Appendix G – 2045 Build Conditions Traffic Operations Technical Memorandum

Technical Memo

Date:	Friday, September 6, 2019
Project:	Southern Meade County Corridor Study
To:	Study Advisory Team
From:	HDR
Subject:	2045 Build Conditions Traffic Operations

Introduction

The purpose of this technical memorandum is to identify minimum build needs and present the associated Build Conditions traffic operations along the proposed east/west corridor between Erickson Ranch Road and 143rd Avenue for the following future-year scenario:

- 2045 Planning Horizon Build Conditions

Primary components of the Build Conditions scenario and this technical memorandum include:

- Traffic operations analysis of Build Conditions at primary intersections and along two-lane highway segments.
- Review of turn lane warrants.
- Recommendations for minimum improvements needed to meet operational goals for this study.

Study Area

The study area is bound by, and includes, the following roadways:

- Elk Creek Road (north boundary)
- 143rd Avenue (east)
- Meade County border (south)
- Erickson Ranch Road (west)

While Elk Vale Road was not part of the original study area, it was included in the traffic forecasts because of its regional importance to connectivity along the eastern edge of the study area. Elk Vale Road provides a direct north/south connection to I-90 (Exit 61) and US16 Bypass.

Build Conditions Roadway Network

The primary difference between the 2045 No-Build and 2045 Build Conditions is the inclusion of a proposed east/west corridor north of the Meade County/Pennington County border that links Erickson Ranch Road, Haines Avenue, and 143rd Avenue. In this study, the corridor was extended over to Elk Vale Road for illustrative purposes as previously described. If the proposed east/west corridor is not extended east to 143rd Avenue, the segment volumes would be applicable to the 224th Street segment between 143rd Avenue and Elk Vale Road.

A series of east/west alignments between Elk Creek Road and the Meade County/Pennington County border were identified in the previous phase of this study. These alignments were narrowed down to three locations, as shown in **Figure 1**, through a comprehensive screening process documented in the May 23, 2019, *Alternatives Development Screening* technical memorandum. Because of the relative close proximity to each other within the overall study area, the same Build Conditions traffic forecasts are applicable to all three of these corridors carried forward for further consideration.

Assumptions used for the proposed east/west corridor operations analysis include:

- Erickson Ranch Road to Haines Avenue: Paved surface (hard surfaced road)
- East of Haines Avenue: Gravel surfacing
- 2-lane highway with 4-foot shoulders
- 30-40% no passing zones due to hilly terrain
- 55 mph design speed (50 mph posted speed)
- Eastbound/westbound approaches on the proposed corridor are stop-controlled
    - Northbound/southbound free movements

Traffic Volume Development

Daily segment volumes and AM and PM peak hour intersection volumes were developed for 2019 Existing Conditions, 2045 No-Build Conditions, and 2045 Build Conditions scenarios.

The 2019 Existing Conditions volume set was developed for the study area using 2019 segment and peak hour counts, factored to a design season (August) to account for seasonal fluctuations. This volume set serves as the foundation for forecasting traffic throughout the study area.

Traffic forecasts for 2045, both Build and No-Build Conditions, were prepared using the most current version of the Rapid City Area MPO travel demand model (year 2040). Methodology used in the development of segment and intersection peak hour forecasts was consistent with *NCHRP 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design*.

For the forecasting, distribution, and assignment of traffic along the proposed corridor in the 2045 Build Conditions scenario, the following process was used (described further in the *Traffic Forecast* memo dated May 2019):

1. Estimate east/west corridor through trips and add to the potential corridor.
2. Estimate traffic volumes that would access the potential corridor based on travel demand model Transportation Analysis Zone (TAZ)/land use for adjacent TAZs.
3. Estimate traffic distribution throughout study area.
4. Assign TAZ/land use-based traffic to the potential corridor at mid-segments.
5. Estimate north/south through trips at the potential corridor intersections.
6. Estimate east/west corridor through trips and add to the potential corridor.
7. Smooth intersection volumes and balance where applicable.

Analysis traffic volumes for the 2045 Build Conditions are summarized provided in **Figure 2**. The *Traffic Forecasts* technical memorandum presents more details regarding the methodology and process of developing existing conditions and future-year peak hour traffic volumes.

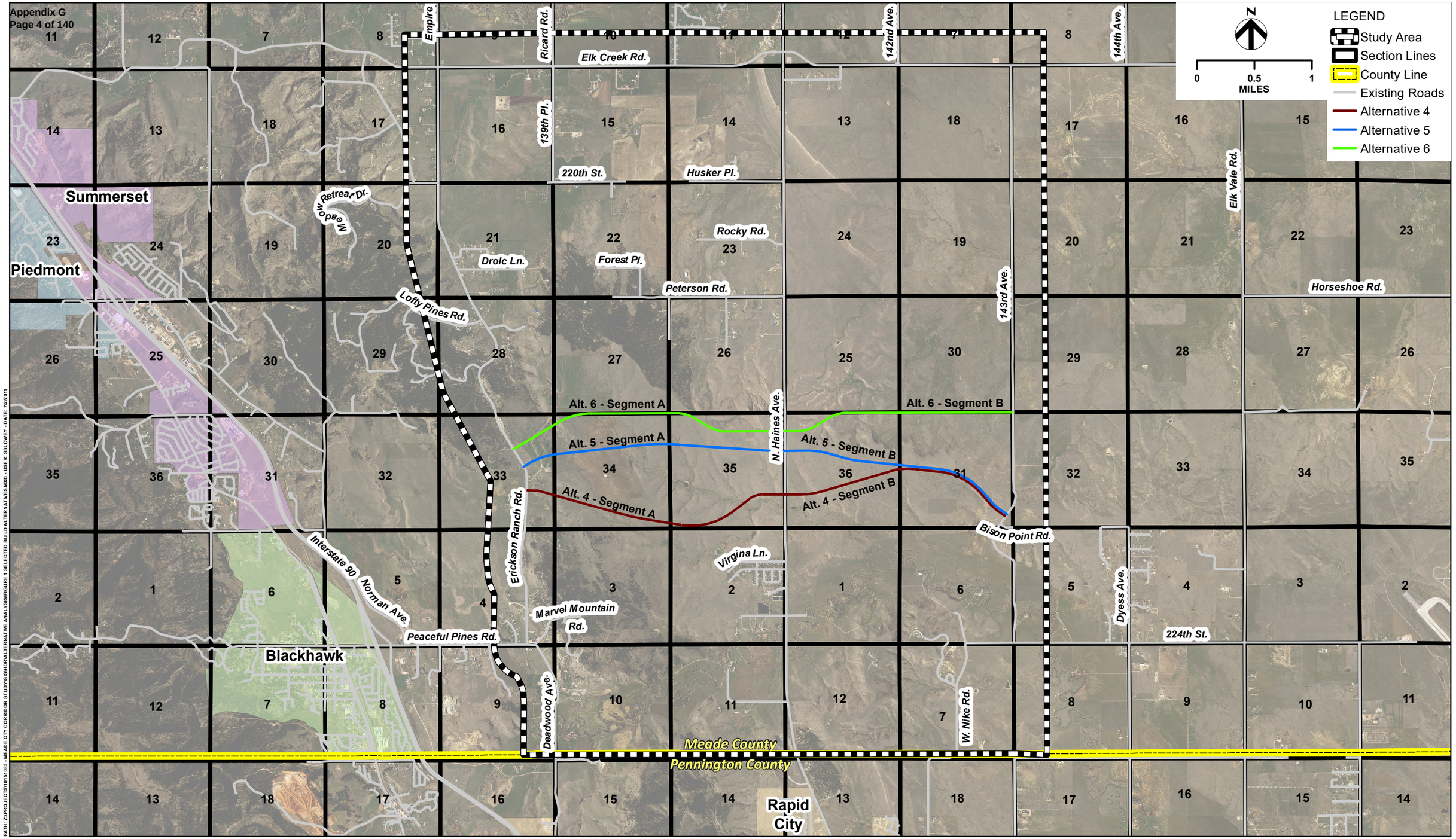
2045 Traffic Forecasts and Proposed East/West Corridor Alternatives

It was found that much of the traffic assigned to the proposed east/west corridor is development driven and destined for an existing north/south route that leads towards Rapid City or an east/west route that leads to I-90. Given the predominant future 2040 land use throughout the study area is rural residential, the east/west travel along the corridor is likely focused on this directional travel to/from home and Rapid City/other areas outside of the study area. Nearly all of the traffic assigned to the east/west corridor comes from this future development identified in the travel demand model.

It would be expected that as the area continues to densify in the future, commercial and other land uses will develop in the area and create a need to accommodate shorter trips contained along the proposed east/west corridor and within the study area.

From a proposed east/west corridor alternative attractiveness standpoint, each of the proposed corridor alternative routes would serve very similar traffic. Each alternative is situated within the Boxelder Creek (and tributaries) valley and would experience similar natural connectivity limitations to development north and south.

Ultimately, the differentiation of future attractiveness between the three corridor alternatives is negligible. The most notable component of localized attractiveness is likely tied to the future location of more dense, urban types of development. Motorists typically seek the shortest/quickest route and do not like to go out of their way (drive past their destination). Therefore, if greater density development (such as an apartment) is constructed north of a proposed corridor route, those trips would likely be more prone to using the east/west corridor than if a similar development is constructed south of the corridor and has alternative access to a north/south route south of the corridor. Therefore, it is recommended that consideration be given to the proximity of natural barriers and that efficient, attractive access to future development is provided along the corridor.



PATH: Z:\PROJECTS\105103 - MEADE CTY CORRIDOR STUDY\GIS\MXD\ALTERNATIVE ANALYSIS\FIGURE 1 SELECTED BUILD ALTERNATIVES.MXD - USER: SSLOWEY - DATE: 7/2/2019

HDR

VICINITY MAP
SELECTED STUDY BUILD ALTERNATIVES

SOUTHERN MEADE COUNTY CORRIDOR STUDY

DATE
7/2/2019

FIGURE
FIGURE 1

N

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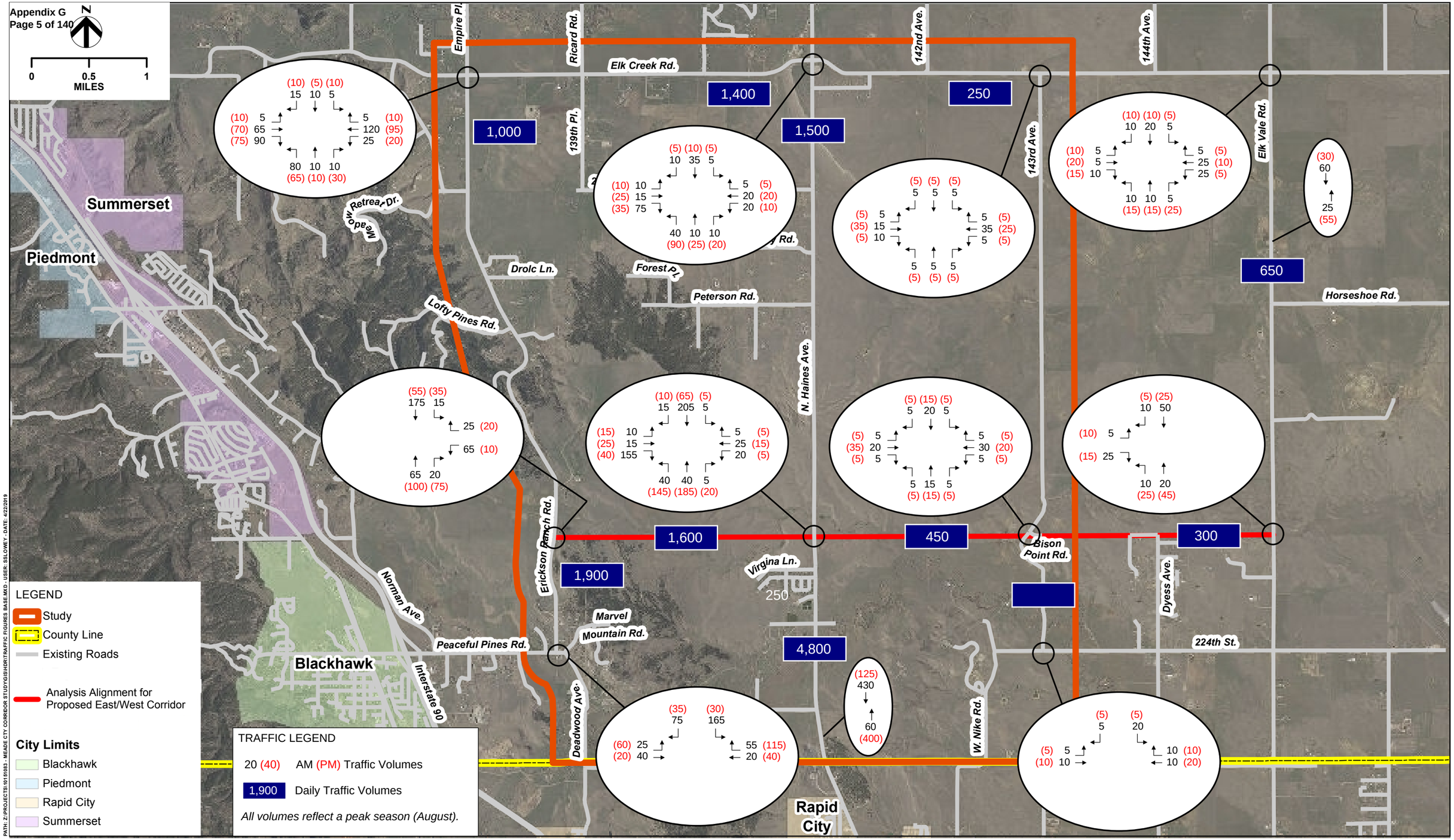
MILES



LEGEND
- Study
- County Line
- Existing Roads
- Analysis Alignment for Proposed East/West Corridor

City Limits
- Blackhawk
- Piedmont
- Rapid City
- Summerset

TRAFFIC LEGEND
- 20 (40) AM (PM) Traffic Volumes
- 1,900 Daily Traffic Volumes

All volumes reflect a peak season (August).

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HDR

2045 BUILD CONDITIONS TRAFFIC FORECASTS PEAK SEASON

SOUTHERN MEADE COUNTY CORRIDOR STUDY

DATE
5/6/2019

FIGURE
2

Traffic Operations Analysis Methodology

Intersection peak hour level of service (LOS) was calculated using 6th Edition of the Highway Capacity Manual (HCM6) analysis methodology replicated in Highway Capacity Software version 7.6 (HCS7). HCM6 analysis methods measure average control delay in terms of seconds of delay per vehicle (sec/veh) at intersections and percent time-spent following (PTSF) on two-lane highways. LOS values can be applied to these measures in accordance with thresholds presented in **Table 1**.

Table 1: Level of Service Thresholds

LOS	Intersection Delay per Vehicle (sec/veh)		Two-Lane Highways PTSF
	Signalized Intersections	Two-Way Stop-Control*, All-Way Stop-Control, and Roundabouts	Percent Time-Spent Following (PTSF) Class II Highway
A	≤ 10	≤ 10	≤ 40
B	> 10 – 20	> 10 – 15	> 40 – 55
C	> 20 - 35	> 15 - 25	> 55 – 70
D	> 35 – 55	> 25 – 35	> 70 – 85
E	> 55 – 80	> 35 – 50	> 85
F	Demand exceeds capacity; > 80	Demand exceeds capacity; > 50	Demand exceeds capacity

Source: Transportation Research Board, HCM6.
* Two-way stop-control LOS reflects worst-case stop-controlled approach.

HCS7 modules used for this analysis include:

- Two-Way Stop-Controlled (TWSC) Intersections – HCS7 TWSC Module
- All-Way Stop-Controlled (AWSC) Intersections – HCS7 AWSC Module
- Two-Lane Highway Segments – HCS7 Two-Lane Module

Current HCM6 methodology does not directly analyze yield-control intersections. For this study, all yield-control approaches will be analyzed as stop-control.

Level of Service Goals for Study

The following minimum allowable LOS thresholds have been established for this study:

- Signalized intersections minimum allowable LOS – LOS B
- Two-way stop-controlled intersections LOS – LOS B (worst-case stop-controlled approach)
- Two-lane highways
    - Rural collector LOS – LOS C
    - Rural minor arterial LOS – LOS B

These LOS thresholds were used to guide the development of potential improvements and subsequent evaluation of concepts.

This memorandum focuses on the traffic operations at the following existing study area intersections:

- Elk Creek Road & Erickson Ranch Road
- Elk Creek Road & Haines Avenue
- Elk Creek Road & 143rd Avenue
- Peaceful Pines Road/Deadwood Avenue & Erickson Ranch Road
- 224th Street & 143rd Avenue
- Proposed east/west corridor & Erickson Ranch Road
- Proposed east/west corridor & Haines Avenue
- Proposed east/west corridor & 143rd Avenue

Intersection Traffic Operations Analysis

A summary of 2045 Build Conditions traffic operations analysis at the primary study area intersections is provided in **Table 2**. Each intersection was built-out, as needed, in the HCS7 traffic model to achieve LOS goals for this study. The resulting recommended intersection lane configurations are shown in **Figure 4**. HCS7 analysis reports are provided in **Appendix A**.

Table 2: Study Area Intersections – 2045 Build Conditions

Study Intersection	Intersection Control Type	AM Peak Period		PM Peak Period	
		Avg. Delay (sec/veh)	LOS	Avg. Delay (sec/veh)	LOS
Elk Creek Road & Erickson Ranch Road	TWSC*	13.3	B	12.0	B
Elk Creek Road & Haines Avenue	AWSC	7.7	A	8.1	A
Elk Creek Road & 143rd Avenue	TWSC*	9.4	A	9.4	A
Peaceful Pines Road/ Deadwood Avenue & Erickson Ranch Road	TWSC*	11.1	B	9.7	A
224th Street & 143rd Avenue	TWSC*	8.8	A	8.7	A
East/West Corridor & Erickson Ranch Road	TWSC*	11.2	B	9.9	A
East/West Corridor & Haines Avenue	TWSC* AWSC Roundabout	15.2 9.8 5.1	C A A	17.1 11.5 5.6	C B A
East/West Corridor & 143rd Avenue	TWSC*	9.8	A	9.8	A

* Two-way stop-control LOS reflects worst-case stop-controlled approach.

No modifications were needed to achieve LOS goals at any of the existing intersections and thus it can be concluded that the existing intersection configurations are adequate for future-year volumes developed for this study.

Along the proposed corridor, each intersection was initially analyzed with a shared approach lane configuration of shared left/thru/right from a single lane. Locations where lanes were separated to achieve LOS goals are noted in discussion. As stated in the initial assumptions of the proposed east/west corridor, it was assumed that the east/west corridor was stop-controlled and the north/south roadways had free movements.

It was found that the primary location with notable delay in TWSC conditions was at the proposed east/west corridor and Haines Avenue. Worst-case stop-controlled approach delay was measured at LOS C in both the AM and PM peak periods. The greatest delays were measured on the low-volume westbound approach and thus separating left-turn and through traffic provides minimal benefit to this LOS measure. The weighted average intersection delay, which accounts for all measured delay throughout the intersection as well as the operational benefits afforded to the free movements at a TWSC intersection, was less than 7 and 6 seconds for AM and PM peak hours, respectively.

Two other intersection alternatives were analyzed at the proposed east/west corridor and Haines Avenue intersection. Both an AWSC intersection and roundabout result in acceptable LOS for this study and are feasible solutions to address future traffic volumes at this intersection. The roundabout configuration results in the lowest overall intersection delay of the three options.

Two-Lane Highway Traffic Operations Analysis

Two-lane highway segments were analyzed using Existing Conditions and 2045 No-Build Conditions traffic volumes for the following paved highway segments:

- Erickson Ranch Road
- Haines Avenue – north of Virginia Lane
- Haines Avenue – south of Virginia Lane
- Elk Creek Road
- Proposed east/west corridor

The 2045 Build Conditions assumes the same roadway conditions, but updates traffic volumes with the future-year Build forecasts. HCM6 methodology does not currently support analysis of gravel roadway segments, and thus existing gravel roadways were not analyzed as part of this review.

Two-lane highway operational analysis results for the 2045 Build Conditions are summarized in **Table 3**. It was found that all analyzed segments, including the proposed east/west collector, result in a LOS C or better. This meets rural collector LOS goals for this study.

