

Appendix F – Existing and 2045 No-Build Conditions Traffic Operations Technical Memorandum

# **Technical Memo**

Date:	Tuesday, May 7, 2019
Project:	Southern Meade County Corridor Study
To:	Study Advisory Team
From:	HDR

Subject: Existing and Future No-Build Conditions Traffic Operations

### Introduction

This memorandum presents results from a traffic operations analysis of the Southern Meade Corridor Study area for the following analysis periods:

- Existing Conditions (Year 2019)
- 2045 Planning Horizon No-Build Conditions (2045 No-Build Conditions)

The purpose of this memorandum is to identify traffic operational needs at primary intersections and along highway segments throughout the traffic analysis study area, which is bound by the following:

- Elk Creek Road (north boundary)
- 143<sup>rd</sup> Avenue (east)
- Meade County line (south)
- Erickson Ranch Road (west)

Elk Vale Road was not part of the original study area, but 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.

In addition to intersection traffic operations analyses of existing and future-year conditions, a two-lane highway operations analysis and planning-level roadway capacity analysis were also conducted to evaluate peak hour and daily highway segment operations.

This analysis also serves as a baseline for the development and evaluation of proposed concepts for a new east/west corridor between Erickson Ranch Road and 143<sup>rd</sup> Avenue that will be carried into conceptual design.



### **Traffic Data**

Traffic data used to develop the 2019 Existing Conditions and 2045 No-Build Conditions volume sets is summarized as follows:

Peak hour (morning and afternoon/evening) intersection turning movement counts:

• Collected by consultant team on Tuesday, February 19, 2019

24-hour roadway segment counts:

• Collected by consultant team on Tuesday, February 19, 2019

Traffic forecasts were based on output from the Rapid City Metropolitan Planning Organization (MPO) travel demand model. The following model versions were used:

- 2013 base year
- 2040 planning horizon

Heavy vehicle percentages and peak hour factors (PHF) used in the analysis were obtained from the peak hour intersection turning movement counts.

### **Traffic Volume Development**

Daily segment volumes and AM and PM peak hour intersection volumes were developed for both the 2019 Existing Condition and 2045 Planning Horizon No-Build Conditions scenarios.

The 2019 Existing Conditions volume set was developed for the study area using the 2019 segment and peak hour counts, factored to a design season (August) to account for seasonal fluctuations. Intersection turning movement volumes were smoothed across the corridor.

Traffic forecasts for 2045 were prepared using the most current version of the Rapid City 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.

Analysis traffic volumes for the 2019 Existing Conditions and 2045 No-Build Conditions are summarized provided in **Figures 1 and 2**. The *Traffic Forecasts* technical memorandum presents more details regarding the development of existing conditions and future-year peak hour traffic volumes.



# **2019 EXISTING CONDITIONS TRAFFIC VOLUMES PEAK SEASON**

SOUTHERN MEADE COUNTY CORRIDOR STUDY

**F** 

FIGURE

5/6/2019



**PEAK SEASON** 

**F** 

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144th Ave.

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Vale Rd.

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(50)

Horseshoe Rd.

# 2045 NO-BUILD CONDITIONS TRAFFIC VOLUMES

224th St.

DATE

38.89

5/6/2019

FIGURE

2

### **Traffic Operations Analysis Methodology**

Intersection peak hour level of service (LOS) was calculated using 6<sup>th</sup> 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**.

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

#### **Table 1: Level of Service Thresholds**

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



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 & 143<sup>rd</sup> Avenue
- Peaceful Pines Road/Deadwood Avenue & Erickson Ranch Road
- 224<sup>th</sup> Street & 143<sup>rd</sup> Avenue

### **Intersection Traffic Operations Analysis**

The Existing Conditions traffic operations analysis reflects a scenario that analyzes the current network, using recently collected traffic counts (2019) and existing roadway conditions such as number of lanes, intersection traffic control, speed limits, signal timings, etc.

The 2019 Existing Conditions intersection operations are summarized in the **Table 2**. HCS7 analysis reports are provided in **Appendix A**.

	Intersection	AM Peak F	Period	PM Peak Period		
Study Intersection	Control Type	Avg. Delay (sec/veh)	LOS	Avg. Delay (sec/veh)	LOS	
Elk Creek Road & Erickson Ranch Road	TWSC* N/S approaches	10.2	В	9.6	В	
Elk Creek Road & Haines Avenue	AWSC	7.2	А	7.6	А	
Elk Creek Road & 143 <sup>rd</sup> Avenue	TWSC* S approach	8.9	А	8.9	А	
Peaceful Pines Road/ Deadwood Avenue & Erickson Ranch Road	TWSC* N approach	9.8	A	9.3	A	
224 <sup>th</sup> Street & 143 <sup>rd</sup> Avenue	TWSC* N approach	8.6	А	8.7	А	

#### Table 2: Study Area Intersections – Existing Conditions

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

The purpose of the 2045 No-Build Conditions analysis is to identify future-year needs and help guide the subsequent development of potential improvements within the study area. Operational results are summarized in **Table 3** and the HCS7 analysis reports are provided in **Appendix B**.

	Intersection	AM Peak F	Period	PM Peak Period		
Study Intersection	Control Type	Avg. Delay (sec/veh)	LOS	Avg. Delay (sec/veh)	LOS	
Elk Creek Road & Erickson Ranch Road	TWSC* N/S approaches	13.2	В	12.0	В	
Elk Creek Road & Haines Avenue	AWSC	7.9	А	8.3	А	
Elk Creek Road & 143 <sup>rd</sup> Avenue	TWSC* S approach	9.5	A	9.5	А	
Peaceful Pines Road/ Deadwood Avenue & Erickson Ranch Road	TWSC* N approach	11.1	A	9.7	A	
224 <sup>th</sup> Street & 143 <sup>rd</sup> Avenue	TWSC* N approach	8.8	А	8.7	А	

#### Table 3: Study Area Intersections – 2045 No-Build Conditions

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

### **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

Similar to the intersection analyses, the existing conditions analysis reflects roadway geometrics and conditions that present in 2019. The 2045 No-Build Conditions assumes the same roadway conditions, but updates traffic volumes with the future-year 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 analyses for the 2019 Existing Conditions and 2045 No-Build Conditions are summarized in **Tables 4 and 5**, respectively. It was found that all analyzed segments were resulted in a LOS C or better, which meet rural collector LOS goals for this study. Segments with the greatest percentage of time a vehicle spends following another vehicle are located towards the southern study area boundary and exhibit higher commuter volumes to/from Rapid City.

Study Two-Lane	Functional	Peak Hour	Peak	AM Peak	Period	PM Peak Period		
Highway Segment	Classification	Hour	Direction of Travel	PTSF <sup>1</sup> (%)	LOS	PTSF <sup>1</sup> (%)	LOS	
Erickson Ranch Rd	Rural	AM	SB	38.7	А			
Elk Creek Rd – Westridge Rd	Collector	PM	NB			30.3	Α	
Erickson Ranch Rd	Rural	AM	SB	60.4	С			
Westridge Rd – Peaceful Pines Rd	Collector	PM	NB			52.9	В	
Haines Avenue	Rural	AM	SB	36.4	А			
Elk Creek Rd – Virginia Ln	Collector	PM	NB			32.1	Α	
Haines Avenue	Rural	AM	SB	51.2	В			
Virginia Ln – Pennington County	Collector	PM	NB			53.0	В	
Elk Creek Road	Rural	AM	EB	22.1	А			
Erickson Ranch Rd – Haines Ave	Collector	PM	WB			22.0	А	

Table 4: Two-Lane Highway Segments – Existing Conditions

<sup>1</sup> PTSF reflects analysis in the peak direction

Study Two-Lane	Functional	Peak Hour	Peak	AM Peak	Period	PM Peak Period		
Highway Segment	Classification	Hour	Direction of Travel	PTSF <sup>1</sup> (%)	LOS	PTSF <sup>1</sup> (%)	LOS	
Erickson Ranch Rd	Rural	AM	SB	45.0	В			
Elk Creek Rd – Westridge Rd	Collector	PM	NB			38.9	Α	
Erickson Ranch Rd	Rural	AM	SB	65.1	С			
Westridge Rd – Peaceful Pines Rd	Collector	PM	NB			58.4	С	
Haines Avenue	Rural	AM	SB	47.1	В			
Elk Creek Rd – Virginia Ln	Collector	PM	NB			42.6	В	
Haines Avenue	Rural	AM	SB	65.0	С			
Virginia Ln – Pennington County	Collector	PM	NB			64.5	С	
Elk Creek Road	Rural	AM	EB	31.5	А			
Erickson Ranch Rd – Haines Ave	Collector	PM	WB			28.8	А	

<sup>1</sup> PTSF reflects analysis in the peak direction

### **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 6**, represent a planning-level guide to cross-sectional needs in terms of through lanes and potential turn lanes based on traffic volumes.

Total	Description	Total Design Year ADT <sup>1</sup>					
Number of Lanes	Description	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 <sup>3</sup>	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 <sup>4</sup>	> 30,000 4				

Table 6: Estimated Number of Lanes Based on Daily Traffic Volumes

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.

### **Summary and Conclusions**

Intersection traffic operations for the 2019 Existing Conditions and 2045 No-Build Conditions scenarios all measure delay within acceptable LOS thresholds (LOS B or better) for this study. Similarly, the two-lane highway analysis measures are all within the acceptable LOS thresholds for rural collector highways (LOS C or better).

A review of daily traffic forecasts and segment capacity, all existing two-lane roadways are expected to accommodate traffic volumes through the 2045 Planning Horizon if the study area stays predominantly rural. As the area becomes more urbanized, particularly areas along the Meade County border, a 3-lane cross-section may be appropriate at next time of reconstruction.



# Appendix

- A. Existing Conditions HCS7 Reports
- B. 2045 No-Build Conditions HCS7 Reports



# Appendix A – Existing Conditions HCS7 Reports

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### CS7 Two-Way Stop-Control Report

HCS7 Two-way stop-Control Report							
General Information		Site Information					
Analyst	HDR	Intersection	Elk Creek & 143rd Ave				
Agency/Co.	HDR	Jurisdiction	Meade County				
Date Performed	4/24/2019	East/West Street	Elk Creek Road				
Analysis Year	2019	North/South Street	143rd Avenue				
Time Analyzed	AM - Existing Conditions	Peak Hour Factor	0.45				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description Southern Meade County Corridor Study							

#### Lanes



Approach	T	Fasth	ound			Westbound				North	bound		Southbound					
Movement	U		T	R	U		Т	R	U			R	U			R		
		L	-		-	L			U	L	Т		0	L	Т			
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0		
Configuration			LTR				LTR				LTR				LTR			
Volume, V (veh/h)		0	5	5		0	10	0		1	0	0		0	0	0		
Percent Heavy Vehicles (%)		20				20				20	20	20		20	20	20		
Proportion Time Blocked																		
Percent Grade (%)										(	0			(	0			
Right Turn Channelized		N	lo			Ν	10			N	lo		No					
Median Type/Storage				Undi	vided													
Critical and Follow-up H	eadwa	iys																
Base Critical Headway (sec)																		
Critical Headway (sec)																		
Base Follow-Up Headway (sec)																		
Follow-Up Headway (sec)																		
Delay, Queue Length, an	d Leve	el of S	ervice	;														
Flow Rate, v (veh/h)	Τ	0				0					2				0			
Capacity, c (veh/h)		1484				1484					924				0			
v/c Ratio		0.00				0.00					0.00							
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.0							
Control Delay (s/veh)		7.4				7.4					8.9				5.0			
Level of Service, LOS		A				A					A				A			
Approach Delay (s/veh)		0.0			0.0			8.9				5.0						
Approach LOS											4				Ą	A		

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#### HCS7 Two-Way Stop-Control Report

ncs/ iwo-way stop-control report							
General Information		Site Information					
Analyst	HDR	Intersection	Elk Creek & Erickson Ra R				
Agency/Co.	HDR	Jurisdiction	Meade County				
Date Performed	4/24/2019	East/West Street	Elk Creek Road				
Analysis Year	2019	North/South Street	Erickson Ranch Road				
Time Analyzed	AM - Existing Conditions	Peak Hour Factor	0.71				
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25				
Project Description Southern Meade County Corridor Study							

#### Lanes



#### Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	ound			North	bound		Southbound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume (veh/h)		0	35	30		20	50	0		30	5	5		0	5	5	
Percent Heavy Vehicles (%)		5				5				5	5	5		5	5	5	
Proportion Time Blocked																	
Percent Grade (%)			-	-		-	-			(	0	-	0				
Right Turn Channelized																	
Median Type   Storage		Undivided															
<b>Critical and Follow-up H</b>	eadwa	ys															
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2	
Critical Headway (sec)		4.15				4.15				7.15	6.55	6.25		7.15	6.55	6.25	
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3	
Follow-Up Headway (sec)		2.25				2.25				3.55	4.05	3.35		3.55	4.05	3.35	
Delay, Queue Length, an	d Leve	l of Se	ervice														
Flow Rate, v (veh/h)	Τ	0				28					56				14		
Capacity, c (veh/h)		1510				1485					743				791		
v/c Ratio		0.00				0.02					0.08				0.02		
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1					0.2				0.1		
Control Delay (s/veh)		7.4				7.5					10.2				9.6		
Level of Service (LOS)		А				А					В				А		
Approach Delay (s/veh)		0	.0			2	.2		10.2				9.6				
Approach LOS										I	В				4		

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#### HCS7 All-Way Stop Control Report

	HCS7 All-Way	Stop Control Report							
General Information		Site Information	Site Information						
Analyst	HDR	Intersection	Elk Creek & Haines						
Agency/Co.	HDR	Jurisdiction	Meade County						
Date Performed	4/24/2019	East/West Street	Elk Creek Road						
Analysis Year	2019	North/South Street	Haines Avenue						
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.89						
Time Analyzed	AM - Existing Conditions								
Project Description	Southern Meade County Corridor S	Study							
Lanes									



#### Vehicle Volume and Adjustments

venicle volume and Adjust	ustments											
Approach		Eastbound			Westbound	b	1	Northboun	d	9	Southboun	d
Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Volume	5	5	55	10	10	0	30	5	5	0	15	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)	73			22			45			28		
Percent Heavy Vehicles	6			6			6			6		
Departure Headway and S	ervice Ti	ime										
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.065			0.020			0.040			0.025		
Final Departure Headway, hd (s)	3.70			4.33			4.30			4.00		
Final Degree of Utilization, x	0.075			0.027			0.054			0.031		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	1.70			2.33			2.30			2.00		
Capacity, Delay and Level of	of Servic	e								<u> </u>		
Flow Rate, v (veh/h)	73			22			45			28		
Capacity	974			831			837			899		
95% Queue Length, Q <sub>95</sub> (veh)	0.2			0.1			0.2			0.1		
Control Delay (s/veh)	7.0			7.5			7.5			7.1		
Level of Service, LOS	A			А			А			A		
Approach Delay (s/veh)		7.0			7.5			7.5		7.1		
Approach LOS		А			А			А			А	
Intersection Delay, s/veh   LOS			7	.2						A		

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#### HCS7 Two-Way Stop-Control Report

	Site Information								
HDR	Intersection	Peaceful P & Erickson RaR							
HDR	Jurisdiction	Meade County							
4/24/2019	East/West Street	Peaceful Pines Road							
2019	North/South Street	Erickson Ranch Road							
AM - Existing Conditions	Peak Hour Factor	0.81							
East-West	Analysis Time Period (hrs)	0.25							
Southern Meade County Corridor Study									
	HDR HDR 4/24/2019 2019 AM - Existing Conditions East-West	HDR     Intersection       HDR     Jurisdiction       4/24/2019     East/West Street       2019     North/South Street       AM - Existing Conditions     Peak Hour Factor       East-West     Analysis Time Period (hrs)							

#### Lanes



#### Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	ound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		0	1	0	
Configuration		L	Т				Т	R							LR		
Volume (veh/h)		10	30				5	15						130		50	
Percent Heavy Vehicles (%)		3												3		3	
Proportion Time Blocked																	
Percent Grade (%)												0					
Right Turn Channelized						Ν	о										
Median Type   Storage				Undi	ided												
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)		4.1												7.1		6.2	
Critical Headway (sec)		4.13												6.43		6.23	
Base Follow-Up Headway (sec)		2.2												3.5		3.3	
Follow-Up Headway (sec)		2.23												3.53		3.33	
Delay, Queue Length, an	d Leve	l of Se	ervice			<u> </u>								<u>.</u>			
Flow Rate, v (veh/h)		12													222		
Capacity, c (veh/h)		1584													964		
v/c Ratio		0.01													0.23		
95% Queue Length, Q <sub>95</sub> (veh)		0.0													0.9		
Control Delay (s/veh)		7.3													9.8		
Level of Service (LOS)		A													A		
Approach Delay (s/veh)		1	.8										9.8				
Approach LOS														A			

