



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)
- 143rd 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 143rd 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.

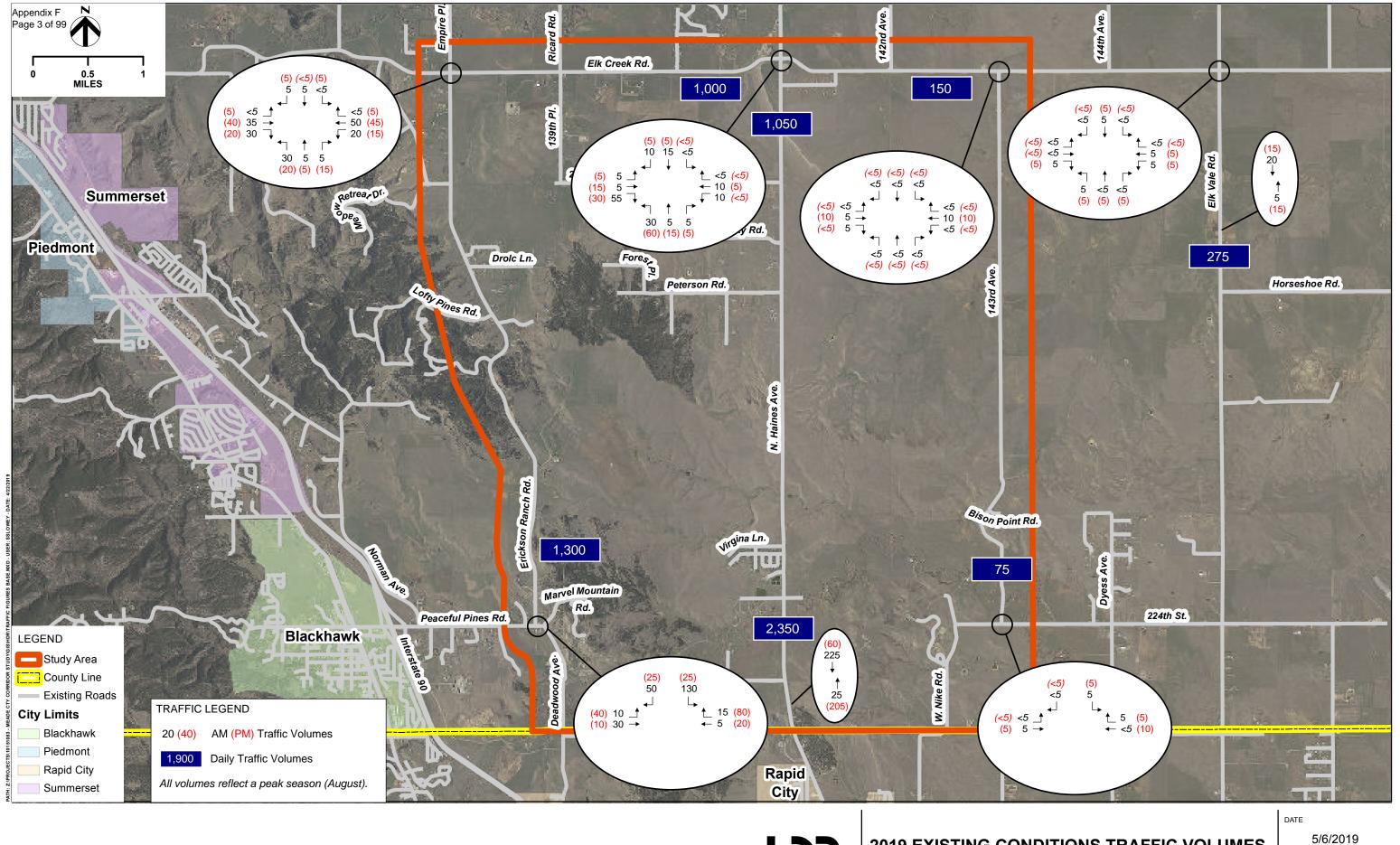
Traffic Volume Development

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.

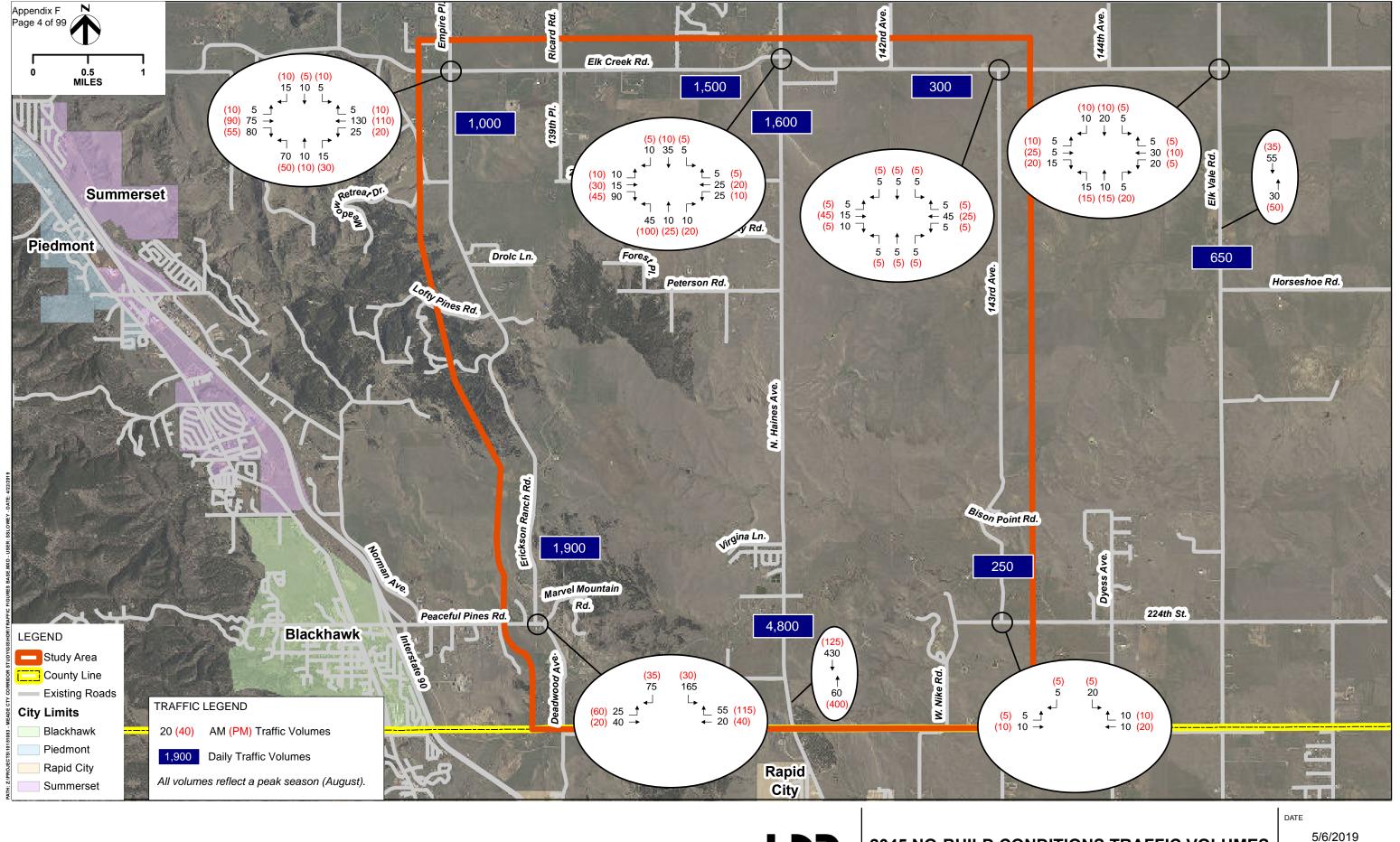


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2019 EXISTING CONDITIONS TRAFFIC VOLUMES PEAK SEASON

5/6/2019 FIGURE

SOUTHERN MEADE COUNTY CORRIDOR STUDY



F)S

2045 NO-BUILD CONDITIONS TRAFFIC VOLUMES PEAK SEASON

FIGURE

SOUTHERN MEADE COUNTY CORRIDOR STUDY



Traffic Operations Analysis Methodology

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

Table 1: Level of Service Thresholds

	Intersection Delay	per Vehicle (sec/veh)	Two-Lane Highways PTSF
LOS	Signalized Intersections	Two-Way Stop- Control*, All-Way Stop-Control, and Roundabouts	Percent Time-Spent Following (PTSF) Class II Highway
Α	≤ 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

Source: Transportation Research Board, HCM6.

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

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



These LOS thresholds will be used to identify areas of operational needs along the corridor. In future Build Conditions operational analysis memoranda, these thresholds will be used to guide the development of potential improvements and subsequent evaluation of concepts.

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

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

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**.

Table 2: Study Area Intersections – Existing Conditions

	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	Α	7.6	Α	
Elk Creek Road & 143 rd Avenue	TWSC* S approach	8.9	Α	8.9	Α	
Peaceful Pines Road/ Deadwood Avenue & Erickson Ranch Road	TWSC* N approach	9.8	А	9.3	А	
224 th Street & 143 rd Avenue	TWSC* N approach	8.6	Α	8.7	Α	

^{*} 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**.



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

	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	Α		
Elk Creek Road & 143 rd Avenue	TWSC* S approach	9.5	Α	9.5	Α		
Peaceful Pines Road/ Deadwood Avenue & Erickson Ranch Road	TWSC* N approach	11.1	А	9.7	А		
224 th Street & 143 rd Avenue	TWSC* N approach	8.8	А	8.7	А		

^{*} 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.



