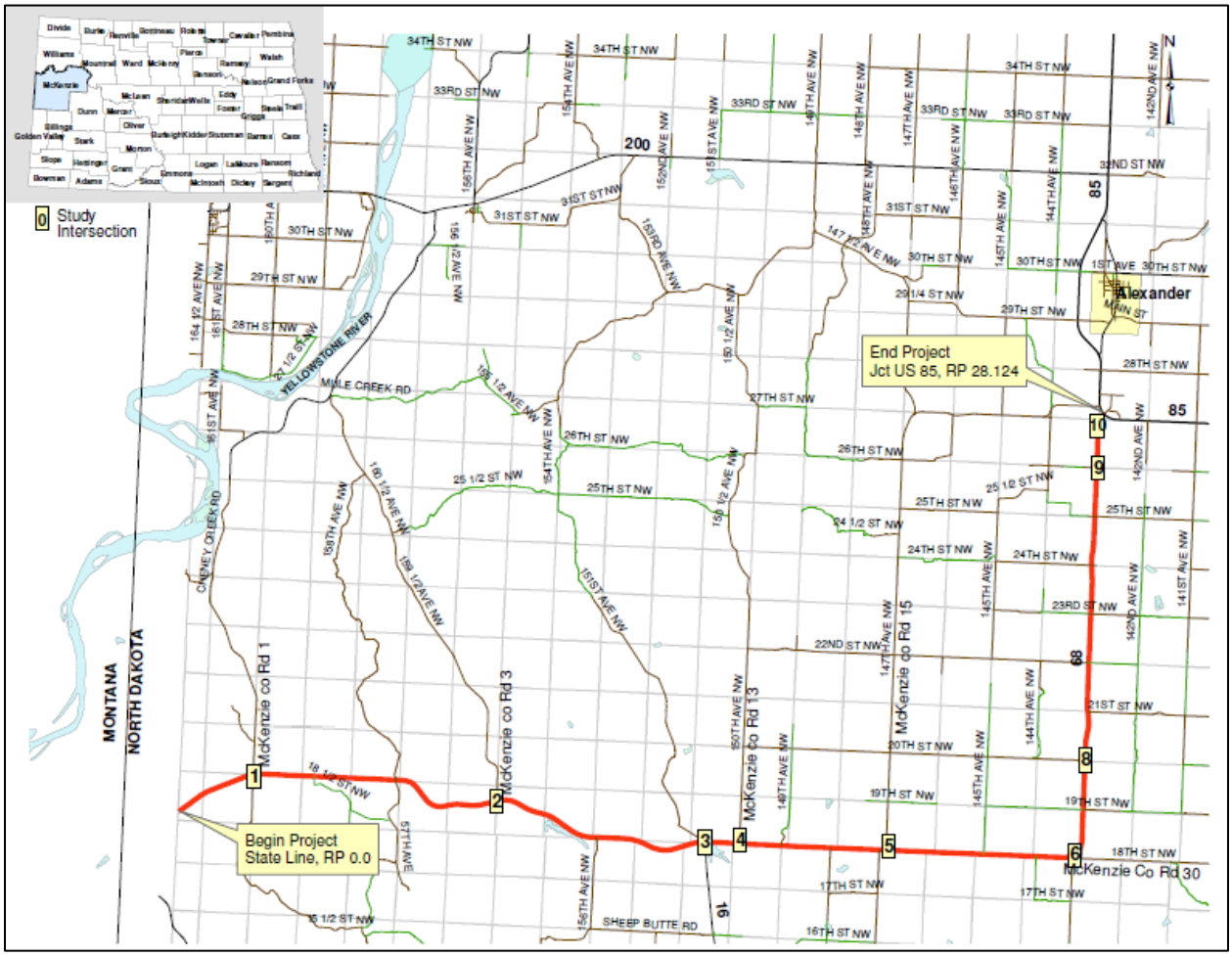
TRAFFIC OPERATION STUDY

ND 68, State Line E and N to Jct US 85

AC-SS-7-068(011)000 PCN 21180



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23 USC § 409 Documents
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INTRODUCTION

The purpose of this study is to evaluate ND 68 from the State Line east to the junction of US 85 to determine if any revisions are needed to improve traffic operations and safety. The total study length is 28.124 miles.

The planned project consists of a structural HBP overlay. The project is tentatively scheduled for 2016 construction.

The recommendations in this study are based on:

- The Manual of Uniform Traffic Control Devices (2009 MUTCD)
- AASHTO's A Policy on Geometric Design of Highways & Street
- The Highway Capacity Manual, TRB 2010
- Synchro - SIM Traffic, Version 9
- The 2010 Highway Safety Improvement Program (HSIP) Implementation Plan
- NDDOT Design Manual
- NDDOT Lighting Warrant Policy, 2015
- NDDOT Guidelines for the Installation of Turn Lanes along State Highways, 2014
- PathWeb roadway images, 2013 (EB) and 2014 (WB)

EXISTING CONDITIONS

Functional Classification: Rural Minor Arterial

Performance Classification: Rural District Corridor

Speed Limits:

From	To	Speed Limit
0.00	27.5951	65 MPH
27.5951	28.1240	55 MPH

AADTs:

From RP	To RP	2015 AADT	2015 TAADT	2035 AADT	2035 TAADT
0.000	11.441	1575	685	2355	1025
11.441	18.957	1735	760	2590	1135
18.957	27.750	1805	615	2695	920
27.750	28.124	5825	1550	8680	2310

Land Use: Grassland and rural agricultural

Typical Section: (2) 12' driving lanes, 1.5' – 2' shoulders, 4:1 inslopes

CRASH HISTORY

The crash history for ND 68 was review for the 5-yr time period from 6-1-2010 to 5-31-2015. A total of 36 crashes were reported within that time frame.