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Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 4/29/2019 Analysis Time Period 2019 - AM EC Southbound Highway Erickson Ranch Raod Peaceful Pines to Elk Creek From/To Jurisdiction Meade County Analysis Year 2019 Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.88 Highway classClass2Peak hour factor, PHF0.88Shoulder width2.0ft% Trucks and buses3%Lane width12.0ft% Trucks crawling0.0%Segment length5.3miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 79 - % Access point density 7 00 Up/down /mi Analysis direction volume, Vd 180 veh/h Opposing direction volume, Vo 25 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.5 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.985 Grade adj. factor (note-1) fg 1 00 0.974 Grade adj. factor, (note-1) fg 1.00 1.00 208 pc/h Directional flow rate,(note-2) vi 29 pc/h Free-Flow Speed from Field Measurement: 42 Field measured speed, (note-3) S FM mi/h Observed total demand, (note-3) V 20 veh/h Estimated Free-Flow Speed: Base free-flow speed, (note-3) BFFS mi/h Adj. for lane and shoulder width, (note-3) fLS mi/h Adj. for access point density,(note-3) fA mi/h Free-flow speed, FFSd 42.2 mi/h Adjustment for no-passing zones, fnp 2.2 mi/h Average travel speed, ATSd 38.1 mi/h Percent Free Flow Speed, PFFS 90.5 00

Appendix F Page 17 of 99 Percent Time-Spent-Follow	wing		
DirectionAnalysis(d)PCE for trucks, ET1.1PCE for RVs, ER1.0Heavy-vehicle adjustment factor, fHV0.997Create adjustment factor (rete 1) fr1.00		Opposing 1.1 1.0 0.997	
Grade adjustment factor, (note-1) fg 1.00 Directional flow rate, (note-2) vi 205 g Base percent time-spent-following, (note-4) BPTSFd Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	pc/h 22.0 43.3 60.1	1.00 28 %	pc/h
Level of Service and Other Perform	mance Me	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VMT15 Peak-hour vehicle-miles of travel, VMT60 Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	C 0.53 271 954 7.1 1700 1700 1700		
Passing Lane Analysi:	s		
Total length of analysis segment, Lt Length of two-lane highway upstream of the passing Length of passing lane including tapers, Lpl Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (from above) Level of service, LOSd (from above)	g lane,	5.3 Lu - - 38.1 60.1 C	mi mi mi/h
Average Travel Speed with Pass	sing Lan	e	
Downstream length of two-lane highway within effective length of passing lane for average travel specture Length of two-lane highway downstream of effective	ed, Lde	_	mi
length of the passing lane for average travel Adj. factor for the effect of passing lane on average speed, fpl		Ld - -	mi
Average travel speed including passing lane, ATSp Percent free flow speed including passing lane, P		- 0.0	00
Percent Time-Spent-Following with	Passing	Lane	
Downstream length of two-lane highway within effect of passing lane for percent time-spent-follow:	ctive le	ngth	mi
Length of two-lane highway downstream of effective the passing lane for percent time-spent-follow Adj. factor for the effect of passing lane	-		mi
on percent time-spent-following Percent time-spent-following including passing lane, PTSFpl		-	0
	urpei+	h Paccina	-
Level of Service and Other Performance Measure Level of service including passing lane, LOSpl	A	II FASSING .	пане
Peak 15-min total travel time, TT15	_	veh-h	
Bicycle Level of Servio	ce		

Appendix F Page 18 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	204.5
Effective width of outside lane, We	14.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.91
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.

Appendix	F	Page	19	of	99
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### CS7 Two-Way Stop-Control Report

	HC37 IWO-Wa	у зтор-соптют керот	
General Information		Site Information	
Analyst	HDR	Intersection	224th St & 143rd Ave
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	4/24/2019	East/West Street	224th Street
Analysis Year	2019	North/South Street	143rd Avenue
Time Analyzed	PM - Existing Conditions	Peak Hour Factor	0.69
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Southern Meade County Corridor Stu	udy	

#### Lanes



Major Street: East-West

Vehicle Volumes and Adj	ustme	ents														
Approach		Eastb	ound			West	bound			North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		0	5				10	5						5		0
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized		No No							Ν	lo			Ν	10		
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)		0													7	
Capacity, c (veh/h)		1588													990	
v/c Ratio		0.00													0.01	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													0.0	
Control Delay (s/veh)		7.3													8.7	
Level of Service, LOS		A													A	
Approach Delay (s/veh)		0	.0											8	5.7	
Approach LOS														,	A	

### CS7 Two-Way Stop-Control Report

HCS7 Two-way stop-control Report										
General Information		Site Information								
Analyst	HDR	Intersection	Elk Creek & 143rd Ave							
Agency/Co.	HDR	Jurisdiction	Meade County							
Date Performed	4/24/2019	East/West Street	Elk Creek Road							
Analysis Year	2019	North/South Street	143rd Avenue							
Time Analyzed	PM - Existing Conditions	Peak Hour Factor	0.50							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	Southern Meade County Corridor St	udy								
		,	0.25							

#### Lanes



						or Street: Ea											
Vehicle Volumes and Ad	justme	ents															
Approach		Eastb	ound			West	oound		Northbound				Southbound				
Movement	U	L	Т	R	U	U L T R				L	Т	R	U	L	Т	R	
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0	
Configuration			LTR				LTR				LTR				LTR		
Volume, V (veh/h)		0	10	0		0	10	0		1	0	0		0	0	0	
Percent Heavy Vehicles (%)		20				20				20	20	20		20	20	20	
Proportion Time Blocked																	
Percent Grade (%)											0		0				
Right Turn Channelized		No No						No No									
Median Type/Storage		Undivided															
Critical and Follow-up Headways																	
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2	
Critical Headway (sec)		4.30				4.30				7.30	6.70	6.40		7.30	6.70	6.40	
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3	
Follow-Up Headway (sec)		2.38				2.38				3.68	4.18	3.48		3.68	4.18	3.48	
Delay, Queue Length, an	d Leve	el of S	ervice	9													
Flow Rate, v (veh/h)		0				0					2				0		
Capacity, c (veh/h)		1487				1487					921				0		
v/c Ratio		0.00				0.00					0.00						
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.0						
Control Delay (s/veh)		7.4				7.4					8.9				5.0		
Level of Service, LOS		A				A					A				A		
Approach Delay (s/veh)		0.0 0.0						8.9 5.0				-					
Approach LOS		A A						A									

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#### HCS7 Two-Way Stop-Control Report

HCS7 TWO-Way Stop-Control Report										
General Information		Site Information								
Analyst	HDR	Intersection	Elk Creek & Erickson Ra R							
Agency/Co.	HDR	Jurisdiction	Meade County							
Date Performed	4/24/2019	East/West Street	Elk Creek Road							
Analysis Year	2019	North/South Street	Erickson Ranch Road							
Time Analyzed	PM - Existing Conditions	Peak Hour Factor	0.79							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	Southern Meade County Corridor Stu	ıdy								

#### Lanes



#### Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	bound		Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	40	20		15	45	5		20	5	15		5	0	5
Percent Heavy Vehicles (%)		5				5				5	5	5		5	5	5
Proportion Time Blocked																
Percent Grade (%)				-						(	C	-	0			
Right Turn Channelized																
Median Type   Storage	Undivided															
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.15				4.15				7.15	6.55	6.25		7.15	6.55	6.25
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.25				2.25				3.55	4.05	3.35		3.55	4.05	3.35
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		6				19					51				13	
Capacity, c (veh/h)		1519				1504					825				848	
v/c Ratio		0.00				0.01					0.06				0.01	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.2				0.0	
Control Delay (s/veh)		7.4				7.4					9.6				9.3	
Level of Service (LOS)		А				A					A				А	
Approach Delay (s/veh)	0.6 1.8					9.6				9.3						
Approach LOS						A A										

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HCSTM TWSC Version 7.6 EC\_PM\_ElkCreek-EricksonRaRd\_TWSC.xtw Generated: 5/24/2019 12:38:29 PM

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#### HCS7 All-Way Stop Control Report

General Information Site Information									
General Information		Site information							
Analyst	HDR	Intersection	Elk Creek & Haines						
Agency/Co.	HDR	Jurisdiction	Meade County						
Date Performed	4/24/2019	East/West Street	Elk Creek Road						
Analysis Year	2019	North/South Street	Haines Avenue						
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.73						
Time Analyzed	PM - Existing Conditions								
Project Description	Southern Meade County Corric	dor Study							



#### Vehicle Volume and Adjustments

Approach		Eastbound	1		Westbound			Northboun	d	Southbound		
Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Volume	5	15	30	0	5	0	60	15	5	0	5	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)	68			7			110			14		
Percent Heavy Vehicles	6			6			6			6		
Departure Headway and S	ervice T	ime										
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.061			0.006			0.097			0.012		
Final Departure Headway, hd (s)	3.95			4.35			4.29			3.98		
Final Degree of Utilization, x	0.075			0.008			0.131			0.015		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	1.95			2.35			2.29			1.98		
Capacity, Delay and Level	of Servic	e										
Flow Rate, v (veh/h)	68			7			110			14		
Capacity	912			828			839			906		
95% Queue Length, Q <sub>95</sub> (veh)	0.2			0.0			0.4			0.0		
Control Delay (s/veh)	7.3			7.4			7.9			7.0		
Level of Service, LOS	A			А			А			A		
Approach Delay (s/veh)		7.3			7.4		7.9			7.0		
Approach LOS		А		А		A			A			
Intersection Delay, s/veh   LOS		7.6					A					
												_

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Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 4/29/2019 Analysis Time Period 2019 - PM EC Northbound Highway Erickson Ranch Raod Peaceful Pines to Elk Creek From/To Jurisdiction Meade County Analysis Year 2019 Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.72 Highway classClass2Peak hour factor, PHF0.72Shoulder width2.0ft% Trucks and buses3%Lane width12.0ft% Trucks crawling0.0%Segment length5.3miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length mi % No-passing zones 77 %
% Access point density 7 /mi Up/down Analysis direction volume, Vd 120 veh/h Opposing direction volume, Vo 50 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.6 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.982 Grade adj. factor (note-1) fg 1 00 0.974 1.00 170 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate, (note-2) vi 71 pc/h Free-Flow Speed from Field Measurement: 40 Field measured speed, (note-3) S FM mi/h veh/h Observed total demand, (note-3) V 20 Estimated Free-Flow Speed: Base free-flow speed, (note-3) BFFS mi/h Adj. for lane and shoulder width, (note-3) fLS mi/h Adj. for access point density,(note-3) fA mi/h Free-flow speed, FFSd 40.2 mi/h 2.1 mi/h Adjustment for no-passing zones, fnp Average travel speed, ATSd 36.2 mi/h Percent Free Flow Speed, PFFS 90.1 00

Direction Analysis(d) Opposing (c) PCE for trucks, ET 1.1 1.1 PCE for KVS, EX 1.0 Reavy-vehicle adjustment factor, fW 0.997 0.997 Grade adjustment factor, (note-1) fg 1.00 Directional flow rate, (note-2) vi 167 pc/h 70 pc/h Base percent time-spent-following, (note-4) BFTSFM 18.4 % Adjustment for no-passing zones, fnp 48.1 Percent time-spent-following, (note-4) BFTSFM 18.4 % Values to capacity ratio, v/c 0.53 Peak 15-min total travel time, TTIS 6.1 veh-mi Peak 15-min total travel time, TTIS 6.1 veh-h Capacity from PTS, CdPTS 1700 veh/h Directional Capacity 2000 vence 1000 vence 1000 veh/h Directional Capacity 1700 veh/h Directional Capacity 2000 vence 1000 vence 10000 vence 10000 vence 10000 vence 1000000 vence 10000 vence 10000 vence	Appendix F Page 24 of 99 Percent Time	me-Spent-Follow	ing		
<pre>Directional flow rate, (note-2) vi 167 pc/h 70 pc/h Base percent time-spent-following, (note-4) BPTSFd 18.4 % Adjustment for no-passing zones, fnp 48.1 Percent time-spent-following, PTSFd 52.3 % Level of Service and Other Performance Measures Level of service, LOS B Level of service, MOS B Peak-hour vehicle-miles of travel, VMT15 221 veh-mi Peak-hour vehicle-miles of travel, VMT15 6.1 veh-mi Peak-hour vehicle-miles of travel, VMT15 6.1 veh-mi Peak-hour vehicle-miles of travel, VMT60 636 veh-mi Peak-hour vehicle-miles of travel, VMT60 7.0 veh/h Directional Capacity from PTSF, CAPTSF 1700 veh/h Directional Capacity 1000 veh/h Directional Capacity 1700 veh/h Directional Capacity 1000 veh/h Directional Capacity 2000 veh/h D</pre>	PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fH	1.1 1.0 V 0.997	(	1.1 1.0 0.997	
Level of service, LOS       B         Volume to capacity ratio, v/c       0.53         Peak l5-min vehicle-miles of travel, VMT50       221       veh-mi         Peak-hour vehicle-miles of travel, VMT50       6.6       veh-mi         Peak-hour vehicle-miles of travel, VMT60       6.1       veh-mi         Peak-hour vehicle-miles of travel, VMT60       6.1       veh-h         Capacity from ATS, CdATS       1700       veh/h         Capacity from ATS, CdATS       1700       veh/h         Directional Capacity       1700       veh/h	Directional flow rate, (note-2) vi Base percent time-spent-following, ( Adjustment for no-passing zones, fr	167 p note-4) BPTSFd p	18.4 48.1	70 %	pc/h
Volume to capacity ratio, v/c       0.53         Peak 15-min vehicle-miles of travel, VMT15       221       veh-mi         Peak-hour vehicle-miles of travel, VMT60       636       veh-mi         Peak-bour vehicle-miles of travel, VMT60       636       veh-mi         Peak-bour vehicle-miles of travel, VMT60       6.1       veh-mi         Peak-bour vehicle-miles of travel, VMT60       6.1       veh-mi         Peak-bour vehicle-miles of travel, VMT60       6.1       veh-mi         Capacity from ATS, CdATS       1700       veh/h         Capacity from PTSF, CdPTSF       1700       veh/h         Directional Capacity       1700       veh/h	Level of Service an	d Other Perform	nance Mea	sures	
Total length of analysis segment, Lt       5.3 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)       36.2 mi/h         Percent time-spent-following, PTSrd (from above)       52.3         Level of service, LOSd (from above)       B         Downstream length of two-lane highway within effective       - mi         Length of passing lane for average travel speed, Lde       - mi         Adj. factor for the effect of passing lane       - mi         Average travel speed including passing lane, ATSpl       -         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       -         Adj. factor for the effect of passing lane, PFFSpl       0.0 %	Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel Peak-hour vehicle-miles of travel, Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	VMT60	0.53 221 636 6.1 1700 1700 1700	veh-mi veh-h veh/h veh/h	
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) 36.2 mi/h Percent time-spent-following, PTSFd (from above) 52.3 Level of service, LOSd (from above) B 	Passin	g Lane Analysis	8		
Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde - mi 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 % 	Length of two-lane highway upstream Length of passing lane including ta Average travel speed, ATSd (from ab Percent time-spent-following, PTSFd	of the passing pers, Lpl ove)	g lane, L <sup>.</sup>	u – – 36.2 52.3	mi mi
<pre>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</pre>	Average Travel S	peed with Pass	sing Lane		
<pre>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 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</pre>	length of passing lane for aver	age travel spee	ed, Lde	-	mi
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	<pre>length of the passing lane for Adj. factor for the effect of passi on average speed, fpl</pre>	average travel ng lane	speed, L	d – –	mi
<pre>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</pre>				0.0	90
<pre>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</pre>	Percent Time-Spent-	Following with	Passing 1	Lane	
<pre>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</pre>	of passing lane for percent time	e-spent-followi	.ng, Lde	_	mi
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	the passing lane for percent tin Adj. factor for the effect of passion on percent time-spent-following	me-spent-follow ng lane	-	-	mi
Level of service including passing lane, LOSpl A Peak 15-min total travel time, TT15 - veh-h				-	010
Peak 15-min total travel time, TT15 - veh-h	Level of Service and Other Pe	rformance Measu	res with	Passing	Lane
Diquelo Louel of Corvice		lane, LOSpl	A _	veh-h	
BICACIA TAAAA OL SALAIGA	Bicycle	Level of Servic	ce		

Appendix F Page 25 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	166.7
Effective width of outside lane, We	19.60
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.87
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.