Table 4: Two-Lane Highway Segments – Existing Conditions

Study Two-Lane	Functional	Peak Hour	Peak	AM Peak	Period	PM Peak Period		
Highway Segment	Classification	Hour	Direction of Travel	PTSF ¹ (%)	LOS	PTSF ¹ (%)	LOS	
Erickson Ranch Rd	Rural	AM	SB	38.7	Α			
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	Α			
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	Α			
Erickson Ranch Rd – Haines Ave	Collector	PM	WB			22.0	Α	

¹ PTSF reflects analysis in the peak direction

Table 5: Two-Lane Highway Segments - 2045 No-Build Conditions

Study Two-Lane	Functional	Peak Hour	Peak	AM Peak	Period	PM Peak Period		
Highway Segment	Classification	Hour	Direction of Travel	PTSF ¹ (%)	LOS	PTSF ¹ (%)	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	Α			
Erickson Ranch Rd – Haines Ave	Collector	PM	WB			28.8	Α	

¹ 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.

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

Total	Description	Total Desig	n Year ADT ¹
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 ³	3
5	2 lanes in each direction plus center turn lane	2	16,000 to 30,000
6	3 lanes in each direction	> 20,000 ⁴	> 30,000 ⁴

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

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.

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.

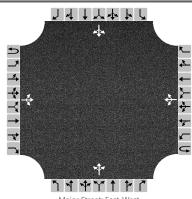
⁴ Medians should be used.

Appendix

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

Appendix A – Existing Conditions HCS7 Reports

Appendix F Page 1	Appendix F Page 12 of 99 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												



					Majo	r Street: Ea	st-West									
Vehicle Volumes and Adj	ustme	ents														
Approach	Eastbound				Westbound			Northbound				Southbound				
Movement	U L T R			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)		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				
Right Turn Channelized		N	lo		No			No				No				
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
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)	П	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 ₉₅ (veh)		0.0				0.0					0.0					
Control Delay (s/veh)		7.4				7.4					8.9				5.0	

Α

0.0

Level of Service, LOS

Approach LOS

Approach Delay (s/veh)

0.0

Α

5.0

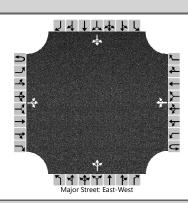
Α

Α

8.9

Α

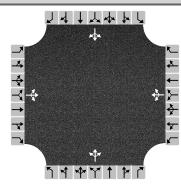
Appendix F Page 13	Appendix F Page 13 of 99 HCS7 Two-Way Stop-Control Report												
General Information		Site Information											
Analyst	HDR	Intersection	Elk Creek & Erickson Ra R										
Agency/Co.	HDR	Jurisdiction	Meade County										
Date Performed	4/24/2019	East/West Street	Elk Creek Road										
Analysis Year	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												



Vehicle Volumes and Ad	justme	nts														
Approach	T	Eastb	ound			Westl	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	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	
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 S	ervice													
Flow Rate, v (veh/h)		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 ₉₅ (veh)		0.0			Ì	0.1					0.2		Ì		0.1	
Control Delay (s/veh)		7.4				7.5					10.2				9.6	
Level of Service (LOS)		А				А					В				Α	
Approach Delay (s/veh)		0	.0	-		2.2			10.2				9.6			
Approach LOS											В		A			

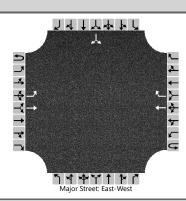
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Appendix F Page 14 or	Appendix F Page 14 of 99 HCS7 All-Way Stop Control Report												
General Information		Site Information											
Analyst	HDR	Intersection	Elk Creek & Haines										
Agency/Co.	HDR	Jurisdiction	Meade County										
Date Performed	4/24/2019	East/West Street	Elk Creek Road										
Analysis Year	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 Study	/											



Approach		Eastbound			Westbound			Northbound			Southbound		
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 T	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 Servic	:e											
Flow Rate, v (veh/h)	73			22			45			28			
Capacity	974			831			837			899			
95% Queue Length, Q ₉₅ (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	А			А			Α			А			
Approach Delay (s/veh)		7.0			7.5		7.5			7.1			
Approach LOS	A				А		А			А			
Intersection Delay, s/veh LOS	İ		7	.2			A						

Appendix F Page 15	Appendix F Page 15 of 99 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	AM - Existing Conditions	Peak Hour Factor	0.81										
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25										
Project Description	Southern Meade County Corridor Study												



Vehicle Volumes and Adjustments																
Approach		Eastb	ound			Westl	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	1		0	0	0		0	1	0
Configuration		L	Т				T	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						No										
Median Type Storage				Undi	vided	ded										
Critical and Follow-up He	Critical and Follow-up Headways															
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, and	l Leve	l of Se	ervice													
Flow Rate, v (veh/h)		12													222	
Capacity, c (veh/h)		1584													964	
v/c Ratio		0.01													0.23	
95% Queue Length, Q ₉₅ (veh)		0.0													0.9	
Control Delay (s/veh)		7.3													9.8	
Level of Service (LOS)		А													А	
Approach Delay (s/veh)		1.8										9.8				
Approach LOS													А			

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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

Enickeen Panch Rand 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 class Class 2

Peak hour factor, PHF 0.88

Shoulder width 2.0 ft % Trucks and buses 3 %

Lane width 12.0 ft % Trucks crawling 0.0 %

Segment length 5.3 mi Truck crawl speed 0.0 mi/hr

Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 79 - % Access point density 7 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

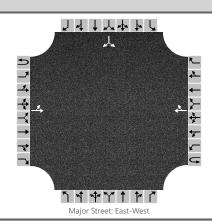
rereementaline	Spenc rollowi	-119		
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	Analysis(d) 1.1 1.0 0.997 1.00		pposing 1.1 1.0 0.997 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, (note Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	205 pc e-4) BPTSFd		28	pc/h
Level of Service and Ot	ther Performa	ance Measi	ures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VMT Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	50	954 7.1 1700 1700	veh-mi veh-mi veh-h veh/h veh/h	
Passing La	ane Analysis_			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including tapers Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (from above)	s, Lpl	lane, Lu	5.3 - - 38.1 60.1 C	mi mi mi mi/h
Average Travel Speed	d with Passi	ng Lane_		
Downstream length of two-lane highway the length of passing lane for average Length of two-lane highway downstream of two-lane highway highway two-lane highway two-lane highway two-lane highway two-lane highway two-lane highway two	travel speed		-	mi
length of the passing lane for aver Adj. factor for the effect of passing 2	rage travel s	speed, Ld	-	mi
on average speed, fpl] 7 m C -]		_	
Average travel speed including passing Percent free flow speed including pass:	_	Spl	0.0	90
Percent Time-Spent-Fold	lowing with F	Passing La	ane	
Downstream length of two-lane highway of passing lane for percent time-sp	pent-followin	ng, Lde	_	mi
Length of two-lane highway downstream of the passing lane for percent time-s Adj. factor for the effect of passing is	spent-followi		I _	mi
on percent time-spent-following, freerent time-spent-following	pl		-	
including passing lane, PTSFpl			_	90
Level of Service and Other Perform	rmance Measur	res with	Passing :	Lane
Level of service including passing land Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h	
Bicycle Leve	el of Service	<u> </u>		

Appendix F Page 18 of 99	
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 1	Appendix F Page 19 of 99 HCS7 Two-Way Stop-Control Report											
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 Study											



	Vehicle	Volumes	and Ad	iustments
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Approach		Eastbound Westbound						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)		0	5				10	5						5		0
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized		N	lo			Ν	lo			N	0			Ν	lo	
Median Type/Storage				Undi	vided	rided										

Critical and Follow-up Headways

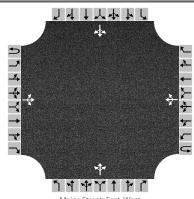
Base Critical Headway (sec)								
Critical Headway (sec)								
Base Follow-Up Headway (sec)								
Follow-Up Headway (sec)								

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)	0								7	
Capacity, c (veh/h)	1588								990	
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	Α								А	
Approach Delay (s/veh)	0	.0						8	.7	

Approach LOS

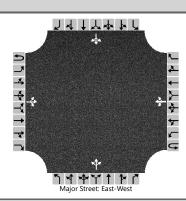
Appendix F Page 2	Appendix F Page 20 of 99 HCS7 Two-Way Stop-Control Report												
General Information		Site Information											
Analyst	HDR	Intersection	Elk Creek & 143rd Ave										
Agency/Co.	HDR	Jurisdiction	Meade County										
Date Performed	4/24/2019	East/West Street	Elk Creek Road										
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 Study												



Major	Street:	East-V	Vest
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					iviajo	iviajor street. East-west										
Vehicle Volumes and Ad	justme	ents														
Approach		Eastk	ound			Westl	oound		Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	T	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	
Right Turn Channelized		١	10		No				Ν	lo		No				
Median Type/Storage		Undiv														
Critical and Follow-up H	leadwa	ıys														
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, ar	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 ₉₅ (veh)		0.0		Ì		0.0			Ì		0.0					
Control Delay (s/veh)		7.4				7.4					8.9				5.0	
Level of Service, LOS		А				А					Α				А	
Approach Delay (s/veh)		C	0.0			0.0			8.9				5.0			
Approach LOS									A				А			

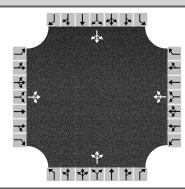
Appendix F Page 21 of 99 HCS7 Two-Way Stop-Control Report								
General Information		Site Information						
Analyst	HDR	Intersection	Elk Creek & Erickson Ra R					
Agency/Co.	HDR	Jurisdiction	Meade County					
Date Performed	4/24/2019	East/West Street	Elk Creek Road					
Analysis Year	2019	North/South 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 Study							