Summary of Crashes

- 33% (12) were single vehicle crashes

- Of the 11 multiple vehicle crashes, 73% (8) were head-on or sideswipe (opposite direction) and most (73%) occurred at night.
- 36% (13) were intersection-related; 3 occurred at a private driveway, 10 occurred at intersections, most (77%) during daylight hours:
    - 1 at ND 68 & Co. Rd. 1
    - 6 at ND 68 & ND 16; 5 occurred when the roadway surface on ND 16 was icy or snow-packed and the driver was unable to stop, 1 occurred at dark when the driver missed the turn.
    - 1 at ND 68 & 20th St NW
    - 2 at ND 68 & 22nd St NW
    - 3 at the truck stop approach
- 50% occurred at dark/dusk.
- 56% (20) were PDO; 1 involved an incapacitating injury, 7 involved non-incapacitating injuries, and 8 involved possible injuries.
- 3 were alcohol related where 2 of the vehicles crossed over the centerline

See *Appendix A* for the detailed crash summary sheets.

TRAFFIC CONTROL DEVICES

Traffic control devices (TCD) along the road segment were reviewed for possible safety improvements.

ND 68 Eastbound/Northbound

- RP 19.362, A cardinal direction is missing on the state assembly route marker
- RP 27.873, Chevron signs should be installed on the outside of the curve (R = 1433', D_c = 4°).

ND 68 Westbound/Southbound

- RP 18.733, The cardinal direction is missing on the state assembly route marker

ND 16 Northbound

- Consider adding a northbound stop ahead sign left of roadway and a stop sign on the left at the intersection.
- Consider 36"x36" stop signs
- Add yellow or red retroreflective strips to the support posts for all four signs.

Rumble Strips

Centerline and edgeline rumble strips should be installed. The transverse rumble strips northbound on ND 16 should be re-installed if needed.

RECOVERY APPROACHES

State and county roads that intersect ND 68 at a "T" were reviewed for installation of a recovery approach in accordance with ND Century Code 24-01-49. The only state highway to intersect ND 68 is ND 16 at RP 11.441.

The approach for 151st Ave NW is approximately 250' east of junction ND 16 and within the functional area of the intersection. The roadway then runs west approximately 150' north of ND 68. Refer to **Figure 1.** If a recovery approach is not feasible, consideration should be given to realigning the approach for 151st Ave opposite the ND 16 approach.

Figure 1 – ND 68 & ND 16

Two county roads intersect ND 68 at a "T" ***(refer to Figures 2 and 3)***, McKenzie County Road 3, RP 6.9 and McKenzie County Road 15, RP 15.13

Figure 2 – ND 68 & Co Rd 3

Figure 3 – ND 68 & Co Rd 15

No crashes were reported at these two locations in the last 5-yr period. However, the feasibility of installing recovery approaches at the two locations should be discussed in the environmental document. Refer to *Design Manual III-03.05.04*.

The recovery approach at McKenzie County Road 30 will be installed with an ongoing county roads project.

SEGMENT CAPACITY ANALYSIS

Segment volumes were used to perform a segment capacity analysis. The results are shown in **Table 1.** Acceptable Level of Service (LOS) thresholds are shown in **Table 2**. Future traffic volumes were applied for the 2035 conditions. The capacity worksheets are included in *Appendix D*.

The analysis indicates the roadway functions at an LOS B with existing traffic volumes and at an LOS C with future traffic volumes and conditions. These are within the acceptable limits for a minor arterial roadway.

Table 1 - ND 68 Segment Capacity Analysis

Conditions	ATS (MPH)	PTSF	Segment LOS
2015	53.3	47.9	B
2035	53.6	57.2	C

Notes: ATS = Average Travel Speed

PTSF = Percent Time Spent Following

LOS = Level of Service

Table 2 - LOS Ranges

LOS	Class 1 Highways	
	ATS (MPH)	PTSF (%)
A	>55	≤35
B	>50-55	>35-50
C	>45-50	>50-65
D	>40-45	>65-80
E	≤40	≤80

Source: 2010 Highway Capacity Manual

ATS - Average Travel Speed

PTSF = Percent Time Spent Following

INTERSECTION ANALYSES

Turning movement counts were obtained in August, 2015 using Miovision Traffic Data Collection for the following intersections:

- ND 68 & McKenzie Co. Rd. 1 (160th Ave NW)
- ND 68 & McKenzie Co. Rd. 3
- ND 68 & ND 16
- ND 68 & Co. Rd. 30 (18th St NW)
- ND 68 & 20th St NW
- ND 68 & 22nd St NW
- ND 68 & 26th St NW
- ND 68 & S Truck Stop Entrance
- ND 68 & N Truck Stop Entrance

Turn Lane Analysis

Under the turn lane guidelines, for speeds ≥ 50 mph, left or right turn lanes may be installed if one of the following criteria is met:

Volume Criteria

1.A The traffic volumes plot within the "Turn Lane Warranted" area of Figure 1, 2, 3, or 4 (pages 2 and 3 of the guidelines). When using the figures, AADT turning volumes should be converted to PCE (Passenger Car Equivalent).

Crash Criteria

1.B There have been 2 crashes in 3 years of crash types susceptible to correction by a turn lane.

Engineering Judgment

1.C A turn lane is recommended based on engineering judgment as part of a traffic operations study. If the traffic operations study is prepared by other than NDDOT staff, NDDOT reserves the right to validate the recommendation.

The crash criteria was not met at any intersection along the segment. **Table 3** summarizes the turn lane volume criteria and indicates whether the warrant is met for the intersection. The traffic volume diagrams and turn lane worksheets can be found in *Appendix B and C*, respectively.