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#### HCS7 Two-Way Stop-Control Report

General Information		Site Information								
Analyst	HDR	Intersection	Peaceful P & Erickson RaR							
Agency/Co.	HDR	Jurisdiction	Meade County							
Date Performed	4/24/2019	East/West Street	Peaceful Pines Road							
Analysis Year	2019	North/South Street	Erickson Ranch Road							
Time Analyzed	PM - Existing Conditions	Peak Hour Factor	0.70							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	Southern Meade County Corridor St	udy								
_										

#### Lanes



#### Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		0	1	0
Configuration		L	Т				Т	R							LR	
Volume (veh/h)		40	10				20	80						25		25
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)															0	
Right Turn Channelized						N	lo									
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33
Delay, Queue Length, an	d Leve	l of Se	ervice										<u>.</u>		<u>.</u>	
Flow Rate, v (veh/h)	Τ	57													71	
Capacity, c (veh/h)		1435													905	
v/c Ratio		0.04													0.08	
95% Queue Length, Q <sub>95</sub> (veh)		0.1													0.3	
Control Delay (s/veh)		7.6													9.3	
Level of Service (LOS)	A													A		
Approach Delay (s/veh)	6.1									9.3						
Approach LOS															A	

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Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.....Date Performed5/1/2019Analysis Time Period2019 - AM EC EastboundThe Creek Peed Highway Elk Creek Road Erickson Ranch to Haines From/To Jurisdiction Meade County Analysis Year 2019 Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.92 Highway classClass2Peak hour factor, PHF0.92Shoulder width0.0ft% Trucks and buses6%Lane width12.0ft% Trucks crawling0.0%Segment length3.0miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length mi % No-passing zones 14
% Access point density 6 00 Up/down /mi Analysis direction volume, Vd 65 veh/h Opposing direction volume, Vo 50 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) PCE for trucks, ET 1.9 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.949 Grade adj. factor (note-1) fg 1 00 0.949 1.00 74 pc/h Grade adj. factor,(note-1) fg 1.00 Directional flow rate,(note-2) vi 57 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 2.4\* Adjustment for no-passing zones, fnp mi/h Average travel speed, ATSd 50.9 mi/h Percent Free Flow Speed, PFFS 93.7 00

Direction       Analysis(d)       Opposing (o)         PCE for trucks, ET       1.1       1.1         PCE for NVS, ER       1.0       1.0         Heavy-vehicle adjustment factor, fNV       0.994       0.994         Grade adjustment factor, (note-1) fg       1.00       1.00         Directional flow rate, (note-2) vi       71       pc/h       55       pc/h         Base percent time-spent-following, (note-4)       BTSFG       8.5       %	Appendix F Page 28 of 99Percent Time	-Spent-Follow	ing		
Directional flow rate, (note-2) vi 71 pc/h 55 pc/h Base percent time-spent-following, (note-4) BPTSFd 8.5 % Adjustment for no-passing zones, fnp 24.2 Percent time-spent-following, PTSFd 22.1 % 	PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV	1.1 1.0 0.994		1.1 1.0 0.994	
Level of service, LOS       A         Volume to capacity ratio, v/c       0.53         Peak 15-min vehicle-miles of travel, VMT15       53       veh-mi         Peak-hour vehicle-miles of travel, VMT60       195       veh-mi         Peak-hour vehicle-miles of travel, VMT60       195       veh-mi         Peak-bour vehicle-miles of travel, VMT60       195       veh-mi         Capacity from ATS, CdATS       1.00       veh/h         Capacity from PTSF, CdPTSF       1700       veh/h         Directional Capacity       1700       veh/h	Directional flow rate, (note-2) vi Base percent time-spent-following, (no Adjustment for no-passing zones, fnp	71 p	8.5 24.2	55 %	pc/h
Volume to capacity ratio, v/c       0.53         Peak 15-min vehicle-miles of travel, VMT15       53       veh-mi         Peak-hour vehicle-miles of travel, VMT60       195       veh-mi         Peak-hour vehicle-miles of travel, VMT60       195       veh-mi         Peak 15-min total travel time, TT15       1.0       veh-h         Capacity from ATS, CdATS       1700       veh/h         Capacity from PTSF, CdPTSF       1700       veh/h         Directional Capacity       1700       veh/h	Level of Service and	Other Perform	ance Mea	sures	
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)       50.9       mi/h         Percent time-spent-following, PTSFd (from above)       22.1         Level of service, LOSd (from above)       A         Average Travel Speed with Passing Lane       -         Downstream length of two-lane highway within effective       -         length of two-lane highway downstream of effective       -         length of the passing lane for average travel speed, Ld       -         Average travel speed including passing lane, ATSpl       -         Average travel 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, Ld       -         Percent Time-Spent-following, Ld       -         Mi       -       -         Average travel speet of passing lane       -	Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, Peak-hour vehicle-miles of travel, VM Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF		0.53 53 195 1.0 1700 1700	veh-mi veh-h veh/h veh/h	
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) 50.9 mi/h Percent time-spent-following, PTSFd (from above) 22.1 Level of service, LOSd (from above) A Average Travel Speed with Passing Lane 	Passing	Lane Analysis			
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 % 	Length of two-lane highway upstream o Length of passing lane including tape Average travel speed, ATSd (from abov Percent time-spent-following, PTSFd (	rs, Lpl e)	lane, I	u – – 50.9 22.1	mi mi
<pre>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, Fpl - Percent time-spent-following, Fpl - Percent time-spent-following - % Level of Service and Other Performance Measures with Passing Lane</pre>	Average Travel Spe	ed with Pass	ing Lane	2	
<pre>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 = - % Level of Service and Other Performance Measures with Passing Lane</pre>	length of passing lane for averag	e travel spee	d, Lde	-	mi
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	Adj. factor for the effect of passing on average speed, fpl	lane	-	.d – – –	mi
<pre>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</pre>	Percent free flow speed including pas	sing lane, PF	FSpl	0.0	00
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	Percent Time-Spent-Fo	llowing with	Passing	Lane	
<pre>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</pre>	of passing lane for percent time-	spent-followi	ng, Lde	_	mi
including passing lane, PTSFpl - %	the passing lane for percent time Adj. factor for the effect of passing on percent time-spent-following,	-spent-follow lane	-		mi
				-	00
	Level of Service and Other Perf	ormance Measu	res with	Passing	Lane
Level of service including passing lane, LOSpl A Peak 15-min total travel time, TT15 - veh-h		ne, LOSpl	A _	veh-h	
Bicycle Level of Service	Bicycle Le	vel of Servic	e		

Appendix F Page 29 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	70.7
Effective width of outside lane, We	20.10
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.21
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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 5/1/2019 Analysis Time Period 2019 - AM EC Southbound Highway Erickson Ranch Road Westridge to Elk Creek From/To Jurisdiction Meade County 2019 Analysis Year Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.71 Highway classClass2Peak hour factor, PHF0.71Shoulder width0.0ft% Trucks and buses5%Lane width12.0ft% Trucks crawling0.0%Segment length2.8miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length mi % No-passing zones 60
 % Access point density 8 00 Up/down /mi Analysis direction volume, Vd 55 veh/h Opposing direction volume, Vo 40 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.9 PCE for trucks, ET 1.9 1.0 PCE for RVs, ER 1.0 Heavy-vehicle adj. factor, (note-5) fHV 0.957 Grade adj. factor (note-1) fg 1 00 0.957 1.00 Grade adj. factor, (note-1) fg 1.00 81 pc/h Directional flow rate,(note-2) vi 59 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 2.1 mi/h Adjustment for no-passing zones, fnp 50.6 Average travel speed, ATSd mi/h Percent Free Flow Speed, PFFS 94.0 00

Appendix F Page 31 of 99Percent	Time-Spent-Follow	ing		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, Crade adjustment factor (noto-1)			Opposing 1.1 1.0 0.995 1.00	
Grade adjustment factor, (note-1) Directional flow rate, (note-2) vi Base percent time-spent-following Adjustment for no-passing zones, Percent time-spent-following, PTS	, (note-4) BPTSFd fnp	oc/h 9.3 50.8 38.7	57 %	pc/h
Level of Service	and Other Perform	nance Mea	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of trav Peak-hour vehicle-miles of travel Peak 15-min total travel time, TT Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	, VMT60 15	A 0.53 54 154 1.1 1700 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Pass	ing Lane Analysis	8		
Total length of analysis segment, Length of two-lane highway upstre Length of passing lane including Average travel speed, ATSd (from Percent time-spent-following, PTS Level of service, LOSd (from abov	am of the passing tapers, Lpl above) Fd (from above)	g lane, I	2.8 - 50.6 38.7 A	mi mi mi/h
Average Travel	. Speed with Pass	ing Lane	9	
Downstream length of two-lane hig length of passing lane for av Length of two-lane highway downst	verage travel spee	ed, Lde	-	mi
<pre>length of the passing lane fo Adj. factor for the effect of pas on average speed, fpl</pre>	or average travel ssing lane	speed, I	Ld – –	mi
Average travel speed including pa Percent free flow speed including			- 0.0	00
Percent Time-Spen			Lane	
Downstream length of two-lane hig of passing lane for percent t	hway within effectime-spent-followi	tive ler	 ngth -	
Length of two-lane highway downst the passing lane for percent Adj. factor for the effect of pas	time-spent-follow	-		mi
on percent time-spent-followi Percent time-spent-following including passing lane, PTSFp			-	90
Level of Service and Other	Performance Measu	res with	n Passing	Lane
Level of service including passin Peak 15-min total travel time, TT	lg lane, LOSpl	A -	veh-h	
Bicycle Level of Service				

Appendix F Page 32 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	77.5
Effective width of outside lane, We	20.70
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.82
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.

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 5/1/2019 Analysis Time Period 2019 - AM EC Southbound Erickson Ranch Road Highway Peaceful Pines to Westridge From/To Jurisdiction Meade County Analysis Year 2019 Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.88 Highway classClass2Peak hour factor, PHF0.88Shoulder width2.0ft% Trucks and buses3%Lane width12.0ft% Trucks crawling0.0%Segment length2.6miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 100 - % Access point density 5 00 Up/down /mi Analysis direction volume, Vd 180 veh/h Opposing direction volume, Vo 25 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) PCE for trucks, ET 1.5 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.985 Grade adj. factor (note-1) fg 1 00 0.974 1.00 208 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 29 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 56.2 Free-flow speed, FFSd mi/h mi/h Adjustment for no-passing zones, fnp 2.7 Average travel speed, ATSd 51.6 mi/h Percent Free Flow Speed, PFFS 91.8 00

Appendix F Page 34 of 99 Percent	Time-Spent-Follow	ving		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor,			Opposing 1.1 1.0 0.997	
Grade adjustment factor, (note-1) Directional flow rate, (note-2) vi Base percent time-spent-following Adjustment for no-passing zones, Percent time-spent-following, PTS	205 g ,(note-4) BPTSFd fnp	DC/h 22.0 43.6 60.4	1.00 28 %	pc/h
Level of Service	and Other Perform	nance Me	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of trave Peak-hour vehicle-miles of travel Peak 15-min total travel time, TT Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	, VMT60 15	C 0.53 133 468 2.6 1700 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Pass	ing Lane Analysis	6		
Total length of analysis segment, Length of two-lane highway upstre Length of passing lane including Average travel speed, ATSd (from Percent time-spent-following, PTS Level of service, LOSd (from abov	am of the passing tapers, Lpl above) Fd (from above)	g lane,	2.6 Lu - 51.6 60.4 C	mi mi mi/h
Average Travel	Speed with Pass	sing Lan	e	
Downstream length of two-lane hig length of passing lane for av Length of two-lane highway downst	erage travel spee	ed, Lde		mi
length of the passing lane fo Adj. factor for the effect of pas on average speed, fpl	r average travel		Ld - -	mi
Average travel speed including pa Percent free flow speed including			_ 0.0	00
Percent Time-Spen				
	_	_		
Downstream length of two-lane hig of passing lane for percent t Length of two-lane highway downst	ime-spent-followi	ing, Lde	_	mi
the passing lane for percent Adj. factor for the effect of pas on percent time-spent-followi	sing lane	ving, Ld	-	mi
Percent time-spent-following including passing lane, PTSFp	1		-	00
Level of Service and Other	Performance Measu	ures wit	h Passing	Lane
Level of service including passin Peak 15-min total travel time, TT		A _	veh-h	
Bicycle Level of Service				

Appendix F Page 35 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	204.5
Effective width of outside lane, We	14.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.91
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.
Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.Inc.Date Performed5/1/2019Analysis Time Period2019 - AM EC Southbound Highway Haines Avenue Virginia Ln to Elk Creek Rd From/To Meade County Jurisdiction 2019 Analysis Year Description Southern Meade County Corridor Input Data\_\_\_\_\_ Highway classClass2Peak nour factor, findShoulder width0.0ft% Trucks and buses4Lane width12.0ft% Trucks crawling0.0Segment length4.4miTruck crawl speed0.0Terrain typeLevel% Recreational vehicles0 Highway class Class 2 Peak hour factor, PHF 0.90 Terrain type Grade: Length mi % No-passing zones 40
 % Access point density 2 00 Up/down /mi Analysis direction volume, Vd 80 veh/h Opposing direction volume, Vo 40 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.9 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.965 Grade adj. factor (note-1) fg 1 00 0.965 1.00 92 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate, (note-2) vi 46 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 0.5 mi/h 50.3 Free-flow speed, FFSd mi/h Adjustment for no-passing zones, fnp 2.4\* mi/h Average travel speed, ATSd 46.8 mi/h Percent Free Flow Speed, PFFS 93.1 00

Appendix F Page 37 of 99 Percent Time-Spent-Follow	ing		
DirectionAnalysis(d)PCE for trucks, ET1.1PCE for RVs, ER1.0Heavy-vehicle adjustment factor, fHV0.996		Opposing 1.1 1.0 0.996	(0)
Grade adjustment factor, (note-1) fg 1.00 Directional flow rate, (note-2) vi 89 p Base percent time-spent-following, (note-4) BPTSFd Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	c/h 10.5 39.0 36.4	1.00 45 %	pc/h
Level of Service and Other Perform	ance Mea	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VMT15 Peak-hour vehicle-miles of travel, VMT60 Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	A 0.53 98 352 2.1 1700 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Passing Lane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of the passing Length of passing lane including tapers, Lpl Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (from above) Level of service, LOSd (from above)	lane, 1	4.4 - 46.8 36.4 A	mi mi mi/h
Average Travel Speed with Pass	ing Lan	e	
Downstream length of two-lane highway within effec length of passing lane for average travel spee Length of two-lane highway downstream of effective	d, Lde	_	mi
<pre>length of the passing lane for average travel Adj. factor for the effect of passing lane on average speed, fpl Average travel speed including passing lane, ATSpl</pre>	speed, I	Ld – – –	mi
Percent free flow speed including passing lane, PF	FSpl	0.0	00
Percent Time-Spent-Following with	Passing	Lane	
Downstream length of two-lane highway within effec of passing lane for percent time-spent-followi Length of two-lane highway downstream of effective	ng, Lde	_	mi
the passing lane for percent time-spent-follow Adj. factor for the effect of passing lane on percent time-spent-following, fpl Percent time-spent-following	-		mi
including passing lane, PTSFpl		-	010
Level of Service and Other Performance Measu	res wit	h Passing 1	Lane
Level of service including passing lane, LOSpl Peak 15-min total travel time, TT15	A -	veh-h	
Bicycle Level of Servic	e		

Appendix F Page 38 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	88.9
Effective width of outside lane, We	19.20
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.90
Bicycle LOS	D

