 1	ļļļ	
Agency HDR							Duration							R.	
Analyst DH			Analysis Date Dec			7, 2018		Area Ty	be		Other			← <sup>▲</sup> / <sub>▶</sub>	
Jurisdiction RAPID CITY			Time F		PM			PHF		0.90			W + E B		
Urban Street SHERIDAN LAKE ROAD						2045 OPTION 7			Analysis Period		1> 7:00			4	
Intersection		CATRON BOULEV		File Na	File Name 2045 PM OPTION 7B.xus								<u>111</u>		
Project Description SLR CORRIDOR STUDY												n in	4 1 <del>4</del> 1 1		
Demand Information					EB			WE	/B		NB			SB	
Approach Movement						R	L	T	R	L	T	R	L T		R
Demand ( v ), veh/h				10	5	5	470	_		5	335	_	865	785	55
	011/11			10	U	Ű	110	00		Ű	000		000	100	
Signal Informa	tion				21	21			_						
Cycle, s	80.2	Reference Phase	2	1		54	, È					4			
Offset, s	0	Reference Point	End	Green	25.0		12.0	4.1	0.0	0.0	0.0		2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		5.0	3.5	3.5	0.0	0.0			<b>st</b>		~
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.5	2.0	1.5	1.5	0.0	0.0		5	6	7	
Timer Results				EBI		EBT	WB	L	WBT	NB	L	NBT	SBI	-	SBT
Assigned Phase	e					8	7		4			6	5		2
Case Number						6.3	2.0		4.0			6.3	2.0		4.0
Phase Duration	, S					9.1	17.0	)	26.1			25.1	29.0		54.1
Change Period	, ( Y+R )	c ), S				5.0	5.0		5.0			7.0	4.0	4.0	
Max Allow Head		,				5.0	5.1		5.0					5.1 5.0	
Queue Clearan	ce Time	e ( g s ), s				2.6	14.0	)	3.9		9.7		24.9		37.6
Green Extensio	n Time	(g <sub>e</sub> ), s				0.2	0.0		0.3		8.4		0.1		8.7
Phase Call Probability						0.82	1.00	0 1.00				1.00	1.00	)	1.00
Max Out Probability						0.00	1.00	)	0.00			0.41	1.00	)	0.37
Movement Gro	oup Res	aults		EB			WB			NB	NB		SB		
Approach Move	-			L	Т	R	L	T	R	L	T	R	L	T	R
Assigned Move				3	8	18	7	4		1	6		5	2	12
		) veh/h		11	11	10	522	56	-	6	372		961	911	
Adjusted Flow Rate ( v ), veh/h Adjusted Saturation Flow Rate ( s ), veh/h/ln			1348	1626	3	1639	1772		612	1687		1639	1758		
Queue Service Time ( $g_s$ ), s			0.6	0.5	,	12.0	1.9		0.6	7.7		22.9	35.6		
Cycle Queue Clearance Time ( $g_c$ ), s			0.6	0.5		12.0	1.9		7.2	7.7		22.9	35.6		
Green Ratio ( $g/C$ )			0.05	0.05		0.15	0.26	1	0.23	0.23		0.31	0.59		
Capacity ( <i>c</i> ), veh/h			159	83		490	467		178	762		1021	1032		
Volume-to-Capacity Ratio ( X )			0.070		3	1.065	0.119		0.031	0.489		0.942	0.883		
Back of Queue ( <i>Q</i> ), ft/ln (95 th percentile)			9.6	10.2		347.4	35.2		4.3	136.4		400.5	487.6		
Back of Queue (Q), veh/ln (95 th percentile)			0.4	0.4	-	13.7	1.4	1	0.2	5.4		15.8	19.2		
Queue Storage Ratio ( $RQ$ ) (95 th percentile)			0.10	0.00		0.87	0.00		0.02	0.00		0.67	0.00		
Uniform Delay ( $d_1$ ), s/veh			36.4	36.3	_	34.1	22.5		29.7	27.0		26.9	14.2		
Incremental De	· ,			0.3	1.0		59.0	0.2		0.1	0.7		16.2	7.4	
Initial Queue De		•		0.0	0.0		0.0	0.2		0.0	0.0		0.0	0.0	
Control Delay (		,		36.6	37.4		93.1	22.6		29.8	27.7		43.1	21.6	
Level of Service				D	D		F	C		C	C		D	C	
Approach Delay				37.0	L	D	86.4		F		27.7 (		32.6		С
Intersection Delay, s/veh / LOS				42.9				•					D		
Intersection Delay, s/ven / LOS         42.9         D															
Multimodal Results					EB		WB			NB			SB		
Pedestrian LOS Score / LOS				2.41		В	2.3		В	2.80	1	С	1.87	11	В
Bicycle LOS Sc				0.52		А	0.77		А	0.73		A	3.58	_	D
						1100.7%							1 40/04		

Copyright © 2018 University of Florida, All Rights Reserved.

HCS™ Streets Version 7.5

# FJS

# Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix H

Access Review

# -)2

# **Technical Memo**

Date:	Wednesday, January 23, 2019
Project:	Sheridan Lake Road Corridor Study
To:	Study Advisory Team
From:	Dustin Hamilton
Subject:	Access – Build Conditions

The City of Rapid City, in cooperation with the Rapid City Metropolitan Planning Organization (MPO), retained HDR to study a portion of the Sheridan Lake Road corridor in southern Rapid City. The study area includes Sheridan Lake Road from Corral Drive to Albertta Drive, Corral Drive from Sheridan Lake Road to Park Drive, and Catron Boulevard from Sheridan Lake Road to Nugget Gulch Road. Sheridan Lake Road and Catron Boulevard are functionally classified as arterial streets and Corral Drive is functionally classified as a collector street in accordance with the Rapid City Major Street Plan.

This memo provides recommendations for each existing access point with regard to current access management standards and the future build conditions scenario.

#### Access Inventory

An inventory of all the access points throughout the corridor is summarized in the access inventory table and access location maps attached to this memo. Recommendations for each access point are included in the inventory table and can become an implementable access plan for the corridor.

### Access Standards and Evaluation

Design of roadways and other facilities in Rapid City are governed by the Design Criteria Manual (see Appendix). The Manual has a number of standards for access spacing, including:

- Minimum distance between intersections 150' (arterial unsignalized) and 90' (collector unsignalized)
- Minimum signalized approach spacing 1200'
- Minimum corner clearance (arterial) 250' from signalized intersection, 150' from unsignalized intersection
- Minimum corner clearance (collector) 175' from unsignalized intersection, 90' from unsignalized intersection

The Manual also addresses the number of driveways allowable from residential, commercial and industrial uses. Additionally, the Access Management Manual – Second Edition prepared by the Transportation Research Board (TRB) was reviewed for accesses near major street intersections.

# FSS

The existing access points throughout the corridor have either been permitted or grandfathered because they pre-date the Manual. As property develops or re-develops, each property access should be reviewed for compliance with the Manual and Urban Arterial Access Management Guidelines.

This study considered alternatives for development of collector and arterial streets intersecting the corridor. Any recommended intersecting collector and arterial streets will drive access recommendations on Sheridan Lake Road to preserve the safety and efficiency of the collector and arterial street roadways in the study area.

#### ACCESS INVENTORY AND RECOMMENDATIONS

ACCESS	LOCATION					
NUMBER	(MILE)	SIDE	ACCESS IDENTIFICATION	RECOMMENDATION		
SHERIDAN LAKE ROAD ACCESS						
1	0.00	+	ALBERTTA DRIVE	Maintain Local Street Intersection		
2	0.05		TANAGER DRIVE	Maintain Local Street Intersection		
3 4	0.11 0.16		RESIDENTIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops Field Observed Poor Grades/Sight Distance/Spacing - Revise with Opportunity		
4 5	0.18		FIELD ENTRANCE	Spacing Criteria Not Met - Coordinate with Access #4 with Re-development		
6	0.18		OKPEALUK STREET	Maintain Local Street Intersection		
7	0.37		TANAGER DRIVE	Maintain Local Street Intersection		
8	0.37	+	COYLE AVENUE	Maintain Local Street Intersection		
9	0.42		COMMERCIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops		
10	0.52	LEFT	MUIRFIELD DRIVE	Maintain Local Street Intersection		
11	0.57	LEFT	RESIDENTIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops - Align with #12		
12	0.59	<b></b>	FIELD ENTRANCE	Coordinate with Future Development - Align with #11		
13	0.64		COMMERCIAL DRIVEWAY	Driveway Does Not Meet 250' Corner Clearance - Revise with Opportunity		
14	0.64		FIELD ENTRANCE	Driveway Does Not Meet 250' Corner Clearance - Revise with Opportunity		
15	0.69	·	DUNSMORE ROAD	Maintain Signalized Intersection		
16	1.13		FIELD ENTRANCE	Coordinate with Future Development.		
17 18	1.13		FIELD ENTRANCE	Coordinate with Future Development.		
18 19	1.33 1.53		FIELD ENTRANCE	Coordinate with Future Development. Address Sight Distance and Coordinate with Future Development		
20	1.53		RESIDENTIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops		
20	1.05	*	RESIDENTIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops		
22	1.91		FIELD ENTRANCE	Coordinate with Future Development		
23	2.16		FIELD ENTRANCE	Coordinate with Future Development		
24	2.32	LEFT	WILDWOOD DRIVE	Maintain Local Street Intersection		
25	2.42		RESIDENTIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops		
26	2.50	LEFT	ESVAL DRIVE	Maintain Local Street Intersection		
27	2.50	RIGHT	COMMERCIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops		
28	2.54		COMMERCIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops - Align with #29		
29	2.56		RESIDENTIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops - Align with #28		
30	2.60		FINCH PLACE	Street at Edge of Intersection Functional Distance* - Revise with Opportunity		
31	2.60		COMMERCIAL DRIVEWAY	Driveway within Intersection Functional Distance* - Revise with Opportunity		
32	2.65		RESIDENTIAL DRIVEWAY	Driveway within Intersection Functional Distance* - Revise with Opportunity		
33 34	2.66			Driveway within Intersection Functional Distance* - Revise with Opportunity		
35 35	2.70 2.70		WILDWOOD DRIVE	Maintain Signalized Intersection Maintain Signalized Intersection		
36	2.70		CHURCH	Driveway within Intersection Functional Distance* - Revise with Opportunity		
37	2.77		COMMERCIAL DRIVEWAY	Driveway within Intersection Functional Distance* - Revise with Opportunity		
38	2.89	+	SUNSHINE TRAIL	Maintain Local Street Intersection		
39	2.93		CHATEAUX RIDGE	Maintain Local Street Intersection		
40	2.93	RIGHT	SUMMERSET DRIVE	Maintain Local Street Intersection		
41	3.01		RESIDENTIAL DRIVEWAY	Driveway Does Not Meet Spacing Criteria - Shared Driveway with Opportunity		
42	3.03	LEFT	RESIDENTIAL DRIVEWAY	Driveway Does Not Meet Spacing Criteria - Shared Driveway with Opportunity		
43	3.04	*	RESIDENTIAL DRIVEWAY	Driveway Does Not Meet Spacing Criteria - Shared Driveway with Opportunity		
44	3.08		RESIDENTIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops		
45	3.14		SUMMERSET DRIVE	Maintain Local Street Intersection		
46	3.23		VISTA HILLS DRIVE	Maintain Local Street Intersection		
47	3.28			Maintain Signalized Intersection		
53 54	3.30		RESIDENTIAL DRIVEWAY	Driveway within Intersection Functional Distance* - Revise with Opportunity		
54 55	3.36 3.40		RESIDENTIAL DRIVEWAY	Maintain Existing Shared Driveway Until Property Redevelops Driveway Meets Standard - Revise with Opportunity due to Arterial Street		
	5.40			CORRAL DRIVE ACCESS		
48	0.09	RIGHT	SEVERSON STREET	Maintain Local Street Intersection		
49	0.21		RESIDENTIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops		
50	0.21		EASY STREET	Maintain Local Street Intersection		
51	0.22		RESIDENTIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops		
52	0.26		PARK DRIVE	Maintain Local Street Intersection		
				CATRON BOULEVARD ACCESS		
56	0.06		COMMERCIAL DRIVEWAY	Driveway within Intersection Functional Distance* - Revise with Opportunity		
57	0.14		BENDT DRIVE	Maintain Local Street Intersection		
58	0.14		BENDT DRIVE	Maintain Local Street Intersection		
59	0.23		COMMERCIAL DRIVEWAY	Maintain Existing Driveway Until Property Redevelops		
60	0.30		NUGGET GULCH ROAD	Maintain Local Street Intersection		
61	0.30	LEFT	NUGGET GULCH ROAD	Maintain Local Street Intersection		

Street Intersection Meets Current Standards

Access Meets Current Standards Revise with Opportunity

\* Recommendation Based Upon Access Management Manual (TRB) Guidelines for Intersection Functional Distance, not Rapid City Design Critera.