Turn Lane Warrants

Intersection	Mainline Entering AADT	Turning Vehicles				Turn Lane Volumes Satisfied
		Mvmt	2015 Volume	% Trucks	PCE	
ND 68 (RP 1.72) & Co. Rd. 1 (Cheney Cr Rd)/160th Ave NW	1571	EBL	19	21	25	No
		EBR	9	33	14	No
	1557	WBL	5	20	7	No
		WBR	6	33	9	No
ND 68 (RP 6.90) & Co Rd 3 (158th Ave NW)	1540	EBL	15	27	21	No
		EBR	0	-	-	No
	1535	WBL	0	-	-	No
		WBR	14	14	17	No
ND 68 (RP 11.441) & ND 16 (RP 137.915)	1530	EBL	0	-	-	No
		EBR	23	43	38	No
	1706	WBL	119	47	203	Yes
		WBR	0	-	-	No
ND 68 (RP 12.14) & Co Rd 13 (150th Ave NW)	1756	EBL	18	22	24	No
		EBR	0	-	-	No
	1735	WBL	0	-	-	No
		WBR	9	0	9	No
ND 68 (RP 15.13) & Co Rd 15 (147th Ave NW)	1845	EBL	51	24	69	No*
		EBR	0	-	-	No
	1811	WBL	0	-	-	No
		WBR	7	0	7	No

* May meet volume warrant in 2020

Turn Lane Warrants						
Intersection	Mainline Entering AADT	Turning Vehicles				Turn Lane Volumes Satisfied
		Mvmt	2015 Volume	% Trucks	PCE	
ND 68 (RP 18.957) & Co Rd 30 (18th St NW)	1883	EBL	0	-	-	No
		EBR	129	82	288	Yes
	1849	WBL	67	34	102	Yes
		WBR	0	-	-	No
ND 68 (RP 21.00) & 20th St NW	1480	NBL	35	77	76	No**
		NBR	0	-	-	No
	1495	SBL	0	-	-	No
		SBR	31	29	45	No
ND 68 (RP 23.00) & 22nd St NW	1592	NBL	9	-	-	No
		NBR	3	0	3	No
	1646	SBL	4	50	7	No
		SBR	41	20	53	No
ND 68 (RP 27.00) & 26th St NW	1553	NBL	5	60	10	No
		NBR	2	0	2	No
	1599	SBL	2	0	2	No
		SBR	31	42	51	No
ND 68 (RP 27.898) & S Truck Stop Entrance	1832	NBL	5	80	11	No
		NBR	11	100	28	No
	1861	SBL	8	75	17	No
		SBR	29	86	67	No***
ND 68 (RP 28.00) & N Truck Stop Entrance	2595	NBL	0	-	-	No
		NBR	249	30	362	Yes
	4894	SBL	1466	26	2033	Yes
		SBR	0	-	-	No

** May meet volume warrant in 2021

*** May meet volume warrant in 2030

Three intersections currently meet turn lane warrants. It is recommended to install the following turn lanes shown below with the recommended storage lengths (L2 + L4).

- ND 68 & ND 16 – Westbound Left, 630'. Presently, there is an existing eastbound right turn lane. However, it is substandard and should be brought up to meet NDDOT current design standards, L4 = 0.
- ND 68 & Co. Rd. 30 – Eastbound Right, L4 = 0, Westbound Left, 630'
- ND 68 & N Truck Stop Approach –Southbound Left, 200'. Presently, there is substandard northbound right turn lane that should be brought up to meet NDDOT current design standards, L4 = 0. The overall length, however, may need to be modified due to the access approach approximately 450' south (S Truck Stop Entrance). See **Figure 4** for proposed geometry. It is recommended to consider a raised median for traffic separation for opposing left turning traffic.

Figure 4

Three intersections may meet future warrants and should be advanced forward as decision items.

- ND 68 & Co. Rd. 15 (147th Ave NW) – Eastbound Left, 630'
- ND 68 & 20th St NW - Northbound Left, 630'
- ND 68 & S Truck Stop Entrance, L4 = 0

Capacity Analysis

HCS 2010 capacity software was used in the analysis of the intersections for two way stop control where turn lanes are recommended. An assumed 0.88 peak hour factor was used in the calculations.

Delay ranges for two-way stop controlled intersections and the corresponding Level of Service (LOS) threshold is shown in **Table 4**. The detailed calculation sheets can be found in *Appendix D*.

The capacity analysis for ND 68 & US 85 was analyzed separately using Synchro/Simtraffic for a signalized intersection to verify the intersection will function adequately with the installation of an southbound left turn lane at the north truck stop entrance.

Table 4 – Capacity LOS

LOS	Unsignalized Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

ND 68, RP 11.441 & ND 16, RP 137.915

ND 68 & ND 16 is a "T" intersection. ND 68 is the free-flowing east/west major roadway. ND 16 is the south leg of the intersection and stop controlled. The existing geometry and traffic volumes are shown in **Figures 5-7.**

*Existing Geometry and Traffic Volumes – **Figures 5-7***

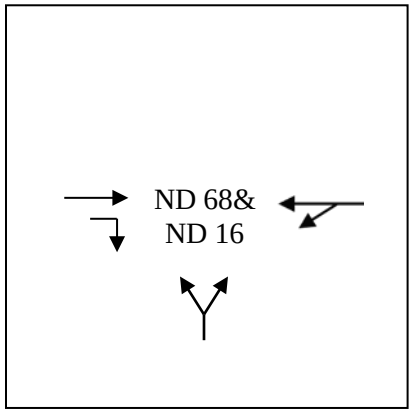


Figure 5 – Existing Geometry

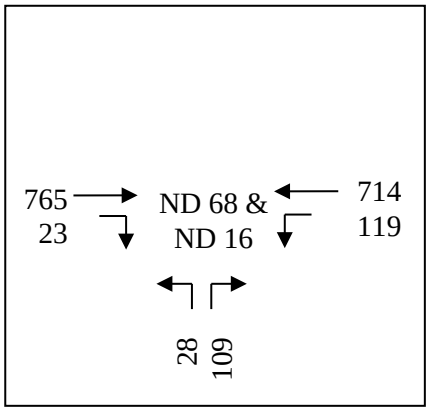


Figure 6 – 2015 AADT

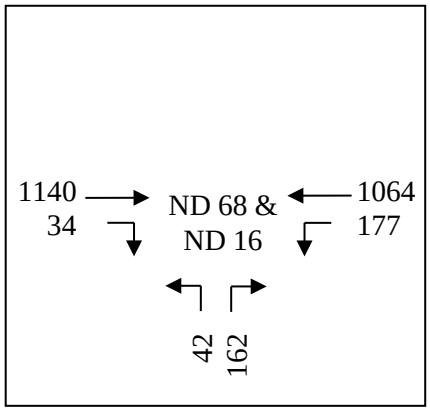


Figure 7 – 2035 AADT

The results of the capacity analysis are shown in **Table 5** and indicate the intersection will function adequately under existing and future traffic conditions (LOS A).