Table 3: Two-Lane Highway Segments – 2045 Build Conditions

Study Two-Lane Highway Segment	Functional Classification	Peak Hour	Peak Direction of Travel	AM Peak Period		PM Peak Period	
				PTSF[1] (%)	LOS	PTSF[1] (%)	LOS
Erickson Ranch Rd *Elk Creek Rd – Westridge Rd*	Rural Collector	AM	SB	46.9	B		
		PM	NB			41.3	B
Erickson Ranch Rd *Westridge Rd – East/West Corridor*	Rural Collector	AM	SB	59.3	C		
		PM	NB			48.4	B
Erickson Ranch Rd *East/West Corridor – Peaceful Pines Rd*	Rural Collector	AM	SB	64.9	C		
		PM	NB			58.4	C
Haines Avenue *Elk Creek Rd – East/West Corridor*	Rural Collector	AM	SB	56.9	C		
		PM	NB			50.1	B
Haines Avenue *East/West Corridor – Pennington County*	Rural Collector	AM	SB	65.0	C		
		PM	NB			64.5	C
Elk Creek Road *Erickson Ranch Rd – Haines Ave*	Rural Collector	AM	EB	29.0	A		
		PM	WB			28.1	A
East/West Corridor *Erickson Ranch Rd – Haines Ave*	Rural Collector	AM	EB	50.7	B		
		PM	WB			49.5	B

[1] PTSF reflects analysis in the peak direction

As found in the previous 2045 No-Build Conditions analysis, segments exhibiting the greatest percentage of time a vehicle spends following another vehicle are located towards the southern study area boundary.

The proposed east/west corridor 2-lane highway cross-section, paved between Erickson Ranch Road and Haines Avenue, is expected to meet LOS goals for this study. The proposed gravel segment between Haines Avenue and 143rd Avenue was not analyzed in HCS7.

Roadway Segment Capacity Assessment

Another method to estimate capacity-related needs is to compare daily segment volume forecasts, as presented in **Figure 2**, to LOS-based roadway segment capacity thresholds (as presented in the *South Dakota Department of Transportation Road Design Manual* Table 15-10). These thresholds, shown in **Table 4**, represent a planning-level guide to cross-sectional needs in terms of through lanes and potential turn lanes based on traffic volumes.

Table 4: Estimated Number of Lanes Based on Daily Traffic Volumes

Total Number of Lanes	Description	Total Design Year ADT [1]	
		Rural Level	Urban
2	1 lane in each direction	< 8,000	< 2,500
3	1 lane in each direction plus center turn lane	[2]	2,500 to 16,000
4	2 lanes in each direction	8,000 to 20,000 [3]	[3]
5	2 lanes in each direction plus center turn lane	[2]	16,000 to 30,000
6	3 lanes in each direction	> 20,000 [4]	> 30,000 [4]

Source: *South Dakota Department of Transportation Road Design Manual*, Table 15-10 (as of 4/26/19)

1 Construction/Reconstruction projects are designed based on a typical 20 year ADT projection beyond the anticipated year of project construction.

2 Continuous left turn lanes may be considered based on left turn volumes and/or when intersections and/or approaches are closely spaced together.

3 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.

4 Medians should be used.

All roadways within the study exhibit a 2045 daily traffic volume forecast that is less than the 'Rural Level' threshold of 8,000 for a two-lane roadway.

As Rapid City continues to grow northward and the area becomes more urbanized, particularly for the southern areas of Meade County, a 3-lane urban cross-section may be applicable. This would provide one lane in each direction plus a center turn lane.

Proposed East/West Corridor Intersection Turn Lanes

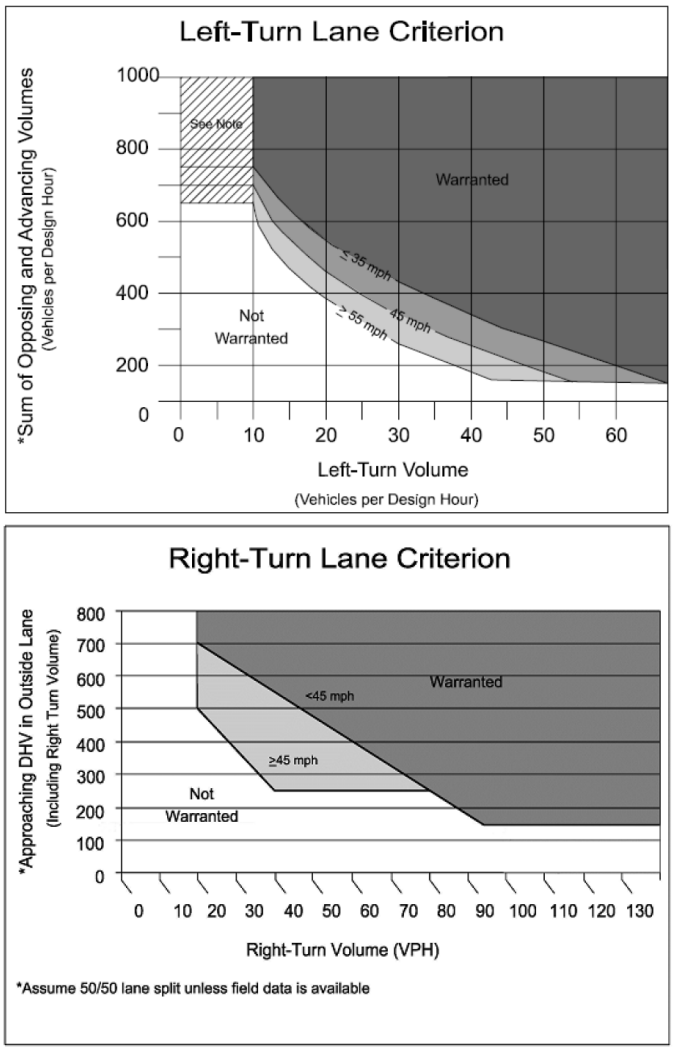
A turn lane warrant evaluation was conducted using 2045 Build Conditions traffic forecasts for the north/south free movements at the proposed east/west corridor intersections with Erickson Ranch Road, Haines Avenue, and 143rd Avenue. Turn lanes for the proposed east/west corridor stop-controlled approaches are typically dictated by operational (delay) needs, as all vehicles are required to stop at the intersection.

This evaluation serves as a tool to aid conceptual design. Conclusions from this evaluation do not require installation, or non-installation, of a turn lane. Turn lanes to crossroads and driveways provide operational and safety benefits to arterial roadway traffic by minimizing through traffic hazards and interference.

Engineering judgment and other factors such as lane balance, access density, route continuity, and sight distance, contribute to the ultimate determination whether a turn lane is constructed. Additionally, future development intensity, timeframe, and desired access play a role in the level of demand at these future minor street intersections and driveways.

Turn lane warrant criteria for the free intersection movements used in this analysis are based on standards for turn lanes presented in the SDDOT Road Design Manual, shown in **Figure 3**. These standards consider the relationship between traffic volumes, posted (or future) speed limits, and number of lanes on a facility to determine whether a turn lane is warranted.

Figure 3: Turn Lane Volume Warrant Criterion



Source: *South Dakota Department of Transportation Road Design Manual*, Figures 15-2 and 15-3 (as of 7/11/19); adapted from Oregon DOT Analysis Procedures Manual 2008.

Table 5 presents results of the turn lane analysis for the north/south free movements at proposed intersections with the east/west corridor.

Table 5: Proposed East/West Corridor Intersection Turn Lane Volume Warrant Review

Future East/West Corridor Intersection	Turn Movement	2045 Turn Lane Volume Warrant Satisfied
Erickson Ranch Road	NB RT	No
	SB LT	No
Haines Avenue	NB LT	Yes (AM & PM)
	NB RT	No
	SB LT	No*
	SB RT	No
143rd Avenue	NB LT	No
	NB RT	No
	SB LT	No
	SB RT	No

Analysis Methodology Source: *South Dakota Department of Transportation Road Design Manual*, Figures 15-2 and 15-3 (as of 7/11/19)

* Consider LT lane when opposing direction includes warranted left-turn lane.

The primary turn lane need based on forecasted volumes for this study is the high volume northbound to westbound left-turn movement at the intersection of the proposed east/west corridor and Haines Avenue. A turn lane at this location would remove left-turning vehicles from the through movement and allow them to wait for a gap in southbound traffic in a turn lane. While not warranted, the complimentary southbound left-turn lane is also recommended to not only remove left-turning traffic from the free through movement but also provides better sight angles when there is a turning vehicle in the opposing left-turn lane.

While turn lanes are not warranted at other locations, further consideration to installation should be given during design due to the operational and safety benefits turn lanes provide.

Recommendations

The following summarizes minimum Build recommendations for the proposed east/west corridor for year 2045. The recommended lane configurations for the proposed east/west corridor are shown in **Figure 4**.

Proposed East/West Corridor Cross-Section

- 2-lane highway section meets LOS goals for this study
- Other cross-sectional elements shall meet current and applicable design standards for the proposed roadway.

Proposed East/West Corridor Intersections

ERICKSON RANCH ROAD

- Turn lanes: LOS goals achieved with shared left/through/right lane configurations.
- Assumes stop-control from proposed east/west corridor approach

HAINES AVENUE

- Two-Way Stop-Control Intersection
  - Worst-case stop-controlled approach does not meet LOS goals for this study, but delay is a low LOS C (less than 20 seconds for low volume westbound approach) and overall intersection delay is less than 7 seconds.
  - Turn Lanes: Northbound left-turn lane warranted; opposing southbound left-turn lane recommended.
  - Assumes stop-control from proposed east/west corridor approach
- All-Way Stop-Control Intersection
  - Turn Lanes: shared left/through/right configuration meets LOS goals for this study
- Roundabout
  - Single-lane roundabout achieves LOS goals for this study and results in the lowest delay of all analyzed intersection configurations.

143RD AVENUE

- Turn lanes: LOS goals achieved with shared left/through/right lane configurations.
- Assumes stop-control from proposed east/west corridor approach

Additional Considerations

TURN LANES

It is recommended that turn lanes be considered at other unwarranted locations based on the operational and safety benefits they provide, particularly when removing turning traffic from high-speed through movements. One example is at the Erickson Ranch Road intersection.

EAST/WEST CORRIDOR ALIGNMENT ALTERNATIVES

Each of the three proposed east/west corridor alignment alternatives are within close proximity to each other from a study area perspective. At the greatest separation, they are still within the same section boundary (one-mile width). From a traffic perspective, each of these three alignments represent the most beneficial location as discussed in the May 23, 2019, *Alternatives Development Screening* technical memorandum. Overall differentiation between these three alignments with regard to traffic volumes is minimal. It will be important to manage access to/from development surrounding the corridor, providing safe and efficient connectivity that maintains the attractiveness and intended function of the corridor.

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MILES

Roundabout Option

All-Way Stop-Control Option

Two-Way Stop-Control Option*

Empire Pl.
Ricard Rd.
139th Pl.
142nd Ave.
144th Ave.
143rd Ave.
Elk Vale Rd.
Horseshoe Rd.
Summerset
Piedmont
Meadow Retreat Dr.
Drolc Ln.
Lofty Pines Rd.
N. Haines Ave.
Erickson Ranch Rd.
Virgina Ln.
Bison Point Rd.
Dyess Ave.
224th St.
Norman Ave.
Marvel
Peaceful
Blackhawk
Interstate 90
W. Nike Rd.
Rapid City

LEGEND
- Study
- County Line
- Existing Roads
- Example Alignment (See Preliminary Alternative Analysis Memo for all Potential Alignment Locations)

City Limits
- Blackhawk
- Piedmont
- Rapid City
- Summerset

TRAFFIC LEGEND
- Intersection Approach Lane Configuration
- Intersection Control

NOTES

Lane configuration and traffic control represent the minimum required configuration to meet LOS goals and turn lane warrants based on traffic forecasts developed for this study. Further consideration of turn lanes at unwarranted locations is recommended during design.

* Worst-case two-way stop-control delay represents a low LOS C, which does not meet study goal of LOS B. Weighted average delay, accounting for all vehicles entering the intersection, represents LOS A.

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MINIMUM REQUIRED LANE CONFIGURATIONS TO MEET STUDY LOS AND TURN LANE WARRANT GOALS

SOUTHERN MEADE COUNTY CORRIDOR STUDY

DATE
7/12/2019

FIGURE
4

Appendix

A. 2045 Build Conditions HCS7 Reports
B. 2045 Turn Lane Volume Warrant Review

Appendix A – 2045 Build Conditions HCS7 Reports

HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_AM_224th-143rd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	224th St & 143rd Ave
Major Street Direction:	East-West
East/West Street Name:	224th Street
North/South Street Name:	143rd Avenue
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	EastBound				WestBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		5	10				10	10
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		6	13				13	13
Percent Heavy Vehicles		3						
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration		LT						TR
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				20		5
Peak Hour Factor, PHF			0.80			
Hourly Flow Rtae, HFR				25		6
Percent Heavy Vehicles				3		3
Number of Lanes	0	0	0	0	1	0
Lane Configuration					LR	
RT channelized?						
Flared Approach | Storage		|		No	|	
Percent Grade					0	

Pedestrian Volumes and Adjustments

Approach	EB	WB	NB	SB
Movement	13	14	15	16
Flow (ped/hr)	0	0		0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		LT							LR	
Flow Rate		6							31	
Lane Capacity		1583							978	
v/c		0.00							0.03	
95% Queue Length		0.0							0.1	
Control Delay		7.3							8.8	
LOS		A							A	
Approach Delay		2.4							8.8	
Approach LOS									A	
Intersction Delay		4.3								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	EastBound				WestBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	NorthBound				SouthBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Volume, V_x		5	10				10	10
Flow Rate, v_x		6	13				13	13

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Volume, V_x					20		5
Flow Rate, v_x					25		6

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Flow Rate, v_x		6	13				13	13
Conflicting Flow, v_c,x		25						

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Flow Rate, v_x					25		6
Conflicting Flow, v_c,x					44		19

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1						7.1		6.2
Stage I										
Stage II										
t_c,HV		1.0						1.0		1.0
P_HV		0.03						0.03		0.03
t_c,G								0.2		0.1
G								0		0
t_3,LT		0.0						0.7		0.0
t_c										
Single Stage		4.13						6.43		6.23
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2						3.5		3.3
t_f,HV		0.9						0.9		0.9
P_HV		0.03						0.03		0.03
t_f		2.23						3.53		3.33

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		25						44		19
t_c,x		4.13						6.43		6.23
t_f,x		2.23						3.53		3.33
c_p,x		1583						964		1057

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance

Approach	EB	WB	NB	SB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0		0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4	
Conflicting Flow, v_c,x		25		
Potential Capacity, c_p,x		1583		
Pedestrian Impedance Factor, p_p,x		1.000		
Movement Capacity, c_m,x		1583		
Probability of Queue-free State, p_0,j		0.996		
Major L-Shared Probability Queue-free State, p*_0,j		0.996		

Minor-Street Right-Turn Movements		9	12	
Conflicting Flow, v_c,x			19	
Potential Capacity, c_p,x			1057	
Pedestrian Impedance Factor, p_p,x			1.000	
Movement Capacity, c_m,x			1057	
Probability of Queue-free State, p_0,j			0.994	

Major-Street U-Turn Movements		1U	4U	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Shared L/U Capacity, c_SH				
Probability of Queue-free State, p_0,j				

Minor-Street Through Movements		8	11	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Pedestrian Impedance Factor, p_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Probability of Queue-free State, p_0,j				

Minor-Street Left-Turn Movements		7	10	
Conflicting Flow, v_c,x			44	
Potential Capacity, c_p,x			964	
Pedestrian Impedance Factor, p_p,x			1.000	
Major L, Minor T Adjusted Impedance Factor, p"				
Major L, Minor T Impedance Factor, p'				
Capacity Adjustment Factor, f_x			0.996	
Movement Capacity, c_m,x			961	

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
Lane Configuration					LR	
Shared Flow Rate, v_y					31	
Movement Capacity, c_m,x				961		1057
Shared Capacity, c_SH					978	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	EB			WB		NorthBound		SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		6						25		6
Movement Capacity		1583						961		1057
Lane Configuration		LT							LR	
Shared Capacity									978	
Control Delay		7.3							8.8	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach		EB	WB
Movement		2	5
Number of Major Street Through Lanes, N		1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j		0.996	
Delay to Major Left-turning Vehicles, d_MLT		7.3	
Major Street Through Vehicles in Shared Lane, v_i1		13	
Major Street Turning Vehicles in Shared Lane, v_i2		6	
Saturation Flow Rate for Major Street Through, s_i1		1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700
Delay to Rank 1 Vehicles, d_Rank1	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		LT							LR	
Flow Rate		6							31	
Lane Capacity		1583							978	
v/c		0.00							0.03	
95% Queue Length		0.0							0.1	
Control Delay		7.3							8.8	
LOS		A							A	
Approach Delay		2.4							8.8	
Approach LOS									A	
Intersction Delay		4.3								

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HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_AM_EastWestCorridor-143rd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	E/W Corridor & 143rd Ave
Major Street Direction:	North-South
East/West Street Name:	East/West Corridor
North/South Street Name:	143rd Ave
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		5	15	5		5	20	5
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		6	19	6		6	25	6
Percent Heavy Vehicles		20				20		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	WestBound				EastBound		
Movement	7	8	9		10	11	12
	L	T	R		L	T	R
Volume	5	30	5		5	20	5
Peak Hour Factor, PHF			0.80				
Hourly Flow Rtae, HFR	6	38	6		6	25	6
Percent Heavy Vehicles	20	20	20		20	20	20
Number of Lanes	0	1	0		0	1	0
Lane Configuration		LTR				LTR	
RT channelized?							
Flared Approach | Storage	No	|		No	|	
Percent Grade		0				0	

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		6		50			38	
Lane Capacity		1472		1480		801			808	
v/c		0.00		0.00		0.06			0.05	
95% Queue Length		0.0		0.0		0.2			0.1	
Control Delay		7.5		7.4		9.8			9.7	
LOS		A		A		A			A	
Approach Delay		1.5		1.3		9.8			9.7	
Approach LOS						A			A	
Intersction Delay		6.1								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	WestBound				EastBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1	2	3	|	4	5	6
	L	T	R	|	L	T	R
Volume, V_x	5	15	5		5	20	5
Flow Rate, v_x	6	19	6		6	25	6

Minor Street:

Approach	WestBound				EastBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Volume, V_x	5	30	5		5	20	5
Flow Rate, v_x	6	38	6		6	25	6

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1	2	3	|	4	5	6
	L	T	R	|	L	T	R
Flow Rate, v_x	6	19	6		6	25	6
Conflicting Flow, v_c,x	31				25		

Minor Street:

Approach	WestBound				EastBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Flow Rate, v_x	6	38	6		6	25	6
Conflicting Flow, v_c,x	91	78	22		97	78	28

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1	4	7	8	9	10	11	12		
	L	U	L	U	L	T	R	L	T	R
t_c,base										
Single Stage	4.1		4.1		7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV	1.0		1.0		1.0	1.0	1.0	1.0	1.0	1.0
P_HV	0.20		0.20		0.20	0.20	0.20	0.20	0.20	0.20
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT	0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage	4.30		4.30		7.30	6.70	6.40	7.30	6.70	6.40
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1	4	7	8	9	10	11	12		
	L	U	L	U	L	T	R	L	T	R
t_f,base	2.2		2.2		3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV	0.9		0.9		0.9	0.9	0.9	0.9	0.9	0.9
P_HV	0.20		0.20		0.20	0.20	0.20	0.20	0.20	0.20
t_f	2.38		2.38		3.68	4.18	3.48	3.68	4.18	3.48

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1	4	7	8	9	10	11	12		
	L	U	L	U	L	T	R	L	T	R
v_c,x	31		25		91	78	22	97	78	28
t_c,x	4.30		4.30		7.30	6.70	6.40	7.30	6.70	6.40
t_f,x	2.38		2.38		3.68	4.18	3.48	3.68	4.18	3.48
c_p,x	1472		1480		852	779	1006	844	779	997

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance				
Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements	1	4
Conflicting Flow, v_c,x	31	25
Potential Capacity, c_p,x	1472	1480
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	1472	1480
Probability of Queue-free State, p_0,j	0.996	0.996
Major L-Shared Probability Queue-free State, p*_0,j	0.996	0.996

Minor-Street Right-Turn Movements	9	12
Conflicting Flow, v_c,x	22	28
Potential Capacity, c_p,x	1006	997
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	1006	997
Probability of Queue-free State, p_0,j	0.994	0.994

Major-Street U-Turn Movements	1U	4U
Conflicting Flow, v_c,x		
Potential Capacity, c_p,x		
Capacity Adjustment Factor, f_x		
Movement Capacity, c_m,x		
Shared L/U Capacity, c_SH		
Probability of Queue-free State, p_0,j		

Minor-Street Through Movements	8	11
Conflicting Flow, v_c,x	78	78
Potential Capacity, c_p,x	779	779
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Capacity Adjustment Factor, f_x	0.991	0.991
Movement Capacity, c_m,x	772	772
Probability of Queue-free State, p_0,j	0.951	0.968