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.Inc.Date Performed5/1/2019Analysis Time Period2019 - AM EC Southbound Highway Haines Avenue Pennington Co to Virginia Ln From/To Meade County Jurisdiction 2019 Analysis Year Description Southern Meade County Corridor Input Data\_\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width2.0ft% Trucks and buses4%Lane width12.0ft% Trucks crawling0.0%Segment length1.7miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 27 - % Access point density 5 00 Up/down /mi Analysis direction volume, Vd 225 veh/h Opposing direction volume, Vo 25 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) PCE for trucks, ET 1.4 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.984 Grade adj factor (note-1) fg 1 00 0.965 1.00 286 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 32 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 56.2 Free-flow speed, FFSd mi/h Adjustment for no-passing zones, fnp 2.4\* mi/h Average travel speed, ATSd 51.3 mi/h Percent Free Flow Speed, PFFS 91.3 00

Appendix F Page 40 of 99 Percent T	ime-Spent-Follow	ving		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, f Grade adjustment factor, (note-1) f			Opposing 1.1 1.0 0.996 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, Adjustment for no-passing zones, f Percent time-spent-following, PTSF	282 g (note-4) BPTSFd np	bc/h 28.8 24.9 51.2	31 %	pc/h
Level of Service a	nd Other Perform	nance Mea	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of trave Peak-hour vehicle-miles of travel, Peak 15-min total travel time, TT1 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	VMT60 5	B 0.53 120 383 2.3 1700 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Passi	ng Lane Analysis	8		
Total length of analysis segment, Length of two-lane highway upstreat Length of passing lane including t Average travel speed, ATSd (from a Percent time-spent-following, PTSF Level of service, LOSd (from above	m of the passing apers, Lpl bove) d (from above)	g lane, I	1.7 - 51.3 51.2 B	mi mi mi/h
Average Travel	Speed with Pass	sing Lane	2	
Downstream length of two-lane high length of passing lane for ave Length of two-lane highway downstr	rage travel spee	ed, Lde	_	mi
length of the passing lane for Adj. factor for the effect of pass on average speed, fpl	average travel		Ld – –	mi
Average travel speed including pas Percent free flow speed including			- 0.0	90
Percent Time-Spent	-Following with	Passing	Lane	
Downstream length of two-lane high of passing lane for percent ti	way within effec	ctive ler		mi
Length of two-lane highway downstr the passing lane for percent t Adj. factor for the effect of pass	ime-spent-follow	-		mi
on percent time-spent-followin Percent time-spent-following including passing lane, PTSFpl	g, fpl		-	00
Level of Service and Other P		ıres witt	Passing	Lane
Level of service including passing Peak 15-min total travel time, TT1	lane, LOSpl	A –	veh-h	Lunc
	Level of Servio			
вісусте	TEAST OF SELATO			

Appendix F Page 41 of 99 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	14.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.34
Bicycle LOS	E

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 5/1/2019 Analysis Time Period 2019 - PM EC Northbound Highway Erickson Ranch Road Westridge to Elk Creek From/To Jurisdiction Meade County 2019 Analysis Year Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.79 Highway classClass2Peak hour factor, PHF0.79Shoulder width0.0ft% Trucks and buses5%Lane width12.0ft% Trucks crawling0.0%Segment length2.8miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length mi % No-passing zones 56 %
% Access point density 6 /mi Up/down Analysis direction volume, Vd 40 veh/h Opposing direction volume, Vo 40 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.9 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.957 Grade adj. factor, (note-1) fg 1.00 0.957 1.00 53 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 53 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 mi/h Adjustment for no-passing zones, fnp 2.0 Average travel speed, ATSd 51.5 mi/h Percent Free Flow Speed, PFFS 94.9 90

Direction       Analysis(d)       Opposing (d)         PCE for trucks, ET       1.1       1.1         PCE for trucks, ET       1.0       1.0         Beavy-vehicle adjustment factor, INV       0.993       0.995         Grade adjustment factor, INV       0.993       0.995         Beav percent time-spent-following, (note-4)       BTEFE 6.2       %         Adjustment for no-passing zones, fsp       48.2         Percent time-spent-following, PTSPd       30.3       %         Capacity frain, v/c       0.53         Peak 15-min vehicle-miles of travel, VMT15       35       veh-mi         Peak 16-min vehicle-miles of travel, VMT15       0.7       veh-h         Capacity from MTS, CdMTS       1700       veh/h         Directional Capacity       1700       weh/h         Directional Capacity </th <th>Appendix F Page 43 of 99Percent Tim</th> <th>e-Spent-Follow</th> <th>ing</th> <th></th> <th></th>	Appendix F Page 43 of 99Percent Tim	e-Spent-Follow	ing		
Heavy-vehicle adjustment factor, fWV 0.995 0.995 Grade adjustment factor, (note-1) fg 1.00 1.00 Directional flow rate, (note-2) vi 51 pc/h 51 pc/h Base percent time-spent-following, (note-4) BPTSFd 6.2 % Percent time-spent-following, PTSrd 30.3 % Level of Service and Other Performance Measures Level of service, LOS A Volume to capacity ratio, v/c 0.53 Peak-hour vehicle-miles of travel, VMT15 35 veh-mi Peak-hour vehicle-miles of travel, VMT60 112 veh-mi Peak-hour vehicle-miles of travel, peak Capacity from ATS, CdATS 1700 veh/h Directional Capacity 1700 veh/h Directional Capacity 1700 veh/h Directional Capacity 500 100 veh/h Directional Capacity 500 100 veh/h Directional Capacity 500 100 veh/h Percent fime-spent-following, PTSFd (from above) 30.3 Level of service, LOSG (from above) 30.3 Level of service, LOSG (from above) A 	PCE for trucks, ET	1.1		1.1	(0)
Base percent time-spent-following, (note-4) BPTSFd 6.2 % Adjustment for no-passing zones, fnp 48.2 Percent time-spent-following, PTSFd 30.3 % Percent time-spent-following, PTSFd 30.3 % Percent time-spent-following, PTSFd 30.3 % Peak 15-min vehicle-miles of travel, VMT05 15 veh-mi Peak 15-min vehicle-miles of travel, VMT06 112 veh-mi Peak 15-min vehicle-miles of travel, VMT06 112 veh-mi Peak 15-min vehicle-miles of travel, VMT07 170 veh/h Capacity from ATS, CdATS 1700 veh/h Capacity from ATS, CdATS 1700 veh/h Directional Capacity 700 veh/h Percent Capacity from ATS, CdATS 1700 veh/h Percent frespent-following, PTSPd (from above) 30.3 Level of service, LOS (from above) 30.3 Level of service, LOS (from above) A Percent time-spent-following, PTSPd (from above) A Percent free flow speed including tapers travel speed, Lde - mi Length of two-lane highway within effective length of two-lane highway downstream of effective length of two-lane highway downstream of effective length of two-lane highway downstream for effective length of two-lane highway downstream for effective length of two-lane highway downstream for effective length of passing lane for average travel speed, Ld - mi Adj. factor for the effect of passing lane, ATSpl - Percent free flow speed including passing lane, FFFSpl 0.0 % Percent free flow speed including passing lane, FFFSpl 0.0 % Percent time-spent-following, fpl - Percent time-spent-following, Ld - mi Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld - mi Length of two-lane highway downstream for effective length of the passing lane for percent time-spent-following, Ld - mi Length of two-lane highway downstream for effective length of the passing lane for percent time-spent-following, Ld - mi	Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	1.00		1.00	
Level of service, LOS       A         Volume to capacity ratio, v/c       0.53         Peak 15-min vehicle-miles of travel, VMT05       35       veh-mi         Peak-hour vehicle-miles of travel, VMT06       112       veh-mi         Peak-hour vehicle-miles of travel, VMT06       0.7       veh-mi         Peak-hour vehicle-miles of travel, VMT06       112       veh-mi         Peak-hour vehicle-miles of travel, VMT06       112       veh-mi         Capacity from ATS, CdATS       1700       veh/h         Capacity from ATS, CdATS       1700       veh/h         Directional Capacity       1700       veh/h	Base percent time-spent-following, (n Adjustment for no-passing zones, fnp	ote-4) BPTSFd	6.2 48.2	00	pc/h
Volume to capacity ratio, v/c       0.53         Peak 15-min vehicle-miles of travel, VMT15       35       veh-mi         Peak-hour vehicle-miles of travel, VMT60       112       veh-mi         Peak 15-min total travel time, TT15       0.7       veh/h         Capacity from ATS, CdATS       1700       veh/h         Capacity from ATSP, CdPTSF       1700       veh/h         Directional Capacity       1700       veh/h	Level of Service and	Other Perform	nance Mea	sures	
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)       51.5 mi/h         Percent time-spent-following, PTSfd (from above)       30.3         Level of service, LOSd (from above)       A	Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, Peak-hour vehicle-miles of travel, V Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF		0.53 35 112 0.7 1700 1700	veh-mi veh-h veh/h veh/h	
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) 30.3 Level of service, LOSd (from above) 30.3 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 - Minimum and the speed including passing lane, PFFSpl 0.0 % 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, Ld - mi Adj. factor for the effect of passing lane on average speed, fpl - Minimum and the spent-following for the 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, Ld - mi Adj. factor for the effect of passing lane on percent time-spent-following, fpl - Percent time-spent-following, Ld - mi Adj. factor for the effect of passing lane on percent time-spent-following, fpl - Percent time-spent-following - Minimum and the spent following - Minimum and the spent following fpl - Percent time-spent-following - Ninimum and the spent - Simple -	Passing	Lane Analysis	3		
Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde - mi 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, Ld - mi Adj. factor for the effect of passing lane on percent time-spent-following, Ld - mi 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	Length of two-lane highway upstream Length of passing lane including tap Average travel speed, ATSd (from abo Percent time-spent-following, PTSFd	of the passing ers, Lpl ve)	g lane, L	u – – 51.5 30.3	mi mi
<pre>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 mith Passing Lane 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</pre>	Average Travel Sp	eed with Pass	sing Lane		
<pre>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 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</pre>	length of passing lane for avera	ge travel spee	ed, Lde	_	mi
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	length of the passing lane for a Adj. factor for the effect of passin	verage travel		.d –	mi
<pre>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</pre>	Average travel speed including passi			_ 0.0	<u>9</u>
<pre>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</pre>	Percent Time-Spent-F	ollowing with	Passing	Lane	
<pre>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</pre>	of passing lane for percent time	-spent-followi	.ng, Lde	_	mi
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	the passing lane for percent tim Adj. factor for the effect of passin on percent time-spent-following,	e-spent-follow g lane	-		mi
Level of service including passing lane, LOSpl A Peak 15-min total travel time, TT15 - veh-h				-	90
Peak 15-min total travel time, TT15 - veh-h	Level of Service and Other Per	formance Measu	res with	Passing	Lane
Bicycle Level of Service		ane, LOSpl	A _	veh-h	
	Bicycle L	evel of Servic	ce		

Appendix F Page 44 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	50.6
Effective width of outside lane, We	21.60
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.42
Bicycle LOS	С

- 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.

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 5/1/2019 Analysis Time Period 2019 - PM EC Northbound Erickson Ranch Road Highway Peaceful Pines to Westridge From/To Jurisdiction Meade County Analysis Year 2019 Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.72 Highway classClass2Peak hour factor, PHF0.72Shoulder width2.0ft% Trucks and buses3%Lane width12.0ft% Trucks crawling0.0%Segment length2.6miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 100 - % Access point density 7 00 Up/down /mi Analysis direction volume, Vd 120 veh/h Opposing direction volume, Vo 50 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.6 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.982 Grade adj. factor (note-1) fg 1 00 0.974 1.00 170 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 71 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 1.8 mi/h Free-flow speed, FFSd 55.7 mi/h Adjustment for no-passing zones, fnp 2.4\* mi/h Average travel speed, ATSd 51.4 mi/h Percent Free Flow Speed, PFFS 92.3 00

Appendix F Page 46 of 99Percent	Time-Spent-Follow	ving		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, Grade adjustment factor,(note-1)			Opposing 1.1 1.0 0.997 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following Adjustment for no-passing zones, Percent time-spent-following, PTS	167 p ,(note-4) BPTSFd fnp		70 %	pc/h
Level of Service	and Other Perform	mance Mea	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of trav Peak-hour vehicle-miles of travel Peak 15-min total travel time, TT Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	, VMT60 15	B 0.53 108 312 2.1 1700 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Pass	ing Lane Analysis	5		
Total length of analysis segment, Length of two-lane highway upstre Length of passing lane including Average travel speed, ATSd (from Percent time-spent-following, PTS Level of service, LOSd (from abov	am of the passing tapers, Lpl above) Fd (from above)	g lane, I	2.6 - - 51.4 52.9 B	mi mi mi/h
Average Travel	Speed with Pass	sing Lane	Э	
Downstream length of two-lane hig length of passing lane for av Length of two-lane highway downst	erage travel spee	ed, Lde	_	mi
length of the passing lane fo Adj. factor for the effect of pas on average speed, fpl	r average travel		Ld – –	mi
Average travel speed including pa Percent free flow speed including			- 0.0	00
Percent Time-Spen			Lane	
	-	_		
Downstream length of two-lane hig of passing lane for percent t Length of two-lane highway downst	ime-spent-follow:	ing, Lde	_	mi
the passing lane for percent Adj. factor for the effect of pas on percent time-spent-followi	sing lane	wing, Ld	_	mi
Percent time-spent-following including passing lane, PTSFp	1		_	010
Level of Service and Other	Performance Measu	ures with	n Passing	Lane
Level of service including passin Peak 15-min total travel time, TT		A _	veh-h	
Bicycl	e Level of Servio	ce		

Appendix F Page 47 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	166.7
Effective width of outside lane, We	19.60
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.87
Bicycle LOS	D

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.Inc.Date Performed5/1/2019Analysis Time Period2019 - PM EC Northbound Highway Haines Avenue Virginia Ln to Elk Creek Rd From/To Meade County Jurisdiction 2019 Analysis Year Description Southern Meade County Corridor Input Data\_\_\_\_ Highway classClass2Peak nour factor, findShoulder width0.0ft% Trucks and buses5%Lane width12.0ft% Trucks crawling0.0%Segment length4.4miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Highway class Class 2 Peak hour factor, PHF 0.93 Terrain type Grade: Length mi % No-passing zones 28
% Access point density 4 00 Up/down /mi Analysis direction volume, Vd 80 veh/h Opposing direction volume, Vo 40 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.9 PCE for trucks, ET 1.9 1.0 PCE for RVs, ER 1.0 Heavy-vehicle adj. factor, (note-5) fHV 0.957 Grade adj. factor, (note-1) fg 1.00 0.957 1.00 90 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate, (note-2) vi 45 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 46.4 mi/h Percent Free Flow Speed, PFFS 93.1 00

Appendix F Page 49 of 99 Percent Time-Spent-Follo	wing		
Direction Analysis(d) PCE for trucks, ET 1.1		Opposing 1.1	(0)
PCE for RVs, ER1.0Heavy-vehicle adjustment factor, fHV0.995		1.0 0.995	
Grade adjustment factor, (note-1) fg 1.00 Directional flow rate, (note-2) vi 86 Base percent time-spent-following, (note-4) BPTSFC	pc/h	1.00 43 %	pc/h
Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	33.0 32.1	0	
Level of Service and Other Perfor	rmance Me	asures	
Level of service, LOS	A 0.53		
Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VMT15 Peak-hour vehicle-miles of travel, VMT60	95 352	veh-mi veh-mi	
Peak 15-min total travel time, TT15 Capacity from ATS, CdATS	2.0 1700	veh-h veh/h	
Capacity from PTSF, CdPTSF Directional Capacity	1700 1700	veh/h	
Passing Lane Analysi	.s		
Total length of analysis segment, Lt Length of two-lane highway upstream of the passin Length of passing lane including tapers, Lpl Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (from above) Level of service, LOSd (from above)	ig lane,	4.4 Lu - 46.4 32.1 A	mi mi mi/h
Average Travel Speed with Pas	sing Lan		
Downstream length of two-lane highway within effe length of passing lane for average travel spe Length of two-lane highway downstream of effective	ed, Lde	_	mi
length of the passing lane for average travel Adj. factor for the effect of passing lane		Ld -	mi
on average speed, fpl Average travel speed including passing lane, ATSp		-	o
Percent free flow speed including passing lane, F Percent Time-Spent-Following with	_	0.0	<u>0</u> 0
Downstream length of two-lane highway within effe	_		
of passing lane for percent time-spent-follow Length of two-lane highway downstream of effective	ving, Lde		mi
the passing lane for percent time-spent-follo Adj. factor for the effect of passing lane	wing, Ld	_	mi
on percent time-spent-following, fpl Percent time-spent-following including passing lane, PTSFpl		-	8
Level of Service and Other Performance Meas	ures wit	h Passing	
Level of service including passing lane, LOSpl Peak 15-min total travel time, TT15	A _	veh-h	
Bicycle Level of Servi	.ce		