Table 5 – Capacity Analysis for ND 68 & ND 16

Conditions	EB LOS Delay (sec)	WB LOS Delay (sec)	NB LOS Delay (sec)	SB LOS Delay (sec)
2015 Existing Geometry	-	A 7.9	A 9.3	-
2015 Revised Geometry	-	A 7.9	A 9.7	-
2035 Existing Geometry	-	A 8.0	A 9.7	-
2035 Revised Geometry	-	A 8.0	A 9.7	-

ND 68 & Co Rd 30 (18 St NW) RP 18.957

ND 68 & McKenzie Co Rd 30 is a radial-T intersection. ND 68 is the free-flowing east/west major roadway that turns north at the intersection. Co Rd 30 intersects on the east and is stop controlled. The existing geometry and traffic volumes are shown in **Figures 8-10.**

*Existing Geometry and Traffic Volumes – **Figures 8-10***

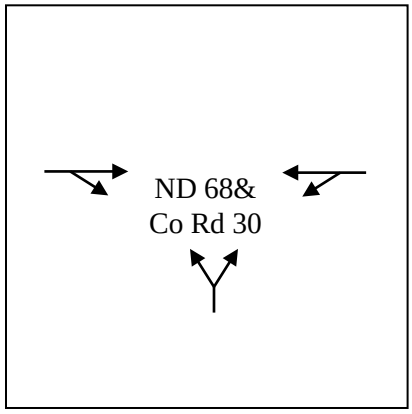


Figure 8– Existing Geometry

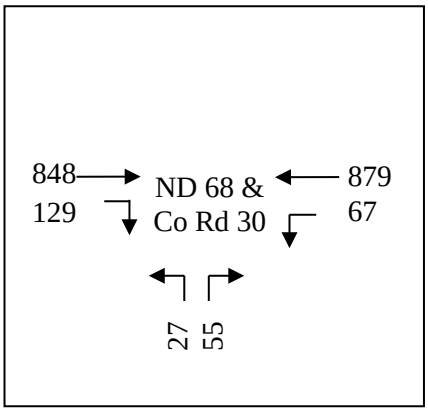


Figure 9 – 2015 AADT

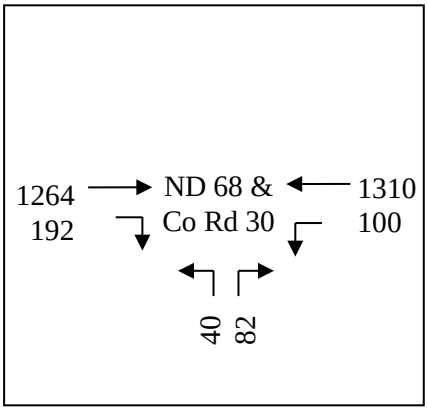


Figure 10 – 2035 AADT

The results of the capacity analysis are shown in **Table 6** and indicate the intersection will function adequately under existing and future traffic conditions (LOS A).

Table 6 – Capacity Analysis for ND 68 & Co Rd 30

Conditions	EB LOS Delay (sec)	WB LOS Delay (sec)	NB LOS Delay (sec)	SB LOS Delay (sec)
2015 Existing Geometry	-	A 7.8	A 9.5	-
2015 Revised Geometry	-	A 7.8	A 9.4	-
2035 Existing Geometry	-	A 7.9	A 9.9	-
2035 Revised Geometry	-	A 7.9	A 9.9	-

ND 68 & N Truck Stop Entrance (RP 28.00)

ND 68 & the North Truck Stop Entrance is a "T" intersection. ND 68 is free-flowing northeast and southwest at this location. The north truck stop access approach intersects on the east and is stop controlled. The existing geometry and traffic volumes are shown in **Figures 10-12.**

*Existing Geometry and Traffic Volumes – **Figures 11-13***

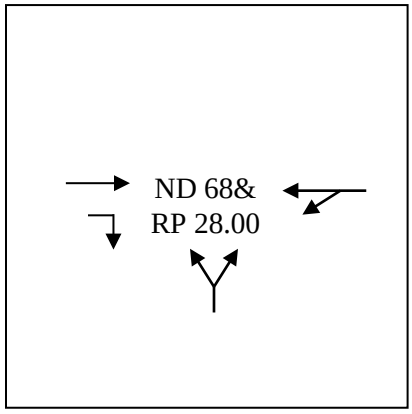


Figure 11 – Existing Geometry

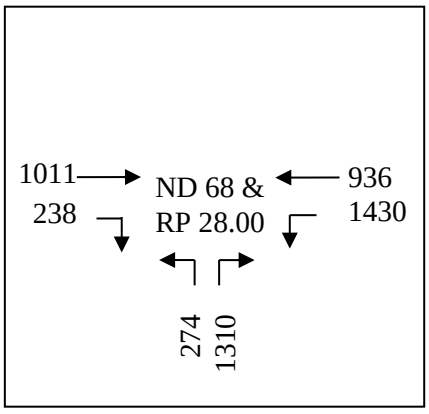


Figure 12 – 2015 AADT

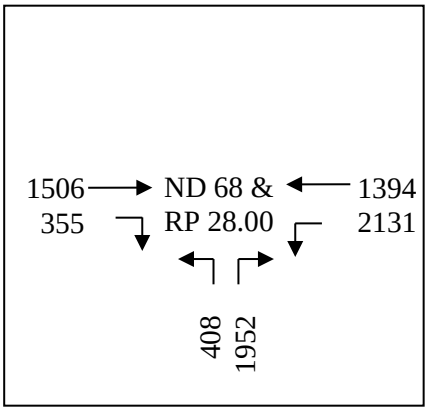


Figure 13 – 2035 AADT

The results of the capacity analysis are shown in **Table 7** and indicate the intersection will function at acceptable LOS ranges under existing and future traffic conditions.