Minor-Street Left-Turn Movements	7	10
Conflicting Flow, v_c,x	91	97
Potential Capacity, c_p,x	852	844
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"	0.959	0.943
Major L, Minor T Impedance Factor, p'	0.969	0.957
Capacity Adjustment Factor, f_x	0.963	0.951
Movement Capacity, c_m,x	821	803

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		50			38	
Movement Capacity, c_m,x	821	772	1006	803	772	997
Shared Capacity, c_SH		801			808	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		6		6	6	38	6	6	25	6
Movement Capacity		1472		1480	821	772	1006	803	772	997
Lane Configuration						LTR			LTR	
Shared Capacity						801			808	
Control Delay		7.5		7.4		9.8			9.7	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	NB	SB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.996	0.996
Delay to Major Left-turning Vehicles, d_MLT	7.5	7.4
Major Street Through Vehicles in Shared Lane, v_i1	19	25
Major Street Turning Vehicles in Shared Lane, v_i2	13	13
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	0.0	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB		SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		6		50			38	
Lane Capacity		1472		1480		801			808	
v/c		0.00		0.00		0.06			0.05	
95% Queue Length		0.0		0.0		0.2			0.1	
Control Delay		7.5		7.4		9.8			9.7	
LOS		A		A		A			A	
Approach Delay		1.5		1.3		9.8			9.7	
Approach LOS						A			A	
Intersction Delay		6.1								

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HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_AM_EastWestCorridor-ElkVale_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	E/W Corridor & Elk Vale R
Major Street Direction:	North-South
East/West Street Name:	East/West Corridor
North/South Street Name:	Elk Vale Rd
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:									
Approach		NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6	
	U	L	T	R	U	L	T	R	
Volume		10	20				50	10	
Peak Hour Factor, PHF				0.80					
Hourly Flow Rtae, HFR		13	25				63	13	
Percent Heavy Vehicles		14							
Number of Lanes	0	0	1	0	0	0	1	0	
Lane Configuration		LT						TR	
Median Type				Undivided					
Median Storage									
RT channelized?									
Left-Turn Lane Storage									
Upstream Signal?				Not Present					

Minor Street:							
Approach	WestBound			EastBound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume				5		25	
Peak Hour Factor, PHF			0.80				
Hourly Flow Rtae, HFR				6		31	
Percent Heavy Vehicles				14		14	
Number of Lanes	0	0	0	0	1	0	
Lane Configuration					LR		
RT channelized?							
Flared Approach | Storage		|		No	|		
Percent Grade					0		

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0		0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		LT							LR	
Flow Rate		13							38	
Lane Capacity		1451							939	
v/c		0.01							0.04	
95% Queue Length		0.0							0.1	
Control Delay		7.5							9.0	
LOS		A							A	
Approach Delay		2.5							9.0	
Approach LOS									A	
Intersction Delay		2.9								

Step 1: MOVEMENT PRIORITIES

Major Street:									
Approach		NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6	
Movement	U	L	T	R	U	L	T	R	
Minor Street:									

Approach	WestBound			EastBound		
Priority	7	8	9	10	11	12
Movement	L	T	R	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume, V_x		10	20				50	10
Flow Rate, v_x		13	25				63	13

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume, V_x				5		25
Flow Rate, v_x				6		31

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Flow Rate, v_x		13	25				63	13
Conflicting Flow, v_c,x		75						

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Flow Rate, v_x				6		31
Conflicting Flow, v_c,x				119		69

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1						7.1		6.2
Stage I										
Stage II										
t_c,HV		1.0						1.0		1.0
P_HV		0.14						0.14		0.14
t_c,G								0.2		0.1
G								0		0
t_3,LT		0.0						0.7		0.0
t_c										
Single Stage		4.24						6.54		6.34
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2						3.5		3.3
t_f,HV		0.9						0.9		0.9
P_HV		0.14						0.14		0.14
t_f		2.33						3.63		3.43

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		75						119		69
t_c,x		4.24						6.54		6.34
t_f,x		2.33						3.63		3.43
c_p,x		1451						849		962

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance				
Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0		0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4	
Conflicting Flow, v_c,x		75		
Potential Capacity, c_p,x		1451		
Pedestrian Impedance Factor, p_p,x		1.000		
Movement Capacity, c_m,x		1451		
Probability of Queue-free State, p_0,j		0.991		
Major L-Shared Probability Queue-free State, p*_0,j		0.991		

Minor-Street Right-Turn Movements		9	12	
Conflicting Flow, v_c,x			69	
Potential Capacity, c_p,x			962	
Pedestrian Impedance Factor, p_p,x			1.000	
Movement Capacity, c_m,x			962	
Probability of Queue-free State, p_0,j			0.968	

Major-Street U-Turn Movements		1U	4U	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Shared L/U Capacity, c_SH				
Probability of Queue-free State, p_0,j				

Minor-Street Through Movements		8	11	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Pedestrian Impedance Factor, p_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Probability of Queue-free State, p_0,j				

Minor-Street Left-Turn Movements		7	10	
Conflicting Flow, v_c,x			119	
Potential Capacity, c_p,x			849	
Pedestrian Impedance Factor, p_p,x			1.000	
Major L, Minor T Adjusted Impedance Factor, p"				
Major L, Minor T Impedance Factor, p'				
Capacity Adjustment Factor, f_x			0.991	
Movement Capacity, c_m,x			842	

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration					LR	
Shared Flow Rate, v_y					38	
Movement Capacity, c_m,x				842		962
Shared Capacity, c_SH					939	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound		EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		13						6		31
Movement Capacity		1451						842		962
Lane Configuration		LT							LR	
Shared Capacity									939	
Control Delay		7.5							9.0	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach		NB	SB	
Movement		2	5	
Number of Major Street Through Lanes, N		1	1	
Proportion of Rank 1 vehicles not blocked, p*_0,j		0.991		
Delay to Major Left-turning Vehicles, d_MLT		7.5		
Major Street Through Vehicles in Shared Lane, v_i1		25		
Major Street Turning Vehicles in Shared Lane, v_i2		13		
Saturation Flow Rate for Major Street Through, s_i1		1700	1700	

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700
Delay to Rank 1 Vehicles, d_Rank1	0.1

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB		SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		LT							LR	
Flow Rate		13							38	
Lane Capacity		1451							939	
v/c		0.01							0.04	
95% Queue Length		0.0							0.1	
Control Delay		7.5							9.0	
LOS		A							A	
Approach Delay		2.5							9.0	
Approach LOS									A	
Intersction Delay		2.9								

This TWSC text report was created in HCS™ TWSC Version 7.8 on 9/5/2019 2:53:52 PM

HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_AM_EastWestCorridor_EricksonRaRd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	E/W Corridor & Erickson R
Major Street Direction:	North-South
East/West Street Name:	East/West Corridor
North/South Street Name:	Erickson Ranch Road
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume			65	20		15	175	
Peak Hour Factor, PHF					0.80			
Hourly Flow Rtae, HFR			81	25		19	219	
Percent Heavy Vehicles						5		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration				TR		LT		
Median Type					Undivided			
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?					Not Present			

Minor Street:

Approach	WestBound				EastBound		
Movement	7	8	9		10	11	12
	L	T	R		L	T	R
Volume	65		25				
Peak Hour Factor, PHF				0.80			
Hourly Flow Rtae, HFR	81		31				
Percent Heavy Vehicles	5		5				
Number of Lanes	0	1	0		0	0	0
Lane Configuration		LR					
RT channelized?							
Flared Approach | Storage	No	|			|	
Percent Grade		0					

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration				LT		LR				
Flow Rate				19		113				
Lane Capacity				1466		697				
v/c				0.01		0.16				
95% Queue Length				0.0		0.6				
Control Delay				7.5		11.2				
LOS				A		B				
Approach Delay				0.7		11.2				
Approach LOS						B				
Intersction Delay	3.1									

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	WestBound			EastBound		
Priority	7	8	9	10	11	12
Movement	L	T	R	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume, V_x			65	20		15	175	
Flow Rate, v_x			81	25		19	219	

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume, V_x	65		25			
Flow Rate, v_x	81		31			

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Flow Rate, v_x			81	25		19	219	
Conflicting Flow, v_c,x						106		

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Flow Rate, v_x	81		31			
Conflicting Flow, v_c,x	350		94			

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage				4.1	7.1		6.2			
Stage I										
Stage II										
t_c,HV				1.0	1.0		1.0			
P_HV				0.05	0.05		0.05			
t_c,G					0.2		0.1			
G					0		0			
t_3,LT				0.0	0.7		0.0			
t_c										
Single Stage				4.15	6.45		6.25			
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base				2.2	3.5		3.3			
t_f,HV				0.9	0.9		0.9			
P_HV				0.05	0.05		0.05			
t_f				2.25	3.55		3.35			

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x				106	350		94			
t_c,x				4.15	6.45		6.25			
t_f,x				2.25	3.55		3.35			
c_p,x				1466	641		955			

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance				
Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				
Major-Street Left-Turn Movements		1	4	
Conflicting Flow, v_c,x			106	
Potential Capacity, c_p,x			1466	
Pedestrian Impedance Factor, p_p,x			1.000	
Movement Capacity, c_m,x			1466	
Probability of Queue-free State, p_0,j			0.987	
Major L-Shared Probability Queue-free State, p*_0,j			0.985	
Minor-Street Right-Turn Movements		9	12	
Conflicting Flow, v_c,x		94		
Potential Capacity, c_p,x		955		
Pedestrian Impedance Factor, p_p,x		1.000		
Movement Capacity, c_m,x		955		
Probability of Queue-free State, p_0,j		0.967		
Major-Street U-Turn Movements		1U	4U	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Shared L/U Capacity, c_SH				
Probability of Queue-free State, p_0,j				
Minor-Street Through Movements		8	11	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Pedestrian Impedance Factor, p_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Probability of Queue-free State, p_0,j				
Minor-Street Left-Turn Movements		7	10	
Conflicting Flow, v_c,x		350		
Potential Capacity, c_p,x		641		
Pedestrian Impedance Factor, p_p,x		1.000		
Major L, Minor T Adjusted Impedance Factor, p"				
Major L, Minor T Impedance Factor, p'				
Capacity Adjustment Factor, f_x		0.985		
Movement Capacity, c_m,x		632		

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration		LR				
Shared Flow Rate, v_y		113				
Movement Capacity, c_m,x	632		955			
Shared Capacity, c_SH		697				

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12	
Flow Rate				19	81		31				
Movement Capacity				1466	632		955				
Lane Configuration				LT		LR					
Shared Capacity						697					
Control Delay				7.5		11.2					

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	NB	SB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j		0.985
Delay to Major Left-turning Vehicles, d_MLT		7.5
Major Street Through Vehicles in Shared Lane, v_i1		219
Major Street Turning Vehicles in Shared Lane, v_i2		19
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700
Delay to Rank 1 Vehicles, d_Rank1	0.1

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB			SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration				LT		LR				
Flow Rate				19		113				
Lane Capacity				1466		697				
v/c				0.01		0.16				
95% Queue Length				0.0		0.6				
Control Delay				7.5		11.2				
LOS				A		B				
Approach Delay				0.7		11.2				
Approach LOS						B				
Intersction Delay	3.1									

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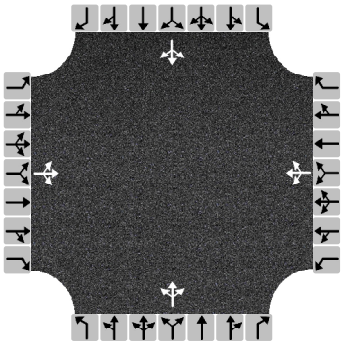
HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	HDR	Intersection	E/W Corridor & Haines Ave
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	7/11/2019	East/West Street	East/West Corridor
Analysis Year	2045	North/South Street	Haines Avenue
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.80
Time Analyzed	AM - 2045 Build Conditon		
Project Description	Southern Meade County Corridor Study		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	10	15	155	20	25	5	40	40	5	5	205	15
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	225			63			106			281		
Percent Heavy Vehicles	6			6			6			6		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.200			0.056			0.094			0.250		
Final Departure Headway, hd (s)	4.57			5.31			5.15			4.83		
Final Degree of Utilization, x	0.286			0.092			0.152			0.377		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.57			3.31			3.15			2.83		

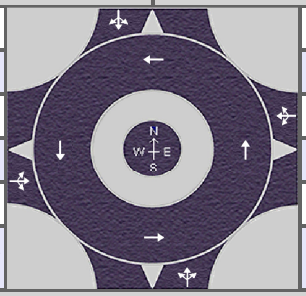
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	225			63			106			281		
Capacity	788			678			699			746		
95% Queue Length, Q_{95} (veh)	1.2			0.3			0.5			1.8		
Control Delay (s/veh)	9.4			8.9			9.1			10.7		
Level of Service, LOS	A			A			A			B		
Approach Delay (s/veh)	9.4			8.9			9.1			10.7		
Approach LOS	A			A			A			B		
Intersection Delay, s/veh | LOS	9.8						A					

HCS7 Roundabouts Report

General Information

Analyst	HDR
Agency or Co.	HDR
Date Performed	7/11/2019
Analysis Year	2045
Time Analyzed	AM - 2045 Build Condition
Project Description	Southern Meade County Cor...



Site Information

Intersection	E/W Corridor & Haines Ave
E/W Street Name	East/West Corridor
N/S Street Name	Haines Avenue
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.80
Jurisdiction	Meade County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	10	15	155	0	20	25	5	0	40	40	5	0	5	205	15
Percent Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Flow Rate (v_{PCE}), pc/h	0	13	20	205	0	27	33	7	0	53	53	7	0	7	272	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		238			67			113			299	
Entry Volume, veh/h		225			63			107			282	
Circulating Flow (v_c), pc/h	306			119			40			113		
Exiting Flow (v_{ex}), pc/h	34			106			73			504		
Capacity (c_{pce}), pc/h		1010			1222			1325			1230	
Capacity (c), veh/h		953			1153			1250			1160	
v/c Ratio (x)		0.24			0.05			0.09			0.24	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.1			3.6			3.6			5.3	
Lane LOS		A			A			A			A	
95% Queue, veh		0.9			0.2			0.3			1.0	
Approach Delay, s/veh	6.1			3.6			3.6			5.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.1						A					

HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_AM_EastWestCorridor_Haines_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	E/W Corridor & Haines Ave
Major Street Direction:	North-South
East/West Street Name:	East/West Corridor
North/South Street Name:	N. Haines Ave
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		40	40	5		5	205	15
Peak Hour Factor, PHF					0.80			
Hourly Flow Rtae, HFR		50	50	6		6	256	19
Percent Heavy Vehicles		6				6		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type					Undivided			
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?					Not Present			

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	20	25	5	10	15	155
Peak Hour Factor, PHF			0.80			
Hourly Flow Rtae, HFR	25	31	6	13	19	194
Percent Heavy Vehicles	6	6	6	6	6	6
Number of Lanes	0	1	0	0	1	0
Lane Configuration		LTR			LTR	
RT channelized?						
Flared Approach | Storage	No	|		No	|
Percent Grade		0			0	

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		50		6		63			225	
Lane Capacity		1265		1523		414			705	
v/c		0.04		0.00		0.15			0.32	
95% Queue Length		0.1		0.0		0.5			1.4	
Control Delay		8.0		7.4		15.2			12.5	
LOS		A		A		C			B	
Approach Delay		3.9		0.2		15.2			12.5	
Approach LOS						C			B	
Intersction Delay		6.3								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	WestBound			EastBound		
Priority	7	8	9	10	11	12
Movement	L	T	R	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume, V_x		40	40	5		5	205	15
Flow Rate, v_x		50	50	6		6	256	19

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume, V_x	20	25	5	10	15	155
Flow Rate, v_x	25	31	6	13	19	194

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Flow Rate, v_x		50	50	6		6	256	19
Conflicting Flow, v_c,x		275				56		

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Flow Rate, v_x	25	31	6	13	19	194
Conflicting Flow, v_c,x	538	441	53	450	434	266

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1		4.1	7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV		1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0
P_HV		0.06		0.06	0.06	0.06	0.06	0.06	0.06	0.06
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage		4.16		4.16	7.16	6.56	6.26	7.16	6.56	6.26
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2		2.2	3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV		0.9		0.9	0.9	0.9	0.9	0.9	0.9	0.9
P_HV		0.06		0.06	0.06	0.06	0.06	0.06	0.06	0.06
t_f		2.25		2.25	3.55	4.05	3.35	3.55	4.05	3.35

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		275		56	538	441	53	450	434	266
t_c,x		4.16		4.16	7.16	6.56	6.26	7.16	6.56	6.26
t_f,x		2.25		2.25	3.55	4.05	3.35	3.55	4.05	3.35
c_p,x		1265		1523	448	505	1003	513	509	763

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance

Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements	1	4
Conflicting Flow, v_c,x	275	56
Potential Capacity, c_p,x	1265	1523
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	1265	1523
Probability of Queue-free State, p_0,j	0.960	0.996
Major L-Shared Probability Queue-free State, p*_0,j	0.959	0.995

Minor-Street Right-Turn Movements	9	12
Conflicting Flow, v_c,x	53	266
Potential Capacity, c_p,x	1003	763
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	1003	763
Probability of Queue-free State, p_0,j	0.994	0.746

Major-Street U-Turn Movements	1U	4U
Conflicting Flow, v_c,x		
Potential Capacity, c_p,x		
Capacity Adjustment Factor, f_x		
Movement Capacity, c_m,x		
Shared L/U Capacity, c_SH		
Probability of Queue-free State, p_0,j		

Minor-Street Through Movements	8	11
Conflicting Flow, v_c,x	441	434
Potential Capacity, c_p,x	505	509
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Capacity Adjustment Factor, f_x	0.954	0.954
Movement Capacity, c_m,x	482	486
Probability of Queue-free State, p_0,j	0.935	0.961

Minor-Street Left-Turn Movements	7	10
Conflicting Flow, v_c,x	538	450
Potential Capacity, c_p,x	448	513
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"	0.918	0.893
Major L, Minor T Impedance Factor, p'	0.937	0.918
Capacity Adjustment Factor, f_x	0.699	0.912
Movement Capacity, c_m,x	313	467

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		63			225	
Movement Capacity, c_m,x	313	482	1003	467	486	763
Shared Capacity, c_SH		414			705	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		50		6	25	31	6	13	19	194
Movement Capacity		1265		1523	313	482	1003	467	486	763
Lane Configuration						LTR			LTR	
Shared Capacity						414			705	
Control Delay		8.0		7.4		15.2			12.5	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	NB	SB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.959	0.995
Delay to Major Left-turning Vehicles, d_MLT	8.0	7.4
Major Street Through Vehicles in Shared Lane, v_i1	50	256
Major Street Turning Vehicles in Shared Lane, v_i2	56	25
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	0.3	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB		SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		50		6		63			225	
Lane Capacity		1265		1523		414			705	
v/c		0.04		0.00		0.15			0.32	
95% Queue Length		0.1		0.0		0.5			1.4	
Control Delay		8.0		7.4		15.2			12.5	
LOS		A		A		C			B	
Approach Delay		3.9		0.2		15.2			12.5	
Approach LOS						C			B	
Intersction Delay		6.3								

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HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_AM_ElkCreek-143rd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	Elk Creek & 143rd Ave
Major Street Direction:	East-West
East/West Street Name:	Elk Creek Road
North/South Street Name:	143rd Avenue
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	EastBound				WestBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		5	15	10		5	35	5
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		6	19	13		6	44	6
Percent Heavy Vehicles		20				20		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9		10	11	12
	L	T	R		L	T	R
Volume	5	5	5		5	5	5
Peak Hour Factor, PHF			0.80				
Hourly Flow Rtae, HFR	6	6	6		6	6	6
Percent Heavy Vehicles	20	20	20		20	20	20
Number of Lanes	0	1	0		0	1	0
Lane Configuration		LTR				LTR	
RT channelized?							
Flared Approach | Storage	No	|		No	|	
Percent Grade		0				0	

Pedestrian Volumes and Adjustments

Approach	EB	WB	NB	SB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		6		19			19	
Lane Capacity		1449		1472		845			837	
v/c		0.00		0.00		0.02			0.02	
95% Queue Length		0.0		0.0		0.1			0.1	
Control Delay		7.5		7.5		9.4			9.4	
LOS		A		A		A			A	
Approach Delay		1.3		0.9		9.4			9.4	
Approach LOS						A			A	
Intersction Delay		3.4								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	EastBound				WestBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	NorthBound				SouthBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U U	1 L	2 T	3 R	4U U	4 L	5 T	6 R
Volume, V_x		5	15	10		5	35	5
Flow Rate, v_x		6	19	13		6	44	6