SHERIDAN LAKE ROAD TRAFFIC STUDY





APPENDIX RAPID CITY DESIGN CRITERIA ACCESS APPROACHES SECTION 2.16 AND FIGURE 2-9

#### 2.15.7 Sidewalk Grades:

Longitudinal sidewalk grades shall, where possible, match the profile grade of the adjacent street. Sidewalks for steep streets shall, where possible, be designed to comply with ADA requirements. If ADA requirements cannot be met, an exception to these criteria may be granted allowing the deletion of sidewalks. Steps in the sidewalk will not be permitted. Transverse grades shall slope toward the street and not exceed two percent (2%).

#### 2.15.8 Handicapped Accessibility:

Walkways (sidewalks, crosswalks, ramps, etc) shall be in compliance with the Americans with Disability Act (ADA) accessibility guidelines except when the unique characteristics of terrain prevent the full incorporation of accessibility features. Handicapped access ramps shall be constructed at all intersections where sidewalks are required and shall conform to the City's Standard Specifications.

#### 2.16 <u>Access Approaches</u>

The design and location of access approaches onto streets is directly related to the specific use of the approach and the functional classification of the street the approach is fronting. Also, where work is being done in areas previously developed, exceptions to the access requirements may need to be considered in order to allow sensible redevelopment.

All access approaches shall be constructed in accordance with the City's Standard Specifications, unless exceptions are granted.

#### 2.16.1 General Requirements:

All access approaches constructed, relocated, widened, or altered in any way shall be in compliance with the following conditions:

- 1) No access approach shall be so located as to interfere with a utility facility.
- 2) Any necessary adjustments to a private or public utility facility or public structure must be approved by the City of Rapid City. Approved adjustments shall be at no cost to the utility.
- No access approach shall be located so as to create a hazard to pedestrians or motorists or so as to invite or compel illegal or unsafe vehicular movements.
- 4) City Street and highway right-of-ways shall not be used for private or commercial purposes. Parking shall not be allowed within the boulevard area. An approach access permit shall not be issued unless all vehicles to be serviced can maneuver and park entirely within the private property lines. However, backing from the property into the street may be allowed in residential areas.

- 5) If a property borders or fronts on more than one Lane / Place or Local Street, approach access may be granted on either street, at the request of the property owner.
- 6) Lots with street frontage of two hundred feet (200 ft.) or less shall be limited to one access approach.
- 7) The setback distance in Section 2.16 shall be measured from the property line, unless otherwise noted.
- 8) Access approach driveway aprons and / or curbs shall not encroach past the extended adjacent property line. The driveway opening shall be located a minimum of five feet (5 ft.) from the extended adjacent property line.
- 9) Access Approach Spacing shall be in accordance with Section 2.16.7.
- 10) Where several adjacent properties exist along a collector or higher classification of street, each having limited frontage, or where there is a probability of such development, consideration shall be given to shared access points, and frontage or rear age roads so as to reduce the number of accesses to the street. Frontage or rear age road access to the street shall be at the extremities of the frontage or rear age road from street intersections or at well spaced intervals along it. Intervals shall be at least the distance of normal intersection spacing.

### 2.16.2 Residential Areas

In addition to the requirements of Section 2.16.1 the following items shall also apply to access approaches.

Number of Openings:

- 1) Not more than one access approach will be allowed to a single residence except as noted below.
- 2) Two access approaches are permitted if no traffic operation or safety problems result for:
  - a) Lots with three hundred feet (300 ft.) or more of combined frontage on two Local Street in a residential area. Second access approaches will not be permitted on Collector or Arterial Streets.
  - b) To accommodate circular driveways, mid-block lots with two hundred feet (200 ft.) or more of street frontage which meet the standards listed in Section 2.16.4, or mid block lots that have severe terrain prohibiting a standard two (2) or three (3) stall side-by-side garage.

#### 2.16.3 Width of Access Approach and Driveway in Right of Way

- 1) A twenty feet (20 ft.) maximum access approach and driveway in the ROW plus five feet (5 ft.) tapers is allowed for the following situations:
  - a) One and two stall (side-by-side) garage at all setback distances;
  - b) Three stall (side-by-side) garage with a garage setback distance of thirty (30) or more feet;
  - c) On the bulb of cul-de-sacs, for one and two stall (side-by-side) garages.
- 2) A twenty four feet (24 ft.) maximum access approach and driveway in the ROW plus five feet (5 ft.) tapers is allowed where two family units or larger are built or where a shared approach is used.
- 3) A thirty feet (30 ft.) maximum access approach and driveway in the ROW plus five feet (5 ft) tapers is allowed for the following situations:
  - a) Three stall (side-by-side) garage with a garage setback distance of less than thirty feet (30 ft.)
  - b) A shared driveway for townhouses and duplexes with adjoining two or three stall (side-by-side) garages with a setback distance of thirty (30) or more feet.
  - c) On the bulb of cul-de-sacs for a three or more stall (sideby-side) garage.
- 4) A forty feet (40 ft.) maximum access approach and driveway in the ROW plus five feet (5 ft.) tapers is allowed where a shared driveway for townhouses and duplexes with adjoining two or three stall (sideby-side) garages with a setback distance of less than thirty feet (30 ft.)

### 2.16.4 Circular Driveways

Circular driveways are permitted if all the following conditions are met:

- 1) The lot has two hundred feet (200 ft.) or more of street frontage,
- 2) The inside radius of the driveway is not less than twenty feet (20 ft.),
- 3) The radius point is located at or inside the property line,
- 4) The minimum acute angle, measured from the edge of pavement, is eighty degrees  $(80^{\circ})$ .

5) The maximum width of the access approach and driveway in the ROW is sixteen feet (16 ft.) plus five feet (5 ft.) tapers.

#### 2.16.5 Commercial and Industrial Areas

In addition to the requirements of Section 2.16.1, the following items shall also apply to access approaches in commercial and industrial areas.

- 1) The number of access approaches allowed to a commercial or industrial establishment will be dependent on the size and design of the establishment or development. The developer or owner shall be responsible to show the need for the proposed number of access points.
- 2) In commercial and industrially zoned areas, the access approach openings shall be not less than sixteen feet (16 ft.) in width for one way traffic, not less than twenty four feet (24 ft.) in width for two way traffic, and no more than forty feet (40 ft.) in width, exclusive of the curb tapers or radii.
- 3) Access approaches for commercial and industrial sites shall be designed as radius approaches, similar to an intersection. Radii shall be as specified elsewhere in these criteria.

#### 2.16.6 Access Approach Spacing

The distance between adjacent access approaches must be sufficient to allow vehicles to safely queue, accelerate, decelerate, and cross-conflicting traffic streams without excessive interference with through traffic or traffic using adjacent access approaches.

Where access approaches are to be signalized, a minimum spacing of one thousand two hundred feet (1,200 ft.) to any other signalized intersection is required. Access approach signals shall be interconnected with any other signals within two thousand five hundred feet (2,500 ft.) of the signalized approach.

Access approach signalization shall be in accordance with City and/or State of South Dakota standards in effect at the time the permit is acquired. The access approach signalization shall be at no cost to the City or State. The City will assume maintenance and utility costs upon completion and acceptance of the installation.

#### 2.16.7 Approach Corner Clearance

Minimum access approach clearances for street intersections shall be as indicated on Figure 2-9. All distances in Figure 2-9 shall be measured from the back of curb or, where there is no curb, from the edge of the pavement or gravel.

#### 2.16.8 Location Coordination

Commercial and industrial access approaches on opposite sides of a street, where possible and reasonable, will be located so opposing lanes lineup to provide the best possible vision of drivers entering the street. Adequate sight distance shall be provided for vehicles exiting and entering an approach. Approach locations will be evaluated to determine whether sight obstructions such as buildings, signs, vegetation, parked vehicles, highway alignments, etc. exist.

### 2.16.9 Joint or Shared Access Easement

When one access approach is to be used or shared by adjacent properties under different ownership, each property owner must provide the necessary legal documents to establish an access easement agreement. Joint access is encouraged whenever practical.

#### 2.16.10 Driveway Grades

Driveway grades shall be compatible with their intended use and in compliance with the City's Standard Specifications.

### 2.17 Traffic Studies

#### 2.17.1 Responsibilities for Traffic Report

- 1) Traffic impact reports shall be required by the City, on projects as specified below, in order to adequately assess the impact of a proposal on the existing or planned street system. The primary responsibility for assessing the traffic impacts associated with a proposed development will rest with the developer with the City serving in a review capacity.
- 2) Unless waived by the Public Works Director and Community Planning & Development Services Director, a written report meeting the City guidelines will be required for any nonresidential development proposal when trip generation during the peak hour is expected to exceed one hundred (100) vehicles as determined by section 2.17.2.2, or any multifamily residential development with one hundred fifty (150) or more dwelling units.
- 3) Preparation of the report shall be the responsibility of the developer and must be prepared by a South Dakota licensed Professional Engineer with experience in traffic engineering. Upon submission of a draft traffic report, the City will review the study data sources, methods, and findings. Comments will be provided in a written form. The developer and his engineer preparing the report will then have an opportunity to incorporate necessary revisions prior to submitting a final report. All reports shall be reviewed and accepted by the City.
- 4) When a new phase of a development is submitted for review, all previous traffic reports relating to the development that are more than two years old must be updated, unless it is determined by the Public Works Director, that conditions have not changed enough to warrant an update.

- 5) Traffic reports will be required if the trip generation or dwelling unit criteria as noted in Section 2.17.1.2 are exceeded for the following:
  - a) For a rezoning application or Conditional Use Permit.
  - b) For a final plan or final development plan if the property has already been rezoned for the proposed use and no traffic report was required for the rezoning.
  - Prior to issuance of a building permit, if the property has already been zoned / platted and no previous traffic report less than two (2) years old exists.
  - d) Additional access off an arterial street to an existing use is being requested.
  - e) The developer shall be required to submit a new traffic report if, after submitting the original traffic report, the land use intensity and traffic generation area increase by more than fifteen percent (15%).
  - f) Where access points are not defined or a site plan is not available at the time the traffic report is prepared, additional traffic analysis may be required when a site plan becomes available or the access points are defined.
  - g) The developer will be notified at the planning stage if a traffic report will be required, provided sufficient information is available for the City to determine whether the trip generation / dwelling unit criteria have been met. If insufficient information is available but the property appears to involve a sufficiently intense land use, a traffic report may be required.