Table 7 – Capacity Analysis for ND 68 & N Truck Stop Entrance				
Conditions	**EB LOS Delay (sec)**	**WB LOS Delay (sec)**	**NB LOS Delay (sec)**	**SB LOS Delay (sec)**
2015 Existing Geometry	-	B 11.4	-	A 8.1
2015 Revised Geometry	-	B 11.4	-	A 8.1
2035 Existing Geometry	-	C 15.7	-	A 8.6
2035 Revised Geometry	-	C 15.7	-	A 8.6

ND 68 & US 85

ND 68 & US 85 is a signalized intersection. The existing geometry and traffic volumes are shown in **Figures 14-16.**

Synchro/Simtraffic was used to validate the operational LOS of the intersection with the addition of a southbound left turn lane. Delay ranges for signalized intersections and the corresponding Level of Service (LOS) threshold is shown in **Table 8**.

Table 8 - Capacity LOS	
LOS	**Signalized Delay (sec/veh)**
A	≤ 10
B	>10 - 20
C	>20 - 35
D	>35 - 55
E	>55 - 80
F	>80

*Existing Geometry and Traffic Volumes – **Figures 14-16***

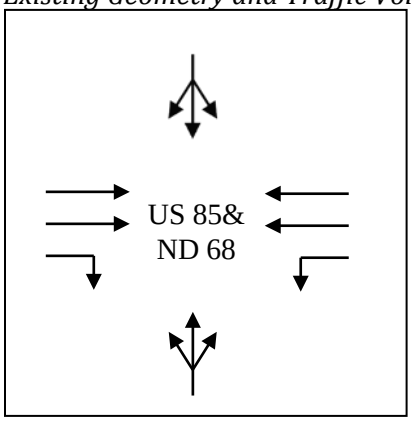


Figure 14 – Existing Geometry

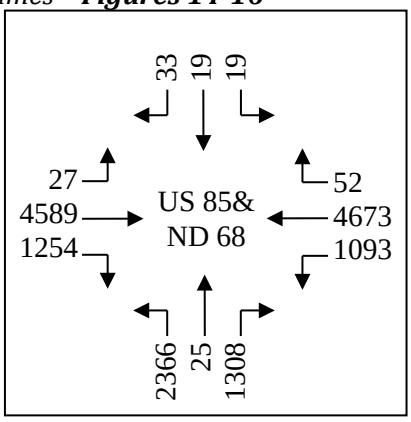


Figure 15 – 2015 AADT

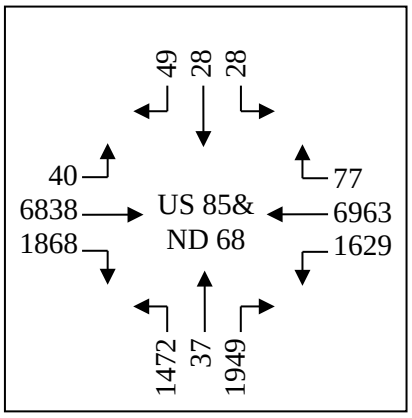


Figure 16 – 2035 AADT

The results of the capacity analysis are shown in **Table 9** and indicate the LOS of US 85 & ND 68 is unchanged with the revised geometry of a southbound left turn added for the north truck stop approach. The detailed capacity analysis worksheets are included in *Appendix D*.

Table 9 – Capacity Analysis for US 85 & ND 68				
Conditions	EB LOS Delay (sec)	WB LOS Delay (sec)	NB LOS Delay (sec)	SB LOS Delay (sec)
2015 Existing Geometry	A 9.5	B 10.8	B 15.3	B 12.7
2015 Revised Geometry	A 9.5	B 10.8	B 15.3	B 12.7
2035 Existing Geometry	C 24.6	B 19.9	C 24.1	B 19.5
2035 Revised Geometry	C 24.6	B 19.9	C 24.1	B 19.5

It is recommended to consider a raised median during design of the project to separate traffic through the turn lane.

Intersection Sight Distance Analysis (ISD)

Intersection sight distances (ISDs) for the study intersections were reviewed as a preliminary evaluation for any obstructions at the calculated distances from the 2011 AASHTO Green Book. The required ISDs for the speed limits are shown below:

Speed Limit	Truck B1 (ft)	Truck B2 (ft)	Pass Car B1 (ft)	Pass Car B2 (ft)
55	930	850	610	530
65	1100	1005	720	625

It is assumed that if the intersection is visible to mainline traffic, the ISD for traffic on the minor road is also adequate. However, actual ISDs should be verified during design of the project.

During preliminary review of the intersections, the following observations were made from the PathWeb images:

- ND 68 & Co. Rd. 1/160th Ave NW. The intersection is in a 1.3˚ horizontal curve. The backslope in the NW quadrant may be obstructing the sight distance for southbound left turning traffic on Co. Rd. 1.
- ND 68 & ND 16. Eastbound D&D sign may be obstructing sight distance for NB right turning traffic on ND 16.
- ND 68 & Co. Rd. 30. The intersection is in a 3˚ horizontal curve. A recent county roads project has realigned Co. Rd. 30 (18th St NW) to intersect ND 68 at a radial T. It is assumed sight distances were verified during design of the project.

LIGHTING ANALYSIS

Lighting was installed at the junction of ND 68 & US 85 on the signal project SOIA-7-085(101)159 (PCN 20985) which was completed in 2015. There is no other lighting through the study area.