Appendix F Page 50 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	86.0
Effective width of outside lane, We	19.20
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.17
Bicycle LOS	D

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.Inc.Date Performed5/1/2019Analysis Time Period2019 - PM EC Northbound Highway Haines Avenue Pennington Co to Virginia Ln From/To Meade County Jurisdiction 2019 Analysis Year Description Southern Meade County Corridor Input Data\_\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.67 Highway classClass2Peak hour factor, PHF0.67Shoulder width0.0ft% Trucks and buses7%Lane width12.0ft% Trucks crawling0.0%Segment length4.4miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 23 - % Access point density 6 00 Up/down /mi Analysis direction volume, Vd 205 veh/h Opposing direction volume, Vo 60 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.4 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.973 Grade adj. factor (note-1) fg 1 00 0.941 1.00 314 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 95 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 2.4\* Adjustment for no-passing zones, fnp mi/h Average travel speed, ATSd 48.7 mi/h Percent Free Flow Speed, PFFS 89.7 00

Appendix F Page 52 of 99 Percent Time-Spent-Follow	/ing		
DirectionAnalysis(d)PCE for trucks, ET1.1PCE for RVs, ER1.0Heavy-vehicle adjustment factor, fHV0.993Grade adjustment factor, (note-1) fg1.00		Opposing 1.1 1.0 0.993 1.00	(0)
	bc/h 30.9 28.5 53.0	90 %	pc/h
Level of Service and Other Perform	nance Mea	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VMT15 Peak-hour vehicle-miles of travel, VMT60 Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	B 0.53 337 902 6.9 1700 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Passing Lane Analysis	8		
Total length of analysis segment, Lt Length of two-lane highway upstream of the passing Length of passing lane including tapers, Lpl Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (from above) Level of service, LOSd (from above)	g lane, I	4.4 - 48.7 53.0 B	mi mi mi/h
Average Travel Speed with Pass	sing Lane	e	
Downstream length of two-lane highway within effect length of passing lane for average travel spec Length of two-lane highway downstream of effective	ctive ed, Lde	_	mi
<pre>length of the passing lane for average travel Adj. factor for the effect of passing lane     on average speed, fpl</pre>	speed, I	Ld – –	mi
Average travel speed including passing lane, ATSpl Percent free flow speed including passing lane, PE		- 0.0	010
Percent Time-Spent-Following with	Passing	Lane	
Downstream length of two-lane highway within effect of passing lane for percent time-spent-followi	ctive ler		
Length of two-lane highway downstream of effective the passing lane for percent time-spent-follow Adj. factor for the effect of passing lane	-		mi
on percent time-spent-following, fpl Percent time-spent-following including passing lane, PTSFpl		_	00
	ree witt	Daceina 1	
Level of Service and Other Performance Measu	ires with	I PASSING I	Lalle
Level of service including passing lane, LOSpl Peak 15-min total travel time, TT15	A _	veh-h	
Bicycle Level of Servic	ce		

Appendix F Page 53 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	306.0
Effective width of outside lane, We	12.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	6.58
Bicycle LOS	F

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 5/1/2019 Analysis Time Period 2019 - PM EC Westbound Highway Elk Creek Road Erickson Ranch to Haines From/To Jurisdiction Meade County 2019 Analysis Year Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.78 Highway classClass2Peak hour factor, PHF0.78Shoulder width2.0ft% Trucks and buses7%Lane width12.0ft% Trucks crawling0.0%Segment length3.0miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length mi % No-passing zones 7 %
- % Access point density 4 /mi Up/down Analysis direction volume, Vd 75 veh/h Opposing direction volume, Vo 50 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) PCE for trucks, ET 1.9 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.941 Grade adj. factor (note-1) fg 1 00 0.941 1.00 102 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate, (note-2) vi 68 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 0.6 mi/h Adjustment for no-passing zones, fnp Average travel speed, ATSd 54.5 mi/h Percent Free Flow Speed, PFFS 96.7 90

Appendix F Page 55 of 99 Percent Time-Spe	nt-Following
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV	ysis(d) Opposing (o) 1.1 1.1 1.0 1.0 0.993 0.993 1.00
Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi Base percent time-spent-following, (note-4 Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	1.00 1.00 97 pc/h 65 pc/h BPTSFd 11.3 % 17.9 22.0 %
Level of Service and Othe	Performance Measures
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VMT1 Peak-hour vehicle-miles of travel, VMT60 Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	A 0.53 72 veh-mi 225 veh-mi 1.3 veh-h 1700 veh/h 1700 veh/h 1700 veh/h
Passing Lane	Analysis
Total length of analysis segment, Lt Length of two-lane highway upstream of th Length of passing lane including tapers, Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (from Level of service, LOSd (from above)	.pl - mi 54.5 mi/h
Average Travel Speed	with Passing Lane
Downstream length of two-lane highway wit length of passing lane for average tr Length of two-lane highway downstream of	avel speed, Lde – mi
length of the passing lane for averag Adj. factor for the effect of passing lan on average speed, fpl	e travel speed, Ld - mi e -
Average travel speed including passing la Percent free flow speed including passing	
Percent Time-Spent-Follow	ng with Passing Lane
Downstream length of two-lane highway wit of passing lane for percent time-spen Length of two-lane highway downstream of	-following, Lde - mi
Adj. factor for the effect of passing lan on percent time-spent-following, fpl	nt-following, Ld - mi
Percent time-spent-following including passing lane, PTSFpl	- %
Level of Service and Other Performa	nce Measures with Passing Lane
Level of service including passing lane, Peak 15-min total travel time, TT15	LOSpl A - veh-h
Bicycle Level	of Service

Appendix F Page 56 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	96.2
Effective width of outside lane, We	22.75
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.13
Bicycle LOS	D

- 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.



# Appendix B – 2045 No-Build Conditions HCS7 Reports

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General Information		Site Information	Site Information						
Analyst	HDR	Intersection	224th St & 143rd Ave						
Agency/Co.	HDR	Jurisdiction	Meade County						
Date Performed	4/24/2019	East/West Street	224th Street						
Analysis Year	2045	North/South Street	143rd Avenue						
Time Analyzed	AM - 2045 No-Build Cond.	Peak Hour Factor	0.80						
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25						
Project Description	Southern Meade County Corridor Stud	ду							

#### Lanes



Major Street: East-West

Vehicle Volumes and Ad	justme	ents														
Approach		Eastb	ound			West	oound			North	bound			Southbound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		5	10				10	10						20		5
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized		Ν	lo			Ν	No No					No				
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	ays														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)		6													31	
Capacity, c (veh/h)		1584													981	
v/c Ratio		0.00													0.03	
95% Queue Length, Q <sub>95</sub> (veh)		0.0													0.1	
Control Delay (s/veh)		7.3													8.8	
Level of Service, LOS		A													A	
Approach Delay (s/veh)		2	.4	-		-	-				-	-		8	3.8	
Approach LOS															A	

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HCS7 TWO-Way Stop-Control Report									
	Site Information								
HDR	Elk Creek & 143rd Ave								
HDR	Jurisdiction	Meade County							
4/24/2019	East/West Street	Elk Creek Road							
2045	North/South Street	143rd Avenue							
AM - 2045 No-Build Cond.	Peak Hour Factor	0.80							
East-West	Analysis Time Period (hrs)	0.25							
Southern Meade County Corridor Study									
	HDR         4/24/2019         2045         AM - 2045 No-Build Cond.         East-West	HDR     Intersection       HDR     Jurisdiction       4/24/2019     East/West Street       2045     North/South Street       AM - 2045 No-Build Cond.     Peak Hour Factor       East-West     Analysis Time Period (hrs)							

### Lanes



					Majo	or Street: Ea	ist-West									
Vehicle Volumes and Ad	justme	ents														
Approach		Eastb	ound			West	bound			North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		5	15	10		5	45	5		5	5	5		5	5	5
Percent Heavy Vehicles (%)		20				20				20	20	20		20	20	20
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized		No No			No			No								
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	ervice	3												
Flow Rate, v (veh/h)	Γ	6				6					18				18	
Capacity, c (veh/h)		1434				1473					836				825	
v/c Ratio		0.00				0.00					0.02				0.02	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.1				0.1	
Control Delay (s/veh)		7.5				7.5					9.4				9.5	
Level of Service, LOS		A				A					A				A	
Approach Delay (s/veh)		. 1	.2			. 0	.7			9	.4			. 9	.5	
Approach LOS										1	4				Ą	

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HCS7 Two-way stop-control Report									
General Information		Site Information							
Analyst	HDR	Intersection	Elk Creek & Elk Vale						
Agency/Co.	HDR	Jurisdiction	Meade County						
Date Performed	4/24/2019	East/West Street	Elk Creek Road						
Analysis Year	2045	North/South Street	Elk Vale Road						
Time Analyzed	AM - 2045 No-Build Cond.	Peak Hour Factor	0.80						
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25						
Project Description	Southern Meade County Corridor Study								

#### Lanes



Vehicle Volumes and Adj	ustme	ents														
Approach		Eastb	ound			West	oound		Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		5	10	10		15	30	5		15	5	5		5	15	10
Percent Heavy Vehicles (%)		14	14	14		14	14	14		14				14		
Proportion Time Blocked																
Percent Grade (%)		0					0									
Right Turn Channelized	No No No				No											
Median Type/Storage				Undi	vided											
Critical and Follow-up Ho	eadwa	iys														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, and	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)			30				63			19				6		
Capacity, c (veh/h)			859				804			1507				1532		
v/c Ratio			0.03				0.08			0.01				0.00		
95% Queue Length, Q <sub>95</sub> (veh)			0.1				0.3			0.0				0.0		
Control Delay (s/veh)			9.3				9.9			7.4				7.4		
Level of Service, LOS			A				A			A				A		
Approach Delay (s/veh)		9	.3			9	.9			4	.6			1	.2	
Approach LOS			A			,	Ą									

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ckson Ra R										
Road										

### Lanes



### **Vehicle Volumes and Adjustments**

Approach		Eastb	ound			West	bound			North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		5	75	80		25	130	5		70	10	15		5	10	15
Percent Heavy Vehicles (%)		5				5				5	5	5		5	5	5
Proportion Time Blocked																
Percent Grade (%)											0		0			
Right Turn Channelized																
Median Type   Storage				Undi	vided	ided										
Critical and Follow-up Headways																
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.15				4.15				7.15	6.55	6.25		7.15	6.55	6.25
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.25				2.25				3.55	4.05	3.35		3.55	4.05	3.35
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		6				31					119				38	
Capacity, c (veh/h)		1390				1362					558				638	
v/c Ratio		0.00				0.02					0.21				0.06	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1					0.8				0.2	
Control Delay (s/veh)		7.6				7.7					13.2				11.0	
Level of Service (LOS)		A				A					В				В	
Approach Delay (s/veh)		0	.3			1	.4		13.2				11.0			
Approach LOS	1							В				В				

# HCS7 All-Way Stop Control Report

General Information		Site Information	Site Information						
Analyst	HDR	Intersection	Elk Creek & Haines						
Agency/Co.	HDR	Jurisdiction	Meade County						
Date Performed	4/24/2019	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	AM - 2045 No-Build Cond.	· · · ·							
Project Description Southern Meade County Corridor Study									



### Vehicle Volume and Adjustments

venicle volume and Adjus	tments											
Approach		Eastbound	1		Westbound	b	1	Northboun	d	9	Southboun	d
Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Volume	10	15	90	25	25	5	45	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)	144			69			81			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	0.128			0.061			0.072			0.056		
Final Departure Headway, hd (s)	3.97			4.53			4.59			4.47		
Final Degree of Utilization, x	0.159			0.086			0.104			0.078		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	1.97			2.53			2.59			2.47		
Capacity, Delay and Level	of Servic	e										
Flow Rate, v (veh/h)	144			69			81			63		
Capacity	906			795			785			806		
95% Queue Length, Q <sub>95</sub> (veh)	0.6			0.3			0.3			0.3		
Control Delay (s/veh)	7.7			8.0			8.1			7.8		
Level of Service, LOS	А			А			А			A		
Approach Delay (s/veh)		7.7			8.0		8.1			7.8		
Approach LOS		А			А			А		A		
Intersection Delay, s/veh   LOS			7	.9						A		

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## HCS7 Two-Way Stop-Control Report

General Information		Site Information									
Analyst	HDR	Intersection	Peaceful P & Erickson RaR								
Agency/Co.	HDR	Jurisdiction	Meade County								
Date Performed	4/24/2019	East/West Street	Peaceful Pines Road								
Analysis Year	2045	North/South Street	Erickson Ranch Road								
Time Analyzed	AM - 2045 No-Build Cond.	Peak Hour Factor	0.80								
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25								
Project Description	Southern Meade County Corridor Stu	dy									

### Lanes



### Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	T	R	
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		0	1	0	
Configuration		L	Т				т	R							LR		
Volume (veh/h)		25	40				20	55						165		75	
Percent Heavy Vehicles (%)		3												3		3	
Proportion Time Blocked																	
Percent Grade (%)				-		-				-	-		0				
Right Turn Channelized						Ν	lo										
Median Type   Storage				Undi	ivided												
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)		4.1												7.1		6.2	
Critical Headway (sec)		4.13												6.43		6.23	
Base Follow-Up Headway (sec)		2.2												3.5		3.3	
Follow-Up Headway (sec)		2.23												3.53		3.33	
Delay, Queue Length, an	d Leve	l of Se	ervice								<u>.</u>		-	-			
Flow Rate, v (veh/h)	Τ	31													300		
Capacity, c (veh/h)		1495													892		
v/c Ratio		0.02													0.34		
95% Queue Length, Q <sub>95</sub> (veh)		0.1													1.5		
Control Delay (s/veh)		7.5													11.1		
Level of Service (LOS)		А													В		
Approach Delay (s/veh)		2	.9						1				11.1				
Approach LOS															В		

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General Information		Site Information	Site Information					
Analyst	HDR	Intersection	224th St & 143rd Ave					
Agency/Co.	HDR	Jurisdiction	Meade County					
Date Performed	4/24/2019	East/West Street	224th Street					
Analysis Year	2045	North/South Street	143rd Avenue					
Time Analyzed	PM - 2045 No-Build Cond.	Peak Hour Factor	0.80					
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25					
Project Description	Southern Meade County Corridor Stu	dy						

#### Lanes



Major Street: East-West

Vehicle Volumes and Ad	justme	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		5	10				20	10						5		5
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)									0							
Right Turn Channelized		Ν	No No No					No								
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)		6													12	
Capacity, c (veh/h)		1567													992	
v/c Ratio		0.00													0.01	
95% Queue Length, $Q_{95}$ (veh)		0.0													0.0	
Control Delay (s/veh)		7.3													8.7	
Level of Service, LOS		A													A	
Approach Delay (s/veh)		2	.5										8.7			
Approach LOS														,	Ą	

ncs7 two-way stop-control Report											
	Site Information										
HDR	Intersection	Elk Creek & 143rd Ave									
HDR	Jurisdiction	Meade County									
4/24/2019	East/West Street	Elk Creek Road									
2045	North/South Street	143rd Avenue									
PM - 2045 No-Build Cond.	Peak Hour Factor	0.80									
East-West	Analysis Time Period (hrs)	0.25									
Project Description Southern Meade County Corridor Study											
	HDR 4/24/2019 2045 PM - 2045 No-Build Cond. East-West	HDR     Intersection       HDR     Jurisdiction       4/24/2019     East/West Street       2045     North/South Street       PM - 2045 No-Build Cond.     Peak Hour Factor       East-West     Analysis Time Period (hrs)									

#### Lanes



Approach	T	Easth	ound			West	ound			North	bound			South	bound	
Movement	U		T	R	U		T	R	U			R	U			R
		L	-		-	L			U	L	Т		U	L	Т	
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		5	45	5		5	25	5		5	5	5		5	5	5
Percent Heavy Vehicles (%)		20				20				20	20	20		20	20	20
Proportion Time Blocked																
Percent Grade (%)										(	C			(	0	
Right Turn Channelized		N	lo			N	lo			N	lo			Ν	10	
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, an	d Leve	el of S	ervice	;												
Flow Rate, v (veh/h)	Τ	6				6					18				18	
Capacity, c (veh/h)		1465				1434					818				826	
v/c Ratio		0.00				0.00					0.02				0.02	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.0					0.1				0.1	
Control Delay (s/veh)		7.5				7.5					9.5				9.5	
Level of Service, LOS		Α				А					A				A	
Approach Delay (s/veh)		0	.7			1	.1			9	.5			9	.5	
Approach LOS											4				Ą	