### 2.17.2 Traffic Report Format

Traffic consultants are encouraged to discuss projects with the applicable City Department prior to starting the study. Topics for possible discussion at such meetings may include directional distribution of traffic, definition of the study area, intersections requiring critical lane analysis, and methods for projecting build-out volume. A firm base of cooperation and communication between the City, the owner or developer, and the consultant in creating traffic characteristics that are in the best interest of the total community is desired. Specific requirements will vary depending on the site location; however, all traffic reports shall contain, as a minimum, the following information:

1) Introduction:

A brief description of the size of the land parcel, general terrain features, the location within the jurisdiction and the region should be included in this section. In addition, the roadways that afford access to the site, and are included in the study area, must be identified. The exact limits of the study area are to be based on engineering judgment, and an understanding of existing traffic conditions at the site. In all instances, however, the study
# FJS

## Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix I

Website Comment Summary

### Website Comment Summary

Project:	Sheridan Lake Road Traffic Study
Subject:	Website Comment Summary
Date:	Monday, June 17, 2019
Location:	N/A

### Introduction

As part of the Sheridan Lake Road Traffic Study, a website was established for posting study materials and receiving comments from the public. Post cards were mailed to approximately 1000 landowners along the study corridor to notify residents of the study and request comments through the study website. The post card mailing list was developed from GIS parcel data using a 1500' buffer along the study corridor. This area is shown in Figure 1.



Figure 1. GIS Parcels used for post card mailing list.

The post cards were mailed on April 17, 2019 and comments on the study materials were received through May 17, 2019. As a result of the mailing, 16 unique comments were received with several duplicate comments.

Identified themes are as follows:

- Maintain full access at Wildwood Drive.
- Promote multi-modal (sidewalk and bicycle) use of the corridor.
- Residents experience difficulty making left turns from stop-controlled, side streets.
- Some residents who live south of Wildwood Drive prefer an overpass-type intersection at Catron Boulevard to expedite through traffic.
- Some residents who live north of Wildwood Drive prefer a neighborhood-feel that promotes slower traffic speeds and higher safety for pedestrians.
- School traffic is contributing to congestion and may be relieved with construction of a new school south of town.
- There is concern related to children walking to school with current and expected traffic volumes at Corral Drive.

There were two comments requesting consideration of Restricted Crossing U-Turns (RCUT, or J-Turn). This configuration eliminates conflict points for left turn maneuvers by changing it to a right turn maneuver followed by a u-turn. It typically includes a wide, raised median when implemented as an intersection alternative because of the need to accommodate truck turning. Travelers that want to make a left turn at an intersection would be forced to make a right turn and then complete a u-turn at a planned median opening. This option was not formally evaluated with the study. The commenter suggested implementation of the RCUT at the Catron Boulevard (Wildwood Drive) and Corral Drive intersections. Elimination of the left-turn movement at the west approach of the Catron Boulevard intersection was considered with Alternative 1. However, elimination of the leftturn movement at the west approach of the Corral Drive intersection was not considered. The eastbound left-turn traffic volumes at Corral Drive are significantly higher than the Catron Boulevard intersection and the RCUT may not be able to accommodate the turning traffic volume and associated weaving. Implementation of a median would have safety benefits. A median would also require change to current access patterns and should be coordinated with the adjacent landowners. An evaluation of truck accommodation would also be an important consideration since it will directly affect the median width requirement and associated right-of-way impacts. Since Alternative 8 is ranked higher than Alternative 1, an evaluation of the RCUT is not recommended at the Catron Boulevard Intersection. The RCUT would be viewed similar to Alternative 1 with lower rankings in a number of categories.



### Comments

The comments are included below. Personal information including name and address numbers have been removed.

#### COMMENT 1:

I am glad that the city is trying to address this issue. I live at Wildwood Drive which is generally close to the Sheridan Lake Road/Catron Boulevard Intersection. Out of the alternatives I prefer the recommended alternative of construction of the Les Hollers Way route with alternative 8 at the intersection. As a city street that also serves as access to many peoples place of residence I don't think the city should look at dramatically expanding the intersection into a major highway as some of the alternatives propose. Sheridan Lake road serves as a major bike and walking route for many of the areas residences and turning the road into a major highway as some of the alternatives unattractive. I think that adding the Les Hollers Way route will improve all of that while also improving the overall traffic noise in the area by routing the significant Red Rocks traffic to the east before Catron Blvd. I also like alternative 8 because it will cause the least impact on the right of way. Some of the alternatives look like they would dramatically increase the width of Sheridan Lake Road taking out existing homes in my neighborhood.

I think the city should also try and address road traffic noise as a part of the construction by looking at using quiet asphalt or other quiet materials. As a major roadway located adjacent to homes the city should try to reduce future road noise in the area.

I also think the city needs to look at addressing the need for a new elementary/middle school in the Red Rocks Area. Much of the traffic congestion that occurs in the morning and afternoon is due to the location of Corral Drive School and the large numbers of individuals that must travel from the Red Rocks Area to Corral Drive. With Corral Drive already above capacity forcing some kids to travel to other school areas it makes sense to build a new school to serve the newly expanded area. A new school is directly related to the congestion along Sheridan Lake Road and should be tied to this project. A new school, the Les Hollers Way Route, and the improvements to the Sheridan Lake Road/Catron Intersection would greatly improve the quality of life in southwest Rapid City.

#### COMMENT 2:

Current plans by the County is to widen Sheridan Lake from Tanager out five miles. This proposal incorporates sidewalks adjacent to the Countryside Developments. I'd recommend that the City consider sidewalks that will connect from City limits to the Countryside Developments, thereby ensuring safety for people that run and bike.

#### COMMENT 3:

Please, you HAVE TO build it for the future, not for the right now, as Rapid City has the tendancy to do!! We spend way more money fixing our underbuilds than just doing it right the first time. If Catron Blvd is truly the thoroughfare it's supposed to be then make it that way, no stop lights. Please stop underbuilding our streets. Please make Sheridan Lake road a 4 lane with a turning lane to at least countryside. This is the city of bottlenecks, deadends and shortcuts through neighborhoods. Thank you!!

### FC

#### COMMENT 4:

I live on Chateaux Ridge Ct. As a retiree with plenty of time and a little planning I am able to avoid the traffic nightmare during certain times of the day that exists on Sheridan Lake Road. However, on very rare occasions I'm force to "run the gauntlet" and attempt a left hand turn onto Sheridan Lake between 7:45 AM and 8:15 AM. If any of the proposals being considered, involve allowing north bound travel to move unimpeded, are put into effect it'll be almost impossible for someone needing to enter north bound traffic from Chateaux Ridge at certain times of the day. I'm sure you've considered this, but I just wanted to respectfully make you aware of the potential problems.

#### COMMENT 5:

I appreciate that this study is being done now before the roads get more crowded in a few years. However, I'm wondering if simply expanding Sheridan Lake Road so that there are more lanes on both sides would be an option? I'm also curious what time these studies were conducted. I've noticed that yes, traffic is heavier at certain times in the morning but that if I take my kids to school just 5 minutes later (at 7:45, for example), that traffic is cleared out and not that bad. If I leave between 7:30-40, though, it's nearly impossible to turn left onto Catron from Bendt Drive. I sure wish there was another access out of our neighborhood besides just onto Catron.

#### COMMENT 6:

As a resident in the Wildwood subdivision, our family often times opt to use the existing light at the wildwood/Catron/Sheridan lake intersection, even though my residence is closer to using the South loop/portion of Wildwood. Losing east-west access from wildwood to catron would be difficult for residences in this area. The primary reason being is that the South wildwood (stop sign) control to Sheridan lake road is substantially more dangerous to use. The reasons being are that it is an extremely steep grade to come down in the winter with no run out at the bottom, visibility looking to the south (down Sheridan lake) can be cumbersome at times as vehicles are approaching rapidly from around the corner further south, and because of the extreme amounts of traffic that are traveling. It often times will back up to this location in the AM and can be impossible to make a left turn (north bound onto Sheridan lake) through the traffic until a polite driver waves you in. Therefore the light becomes a necessary area to get out of our subdivision.

#### COMMENT 7:

I really like the steady flow of Alt 6 where there's an elevated bridge to keep traffic flowing over the intersection at Catron on Sheridan Lake Road, and I think that would solve a lot of the bottleneck at that Sheridan/Catron intersection.

#### COMMENT 8:

I live just off of SLR and access it from Summer Set Drive. Most of the day it is impossible to make a left hand turn, and a dangerous challenge to make a right hand turn onto SLR. There is a slight rise in SLR to the south that makes seeing vehicles traveling north impossible to see till they are very close. And most seem to one exceeding the speed limit. The speed limit should be reduced, or a stop light should be installed to allow residents from the neighborhood to safely access SLR.

Thanks, It's dangerous out there!!!

### FJS

#### COMMENT 9:

I live in the Whispering Pines region and access Sheridan Lake Road from Dunsmore. For the Dunsmore-Sheridan Lake Rd intersection I would suggest having just 1 through lane in each direction in addition to the right and left turn lanes in each directions. There are a lot of unsafe drivers who come through this intersection and having two through lanes would just be an excuse to race and cut people off. On the Catron-Sheridan Lake Rd Interchange I definitely would not do a roundabout as nothing worse than excessive traffic full of parents and workers in a hurry to lead to poor and dangerous traffic flow. The Northbound overpass here might make the most sense, facilitating the dramatically backed up Northbound traffic, allowing more flow of Southbound traffic nore easily under the Northbound ramp, not having to contend with as many straight Northbound drivers. This arrangement would also facilitate the Southbound flow in the evenings when the traffic load is somewhat reversed without having the expense and size necessary to accommodate the two way overpass in another one of the options. As for the Corral Drive interchange, I think that is a reasonable option for getting drivers into the Coral Drive region in the AM, as long as the subsequent drivers don't get bogged down in the Coral Drive-Southwest Middle school region at the school site itself which is also part of the traffic congestion issue in the area.

#### COMMENT 10:

I live in the Wildwood Drive neighborhood and feel alternate 1 would greatly increase my families risk to get places safely. The back side of wildwood drive is in HORRIBLE condition and is not sufficient to hold two way traffic if that is the only exit point onto SLR. Plus, taking away our stop light to turn safely left onto SLR or straight onto catron (which 99% of our neighborhood does) increases our risk of getting out onto SLR at the other intersection. We won't have a stoplight to assist us and have 4 lanes of traffic to cross. Two of those coming off pretty much a blind corner of SLR. I would be devastated if this alternate option occurred and would have to seriously consider moving to somewhere that is safer for my family. The amount of traffic on SLR is massive and I don't feel by cutting off Wildwood that it will help anyone and in fact only hurts our entire neighborhood.

#### COMMENT 11:

In reviewing the SLR plan, I want to draw your attention to the concept of "Alternative Intersections: Restricted Crossing U-Turns" viewable at https://www.youtube.com/watch?v=BLwl01NCp9I.