Rural destination lighting may be installed under the NDDOT Lighting Warrants Policy for Destination Lighting at Rural and Suburban Intersections if one of the following lighting warrants from Table 6 of the policy is satisfied:

> *6A - Where lighting is recommended based on the Highway Safety Improvement Program Implementation Plan*
> *6B - Where the current traffic volume cross product (Major AADT x Minor AADT) is 2,000,000 or more.*

6C - Where an overhead span-wire flashing beacon system is removed.
6D - Where lighting is recommended based on engineering judgment as part of a traffic operations study.
6E - Where an existing destination lighting system is removed due to a roadway construction project.

Traffic volumes for the applicable warrant, 6B, are shown in **Table 8.** Based on crash history and NDDOT lighting warrants, no lighting is recommended.

Table 10 - Rural Destination Lighting

Hwy & RP	Intersection	Major AADT	Minor AADT	Cross Product	Meets Warrant
ND 68, RP 1.72	ND 68 & 160th Ave NW (Co Rd 1)	1,571	81	127,251	No
ND 68, RP 6.90	ND 68 & 158th Ave NW (Co Rd 3)	1,540	61	93,940	No
ND 68, RP 11.441	ND 68 & ND 16 (RP 137.915)	1,706	278	474,268	No
ND 68, RP 12.14	ND 68 & 150th Ave NW (Co Rd 13)	1,756	51	89,556	No
ND 68, RP 15.13	ND 68 & 147th Ave NW (CO Rd 15)	1,845	104	191,880	No
ND 68, RP 18.957	ND 68 & 18th St NW (Co Rd 30)	1,883	278	523,474	No
ND 68, RP 21.00	ND 68 & 20th St NW	1,495	179	267,605	No
ND 68, RP 23.00	ND 68 & 22nd St NW	1,646	88	144,848	No
ND 68, RP 27.00	ND 68 & 26th St NW	1,599	63	100,737	No
ND 68, RP 27.898	ND 68 & Truck Stop S Entrance	1,861	39	72,579	No
ND 68, RP 28.00	ND 68 & Truck N Entrance	3,290	2,270	7,468,300	Yes*

* Presently lighted (2015 - PCN 20985)

RECOMMENDATIONS

- RP 19.362 EB, Install cardinal direction sign on the state assembly route marker.
- RP 27.873 EB, Install chevron signs on the outside of the curve.
- RP 18.733 WB, Install cardinal direction sign on state assembly route marker.
- Northbound ND 16, Consider adding a stop ahead left of roadway for the junction and a stop sign on the left at the intersection.
- Consider 36”x36” stop signs
- Add red retroreflective strips to stop ahead and stop sign supports.
- Install centerline & edgeline rumble strips.
- Install NB transverse rumble strips on ND 16 at junction ND 68 if needed.
- RP 11.441, Install recovery approach for ND 16 if feasible. If not, consider realigning 151st Ave approach opposite the ND 16 approach.
- RP 6.9, Review feasibility for recovery approach at McKenzie Co. Rd. 3 in environmental stage
- RP 15.13, Review feasibility for recovery approach at McKenzie Co. Rd. 15 in environmental stage
- Install turn lanes at the following locations with the recommended storage lengths:
  - ND 68 & ND 16 – Westbound Left, 630’
  - ND 68 & Co. Rd. 30 – Eastbound Right, Westbound Left, 630’
  - ND 68 & N Truck Stop Approach – Northbound Right, Southbound Left, 200’
- Advance turn lane installation at the following locations as decision items:

  - ND 68 & Co. Rd. 15 (147th Ave NW) – Eastbound Left, 630'
  - ND 68 & 20th St NW - Northbound Left, 630'
- Consider a raised median for traffic separation of opposing left turning traffic between US 85 and N Truck Stop approach.
- Verify intersection sight distances; ND 68 & Co. Rd. 1/160th Ave NW and ND 68 & ND 16.
- ND 68 & ND 16, Ensure placement of the eastbound D&D sign does not obstruct sight distance for northbound turning traffic on ND 16.

APPENDIX A

Crash Summary Sheets

Total Crashes: 36 **Location Description:** ND 68 from State Line to Jct US 85
Length: 28.124 **Start RP:** 0.000
Sorted By: Longitude **End RP:** 28.124

	M	D	Year
Start Date:	6	1	2010
End Date:	5	31	2015

# of Years: 5.00

Notes: Animal crashes were not included.

23 USC § 409 Documents
NDDOT Reserves All Objections

Statistics for Total Crashes

Crash Severity

Fatal =	0	0%
InjA =	1	3%
InjB =	7	19%
InjC =	8	22%
PDO =	20	56%
	36	

Day of Week

Monday =	4	11%
Tuesday =	5	14%
Wednesday =	4	11%
Thursday =	3	8%
Friday =	11	31%
Saturday =	3	8%
Sunday =	6	17%
	36	

Surface Conditions

Dry =	15	42%
Wet =	2	6%
Ice / Snow =	19	53%
Other =	0	0%
	36	

Lighting Conditions

Dawn =	1	3%
Daylight =	17	47%
Dusk =	2	6%
Dark =	16	44%
Dark (lighted) =	0	0%
	36	

Under Construction

Yes =	0	0%

Roadway Geometrics

Straight (on level) =	17	47%
Straight (on grade) =	14	39%
Curve (on level) =	2	6%
Curve (on grade) =	1	3%
Hill Crest =	2	6%
Unknown =	0	0%
	36	

Manner of Collision

Angle =	3	8%
Rear End =	3	8%
Left Turn =	1	3%
Sideswipe (same direction) =	0	0%
Single Vehicle =	18	50%
Ped / Bike =	0	0%
Other =	11	31%
	36	

First Harmful Event

Motor Vehicle in Transport =	18	50%
Animal =	0	0%
Jackknife =	2	6%
Ran Off Roadway (not including below crashes) =	13	36%
Guardrail + Concrete Barrier + Bridge Rail =	0	0%
Bridge / Pier / Abutment / Overhead Structure =	0	0%
Poles / Posts / Trees / Overhead Sign Supports =	0	0%

These are only the most popular choices.

Relation to Junction

Non-Junction =	22	61%
Intersection + Intersection-Related =	13	36%
Alley / Driveway Access =	1	3%
Interchange Area + Exit / Entrance Ramp =	0	0%

These are only the most popular choices.