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7 L	8 T	9 R	|	10 L	11 T	12 R
Volume, V_x	5	5	5		5	5	5
Flow Rate, v_x	6	6	6		6	6	6

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U U	1 L	2 T	3 R	4U U	4 L	5 T	6 R
Flow Rate, v_x		6	19	13		6	44	6
Conflicting Flow, v_c,x		50				31		

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7 L	8 T	9 R	|	10 L	11 T	12 R
Flow Rate, v_x	6	6	6		6	6	6
Conflicting Flow, v_c,x	103	100	25		103	103	47

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U U	1 L	4U U	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t_c,base										
Single Stage		4.1		4.1	7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV		1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0
P_HV		0.20		0.20	0.20	0.20	0.20	0.20	0.20	0.20
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage		4.30		4.30	7.30	6.70	6.40	7.30	6.70	6.40
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U U	1 L	4U U	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t_f,base		2.2		2.2	3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV		0.9		0.9	0.9	0.9	0.9	0.9	0.9	0.9
P_HV		0.20		0.20	0.20	0.20	0.20	0.20	0.20	0.20
t_f		2.38		2.38	3.68	4.18	3.48	3.68	4.18	3.48

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U U	1 L	4U U	4 L	7 L	8 T	9 R	10 L	11 T	12 R
v_c,x		50		31	103	100	25	103	103	47
t_c,x		4.30		4.30	7.30	6.70	6.40	7.30	6.70	6.40
t_f,x		2.38		2.38	3.68	4.18	3.48	3.68	4.18	3.48
c_p,x		1449		1472	836	757	1002	836	754	973

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance Approach	EB	WB	NB	SB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4
Conflicting Flow, v_c,x		50	31
Potential Capacity, c_p,x		1449	1472
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		1449	1472
Probability of Queue-free State, p_0,j		0.996	0.996
Major L-Shared Probability Queue-free State, p*_0,j		0.996	0.996

Minor-Street Right-Turn Movements		9	12
Conflicting Flow, v_c,x		25	47
Potential Capacity, c_p,x		1002	973
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		1002	973
Probability of Queue-free State, p_0,j		0.994	0.994

Major-Street U-Turn Movements		1U	4U
Conflicting Flow, v_c,x			
Potential Capacity, c_p,x			
Capacity Adjustment Factor, f_x			
Movement Capacity, c_m,x			
Shared L/U Capacity, c_SH			
Probability of Queue-free State, p_0,j			

Minor-Street Through Movements		8	11
Conflicting Flow, v_c,x		100	103
Potential Capacity, c_p,x		757	754
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Capacity Adjustment Factor, f_x		0.991	0.991
Movement Capacity, c_m,x		751	748
Probability of Queue-free State, p_0,j		0.992	0.992

Minor-Street Left-Turn Movements		7	10
Conflicting Flow, v_c,x		103	103
Potential Capacity, c_p,x		836	836
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"		0.983	0.983
Major L, Minor T Impedance Factor, p'		0.987	0.987
Capacity Adjustment Factor, f_x		0.981	0.981
Movement Capacity, c_m,x		820	820

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		19			19	
Movement Capacity, c_m,x	820	751	1002	820	748	973
Shared Capacity, c_SH		845			837	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	EB			WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12	
Flow Rate		6		6	6	6	6	6	6	6	
Movement Capacity		1449		1472	820	751	1002	820	748	973	
Lane Configuration						LTR			LTR		
Shared Capacity						845			837		
Control Delay		7.5		7.5		9.4			9.4		

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	EB	WB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.996	0.996
Delay to Major Left-turning Vehicles, d_MLT	7.5	7.5
Major Street Through Vehicles in Shared Lane, v_i1	19	44
Major Street Turning Vehicles in Shared Lane, v_i2	19	13
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	0.0	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	EB		WB		NorthBound			SouthBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		6		19			19	
Lane Capacity		1449		1472		845			837	
v/c		0.00		0.00		0.02			0.02	
95% Queue Length		0.0		0.0		0.1			0.1	
Control Delay		7.5		7.5		9.4			9.4	
LOS		A		A		A			A	
Approach Delay		1.3		0.9		9.4			9.4	
Approach LOS						A			A	
Intersction Delay		3.4								

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HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_AM_ElkCreek-ElkVale_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	Elk Creek & Elk Vale
Major Street Direction:	North-South
East/West Street Name:	Elk Creek Road
North/South Street Name:	Elk Vale Road
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		10	10	5		5	20	10
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		13	13	6		6	25	13
Percent Heavy Vehicles		14				14		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	25	25	5	5	5	10
Peak Hour Factor, PHF			0.80			
Hourly Flow Rtae, HFR	31	31	6	6	6	13
Percent Heavy Vehicles	14	14	14	14	14	14
Number of Lanes	0	1	0	0	1	0
Lane Configuration		LTR			LTR	
RT channelized?						
Flared Approach | Storage	No	|		No	|
Percent Grade		0			0	

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		13		6		69			25	
Lane Capacity		1499		1523		817			886	
v/c		0.01		0.00		0.08			0.03	
95% Queue Length		0.0		0.0		0.3			0.1	
Control Delay		7.4		7.4		9.8			9.2	
LOS		A		A		A			A	
Approach Delay		3.0		1.1		9.8			9.2	
Approach LOS						A			A	
Intersction Delay		6.2								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	WestBound			EastBound		
Priority	7	8	9	10	11	12
Movement	L	T	R	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume, V_x		10	10	5		5	20	10
Flow Rate, v_x		13	13	6		6	25	13

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume, V_x	25	25	5	5	5	10
Flow Rate, v_x	31	31	6	6	6	13

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Flow Rate, v_x		13	13	6		6	25	13
Conflicting Flow, v_c,x		38				19		

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Flow Rate, v_x	31	31	6	6	6	13
Conflicting Flow, v_c,x	94	91	16	103	88	31

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1		4.1	7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV		1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0
P_HV		0.14		0.14	0.14	0.14	0.14	0.14	0.14	0.14
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage		4.24		4.24	7.24	6.64	6.34	7.24	6.64	6.34
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2		2.2	3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV		0.9		0.9	0.9	0.9	0.9	0.9	0.9	0.9
P_HV		0.14		0.14	0.14	0.14	0.14	0.14	0.14	0.14
t_f		2.33		2.33	3.63	4.13	3.43	3.63	4.13	3.43

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		38		19	94	91	16	103	88	31
t_c,x		4.24		4.24	7.24	6.64	6.34	7.24	6.64	6.34
t_f,x		2.33		2.33	3.63	4.13	3.43	3.63	4.13	3.43
c_p,x		1499		1523	862	777	1030	850	780	1009

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance

Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4
Conflicting Flow, v_c,x		38	19
Potential Capacity, c_p,x		1499	1523
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		1499	1523
Probability of Queue-free State, p_0,j		0.992	0.996
Major L-Shared Probability Queue-free State, p*_0,j		0.992	0.996

Minor-Street Right-Turn Movements		9	12
Conflicting Flow, v_c,x		16	31
Potential Capacity, c_p,x		1030	1009
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		1030	1009
Probability of Queue-free State, p_0,j		0.994	0.988

Major-Street U-Turn Movements		1U	4U
Conflicting Flow, v_c,x			
Potential Capacity, c_p,x			
Capacity Adjustment Factor, f_x			
Movement Capacity, c_m,x			
Shared L/U Capacity, c_SH			
Probability of Queue-free State, p_0,j			

Minor-Street Through Movements		8	11
Conflicting Flow, v_c,x		91	88
Potential Capacity, c_p,x		777	780
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Capacity Adjustment Factor, f_x		0.987	0.987
Movement Capacity, c_m,x		767	771
Probability of Queue-free State, p_0,j		0.959	0.992

Minor-Street Left-Turn Movements		7	10
Conflicting Flow, v_c,x		94	103
Potential Capacity, c_p,x		862	850
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"		0.979	0.947
Major L, Minor T Impedance Factor, p'		0.984	0.960
Capacity Adjustment Factor, f_x		0.972	0.954
Movement Capacity, c_m,x		838	810

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		69			25	
Movement Capacity, c_m,x	838	767	1030	810	771	1009
Shared Capacity, c_SH		817			886	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		13		6	31	31	6	6	6	13
Movement Capacity		1499		1523	838	767	1030	810	771	1009
Lane Configuration						LTR			LTR	
Shared Capacity						817			886	
Control Delay		7.4		7.4		9.8			9.2	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	NB	SB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.992	0.996
Delay to Major Left-turning Vehicles, d_MLT	7.4	7.4
Major Street Through Vehicles in Shared Lane, v_i1	13	25
Major Street Turning Vehicles in Shared Lane, v_i2	19	19
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	0.1	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB		SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		13		6		69			25	
Lane Capacity		1499		1523		817			886	
v/c		0.01		0.00		0.08			0.03	
95% Queue Length		0.0		0.0		0.3			0.1	
Control Delay		7.4		7.4		9.8			9.2	
LOS		A		A		A			A	
Approach Delay		3.0		1.1		9.8			9.2	
Approach LOS						A			A	
Intersction Delay		6.2								

This TWSC text report was created in HCS™ TWSC Version 7.8 on 9/5/2019 2:54:47 PM

HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_AM_ElkCreek-EricksonRaRd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	Elk Creek & Erickson Ra R
Major Street Direction:	East-West
East/West Street Name:	Elk Creek Road
North/South Street Name:	Erickson Ranch Road
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	EastBound				WestBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		5	65	90		25	120	5
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		6	81	113		31	150	6
Percent Heavy Vehicles		5				5		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	80	10	10	5	10	15
Peak Hour Factor, PHF			0.80			
Hourly Flow Rtae, HFR	100	13	13	6	13	19
Percent Heavy Vehicles	5	5	5	5	5	5
Number of Lanes	0	1	0	0	1	0
Lane Configuration		LTR			LTR	
RT channelized?						
Flared Approach | Storage	No	|		No	|
Percent Grade		0			0	

Pedestrian Volumes and Adjustments

Approach	EB	WB	NB	SB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		31		125			38	
Lane Capacity		1404		1362		559			652	
v/c		0.00		0.02		0.22			0.06	
95% Queue Length		0.0		0.1		0.9			0.2	
Control Delay		7.6		7.7		13.3			10.9	
LOS		A		A		B			B	
Approach Delay		0.3		1.4		13.3			10.9	
Approach LOS						B			B	
Intersction Delay		4.4								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	EastBound				WestBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	NorthBound				SouthBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Volume, V_x		5	65	90		25	120	5
Flow Rate, v_x		6	81	113		31	150	6

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Volume, V_x	80	10	10		5	10	15
Flow Rate, v_x	100	13	13		6	13	19

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Flow Rate, v_x		6	81	113		31	150	6
Conflicting Flow, v_c,x		156				194		

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Flow Rate, v_x	100	13	13		6	13	19
Conflicting Flow, v_c,x	381	369	138		378	422	153

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1		4.1	7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV		1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0
P_HV		0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage		4.15		4.15	7.15	6.55	6.25	7.15	6.55	6.25
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2		2.2	3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV		0.9		0.9	0.9	0.9	0.9	0.9	0.9	0.9
P_HV		0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05
t_f		2.25		2.25	3.55	4.05	3.35	3.55	4.05	3.35

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		156		194	381	369	138	378	422	153
t_c,x		4.15		4.15	7.15	6.55	6.25	7.15	6.55	6.25
t_f,x		2.25		2.25	3.55	4.05	3.35	3.55	4.05	3.35
c_p,x		1404		1362	571	556	903	574	519	885

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance

Approach	EB	WB	NB	SB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements	1	4
Conflicting Flow, v_c,x	156	194
Potential Capacity, c_p,x	1404	1362
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	1404	1362
Probability of Queue-free State, p_0,j	0.996	0.977
Major L-Shared Probability Queue-free State, p*_0,j	0.995	0.975

Minor-Street Right-Turn Movements	9	12
Conflicting Flow, v_c,x	138	153
Potential Capacity, c_p,x	903	885
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	903	885
Probability of Queue-free State, p_0,j	0.986	0.979

Major-Street U-Turn Movements	1U	4U
Conflicting Flow, v_c,x		
Potential Capacity, c_p,x		
Capacity Adjustment Factor, f_x		
Movement Capacity, c_m,x		
Shared L/U Capacity, c_SH		
Probability of Queue-free State, p_0,j		

Minor-Street Through Movements	8	11
Conflicting Flow, v_c,x	369	422
Potential Capacity, c_p,x	556	519
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Capacity Adjustment Factor, f_x	0.970	0.970
Movement Capacity, c_m,x	539	503
Probability of Queue-free State, p_0,j	0.977	0.975

Minor-Street Left-Turn Movements	7	10
Conflicting Flow, v_c,x	381	378
Potential Capacity, c_p,x	571	574
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"	0.946	0.947
Major L, Minor T Impedance Factor, p'	0.959	0.960
Capacity Adjustment Factor, f_x	0.938	0.946
Movement Capacity, c_m,x	536	543

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		125			38	
Movement Capacity, c_m,x	536	539	903	543	503	885
Shared Capacity, c_SH		559			652	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	EB			WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		6		31	100	13	13	6	13	19
Movement Capacity		1404		1362	536	539	903	543	503	885
Lane Configuration						LTR			LTR	
Shared Capacity						559			652	
Control Delay		7.6		7.7		13.3			10.9	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	EB	WB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.995	0.975
Delay to Major Left-turning Vehicles, d_MLT	7.6	7.7
Major Street Through Vehicles in Shared Lane, v_i1	81	150
Major Street Turning Vehicles in Shared Lane, v_i2	119	38
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	0.0	0.2

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	EB		WB		NorthBound			SouthBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		31		125			38	
Lane Capacity		1404		1362		559			652	
v/c		0.00		0.02		0.22			0.06	
95% Queue Length		0.0		0.1		0.9			0.2	
Control Delay		7.6		7.7		13.3			10.9	
LOS		A		A		B			B	
Approach Delay		0.3		1.4		13.3			10.9	
Approach LOS						B			B	
Intersction Delay		4.4								

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HCS7 All-Way Stop Control Report

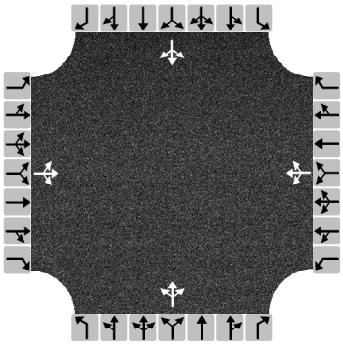
General Information

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/3/2019
Analysis Year	2045
Analysis Time Period (hrs)	0.25
Time Analyzed	AM - 2045 Build Cond.
Project Description	Southern Meade County Corridor Study

Site Information

Intersection	Elk Creek & Haines
Jurisdiction	Meade County
East/West Street	Elk Creek Road
North/South Street	Haines Avenue
Peak Hour Factor	0.80

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	10	15	75	20	20	5	40	10	10	5	35	10
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	125			56			75			63		
Percent Heavy Vehicles	6			6			6			6		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.111			0.050			0.067			0.056		
Final Departure Headway, hd (s)	3.95			4.46			4.49			4.37		
Final Degree of Utilization, x	0.137			0.070			0.094			0.076		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	1.95			2.46			2.49			2.37		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	125			56			75			63		
Capacity	912			807			802			824		
95% Queue Length, Q_{95} (veh)	0.5			0.2			0.3			0.2		
Control Delay (s/veh)	7.6			7.8			8.0			7.7		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.6			7.8			8.0			7.7		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.7						A					

HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_AM_PeacefulPines-EricksonRaRd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	Peaceful P & Erickson RaR
Major Street Direction:	East-West
East/West Street Name:	Peaceful Pines Road
North/South Street Name:	Erickson Ranch Road
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:									
Approach		EastBound				WestBound			
Movement	1U	1	2	3	4U	4	5	6	
	U	L	T	R	U	L	T	R	
Volume		25	40				20	55	
Peak Hour Factor, PHF				0.80					
Hourly Flow Rtae, HFR		31	50				25	69	
Percent Heavy Vehicles		3							
Number of Lanes	0	1	1	0	0	0	1	1	
Lane Configuration		L	T				T	R	
Median Type				Undivided					
Median Storage									
RT channelized?								No	
Left-Turn Lane Storage									
Upstream Signal?				Not Present					

Minor Street:							
Approach	NorthBound			SouthBound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume				165		75	
Peak Hour Factor, PHF			0.80				
Hourly Flow Rtae, HFR				206		94	
Percent Heavy Vehicles				3		3	
Number of Lanes	0	0	0	0	1	0	
Lane Configuration					LR		
RT channelized?							
Flared Approach | Storage		|		No	|		
Percent Grade					0		

Pedestrian Volumes and Adjustments

Approach	EB	WB	NB	SB
Movement	13	14	15	16
Flow (ped/hr)	0	0		0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		L							LR	
Flow Rate		31							300	
Lane Capacity		1495							892	
v/c		0.02							0.34	
95% Queue Length		0.1							1.5	
Control Delay		7.5							11.1	
LOS		A							B	
Approach Delay		2.9							11.1	
Approach LOS									B	
Intersction Delay		7.5								

Step 1: MOVEMENT PRIORITIES

Major Street:									
Approach		EastBound				WestBound			
Priority	1U	1	2	3	4U	4	5	6	
Movement	U	L	T	R	U	L	T	R	
Minor Street:									

Approach	NorthBound				SouthBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Volume, V_x		25	40				20	55
Flow Rate, v_x		31	50				25	69

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Volume, V_x					165		75
Flow Rate, v_x					206		94

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Flow Rate, v_x		31	50				25	69
Conflicting Flow, v_c,x		94						

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Flow Rate, v_x					206		94
Conflicting Flow, v_c,x					138		25

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1						7.1		6.2
Stage I										
Stage II										
t_c,HV		1.0						1.0		1.0
P_HV		0.03						0.03		0.03
t_c,G								0.2		0.1
G								0		0
t_3,LT		0.0						0.7		0.0
t_c										
Single Stage		4.13						6.43		6.23
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2						3.5		3.3
t_f,HV		0.9						0.9		0.9
P_HV		0.03						0.03		0.03
t_f		2.23						3.53		3.33

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		94						138		25
t_c,x		4.13						6.43		6.23
t_f,x		2.23						3.53		3.33
c_p,x		1495						854		1049

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance

Approach	EB	WB	NB	SB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0		0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				
Major-Street Left-Turn Movements		1	4	
Conflicting Flow, v_c,x		94		
Potential Capacity, c_p,x		1495		
Pedestrian Impedance Factor, p_p,x		1.000		
Movement Capacity, c_m,x		1495		
Probability of Queue-free State, p_0,j		0.979		
Major L-Shared Probability Queue-free State, p*_0,j				
Minor-Street Right-Turn Movements		9	12	
Conflicting Flow, v_c,x			25	
Potential Capacity, c_p,x			1049	
Pedestrian Impedance Factor, p_p,x			1.000	
Movement Capacity, c_m,x			1049	
Probability of Queue-free State, p_0,j			0.911	
Major-Street U-Turn Movements		1U	4U	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Shared L/U Capacity, c_SH				
Probability of Queue-free State, p_0,j				
Minor-Street Through Movements		8	11	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Pedestrian Impedance Factor, p_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Probability of Queue-free State, p_0,j				
Minor-Street Left-Turn Movements		7	10	
Conflicting Flow, v_c,x			138	
Potential Capacity, c_p,x			854	
Pedestrian Impedance Factor, p_p,x			1.000	
Major L, Minor T Adjusted Impedance Factor, p"				
Major L, Minor T Impedance Factor, p'				
Capacity Adjustment Factor, f_x			0.979	
Movement Capacity, c_m,x			836	

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
Lane Configuration					LR	
Shared Flow Rate, v_y					300	
Movement Capacity, c_m,x				836		1049
Shared Capacity, c_SH					892	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		31						206		94
Movement Capacity		1495						836		1049
Lane Configuration		L							LR	
Shared Capacity									892	
Control Delay		7.5							11.1	

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		L							LR	
Flow Rate		31							300	
Lane Capacity		1495							892	
v/c		0.02							0.34	
95% Queue Length		0.1							1.5	
Control Delay		7.5							11.1	

LOS	A	B
Approach Delay	2.9	11.1
Approach LOS		B
Intersction Delay	7.5	

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HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_PM_224th-143rd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	PM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	224th St & 143rd Ave
Major Street Direction:	East-West
East/West Street Name:	224th Street
North/South Street Name:	143rd Avenue
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	EastBound				WestBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		5	10				20	10
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		6	13				25	13
Percent Heavy Vehicles		3						
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration		LT						TR
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				5		5
Peak Hour Factor, PHF			0.80			
Hourly Flow Rtae, HFR				6		6
Percent Heavy Vehicles				3		3
Number of Lanes	0	0	0	0	1	0
Lane Configuration					LR	
RT channelized?						
Flared Approach | Storage		|		No |	
Percent Grade					0	