Vehicle Volumes and Adj	ustme	nts														
Approach		Eastb	ound			Westl	oound		Northbound				Southbound			
Movement	U	L	Т	R	U	U L T 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 (%)										()		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 S	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 ₉₅ (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				Α					Α				Α	
Approach Delay (s/veh)		0	.6			1	.8		9.6				9.3			
Approach LOS										,	4			,	4	

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Appendix F Page 22 of 99 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	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 Corridor Study							



Approach	T	Facthouse	<u> </u>	Ι,	Masthaun	Eastbound Westbound				Southbound		
		Eastbound	1		vvestbound	1	Northbound			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 ₉₅ (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	А			Α			Α			Α		
Approach Delay (s/veh)		7.3			7.4			7.9		7.0		
Approach LOS		Α			Α		A			А		
Intersection Delay, s/veh LOS			7	7.6			A					

Fax:

Phone:

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

Enighteen Panch Rand 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 class Class 2

Shoulder width

2.0

ft

% Trucks and buses

3

%

Lane width

12.0

ft

% Trucks crawling

0.0

%

Segment length

5.3

mi

Truck crawl speed

% Recreational vehicles

0

% 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

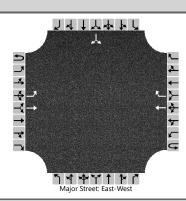
rereent rime	Spenc rollows	L119		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi	Analysis(d) 1.1 1.0 0.997 1.00 167 pc		pposing 1.1 1.0 0.997 1.00	(0) pc/h
Base percent time-spent-following, (not Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	e-4) BPTSFd	18.4 % 48.1 52.3 %		
Level of Service and O	ther Performa	ance Meası	ires	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, V Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	60	636 6.1 1700 1700	veh-mi veh-mi veh-h veh/h veh/h	
Passing L	ane Analysis_			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including taper Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (f Level of service, LOSd (from above)	s, Lpl)	lane, Lu	5.3 - - 36.2 52.3 B	mi mi mi mi/h
Average Travel Spee	d with Passi	ing Lane_		
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	travel speed		-	mi
length of the passing lane for ave Adj. factor for the effect of passing	rage travel s	speed, Ld		mi
on average speed, fpl Average travel speed including passing	lano ATChl		_	
Percent free flow speed including pass	_	FSpl	0.0	90
Percent Time-Spent-Fol	lowing with B	Passing La	ane	
Downstream length of two-lane highway of passing lane for percent time-s	pent-followir	ng, Lde	_	mi
Length of two-lane highway downstream the passing lane for percent time- Adj. factor for the effect of passing	spent-followi		_	mi
on percent time-spent-following, f Percent time-spent-following	pl		-	
including passing lane, PTSFpl			_	00
Level of Service and Other Perfo	rmance Measuı	res with 1	Passing :	Lane
Level of service including passing lan Peak 15-min total travel time, TT15	e, LOSpl	A 	veh-h	
Bicycle Lev	el of Service	e		

Appendix F Page 25 of 99 Posted speed limit, Sp	5.5
- · · · · · · · · · · · · · · · · · · ·	33
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.

Appendix F Page 26 of 99 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 Study							



Vehicle Volumes and Adj	ustme	nts														
Approach		Eastb	ound			Westl	oound		Northbound					South	bound	
Movement	U	L	Т	R	U	U L T 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		No														
Median Type Storage		Undivided														
Critical and Follow-up He	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, and	l Leve	l of Se	ervice													
Flow Rate, v (veh/h)		57													71	
Capacity, c (veh/h)		1435													905	
v/c Ratio		0.04													0.08	
95% Queue Length, Q ₉₅ (veh)		0.1													0.3	
Control Delay (s/veh)		7.6													9.3	
Level of Service (LOS)		А													А	
Approach Delay (s/veh)		6	.1										9.3			
Approach LOS														,	Ą	

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Phone:

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Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Agency/Co.

Date Performed 5/1/2019

Analysis Time Period 2019 - AM EC Eastbound 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 Shoulder width 0.0 ft % Trucks and buses 6 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 3.0 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 14 - % Access point density 6 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 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

reredic rime b	penc rorrowr			
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	nalysis(d) 1.1 1.0 0.994 1.00		posing 1.1 1.0 0.994 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, (note Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	:		55	pc/h
Level of Service and Ot	her Performan	nce Measu	res	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VM Peak-hour vehicle-miles of travel, VMT6 Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	T15 0	195 v 1.0 v 1700 v	reh-mi reh-mi reh-h reh/h reh/h reh/h	
rassing La	ne Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including tapers Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (fr Level of service, LOSd (from above)	, Lpl	lane, Lu	3.0 - - 50.9 22.1 A	mi mi mi mi/h
Average Travel Speed	with Passin	ng Lane		
Downstream length of two-lane highway w length of passing lane for average Length of two-lane highway downstream of	travel speed		-	mi
length of the passing lane for aver Adj. factor for the effect of passing l	age travel sp	peed, Ld	-	mi
on average speed, fpl			_	
Average travel speed including passing Percent free flow speed including passi	_	Spl	0.0	00
				v
Percent Time-Spent-Foll	owing with Pa	assing La	.ne	
Downstream length of two-lane highway w of passing lane for percent time-sp Length of two-lane highway downstream of	ent-following	g, Lde	_	mi
the passing lane for percent time-s Adj. factor for the effect of passing l	pent-following ane		_	mi
on percent time-spent-following, fp Percent time-spent-following	1		_	
including passing lane, PTSFpl			_	ଚ
Level of Service and Other Perfor	mance Measure	es with P	assing l	Lane
Level of service including passing lane Peak 15-min total travel time, TT15	, LOSpl	A v	reh-h	
Bicycle Leve	l of Service			

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

Fax:

Phone:

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

Enighteen Panch Road 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 class Class 2 Peak hour factor, PHF 0.71
Shoulder width 0.0 ft % Trucks and buses 5 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 2.8 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 60 - % Access point density 8 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 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

rercent rime	Spenc rollow	1119		
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV	Analysis(d) 1.1 1.0 0.995	C	0pposing 1.1 1.0 0.995	
Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi Base percent time-spent-following, (not Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	1.00 78 p e-4) BPTSFd			pc/h
Level of Service and O	ther Perform	ance Meas	sures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VI Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	60	154 1.1 1700 1700	veh-mi veh-mi veh-h veh/h veh/h	
rassing L	ane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including taper Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (f Level of service, LOSd (from above)	s, Lpl)	lane, Lu	2.8 - - 50.6 38.7 A	mi mi mi mi/h
Average Travel Spee	d with Pass	ing Lane_		
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	travel spee	d, Lde	-	mi
length of the passing lane for ave Adj. factor for the effect of passing		speed, Lo	l –	mi
on average speed, fpl			_	
Average travel speed including passing	_		-	0
Percent free flow speed including pass	ing lane, PF	FSpI	0.0	90
Percent Time-Spent-Fol	lowing with	Passing I	ane	
Downstream length of two-lane highway of passing lane for percent time-stangth of two-lane highway downstream	pent-followi	ng, Lde	_	mi
the passing lane for percent time-Adj. factor for the effect of passing	spent-follow lane		-	mi
on percent time-spent-following, f	pl		_	
including passing lane, PTSFpl			_	ે
Level of Service and Other Perfo	rmance Measu	res with	Passing	Lane
Level of service including passing landered peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h	
Bicycle Lev	el of Servic	e		

Appendix F Page 32 of 99 Posted speed limit, Sp	
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:

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

Enickeen Panch Road 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 class Class 2 Peak hour factor, PHF 0.88

Shoulder width 2.0 ft % Trucks and buses 3 %

Lane width 12.0 ft % Trucks crawling 0.0 %

Segment length 2.6 mi Truck crawl speed 0.0 mi/hr

Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 100 - % Access point density 5 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 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

Fax:

reredic rime b	penc rollow				
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	analysis(d) 1.1 1.0 0.997 1.00 205 p		Opposing 1.1 1.0 0.997 1.00		
Directional flow rate, (note-2) vi Base percent time-spent-following, (note Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	-			pc/h	
Level of Service and Other Performance Measures					
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VM Peak-hour vehicle-miles of travel, VMT6 Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	50	468 2.6 1700 1700	veh-mi veh-mi veh-h veh/h veh/h		
Passing Lane Analysis					
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including tapers Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (fr Level of service, LOSd (from above)	s, Lpl	lane, Lu	2.6 - 51.6 60.4	mi mi mi mi/h	
Average Travel Speed	l with Pass	ing Lane_			
Downstream length of two-lane highway we length of passing lane for average Length of two-lane highway downstream of	travel spee	d, Lde	_	mi	
length of the passing lane for aver Adj. factor for the effect of passing l	age travel		d –	mi	
on average speed, fpl	1 7 M C - 1		-		
Average travel speed including passing Percent free flow speed including passi			0.0	90	
Percent Time-Spent-Following with Passing Lane					
Downstream length of two-lane highway w	ent-followi	ng, Lde	_	mi	
Length of two-lane highway downstream of the passing lane for percent time-s Adj. factor for the effect of passing l	spent-follow		of -	mi	
on percent time-spent-following, fr Percent time-spent-following			-		
including passing lane, PTSFpl			-	90	
Level of Service and Other Performance Measures with Passing Lane					
Level of service including passing lane Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h		
Bicycle Level of Service					

Appendix F Page 35 of 99 Posted speed limit, Sp	==
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.