V1 and V2 Configuration*

Passenger Car =	7
PU / Van / Utility =	30
Truck =	19
Bus / Motorhome =	0
Motorcycle + Moped =	0

These are only the most popular choices.

V1 and V2 Directions*

North =	12
South =	10
East =	13
West =	21

D1 and D2 Sex*

Female =	7
Male =	45

D1 and D2 Age*

0-17 =	0	45-54 =	12
18-24 =	8	55-64 =	4
25-34 =	18	65-74 =	1
35-44 =	9	75+ =	0

D1 and D2 Alcohol / Drugs*

Yes (alcohol or drugs present) = 3

D1 and D2 Contr. Factors*

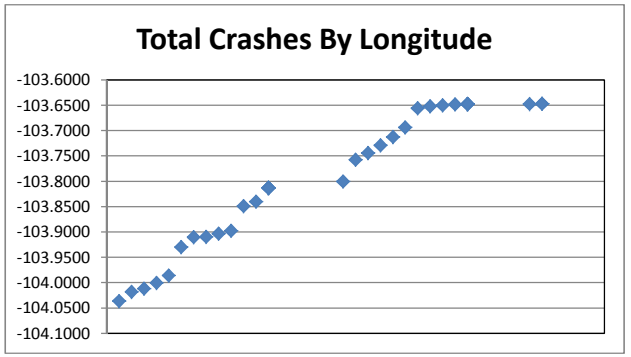
No Clear Factor =	17
Attention Distracted =	1
Weather =	7
Speed =	3
Too Fast for Conditions =	7
Fail to Yield =	1
Improper Backing/Turning =	1

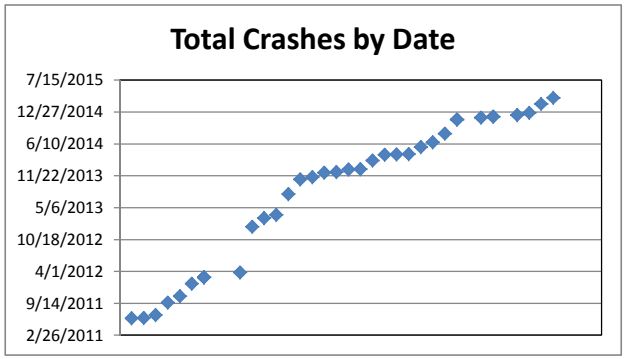
These are only the most popular choices.

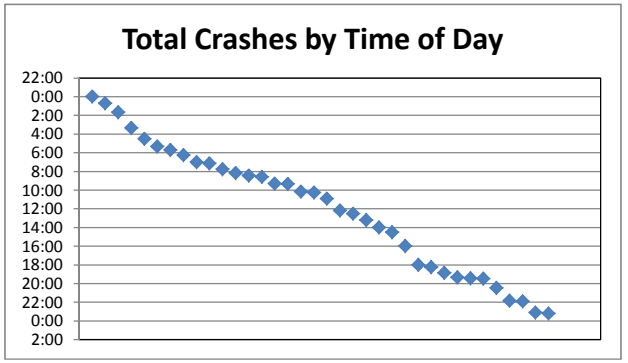
D1 or D2 Ejected*

Yes (partially or fully) = 0

**This info is not available for all units.*







General Summary

Yr	Start Date	End Date	Intersection or Alley / Drvwy	Non-Intersection		Total	AADT (two-way)	Crash Rate
				Single Veh	Mult. Veh			
1	6/1/2010	5/31/2011	0	0	0	0	1050	0.00
2	6/1/2011	5/31/2012	3	3	4	10	1940	0.50
3	6/1/2012	5/31/2013	2	0	1	3	1360	0.21
4	6/1/2013	5/31/2014	6	5	1	12	2450	0.48
5	6/1/2014	5/31/2015	3	4	4	11	1735	0.62
			14	**12**	**10**	**36**		
			39%	**33%**	**28%**			

For Crash Severity: Fatal = Fatility, InjA = Incapacitating Injury, InjB = Non-Incapacitating Injury, InjC = Possible Injury, PDO = Property Damage Only
ADI = Alcohol or Drug Involvment

Crash Summary Sheets

Total Crashes: 36 **Location Description:** ND 68 from State Line to Jct US 85
Length: 28.124 **Start RP:** 0.000
Sorted By: Longitude **End RP:** 28.124

	M	D	Year
Start Date:	6	1	2010
End Date:	5	31	2015

# of Years: 5.00

Notes: Animal crashes were not included.

Statistics for Intersection-Related Crashes ONLY

Crash Severity

Fatal =	0	0%
InjA =	0	0%
InjB =	3	21%
InjC =	1	7%
PDO =	10	71%
	14	

Surface Conditions

Dry =	4	29%
Wet =	0	0%
Ice / Snow =	10	71%
Other =	0	0%

Lighting Conditions

Dawn =	0	0%
Daylight =	10	71%
Dusk =	1	7%
Dark =	3	21%
Dark (lighted) =	0	0%

Under Construction

Yes =	0	0%

Relation to Junction

Intersection + Intersection-Related =	13	93%
Alley / Driveway Access =	1	7%

Manner of Collision

Angle =	2	14%
Rear End =	2	14%
Left Turn =	1	7%
Sideswipe (same direction) =	0	0%
Single Vehicle =	6	43%
Ped / Bike =	0	0%
Other =	3	21%

D1 and D2 Contributing Factors*

No Clear Factor =	8
Attention Distracted =	0
Weather =	2
Speed =	2
Too Fast for Conditions =	4
Fail to Yield =	1
Improper Backing / Turning =	1

These are only the most popular choices.

D1 and D2 Alcohol / Drugs Present*

Yes (alcohol or drugs) =	0

V1 and V2 Unit Config.*

Passenger Car =	2
PU / Van / Utility =	11
Truck =	10
Bus / Motorhome =	0
Motorcycle + Moped =	0

These are only the most popular choices.