Visualize the median for West Blvd. the grass with trees and very pedestrian friendly. Why can't this be an option for SLR? Instead of 2 lanes each direction, the city could install one lane each way and utilize the "super street" concept. The video mentions 43,000 cars per day on that facility. SLR future volume for 2045 is 29,000.

SLR is classified as a principal arterial. To me it functions more like a minor arterial such as park drive, or canyon lake drive. If a full road redo is imminent, I would recommend changing SLR to a minor arterial as the area SLR goes through is too residential.

My concern is if SLR goes to 5 lanes the speed limit signs will not work and people will pass each other and go very fast. The fatal rate of a ped/vehicle crash goes up exponentially as speed increases. How many kids have to die or be permanently injured for us to prioritize use alternatives to stop light intersections?

#### COMMENT 12:

To whom it may concern:

Thank you for the postcard notification to provide comments on the Sheridan Lake Road Traffic Study report. Our family lives at Summerset Drive, Autumn Hills Subdivision. We use the north entrance of Summerset Drive to access Sheridan Lake Road daily. We understand the traffic delay concerns the city has for all the intersections in the SLR (Sheridan Lake Road) study area. This traffic delay could become a big problem if a good traffic plan is not in place. Rapid City lacks collector roads to feed traffic to the multi-lane highways SD44 and US16. I like the 2045 No-build option of constructing the Future Collector 1/ Les Hollers Way to reduce traffic pressure on SLR. Improvements to Moon Meadows could also reduce the traffic pressure on SLR. If a new school is built south of Catron and west of US16, as proposed in the RC Schools' "Forward" plan, an even greater reduction in traffic pressure could occur.

The 7 lanes proposed at the intersection of SLR and Corral will have a negative impact on the Autumn Hills neighborhood for children crossing and going to school, as well as for vehicles trying to take a left from our neighborhood onto SLR. The cost to add lanes appears high with minimal travel-time benefit during the AM or PM traffic rush. Adding lanes will increase the crash rate if not properly designed. If it is absolutely necessary to widen, then please consider a 40' wide median and U-turn access. This median width would allow a delivery truck or school bus to perform a U-turn maneuver. A passenger vehicle could store in the median and then turn left into the inside lane. Pedestrians could refuge in the median when crossing SLR. Please consider the Restricted Crossing U-Turn intersection design at the Corral intersection and the Wildwood/Catron intersections. It is my understanding that this is a very safe intersection design and once signalized could be synchronized with the Catron/Wildwood signal to improve the traffic flow thru the SLR corridor.

Restricting the left-out of Corral should be considered in the study. I usually see many cars on SLR being impacted by a few vehicles turning left from Corral. The double left turn lane construction on SLR could be implemented without reconstructing Corral Drive if the left turn lane on Corral was converted to an additional westbound lane. A U-turn and median would be needed on SLR south of Corral to allow eastbound Corral vehicles to head north on SLR. Reducing the number of signal phases from 3 to 2 would have a positive impact on the traffic flow thru this intersection. The crash rate would also be improved with the left-out restriction.

The 4-lane section of SLR north of Corral might function like a 3-lane due to stopped vehicles waiting in the inside lanes to turn left if the build 2045 traffic volume of 20,700 ADT is allowed to occur. Please consider a study to convert SLR from 4 to 3 lanes from Corral Drive to the W. Flormann intersection. The potential outcomes of this conversion would be the following:

1) a reduction of the crash rate (adding a 2-way left turn lane) without adversely impacting the traffic flow

2) the addition of bike lanes

3) an increase of the separation distance between vehicles and pedestrians the sidewalk

This conversion would be an enhancement to the city and the property owners along SLR. Currently, children regularly run across 4 lanes of traffic at the Common Cents store location. If converted to a 3-lane, they could cross one lane, refuge in the median and then cross the second lane. This would improve pedestrian accessibility, safety and enhance the adjacent neighborhood.

Please consider bike lanes with any reconstruction efforts. The neighborhood street system is poorly connected and SLR is our only option to access bicycle friendly roads. If the 4 to 3 lane conversion occurred as previously stated, then SLR could be considered a bicycle friendly road. Let's make Rapid City a desirable community in which to live. To achieve this, the goals for SLR could be the following: 1) improve traffic operations

2) reduce crashes

3) create a pedestrian friendly environment.

Please keep these three goals in mind for the completion of the SLR traffic study. Thank You.

#### COMMENT 13:

I've spent some time over the last few weeks reviewing the proposals for the SLR construction. I am a resident in the Wildwood development and feel one of the proposals would have a huge effect on my commute and safety. I don't know if I should be directing these questions towards you but I'm having a hard time understanding the thought process behind the "right in right out" (Alt. #1) option for SLR. Maybe you can help.

I do understand this. Alt. #1 eliminates the need for a light coming out of wildwood and would allow traffic to flow more consistently on SLR. However I see so many issues and dangerous situations with this proposal. To access SLR north residents would have two options. 1) use the Wildwood south exit or 2) "u turn" on SLR after turning right out of wildwood north.

1) Exiting Wildwood south proposes a number of issues. The first is the grade of the road. Often times during the peak morning hours there are 3-7 cars backed up on wildwood north exit in the left turn lane. If 3-7 cars are backed up using the wildwood south exit during wet and slippery conditions it's going to be very difficult to avoid hitting cars stopped in front of you. Or sliding into oncoming traffic on SLR. The second issue with the Wildwood south exit is crossing a potential two lanes of traffic without a light to access SLR north. How does the city not see this as an issue? To take it a step further, a car that wanted to access Catron Blvd would need to do the following.... Cross two lanes of traffic, merge into two lanes of traffic and merge over two lanes to access the right turn to Catron. All in a short distance. How does the SLR planning study take into effect these situation?

On top of all this the smaller roads in the Wildwood subdivision are not updated or safe. Sunburst, and Una Del are in horrible condition and traffic will only increase on these two roads with the Alt. #1 option.

2) If a commuter were to use the right out option exiting Wildwood north and need to access Catron or SLR north would there be a U turn lane? I turn left on to SLR every morning and I don't understand how I would be able to access SLR north without doing a u turn or using the Wings N Rings parking lot as a turn around. Again, this seems like another dangerous situation. How does the study suggest commuters use SLR north out of the Wildwood north exit?

I can't stress enough the issues that present themselves with the Alt. #1 option. Traffic always seems to find the quickest route and with a restriction such as this it's going to cause dangerous situations. I don't understand that if we are building for the future why we would create restrictions. My proposal is Alt 7B in the SLR study. SLR is not a residential arterial. It's a principal arterial. It's a main thoroughfare connecting residents in the Red Rock, Red Rock Meadows, High Point Ranch, Countryside S and N and other neighborhoods to Rapid City west and other major employers. Adding lanes in all directions and not restricting Wildwood residents is my hope for the future of SLR.

#### COMMENT 14:

I've been thinking about this more--it would be helpful if you could survey drivers and find out where they're going in the morning when traffic is the worst. If they're just dropping kids off at school, one of these alternate routes doesn't work. If they're going up Catron to get to the other side of town, another road up to Mt. Rushmore Road seems in order. If they're going downtown, then perhaps other options may be better--either another route to get up to Mt. Rushmore faster (the windy Moon Meadows road gets there but it's definitely not faster)--you almost need another road straight from Sheridan Lake to Mt. Rushmore--there are several big fields/cattle grazing areas that don't seem to be used. Adding another access area through one of those fields might clear up a ton of congestion in the morning...again, depending on where people are going in the mornings.

#### COMMENT 15:

Our address is Skyview Drive. We wish to comment on the 3-way intersection at Corral and Park Drive. In our opinion, this intersection is currently very dysfunctional. Traffic arriving from the east and west have a stop sign, but northbound traffic does not. This results in two issues that need to be addressed:

1. School: This is the main problem. During the school year...particularly during the early morning and afternoon when the traffic volume is highest due to parents and buses...this intersection becomes clogged with traffic. Cars and buses coming from the west must stop. Cars coming from the east must stop. So there are long lines of vehicles from both directions on Corral. There is also a long line of traffic coming from the north. This traffic moves very slowly because it often must stop for children crossing this intersection before turning east.

In addition, for those of us who live on Skyview Drive, the situation is particularly frustrating because: (1) we are blocked from entering Corral from the south by eastbound traffic backed up at the stop sign, and (2) after passing through the intersection from the east, we are blocked from making a left turn onto Skyview Drive by eastbound traffic backed up at the stop sign.

2. Other Times: During non-school hours this intersection is also confusing because southbound vehicles have a dead end and tend to stop for east and west bound vehicles (who are waiting at the stop sign) before proceeding through the intersection.

Both of these issues are a hindrance to the smooth flow of traffic through this intersection. It seems that the best solution would be to install a traffic light.

#### COMMENT 16:

As a homeowner in the Autum Hills area - Closest to Corral Drive. We would just like to know when this construction is likely to start and how long it might take to complete. We KNOW it needs to be done for sure and appreciate the options that are being looked at. Thanks!

### Sheridan Lake Road Study Website

http://www.sheridanlakeroadstudy.com

The City of Rapid City has teamed with HDR Engineering to conduct a traffic study of Sheridan Lake Road between Corral Drive and Albertta Drive.

Please visit the website to view the Draft Study Report and submit any comments you may have by May 17, 2019.

aaron.fagerness@hdrinc.com 605.977.7744



# FJS

## Sheridan Lake Road Traffic Study Report Corral Drive to Albertta Drive

CITY OF RAPID CITY

Rapid City, South Dakota

Appendix J

**Construction Cost Calculations** 

		ALTERNATIVE At-Grade Intersection - Wildwood I (Sheridan Lk Rd & Catron B	Drive Right	•	ht-0	Out	
NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QTY	UNIT		UNIT BID PRICE	EXTENDED PRICE
		Roadway					
1	009	Mobilization	1	LS	\$	430,000.00	\$ 430,000.00
2	009	Construction Staking	1	LS	\$	31,300.00	\$ 31,300.00
3	100	Clearing	1	LS	\$	41,000.00	\$ 41,000.00
4	110	Remove Concrete Curb & Gutter	1,000	LF	\$	5.50	\$ 5,500.00
5	110	Remove Concrete Pavement	25,600	SY	\$	6.00	\$ 153,600.00
6	110	Remove ACC Pavement	3,200	SY	\$	3.50	\$ 11,200.00
7	110	Remove Luminaire Pole	18	EA	\$	250.00	\$ 4,500.00
8	120	Unclassified Excavation	34,400	CY	\$	4.50	\$ 154,800.00
9	120	Borrow Unclassified Excavation	8,000	CY	\$	5.50	\$ 44,000.00
10	230	Remove & Place Topsoil	3,000	CY	\$	2.50	\$ 7,500.00
11	260	Gravel Cushion / Base Course	14,300	TON	\$	15.00	\$ 214,500.00
12	320	Asphalt Concrete Composite (6" ACC / 9" Base)	500	TON	\$	100.00	\$ 50,000.00
13	380	10" Nonreinforced PCC Pavement (10" PCC / 5" Base)	38,900	SY	\$	50.00	\$ 1,945,000.00
14	380	6" Median PCC Pavement (6" ACC / 15" Base)	900	SY	\$	60.00	\$ 54,000.00
15	450	Storm Sewer	4,300	LF	\$	90.00	\$ 387,000.00
16	633	Pavement Marking	39,400	LF	\$	0.60	\$ 23,600.00
17	634	Traffic Control	1	LS	\$	329,500.00	\$ 329,500.00
18	651	Concrete Sidewalk (6" PCC / 2" Base)	70,200	SF	\$	6.50	\$ 456,300.00
19	635	Roadway Lighting	1	LS	\$	180,000.00	\$ 180,000.00
20	635	Traffic Signal System	1	EA	\$	350,000.00	\$ 350,000.00
21	650	Type B66 Concrete Curb and Gutter	500	LF	\$	22.00	\$ 11,000.00
22	650	Type B610 Concrete Curb and Gutter	15,000	LF	\$	23.00	\$ 345,000.00
23	650	Concrete Barrier Curb and Gutter	0	LF	\$	220.00	\$ -
24	670	Drainage Structure	62	EA	\$	3,500.00	\$ 217,000.00
25	730-732	Seeding, Fertilizing, Mulching	4	AC	\$	19,000.00	\$ 76,000.00
26	734	Erosion Control and Landscaping Restoration	1	LS	\$	179,700.00	\$ 179,700.00
27	671	Sanitary Sewer - Reconstruct Manhole	16	EA	\$	2,000.00	\$ 32,000.00
28	451	Water Main - Hydrant Relocation (Furnish New)	14	EA	\$	6,000.00	\$ 84,000.00
						Subtotal:	\$ 5,818,000.00
				(	Cont	tingency (30%)	\$ 1,745,400.00