Fax:

Phone:

E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Date Performed 5/1/2019
Analysis Time Period 2019 - 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 class Class 2

Shoulder width 0.0 ft % Trucks and buses 4 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 4.4 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Highway class Class 2 Peak hour factor, PHF 0.90 Terrain type Grade: Length - mi % No-passing zones 40 - % Access point density 2 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 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

rercent rime	Spenc rollow	1119		
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	Analysis(d) 1.1 1.0 0.996 1.00		Opposing 1.1 1.0 0.996 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, (not Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	89 p e-4) BPTSFd		45 %	pc/h
Level of Service and O	ther Perform	ance Mea	sures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, V Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	60	A 0.53 98 352 2.1 1700 1700	•	
Passing L	ane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including taper Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (f Level of service, LOSd (from above)	s, Lpl)	lane, I	4.4 - - 46.8 36.4 A	mi mi mi mi/h
Average Travel Spee	d with Pass	ing Lane	<u>}</u>	
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	travel spee	d, Lde	-	mi
length of the passing lane for ave Adj. factor for the effect of passing	rage travel		ud -	mi
on average speed, fpl			_	
Average travel speed including passing Percent free flow speed including pass	_		0.0	୬
Percent Time-Spent-Fol	_	_	T.ano	
	-	_		
Downstream length of two-lane highway of passing lane for percent time-s Length of two-lane highway downstream	pent-followi	ng, Lde	_	mi
the passing lane for percent time-Adj. factor for the effect of passing	spent-follow lane		-	mi
on percent time-spent-following, f Percent time-spent-following	pΤ		-	
including passing lane, PTSFpl			-	00
Level of Service and Other Perfo	rmance Measu	res with	Passing	Lane
Level of service including passing lan Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h	
Bicycle Lev	el of Servic	e		

Appendix F Page 38 of 99 Posted speed limit, Sp	
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 Date Performed 5/1/2019
Analysis Time Period 2019 - 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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 2.0 ft % Trucks and buses 4 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 1.7 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 27 - % Access point density 5 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 Adj. for lane and shoulder width, (note-3) fLS 2.6 mi/h Adj. for access point density, (note-3) fA 1.3 mi/h Free-flow speed, FFSd 56.2 mi/h Adjustment for no-passing zones, fnp 2.4* mi/h Average travel speed, ATSd 51.3 mi/h Percent Free Flow Speed, PFFS 91.3

Percent rime	-spenc-rollow	1119		
Direction	Analysis(d)		Opposing	(0)
PCE for trucks, ET	1.1		1.1	(0)
PCE for RVs, ER	1.0		1.0	
				_
Heavy-vehicle adjustment factor, fHV	0.996		0.996	0
Grade adjustment factor, (note-1) fg	1.00	/1	1.00	/1
Directional flow rate, (note-2) vi	282 p		31	pc/h
Base percent time-spent-following, (no	te-4) BPTSFd		%	
Adjustment for no-passing zones, fnp		24.9		
Percent time-spent-following, PTSFd		51.2	%	
Level of Service and	Other Perform	ance Me	asures	
Level of service, LOS		В		
Volume to capacity ratio, v/c		0.53		
	7Mm1 5	120	veh-mi	
Peak 15-min vehicle-miles of travel,			_	
Peak-hour vehicle-miles of travel, VM	1'60	383	veh-mi	
Peak 15-min total travel time, TT15		2.3	veh-h	
Capacity from ATS, CdATS		1700	veh/h	
Capacity from PTSF, CdPTSF		1700	veh/h	
Directional Capacity		1700	veh/h	
Passing	Lane Analysis			
Total length of analysis segment, Lt			1.7	mi
	f the pagetine	1000		mi
Length of two-lane highway upstream o		lane,		
Length of passing lane including tape	_		_	mi
Average travel speed, ATSd (from abov			51.3	mi/h
Percent time-spent-following, PTSFd (from above)		51.2	
Level of service, LOSd (from above)			В	
Average Travel Spe	ed with Pass	ing Lan	e	
Downstream length of two-lane highway	within effec	+ i 170		
length of passing lane for averag			_	mi
	_			1111.1
Length of two-lane highway downstream			- 1	
length of the passing lane for av Adj. factor for the effect of passing ${\cal A}$	_	speed,	La -	mi
on average speed, fpl			-	
Average travel speed including passin	g lane, ATSpl		_	
Percent free flow speed including pas	sing lane, PF	'FSpl	0.0	90
Percent Time-Spent-Fo	llowing with	Passing	Lane	
Downstroam longth of two long high	within offer	+ 1 7 -	na+h	
Downstream length of two-lane highway			_	
of passing lane for percent time-				mi
Length of two-lane highway downstream		_		
the passing lane for percent time	_	ung, Ld	. -	mi
Adj. factor for the effect of passing				
on percent time-spent-following,	fpl		_	
Percent time-spent-following				
including passing lane, PTSFpl			_	8
Level of Service and Other Perf	ormance Measu	res wit	h Passing	Lane
Tanal of annia in 1 dia anni	T O C - 1	70		
Level of service including passing la	ne, LUSPI	A		
Peak 15-min total travel time, TT15		_	veh-h	
Riavala Ta	vel of Servic			
broycle Le	AST OT PETATO			

Appendix F Page 41 of 99 Posted speed limit, Sp	
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

Fax:

Phone:

E-Mail:

Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR 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 class Class 2 Peak hour factor, PHF 0.79

Shoulder width 0.0 ft % Trucks and buses 5 %

Lane width 12.0 ft % Trucks crawling 0.0 %

Segment length 2.8 mi Truck crawl speed 0.0 mi/hr

Terrain type Level % Recreational vehicles 0 % 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 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

rerearching by	penc rollowin			
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	nalysis(d) 1.1 1.0 0.995 1.00		posing (1.1 1.0 0.995 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, (note- Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	4		51	pc/h
Level of Service and Ot	her Performan	ice Measui	res	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VMTPeak-hour vehicle-miles of travel, VMTPeak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	T15 3 0 1 0 1 1 1	0.53 85 ve .12 ve 0.7 ve .700 ve	eh-mi eh-mi eh-h eh/h eh/h	
Passing La	ne Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including tapers Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (from above)	, Lpl	ane, Lu	2.8 - - 51.5 30.3 A	mi mi mi mi/h
Average Travel Speed	with Passin	ng Lane		
Downstream length of two-lane highway was length of passing lane for average Length of two-lane highway downstream of	travel speed,		-	mi
length of the passing lane for average. Adj. factor for the effect of passing land the state of		peed, Ld	-	mi
on average speed, fpl Average travel speed including passing	lane. ATSnl		_	
Percent free flow speed including passing	_	Spl	0.0	%
Percent Time-Spent-Foll	owing with Pa	ssing Lar	ne	
Downstream length of two-lane highway was of passing lane for percent time-species to two-lane highway downstream of	ent-following	, Lde	n -	mi
the passing lane for percent time-space. Adj. factor for the effect of passing land	pent-followin ane		_	mi
on percent time-spent-following, fp. Percent time-spent-following including passing lane, PTSFpl	L		_	00
				·
Level of Service and Other Perform	mance Measure	es with Pa	assing L	ane
Level of service including passing lane Peak 15-min total travel time, TT15	, LOSpl A		eh−h	
Bicycle Leve.	l of Service			

Appendix F Page 44 of 99 Posted speed limit, Sp	
Posted spëed 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:

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

Enickeen Panch Road 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 class Class 2 Peak hour factor, PHF 0.72
Shoulder width 2.0 ft % Trucks and buses 3 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 2.6 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 100 - % Access point density 7 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 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

Fax:

rmance Measures	with Passi	ng Lane
		_
	_	6
⊬	_	୧
lane	та -	mi
of effective len	gth of	mi mi
	_	
lane, ATSpl ing lane, PFFSpl	-0.0	%
lane	, - -	
of effective		mi mi
within effective		:
d with Passing	Lane	
rom above)	51. 52. B	
s, Lpl	-	mi mi 4 mi/h
	2.6	
170	0 veh/h	
60 312	veh-m	i
ther Performance	Measures_	
e-4) BPTSFd 18. 48.	4 % 9	pc/h
0.997 1.00		997
1.1	1.	1
	Analysis (d) 1.1 1.0 0.997 1.00 167 pc/h e-4) BPTSFd 18. 48. 52. ther Performance B 0.5 MT15 60 312 2.1 170 170 ane Analysis the passing lans, Lpl) rom above) d with Passing within effective travel speed, I of effective rage travel speed I ane lane, ATSpl ing lane, PFFSpl lowing with Pass within effective rage travel speed I sp	1.1 1.0 0.997 1.00 167 pc/h e-4) BPTSFd 18.4 48.9 52.9 ther Performance Measures B 0.53 MT15 108 veh-m 2.1 veh-h 1700 veh/h 1700 veh/h 1700 veh/h 1700 veh/h 2.1 veh-h 2.1 veh-h 51.00 0 veh/h 1700

Appendix F Page 47 of 99 Posted speed limit, Sp	
Posted spëed 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 Date Performed 5/1/2019
Analysis Time Period 2019 - 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 class Class 2 reak nour ractor, r...