Pedestrian Volumes and Adjustments

Approach	EB	WB	NB	SB
Movement	13	14	15	16
Flow (ped/hr)	0	0		0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		LT							LR	
Flow Rate		6							13	
Lane Capacity		1566							990	
v/c		0.00							0.01	
95% Queue Length		0.0							0.0	
Control Delay		7.3							8.7	
LOS		A							A	
Approach Delay		2.5							8.7	
Approach LOS									A	
Intersction Delay		2.2								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	EastBound				WestBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	NorthBound				SouthBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Volume, V_x		5	10				20	10
Flow Rate, v_x		6	13				25	13

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Volume, V_x					5		5
Flow Rate, v_x					6		6

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Flow Rate, v_x		6	13				25	13
Conflicting Flow, v_c,x		38						

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Flow Rate, v_x					6		6
Conflicting Flow, v_c,x					56		31

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1						7.1		6.2
Stage I										
Stage II										
t_c,HV		1.0						1.0		1.0
P_HV		0.03						0.03		0.03
t_c,G								0.2		0.1
G								0		0
t_3,LT		0.0						0.7		0.0
t_c										
Single Stage		4.13						6.43		6.23
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2						3.5		3.3
t_f,HV		0.9						0.9		0.9
P_HV		0.03						0.03		0.03
t_f		2.23						3.53		3.33

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		38						56		31
t_c,x		4.13						6.43		6.23
t_f,x		2.23						3.53		3.33
c_p,x		1566						949		1040

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance

Approach	EB	WB	NB	SB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0		0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4	
Conflicting Flow, v_c,x		38		
Potential Capacity, c_p,x		1566		
Pedestrian Impedance Factor, p_p,x		1.000		
Movement Capacity, c_m,x		1566		
Probability of Queue-free State, p_0,j		0.996		
Major L-Shared Probability Queue-free State, p*_0,j		0.996		

Minor-Street Right-Turn Movements		9	12	
Conflicting Flow, v_c,x			31	
Potential Capacity, c_p,x			1040	
Pedestrian Impedance Factor, p_p,x			1.000	
Movement Capacity, c_m,x			1040	
Probability of Queue-free State, p_0,j			0.994	

Major-Street U-Turn Movements		1U	4U	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Shared L/U Capacity, c_SH				
Probability of Queue-free State, p_0,j				

Minor-Street Through Movements		8	11	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Pedestrian Impedance Factor, p_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Probability of Queue-free State, p_0,j				

Minor-Street Left-Turn Movements		7	10	
Conflicting Flow, v_c,x			56	
Potential Capacity, c_p,x			949	
Pedestrian Impedance Factor, p_p,x			1.000	
Major L, Minor T Adjusted Impedance Factor, p"				
Major L, Minor T Impedance Factor, p'				
Capacity Adjustment Factor, f_x			0.996	
Movement Capacity, c_m,x			945	

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
Lane Configuration					LR	
Shared Flow Rate, v_y					13	
Movement Capacity, c_m,x				945		1040
Shared Capacity, c_SH					990	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	EB			WB		NorthBound		SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		6						6		6
Movement Capacity		1566						945		1040
Lane Configuration		LT							LR	
Shared Capacity									990	
Control Delay		7.3							8.7	

CONTROL DELAY TO RANK 1 MOVEMENTS				
Approach		EB	WB	
Movement		2	5	
Number of Major Street Through Lanes, N		1	1	
Proportion of Rank 1 vehicles not blocked, p*_0,j		0.996		
Delay to Major Left-turning Vehicles, d_MLT		7.3		
Major Street Through Vehicles in Shared Lane, v_i1		13		
Major Street Turning Vehicles in Shared Lane, v_i2		6		
Saturation Flow Rate for Major Street Through, s_i1		1700	1700	

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700
Delay to Rank 1 Vehicles, d_Rank1	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		LT							LR	
Flow Rate		6							13	
Lane Capacity		1566							990	
v/c		0.00							0.01	
95% Queue Length		0.0							0.0	
Control Delay		7.3							8.7	
LOS		A							A	
Approach Delay		2.5							8.7	
Approach LOS									A	
Intersction Delay		2.2								

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HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_PM_EastWestCorridor-143rd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	AM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	E/W Corridor & 143rd Ave
Major Street Direction:	North-South
East/West Street Name:	East/West Corridor
North/South Street Name:	143rd Ave
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		5	15	5		5	15	5
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		6	19	6		6	19	6
Percent Heavy Vehicles		20				20		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	WestBound				EastBound		
Movement	7	8	9		10	11	12
	L	T	R		L	T	R
Volume	5	20	5		5	35	5
Peak Hour Factor, PHF			0.80				
Hourly Flow Rtae, HFR	6	25	6		6	44	6
Percent Heavy Vehicles	20	20	20		20	20	20
Number of Lanes	0	1	0		0	1	0
Lane Configuration		LTR				LTR	
RT channelized?							
Flared Approach | Storage	No	|		No	|	
Percent Grade		0				0	

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		6		38			56	
Lane Capacity		1480		1480		813			804	
v/c		0.00		0.00		0.05			0.07	
95% Queue Length		0.0		0.0		0.1			0.2	
Control Delay		7.4		7.4		9.6			9.8	
LOS		A		A		A			A	
Approach Delay		1.5		1.5		9.6			9.8	
Approach LOS						A			A	
Intersction Delay		6.5								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	WestBound				EastBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Volume, V_x		5	15	5		5	15	5
Flow Rate, v_x		6	19	6		6	19	6

Minor Street:

Approach	WestBound				EastBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Volume, V_x	5	20	5		5	35	5
Flow Rate, v_x	6	25	6		6	44	6

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Flow Rate, v_x		6	19	6		6	19	6
Conflicting Flow, v_c,x		25				25		

Minor Street:

Approach	WestBound				EastBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Flow Rate, v_x	6	25	6		6	44	6
Conflicting Flow, v_c,x	94	72	22		84	72	22

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1		4.1	7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV		1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0
P_HV		0.20		0.20	0.20	0.20	0.20	0.20	0.20	0.20
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage		4.30		4.30	7.30	6.70	6.40	7.30	6.70	6.40
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2		2.2	3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV		0.9		0.9	0.9	0.9	0.9	0.9	0.9	0.9
P_HV		0.20		0.20	0.20	0.20	0.20	0.20	0.20	0.20
t_f		2.38		2.38	3.68	4.18	3.48	3.68	4.18	3.48

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		25		25	94	72	22	84	72	22
t_c,x		4.30		4.30	7.30	6.70	6.40	7.30	6.70	6.40
t_f,x		2.38		2.38	3.68	4.18	3.48	3.68	4.18	3.48
c_p,x		1480		1480	848	785	1006	860	785	1006

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance				
Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4
Conflicting Flow, v_c,x		25	25
Potential Capacity, c_p,x		1480	1480
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		1480	1480
Probability of Queue-free State, p_0,j		0.996	0.996
Major L-Shared Probability Queue-free State, p*_0,j		0.996	0.996

Minor-Street Right-Turn Movements		9	12
Conflicting Flow, v_c,x		22	22
Potential Capacity, c_p,x		1006	1006
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		1006	1006
Probability of Queue-free State, p_0,j		0.994	0.994

Major-Street U-Turn Movements		1U	4U
Conflicting Flow, v_c,x			
Potential Capacity, c_p,x			
Capacity Adjustment Factor, f_x			
Movement Capacity, c_m,x			
Shared L/U Capacity, c_SH			
Probability of Queue-free State, p_0,j			

Minor-Street Through Movements		8	11
Conflicting Flow, v_c,x		72	72
Potential Capacity, c_p,x		785	785
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Capacity Adjustment Factor, f_x		0.991	0.991
Movement Capacity, c_m,x		779	779
Probability of Queue-free State, p_0,j		0.968	0.944

Minor-Street Left-Turn Movements		7	10
Conflicting Flow, v_c,x		94	84
Potential Capacity, c_p,x		848	860
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"		0.936	0.960
Major L, Minor T Impedance Factor, p'		0.951	0.969
Capacity Adjustment Factor, f_x		0.945	0.963
Movement Capacity, c_m,x		802	829

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		38			56	
Movement Capacity, c_m,x	802	779	1006	829	779	1006
Shared Capacity, c_SH		813			804	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		6		6	6	25	6	6	44	6
Movement Capacity		1480		1480	802	779	1006	829	779	1006
Lane Configuration						LTR			LTR	
Shared Capacity						813			804	
Control Delay		7.4		7.4		9.6			9.8	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	NB	SB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.996	0.996
Delay to Major Left-turning Vehicles, d_MLT	7.4	7.4
Major Street Through Vehicles in Shared Lane, v_i1	19	19
Major Street Turning Vehicles in Shared Lane, v_i2	13	13
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	0.0	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB		SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		6		38			56	
Lane Capacity		1480		1480		813			804	
v/c		0.00		0.00		0.05			0.07	
95% Queue Length		0.0		0.0		0.1			0.2	
Control Delay		7.4		7.4		9.6			9.8	
LOS		A		A		A			A	
Approach Delay		1.5		1.5		9.6			9.8	
Approach LOS						A			A	
Intersction Delay		6.5								

This TWSC text report was created in HCS™ TWSC Version 7.8 on 9/5/2019 3:14:13 PM

HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_PM_EastWestCorridor-ElkVale_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	PM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	E/W Corridor & Elk Vale R
Major Street Direction:	North-South
East/West Street Name:	East/West Corridor
North/South Street Name:	Elk Vale Rd
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:									
Approach		NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6	
	U	L	T	R	U	L	T	R	
Volume		25	45				25	5	
Peak Hour Factor, PHF				0.80					
Hourly Flow Rtae, HFR		31	56				31	6	
Percent Heavy Vehicles		14							
Number of Lanes	0	0	1	0	0	0	1	0	
Lane Configuration		LT						TR	
Median Type				Undivided					
Median Storage									
RT channelized?									
Left-Turn Lane Storage									
Upstream Signal?				Not Present					

Minor Street:							
Approach	WestBound			EastBound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume				10		15	
Peak Hour Factor, PHF			0.80				
Hourly Flow Rtae, HFR				13		19	
Percent Heavy Vehicles				14		14	
Number of Lanes	0	0	0	0	1	0	
Lane Configuration					LR		
RT channelized?							
Flared Approach | Storage		|		No	|		
Percent Grade					0		

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0		0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		LT							LR	
Flow Rate		31							31	
Lane Capacity		1499							908	
v/c		0.02							0.03	
95% Queue Length		0.1							0.1	
Control Delay		7.5							9.1	
LOS		A							A	
Approach Delay		2.8							9.1	
Approach LOS									A	
Intersction Delay		3.4								

Step 1: MOVEMENT PRIORITIES

Major Street:									
Approach		NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6	
Movement	U	L	T	R	U	L	T	R	
Minor Street:									

Approach	WestBound			EastBound		
Priority	7	8	9	10	11	12
Movement	L	T	R	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume, V_x		25	45				25	5
Flow Rate, v_x		31	56				31	6

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume, V_x				10		15
Flow Rate, v_x				13		19

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Flow Rate, v_x		31	56				31	6
Conflicting Flow, v_c,x		38						

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Flow Rate, v_x				13		19
Conflicting Flow, v_c,x				153		34

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1						7.1		6.2
Stage I										
Stage II										
t_c,HV		1.0						1.0		1.0
P_HV		0.14						0.14		0.14
t_c,G								0.2		0.1
G								0		0
t_3,LT		0.0						0.7		0.0
t_c										
Single Stage		4.24						6.54		6.34
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2						3.5		3.3
t_f,HV		0.9						0.9		0.9
P_HV		0.14						0.14		0.14
t_f		2.33						3.63		3.43

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		38						153		34
t_c,x		4.24						6.54		6.34
t_f,x		2.33						3.63		3.43
c_p,x		1499						811		1005

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance

Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0		0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4	
Conflicting Flow, v_c,x		38		
Potential Capacity, c_p,x		1499		
Pedestrian Impedance Factor, p_p,x		1.000		
Movement Capacity, c_m,x		1499		
Probability of Queue-free State, p_0,j		0.979		
Major L-Shared Probability Queue-free State, p*_0,j		0.978		

Minor-Street Right-Turn Movements		9	12	
Conflicting Flow, v_c,x			34	
Potential Capacity, c_p,x			1005	
Pedestrian Impedance Factor, p_p,x			1.000	
Movement Capacity, c_m,x			1005	
Probability of Queue-free State, p_0,j			0.981	

Major-Street U-Turn Movements		1U	4U	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Shared L/U Capacity, c_SH				
Probability of Queue-free State, p_0,j				

Minor-Street Through Movements		8	11	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Pedestrian Impedance Factor, p_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Probability of Queue-free State, p_0,j				

Minor-Street Left-Turn Movements		7	10	
Conflicting Flow, v_c,x			153	
Potential Capacity, c_p,x			811	
Pedestrian Impedance Factor, p_p,x			1.000	
Major L, Minor T Adjusted Impedance Factor, p"				
Major L, Minor T Impedance Factor, p'				
Capacity Adjustment Factor, f_x			0.978	
Movement Capacity, c_m,x			794	

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration					LR	
Shared Flow Rate, v_y					31	
Movement Capacity, c_m,x				794		1005
Shared Capacity, c_SH					908	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound		EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		31						13		19
Movement Capacity		1499						794		1005
Lane Configuration		LT							LR	
Shared Capacity									908	
Control Delay		7.5							9.1	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach		NB	SB	
Movement		2	5	
Number of Major Street Through Lanes, N		1	1	
Proportion of Rank 1 vehicles not blocked, p*_0,j		0.978		
Delay to Major Left-turning Vehicles, d_MLT		7.5		
Major Street Through Vehicles in Shared Lane, v_i1		56		
Major Street Turning Vehicles in Shared Lane, v_i2		31		
Saturation Flow Rate for Major Street Through, s_i1		1700	1700	

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700
Delay to Rank 1 Vehicles, d_Rank1	0.2

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB		SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		LT							LR	
Flow Rate		31							31	
Lane Capacity		1499							908	
v/c		0.02							0.03	
95% Queue Length		0.1							0.1	
Control Delay		7.5							9.1	
LOS		A							A	
Approach Delay		2.8							9.1	
Approach LOS									A	
Intersction Delay		3.4								

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HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_PM_EastWestCorridor_EricksonRaRd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	PM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	E/W Corridor & Erickson R
Major Street Direction:	North-South
East/West Street Name:	East/West Corridor
North/South Street Name:	Erickson Ranch Road
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume			100	75		35	55	
Peak Hour Factor, PHF					0.80			
Hourly Flow Rtae, HFR			125	94		44	69	
Percent Heavy Vehicles						5		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration				TR		LT		
Median Type					Undivided			
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?					Not Present			

Minor Street:

Approach	WestBound				EastBound		
Movement	7	8	9		10	11	12
	L	T	R		L	T	R
Volume	10		20				
Peak Hour Factor, PHF				0.80			
Hourly Flow Rtae, HFR	13		25				
Percent Heavy Vehicles	5		5				
Number of Lanes	0	1	0		0	0	0
Lane Configuration		LR					
RT channelized?							
Flared Approach | Storage	No	|			|	
Percent Grade		0					

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration				LT		LR				
Flow Rate				44		38				
Lane Capacity				1333		773				
v/c				0.03		0.05				
95% Queue Length				0.1		0.2				
Control Delay				7.8		9.9				
LOS				A		A				
Approach Delay				3.2		9.9				
Approach LOS						A				
Intersction Delay		2.0								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	WestBound			EastBound		
Priority	7	8	9	10	11	12
Movement	L	T	R	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume, V_x			100	75		35	55	
Flow Rate, v_x			125	94		44	69	

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume, V_x	10		20			
Flow Rate, v_x	13		25			

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Flow Rate, v_x			125	94		44	69	
Conflicting Flow, v_c,x						219		

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Flow Rate, v_x	13		25			
Conflicting Flow, v_c,x	328		172			

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage				4.1	7.1		6.2			
Stage I										
Stage II										
t_c,HV				1.0	1.0		1.0			
P_HV				0.05	0.05		0.05			
t_c,G					0.2		0.1			
G					0		0			
t_3,LT				0.0	0.7		0.0			
t_c										
Single Stage				4.15	6.45		6.25			
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base				2.2	3.5		3.3			
t_f,HV				0.9	0.9		0.9			
P_HV				0.05	0.05		0.05			
t_f				2.25	3.55		3.35			

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x				219	328		172			
t_c,x				4.15	6.45		6.25			
t_f,x				2.25	3.55		3.35			
c_p,x				1333	660		864			

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance				
Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				
Major-Street Left-Turn Movements		1	4	
Conflicting Flow, v_c,x			219	
Potential Capacity, c_p,x			1333	
Pedestrian Impedance Factor, p_p,x			1.000	
Movement Capacity, c_m,x			1333	
Probability of Queue-free State, p_0,j			0.967	
Major L-Shared Probability Queue-free State, p*_0,j			0.966	
Minor-Street Right-Turn Movements		9	12	
Conflicting Flow, v_c,x		172		
Potential Capacity, c_p,x		864		
Pedestrian Impedance Factor, p_p,x		1.000		
Movement Capacity, c_m,x		864		
Probability of Queue-free State, p_0,j		0.971		
Major-Street U-Turn Movements		1U	4U	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Shared L/U Capacity, c_SH				
Probability of Queue-free State, p_0,j				
Minor-Street Through Movements		8	11	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Pedestrian Impedance Factor, p_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Probability of Queue-free State, p_0,j				
Minor-Street Left-Turn Movements		7	10	
Conflicting Flow, v_c,x		328		
Potential Capacity, c_p,x		660		
Pedestrian Impedance Factor, p_p,x		1.000		
Major L, Minor T Adjusted Impedance Factor, p"				
Major L, Minor T Impedance Factor, p'				
Capacity Adjustment Factor, f_x		0.966		
Movement Capacity, c_m,x		638		

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration		LR				
Shared Flow Rate, v_y		38				
Movement Capacity, c_m,x	638		864			
Shared Capacity, c_SH		773				

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12	
Flow Rate				44	13		25				
Movement Capacity				1333	638		864				
Lane Configuration				LT		LR					
Shared Capacity						773					
Control Delay				7.8		9.9					

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	NB	SB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j		0.966
Delay to Major Left-turning Vehicles, d_MLT		7.8
Major Street Through Vehicles in Shared Lane, v_i1		69
Major Street Turning Vehicles in Shared Lane, v_i2		44
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700
Delay to Rank 1 Vehicles, d_Rank1	0.3

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB			SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration				LT		LR				
Flow Rate				44		38				
Lane Capacity				1333		773				
v/c				0.03		0.05				
95% Queue Length				0.1		0.2				
Control Delay				7.8		9.9				
LOS				A		A				
Approach Delay				3.2		9.9				
Approach LOS						A				
Intersction Delay	2.0									

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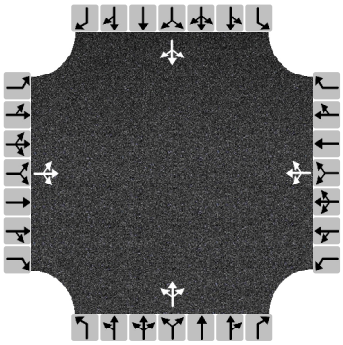
HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	HDR	Intersection	E/W Corridor & Haines Ave
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	7/11/2019	East/West Street	East/West Corridor
Analysis Year	2045	North/South Street	Haines Avenue
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.80
Time Analyzed	PM - 2045 Build Conditon		
Project Description	Southern Meade County Corridor Study		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	15	25	40	5	15	5	145	185	20	5	65	10
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	100			31			438			100		
Percent Heavy Vehicles	6			6			6			6		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.089			0.028			0.389			0.089		
Final Departure Headway, hd (s)	5.06			5.36			4.53			4.79		
Final Degree of Utilization, x	0.141			0.046			0.550			0.133		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.06			3.36			2.53			2.79		

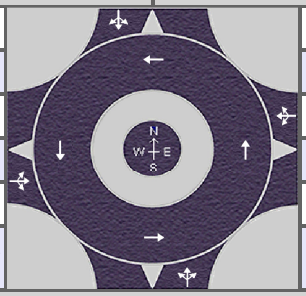
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	100			31			438			100		
Capacity	712			672			795			751		
95% Queue Length, Q_{95} (veh)	0.5			0.1			3.4			0.5		
Control Delay (s/veh)	8.9			8.6			12.9			8.5		
Level of Service, LOS	A			A			B			A		
Approach Delay (s/veh)	8.9			8.6			12.9			8.5		
Approach LOS	A			A			B			A		
Intersection Delay, s/veh | LOS	11.5						B					

HCS7 Roundabouts Report

General Information

Analyst	HDR
Agency or Co.	HDR
Date Performed	7/11/2019
Analysis Year	2045
Time Analyzed	PM - 2045 Build Condition
Project Description	Southern Meade County Cor...