Construction Cost Subtotal: \$ 7,563,000.00

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED	PRICE
		Bridge Structure an	d Walls				
29	460	Bridge Structures - Flyover	0	LS	\$-	\$	-
30	530	MSE Large Panel Wall	0	SQFT	\$ 78.00	\$	-
					Subtotal:	\$	-
	Contingency (30%)	\$	-				
	re & Wall Subtotal:	\$	-				

7,563,000.00 Construction Total: \$

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED	PRICE					
	Right-of-Way And Utilities											
31		Right-of-Way Impacts	86,127	SQFT	\$ 3.50	\$ 3	01,444.50					
				-	Subtotal:	\$ 3	01,444.50					
	Contingency (30%)	\$	90,433.35									
	ROW Subtotal:	\$ 3	92,000.00									

Grand Total: \$ 7,955,000.00

NO.   ITEM NO.   ITEM DESCRIPTION   APPROX QTY   UNIT   UNIT BID PRICE   EXTENDED PRICE     1   009   Mobilization   1   LS   \$ 630,000.00   \$ 630,000     3   100   Clearing   1   LS   \$ 47,100.00   \$ 47,100     3   100   Clearing   1   LS   \$ 47,100.00   \$ 47,100     4   110   Remove Concrete Curb & Gutter   1,800   LF   \$ 550.00   \$ 50,000     5   110   Remove Concrete Pavement   31,100   SY   \$ 6.00   \$ 186.600     6   110   Remove Concrete Pavement   5,900   SY   \$ 3.50   \$ 20,700     7   110   Remove Luminaire Pole   22   EA   \$ 255.00   \$ 5.50   \$ 161,700     10   230   Remove & Place Topsoil   4,400   CY   \$ 4.50   \$ 321,300     12   320   Asphalt Concrete Composite (6" ACC / 9" Base)   1,000   TON   \$ 100.00   \$ 100,000     13   380   10" N			ALTERNATIVE Flyover Southbound to (Sheridan Lk Rd & Catron B	Eastbound				
1   009   Mobilization   1   LS   \$ 630,000.0   \$ 630,000.0     2   009   Construction Staking   1   LS   \$ 47,100.00   \$ 47,100.00     3   100   Clearing   1   LS   \$ 50,000.00   \$ 50,000.00     4   110   Remove Concrete Curb & Gutter   1,800   LF   \$ 55.00   \$ 9,900     5   110   Remove Concrete Pavement   31,100   SY   \$ 6.00   \$ 186,600     6   110   Remove ACC Pavement   5.900   SY   \$ 3.50   \$ 207,000     7   110   Remove ACC Pavement   5.900   SY   \$ 3.50   \$ 321,300     9   120   Borrow Unclassified Excavation   29,400   CY   \$ 5.50   \$ 111,000     11   260   Gravel Cushion / Base Course   18,900   TON   \$ 150.00   \$ 284,000     12   320   Asphalt Concrete Composite (6" ACC / 9" Base)   1.000   TON   \$ 100.00   \$ 100,000     13   380   10" Nonreinforced P	NO.	ITEM NO.	,	APPROX	,			
2   000   Construction Staking   1   Ls   \$ 47,100.00   \$ 47,100.00     3   100   Clearing   1   LS   \$ 50,000.00   \$ 50,000     4   110   Remove Concrete Curb & Gutter   1,800   LF   \$ 5,500   \$ 9,900     5   110   Remove Concrete Pavement   31,100   SY   \$ 6,000   \$ 186,600     6   110   Remove ACC Pavement   5,900   SY   \$ 3,50   \$ 20,700     7   110   Remove Luminaire Pole   22   EA   \$ 250.00   \$ 5,500     8   120   Unclassified Excavation   71,400   CY   \$ 4,500   \$ 321,300     10   230   Remove & Place Topsoil   4,400   CY   \$ 5,500   \$ 111,000     11   260   Gravel Cushion / Base Course   18,900   TON   \$ 15.00   \$ 283,500     12   320   Asphalt Concrete Composite (6" ACC / 9" Base)   1,000   TON   \$ 100,000   \$ 100,000     13   380   10" Nonreinforced PC			Roadway	1				
3   100   Clearing   1   LS   \$   50,000.00   \$   50,000.00     4   110   Remove Concrete Curb & Gutter   1,800   LF   \$   5,500   \$   9,900     5   110   Remove Concrete Pavement   31,100   SY   \$   6.00   \$   186,600     6   110   Remove Acc Pavement   5,900   SY   \$   3,50   \$   20,700     7   110   Remove Luminaire Pole   22   EA   \$   250.00   \$   5,500     8   120   Unclassified Excavation   71,400   CY   \$   4,50   \$   321,300     9   120   Borrow Unclassified Excavation   29,400   CY   \$   5,500   \$   161,000     10   230   Remove & Place Topsoil   4,400   CY   \$   2,500   \$   110,000     12   320   Asphalt Concrete Composite (6"ACC / 9" Base)   1,000   TON   \$   100,000   \$	1	009	Mobilization	1	LS	\$	630,000.00	\$ 630,000.00
100   100 <td>2</td> <td>009</td> <td>Construction Staking</td> <td>1</td> <td>LS</td> <td>\$</td> <td>47,100.00</td> <td>\$ 47,100.00</td>	2	009	Construction Staking	1	LS	\$	47,100.00	\$ 47,100.00
110   Remove Concrete Pavement   31,100   SY   \$6,00   \$186,00     6   110   Remove ACC Pavement   31,100   SY   \$6,00   \$186,000     6   110   Remove ACC Pavement   5,900   SY   \$3,50   \$20,700     7   110   Remove Luminaire Pole   22   EA   \$250,00   \$5,500     8   120   Unclassified Excavation   71,400   CY   \$4,50   \$321,300     9   120   Borrow Unclassified Excavation   29,400   CY   \$5,50   \$1161,700     10   230   Remove & Place Topsoil   4,400   CY   \$2,50   \$11,000     11   260   Gravel Cushon / Base Course   18,900   TON   \$15,00   \$28,80,000     12   320   Asphalt Concrete Composite (6" ACC / 9" Base)   1,000   TON   \$100,00   \$100,000     13   380   10" Nonreinforced PCC Pavement (10" PCC / 5" Base)   400   SY   \$60,00   \$24,900     15   450   Storm Sewer	3	100	Clearing	1	LS	\$	50,000.00	\$ 50,000.00
6   110   Remove ACC Pavement   5,900   SY   \$   3.50   \$   20,700     7   110   Remove Luminaire Pole   22   EA   \$   250,00   \$   5,500     8   120   Unclassified Excavation   71,400   CY   \$   4,500   \$   321,300     9   120   Borrow Unclassified Excavation   29,400   CY   \$   5,500   \$   111,700     10   230   Remove & Place Topsoil   4,400   CY   \$   2,500   \$   110,000     12   320   Asphalt Concrete Composite (6" ACC / 9" Base)   1,000   TON   \$   100,000   \$   100,000     13   380   10" Nonreinforced PCC Pavement (10" PCC / 5" Base)   56,800   SY   \$   50,000   \$   2,400,000     14   380   6" Median PCC Pavement (6" ACC / 15" Base)   400   SY   \$   603,000   \$   24,000     14   450   Storn Sewer   6,700   LF   \$ <td>4</td> <td>110</td> <td>Remove Concrete Curb &amp; Gutter</td> <td>1,800</td> <td>LF</td> <td>\$</td> <td>5.50</td> <td>\$ 9,900.00</td>	4	110	Remove Concrete Curb & Gutter	1,800	LF	\$	5.50	\$ 9,900.00
7 110 Remove Luminaire Pole 22 EA \$ 250.00 \$ 5.500   8 120 Unclassified Excavation 71.400 CY \$ 4.50 \$ 321.300   9 120 Borrow Unclassified Excavation 29.400 CY \$ 5.50 \$ 161.700   10 230 Remove & Place Topsoil 4.400 CY \$ 2.50 \$ 110.000   11 260 Gravel Cushion / Base Course 18.900 TON \$ 150.00 \$ 283.500   12 320 Asphalt Concrete Composite (6" ACC / 9" Base) 1,000 TON \$ 100.000 \$ 100.000   13 380 10" Nonreinforced PCC Pavement (10" PCC / 5" Base) 400 SY \$ 60.00 \$ 2.840,000   14 380 6" Median PCC Pavement (6" ACC / 15" Base) 400 SY \$ 60.00 \$ 2.40,000   15 450 Storm Sewer 6.700 LF \$ 90.00 \$ 603,000   16 633 Pavement Marking 57,000 LF \$ 0.600 \$ 34.200   16 634 Traffic Control 1 LS \$ 363,600.00 \$ 363,600	5	110	Remove Concrete Pavement	31,100	SY	\$	6.00	\$ 186,600.00
Interview   Interview <t< td=""><td>6</td><td>110</td><td>Remove ACC Pavement</td><td>5,900</td><td>SY</td><td>\$</td><td>3.50</td><td>\$ 20,700.00</td></t<>	6	110	Remove ACC Pavement	5,900	SY	\$	3.50	\$ 20,700.00
120   Borrow Unclassified Excavation   29,400   CY   \$ 5.50   \$ 161,700     10   230   Remove & Place Topsoil   4,400   CY   \$ 2.50   \$ 11,000     11   260   Gravel Cushion / Base Course   18,900   TON   \$ 15.00   \$ 283,500     12   320   Asphalt Concrete Composite (6" ACC / 9" Base)   1,000   TON   \$ 100,00   \$ 100,000     13   380   10" Nonreinforced PCC Pavement (10" PCC / 5" Base)   56,800   SY   \$ 50.00   \$ 2,840,000     14   380   6" Median PCC Pavement (6" ACC / 15" Base)   400   SY   \$ 60.00   \$ 2,4000     15   450   Storm Sewer   6,700   LF   \$ 90.00   \$ 603,000     16   633   Pavement Marking   57,000   LF   \$ 0.60   \$ 34,200     17   634   Traffic Control   1   LS   \$ 363,600.00   \$ 363,600.00     18   651   Concrete Sidewalk (6" PCC / 2" Base)   88,900   SF   \$ 6.50   \$ 577,900     20	7	110	Remove Luminaire Pole	22	EA	\$	250.00	\$ 5,500.00
9 120 Borrow Unclassified Excavation 29,400 CY \$ 5.50 \$ 161,700   10 230 Remove & Place Topsoil 4,400 CY \$ 2.50 \$ 11,000   11 260 Gravel Cushion / Base Course 18,900 TON \$ 15.00 \$ 283,500   12 320 Asphalt Concrete Composite (6" ACC / 9" Base) 1,000 TON \$ 100,000 \$ 100,000   13 380 10" Nonreinforced PCC Pavement (10" PCC / 5" Base) 56,800 SY \$ 50.00 \$ 2,840,000   14 380 6" Median PCC Pavement (6" ACC / 15" Base) 400 SY \$ 60.00 \$ 2,840,000   15 450 Storm Sewer 6,700 LF \$ 90.00 \$ 603,000   16 633 Pavement Marking 1 LS \$ 363,600.00 \$ 363	8	120	Unclassified Excavation	71,400	CY	\$	4.50	\$ 321,300.00
Loss   Instruction (Base Course)   Image State   Image State <td>9</td> <td>120</td> <td>Borrow Unclassified Excavation</td> <td>29,400</td> <td>CY</td> <td>\$</td> <td>5.50</td> <td>\$ 161,700.00</td>	9	120	Borrow Unclassified Excavation	29,400	CY	\$	5.50	\$ 161,700.00
12 320 Asphalt Concrete Composite (6" ACC / 9" Base) 1,000 TON \$ 100,000   13 380 10" Nonreinforced PCC Pavement (10" PCC / 5" Base) 56,800 SY \$ 50,00 \$ 2,840,000   14 380 6" Median PCC Pavement (6" ACC / 15" Base) 400 SY \$ 60,00 \$ 2,840,000   15 450 Storm Sewer 6,700 LF \$ 90,00 \$ 603,000   16 633 Pavement Marking 57,000 LF \$ 0,60 \$ 34,200   17 634 Traffic Control 1 LS \$ 363,600.00 \$ 363,600   18 651 Concrete Sidewalk (6" PCC / 2" Base) 88,900 SF \$ 6.50 \$ 577,900   19 635 Roadway Lighting 1 LS \$ 220,000.00 \$ 220,000   20 635 Traffic Signal System 1 EA \$ 350,000.00 \$ 350,000   21 650 Type B610 Concrete Curb and Gutter 12,900 LF \$ 22.00 \$ 616,000   22 650 Type B610 Concrete Curb and Gutter 2,800 LF \$ 220,000 \$ 28	10	230	Remove & Place Topsoil	4,400	CY	\$	2.50	\$ 11,000.00