Shoulder width 0.0 ft % Trucks and buses 5 %

Lane width 12.0 ft % Trucks crawling 0.0 %

Segment length 4.4 mi Truck crawl speed 0.0 mi/hr

Terrain type Level % Recreational vehicles 0 % Highway class Class 2 Peak hour factor, PHF 0.93 Terrain type Grade: Length - mi % No-passing zones 28 - % Access point density 4 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 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

reredic rime	Spenc rollow	villg		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	1.00		Opposing 1.1 1.0 0.995 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, (no Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	-	33.0	43 %	pc/h
Level of Service and	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, VM Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	F60	A 0.53 95 352 2.0 1700 1700	veh-mi veh-h veh/h veh/h veh/h	
Passing	Lane Analysis	5		
Total length of analysis segment, Lt Length of two-lane highway upstream o Length of passing lane including tape Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (Level of service, LOSd (from above)	rs, Lpl e)	g lane, L	4.4 u – 46.4 32.1 A	mi mi mi mi/h
Average Travel Spe	ed with Pass	sing Lane		
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	e travel spee	ed, Lde	-	mi
length of the passing lane for available. Adj. factor for the effect of passing		speed, L	d -	mi
on average speed, fpl Average travel speed including passing	r lane. ATSnl	1	_	
Percent free flow speed including pas			0.0	%
Percent Time-Spent-Fo	llowing with	Passing	Lane	
Downstream length of two-lane highway of passing lane for percent time-			gth -	
Length of two-lane highway downstream			of	ш
the passing lane for percent time Adj. factor for the effect of passing	lane	wing, Ld	-	mi
on percent time-spent-following, Percent time-spent-following	tp1		_	
including passing lane, PTSFpl			_	ଡ଼
Level of Service and Other Perf	ormance Measu	res with	Passing	Lane
Level of service including passing lampeak 15-min total travel time, TT15	ne, LOSpl	A -	veh-h	
Bicycle Le	vel of Servi	ce		

Appendix F Page 50 of 99 Posted speed limit, Sp	
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

Fax:

Phone:

E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Date Performed 5/1/2019
Analysis Time Period 2019 - 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 class Class 2 Peak hour factor, PHF 0.67
Shoulder width 0.0 ft % Trucks and buses 7 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 4.4 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 23 - % Access point density 6 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 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

rerearching	Spenc rollow	71119		
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi	Analysis(d) 1.1 1.0 0.993 1.00 308		0pposing 1.1 1.0 0.993 1.00	
Base percent time-spent-following, (no Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	te-4) BPTSFd	30.9 % 28.5 53.0 %		
Level of Service and	Other Perform	nance Meas	sures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, Y Peak-hour vehicle-miles of travel, VM Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity		902 6.9 1700 1700	veh-mi veh-mi veh-h veh/h veh/h	
Passing	Lane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including tape. Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (from above)	rs, Lpl e)	g lane, Lu	4.4 - - 48.7 53.0 B	mi mi mi mi/h
Average Travel Spe	ed with Pass	sing Lane_		
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	e travel spee	ed, Lde	_	mi
length of the passing lane for ave Adj. factor for the effect of passing	erage travel		d –	mi
on average speed, fpl	r lana Amenl		_	
Average travel speed including passing Percent free flow speed including passing			0.0	9
Percent Time-Spent-Fo	llowing with	Passing I	ane	
Downstream length of two-lane highway of passing lane for percent time-Length of two-lane highway downstream	spent-followi	ng, Lde	_	mi
the passing lane for percent time. Adj. factor for the effect of passing	-spent-follow lane		_	mi
on percent time-spent-following, Percent time-spent-following including passing lane, PTSFpl	fpl		-	90
Level of Service and Other Perf	ormance Measu	ires with	Passing	Lane
Level of service including passing last Peak 15-min total travel time, TT15		A	veh-h	
Bicycle Le	vel of Servic	e		

Appendix F Page 53 of 99 Posted speed limit, Sp	55
rosted 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

Fax:

Phone:

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 class Class 2 Peak hour factor, PHF 0.78

Shoulder width 2.0 ft % Trucks and buses 7 %

Lane width 12.0 ft % Trucks crawling 0.0 %

Segment length 3.0 mi Truck crawl speed 0.0 mi/hr

Terrain type Level % Recreational vehicles 0 % 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 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

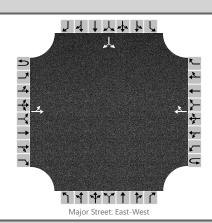
	-spent-rollow	1119		
Direction	Analysis(d)		Opposing	(0)
PCE for trucks, ET	1.1		1.1	(0)
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV			0.993	2
Grade adjustment factor, (note-1) fg	1.00		1.00)
		. a / b		ma/h
Directional flow rate, (note-2) vi		oc/h	65	pc/h
Base percent time-spent-following, (no	te-4) BPTSFQ		90	
Adjustment for no-passing zones, fnp		17.9	0	
Percent time-spent-following, PTSFd		22.0	%	
Level of Service and	Other Perform	nance Me	asures	
Level of service, LOS		A		
Volume to capacity ratio, v/c		0.53		
Peak 15-min vehicle-miles of travel,	VMT15	72	veh-mi	
Peak-hour vehicle-miles of travel, VM		225	veh-mi	
Peak 15-min total travel time, TT15	100	1.3	veh-h	
		1.3	ven-n veh/h	
Capacity from DTSF CdDTSF		1700	ven/n veh/h	
Capacity from PTSF, CdPTSF		1700		
Directional Capacity		1/00	veh/h	
Passing	Lane Analysis			
Total length of analysis segment, Lt			3.0	mi
Length of two-lane highway upstream o	f the nassino	r lane.		mi
Length of passing lane including tape		1 22110	_	mi
Average travel speed, ATSd (from abov	_		54.5	mi/h
Percent time-spent-following, PTSFd (22.0	1111 / 11
Level of service, LOSd (from above)	IIOM above)		22.0 A	
hever or service, host (from above)			A	
Average Travel Spe	ed with Pass	ing Lan	e	
Downstream length of two-lane highway	within effec	tive		
length of passing lane for averag			_	mi
Length of two-lane highway downstream	_			
length of the passing lane for av			I.d -	mi
Adj. factor for the effect of passing	_	speca,	14	1111
on average speed, fpl	Tune		_	
Average travel speed including passin	a lano ATSnl		_	
Percent free flow speed including passing			0.0	90
referre free from speed including pas	sing rane, ir	горт	0.0	O
Percent Time-Spent-Fo	llowing with	Passing	Lane	
Downstream length of two-lane highway	within effec	tive le	ngth	
of passing lane for percent time-			_	mi
Length of two-lane highway downstream				
the passing lane for percent time		_		mi
Adj. factor for the effect of passing	_	,		<u></u>
on percent time-spent-following,			_	
Percent time-spent-following,	-1-			
including passing lane, PTSFpl			_	9
Level of Service and Other Perf	ormance Measu	res wit	h Passing	Lane
			_	
Level of service including passing la	ne, LOSpl	A		
Peak 15-min total travel time, TT15		_	veh-h	
D'	1 of G- · '			
Bicycle Le	vel of Servic	:e		

Appendix F Page 56 of 99 Posted speed limit, Sp	5.5
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

Appendix F Page 58 of 99 HCS7 Two-Way Stop-Control Report												
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	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 Study											



Vehicle Volumes a	and Adjustments
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Approach		Eastb	ound			Westl	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		N	lo			Ν	lo			N	lo			Ν	lo		
Median Type/Storage				Undi	vided												

Critical and Follow-up Headways

Flow Rate, v (veh/h)

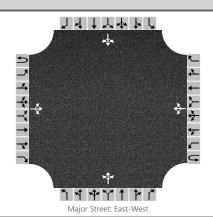
Approach LOS

Base Critical Headway (sec)								
Critical Headway (sec)								
Base Follow-Up Headway (sec)								
Follow-Up Headway (sec)								

Delay, Queue Length, and Level of Service

Capacity, c (veh/h)	1584								981	
v/c Ratio	0.00								0.03	
95% Queue Length, Q ₉₅ (veh)	0.0								0.1	
Control Delay (s/veh)	7.3								8.8	
Level of Service, LOS	А								А	
Approach Delay (s/veh)	2	.4						8	.8	

Appendix F Page 59 of 99 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	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 Study											



V	ehicle	Volumes	and A	diustments	
•		voiuiles	allu A	ulustillelits	

Approach		Eastb	ound			Westl	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	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			
Right Turn Channelized		Ν	lo			Ν	lo			N	0			Ν	lo		
Median Type/Storage				Undi	vided								•				

Critical and Follow-up Headways

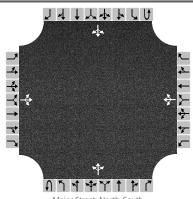
Base Critical Headway (sec)								
Critical Headway (sec)								
Base Follow-Up Headway (sec)								
Follow-Up Headway (sec)								

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)	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 ₉₅ (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	Α			А				А			А	
Approach Delay (s/veh)	1.	.2		0.	.7		9	.4		9.	.5	

Approach LOS

Appendix F Page 60 of 99 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											



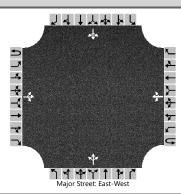
Major Street: I	North-South
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Vehicle Volumes and Adj	ustme	nts														
Approach		Eastb	ound		Π	Westl	bound		Ι	North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume, V (veh/h)		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		Ν	lo			Ν	10			Ν	lo			Ν	lo	
Median Type/Storage		Undivided														
Critical and Follow-up Ho	eadwa	adways														
Base Critical Headway (sec)																
															=	

Circical and Follow up in	aavv	.y.								
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	•						

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 ₉₅ (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		Α			А		А			А		
Approach Delay (s/veh)	9.	3		9	.9		4	.6		1	.2	
Approach LOS	А			,	4							