	HCS7 TWO-Way	Stop-Control Report	
General Information		Site Information	
Analyst	HDR	Intersection	Elk Creek & Elk Vale
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	4/24/2019	East/West Street	Elk Creek Road
Analysis Year	2045	North/South Street	Elk Vale Road
Time Analyzed	PM - 2045 No-Build Cond.	Peak Hour Factor	0.80
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	Southern Meade County Corridor Stud	ly	

#### Lanes



Vehicle Volumes and Adj	ustme	ents														
Approach		Eastk	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		10	25	20		5	20	5		5	10	15		5	5	10
Percent Heavy Vehicles (%)		14	14	14		14	14	14		14				14		
Proportion Time Blocked																
Percent Grade (%)			0			(	0									
Right Turn Channelized		Ν	lo			Ν	lo			Ν	lo			Ν	lo	
Median Type/Storage				Undi	vided											
Critical and Follow-up Ho	eadwa	iys														
Base Critical Headway (sec)																
Critical Headway (sec)																
Base Follow-Up Headway (sec)																
Follow-Up Headway (sec)																
Delay, Queue Length, and	d Leve	el of S	ervice	<u>)</u>												
Flow Rate, v (veh/h)			68				37			6				6		
Capacity, c (veh/h)			881				831			1524				1507		
v/c Ratio			0.08				0.04			0.00				0.00		
95% Queue Length, Q <sub>95</sub> (veh)			0.3				0.1			0.0				0.0		
Control Delay (s/veh)			9.4				9.5			7.4				7.4		
Level of Service, LOS			А				A			A				A		
Approach Delay (s/veh)		9	.4			9	.5			1	.2			1	.9	
Approach LOS			٩			1	Ą									

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HCS7100 TWSC Version 7.2 2045-NB\_PM\_ElkCreek-ElkVale\_TWSC.xtw Appendix F Page 67 of 99

# HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	HDR	Intersection	Elk Creek & Erickson Ra R
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	4/24/2019	East/West Street	Elk Creek Road
Analysis Year	2045	North/South Street	Erickson Ranch Road
Time Analyzed	PM - 2045 No-Build Cond.	Peak Hour Factor	0.80
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Southern Meade County Corridor Stud	у	

### Lanes



### **Vehicle Volumes and Adjustments**

Approach		Eastb	ound			Wost	oound			North	bound			South	bound	
••				D				D				D		1	1	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		10	90	55		20	110	10		50	10	30		10	5	10
Percent Heavy Vehicles (%)		5				5				5	5	5		5	5	5
Proportion Time Blocked																
Percent Grade (%)										(	C				0	
Right Turn Channelized																
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.15				4.15				7.15	6.55	6.25		7.15	6.55	6.25
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.25				2.25				3.55	4.05	3.35		3.55	4.05	3.35
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		13				25					113				31	
Capacity, c (veh/h)		1412				1376					629				623	
v/c Ratio		0.01				0.02					0.18				0.05	
95% Queue Length, Q <sub>95</sub> (veh)		0.0				0.1					0.6				0.2	
Control Delay (s/veh)		7.6				7.7					12.0				11.1	
Level of Service (LOS)	1	Α				Α					В				В	
Approach Delay (s/veh)		0	.6			1	.2			12	2.0			1	1.1	
Approach LOS										I	В				В	

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# HCS7 All-Way Stop Control Report

	HCS7 All-Way	Stop Control Report	
General Information		Site Information	
Analyst	HDR	Intersection	Elk Creek & Haines
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	4/24/2019	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 No-Build Cond.		
Project Description	Southern Meade County Corridor	Study	
Lanes	<b>.</b>		



### Vehicle Volume and Adjustments

venicle volume and Adjust	incinto											
Approach		Eastbound		,	Westbound	ł	1	Northboun	d	2	outhboun	b
Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Volume	10	30	45	10	20	5	100	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)	106			44			181			25		
Percent Heavy Vehicles	6			6			6			6		
Departure Headway and Se	rvice Ti	ime										
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.094			0.039			0.161			0.022		
Final Departure Headway, hd (s)	4.25			4.58			4.43			4.45		
Final Degree of Utilization, x	0.125			0.056			0.223			0.031		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.25			2.58			2.43			2.45		
Capacity, Delay and Level o	f Servic	e										
Flow Rate, v (veh/h)	106			44			181			25		
Capacity	848			786			812			809		
95% Queue Length, Q <sub>95</sub> (veh)	0.4			0.2			0.9			0.1		
Control Delay (s/veh)	7.9			7.8			8.7			7.6		
Level of Service, LOS	А			А			А			А		
Approach Delay (s/veh)		7.9			7.8			8.7			7.6	
Approach LOS		А			А			А			А	
Intersection Delay, s/veh   LOS			8	.3						Ą		

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# HCS7 Two-Way Stop-Control Report

		y stop-control Report	
General Information		Site Information	
Analyst	HDR	Intersection	Peaceful P & Erickson RaR
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	4/24/2019	East/West Street	Peaceful Pines Road
Analysis Year	2045	North/South Street	Erickson Ranch Road
Time Analyzed	PM - 2045 No-Build Cond.	Peak Hour Factor	0.80
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Southern Meade County Corridor Stu	dy	

### Lanes



### Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		0	1	0
Configuration		L	Т				Т	R							LR	
Volume (veh/h)		60	20				40	115						30		35
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)				-		-		-			-				0	
Right Turn Channelized						Ν	lo									
Median Type   Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)	Τ	75													81	
Capacity, c (veh/h)		1374													854	
v/c Ratio		0.05													0.10	
95% Queue Length, Q <sub>95</sub> (veh)		0.2													0.3	
Control Delay (s/veh)		7.8													9.7	
Level of Service (LOS)		А													A	
Approach Delay (s/veh)		5.	.8								-			Ç	).7	
Approach LOS															A	

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.AlexaDate Performed5/1/2019Analysis Time Period2045 - AM No-Build EastboundTill Creek Pood Highway Elk Creek Road Erickson Ranch to Haines From/To Jurisdiction Meade County Analysis Year 2045 Description Southern Meade County Corridor Input Data\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width0.0ft% Trucks and buses6%Lane width12.0ft% Trucks crawling0.0%Segment length3.0miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 14 - % Access point density 6 00 Up/down /mi Analysis direction volume, Vd 115 veh/h Opposing direction volume, Vo 80 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.7 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.960 Grade adj. factor (note-1) fg 1 00 0.949 1.00 150 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 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 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 49.9 mi/h Percent Free Flow Speed, PFFS 91.9 00

		wing		
Direction	Analysis(d)		Opposing	(0)
CE for trucks, ET	1.1		1.1	
CE for RVs, ER	1.0		1.0	
eavy-vehicle adjustment factor, fHV	0.994		0.99	4
rade adjustment factor, (note-1) fg	1.00		1.00	
irectional flow rate, (note-2) vi		pc/h	101	pc/h
ase percent time-spent-following, (not		-	00	1
djustment for no-passing zones, fnp		25.8		
ercent time-spent-following, PTSFd		31.5	00	
Level of Service and (	other Perior	mance Me	asures	
evel of service, LOS		A		
olume to capacity ratio, v/c		0.53		
eak 15-min vehicle-miles of travel, N	/MT15	108	veh-mi	
eak-hour vehicle-miles of travel, VM		345	veh-mi	
eak 15-min total travel time, TT15	-	2.2	veh-h	
apacity from ATS, CdATS		1700		
apacity from PTSF, CdPTSF		1700		
Pirectional Capacity		1700	ven/n veh/h	
rectional capacity		1 / U U	v C11/ 11	
Passing I	Lane Analysi	s		
otal length of analysis segment, Lt			3.0	mi
ength of two-lane highway upstream of	f the nassin	a lane		mi
ength of passing lane including taper	-	g rane,		mi
verage travel speed, ATSd (from above			49.9	mi/h
				111 / 11
Percent time-spent-following, PTSFd (1	from above)		31.5	
evel of service, LOSd (from above)			A	
Average Travel Spee	ed with Pas	sing Lan	e	
ownstream length of two-lane highway	within effe	ctive		
length of passing lane for average			-	mi
ength of two-lane highway downstream				
	of effectiv	<u>е</u>		
			I.d -	mi
length of the passing lane for ave	erage travel		Ld -	mi
length of the passing lane for ave dj. factor for the effect of passing	erage travel		Ld -	mi
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl</pre>	erage travel lane	speed,	Ld - -	mi
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing</pre>	erage travel lane g lane, ATSp	speed,	- -	
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing</pre>	erage travel lane g lane, ATSp	speed,	Ld - - - 0.0	mi %
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing</pre>	erage travel lane g lane, ATSp sing lane, P	speed, l FFSpl	_ _ 0.0	
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass Percent Time-Spent-Fol </pre>	erage travel lane g lane, ATSp sing lane, P Llowing with	speed, l FFSpl Passing	- 0.0 Lane	
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass Percent Time-Spent-Fol ownstream length of two-lane highway</pre>	erage travel lane g lane, ATSp sing lane, P Llowing with within effe	speed, l FFSpl Passing ctive le	- 0.0 Lane	9 9
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass Percent Time-Spent-Fol ownstream length of two-lane highway of passing lane for percent time-speed section of the section of</pre>	erage travel lane g lane, ATSp sing lane, P llowing with within effe spent-follow	speed, I FFSpl Passing ctive le	- 0.0 Lane ngth -	
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass Percent Time-Spent-Fol ownstream length of two-lane highway of passing lane for percent time-s ength of two-lane highway downstream</pre>	erage travel lane g lane, ATSp sing lane, P llowing with within effe spent-follow of effectiv	speed, l PFFSpl Passing ctive le ing, Lde e length	- 0.0 Lane ngth _ of	% 
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass </pre>	erage travel lane g lane, ATSp sing lane, P llowing with within effe spent-follow of effectiv -spent-follo	speed, l PFFSpl Passing ctive le ing, Lde e length	- 0.0 Lane ngth _ of	9 9
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass </pre>	erage travel lane g lane, ATSp sing lane, P Llowing with within effe spent-follow of effectiv -spent-follo lane	speed, l PFFSpl Passing ctive le ing, Lde e length	- 0.0 Lane ngth _ of	% mi
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass Percent Time-Spent-Fol ownstream length of two-lane highway of passing lane for percent time-sength of two-lane highway downstream the passing lane for percent time- dj. factor for the effect of passing on percent time-spent-following, for the spent-following, for the spent-following spent-f</pre>	erage travel lane g lane, ATSp sing lane, P Llowing with within effe spent-follow of effectiv -spent-follo lane	speed, l PFFSpl Passing ctive le ing, Lde e length	- 0.0 Lane ngth _ of	% 
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass Percent Time-Spent-Fol ownstream length of two-lane highway of passing lane for percent time-se ength of two-lane highway downstream the passing lane for percent time- dj. factor for the effect of passing on percent time-spent-following, for ercent time-spent-following</pre>	erage travel lane g lane, ATSp sing lane, P Llowing with within effe spent-follow of effectiv -spent-follo lane	speed, l PFFSpl Passing ctive le ing, Lde e length	- 0.0 Lane ngth _ of	% 
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass Percent Time-Spent-Fol ownstream length of two-lane highway of passing lane for percent time-sength of two-lane highway downstream the passing lane for percent time- dj. factor for the effect of passing on percent time-spent-following, for the passing lane for percent following, for</pre>	erage travel lane g lane, ATSp sing lane, P Llowing with within effe spent-follow of effectiv -spent-follo lane	speed, l PFFSpl Passing ctive le ing, Lde e length	- 0.0 Lane ngth _ of	% 
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass Percent Time-Spent-Fol ownstream length of two-lane highway of passing lane for percent time-se ength of two-lane highway downstream the passing lane for percent time- dj. factor for the effect of passing on percent time-spent-following, for ercent time-spent-following</pre>	erage travel lane g lane, ATSp sing lane, P llowing with within effe spent-follow of effectiv -spent-follo lane fpl	speed, l FFSpl Passing ctive le ing, Lde e length wing, Ld	- 0.0 Lane ngth - of - -	% mi mi %
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass </pre>	erage travel lane g lane, ATSp sing lane, P llowing with within effe spent-follow of effectiv -spent-follo lane fpl	speed, I FFSpl Passing ctive le ing, Lde e length wing, Ld	- 0.0 Lane ngth - of - -	۶ mi mi ۶
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass Percent Time-Spent-For ownstream length of two-lane highway of passing lane for percent time-se ength of two-lane highway downstream the passing lane for percent time- dj. factor for the effect of passing on percent time-spent-following, for ercent time-spent-following including passing lane, PTSFpl Level of Service and Other Perfor evel of service including passing lang</pre>	erage travel lane g lane, ATSp sing lane, P llowing with within effe spent-follow of effectiv -spent-follo lane fpl	speed, l FFSpl Passing ctive le ing, Lde e length wing, Ld	- 0.0 Lane ngth - of - - h Passing	۶ mi mi ۶
<pre>length of the passing lane for ave dj. factor for the effect of passing on average speed, fpl verage travel speed including passing ercent free flow speed including pass </pre>	erage travel lane g lane, ATSp sing lane, P llowing with within effe spent-follow of effectiv -spent-follo lane fpl	speed, I FFSpl Passing ctive le ing, Lde e length wing, Ld	- 0.0 Lane ngth - of - -	% mi mi %
Appendix F Page 72 of 99 Posted speed limit, Sp	55			
---	-------			
Percent of segment with occupied on-highway parking	0			
Pavement rating, P	3			
Flow rate in outside lane, vOL	143.8			
Effective width of outside lane, We	17.10			
Effective speed factor, St	4.79			
Bicycle LOS Score, BLOS	5.13			
Bicycle LOS	E			

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 5/1/2019 Analysis Time Period 2045 - AM No-Build Southbound Highway Erickson Ranch Road Westridge to Elk Creek From/To Jurisdiction Meade County Analysis Year 2045 Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width0.0ft% Trucks and buses5%Lane width12.0ft% Trucks crawling0.0%Segment length2.8miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 60 - % Access point density 8 00 /mi Up/down Analysis direction volume, Vd 115 veh/h Opposing direction volume, Vo 95 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.7 PCE for trucks, ET 1.8 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.966 Grade adj. factor (note-1) fg 1 00 0.962 1.00 149 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 123 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 mi/h Adjustment for no-passing zones, fnp 2.4 Average travel speed, ATSd 49.3 mi/h Percent Free Flow Speed, PFFS 91.6 00

Appendix F Page 74 of 99 Percent Time-	Spent-Follow	ing		
Direction PCE for trucks, ET	Analysis(d) 1.1	(	Opposing 1.1	(0)
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	-	c/h	119	pc/h
Base percent time-spent-following, (not	e-4) BPTSFd		00	
Adjustment for no-passing zones, fnp		52.6 45.0	20	
Percent time-spent-following, PTSFd		43.0	6	
Level of Service and O	ther Perform	ance Meas	sures	
Level of service, LOS		В		
Volume to capacity ratio, v/c		0.53		
Peak 15-min vehicle-miles of travel, V	MT15	101	veh-mi	
Peak-hour vehicle-miles of travel, VMT	60	322	veh-mi	
Peak 15-min total travel time, TT15		2.1	veh-h	
Capacity from ATS, CdATS		1700	veh/h	
Capacity from PTSF, CdPTSF		1700	veh/h weh/h	
Directional Capacity		1700	veh/h	
Passing L	ane Analysis			
Total length of analysis segment, Lt			2.8	mi
Length of two-lane highway upstream of	the passing	lane, Lu	u –	mi
Length of passing lane including taper	s, Lpl		-	mi
Average travel speed, ATSd (from above			49.3	mi/h
Percent time-spent-following, PTSFd (f	rom above)		45.0	
Level of service, LOSd (from above)			В	
Average Travel Spee	d with Pass	ing Lane		
Downstream length of two-lane highway	within effec	tive		
length of passing lane for average			_	mi
Length of two-lane highway downstream	of effective			
length of the passing lane for ave		speed, Lo	d – b	mi
Adj. factor for the effect of passing	lane			
on average speed, fpl			-	
Average travel speed including passing	-		-	0
Percent free flow speed including pass	ing lane, PF	FSPI	0.0	00
Percent Time-Spent-Fol	lowing with	Passing 1	Lane	
Downstream length of two-lane highway	within effec	tive lend	ath	
of passing lane for percent time-s			_	mi
Length of two-lane highway downstream		-	of	
the passing lane for percent time-	spent-follow	-	-	mi
Adj. factor for the effect of passing				
on percent time-spent-following, f	ρl		_	
Percent time-spent-following including passing lane, PTSFpl			-	010
Level of Service and Other Perfo	rmance Measu	res with	Passing	Lane
Torrol of correction including president las		7		
Level of service including passing lan Peak 15-min total travel time, TT15	e, rosbr	A _	veh-h	
reak is min cotar traver time, 1115			v C11-11	
Bicycle Lev	el of Servic	e		

Appendix F Page 75 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	143.8
Effective width of outside lane, We	17.10
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.81
Bicycle LOS	E

- 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.