12 320 Asphalt Concrete Composite (6" ACC / 9" Base) 1,000 TON \$ 100.00 \$ 100.000   13 380 10" Nonreinforced PCC Pavement (10" PCC / 5" Base) 56,800 SY \$ 50.00 \$ 2,840,000   14 380 6" Median PCC Pavement (6" ACC / 15" Base) 400 SY \$ 60.00 \$ 2,840,000   15 450 Storm Sewer 6,700 LF \$ 90.00 \$ 603,000   16 633 Pavement Marking 57,000 LF \$ 0.60 \$ 34,200   17 634 Traffic Control 1 LS \$ 363,600.00 \$ 363,600   18 651 Concrete Sidewalk (6" PCC / 2" Base) 88,900 SF \$ 6.50 \$ 577,900   19 635 Roadway Lighting 1 LS \$ 220,000.00 \$ 220,000   20 635 Traffic Signal System 1 EA \$ 350,000.00 \$ 350,000   21 650 Type B66 Concrete Curb and Gutter 900 LF \$ 22.00 \$ 19,800   22 650 Type B610 Concrete Gurb and Gutter 2,800 LF \$ 22.00 <td>11</td> <td>260</td> <td>Gravel Cushion / Base Course</td> <td>18,900</td> <td>TON</td> <td>\$</td> <td>15.00</td> <td>\$ 283,500.00</td>	11	260	Gravel Cushion / Base Course	18,900	TON	\$	15.00	\$ 283,500.00
14 380 6" Median PCC Pavement (6" ACC / 15" Base) 400 SY \$ 60.00 \$ 24,000   15 450 Storm Sewer 6,700 LF \$ 90.00 \$ 603,000   16 633 Pavement Marking 57,000 LF \$ 90.00 \$ 603,000   16 633 Pavement Marking 57,000 LF \$ 90.00 \$ 603,000   17 634 Traffic Control 1 LS \$ 363,60.00 \$ 34,200   18 651 Concrete Sidewalk (6" PCC / 2" Base) 88,900 SF \$ 6.50 \$ 577,900   19 635 Roadway Lighting 1 LS \$ 220,000.00 \$ 220,000   20 635 Traffic Signal System 1 EA \$ 350,000.00 \$ 350,000   21 650 Type B66 Concrete Curb and Gutter 900 LF \$ 22.00 \$ 19,800   22 650 Type B610 Concrete Curb and Gutter 12,900 LF \$ 22.00 \$ 616,000   23 650 Concrete Barrier Curb and Gutter 2,800 LF \$ 22.00 \$ 616,000	12	320	Asphalt Concrete Composite (6" ACC / 9" Base)	1,000	TON	\$	100.00	\$ 100,000.00
15 450 Storm Sewer 6,700 LF \$ 90.00 \$ 603.000   16 633 Pavement Marking 57,000 LF \$ 90.00 \$ 603.000   17 634 Traffic Control 1 LS \$ 363,600.00 \$ 363,600.00   18 651 Concrete Sidewalk (6" PCC / 2" Base) 88,900 SF \$ 6.50 \$ 577,900   19 635 Roadway Lighting 1 LS \$ 220,000.00 \$ 220,000.00   20 635 Traffic Signal System 1 EA \$ 350,000.00 \$ 350,000.00   21 650 Type B66 Concrete Curb and Gutter 900 LF \$ 22.00 \$ 19,800.00   22 650 Type B610 Concrete Curb and Gutter 2,800 LF \$ 22.00 \$ 19,800.00   23 650 Concrete Barrier Curb and Gutter 2,800 LF \$ 220.00 \$ 616,000.00   24 670 Drainage Structure 80	13	380	10" Nonreinforced PCC Pavement (10" PCC / 5" Base)	56,800	SY	\$	50.00	\$ 2,840,000.00
160 1	14	380	6" Median PCC Pavement (6" ACC / 15" Base)	400	SY	\$	60.00	\$ 24,000.00
17 634 Traffic Control 1 LS \$ 363,600.00 \$ 363,600.01   18 651 Concrete Sidewalk (6" PCC / 2" Base) 88,900 SF \$ 6.50 \$ 577,900.01   19 635 Roadway Lighting 1 LS \$ 220,000.00 \$ 220,000.00   20 635 Traffic Signal System 1 EA \$ 350,000.00 \$ 220,000.00   21 650 Type B66 Concrete Curb and Gutter 900 LF \$ 220.00 \$ 350,000.00   22 650 Type B610 Concrete Curb and Gutter 12,900 LF \$ 220.00 \$ 296,700.01   23 650 Concrete Barrier Curb and Gutter 2,800 LF \$ 220,000 \$ 280,000.01   24 670 Drainage Structure 80 EA \$ 3,500.00 \$ 280,000.01   25 730-732 Seeding, Fertilizing, Mulching 5 AC \$ 19,000.00 \$ 95,000.01   26 734 Erosion Control and Landscaping Restoration 1 LS \$ 206,100.00 \$ 206,100.00   27 671 Sanitary Sewer - Reconstruct Manhole 22	15	450	Storm Sewer	6,700	LF	\$	90.00	\$ 603,000.00
18 651 Concrete Sidewalk (6" PCC / 2" Base) 88,900 SF \$ 6.50 \$ 577,900   19 635 Roadway Lighting 1 LS \$ 220,000.00 \$ 220,000.00   20 635 Traffic Signal System 1 EA \$ 350,000.00 \$ 220,000.00   21 650 Type B66 Concrete Curb and Gutter 900 LF \$ 22.00 \$ 19,800   22 650 Type B610 Concrete Curb and Gutter 12,900 LF \$ 23.00 \$ 296,700   23 650 Concrete Barrier Curb and Gutter 2,800 LF \$ 220.00 \$ 616,000   24 670 Drainage Structure 80 EA \$ 3,500.00 \$ 280,000   25 730-732 Seeding, Fertilizing, Mulching 5 AC \$ 19,000.00 \$ 95,000   26 734 Erosion Control and Landscaping Restoration 1 LS \$ 206,100.00 \$ 206,100.00 \$ 206,100.00 \$	16	633	Pavement Marking	57,000	LF	\$	0.60	\$ 34,200.00
19 635 Roadway Lighting 1 LS \$ 220,000.00 \$ 220,000   20 635 Traffic Signal System 1 EA \$ 350,000.00 \$ 350,000   21 650 Type B66 Concrete Curb and Gutter 900 LF \$ 220,00 \$ 19,800   22 650 Type B610 Concrete Curb and Gutter 12,900 LF \$ 220,00 \$ 296,700   23 650 Concrete Barrier Curb and Gutter 2,800 LF \$ 220,00 \$ 280,000   24 670 Drainage Structure 80 EA \$ 3,500,00 \$ 280,000   24 670 Drainage Structure 80 EA \$ 3,500,00 \$ 280,000   25 730-732 Seeding, Fertilizing, Mulching 5 AC \$ 19,000,00 \$ 95,000   26 734 Erosion Control and Landscaping Restoration 1 LS \$ 206,100,00 \$ 206,100,00   27 671 Sanitary Sewer - Reconstruct Manhole 22 EA \$ 2,000,00 \$ 44,000   28 451 Water Main - Hydrant Relocation (Furnish New) 17 EA 6	17	634	Traffic Control	1	LS	\$	363,600.00	\$ 363,600.00
20 635 Traffic Signal System 1 EA \$ 350,000.00 \$ 350,000   21 650 Type B66 Concrete Curb and Gutter 900 LF \$ 22.00 \$ 19,800   22 650 Type B610 Concrete Curb and Gutter 12,900 LF \$ 22.00 \$ 19,800   23 650 Concrete Barrier Curb and Gutter 2,800 LF \$ 220.00 \$ 616,000   24 670 Drainage Structure 80 EA \$ 3,500.00 \$ 280,000   25 730-732 Seeding, Fertilizing, Mulching 5 AC \$ 19,000.00 \$ 95,000   26 734 Erosion Control and Landscaping Restoration 1 LS \$ 206,100.00 \$ 206,100   27 671 Sanitary Sewer - Reconstruct Manhole 22 EA \$ 2,000.00 \$ 44,000   28 451 Water Main - Hydrant Relocation (Furnish New) 17 EA \$ 6,000.00 \$ 102,000   28 451 Water Main - Hydrant Relocation (Furnish New) 17 EA \$ 6,000.00 \$ 102,000	18	651	Concrete Sidewalk (6" PCC / 2" Base)	88,900	SF	\$	6.50	\$ 577,900.00
21 650 Type B66 Concrete Curb and Gutter 900 LF \$ 22.00 \$ 19,800   22 650 Type B610 Concrete Curb and Gutter 12,900 LF \$ 22.00 \$ 296,700   23 650 Concrete Barrier Curb and Gutter 2,800 LF \$ 220.00 \$ 616,000   24 670 Drainage Structure 80 EA \$ 3,500.00 \$ 280,000   25 730-732 Seeding, Fertilizing, Mulching 5 AC \$ 19,000.00 \$ 95,000   26 734 Erosion Control and Landscaping Restoration 1 LS \$ 206,100.00 \$ 206,100   27 671 Sanitary Sewer - Reconstruct Manhole 22 EA \$ 2,000.00 \$ 44,000   28 451 Water Main - Hydrant Relocation (Furnish New) 17 EA \$ 6,000.00 \$ 102,000   Subtotal:	19	635	Roadway Lighting	1	LS	\$	220,000.00	\$ 220,000.00
22 650 Type B610 Concrete Curb and Gutter 12,900 LF \$ 23.00 \$ 296,700   23 650 Concrete Barrier Curb and Gutter 2,800 LF \$ 220.00 \$ 616,000   24 670 Drainage Structure 80 EA \$ 3,500.00 \$ 280,000   25 730-732 Seeding, Fertilizing, Mulching 5 AC \$ 19,000.00 \$ 95,000   26 734 Erosion Control and Landscaping Restoration 1 LS \$ 206,100.00 \$ 206,100   27 671 Sanitary Sewer - Reconstruct Manhole 22 EA \$ 2,000.00 \$ 44,000   28 451 Water Main - Hydrant Relocation (Furnish New) 17 EA \$ 6,000.00 \$ 102,000	20	635	Traffic Signal System	1	EA	\$		\$ 350,000.00
23 650 Concrete Barrier Curb and Gutter 2,800 LF \$ 220.00 \$ 616,000   24 670 Drainage Structure 80 EA \$ 3,500.00 \$ 280,000   25 730-732 Seeding, Fertilizing, Mulching 5 AC \$ 19,000.00 \$ 95,000   26 734 Erosion Control and Landscaping Restoration 1 LS \$ 206,100.00 \$ 206,100   27 671 Sanitary Sewer - Reconstruct Manhole 22 EA \$ 2,000.00 \$ 44,000   28 451 Water Main - Hydrant Relocation (Furnish New) 17 EA \$ 6,000.00 \$ 102,000   Subtotal:	21	650	Type B66 Concrete Curb and Gutter	900	LF	\$	22.00	\$ 19,800.00
24 670 Drainage Structure 80 EA \$ 3,500.00 \$ 280,000   25 730-732 Seeding, Fertilizing, Mulching 5 AC \$ 19,000.00 \$ 95,000   26 734 Erosion Control and Landscaping Restoration 1 LS \$ 206,100.00 \$ 206,100   27 671 Sanitary Sewer - Reconstruct Manhole 22 EA \$ 2,000.00 \$ 44,000   28 451 Water Main - Hydrant Relocation (Furnish New) 17 EA \$ 6,000.00 \$ 102,000   Subtotal:	22	650	Type B610 Concrete Curb and Gutter	12,900	LF	\$	23.00	\$ 296,700.00
24   670   Drainage Structure   80   EA   \$ 3,500.00   \$ 280,000     25   730-732   Seeding, Fertilizing, Mulching   5   AC   \$ 19,000.00   \$ 95,000     26   734   Erosion Control and Landscaping Restoration   1   LS   \$ 206,100.00   \$ 206,100     27   671   Sanitary Sewer - Reconstruct Manhole   22   EA   \$ 2,000.00   \$ 44,000     28   451   Water Main - Hydrant Relocation (Furnish New)   17   EA   \$ 6,000.00   \$ 102,000     Subtotal:	23	650		2,800	LF	\$	220.00	\$ 616,000.00
26 734 Erosion Control and Landscaping Restoration 1 LS \$ 206,100.00 \$ 206,100.00   27 671 Sanitary Sewer - Reconstruct Manhole 22 EA \$ 2,000.00 \$ 44,000   28 451 Water Main - Hydrant Relocation (Furnish New) 17 EA \$ 6,000.00 \$ 102,000   Subtotal:	24	670	Drainage Structure	80	EA	\$	3,500.00	\$ 280,000.00
26   734   Erosion Control and Landscaping Restoration   1   LS   \$ 206,100.00   \$ 206,100     27   671   Sanitary Sewer - Reconstruct Manhole   22   EA   \$ 2,000.00   \$ 44,000     28   451   Water Main - Hydrant Relocation (Furnish New)   17   EA   \$ 6,000.00   \$ 102,000     Subtotal:	25	730-732	Seeding, Fertilizing, Mulching	5	AC	\$	19,000.00	\$ 95,000.00
27   671   Sanitary Sewer - Reconstruct Manhole   22   EA   \$ 2,000.00   \$ 44,000     28   451   Water Main - Hydrant Relocation (Furnish New)   17   EA   \$ 6,000.00   \$ 102,000     Subtotal:	26	734	Erosion Control and Landscaping Restoration	1		\$	206,100.00	\$ 206,100.00
Subtotal: \$ 8,499,600	27	671		22	EA	\$		\$ 44,000.00
Subtotal: \$ 8,499,600	28	451	Water Main - Hydrant Relocation (Furnish New)	17	EA	\$	6,000.00	\$ 102,000.00
						<u>د                                     </u>	Subtotal:	\$ 8,499,600.00
Contingency (30%)   \$ 2,349,660					(	Con	tingency (30%)	\$ 2,549,880.00