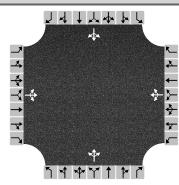
Appendix F Page 61 of 99 HCS7 Two-Way Stop-Control Report											
General Information Site Information											
Analyst	HDR	Intersection	Elk Creek & Erickson Ra R								
Agency/Co.	HDR	Jurisdiction	Meade County								
Date Performed	4/24/2019	East/West Street	Elk Creek Road								
Analysis Year	2045	North/South Street	Erickson Ranch Road								
Time Analyzed	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 Study										



Vehicle Volumes and Ad	justme	nts														
Approach		Eastb	ound			Westl	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	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	
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 S	ervice													
Flow Rate, v (veh/h)	T	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 ₉₅ (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)		А			A					В				В		
Approach Delay (s/veh)		0.3 1.4								13	3.2			1	1.0	
Approach LOS											В				В	

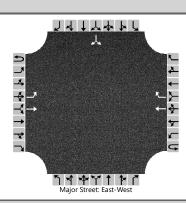
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Appendix F Page 62 of 99 HCS7 All-Way Stop Control Report										
General Information		Site Information								
Analyst	HDR	Intersection	Elk Creek & Haines							
Agency/Co.	HDR	Jurisdiction	Meade County							
Date Performed	4/24/2019	East/West 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	AM - 2045 No-Build Cond.									
Project Description	Southern Meade County Corridor Study									



Approach		Eastbound	l	,	Westbound	d	۱ ا	Northboun	d	Southbound			
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 S	ervice T	ime											
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 ₉₅ (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			Α			А			
Approach Delay (s/veh)		7.7 8.0				8.1		7.8					
Approach LOS		A A			A A								
Intersection Delay, s/veh LOS		7.9				A							

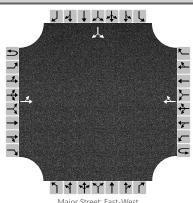
Appendix F Page 63 of 99 HCS7 Two-Way Stop-Control Report											
General Information Site Information											
Analyst	HDR	Intersection	Peaceful P & Erickson RaR								
Agency/Co.	HDR	Jurisdiction	Meade County								
Date Performed	4/24/2019	East/West Street	Peaceful Pines Road								
Analysis 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 Study										



Vehicle Volumes and Adj	ustme	nts														
Approach		Eastb	ound			Westl	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	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		Undivided														
Critical and Follow-up He	eadwa	dways														
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, and	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		31													300	
Capacity, c (veh/h)		1495													892	
v/c Ratio		0.02													0.34	
95% Queue Length, Q ₉₅ (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							11.1					1.1		
Approach LOS									В					В		

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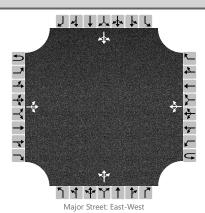
Appendix F Page 64 of 99 HCS7 Two-Way Stop-Control Report											
General Information Site Information											
Analyst	HDR	Intersection	224th St & 143rd Ave								
Agency/Co.	HDR	Jurisdiction	Meade County								
Date Performed	4/24/2019	East/West Street	224th Street								
Analysis Year	2045	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 Study											



						r Street: Ea	ast-West										
Vehicle Volumes and Ad	justme	ents															
Approach		Eastk	oound			West	oound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority	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		No No								Ν	lo			Ν	lo		
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)		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													А		
Approach Delay (s/veh)		2	5											8	.7		

Approach LOS

Appendix F Page 6	HCS7 Two-Way Stop	o-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	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 Study		



Vehicle Volumes and Adj	ustments

Accessed	Г	Feetle			Г	\A/1			Ι	NI	l			C . II.	la a a al	
Approach		Eastr	ound			vvesti	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	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 (%)										()		0			
Right Turn Channelized		Ν	10			Ν	lo			N	lo			Ν	lo	
Median Type/Storage		Undivided														
Critical and Follow-up He	adwa	ys														

Base Critical Headway (sec)								
Critical Headway (sec)								
Base Follow-Up Headway (sec)								
Follow-Up Headway (sec)								

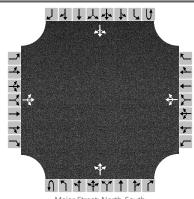
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)

Approach LOS

. , . ,												
Capacity, c (veh/h)	1465			1434				818			826	
v/c Ratio	0.00			0.00				0.02			0.02	
95% Queue Length, Q ₉₅ (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	А			А				А			Α	
Approach Delay (s/veh)	0	.7		1	.1		9	.5		9	.5	

Appendix F Page 6	HCS7 Two-Way Sto	p-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 Study		

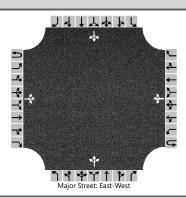


						Street: No												
Vehicle Volumes and Ad	justme	ents																
Approach	Т	Eastb	ound			Westl	oound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	T	R	U	L	Т	R		
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6		
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	0	1	0		
Configuration			LTR				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		No No									No No							
Median Type/Storage				Undi	vided													
Critical and Follow-up H	leadwa	ays																
Base Critical Headway (sec)	Т																	
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)	T		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 ₉₅ (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	Ì		A A A A A															
Approach Delay (s/veh)		9	0.4	•		9	.5			1	.2	•		1	.9	•		

Approach LOS

Α

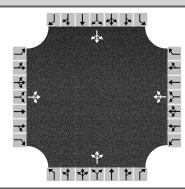
Appendix F Page 67	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	HDR	Intersection	Elk Creek & Erickson Ra R
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	4/24/2019	East/West Street	Elk Creek Road
Analysis Year	2045	North/South Street	Erickson Ranch Road
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 Study		



Approach	$\overline{}$	Eacth	ound		T	\\/oc+l	oound			North	bound		Г	Courth	bound		
Approach	_																
Movement	U	L	T	R	U	L	Т	R	U	L	Т	R	U	L	T	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)		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 (%)										. ()		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 ₉₅ (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)		А			A					В		В					
Approach Delay (s/veh)		0	.6			1	.2		12.0					11.1			
Approach LOS											В				В		

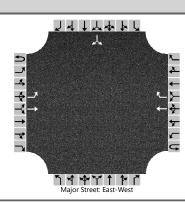
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Appendix F Page 68 or	^{f 99} HCS7 All-Way Sto	op Control Report	
General Information		Site Information	
Analyst	HDR	Intersection	Elk Creek & Haines
Agency/Co.	HDR	Jurisdiction	Meade County
Date Performed	4/24/2019	East/West Street	Elk Creek Road
Analysis 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	/	



Vehicle Volume and Adjus	tments											
Approach		Eastbound	i	,	Westbound	t	1	Northboun	d	9	Southboun	d
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 S	ervice T	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	of Servic	:e										
Flow Rate, v (veh/h)	106			44			181			25		
Capacity	848			786			812			809		
95% Queue Length, Q ₉₅ (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			Α			А		
Approach Delay (s/veh)		7.9			7.8			8.7			7.6	
Approach LOS		Α			Α			Α			Α	
Intersection Delay, s/veh LOS		8.3 A										

Appendix F Page 69 of 99 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	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 Study								



Vehicle Volumes and Ad	justme	nts														
Approach	Т	Eastb	oound			Westl	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)		60	20				40	115						30		35
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized		No														
Median Type Storage		Undivided														
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)	\top	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 S	ervice													
Flow Rate, v (veh/h)	\top	75													81	
Capacity, c (veh/h)		1374													854	
v/c Ratio		0.05													0.10	
95% Queue Length, Q ₉₅ (veh)		0.2													0.3	
Control Delay (s/veh)		7.8													9.7	
Level of Service (LOS)		А													Α	
Approach Delay (s/veh)		5.8								9.7						
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 5/1/2019

Analysis Time Period 2045 - AM No-Build Eastbound 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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 0.0 ft % Trucks and buses 6 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 3.0 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 14 - % Access point density 6 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 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

rercent rime	Spenc rollow									
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi	Analysis(d) 1.1 1.0 0.994 1.00 145 p		pposing 1.1 1.0 0.994 1.00 101	(0) pc/h						
Base percent time-spent-following, (not Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	e-4) BPTSFd	16.3 % 25.8 31.5 %								
Level of Service and Other Performance Measures										
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, V Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	60	345 2.2 1700 1700	veh-mi veh-mi veh-h veh/h veh/h							
Passing L	ane Analysis									
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including taper Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (f Level of service, LOSd (from above)	s, Lpl)	lane, Lu	3.0 - - 49.9 31.5 A	mi mi mi mi/h						
Average Travel Spee	d with Pass	ing Lane_								
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	travel spee	d, Lde	-	mi						
length of the passing lane for ave Adj. factor for the effect of passing	rage travel		l –	mi						
on average speed, fpl Average travel speed including passing	lano ATChl		_							
Percent free flow speed including passing	_		0.0	ଚ						
Percent Time-Spent-Fol	lowing with	Passing L	ane							
Downstream length of two-lane highway of passing lane for percent time-s	pent-followi	ng, Lde	_	mi						
Length of two-lane highway downstream the passing lane for percent time- Adj. factor for the effect of passing	spent-follow)	mi						
on percent time-spent-following, f Percent time-spent-following	pl		_							
including passing lane, PTSFpl			_	00						
Level of Service and Other Performance Measures with Passing Lane										
Level of service including passing lan Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h							
Bicycle Lev	el of Servic	e								

Appendix F Page 72 of 99 Posted speed limit, Sp	EE
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:

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

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

Fax:

refeele filme	Spenc rollow			
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi Base percent time-spent-following, (note-2)	1.00 144 p	oc/h 16.2	Opposing 1.1 1.0 0.99 1.00 119	5
Adjustment for no-passing zones, fnp		52.6		
Percent time-spent-following, PTSFd		45.0	용	
Level of Service and (Other Perform	lance Me	asures	
Bever or service and v	Jener rerrorm	lance me	asures	
Level of service, LOS		В		
Volume to capacity ratio, v/c		0.53		
Peak 15-min vehicle-miles of travel,	/MT15	101	veh-mi	
Peak-hour vehicle-miles of travel, VM	Г60	322	veh-mi	
Peak 15-min total travel time, TT15		2.1		
Capacity from ATS, CdATS		1700		
Capacity from PTSF, CdPTSF		1700		
Directional Capacity		1700	•	
Directional capacity		1700	V C117 11	
Passing 1	Lane Analysis			
Total longth of analysis sogment It			2.8	m i
Total length of analysis segment, Lt	6 ±1==	. 1		mi :
Length of two-lane highway upstream of		lane,	Lu –	mi
Length of passing lane including tape:	_		_	mi . /
Average travel speed, ATSd (from above			49.3	mi/h
Percent time-spent-following, PTSFd (from above)		45.0	
Level of service, LOSd (from above)			В	
Average Travel Spe	ed with Pass	ing Lan	.e	
Downstream length of two-lane highway				
length of passing lane for average	e travel spee	d, Lde	_	mi
Length of two-lane highway downstream	of effective	:		
length of the passing lane for ave		speed,	Ld -	mi
Adj. factor for the effect of passing	lane			
on average speed, fpl			_	
Average travel speed including passing			_	
Percent free flow speed including pass	sing lane, PF	'FSpl	0.0	00
Percent Time-Spent-Fo.	llowing with	Passing	Lane	
Downstream length of two-lane highway	within effec	tive le	ngth	
of passing lane for percent time-	spent-followi	ng, Lde	_	mi
Length of two-lane highway downstream	of effective	length	of	
the passing lane for percent time	-spent-follow	ing, Ld	_	mi
Adj. factor for the effect of passing	_	J.		
on percent time-spent-following,			_	
Percent time-spent-following	-1-			
including passing lane, PTSFpl			_	ଚ୍ଚ
Level of Service and Other Perfo	ormance Measu	res wit	h Passing	Lane
Level of service including passing la	ne INGn1	A		
	ie, noshi	_	trob b	
Peak 15-min total travel time, TT15		_	veh-h	
Bicycle Le	vel of Servic	e		

Appendix F Page 75 of 99 Posted speed limit, Sp	
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

Existeen Ranch Road 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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 2.0 ft % Trucks and buses 3 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 2.6 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 100 - % Access point density 5 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 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

rerearching	openc rollow			
Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi Base percent time-spent-following, (note-	Analysis (d) 1.1 1.0 0.997 1.00 301 p	c/h	0pposing 1.1 1.0 0.997 1.00 100	(o) pc/h
Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	.,	46.4 65.1 %		
Level of Service and O	ther Perform	ance Meas	sures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VM Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	60	624 3.9 1700 1700	veh-mi veh-mi veh-h veh/h veh/h	
Passing L	ane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including taper Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (flevel of service, LOSd (from above)	s, Lpl)	lane, Lu	2.6 - - 50.2 65.1	mi mi mi mi/h
Average Travel Spee	d with Pass	ing Lane_		
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	travel spee	d, Lde	-	mi
length of the passing lane for ave Adj. factor for the effect of passing		speed, Ld	l –	mi
on average speed, fpl	lana Amcal		_	
Average travel speed including passing Percent free flow speed including pass	_		0.0	ଚ
Percent Time-Spent-Fol	lowing with	Passing L	ane	
Downstream length of two-lane highway of passing lane for percent time-space. Length of two-lane highway downstream	pent-followi	ng, Lde	_	mi
the passing lane for percent time-Adj. factor for the effect of passing	spent-follow lane		<u> </u>	mi
on percent time-spent-following, f	pl		-	0.
including passing lane, PTSFpl				90
Level of Service and Other Perfo	rmance Measu	res with	Passing 1	Lane
Level of service including passing land Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h	
Bicycle Leve	el of Servic	e		

Appendix F Page 78 of 99 Posted speed limit, Sp	
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:

E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Date Performed 5/1/2019
Analysis Time Period 2045 - 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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 0.0 ft % Trucks and buses 4 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 4.4 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 40 - % Access point density 2 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 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

rercent time	Spenc rollow	1119		
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	1.00		pposing 1.1 1.0 0.996 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, (not Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	188 p e-4) BPTSFd			pc/h
Level of Service and C	ther Perform	ance Meas	ures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, V Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	760	660 4.5 1700 1700	veh-mi veh-mi veh-h veh/h veh/h	
Passing I	ane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including taper Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (f Level of service, LOSd (from above)	s, Lpl	lane, Lu	4.4 - - 45.8 47.1 B	mi mi mi mi/h
Average Travel Spee	d with Pass	ing Lane_		
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	travel spee	d, Lde	-	mi
length of the passing lane for ave Adj. factor for the effect of passing	rage travel		l –	mi
on average speed, fpl Average travel speed including passing	· lana Amcal		_	
Percent free flow speed including passing	_		0.0	ଚ୍ଚ
Percent Time-Spent-Fol	lowing with	Passing L	ane	
Downstream length of two-lane highway of passing lane for percent time-s Length of two-lane highway downstream	pent-followi	ng, Lde	_	mi
the passing lane for percent time-Adj. factor for the effect of passing	spent-follow lane		_	mi
on percent time-spent-following, f Percent time-spent-following	pl		_	9
including passing lane, PTSFpl			D '	•
Level of Service and Other Perfo	rmance Measu	res with	Passing 1	Lane
Level of service including passing land Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h	
Bicycle Lev	el of Servic	e		

Appendix F Page 81 of 99	
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:

E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Date Performed 5/1/2019
Analysis Time Period 2045 - 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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 2.0 ft % Trucks and buses 4 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 1.7 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % 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 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

reredictime t	openc rollow	±1119		
PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	Analysis (d) 1.0 1.0 1.00 1.000		Opposing 1.1 1.0 0.996 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, (note Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	537 p e-4) BPTSFd	47.0 20.5	75 %	pc/h
Level of Service and Ot	ther Perform	ance Mea	sures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VM Peak-hour vehicle-miles of travel, VMT6 Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity		C 0.53 228 731 4.7 1700 1700	veh-mi veh-mi veh-h veh/h veh/h veh/h	
Passing La	ane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including tapers Average travel speed, ATSd (from above) Percent time-spent-following, PTSFd (fr Level of service, LOSd (from above)	s, Lpl	lane, L	1.7 u - - 48.9 65.0 C	mi mi mi mi/h
Average Travel Speed	d with Pass	ing Lane		
Downstream length of two-lane highway we length of passing lane for average Length of two-lane highway downstream of	travel spee	d, Lde	-	mi
length of the passing lane for aver Adj. factor for the effect of passing l		speed, L	d -	mi
on average speed, fpl Average travel speed including passing	lane, ATSpl		_	
Percent free flow speed including passi	_		0.0	90
Percent Time-Spent-Foll	lowing with	Passing	Lane	
Downstream length of two-lane highway wo of passing lane for percent time-sp. Length of two-lane highway downstream of	pent-followi	ng, Lde	_	mi
the passing lane for percent time-s Adj. factor for the effect of passing I	spent-follow lane		-	mi
on percent time-spent-following, fr Percent time-spent-following including passing lane, PTSFpl	ρl		_	90
	omanca Mass-	rog+1-	Dagaine	· ·
Level of Service and Other Perfor	rmance Measu	res With	rassing	nglie
Level of service including passing lane Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h	
Bicycle Leve	el of Servic	e		

Appendix F Page 84 of 99 Posted speed limit, Sp	
<u>.</u>	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

Drickson Panch Road 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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 0.0 ft % Trucks and buses 5 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 2.8 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % 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 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

	opono rorro	9		
Direction	Analysis(d)	(Opposing	(0)
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	0.995		0.99	5
Grade adjustment factor, (note-1) fg	1.00		1.00	
Directional flow rate, (note-2) vi	113 p	c/h	101	pc/h
Base percent time-spent-following, (no	te-4) BPTSFd	13.0	2	
Adjustment for no-passing zones, fnp		49.1		
Percent time-spent-following, PTSFd		38.9	20	
Level of Service and	Other Perform	ance Meas	sures	
Level of service, LOS		A		
Volume to capacity ratio, v/c		0.53		
Peak 15-min vehicle-miles of travel,	VMT15	79	veh-mi	
Peak-hour vehicle-miles of travel, VM	T60	252	veh-mi	
Peak 15-min total travel time, TT15		1.6	veh-h	
Capacity from ATS, CdATS		1700	veh/h	
Capacity from PTSF, CdPTSF		1700	veh/h	
Directional Capacity		1700	veh/h	
Passing	Lane Analysis	i		
Total length of analysis segment, Lt			2.8	mi
Length of two-lane highway upstream o	f the passing	r lane, Li		mi
Length of passing lane including tape		,	_	mi
Average travel speed, ATSd (from abov			50.6	mi/h
Percent time-spent-following, PTSFd (38.9	
Level of service, LOSd (from above)	,		A	
Average Travel Spe	ed with Pass	sing Lane		
Downstream length of two-lane highway	within effec	rtive		
length of passing lane for averag			_	mi
Length of two-lane highway downstream				111.1
length of the passing lane for av			- F	mi
Adj. factor for the effect of passing		speca, in		1111
on average speed, fpl	14110		_	
Average travel speed including passin	d lane. ATSpl		_	
Percent free flow speed including passing	_		0.0	9
Percent Time-Spent-Fo	llowing with	Passing 1	Lane	
	_	_		
Downstream length of two-lane highway			gth	
of passing lane for percent time-			_	mi
Length of two-lane highway downstream		-	of	
the passing lane for percent time	_	ing, Ld	-	mi
Adj. factor for the effect of passing				
on percent time-spent-following,	fpl		_	
Percent time-spent-following				
including passing lane, PTSFpl			_	0/0
Level of Service and Other Perf	ormance Measu	res with	Passing	Lane
Level of service including passing la	ne, LOSpl	A		
Peak 15-min total travel time, TT15	,1-	_	veh-h	
Diamala Ia	wal of commin	10		
BicAcie Te	vel of Servic	,e 		