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 5/1/2019 Analysis Time Period 2045 - AM No-Build Southbound Erickson Ranch Road Peaceful Pines to Westridge From/To Jurisdiction Meade County Analysis Year 2045 Description Southern Meade County Corridor Input Data\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width2.0ft% Trucks and buses3%Lane width12.0ft% Trucks crawling0.0%Segment length2.6miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 100 - % Access point density 5 00 Up/down /mi Analysis direction volume, Vd 240 veh/h Opposing direction volume, Vo 80 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.4 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.988 Grade adj. factor (note-1) fg 1 00 0.974 1.00 304 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 103 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 2.8 mi/h Adjustment for no-passing zones, fnp Average travel speed, ATSd 50.2 mi/h Percent Free Flow Speed, PFFS 89.4 00

Appendix F Page 77 of 99 Percent	Time-Spent-Follow	ving		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor,			Opposing 1.1 1.0 0.997	
Grade adjustment factor, (note-1) Directional flow rate, (note-2) vi Base percent time-spent-following Adjustment for no-passing zones, Percent time-spent-following, PTS	301 g ,(note-4) BPTSFd fnp	bc/h 30.3 46.4 65.1	1.00 100 %	pc/h
Level of Service	and Other Perform	nance Mea	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of trav Peak-hour vehicle-miles of travel Peak 15-min total travel time, TT Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	, VMT60 15	C 0.53 195 624 3.9 1700 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Pass	ing Lane Analysis	8		
Total length of analysis segment, Length of two-lane highway upstre Length of passing lane including Average travel speed, ATSd (from Percent time-spent-following, PTS Level of service, LOSd (from abov	am of the passing tapers, Lpl above) Fd (from above)	g lane, 1	2.6 Lu - 50.2 65.1 C	mi mi mi/h
Average Travel	Speed with Pass	sing Lane	Э	
Downstream length of two-lane hig length of passing lane for av Length of two-lane highway downst	erage travel spee	ed, Lde	_	mi
<pre>length of the passing lane fo Adj. factor for the effect of pas on average speed, fpl</pre>	er average travel sing lane	speed, 1	Ld – –	mi
Average travel speed including pa Percent free flow speed including			- 0.0	010
Percent Time-Spen	t-Following with	Passing	Lane	
Downstream length of two-lane hig of passing lane for percent t	hway within effectime-spent-followi	ctive ler Ing, Lde	 ngth _	
Length of two-lane highway downst the passing lane for percent Adj. factor for the effect of pas	time-spent-follow	-		mi
on percent time-spent-followi Percent time-spent-following including passing lane, PTSFp			-	80
Level of Service and Other	Performance Measu	ires with	n Passing	Lane
Level of service including passin Peak 15-min total travel time, TT	g lane, LOSpl	A -	veh-h	
Bicycl	e Level of Servio	ce		

Appendix F Page 78 of 99 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

- 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.

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.....Date Performed5/1/2019Analysis Time Period2045 - AM No-Build Southbound Highway Haines Avenue Virginia Ln to Elk Creek Rd From/To Meade County Jurisdiction Analysis Year 2045 Description Southern Meade County Corridor Input Data\_\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width0.0ft% Trucks and buses4%Lane width12.0ft% Trucks crawling0.0%Segment length4.4miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 40 - % Access point density 2 00 Up/down /mi Analysis direction volume, Vd 150 veh/h Opposing direction volume, Vo 65 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.6 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.977 Grade adj. factor (note-1) fg 1 00 0.965 1.00 Grade adj. factor, (note-1) fg 1.00 192 pc/h Directional flow rate,(note-2) vi 84 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 0.5 mi/h 50.3 Free-flow speed, FFSd mi/h Adjustment for no-passing zones, fnp 2.4\* mi/h Average travel speed, ATSd 45.8 mi/h Percent Free Flow Speed, PFFS 91.0 00

Direction       Analysis(d)       Opposing (o)         PCE for trucks, ET       1.1       1.1         PCE for trucks, ET       1.0         Beavy-vchicle adjustment factor, fHV       0.996       0.996         Grade adjustment factor, (note-1) fg       1.00       1.00         Directional flow rate, (note-2) vi       188 pc/h       82 pc/h         Base percent time-spent-following, (note-4) BFTSFd 20.4       %         Adjustment for no-passing zones, fnp       38.3         Percent time-spent-following, (Note-4) BFTSFd 20.4       %         Mulma to capacity ratio, v/c       0.53         Peak 15-min vehicle-miles of travel, VMT15       206       veh-mi         Peak 15-min total travel time, TT15       4.5       weh-h         Capacity from PTSF, CdPTSF       1700       weh/h         Directional Capacity	Appendix F Page 80 of 99Percent Time	e-Spent-Follow	ving		
Directional flow rate, (note-2) vi 188 pc/h 82 pc/h Base percent time-spent-following, (note-4) BPTSFd 20.4 % Adjustment for no-passing zones, fnp 38.3 Percent time-spent-following, PTSFd 47.1 % Level of Service and Other Performance Measures Level of service, LOS B Volume to capacity ratio, v/c 0.53 Peak-hour wehicle-miles of travel, VMT15 206 veh-mi Peak-hour wehicle-miles of travel, VMT5 4.5 veh-h Capacity from PTSF, CAPTSF 1700 veh/h Directional Capacity 100 veh/h Directional Capacity 100 veh/h Directional Capacity 100 veh/h Directional Capacity from PTSF, CAPTSF 1700 veh/h Directional Capacity 100 veh/h Dire	PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV	1.1 1.0 0.996	C	1.1 1.0 0.996	
Level of service, LOS       B         Volume to capacity ratio, v/c       0.53         Peak IS-min vehicle-miles of travel, VMT50       206       veh-mi         Peak-hour vehicle-miles of travel, VMT50       660       veh-mi         Peak IS-min total travel time, TT15       4.5       veh-h         Capacity from ATS, CdATS       1700       veh/h         Capacity from ATS, CdATS       1700       veh/h         Directional Capacity       1700       veh/h	Directional flow rate, (note-2) vi Base percent time-spent-following, (no Adjustment for no-passing zones, fnp	188 p pte-4) BPTSFd	20.4 38.3	82	pc/h
Volume to capacity ratio, v/c       0.53         Peak 15-min vehicle-miles of travel, VMT15       206       veh-mi         Peak-hour vehicle-miles of travel, VMT60       660       veh-mi         Peak 15-min total travel time, TT15       4.5       veh/h         Capacity from ATS, CdATS       1700       veh/h         Capacity from PTSF, CdPTSF       1700       veh/h         Directional Capacity       1700       veh/h	Level of Service and	Other Perform	nance Meas	sures	
Total length of analysis segment, Lt       4.4       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)       45.8       mi/h         Percent time-spent-following, PTSPd (from above)       47.1         Level of service, LOSd (from above)       B         Downstream length of two-lane highway within effective       -       mi         Length of passing lane for average travel speed, Ld       -       mi         Adj. factor for the effect of passing lane       -       -         Average travel speed including passing lane, ATSpl       -       -         Percent Time-Spent-Following with Passing Lane       -       mi         Downstream length of two-lane highway within effective length       -       -         na average speed, fpl       -       -       -         Average travel speed including passing lane, PFFSpl       0.0       %       -	Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, Peak-hour vehicle-miles of travel, VN Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF		0.53 206 660 4.5 1700 1700	veh-mi veh-h veh/h veh/h	
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) 45.8 mi/h Percent time-spent-following, PTSFd (from above) 47.1 Level of service, LOSd (from above) B 	Passing	Lane Analysis	s		
Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde - mi 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 % 	Length of two-lane highway upstream of Length of passing lane including tape Average travel speed, ATSd (from above Percent time-spent-following, PTSFd	ers, Lpl ve)	g lane, Lu	45.8 47.1	mi mi
Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde - mi 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, Ld - mi Adj. factor for the effect of passing lane on percent time-spent-following, Ld - mi 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	Average Travel Spe	eed with Pass	ing Lane		
<pre>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 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</pre>	Downstream length of two-lane highway length of passing lane for average	y within effec ge travel spee	ctive ed, Lde	_	mi
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	length of the passing lane for av Adj. factor for the effect of passing on average speed, fpl	verage travel g lane	speed, Lo	1 – –	mi
<pre>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</pre>				- 0.0	00
<pre>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</pre>	Percent Time-Spent-Fo	ollowing with	Passing I	Lane	
<pre>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</pre>	of passing lane for percent time-	-spent-followi	ng, Lde	_	mi
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	the passing lane for percent time Adj. factor for the effect of passing	e-spent-follow g lane	-	of -	mi
Level of service including passing lane, LOSpl A Peak 15-min total travel time, TT15 - veh-h	Percent time-spent-following	трт		_	20
Peak 15-min total travel time, TT15 - veh-h	Level of Service and Other Pers	formance Measu	res with	Passing	Lane
		ane, LOSpl	A _	veh-h	
Bicycle Level of Service	Bicycle Le	evel of Servic	:e		

Appendix F Page 81 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	187.5
Effective width of outside lane, We	15.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.99
Bicycle LOS	E

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.Inc.Date Performed5/1/2019Analysis Time Period2045 - AM No-Build Southbound Highway Haines Avenue Pennington Co to Virginia Ln From/To Meade County Jurisdiction 2045 Analysis Year Description Southern Meade County Corridor Input Data\_\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width2.0ft% Trucks and buses4%Lane width12.0ft% Trucks crawling0.0%Segment length1.7miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length mi % No-passing zones 27 %
% Access point density 5 /mi Up/down Analysis direction volume, Vd 430 veh/h Opposing direction volume, Vo 60 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.2 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.992 Grade adj. factor (note-1) fg 1 00 0.965 1.00 542 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 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 56.2 Free-flow speed, FFSd 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 00

Appendix F Page 83 of 99Percent Ti	.me-Spent-Follow	ing		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fE Grade adjustment factor, (note-1) fo			Opposing 1.1 1.0 0.996 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, ( Adjustment for no-passing zones, fr Percent time-spent-following, PTSFC	537 p (note-4) BPTSFd p	bc/h 47.0 20.5 65.0	75 %	pc/h
Level of Service ar	nd Other Perform	nance Mea	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel Peak-hour vehicle-miles of travel, Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	VMT60	C 0.53 228 731 4.7 1700 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Passir	ng Lane Analysis	8		
Total length of analysis segment, I Length of two-lane highway upstream Length of passing lane including ta Average travel speed, ATSd (from ab Percent time-spent-following, PTSFC Level of service, LOSd (from above)	n of the passing opers, Lpl pove) d (from above)	g lane, I	1.7 - - 48.9 65.0 C	mi mi mi/h
Average Travel S	speed with Pass	sing Lane	e	
Downstream length of two-lane highw length of passing lane for aver Length of two-lane highway downstre	yay within effect age travel spee	ctive ed, Lde	_	mi
<pre>length of the passing lane for Adj. factor for the effect of passi on average speed, fpl</pre>	average travel ng lane	speed, I	Ld – –	mi
Average travel speed including pass Percent free flow speed including p			- 0.0	00
Percent Time-Spent-	Following with	Passing	Lane	
Downstream length of two-lane highw of passing lane for percent tim	ne-spent-followi	.ng, Lde	_	mi
Length of two-lane highway downstree the passing lane for percent ti Adj. factor for the effect of passi on percent time-spent-following	me-spent-follow. ng lane	-		mi
Percent time-spent-following including passing lane, PTSFpl	, TDT		_	00
Level of Service and Other Pe	erformance Measu	res with	n Passing	Lane
Level of service including passing Peak 15-min total travel time, TT15	lane, LOSpl	A -	veh-h	
Bicycle	Level of Servic	ce		

Appendix F Page 84 of 99 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

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 5/1/2019 Analysis Time Period 2045 - PM No-Build Northbound Highway Erickson Ranch Road Westridge to Elk Creek From/To Jurisdiction Meade County Analysis Year 2045 Description Southern Meade County Corridor Input Data Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width0.0ft% Trucks and buses5%Lane width12.0ft% Trucks crawling0.0%Segment length2.8miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 56 % - % Access point density 6 /mi Up/down Analysis direction volume, Vd 90 veh/h Opposing direction volume, Vo 80 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.9 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.957 Grade adj. factor (note-1) fg 1 00 0.957 1.00 118 pc/h Grade adj. factor,(note-1) fg 1.00 Directional flow rate,(note-2) vi 104 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 mi/h Adjustment for no-passing zones, fnp 2.0 Average travel speed, ATSd 50.6 mi/h Percent Free Flow Speed, PFFS 93.1 00

Appendix F Page 86 of 99 Percent Time-Sp	ent-Following
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV	alysis(d)Opposing (o)1.11.11.01.00.9950.995
Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi Base percent time-spent-following, (note- Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	1.00 113 pc/h 4) BPTSFd 13.0 % 49.1 38.9 %
Level of Service and Otl	er Performance Measures
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VMT Peak-hour vehicle-miles of travel, VMT60 Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	
Passing La	e Analysis
Total length of analysis segment, Lt Length of two-lane highway upstream of the Length of passing lane including tapers, Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (from Level of service, LOSd (from above)	Lpl – mi 50.6 mi/h
Average Travel Speed	with Passing Lane
Downstream length of two-lane highway will length of passing lane for average Length of two-lane highway downstream of	ravel speed, Lde – mi
length of the passing lane for avera Adj. factor for the effect of passing la on average speed, fpl	ge travel speed, Ld – mi ne –
Average travel speed including passing Percent free flow speed including passing	
Percent Time-Spent-Follo	wing with Passing Lane
Downstream length of two-lane highway wi of passing lane for percent time-spe Length of two-lane highway downstream of	nt-following, Lde - mi
the passing lane for percent time-sp Adj. factor for the effect of passing la on percent time-spent-following, fp	ent-following, Ld - mi ne
Percent time-spent-following including passing lane, PTSFpl	<del>-</del> %
Level of Service and Other Perform	ance Measures with Passing Lane
Level of service including passing lane, Peak 15-min total travel time, TT15	LOSpl A - veh-h
Bicycle Leve:	of Service

Appendix F Page 87 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	112.5
Effective width of outside lane, We	18.60
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.42
Bicycle LOS	D

- 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.