Construction Cost Subtotal: \$ 11,049,000.00

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDE	D PRICE
		Bridge Structure an	d Walls				
29	460	Bridge Structures - Flyover	11,100	SQFT	\$ 211.00	\$ 2	,342,100.00
30	530	MSE Large Panel Wall	70,000	SQFT	\$ 78.00	\$5	,460,000.00
					Subtotal:	\$ 7	,802,100.00
		Contingency (30%)	\$ 2	,340,630.00			
	re & Wall Subtotal:	\$ 10	,143,000.00				

Construction Total: \$ 21,192,000.00

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED	) PRICE
31		Right-of-Way Impacts	123,418	SQFT	\$ 3.50	\$ 4	431,963.00
					Subtotal:	\$ 4	431,963.00
	Contingency (30%)	\$	129,588.90				
	ROW Subtotal:	\$ !	562,000.00				

#### Grand Total: \$ 21,754,000.00

		Continuous Flow Int (Sheridan Lk Rd & Catron B		ction)			
NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QTY	UNIT	UNIT BID PRICE		EXTENDED PRICE
		Roadway					
1	009	Mobilization	1	LS	\$ 580,000.00	\$	580,000.00
2	009	Construction Staking	1	LS	\$ 35,100.00	\$	35,100.00
3	100	Clearing	1	LS	\$ 50,000.00	\$	50,000.00
4	110	Remove Concrete Curb & Gutter	1,300	LF	\$ 5.50	\$	7,200.00
5	110	Remove Concrete Pavement	29,500	SY	\$ 6.00	\$	177,000.00
6	110	Remove ACC Pavement	4,400	SY	\$ 3.50	\$	15,400.00
7	110	Remove Luminaire Pole	22	EA	\$ 250.00	\$	5,500.00
8	120	Unclassified Excavation	42,000	CY	\$ 4.50	\$	189,000.00
9	120	Borrow Unclassified Excavation	10,900	CY	\$ 5.50	\$	60,000.00
10	230	Remove & Place Topsoil	3,900	CY	\$ 2.50	\$	9,800.00
11	260	Gravel Cushion / Base Course	21,100	TON	\$ 15.00	\$	316,500.00
12	320	Asphalt Concrete Composite (6" ACC / 9" Base)	700	TON	\$ 100.00	\$	70,000.00
13	380	10" Nonreinforced PCC Pavement (10" PCC / 5" Base)	49,600	SY	\$ 50.00	\$	2,480,000.00
14	380	6" Median PCC Pavement (6" ACC / 15" Base)	5,000	SY	\$ 60.00	\$	300,000.00
15	450	Storm Sewer	5,200	LF	\$ 90.00	\$	468,000.00
16	633	Pavement Marking	44,600	LF	\$ 0.60	\$	26,800.00
17	634	Traffic Control	1	LS	\$ 420,500.00	\$	420,500.00
18	651	Concrete Sidewalk (6" PCC / 2" Base)	85,700	SF	\$ 6.50	\$	557,100.00
19	635	Roadway Lighting	1	LS	\$ 220,000.00	\$	220,000.00
20	635	Traffic Signal System	2	EA	\$ 350,000.00	\$	700,000.00
21	650	Type B66 Concrete Curb and Gutter	700	LF	\$ 22.00	\$	15,400.00
22	650	Type B610 Concrete Curb and Gutter	16,300	LF	\$ 23.00	\$	374,900.00
23	650	Concrete Barrier Curb and Gutter	0	LF	\$ 220.00	\$	-
24	670	Drainage Structure	72	EA	\$ 3,500.00	\$	252,000.00
25		Seeding, Fertilizing, Mulching	5	AC	\$ 19,000.00	\$	95,000.00
26	734	Erosion Control and Landscaping Restoration	1	LS	\$ 206,100.00	\$	206,100.00
27	671	Sanitary Sewer - Reconstruct Manhole	23	EA	\$ 2,000.00	\$	46,000.00
28	451	Water Main - Hydrant Relocation (Furnish New)	19	EA	\$ 6,000.00	\$	114,000.00
	1				 Subtotal:	•	7,791,300.00

Construction Cost Subtotal: \$ 10,129,000.00

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED	PRICE
		Bridge Structure and	d Walls				
29	460	Bridge Structures - Flyover	0	LS	\$-	\$	-
30	530	MSE Large Panel Wall	0	SQFT	\$ 78.00	\$	-
	Subtotal:	\$	-				
	Contingency (30%)	\$	-				
				<b>•</b> •••••			

Structure & Wall Subtotal: \$ -

Construction Total: \$ 10,129,000.00

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED	PRICE
		Right-of-Way And U	Itilities				
31		Right-of-Way Impacts	140,329	SQFT	\$ 3.50	\$ 49	1,151.50
					Subtotal:	\$ 49	1,151.50
	Contingency (30%)	\$ 14	7,345.45				
	ROW Subtotal:	\$ 63	8,000.00				