Site Information

Intersection	E/W Corridor & Haines Ave
E/W Street Name	East/West Corridor
N/S Street Name	Haines Avenue
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.80
Jurisdiction	Meade County

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	15	25	40	0	5	15	5	0	145	185	20	0	5	65	10
Percent Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Flow Rate (v_{PCE}), pc/h	0	20	33	53	0	7	20	7	0	192	245	27	0	7	86	13
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		106			34			464			106	
Entry Volume, veh/h		100			32			438			100	
Circulating Flow (v_c), pc/h	100			457			60			219		
Exiting Flow (v_{ex}), pc/h	67			225			272			146		
Capacity (c_{pce}), pc/h		1246			866			1298			1104	
Capacity (c), veh/h		1176			817			1225			1041	
v/c Ratio (x)		0.09			0.04			0.36			0.10	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		3.8			4.8			6.4			4.3	
Lane LOS		A			A			A			A	
95% Queue, veh		0.3			0.1			1.6			0.3	
Approach Delay, s/veh	3.8			4.8			6.4			4.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.6						A					

HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_PM_EastWestCorridor_Haines_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	PM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	E/W Corridor & Haines Ave
Major Street Direction:	North-South
East/West Street Name:	East/West Corridor
North/South Street Name:	N. Haines Ave
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		145	185	20		5	65	10
Peak Hour Factor, PHF					0.80			
Hourly Flow Rtae, HFR		181	231	25		6	81	13
Percent Heavy Vehicles		6				6		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type					Undivided			
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?					Not Present			

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	5	15	5	15	25	40
Peak Hour Factor, PHF			0.80			
Hourly Flow Rtae, HFR	6	19	6	19	31	50
Percent Heavy Vehicles	6	6	6	6	6	6
Number of Lanes	0	1	0	0	1	0
Lane Configuration		LTR			LTR	
RT channelized?						
Flared Approach | Storage	No	|		No	|
Percent Grade		0			0	

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		181		6		31			100	
Lane Capacity		1476		1286		328			448	
v/c		0.12		0.00		0.10			0.22	
95% Queue Length		0.4		0.0		0.3			0.8	
Control Delay		7.8		7.8		17.1			15.3	
LOS		A		A		C			C	
Approach Delay		3.9		0.5		17.1			15.3	
Approach LOS						C			C	
Intersction Delay		5.7								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	WestBound			EastBound		
Priority	7	8	9	10	11	12
Movement	L	T	R	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume, V_x		145	185	20		5	65	10
Flow Rate, v_x		181	231	25		6	81	13

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume, V_x	5	15	5	15	25	40
Flow Rate, v_x	6	19	6	19	31	50

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Flow Rate, v_x		181	231	25		6	81	13
Conflicting Flow, v_c,x		94				256		

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Flow Rate, v_x	6	19	6	19	31	50
Conflicting Flow, v_c,x	747	713	244	719	719	88

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1		4.1	7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV		1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0
P_HV		0.06		0.06	0.06	0.06	0.06	0.06	0.06	0.06
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage		4.16		4.16	7.16	6.56	6.26	7.16	6.56	6.26
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2		2.2	3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV		0.9		0.9	0.9	0.9	0.9	0.9	0.9	0.9
P_HV		0.06		0.06	0.06	0.06	0.06	0.06	0.06	0.06
t_f		2.25		2.25	3.55	4.05	3.35	3.55	4.05	3.35

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		94		256	747	713	244	719	719	88
t_c,x		4.16		4.16	7.16	6.56	6.26	7.16	6.56	6.26
t_f,x		2.25		2.25	3.55	4.05	3.35	3.55	4.05	3.35
c_p,x		1476		1286	324	353	785	339	350	960

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance				
Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4
Conflicting Flow, v_c,x		94	256
Potential Capacity, c_p,x		1476	1286
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		1476	1286
Probability of Queue-free State, p_0,j		0.877	0.995
Major L-Shared Probability Queue-free State, p*_0,j		0.855	0.995

Minor-Street Right-Turn Movements		9	12
Conflicting Flow, v_c,x		244	88
Potential Capacity, c_p,x		785	960
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		785	960
Probability of Queue-free State, p_0,j		0.992	0.948

Major-Street U-Turn Movements		1U	4U
Conflicting Flow, v_c,x			
Potential Capacity, c_p,x			
Capacity Adjustment Factor, f_x			
Movement Capacity, c_m,x			
Shared L/U Capacity, c_SH			
Probability of Queue-free State, p_0,j			

Minor-Street Through Movements		8	11
Conflicting Flow, v_c,x		713	719
Potential Capacity, c_p,x		353	350
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Capacity Adjustment Factor, f_x		0.851	0.851
Movement Capacity, c_m,x		300	298
Probability of Queue-free State, p_0,j		0.937	0.895

Minor-Street Left-Turn Movements		7	10
Conflicting Flow, v_c,x		747	719
Potential Capacity, c_p,x		324	339
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"		0.762	0.798
Major L, Minor T Impedance Factor, p'		0.816	0.844
Capacity Adjustment Factor, f_x		0.774	0.838
Movement Capacity, c_m,x		251	284

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		31			100	
Movement Capacity, c_m,x	251	300	785	284	298	960
Shared Capacity, c_SH		328			448	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound		EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		181		6	6	19	6	19	31	50
Movement Capacity		1476		1286	251	300	785	284	298	960
Lane Configuration						LTR			LTR	
Shared Capacity						328			448	
Control Delay		7.8		7.8		17.1			15.3	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	NB	SB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.855	0.995
Delay to Major Left-turning Vehicles, d_MLT	7.8	7.8
Major Street Through Vehicles in Shared Lane, v_i1	231	81
Major Street Turning Vehicles in Shared Lane, v_i2	206	19
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	1.1	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB		SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		181		6		31			100	
Lane Capacity		1476		1286		328			448	
v/c		0.12		0.00		0.10			0.22	
95% Queue Length		0.4		0.0		0.3			0.8	
Control Delay		7.8		7.8		17.1			15.3	
LOS		A		A		C			C	
Approach Delay		3.9		0.5		17.1			15.3	
Approach LOS						C			C	
Intersction Delay		5.7								

This TWSC text report was created in HCS™ TWSC Version 7.8 on 9/5/2019 3:13:32 PM

HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_PM_ElkCreek-143rd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	PM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	Elk Creek & 143rd Ave
Major Street Direction:	East-West
East/West Street Name:	Elk Creek Road
North/South Street Name:	143rd Avenue
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	EastBound				WestBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		5	35	5		5	25	5
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		6	44	6		6	31	6
Percent Heavy Vehicles		20				20		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9		10	11	12
	L	T	R		L	T	R
Volume	5	5	5		5	5	5
Peak Hour Factor, PHF				0.80			
Hourly Flow Rtae, HFR	6	6	6		6	6	6
Percent Heavy Vehicles	20	20	20		20	20	20
Number of Lanes	0	1	0		0	1	0
Lane Configuration		LTR				LTR	
RT channelized?							
Flared Approach | Storage	No	|			No	|	
Percent Grade		0				0		

Pedestrian Volumes and Adjustments

Approach	EB	WB	NB	SB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		6		19			19	
Lane Capacity		1464		1449		830			834	
v/c		0.00		0.00		0.02			0.02	
95% Queue Length		0.0		0.0		0.1			0.1	
Control Delay		7.5		7.5		9.4			9.4	
LOS		A		A		A			A	
Approach Delay		0.9		1.1		9.4			9.4	
Approach LOS						A			A	
Intersction Delay		3.3								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	EastBound				WestBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	NorthBound				SouthBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Volume, V_x		5	35	5		5	25	5
Flow Rate, v_x		6	44	6		6	31	6

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Volume, V_x	5	5	5		5	5	5
Flow Rate, v_x	6	6	6		6	6	6

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Flow Rate, v_x		6	44	6		6	31	6
Conflicting Flow, v_c,x		38				50		

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Flow Rate, v_x	6	6	6		6	6	6
Conflicting Flow, v_c,x	113	109	47		113	109	34

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1		4.1	7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV		1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0
P_HV		0.20		0.20	0.20	0.20	0.20	0.20	0.20	0.20
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage		4.30		4.30	7.30	6.70	6.40	7.30	6.70	6.40
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2		2.2	3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV		0.9		0.9	0.9	0.9	0.9	0.9	0.9	0.9
P_HV		0.20		0.20	0.20	0.20	0.20	0.20	0.20	0.20
t_f		2.38		2.38	3.68	4.18	3.48	3.68	4.18	3.48

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		38		50	113	109	47	113	109	34
t_c,x		4.30		4.30	7.30	6.70	6.40	7.30	6.70	6.40
t_f,x		2.38		2.38	3.68	4.18	3.48	3.68	4.18	3.48
c_p,x		1464		1449	824	748	973	824	748	989

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance				
Approach	EB	WB	NB	SB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4
Conflicting Flow, v_c,x		38	50
Potential Capacity, c_p,x		1464	1449
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		1464	1449
Probability of Queue-free State, p_0,j		0.996	0.996
Major L-Shared Probability Queue-free State, p*_0,j		0.996	0.996

Minor-Street Right-Turn Movements		9	12
Conflicting Flow, v_c,x		47	34
Potential Capacity, c_p,x		973	989
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Movement Capacity, c_m,x		973	989
Probability of Queue-free State, p_0,j		0.994	0.994

Major-Street U-Turn Movements		1U	4U
Conflicting Flow, v_c,x			
Potential Capacity, c_p,x			
Capacity Adjustment Factor, f_x			
Movement Capacity, c_m,x			
Shared L/U Capacity, c_SH			
Probability of Queue-free State, p_0,j			

Minor-Street Through Movements		8	11
Conflicting Flow, v_c,x		109	109
Potential Capacity, c_p,x		748	748
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Capacity Adjustment Factor, f_x		0.991	0.991
Movement Capacity, c_m,x		742	742
Probability of Queue-free State, p_0,j		0.992	0.992

Minor-Street Left-Turn Movements		7	10
Conflicting Flow, v_c,x		113	113
Potential Capacity, c_p,x		824	824
Pedestrian Impedance Factor, p_p,x		1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"		0.983	0.983
Major L, Minor T Impedance Factor, p'		0.987	0.987
Capacity Adjustment Factor, f_x		0.981	0.981
Movement Capacity, c_m,x		808	808

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		19			19	
Movement Capacity, c_m,x	808	742	973	808	742	989
Shared Capacity, c_SH		830			834	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		6		6	6	6	6	6	6	6
Movement Capacity		1464		1449	808	742	973	808	742	989
Lane Configuration						LTR			LTR	
Shared Capacity						830			834	
Control Delay		7.5		7.5		9.4			9.4	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	EB	WB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.996	0.996
Delay to Major Left-turning Vehicles, d_MLT	7.5	7.5
Major Street Through Vehicles in Shared Lane, v_i1	44	31
Major Street Turning Vehicles in Shared Lane, v_i2	13	13
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	0.0	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	EB		WB		NorthBound			SouthBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		6		6		19			19	
Lane Capacity		1464		1449		830			834	
v/c		0.00		0.00		0.02			0.02	
95% Queue Length		0.0		0.0		0.1			0.1	
Control Delay		7.5		7.5		9.4			9.4	
LOS		A		A		A			A	
Approach Delay		0.9		1.1		9.4			9.4	
Approach LOS						A			A	
Intersction Delay		3.3								

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HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_PM_ElkCreek-ElkVale_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	3/7/2019
Time Analyzed:	PM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	Elk Creek & Elk Vale
Major Street Direction:	North-South
East/West Street Name:	Elk Creek Road
North/South Street Name:	Elk Vale Road
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	NorthBound				SouthBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		15	15	25		5	10	10
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		19	19	31		6	13	13
Percent Heavy Vehicles		14				14		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	WestBound				EastBound		
Movement	7	8	9		10	11	12
	L	T	R		L	T	R
Volume	5	10	5		10	20	15
Peak Hour Factor, PHF			0.80				
Hourly Flow Rtae, HFR	6	13	6		13	25	19
Percent Heavy Vehicles	14	14	14		14	14	14
Number of Lanes	0	1	0		0	1	0
Lane Configuration		LTR				LTR	
RT channelized?							
Flared Approach | Storage	No	|			No	|	
Percent Grade		0				0		

Pedestrian Volumes and Adjustments

Approach	NB	SB	WB	EB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		19		6		25			56	
Lane Capacity		1515		1483		806			832	
v/c		0.01		0.00		0.03			0.07	
95% Queue Length		0.0		0.0		0.1			0.2	
Control Delay		7.4		7.4		9.6			9.6	
LOS		A		A		A			A	
Approach Delay		2.1		1.5		9.6			9.6	
Approach LOS						A			A	
Intersction Delay		5.4								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	NorthBound				SouthBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	WestBound			EastBound		
Priority	7	8	9	10	11	12
Movement	L	T	R	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume, V_x		15	15	25		5	10	10
Flow Rate, v_x		19	19	31		6	13	13

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume, V_x	5	10	5	10	20	15
Flow Rate, v_x	6	13	6	13	25	19

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	NorthBound				SouthBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Flow Rate, v_x		19	19	31		6	13	13
Conflicting Flow, v_c,x		25				50		

Minor Street:

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Flow Rate, v_x	6	13	6	13	25	19
Conflicting Flow, v_c,x	125	109	34	113	119	19

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1		4.1	7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV		1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0
P_HV		0.14		0.14	0.14	0.14	0.14	0.14	0.14	0.14
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage		4.24		4.24	7.24	6.64	6.34	7.24	6.64	6.34
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2		2.2	3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV		0.9		0.9	0.9	0.9	0.9	0.9	0.9	0.9
P_HV		0.14		0.14	0.14	0.14	0.14	0.14	0.14	0.14
t_f		2.33		2.33	3.63	4.13	3.43	3.63	4.13	3.43

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	NB		SB		WestBound			EastBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		25		50	125	109	34	113	119	19
t_c,x		4.24		4.24	7.24	6.64	6.34	7.24	6.64	6.34
t_f,x		2.33		2.33	3.63	4.13	3.43	3.63	4.13	3.43
c_p,x		1515		1483	822	759	1005	838	750	1026

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance				
Approach	NB	SB	WB	EB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements	1	4
Conflicting Flow, v_c,x	25	50
Potential Capacity, c_p,x	1515	1483
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	1515	1483
Probability of Queue-free State, p_0,j	0.988	0.996
Major L-Shared Probability Queue-free State, p*_0,j	0.987	0.996

Minor-Street Right-Turn Movements	9	12
Conflicting Flow, v_c,x	34	19
Potential Capacity, c_p,x	1005	1026
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	1005	1026
Probability of Queue-free State, p_0,j	0.994	0.982

Major-Street U-Turn Movements	1U	4U
Conflicting Flow, v_c,x		
Potential Capacity, c_p,x		
Capacity Adjustment Factor, f_x		
Movement Capacity, c_m,x		
Shared L/U Capacity, c_SH		
Probability of Queue-free State, p_0,j		

Minor-Street Through Movements	8	11
Conflicting Flow, v_c,x	109	119
Potential Capacity, c_p,x	759	750
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Capacity Adjustment Factor, f_x	0.983	0.983
Movement Capacity, c_m,x	746	737
Probability of Queue-free State, p_0,j	0.983	0.966

Minor-Street Left-Turn Movements	7	10
Conflicting Flow, v_c,x	125	113
Potential Capacity, c_p,x	822	838
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"	0.950	0.967
Major L, Minor T Impedance Factor, p'	0.962	0.974
Capacity Adjustment Factor, f_x	0.944	0.968
Movement Capacity, c_m,x	776	811

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	WestBound			EastBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		25			56	
Movement Capacity, c_m,x	776	746	1005	811	737	1026
Shared Capacity, c_SH		806			832	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	NB			SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		19		6	6	13	6	13	25	19
Movement Capacity		1515		1483	776	746	1005	811	737	1026
Lane Configuration						LTR			LTR	
Shared Capacity						806			832	
Control Delay		7.4		7.4		9.6			9.6	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	NB	SB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.987	0.996
Delay to Major Left-turning Vehicles, d_MLT	7.4	7.4
Major Street Through Vehicles in Shared Lane, v_i1	19	13
Major Street Turning Vehicles in Shared Lane, v_i2	50	19
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	0.1	0.0

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	NB		SB		WestBound			EastBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		19		6		25			56	
Lane Capacity		1515		1483		806			832	
v/c		0.01		0.00		0.03			0.07	
95% Queue Length		0.0		0.0		0.1			0.2	
Control Delay		7.4		7.4		9.6			9.6	
LOS		A		A		A			A	
Approach Delay		2.1		1.5		9.6			9.6	
Approach LOS						A			A	
Intersction Delay		5.4								

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HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_PM_ElkCreek-EricksonRaRd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	7/3/2019
Time Analyzed:	PM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	Elk Creek & Erickson Ra R
Major Street Direction:	East-West
East/West Street Name:	Elk Creek Road
North/South Street Name:	Erickson Ranch Road
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:

Approach	EastBound				WestBound			
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume		10	70	75		20	95	10
Peak Hour Factor, PHF				0.80				
Hourly Flow Rtae, HFR		13	88	94		25	119	13
Percent Heavy Vehicles		5				5		
Number of Lanes	0	0	1	0	0	0	1	0
Lane Configuration			LTR				LTR	
Median Type				Undivided				
Median Storage								
RT channelized?								
Left-Turn Lane Storage								
Upstream Signal?				Not Present				

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9		10	11	12
	L	T	R		L	T	R
Volume	65	10	30		10	5	10
Peak Hour Factor, PHF			0.80				
Hourly Flow Rtae, HFR	81	13	38		13	6	13
Percent Heavy Vehicles	5	5	5		5	5	5
Number of Lanes	0	1	0		0	1	0
Lane Configuration		LTR				LTR	
RT channelized?							
Flared Approach | Storage	No	|		No	|	
Percent Grade		0				0	

Pedestrian Volumes and Adjustments

Approach	EB	WB	NB	SB
Movement	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		13		25		131			31	
Lane Capacity		1434		1376		643			646	
v/c		0.01		0.02		0.20			0.05	
95% Queue Length		0.0		0.1		0.8			0.2	
Control Delay		7.5		7.7		12.0			10.9	
LOS		A		A		B			B	
Approach Delay		0.6		1.4		12.0			10.9	
Approach LOS						B			B	
Intersction Delay		4.4								

Step 1: MOVEMENT PRIORITIES

Major Street:

Approach	EastBound				WestBound			
Priority	1U	1	2	3	4U	4	5	6
Movement	U	L	T	R	U	L	T	R

Minor Street:

Approach	NorthBound				SouthBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Volume, V_x		10	70	75		20	95	10
Flow Rate, v_x		13	88	94		25	119	13

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Volume, V_x	65	10	30		10	5	10
Flow Rate, v_x	81	13	38		13	6	13

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3 |	4U	4	5	6
	U	L	T	R |	U	L	T	R
Flow Rate, v_x		13	88	94		25	119	13
Conflicting Flow, v_c,x		131				181		

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Flow Rate, v_x	81	13	38		13	6	13
Conflicting Flow, v_c,x	344	341	134		359	381	125

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1		4.1	7.1	6.5	6.2	7.1	6.5	6.2
Stage I										
Stage II										
t_c,HV		1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0
P_HV		0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05
t_c,G					0.2	0.2	0.1	0.2	0.2	0.1
G					0	0	0	0	0	0
t_3,LT		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
t_c										
Single Stage		4.15		4.15	7.15	6.55	6.25	7.15	6.55	6.25
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2		2.2	3.5	4.0	3.3	3.5	4.0	3.3
t_f,HV		0.9		0.9	0.9	0.9	0.9	0.9	0.9	0.9
P_HV		0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05
t_f		2.25		2.25	3.55	4.05	3.35	3.55	4.05	3.35

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		131		181	344	341	134	359	381	125
t_c,x		4.15		4.15	7.15	6.55	6.25	7.15	6.55	6.25
t_f,x		2.25		2.25	3.55	4.05	3.35	3.55	4.05	3.35
c_p,x		1434		1376	605	576	907	591	547	918