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co....Date Performed5/1/2019Analysis Time Period2045 - PM No-Build NorthboundDate PerformedDate PeriodDate PerformedDate PeriodDate PerformedDate PeriodDate PerformedDate PeriodDate PerformedDate Pe Erickson Ranch Road Highway Peaceful Pines to Westridge From/To Jurisdiction Meade County Analysis Year 2045 Description Southern Meade County Corridor Input Data\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width2.0ft% Trucks and buses3%Lane width12.0ft% Trucks crawling0.0%Segment length2.6miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 100 - % Access point density 7 00 Up/down /mi Analysis direction volume, Vd 175 veh/h Opposing direction volume, Vo 65 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.5 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.985 Grade adj. factor (note-1) fg 1 00 0.974 1.00 222 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 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 1.8 mi/h Free-flow speed, FFSd 55.7 mi/h 2.4\* Adjustment for no-passing zones, fnp mi/h Average travel speed, ATSd 50.9 mi/h Percent Free Flow Speed, PFFS 91.4 00

Appendix F Page 89 of 99Percent Ti	ime-Spent-Follow	ving		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, ff			Opposing 1.1 1.0 0.997	
Grade adjustment factor, (note-1) for Directional flow rate, (note-2) vi Base percent time-spent-following, Adjustment for no-passing zones, fr Percent time-spent-following, PTSFo	219 p (note-4) BPTSFd 1p	48.1	1.00 81 %	pc/h
Level of Service ar	nd Other Perform	nance Mea	sures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel Peak-hour vehicle-miles of travel, Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	VМТ60 5	C 0.53 142 455 2.8 1700 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Passir	ng Lane Analysis	8		
Total length of analysis segment, I Length of two-lane highway upstream Length of passing lane including ta Average travel speed, ATSd (from ak Percent time-spent-following, PTSFo Level of service, LOSd (from above)	n of the passing apers, Lpl bove) d (from above)	g lane, L	2.6 u - 50.9 58.4 C	mi mi mi/h
Average Travel S	Speed with Pass	ing Lane		
Downstream length of two-lane highv length of passing lane for aver Length of two-lane highway downstre	way within effect rage travel spee	ctive ed, Lde	_	mi
<pre>length of the passing lane for Adj. factor for the effect of passi on average speed, fpl</pre>	average travel ing lane	speed, L	d – –	mi
Average travel speed including pass Percent free flow speed including p			- 0.0	00
Percent Time-Spent-	-Following with	Passing	Lane	
Downstream length of two-lane highv of passing lane for percent tim	way within effec ne-spent-followi	tive len	 gth _	mi
Length of two-lane highway downstree the passing lane for percent to Adj. factor for the effect of passion on percent time-spent-following	ime-spent-follow ing lane	-	of _ _	mi
Percent time-spent-following including passing lane, PTSFpl	<b>,</b> tht		-	00
Level of Service and Other Pe	erformance Measu	res with	Passing	Lane
Level of service including passing Peak 15-min total travel time, TT15	lane, LOSpl	A -	veh-h	
Bicycle	Level of Servic	:e		

Appendix F Page 90 of 99 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

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.InterpretDate Performed5/1/2019Analysis Time Period2045 - PM No-Build NorthboundVisit and ParcellaNorthbound Highway Haines Avenue Virginia Ln to Elk Creek Rd From/To Meade County Jurisdiction Analysis Year 2045 Description Southern Meade County Corridor Input Data\_\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width0.0ft% Trucks and buses5%Lane width12.0ft% Trucks crawling0.0%Segment length4.4miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length - mi % No-passing zones 28 - % Access point density 4 00 Up/down /mi Analysis direction volume, Vd 145 veh/h Opposing direction volume, Vo 65 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) PCE for trucks, ET 1.6 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.971 Grade adj. factor, (note-1) fg 1.00 0.957 1.00 187 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 85 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 45.3 mi/h Percent Free Flow Speed, PFFS 90.9 00

Appendix F Page 92 of 99 Percent Time-Spent-Follow	ving		
DirectionAnalysis(d)PCE for trucks, ET1.1PCE for RVs, ER1.0Heavy-vehicle adjustment factor, fHV0.995Grade adjustment factor, (note-1) fg1.00		Opposing 1.1 1.0 0.995 1.00	(0)
	bc/h 19.9 32.9 42.6	82 %	pc/h
Level of Service and Other Perform	nance Me	asures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VMT15 Peak-hour vehicle-miles of travel, VMT60 Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	B 0.53 199 638 4.4 1700 1700 1700		
Passing Lane Analysis	8		
Total length of analysis segment, Lt Length of two-lane highway upstream of the passing Length of passing lane including tapers, Lpl Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (from above) Level of service, LOSd (from above)	g lane,	4.4 Lu - 45.3 42.6 B	mi mi mi/h
Average Travel Speed with Pass	sing Lan	е	
Downstream length of two-lane highway within effect length of passing lane for average travel spec Length of two-lane highway downstream of effective	ctive ed, Lde		mi
<pre>length of the passing lane for average travel Adj. factor for the effect of passing lane     on average speed, fpl</pre>	speed,	Ld - -	mi
Average travel speed including passing lane, ATSp Percent free flow speed including passing lane, PB		- 0.0	010
Percent Time-Spent-Following with	Passing	Lane	
Downstream length of two-lane highway within effect of passing lane for percent time-spent-follows	ctive le	ngth	
Length of two-lane highway downstream of effective the passing lane for percent time-spent-follow	e length	of	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl Percent time-spent-following		_	
including passing lane, PTSFpl		_	00
Level of Service and Other Performance Measu	ures wit	h Passing I	Lane
Level of service including passing lane, LOSpl Peak 15-min total travel time, TT15	A _	veh-h	
Bicycle Level of Servio	ce		

Appendix F Page 93 of 99 Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	181.3
Effective width of outside lane, We	15.30
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.22
Bicycle LOS	E

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co.Inc.Date Performed5/1/2019Analysis Time Period2045 - PM No-Build Northbound Highway Haines Avenue Pennington Co to Virginia Ln From/To Meade County Jurisdiction 2045 Analysis Year Description Southern Meade County Corridor Input Data\_\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width0.0ft% Trucks and buses7%Lane width12.0ft% Trucks crawling0.0%Segment length4.4miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length mi % No-passing zones 23 %
% Access point density 6 /mi Up/down Analysis direction volume, Vd 400 veh/h Opposing direction volume, Vo 125 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.2 PCE for trucks, ET 1.7 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.986 Grade adj. factor (note-1) fg 1 00 0.953 1.00 507 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 164 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 46.7 mi/h Percent Free Flow Speed, PFFS 86.0 00

Appendix F Page 95 of 99 Percent	: Time-Spent-Follow:	ing		
Direction	Analysis(d)	Op	posing	(0)
PCE for trucks, ET	1.0		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor,			0.993	
Grade adjustment factor, (note-1)			1.00	
Directional flow rate, (note-2) v		c/h	157	pc/h
Base percent time-spent-following				
Adjustment for no-passing zones,		26.0		
Percent time-spent-following, PI	SFd	64.5 %		
Level of Service	e and Other Performa	ance Measu	res	
Level of service, LOS		С		
Volume to capacity ratio, v/c		0.53		
Peak 15-min vehicle-miles of tra			eh-mi	
	•		-	
Peak-hour vehicle-miles of trave	-		eh-mi	
Peak 15-min total travel time, I			eh-h	
Capacity from ATS, CdATS			eh/h	
Capacity from PTSF, CdPTSF			eh/h	
Directional Capacity		1700 v	eh/h	
Pas	sing Lane Analysis			
Total length of analysis segment	. т.+		4.4	mi
Length of two-lane highway upstr		lano Iu		mi
Length of passing lane including		Iane, Iu	_	mi
			- 46.7	mi/h
Average travel speed, ATSd (from				111 / 11
Percent time-spent-following, PI			64.5	
Level of service, LOSd (from abo	ove)		С	
Average Trave	el Speed with Pass:	ing Lane		
Downstream length of two-lane hi	chuay within offoct	tivo		
length of passing lane for a			_	mi
Length of two-lane highway downs		, Lue		111 -
length of the passing lane f		anood to		mi
		зреед, ца	—	mı
Adj. factor for the effect of pa	issing lane			
on average speed, fpl			-	
Average travel speed including p		70 - 1	-	0
Percent free flow speed includin	ig passing lane, PF	espi	0.0	00
Percent Time-Spe	ent-Following with B	Passing La	ne	
Downstream length of two-lane hi	ahway within offort	tive lengt	h	
of passing lane for percent		-		mi
Length of two-lane highway downs				111 ⊥
the passing lane for percent		-	_	mi
	—	шg, ца	_	mi
Adj. factor for the effect of pa	-		_	
on percent time-spent-follow	тпд <b>,</b> тЪт		-	
Percent time-spent-following including passing lane, PTSE	ומי		_	90
inclusing publing inne, libr	r -			U U
Level of Service and Other Performance Measures with Passing Lane				
Level of service including passi	ng lane, LOSpl	A		
Peak 15-min total travel time, I			eh-h	
D	lo Iovol of Comis	2		
Вісус	le Level of Service	=		

Appendix F Page 96 of 99 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

- 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

Phone: Fax: E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/co. Date Performed 5/1/2019 Analysis Time Period 2045 - PM No-Build Westbound Highway Elk Creek Road Erickson Ranch to Haines From/To Jurisdiction Meade County Analysis Year 2045 Description Southern Meade County Corridor Input Data\_\_\_\_\_ Highway class Class 2 Peak hour factor, PHF 0.80 Highway classClass2Peak hour factor, PHF0.80Shoulder width2.0ft% Trucks and buses7%Lane width12.0ft% Trucks crawling0.0%Segment length3.0miTruck crawl speed0.0mi/hrTerrain typeLevel% Recreational vehicles0% Terrain type Grade: Length mi % No-passing zones 7 %
- % Access point density 4 /mi Up/down Analysis direction volume, Vd 125 veh/h Opposing direction volume, Vo 85 veh/h Average Travel Speed Direction Analysis(d) Opposing (o) 1.7 PCE for trucks, ET 1.9 1.0 1.0 PCE for RVs, ER Heavy-vehicle adj. factor, (note-5) fHV 0.953 Grade adj. factor (note-1) fg 1 00 0.941 1.00 164 pc/h Grade adj. factor, (note-1) fg 1.00 Directional flow rate,(note-2) vi 113 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 0.7 mi/h Adjustment for no-passing zones, fnp Average travel speed, ATSd 53.6 mi/h Percent Free Flow Speed, PFFS 95.0 00

Direction     Analysis(d)     Opposing (o)       PCS for trucks, ET     1.1     1.1       PCS for trucks, ET     1.0     1.0       Reary-vehicle adjustment factor, HW     0.993     0.993       Grade adjustment factor, note-1) fg     1.00     1.00       Directional flow rate, note-2) vi     157 pc/h     107 pc/h       Base percent time-spent-following, note-4) BFTSFd 17.4 %     %       Percent time-spent-following, PTSFd     28.8 %       Level of Service and Other Performance Measures       Level of service, LOS     A       Volume to capacity ratio, v/c     0.33       Peak-hour vehicle-miles of travel, VMT15     117 veh-mi       Peak-hour vehicle-miles of travel, VMT05     373 veh-mi       Peak-hour vehicle-miles of travel, VMT05     1700 veh/h       Capacity from MTS, CdTSF     1700 veh/h       Capacity from MTS, CdTSF     1700 veh/h       Capacity from MTS, CdTSF     1700 veh/h       Directional capacity     1700 veh/h       Level of service, LOS (from above)     28.8       Maverage Travel Speed with Passing Lane     mi       Level of service, LOS (from above)     A       Average Travel Speed with Passing Lane     mi       Level of service including passing lane, ATSpl     -       Percent time-spent-following, Interabasing Lane     -	Appendix F Page 98 of 99 Percent Time	e-Spent-Follow	ing		
Directional flow rate, (note-2) vi 157 pc/h 107 pc/h Base percent time-spent-following, (note-4) BPTSFd 17.4 % Adjustment for no-passing zones, fnp 19.2 Percent time-spent-following, FTSFd 28.8 % Level of Service and Other Performance Measures Level of service, LOS A A Volume to capacity ratio, v/c 0.53 Peak 15-min vehicle-miles of travel, VMT15 117 veh-mi Peak 15-min vehicle-miles of travel, VMT0 375 veh-mi Peak 15-min total travel time, TT15 2.2 veh-h Capacity from ATS, CdFTSF 1700 veh/h Directional Capacity 1900 veh/h Directional Capacity 2000 veh/h Directional Capacity 1900 veh/h Directional Capacity 2000 veh/h Directional Capacity 2000 veh/h Directional Capacity 2000 veh/h Directional Solo 1000 28.8 Level of service, LOSG (from above) 28.8 Level of service for average travel speed, Ld - mi Adj. factor for the effect of passing lane on average speed, fpl - Percent Time-Spent-Following, Ld - mi Adj. Factor for the effect of passing lane. Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Ld - mi Adj. Factor for the effect of passing lane. Direction time-spent-following, fpl - Percent time-spent-following, fpl - Percent time-spent-following - Dincluding passing lane, PTSFpl - Direction time-spent	PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV	1.1 1.0 0.993		1.1 1.0 0.993	
Level of service, LOS       A         Volume to capacity ratio, v/c       0.53         Peak l5-min vehicle-miles of travel, VMT60       375       veh-mi         Peak-hour vehicle-miles of travel, VMT60       375       veh-mi         Peak-hour vehicle-miles of travel, VMT60       375       veh-mi         Peak-bour vehicle-miles of travel, VMT60       375       veh-mi         Peak-low vehicle-miles of travel, VMT60       2.2       veh-h         Capacity from ATS, CdATS       1700       veh/h         Capacity from ATS, CdATS       1700       veh/h         Directional Capacity       1700       veh/h         Directional Capacity       1700       veh/h         Length of analysis segment, Lt       3.0       mi         Length of passing lane including tapers, Lpl       -       mi         Average travel speed, ATSG (from above)       28.8       Mi/h         Percent time-spent-following, PTSF4 (from above)       28.8       Mi/h         Level of service, LOSd (from above)       28.8       Mi/h         Level of two-lane highway within effective       mi       Mi/h         Length of two passing lane for average travel speed, Ld       mi       Mi/h         Adj. factor for the effect of passing lane, ATSpl       - <t< td=""><td>Directional flow rate, (note-2) vi Base percent time-spent-following, (no Adjustment for no-passing zones, fnp</td><td>157 p</td><td>17.4 19.2</td><td>107 %</td><td>pc/h</td></t<>	Directional flow rate, (note-2) vi Base percent time-spent-following, (no Adjustment for no-passing zones, fnp	157 p	17.4 19.2	107 %	pc/h
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, VMT00       375       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	Level of Service and	Other Perform	nance Mea	sures	
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)       53.6       mi/h         Percent time-spent-following, PTSFd (from above)       28.8         Level of service, LOSd (from above)       A	Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, Peak-hour vehicle-miles of travel, VN Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF		0.53 117 375 2.2 1700 1700	veh-mi veh-h veh/h veh/h	
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) 53.6 mi/h Percent time-spent-following, PTSFd (from above) 26.8 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 Adj. factor for the effect of passing lane, ATSpl - Percent free flow speed including passing lane, ATSpl - Percent Time-Spent-Following with Passing Lane Downstream length of two-lane highway within effective length on average speed, fpl - Average travel 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, Ld - mi Adj. factor for the effect of passing lane Adj. factor for the effect of passing lane Downstream length of two-lane highway within effective length of 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, fpl - Percent time-spent-following, fpl - Percent time-spent-following including passing lane, PTSFpl - % Level of Service and Other Performance Measures with Passing Lane	Passing	Lane Analysis	5		
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, fpl - Percent time-spent-following fpl - Level of Service and Other Performance Measures with Passing Lane Level of service including passing lane, LOSpl A	Length of two-lane highway upstream of Length of passing lane including tape Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (	ers, Lpl ve)	g lane, I	u – – 53.6 28.8	mi mi
<pre>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, fpl - Percent time-spent-following including passing lane, PTSFpl - % Level of Service and Other Performance Measures with Passing Lane</pre>	Average Travel Spe	eed with Pass	ing Lane	9	
<pre>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, Id - mi Percent time-spent-following, fpl - 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</pre>	length of passing lane for average	ge travel spee	ed, Lde	-	mi
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	length of the passing lane for av Adj. factor for the effect of passing on average speed, fpl	verage travel g lane	speed, I	 -	mi
<pre>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</pre>	Percent free flow speed including pas	ssing lane, PF	FSpl	0.0	00
<pre>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</pre>	Percent Time-Spent-Fo	ollowing with	Passing	Lane	
<pre>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</pre>	of passing lane for percent time-	-spent-followi	ng, Lde	_	mi
including passing lane, PTSFpl - % Level of Service and Other Performance Measures with Passing Lane Level of service including passing lane, LOSpl A	the passing lane for percent time Adj. factor for the effect of passing on percent time-spent-following,	e-spent-follow g lane	-		mi
Level of service including passing lane, LOSpl A				-	00
	Level of Service and Other Perf	formance Measu	res with	Passing	Lane
Peak 15-min total travel time, 1115 - veh-h	Level of service including passing la Peak 15-min total travel time, TT15	ane, LOSpl	A _	veh-h	
Bicycle Level of Service	Bicycle Le	evel of Servic	e		

Appendix F Page 99 of 99 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	19.25
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	5.11
Bicycle LOS	E

- 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.