Appendix F Page 87 of 99 Posted speed limit, Sp	ГГ
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 Performed 5/1/2019

Analysis Time Period 2045 - PM No-Build Northbound 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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 2.0 ft % Trucks and buses 3 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 2.6 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 100 - % Access point density 7 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 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

			0	(-)
Direction POE for trucks EM	Analysis(d) 1.1		Opposing 1.1	(0)
PCE for trucks, ET				
PCE for RVs, ER	1.0		1.0	7
Heavy-vehicle adjustment factor, fHV			0.99	/
Grade adjustment factor, (note-1) fg		/1	1.00	/1
Directional flow rate, (note-2) vi	219 p		81	pc/h
Base percent time-spent-following, (not	te-4) BPTSFa		90	
Adjustment for no-passing zones, fnp		48.1		
Percent time-spent-following, PTSFd		58.4	00	
Level of Service and (ther Perform	nance Mea	asures	
Level of service, LOS		С		
Volume to capacity ratio, v/c		0.53		
Peak 15-min vehicle-miles of travel, N		142	veh-mi	
Peak-hour vehicle-miles of travel, VMT	760	455	veh-mi	
Peak 15-min total travel time, TT15		2.8	veh-h	
Capacity from ATS, CdATS		1700	veh/h	
Capacity from PTSF, CdPTSF		1700	veh/h	
Directional Capacity		1700	veh/h	
Passing I	Sane Analysis	S		
Total length of analysis segment, Lt			2.6	mi
Length of two-lane highway upstream of	the passing	ı lane, 1	Lu –	mi
Length of passing lane including taper		,	_	mi
Average travel speed, ATSd (from above	_		50.9	mi/h
Percent time-spent-following, PTSFd (f			58.4	·
Level of service, LOSd (from above)	,		С	
Average Travel Spee	ed with Pass	sing Lane	e	
Downstream length of two-lane highway	within effec	rtive		
length of passing lane for average			_	mi
Length of two-lane highway downstream				111.1
length of the passing lane for ave			r.d –	mi
Adj. factor for the effect of passing		speca, .	Ц	шт
on average speed, fpl	Tanc		_	
Average travel speed including passing	r lana ATChl		_	
Percent free flow speed including passing	_		0.0	90
Torono 1100 1101 Speed Indiading pass	, ing _ano,		• • •	· ·
Percent Time-Spent-Fol	lowing with	Passing	Lane	
Downstream length of two-lane highway	within effec	ctive le	ngth	
of passing lane for percent time-s			-	mi
Length of two-lane highway downstream	of effective	elength	of	
the passing lane for percent time-		_		mi
Adj. factor for the effect of passing	lane	-		
on percent time-spent-following, f			_	
Percent time-spent-following	-			
including passing lane, PTSFpl			-	90
Level of Service and Other Perfo	ormance Measu	ıres witl	n Passing	Lane
Level of service including passing lar	ne. LOSpl	А		
Peak 15-min total travel time, TT15	,	-	veh-h	
Bicycle Lev	vel of Servic	ce		

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:

E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Date Performed 5/1/2019
Analysis Time Period 2045 - PM No-Build Northbound 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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 0.0 ft % Trucks and buses 5 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 4.4 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % Terrain type Grade: Length - mi % No-passing zones 28 - % Access point density 4 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 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

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PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg	Analysis(d) 1.1 1.0 0.995 1.00		pposing 1.1 1.0 0.995 1.00	
Directional flow rate, (note-2) vi Base percent time-spent-following, (not Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	182 po e-4) BPTSFd			pc/h
Level of Service and O	ther Perform	ance Meas	ures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, V Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	60	638 4.4 1700 1700	veh-mi veh-mi veh-h veh/h veh/h	
Passing L	ane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including taper Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (f Level of service, LOSd (from above)	s, Lpl)	lane, Lu	4.4 - - 45.3 42.6 B	mi mi mi mi/h
Average Travel Spee	d with Pass	ing Lane_		
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	travel speed	d, Lde	-	mi
length of the passing lane for ave Adj. factor for the effect of passing	rage travel		_	mi
on average speed, fpl	lana Amenl		-	
Average travel speed including passing Percent free flow speed including pass	_		0.0	ଚ
Percent Time-Spent-Fol	lowing with	Passing L	ane	
Downstream length of two-lane highway of passing lane for percent time-s	pent-followi	ng, Lde	_	mi
Length of two-lane highway downstream the passing lane for percent time-Adj. factor for the effect of passing	spent-follow.		_	mi
on percent time-spent-following, f Percent time-spent-following	pl		-	
including passing lane, PTSFpl			_	90
Level of Service and Other Perfo	rmance Measu	res with	Passing :	Lane
Level of service including passing lan Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h	
Bicycle Lev	el of Servic	e		

Appendix F Page 93 of 99 Posted speed limit, Sp	
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:

E-Mail: Directional Two-Lane Highway Segment Analysis Analyst HDR Agency/Co. HDR Date Performed 5/1/2019
Analysis Time Period 2045 - 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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 0.0 ft % Trucks and buses 7 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 4.4 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % 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 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 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

Fax:

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Direction PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi Base percent time-spent-following, (note-1)	1.00 500 p	oc/h	pposing 1.1 1.0 0.993 1.00 157	
Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	e-4) BPISFQ	26.0 64.5 %		
Level of Service and O	ther Perform	nance Meas	ures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, V Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity		1760 11.8 1700 1700	veh-mi veh-mi veh-h veh/h veh/h	
Passing L	ane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including taper Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (f Level of service, LOSd (from above)	s, Lpl	lane, Lu	4.4 - - 46.7 64.5 C	mi mi mi mi/h
Average Travel Spee	d with Pass	ing Lane_		
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	travel spee	ed, Lde	-	mi
length of the passing lane for ave Adj. factor for the effect of passing		speed, Ld	l -	mi
on average speed, fpl Average travel speed including passing	lane, ATSpl		_ _	
Percent free flow speed including pass			0.0	90
Percent Time-Spent-Fol	lowing with	Passing L	ane	
Downstream length of two-lane highway of passing lane for percent time-s Length of two-lane highway downstream	pent-followi	ng, Lde	_	mi
the passing lane for percent time-Adj. factor for the effect of passing	spent-follow lane		_	mi
on percent time-spent-following, f Percent time-spent-following including passing lane, PTSFpl	pΙ		_	9
	nome n c = No		Događe	•
Level of Service and Other Performance Measures with Passing Lane				
Level of service including passing lan Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h	
Bicycle Lev	el of Servic	e		

Appendix F Page 96 of 99	
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:

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 class Class 2 Peak hour factor, PHF 0.80
Shoulder width 2.0 ft % Trucks and buses 7 %
Lane width 12.0 ft % Trucks crawling 0.0 %
Segment length 3.0 mi Truck crawl speed 0.0 mi/hr
Terrain type Level % Recreational vehicles 0 % 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 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

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PCE for trucks, ET PCE for RVs, ER Heavy-vehicle adjustment factor, fHV Grade adjustment factor, (note-1) fg Directional flow rate, (note-2) vi	Analysis(d) 1.1 1.0 0.993 1.00 157 p	oc/h	Opposing 1.1 1.0 0.993 1.00 107	
Base percent time-spent-following, (not Adjustment for no-passing zones, fnp Percent time-spent-following, PTSFd	e-4) BPTSFd	17.4 19.2 28.8	25	
Level of Service and C	ther Perform	ance Meas	sures	
Level of service, LOS Volume to capacity ratio, v/c Peak 15-min vehicle-miles of travel, VM Peak-hour vehicle-miles of travel, VMT Peak 15-min total travel time, TT15 Capacity from ATS, CdATS Capacity from PTSF, CdPTSF Directional Capacity	60	1700	veh-mi veh-mi veh-h veh/h veh/h	
Passing L	ane Analysis			
Total length of analysis segment, Lt Length of two-lane highway upstream of Length of passing lane including taper Average travel speed, ATSd (from above Percent time-spent-following, PTSFd (flevel of service, LOSd (from above)	s, Lpl	lane, Lu	3.0 - - 53.6 28.8 A	mi mi mi mi/h
Average Travel Spee	d with Pass	ing Lane_		
Downstream length of two-lane highway length of passing lane for average Length of two-lane highway downstream	travel spee	d, Lde	_	mi
length of the passing lane for ave Adj. factor for the effect of passing	rage travel		d –	mi
on average speed, fpl Average travel speed including passing			-	
Percent free flow speed including passing	_		0.0	ଚ୍ଚ
Percent Time-Spent-Fol	lowing with	Passing I	lane	
Downstream length of two-lane highway of passing lane for percent time-s	pent-followi	ng, Lde	_	mi
Length of two-lane highway downstream the passing lane for percent time- Adj. factor for the effect of passing	spent-follow		of -	mi
on percent time-spent-following, f Percent time-spent-following			-	
including passing lane, PTSFpl			_	%
Level of Service and Other Perfo	rmance Measu	res with	Passing :	Lane
Level of service including passing lan Peak 15-min total travel time, TT15	e, LOSpl	A -	veh-h	
Bicycle Lev	el 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.