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance				
Approach	EB	WB	NB	SB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0	0	0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements	1	4
Conflicting Flow, v_c,x	131	181
Potential Capacity, c_p,x	1434	1376
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	1434	1376
Probability of Queue-free State, p_0,j	0.991	0.982
Major L-Shared Probability Queue-free State, p*_0,j	0.990	0.980

Minor-Street Right-Turn Movements	9	12
Conflicting Flow, v_c,x	134	125
Potential Capacity, c_p,x	907	918
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Movement Capacity, c_m,x	907	918
Probability of Queue-free State, p_0,j	0.959	0.986

Major-Street U-Turn Movements	1U	4U
Conflicting Flow, v_c,x		
Potential Capacity, c_p,x		
Capacity Adjustment Factor, f_x		
Movement Capacity, c_m,x		
Shared L/U Capacity, c_SH		
Probability of Queue-free State, p_0,j		

Minor-Street Through Movements	8	11
Conflicting Flow, v_c,x	341	381
Potential Capacity, c_p,x	576	547
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Capacity Adjustment Factor, f_x	0.971	0.971
Movement Capacity, c_m,x	559	531
Probability of Queue-free State, p_0,j	0.978	0.988

Minor-Street Left-Turn Movements	7	10
Conflicting Flow, v_c,x	344	359
Potential Capacity, c_p,x	605	591
Pedestrian Impedance Factor, p_p,x	1.000	1.000
Major L, Minor T Adjusted Impedance Factor, p"	0.959	0.949
Major L, Minor T Impedance Factor, p'	0.969	0.961
Capacity Adjustment Factor, f_x	0.956	0.921
Movement Capacity, c_m,x	578	544

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
Lane Configuration		LTR			LTR	
Shared Flow Rate, v_y		131			31	
Movement Capacity, c_m,x	578	559	907	544	531	918
Shared Capacity, c_SH		643			646	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	EB			WB		NorthBound		SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		13		25	81	13	38	13	6	13
Movement Capacity		1434		1376	578	559	907	544	531	918
Lane Configuration						LTR			LTR	
Shared Capacity						643			646	
Control Delay		7.5		7.7		12.0			10.9	

CONTROL DELAY TO RANK 1 MOVEMENTS

Approach	EB	WB
Movement	2	5
Number of Major Street Through Lanes, N	1	1
Proportion of Rank 1 vehicles not blocked, p*_0,j	0.990	0.980
Delay to Major Left-turning Vehicles, d_MLT	7.5	7.7
Major Street Through Vehicles in Shared Lane, v_i1	88	119
Major Street Turning Vehicles in Shared Lane, v_i2	106	38
Saturation Flow Rate for Major Street Through, s_i1	1700	1700

Saturation Flow Rate for Major Street Right-Turn, s_i2	1700	1700
Delay to Rank 1 Vehicles, d_Rank1	0.1	0.2

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	EB		WB		NorthBound			SouthBound	
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration						LTR			LTR	
Flow Rate		13		25		131			31	
Lane Capacity		1434		1376		643			646	
v/c		0.01		0.02		0.20			0.05	
95% Queue Length		0.0		0.1		0.8			0.2	
Control Delay		7.5		7.7		12.0			10.9	
LOS		A		A		B			B	
Approach Delay		0.6		1.4		12.0			10.9	
Approach LOS						B			B	
Intersction Delay		4.4								

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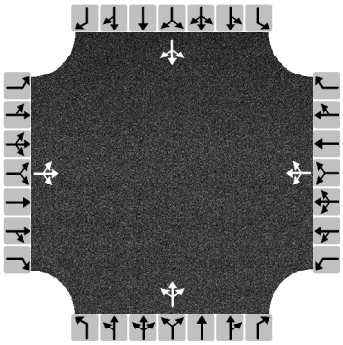
HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	HDR	Intersection	Elk Creek & Haines
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	3/7/2019	East/West Street	Elk Creek Road
Analysis Year	2045	North/South Street	Haines Avenue
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.80
Time Analyzed	PM - 2045 Build Cond.		
Project Description	Southern Meade County Corridor Study		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	10	25	35	10	20	5	90	25	20	5	10	5
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	88			44			169			25		
Percent Heavy Vehicles	6			6			6			6		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.078			0.039			0.150			0.022		
Final Departure Headway, hd (s)	4.23			4.51			4.38			4.38		
Final Degree of Utilization, x	0.103			0.055			0.205			0.030		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.23			2.51			2.38			2.38		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	88			44			169			25		
Capacity	852			798			823			821		
95% Queue Length, Q_{95} (veh)	0.3			0.2			0.8			0.1		
Control Delay (s/veh)	7.7			7.8			8.5			7.5		
Level of Service, LOS	A			A			A			A		
Approach Delay (s/veh)	7.7			7.8			8.5			7.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.1						A					

HCS7 Two-Way Stop-Control Text Report

TWO-WAY STOP CONTROL (TWSC) Analysis

File Name:	2045-Build_PM_PeacefulPines-EricksonRaRd_TWSC.xtw
Analyst:	HDR
Agency:	HDR
Date Performed:	3/7/2019
Time Analyzed:	PM - 2045 Build Cond.
Jurisdiction:	Meade County
Analysis Year:	2045
Project Description:	Southern Meade County Corridor Study
Units:	U.S. Customary
Intersection Name:	Peaceful P & Erickson RaR
Major Street Direction:	East-West
East/West Street Name:	Peaceful Pines Road
North/South Street Name:	Erickson Ranch Road
Analysis Time Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street:									
Approach		EastBound				WestBound			
Movement	1U	1	2	3	4U	4	5	6	
	U	L	T	R	U	L	T	R	
Volume		60	20				40	115	
Peak Hour Factor, PHF				0.80					
Hourly Flow Rtae, HFR		75	25				50	144	
Percent Heavy Vehicles		3							
Number of Lanes	0	1	1	0	0	0	1	1	
Lane Configuration		L	T				T	R	
Median Type				Undivided					
Median Storage									
RT channelized?								No	
Left-Turn Lane Storage									
Upstream Signal?				Not Present					

Minor Street:							
Approach	NorthBound			SouthBound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume				30		35	
Peak Hour Factor, PHF			0.80				
Hourly Flow Rtae, HFR				38		44	
Percent Heavy Vehicles				3		3	
Number of Lanes	0	0	0	0	1	0	
Lane Configuration					LR		
RT channelized?							
Flared Approach | Storage		|		No	|		
Percent Grade					0		

Pedestrian Volumes and Adjustments

Approach	EB	WB	NB	SB
Movement	13	14	15	16
Flow (ped/hr)	0	0		0
Lane Width (ft)				
Walking Speed (ft/sec)				
Pedestrian Blockage Factor, f_pb				

Delay, Queue Length, and Level of Service

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		L							LR	
Flow Rate		75							81	
Lane Capacity		1374							854	
v/c		0.05							0.10	
95% Queue Length		0.2							0.3	
Control Delay		7.8							9.7	
LOS		A							A	
Approach Delay		5.8							9.7	
Approach LOS									A	
Intersction Delay		3.6								

Step 1: MOVEMENT PRIORITIES

Major Street:									
Approach		EastBound				WestBound			
Priority	1U	1	2	3	4U	4	5	6	
Movement	U	L	T	R	U	L	T	R	
Minor Street:									

Approach	NorthBound				SouthBound		
Priority	7	8	9	|	10	11	12
Movement	L	T	R	|	L	T	R

Step 2: MOVEMENT DEMAND VOLUMES AND FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Volume, V_x		60	20				40	115
Flow Rate, v_x		75	25				50	144

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Volume, V_x					30		35
Flow Rate, v_x					38		44

Step 3: CONFLICTING FLOW RATES

Major Street:

Approach	EastBound				WestBound		
Movement	1U	1	2	3	4U	4	5	6
	U	L	T	R	U	L	T	R
Flow Rate, v_x		75	25				50	144
Conflicting Flow, v_c,x		194						

Minor Street:

Approach	NorthBound				SouthBound		
Movement	7	8	9	|	10	11	12
	L	T	R	|	L	T	R
Flow Rate, v_x					38		44
Conflicting Flow, v_c,x					225		50

Step 4: CRITICAL HEADWAYS and FOLLOW-UP HEADWAYS

CRITICAL HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_c,base										
Single Stage		4.1						7.1		6.2
Stage I										
Stage II										
t_c,HV		1.0						1.0		1.0
P_HV		0.03						0.03		0.03
t_c,G								0.2		0.1
G								0		0
t_3,LT		0.0						0.7		0.0
t_c										
Single Stage		4.13						6.43		6.23
Stage I										
Stage II										

FOLLOW-UP HEADWAYS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
t_f,base		2.2						3.5		3.3
t_f,HV		0.9						0.9		0.9
P_HV		0.03						0.03		0.03
t_f		2.23						3.53		3.33

Step 5: POTENTIAL CAPACITIES

NO UPSTREAM SIGNAL EFFECTS PRESENT

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
	U	L	U	L	L	T	R	L	T	R
v_c,x		194						225		50
t_c,x		4.13						6.43		6.23
t_f,x		2.23						3.53		3.33
c_p,x		1374						761		1016

Steps 6 - 9: MOVEMENT CAPACITIES

Pedestrian Impedance

Approach	EB	WB	NB	SB

Movement	13	14	15	16
Pedestrian Flow Rate v_x	0	0		0
Lane Width, w				
Walking Speed, S_p				
Pedestrian Blockage Factor, f_pb				

Major-Street Left-Turn Movements		1	4	
Conflicting Flow, v_c,x		194		
Potential Capacity, c_p,x		1374		
Pedestrian Impedance Factor, p_p,x		1.000		
Movement Capacity, c_m,x		1374		
Probability of Queue-free State, p_0,j		0.945		
Major L-Shared Probability Queue-free State, p*_0,j				

Minor-Street Right-Turn Movements		9	12	
Conflicting Flow, v_c,x			50	
Potential Capacity, c_p,x			1016	
Pedestrian Impedance Factor, p_p,x			1.000	
Movement Capacity, c_m,x			1016	
Probability of Queue-free State, p_0,j			0.957	

Major-Street U-Turn Movements		1U	4U	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Shared L/U Capacity, c_SH				
Probability of Queue-free State, p_0,j				

Minor-Street Through Movements		8	11	
Conflicting Flow, v_c,x				
Potential Capacity, c_p,x				
Pedestrian Impedance Factor, p_p,x				
Capacity Adjustment Factor, f_x				
Movement Capacity, c_m,x				
Probability of Queue-free State, p_0,j				

Minor-Street Left-Turn Movements		7	10	
Conflicting Flow, v_c,x			225	
Potential Capacity, c_p,x			761	
Pedestrian Impedance Factor, p_p,x			1.000	
Major L, Minor T Adjusted Impedance Factor, p"				
Major L, Minor T Impedance Factor, p'				
Capacity Adjustment Factor, f_x			0.945	
Movement Capacity, c_m,x			720	

Step 10: FINAL CAPACITY ADJUSTMENTS

SHARED-LANE CAPACITY OF MINOR STREET APPROACHES

Approach	NorthBound			SouthBound		
Movement	7	8	9	10	11	12
Lane Configuration					LR	
Shared Flow Rate, v_y					81	
Movement Capacity, c_m,x				720		1016
Shared Capacity, c_SH					854	

Step 11: CONTROL DELAY

CONTROL DELAY TO RANK 2 THROUGH 4 MOVEMENTS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Flow Rate		75						38		44
Movement Capacity		1374						720		1016
Lane Configuration		L							LR	
Shared Capacity									854	
Control Delay		7.8							9.7	

Steps 12 - 13: APPROACH/INTERSECTION CONTROL DELAY and 95% QUEUE LENGTHS

Approach	EB		WB		NorthBound			SouthBound		
Movement	1U	1	4U	4	7	8	9	10	11	12
Lane Configuration		L							LR	
Flow Rate		75							81	
Lane Capacity		1374							854	
v/c		0.05							0.10	
95% Queue Length		0.2							0.3	
Control Delay		7.8							9.7	

LOS	A	A
Approach Delay	5.8	9.7
Approach LOS		A
Intersction Delay	3.6	

This TWSC text report was created in HCS™ TWSC Version 7.8 on 9/5/2019 3:16:37 PM

HCS7: Two-Lane Highways Release 7.2

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - AM Build Eastbound
Highway	East/West Corridor
From/To	Erickson Ranch to Haines
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	4.0	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	2.3	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	40	%
Up/down	-	%	Access point density	1	/mi

Analysis direction volume, Vd 180 veh/h
Opposing direction volume, Vo 80 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.5		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.971		0.949	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	232	pc/h	105	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	1.3	mi/h
Adj. for access point density,(note-3) fA	0.3	mi/h
Free-flow speed, FFSd	58.5	mi/h
Adjustment for no-passing zones, fnp	2.4*	mi/h
Average travel speed, ATSd	53.4	mi/h
Percent Free Flow Speed, PFFS	91.4	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	0.994		0.994	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	226	pc/h	101	pc/h
Base percent time-spent-following,(note-4) BPTSFd	23.9	%		
Adjustment for no-passing zones, fnp	38.8			
Percent time-spent-following, PTSFd	50.7	%		

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	129	veh-mi
Peak-hour vehicle-miles of travel, VMT60	414	veh-mi
Peak 15-min total travel time, TT15	2.4	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	2.3	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	53.4	mi/h
Percent time-spent-following, PTSFd (from above)	50.7	
Level of service, LOSd (from above)	B	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	225.0
Effective width of outside lane, We	16.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.53
Bicycle LOS	F

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

HCS7: Two-Lane Highways Release 7.2

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - AM Build Eastbound
Highway	Elk Creek Road
From/To	Erickson Ranch to Haines
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	0.0	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	14	%
Up/down	-	%	Access point density	6	/mi

Analysis direction volume, Vd	100	veh/h
Opposing direction volume, Vo	70	veh/h

Average Travel Speed

Direction	Analysis (d)		Opposing (o)	
PCE for trucks, ET	1.9*		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor, (note-5) fHV	0.949		0.949	
Grade adj. factor, (note-1) fg	1.00		1.00	
Directional flow rate, (note-2) vi	132	pc/h	92	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed, (note-3) S FM	-	mi/h
Observed total demand, (note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, (note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width, (note-3) fLS	4.2	mi/h
Adj. for access point density, (note-3) fA	1.5	mi/h
Free-flow speed, FFSd	54.3	mi/h
Adjustment for no-passing zones, fnp	2.4*	mi/h
Average travel speed, ATSd	50.2	mi/h
Percent Free Flow Speed, PFFS	92.4	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.994	0.994
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	126 pc/h	88 pc/h
Base percent time-spent-following,(note-4) BPTSFd	14.3 %	
Adjustment for no-passing zones, fnp	24.9	
Percent time-spent-following, PTSFd	29.0 %	

Level of Service and Other Performance Measures

Level of service, LOS	A	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	94	veh-mi
Peak-hour vehicle-miles of travel, VMT60	300	veh-mi
Peak 15-min total travel time, TT15	1.9	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	3.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	50.2	mi/h
Percent time-spent-following, PTSFd (from above)	29.0	
Level of service, LOSd (from above)	A	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	125.0
Effective width of outside lane, We	18.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.90
Bicycle LOS	E

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

HCS7: Two-Lane Highways Release 7.2

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - AM Build Southbound
Highway	Erickson Ranch Road
From/To	East/West Co to Westridge Rd
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	2.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.6	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 190 veh/h
Opposing direction volume, Vo 90 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.5		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.976		0.957	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	243	pc/h	118	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	2.6	mi/h
Adj. for access point density,(note-3) fA	1.0	mi/h
Free-flow speed, FFSd	56.4	mi/h
Adjustment for no-passing zones, fnp	3.0	mi/h
Average travel speed, ATSd	50.6	mi/h
Percent Free Flow Speed, PFFS	89.7	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.995	0.995
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	239 pc/h	113 pc/h
Base percent time-spent-following,(note-4) BPTSFd	25.1 %	
Adjustment for no-passing zones, fnp	50.3	
Percent time-spent-following, PTSFd	59.3 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	95	veh-mi
Peak-hour vehicle-miles of travel, VMT60	304	veh-mi
Peak 15-min total travel time, TT15	1.9	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.6	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	50.6	mi/h
Percent time-spent-following, PTSFd (from above)	59.3	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	237.5
Effective width of outside lane, We	14.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.55
Bicycle LOS	F

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

HCS7: Two-Lane Highways Release 7.2

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - AM Build Southbound
Highway	Erickson Ranch Road
From/To	Westridge to Elk Creek
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	0.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	2.8	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	60	%
Up/down	-	%	Access point density	8	/mi

Analysis direction volume, Vd 125 veh/h
Opposing direction volume, Vo 100 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.5*		1.9*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.976		0.957	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	160	pc/h	131	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	4.2	mi/h
Adj. for access point density,(note-3) fA	2.0	mi/h
Free-flow speed, FFSd	53.8	mi/h
Adjustment for no-passing zones, fnp	2.5	mi/h
Average travel speed, ATSd	49.0	mi/h
Percent Free Flow Speed, PFFS	91.1	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.995	0.995
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	157 pc/h	126 pc/h
Base percent time-spent-following,(note-4) BPTSFd	17.4 %	
Adjustment for no-passing zones, fnp	53.2	
Percent time-spent-following, PTSFd	46.9 %	

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	109	veh-mi
Peak-hour vehicle-miles of travel, VMT60	350	veh-mi
Peak 15-min total travel time, TT15	2.2	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	2.8	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	49.0	mi/h
Percent time-spent-following, PTSFd (from above)	46.9	
Level of service, LOSd (from above)	B	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	156.3
Effective width of outside lane, We	16.50
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.95
Bicycle LOS	E

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

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Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - AM Build Southbound
Highway	Erickson Ranch Road
From/To	Peaceful Pines to East/West Co
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	2.0	ft	% Trucks and buses	3	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	12	/mi

Analysis direction volume, Vd 240 veh/h
Opposing direction volume, Vo 85 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.4		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.988		0.974	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	304	pc/h	109	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	2.6	mi/h
Adj. for access point density,(note-3) fA	3.0	mi/h
Free-flow speed, FFSd	54.4	mi/h
Adjustment for no-passing zones, fnp	2.8	mi/h
Average travel speed, ATSd	48.4	mi/h
Percent Free Flow Speed, PFFS	89.0	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.997	0.997
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	301 pc/h	107 pc/h
Base percent time-spent-following,(note-4) BPTSFd	30.3 %	
Adjustment for no-passing zones, fnp	46.9	
Percent time-spent-following, PTSFd	64.9 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	75	veh-mi
Peak-hour vehicle-miles of travel, VMT60	240	veh-mi
Peak 15-min total travel time, TT15	1.5	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	48.4	mi/h
Percent time-spent-following, PTSFd (from above)	64.9	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	300.0
Effective width of outside lane, We	14.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.10
Bicycle LOS	E

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - AM Build Southbound
Highway	Haines Avenue
From/To	East/West Cor. to Elk Creek Rd
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	0.0	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	4.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	40	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 225 veh/h
Opposing direction volume, Vo 55 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.4		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.977		0.949	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	288	pc/h	72	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	55.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	4.2	mi/h
Adj. for access point density,(note-3) fA	1.0	mi/h
Free-flow speed, FFSd	49.8	mi/h
Adjustment for no-passing zones, fnp	2.4*	mi/h
Average travel speed, ATSd	44.6	mi/h
Percent Free Flow Speed, PFFS	89.6	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.994	0.994
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	283 pc/h	69 pc/h
Base percent time-spent-following,(note-4) BPTSFd	28.8 %	
Adjustment for no-passing zones, fnp	34.9	
Percent time-spent-following, PTSFd	56.9 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	281	veh-mi
Peak-hour vehicle-miles of travel, VMT60	900	veh-mi
Peak 15-min total travel time, TT15	6.3	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	4.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	44.6	mi/h
Percent time-spent-following, PTSFd (from above)	56.9	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	281.3
Effective width of outside lane, We	12.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	6.21
Bicycle LOS	F

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

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Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - AM Build Southbound
Highway	Haines Avenue
From/To	Pennington Co to E/W Corridor
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	2.0	ft	% Trucks and buses	4	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	2.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	27	%
Up/down	-	%	Access point density	5	/mi

Analysis direction volume, Vd 430 veh/h
Opposing direction volume, Vo 60 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.992		0.965	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	542	pc/h	78	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	2.6	mi/h
Adj. for access point density,(note-3) fA	1.3	mi/h
Free-flow speed, FFSd	56.2	mi/h
Adjustment for no-passing zones, fnp	2.4*	mi/h
Average travel speed, ATSd	48.9	mi/h
Percent Free Flow Speed, PFFS	87.2	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.996
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	537 pc/h	75 pc/h
Base percent time-spent-following,(note-4) BPTSFd	47.0 %	
Adjustment for no-passing zones, fnp	20.5	
Percent time-spent-following, PTSFd	65.0 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	269	veh-mi
Peak-hour vehicle-miles of travel, VMT60	860	veh-mi
Peak 15-min total travel time, TT15	5.5	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	2.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	48.9	mi/h
Percent time-spent-following, PTSFd (from above)	65.0	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	537.5
Effective width of outside lane, We	14.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.67
Bicycle LOS	F