Grand Total: \$ 10,767,000.00

	ALTERNATIVE 7A At-Grade Intersection (Sheridan Lk Rd & Catron Blvd Intersection)										
NO.	ITEM NO.		APPROX QTY			UNIT BID PRICE		EXTENDED PRICE			
		Roadway	1				1				
1	009	Mobilization	1	LS	\$	600,000.00	\$	600,000.00			
2	009	Construction Staking	1	LS	\$	38,900.00	\$	38,900.00			
3	100	Clearing	1	LS	\$	56,000.00	\$	56,000.00			
4	110	Remove Concrete Curb & Gutter	1,500	LF	\$	5.50	\$	8,300.00			
5	110	Remove Concrete Pavement	34,600	SY	\$	6.00	\$	207,600.00			
6	110	Remove ACC Pavement	5,100	SY	\$	3.50	\$	17,900.00			
7	110	Remove Luminaire Pole	25	EA	\$	250.00	\$	6,300.00			
8	120	Unclassified Excavation	47,700	CY	\$	4.50	\$	214,700.00			
9	120	Borrow Unclassified Excavation	12,300	CY	\$	5.50	\$	67,700.00			
10	230	Remove & Place Topsoil	5,100	CY	\$	2.50	\$	12,800.00			
11	260	Gravel Cushion / Base Course	20,300	TON	\$	15.00	\$	304,500.00			
12	320	Asphalt Concrete Composite (6" ACC / 9" Base)	900	TON	\$	100.00	\$	90,000.00			
13	380	10" Nonreinforced PCC Pavement (10" PCC / 5" Base)	61,200	SY	\$	50.00	\$	3,060,000.00			
14	380	6" Median PCC Pavement (6" ACC / 15" Base)	400	SY	\$	60.00	\$	24,000.00			
15	450	Storm Sewer	6,700	LF	\$	90.00	\$	603,000.00			
16	633	Pavement Marking	60,700	LF	\$	0.60	\$	36,400.00			
17	634	Traffic Control	1	LS	\$	454,500.00	\$	454,500.00			
18	651	Concrete Sidewalk (6" PCC / 2" Base)	96,000	SF	\$	6.50	\$	624,000.00			
19	635	Roadway Lighting	1	LS	\$	250,000.00	\$	250,000.00			
20	635	Traffic Signal System	1	EA	\$	350,000.00	\$	350,000.00			
21	650	Type B66 Concrete Curb and Gutter	800	LF	\$	22.00	\$	17,600.00			
22	650	Type B610 Concrete Curb and Gutter	13,300	LF	\$	23.00	\$	305,900.00			
23	650	Concrete Barrier Curb and Gutter	0	LF	\$	220.00	\$	-			
24	670	Drainage Structure	82	EA	\$	3,500.00	\$	287,000.00			
25	730-732	Seeding, Fertilizing, Mulching	6	AC	\$	19,000.00	\$	114,000.00			
26	734	Erosion Control and Landscaping Restoration	1	LS	\$	232,600.00	\$	232,600.00			
27	671	Sanitary Sewer - Reconstruct Manhole	23	EA	\$	2,000.00	\$	46,000.00			
28	451	Water Main - Hydrant Relocation (Furnish New)	21	EA	\$	6,000.00	\$	126,000.00			
						Subtotal:	\$	8,155,700.00			
				(	Cont	tingency (30%)	\$	2,446,710.00			

Construction Cost Subtotal: \$ 10,602,000.00

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED	PRICE
		Bridge Structure and	d Walls			•	
29	460	Bridge Structures - Flyover	0	LS	\$-	\$	-
30	530	MSE Large Panel Wall	0	SQFT	\$ 78.00	\$	-
					Subtotal:	\$	-
				(	Contingency (30%)	\$	-
Structure & Wall Subtotal						\$	-

10,602,000.00 Construction Total: \$

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED	PRICE			
	Right-of-Way And Utilities									
31		Right-of-Way Impacts	127,021	SQFT	\$ 3.50	\$ 44	4,573.50			
					Subtotal:	\$ 44	4,573.50			
				C	Contingency (30%)	\$ 13	3,372.05			
					ROW Subtotal:	\$ 57	8,000.00			

#### Grand Total: \$ 11,180,000.00

		ALTERNATIV At-Grade Intersection with (Sheridan Lk Rd & Catron I	Future Road	•			
NO.	ITEM NO.	ITEM DESCRIPTION	APPROX	UNIT		UNIT BID PRICE	EXTENDED PRICE
		Roadway					
1	009	Mobilization	1	LS	\$	340,000.00	\$ 340,000.0
2	009	Construction Staking	1	LS	\$	28,000.00	\$ 28,000.0
3	100	Clearing	1	LS	\$	36,000.00	\$ 36,000.0
4	110	Remove Concrete Curb & Gutter	800	LF	\$	5.50	\$ 4,400.0
5	110	Remove Concrete Pavement	22,200	SY	\$	6.00	\$ 133,200.0
6	110	Remove ACC Pavement	2,700	SY	\$	3.50	\$ 9,500.0
7	110	Remove Luminaire Pole	16	EA	\$	250.00	\$ 4,000.0
8	120	Unclassified Excavation	30,500	CY	\$	4.50	\$ 137,300.0
9	120	Borrow Unclassified Excavation	6,100	CY	\$	5.50	\$ 33,600.0
10	230	Remove & Place Topsoil	2,600	CY	\$	2.50	\$ 6,500.0
11	260	Gravel Cushion / Base Course	10,500	TON	\$	15.00	\$ 157,500.0
12	320	Asphalt Concrete Composite (6" ACC / 9" Base)	500	TON	\$	100.00	\$ 50,000.0
13	380	10" Nonreinforced PCC Pavement (10" PCC / 5" Base)	30,200	SY	\$	50.00	\$ 1,510,000.0
14	380	6" Median PCC Pavement (6" ACC / 15" Base)	500	SY	\$	60.00	\$ 30,000.0
15	450	Storm Sewer	3,300	LF	\$	90.00	\$ 297,000.0
16	633	Pavement Marking	28,600	LF	\$	0.60	\$ 17,200.0
17	634	Traffic Control	1	LS	\$	250,000.00	\$ 250,000.0
18	651	Concrete Sidewalk (6" PCC / 2" Base)	54,400	SF	\$	6.50	\$ 353,600.0
19	635	Roadway Lighting	1	LS	\$	160,000.00	\$ 160,000.0
20	635	Traffic Signal System	1	EA	\$	350,000.00	\$ 350,000.0
21	650	Type B66 Concrete Curb and Gutter	400	LF	\$	22.00	\$ 8,800.0
22	650	Type B610 Concrete Curb and Gutter	7,800	LF	\$	23.00	\$ 179,400.0
23	650	Concrete Barrier Curb and Gutter	0	LF	\$	220.00	\$ -
24	670	Drainage Structure	51	EA	\$	3,500.00	\$ 178,500.0
25	730-732	Seeding, Fertilizing, Mulching	3	AC	\$	19,000.00	\$ 57,000.0
26	734	Erosion Control and Landscaping Restoration	1	LS	\$	158,900.00	\$ 158,900.0
27	671	Sanitary Sewer - Reconstruct Manhole	11	EA	\$	2,000.00	\$ 22,000.0
28	451	Water Main - Hydrant Relocation (Furnish New)	11	EA	\$	6,000.00	\$ 66,000.0
			1			Subtotal:	\$ 4,578,400.0
				(	Cont	tingency (30%)	\$ 1,373,520.0

#### Construction Cost Subtotal: \$ 5,952,000.00

APPROX UNIT BID QUANTITY UNIT NO. ITEM NO. **ITEM DESCRIPTION** PRICE EXTENDED PRICE Bridge Structure and Walls 29 460 Bridge Structures - Flyover 0 LS \$ \$ --30 530 MSE Large Panel Wall 0 SQFT \$ 78.00 \$ -Subtotal: \$ -Contingency (30%) \$ -

Structure & Wall Subtotal: \$ -

5,952,000.00

Construct

ion	Total	: :	ş 5
-----	-------	-----	-----

APPROX UNIT BID PRICE NO. ITEM NO. QUANTITY UNIT EXTENDED **ITEM DESCRIPTION** PRICE **Right-of-Way And Utilities** 26,188 Right-of-Way Impacts SQFT \$ 3.50 \$ 91,658.00 31 Subtotal: \$ 91,658.00 Contingency (30%) \$ 27,497.40 ROW Subtotal: \$ 119,000.00

#### Grand Total: \$ 6,071,000.00

	ALTERNATIVE 1 At-Grade Intersection (Sheridan Lk Rd & Corral Drive Intersection)								
NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QTY	UNIT		UNIT BID PRICE		EXTENDED PRICE	
	•	Roadway		•					
1	009	Mobilization	1	LS	\$	410,000.00	\$	410,000.00	
2	009	Construction Staking	1	LS	\$	32,700.00	\$	32,700.00	
3	100	Clearing	1	LS	\$	45,000.00	\$	45,000.00	
4	110	Remove Concrete Curb & Gutter	300	LF	\$	5.50	\$	1,700.00	
5	110	Remove Concrete Pavement	27,400	SY	\$	6.00	\$	164,400.00	
6	110	Remove ACC Pavement	1,000	SY	\$	3.50	\$	3,500.00	
7	110	Remove Luminaire Pole	20	EA	\$	250.00	\$	5,000.00	
8	120	Unclassified Excavation	38,200	CY	\$	4.50	\$	171,900.00	
9	120	Borrow Unclassified Excavation	6,400	CY	\$	5.50	\$	35,200.00	
10	230	Remove & Place Topsoil	3,300	CY	\$	2.50	\$	8,300.00	
11	260	Gravel Cushion / Base Course	11,200	TON	\$	15.00	\$	168,000.00	
12	320	Asphalt Concrete Composite (6" ACC / 9" Base)	200	TON	\$	100.00	\$	20,000.00	
13	380	10" Nonreinforced PCC Pavement (10" PCC / 5" Base)	31,600	SY	\$	50.00	\$	1,580,000.00	
14	380	6" Median PCC Pavement (6" ACC / 15" Base)	200	SY	\$	60.00	\$	12,000.00	
15	450	Storm Sewer	5,900	LF	\$	90.00	\$	531,000.00	
16	633	Pavement Marking	34,100	LF	\$	0.60	\$	20,500.00	
17	634	Traffic Control	1	LS	\$	375,000.00	\$	375,000.00	
18	651	Concrete Sidewalk (6" PCC / 2" Base)	83,400	SF	\$	6.50	\$	542,100.00	
19	635	Roadway Lighting	1	LS	\$	200,000.00	\$	200,000.00	
20	635	Traffic Signal System	1	EA	\$	350,000.00	\$	350,000.00	
21	650	Type B66 Concrete Curb and Gutter	200	LF	\$	22.00	\$	4,400.00	
22	650	Type B610 Concrete Curb and Gutter	10,200	LF	\$	23.00	\$	234,600.00	
23	650	Concrete Barrier Curb and Gutter	0	LF	\$	220.00	\$	-	
24	670	Drainage Structure	66	EA	\$	3,500.00	\$	231,000.00	
25	730-732	Seeding, Fertilizing, Mulching	4	AC	\$	19,000.00	\$	76,000.00	
26	734	Erosion Control and Landscaping Restoration	1	LS	\$	196,700.00	\$	196,700.00	
27	671	Sanitary Sewer - Reconstruct Manhole	13	EA	\$	2,000.00	\$	26,000.00	
28	451	Water Main - Hydrant Relocation (Furnish New)	17	EA	\$	6,000.00	\$	102,000.00	
						Subtotal:	\$	5,547,000.00	
				(	Cont	tingency (30%)	\$	1,664,100.00	
						/	<u>ا</u>		

Construction Cost Subtotal: \$ 7,211,000.00

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED	PRICE
		Bridge Structure and	d Walls				
29	460	Bridge Structures - Flyover	0	LS	\$-	\$	-
30	530	MSE Large Panel Wall	0	SQFT	\$ 78.00	\$	-
					Subtotal:	\$	-
				(	Contingency (30%)	\$	-
				Ch	ra 9 Mall Cubtatal	¢	

Structure & Wall Subtotal: \$ -

Construction Total: \$ 7,211,000.00

NO.	ITEM NO.	ITEM DESCRIPTION	APPROX QUANTITY	UNIT	UNIT BID PRICE	EXTENDED	PRICE
		Right-of-Way And U	Itilities				
31		Right-of-Way Impacts	100,259	SQFT	\$ 3.50	\$ 35	50,906.50
					Subtotal:	\$ 35	50,906.50
				(	Contingency (30%)	\$ 10	)5,271.95
					ROW Subtotal:	\$ 45	56,000.00

Grand Total: \$ 7,667,000.00