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

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Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - PM Build Northbound
Highway	Erickson Ranch Road
From/To	E/W Corridor to Westridge Rd
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	2.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.6	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 120 veh/h
Opposing direction volume, Vo 90 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.5*		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.976		0.957	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	154	pc/h	118	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	2.6	mi/h
Adj. for access point density,(note-3) fA	1.0	mi/h
Free-flow speed, FFSd	56.4	mi/h
Adjustment for no-passing zones, fnp	2.4*	mi/h
Average travel speed, ATSd	51.9	mi/h
Percent Free Flow Speed, PFFS	92.0	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.995	0.995
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	151 pc/h	113 pc/h
Base percent time-spent-following,(note-4) BPTSFd	16.9 %	
Adjustment for no-passing zones, fnp	55.1	
Percent time-spent-following, PTSFd	48.4 %	

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	60	veh-mi
Peak-hour vehicle-miles of travel, VMT60	192	veh-mi
Peak 15-min total travel time, TT15	1.2	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.6	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	51.9	mi/h
Percent time-spent-following, PTSFd (from above)	48.4	
Level of service, LOSd (from above)	B	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	150.0
Effective width of outside lane, We	19.60
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.37
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

HCS7: Two-Lane Highways Release 7.2

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - PM Build Northbound
Highway	Erickson Ranch Road
From/To	Westridge to Elk Creek
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	0.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	2.8	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	56	%
Up/down	-	%	Access point density	8	/mi

Analysis direction volume, Vd 105 veh/h
Opposing direction volume, Vo 100 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.5*		1.9*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.976		0.957	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	134	pc/h	131	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	4.2	mi/h
Adj. for access point density,(note-3) fA	2.0	mi/h
Free-flow speed, FFSd	53.8	mi/h
Adjustment for no-passing zones, fnp	2.3	mi/h
Average travel speed, ATSd	49.4	mi/h
Percent Free Flow Speed, PFFS	91.9	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.995	0.995
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	132 pc/h	126 pc/h
Base percent time-spent-following,(note-4) BPTSFd	15.0 %	
Adjustment for no-passing zones, fnp	51.4	
Percent time-spent-following, PTSFd	41.3 %	

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	92	veh-mi
Peak-hour vehicle-miles of travel, VMT60	294	veh-mi
Peak 15-min total travel time, TT15	1.9	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	2.8	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	49.4	mi/h
Percent time-spent-following, PTSFd (from above)	41.3	
Level of service, LOSd (from above)	B	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	131.3
Effective width of outside lane, We	17.70
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.66
Bicycle LOS	E

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

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Phone: Fax:
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Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - PM Build Northbound
Highway	Erickson Ranch Road
From/To	Peaceful Pines to E/W Corridor
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	2.0	ft	% Trucks and buses	3	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	1.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	12	/mi

Analysis direction volume, Vd	175	veh/h
Opposing direction volume, Vo	65	veh/h

Average Travel Speed

Direction	Analysis (d)		Opposing (o)	
PCE for trucks, ET	1.5		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor, (note-5) fHV	0.985		0.974	
Grade adj. factor, (note-1) fg	1.00		1.00	
Directional flow rate, (note-2) vi	222	pc/h	83	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed, (note-3) S FM	-	mi/h
Observed total demand, (note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, (note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width, (note-3) fLS	2.6	mi/h
Adj. for access point density, (note-3) fA	3.0	mi/h
Free-flow speed, FFSd	54.4	mi/h
Adjustment for no-passing zones, fnp	2.4*	mi/h
Average travel speed, ATSd	49.6	mi/h
Percent Free Flow Speed, PFFS	91.2	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.997	0.997
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	219 pc/h	81 pc/h
Base percent time-spent-following,(note-4) BPTSFd	23.3 %	
Adjustment for no-passing zones, fnp	48.1	
Percent time-spent-following, PTSFd	58.4 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	55	veh-mi
Peak-hour vehicle-miles of travel, VMT60	175	veh-mi
Peak 15-min total travel time, TT15	1.1	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	1.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	49.6	mi/h
Percent time-spent-following, PTSFd (from above)	58.4	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	218.8
Effective width of outside lane, We	14.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.94
Bicycle LOS	E

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

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Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - PM Build Northbound
Highway	Haines Avenue
From/To	E/W Corridor to Elk Creek Rd
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	0.0	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	4.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	28	%
Up/down	-	%	Access point density	4	/mi

Analysis direction volume, Vd 205 veh/h
Opposing direction volume, Vo 80 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.4		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.977		0.949	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	262	pc/h	105	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	55.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	4.2	mi/h
Adj. for access point density,(note-3) fA	1.0	mi/h
Free-flow speed, FFSd	49.8	mi/h
Adjustment for no-passing zones, fnp	2.4*	mi/h
Average travel speed, ATSd	44.6	mi/h
Percent Free Flow Speed, PFFS	89.5	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.994	0.994
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	258 pc/h	101 pc/h
Base percent time-spent-following,(note-4) BPTSFd	26.7 %	
Adjustment for no-passing zones, fnp	32.6	
Percent time-spent-following, PTSFd	50.1 %	

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	256	veh-mi
Peak-hour vehicle-miles of travel, VMT60	820	veh-mi
Peak 15-min total travel time, TT15	5.7	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	4.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	44.6	mi/h
Percent time-spent-following, PTSFd (from above)	50.1	
Level of service, LOSd (from above)	B	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	256.3
Effective width of outside lane, We	12.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	6.16
Bicycle LOS	F

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

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Phone: Fax:
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Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - PM Build Northbound
Highway	Haines Avenue
From/To	Pennington Co to E/W Corridor
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	0.0	ft	% Trucks and buses	7	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	2.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	23	%
Up/down	-	%	Access point density	5	/mi

Analysis direction volume, Vd 400 veh/h
Opposing direction volume, Vo 125 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.3*		1.5*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.979		0.966	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	511	pc/h	162	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	4.2	mi/h
Adj. for access point density,(note-3) fA	1.3	mi/h
Free-flow speed, FFSd	54.5	mi/h
Adjustment for no-passing zones, fnp	2.4*	mi/h
Average travel speed, ATSd	46.9	mi/h
Percent Free Flow Speed, PFFS	86.0	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.993
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	500 pc/h	157 pc/h
Base percent time-spent-following,(note-4) BPTSFd	44.7 %	
Adjustment for no-passing zones, fnp	26.0	
Percent time-spent-following, PTSFd	64.5 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	250	veh-mi
Peak-hour vehicle-miles of travel, VMT60	800	veh-mi
Peak 15-min total travel time, TT15	5.3	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	2.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	46.9	mi/h
Percent time-spent-following, PTSFd (from above)	64.5	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	500.0
Effective width of outside lane, We	12.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	6.83
Bicycle LOS	F

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

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Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - PM Build Westbound
Highway	East/West Corridor
From/To	Erickson Ranch to Haines
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	4.0	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	2.3	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	40	%
Up/down	-	%	Access point density	1	/mi

Analysis direction volume, Vd 170 veh/h
Opposing direction volume, Vo 80 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.5		1.9	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.971		0.949	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	219	pc/h	105	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	1.3	mi/h
Adj. for access point density,(note-3) fA	0.3	mi/h
Free-flow speed, FFSd	58.5	mi/h
Adjustment for no-passing zones, fnp	2.4*	mi/h
Average travel speed, ATSd	53.5	mi/h
Percent Free Flow Speed, PFFS	91.6	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	0.994		0.994	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	214	pc/h	101	pc/h
Base percent time-spent-following,(note-4) BPTSFd	22.8	%		
Adjustment for no-passing zones, fnp	39.3			
Percent time-spent-following, PTSFd	49.5	%		

Level of Service and Other Performance Measures

Level of service, LOS	B	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	122	veh-mi
Peak-hour vehicle-miles of travel, VMT60	391	veh-mi
Peak 15-min total travel time, TT15	2.3	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	2.3	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	53.5	mi/h
Percent time-spent-following, PTSFd (from above)	49.5	
Level of service, LOSd (from above)	B	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	212.5
Effective width of outside lane, We	16.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.51
Bicycle LOS	F

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

* These items have been entered or edited to override calculated value

HCS7: Two-Lane Highways Release 7.2

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	HDR
Agency/Co.	HDR
Date Performed	7/5/2019
Analysis Time Period	2045 - PM Build Westbound
Highway	Elk Creek Road
From/To	Erickson Ranch to Haines
Jurisdiction	Meade County
Analysis Year	2045
Description	Southern Meade County Corridor

Input Data

Highway class	Class 2		Peak hour factor, PHF	0.80	
Shoulder width	0.0	ft	% Trucks and buses	7	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	3.0	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	0	%
Grade: Length	-	mi	% No-passing zones	7	%
Up/down	-	%	Access point density	6	/mi

Analysis direction volume, Vd 125 veh/h
Opposing direction volume, Vo 110 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.5*		1.5*	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.966		0.966	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	162	pc/h	142	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	60.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	4.2	mi/h
Adj. for access point density,(note-3) fA	1.5	mi/h
Free-flow speed, FFSd	54.3	mi/h
Adjustment for no-passing zones, fnp	0.9	mi/h
Average travel speed, ATSd	51.1	mi/h
Percent Free Flow Speed, PFFS	94.0	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.993	0.993
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	157 pc/h	138 pc/h
Base percent time-spent-following,(note-4) BPTSFd	17.4 %	
Adjustment for no-passing zones, fnp	20.1	
Percent time-spent-following, PTSFd	28.1 %	

Level of Service and Other Performance Measures

Level of service, LOS	A	
Volume to capacity ratio, v/c	0.53	
Peak 15-min vehicle-miles of travel, VMT15	117	veh-mi
Peak-hour vehicle-miles of travel, VMT60	375	veh-mi
Peak 15-min total travel time, TT15	2.3	veh-h
Capacity from ATS, CdATS	1700	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1700	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	3.0	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	51.1	mi/h
Percent time-spent-following, PTSFd (from above)	28.1	
Level of service, LOSd (from above)	A	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	A	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	156.3
Effective width of outside lane, We	16.50
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.60
Bicycle LOS	F

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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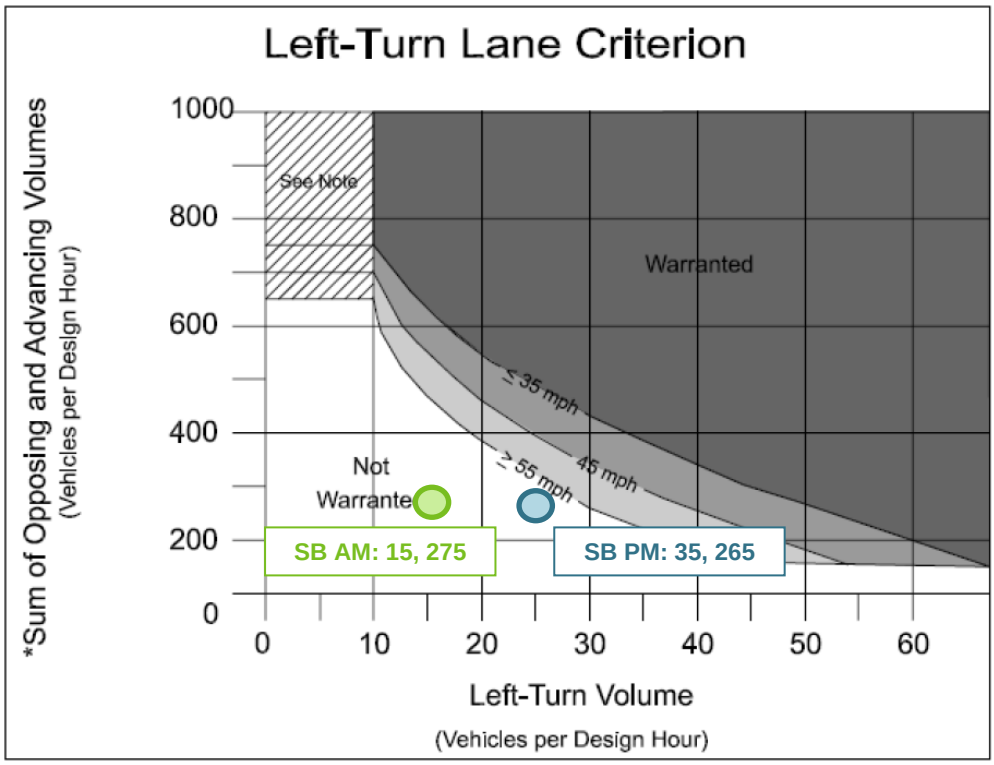
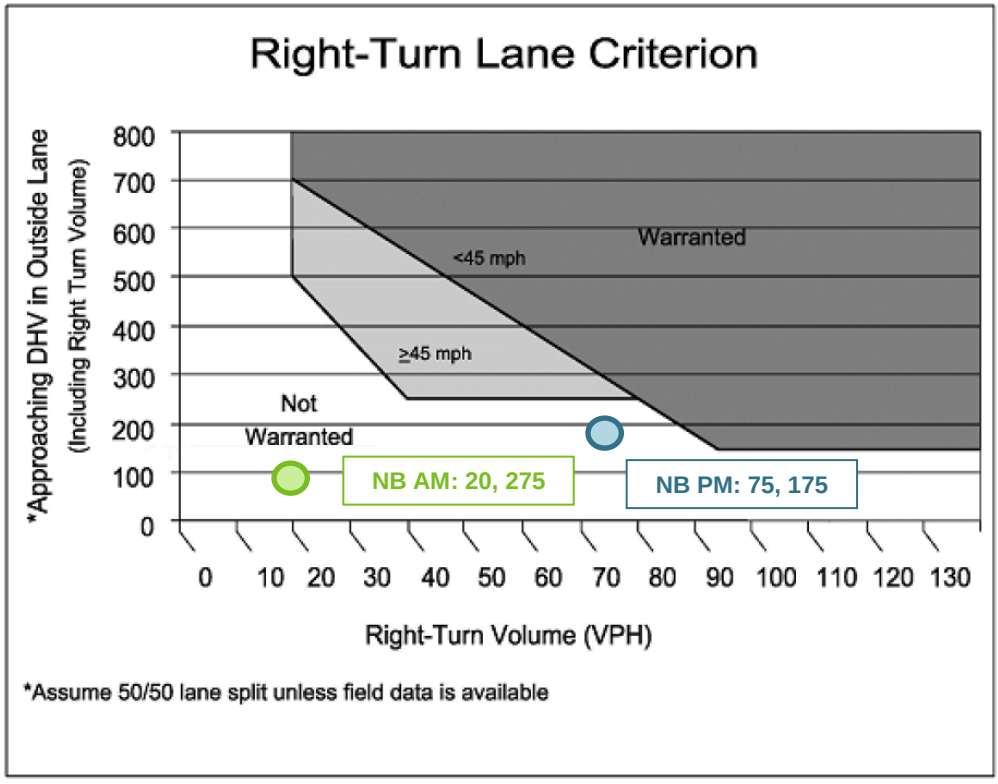
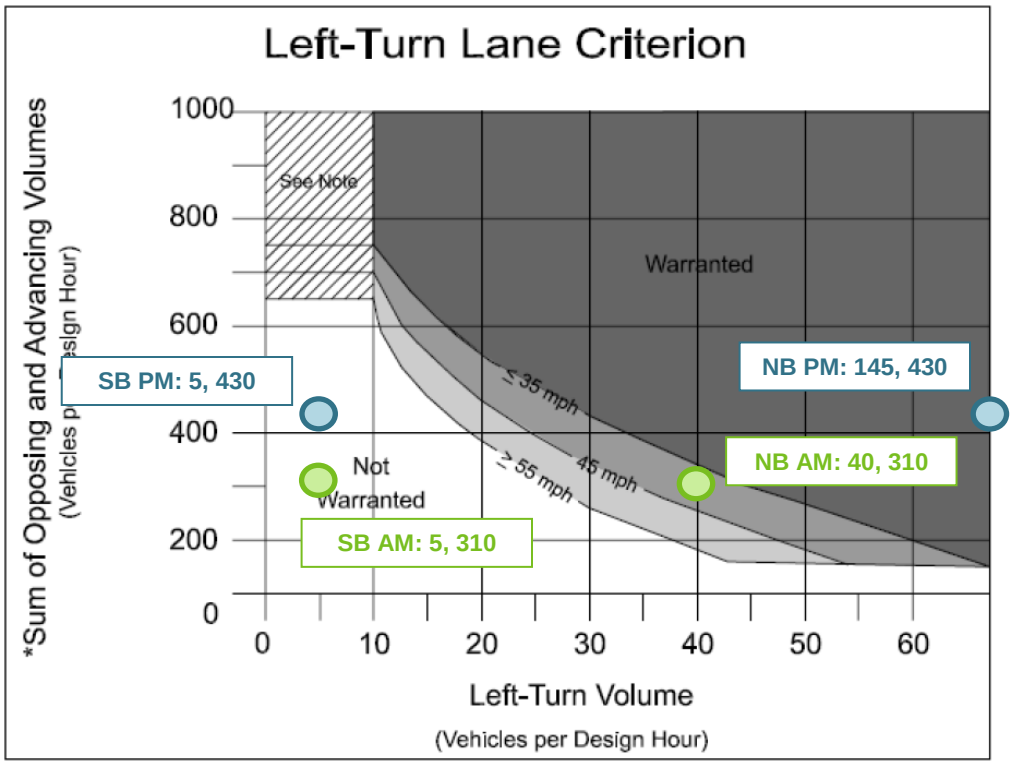
Appendix B – 2045 Turn Lane Volume Warrant Review

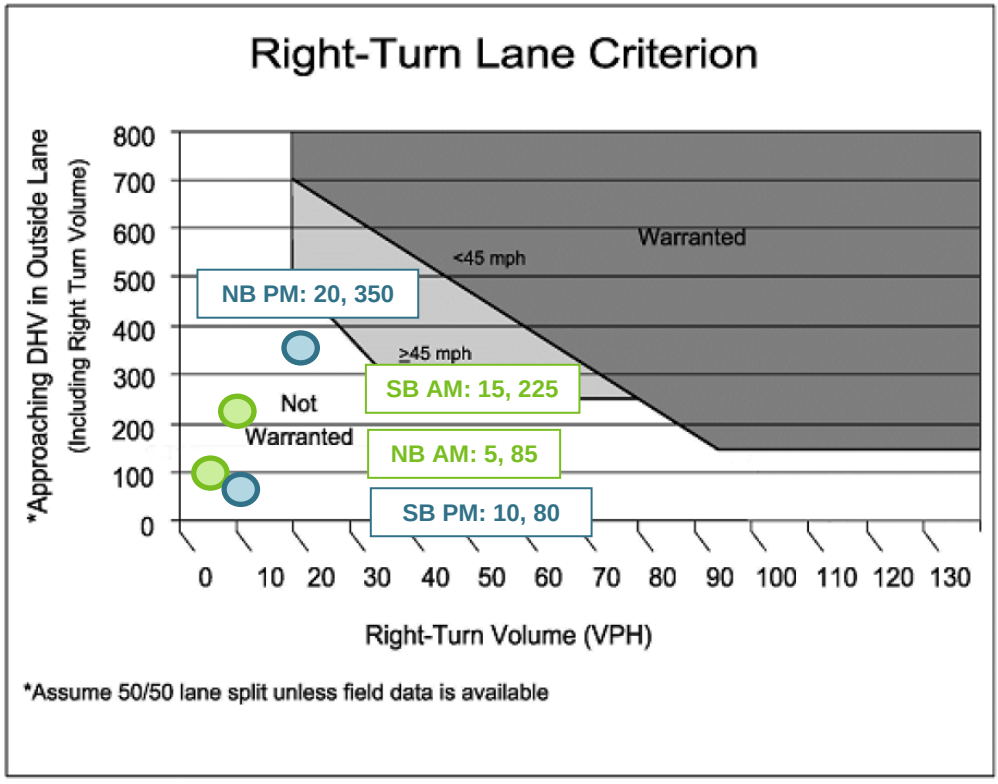
Proposed East/West Corridor and Erickson Ranch Road





Proposed East/West Corridor and Haines Avenue





Proposed East/West Corridor and 143rd Avenue

All forecasted turning movements estimated at 5 vehicles per hour, and thus do not meet volume warrants.