**This info is not available for all units.*

Statistics for Non-Intersection Crashes ONLY

Multiple Vehicle Crashes ONLY

Crash Severity

Fatal =	0	0%
InjA =	1	10%
InjB =	1	10%
InjC =	4	40%
PDO =	4	40%
	10	

Surface Conditions

Dry =	7	70%
Wet =	1	10%
Ice / Snow =	2	20%
Other =	0	0%

Lighting Conditions

Dawn =	1	10%
Daylight =	2	20%
Dusk =	0	0%
Dark =	7	70%
Dark (lighted) =	0	0%

Road Geometrics

Straight (on level) =	4	40%
Straight (on grade) =	5	50%
Curve (on level) =	0	0%
Curve (on grade) =	0	0%
Hill Crest =	1	10%

Under Construction

Yes =	0	0%

D1 or D2 Ejected*

Yes =	0

Manner of Collision

Angle =	1	10%
Rear End =	1	10%
Left Turn =	0	0%
Sideswipe (same direction) =	0	0%
Head-On + Sideswipe (opp direction) =	8	80%
Other =	0	0%

D1 and D2 Alcohol/Drugs Present*

Yes (alcohol or drugs) =	2

V1 and V2 Unit Config.*

Passenger Car =	3
PU / Van / Utility =	10
Truck =	7
Bus / Motorhome =	0
Motorcycle + Moped =	0

These are only the most popular choices.

Non-Collision with Motor Vehicle (a.k.a. Single Vehicle) Crashes ONLY

Crash Severity

Fatal =	0	0%
InjA =	0	0%
InjB =	3	25%
InjC =	3	25%
PDO =	6	50%
	12	

Surface Conditions

Dry =	4	33%
Wet =	1	8%
Ice / Snow =	7	58%
Other =	0	0%

Lighting Conditions

Dawn =	0	0%
Daylight =	5	42%
Dusk =	1	8%
Dark =	6	50%
Dark (lighted) =	0	0%

Road Geometrics

Straight (on level) =	6	50%
Straight (on grade) =	3	25%
Curve (on level) =	1	8%
Curve (on grade) =	1	8%
Hill Crest =	1	8%

Under Construction

Yes =	0	0%

D1 Ejected*

Yes (partially or fully) =	0	0%

D1 Most Harmful Event*

Motor Vehicle in Transport =	0	0%
Animal =	0	0%
Jackknife =	1	8%
Ran Off Roadway (not including below crashes) =	8	67%
Guardrail + Concrete Barrier + Bridge Rail =	0	0%
Bridge / Pier / Abutment / Overhead Structure =	0	0%
Poles / Posts / Trees / Overhead Sign Supports =	2	17%

These are only the most popular choices.

D1 Alcohol / Drugs Present*

Yes (alcohol or drugs) =	1	8%

V1 Unit Config.*

Passenger Car =	2	17%
PU / Van / Utility =	9	75%
Truck =	1	8%
Bus / Motorhome =	0	0%
Motorcycle + Moped =	0	0%

These are only the most popular choices.

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Crash Summary Sheets

Total Crashes: 36 **Location Description:** ND 68 from State Line to Jct US 85
Length: 28.124 **Start RP:** 0.000
Sorted By: Longitude **End RP:** 28.124

	M	D	Year
Start Date:	6	1	2010
End Date:	5	31	2015

# of Years: 5.00

Notes: Animal crashes were not included.

	Hwy / Ref Pt / Lat. / Long.	Crash # / Date / Day / Time	Severity / Weather / Surf Cond / Lighting	Manner of Coll. / Relation to Jct. / Road Geom. / Under Constr.	Veh #	Age	Sex	Address	Contributing Factors	Ejected	A.D.I.	Unit Config.	Direction of Travel	Traffic Control	Most Harmful Event	Shortened Narrative	Inter. of Crash
1	Hwy 68 RP 0.44 47.6812 -104.0361	291207 10/29/2013 Tuesday 7:08 AM	PDO Clear Ice / Snow Dark	Single Veh. Non-Junction Straight (On Grade) No	V1	39	M	Evanston, Wy	To Fast For Conditions	N	N	Pickup - Van - Utility	East	None	Overturn / Rollover	D1 was EB and lost control on icy roads on a vertical grade. V1 spun around and then ran off the roadway and entered the ditch.	
2	Hwy 68 RP 1.4 47.6874 -104.018	306264 6/20/2014 Friday 11:05 PM	PDO Clear Dry Dark	Sideswipe (Opp. Dir.) Non-Junction Straight (On Grade) No	V1 V2	52 39	M M	Butte, MT Seffner, Fl	Other	N N	N N	Pickup - Van - Utility Pickup - Van - Utility	North Southeast	None None	Mv In Transport Mv In Transport	V1 was NB and V2 was SB. D1 fell asleep and entered the SB lane. D1 pulled off into the ditch but was sideswiped by V1.	
3	Hwy 68 RP 2 47.6893 -104.0115	269263 1/5/2013 Saturday 6:00 PM	InjB Clear Ice / Snow Dusk	Angle Intersection Straight (On Level) No	V1 V2	21 36	M M	Sidney, MT Sedro Woolley, Wa	Speed	N N	N N	Pickup - Van - Utility Passenger Car	South East	Stop Sign None	Mv Tran In Other Rdwy Mv Tran In Other Rdwy	V1 was SB on Co Rd 1. V2 was EB on ND 68. D1 was unable to stop at the intersection due to icy roads and struck V2.	ND 68 & Co Rd 1
4	Hwy 68 1/14/2012 47.6894 -104.0004	244269 Saturday 7:20 PM	PDO Cloudy Ice / Snow Dark	Sideswipe (Opp. Dir.) Non-Junction Straight (On Level) No	V1 V2	30 20	M M	Kalispell, MT Enid, Ok	Weather	N N	N N	Pickup - Van - Utility Pickup - Van - Utility	East West	None None	Mv In Transport Mv In Transport	V1 was EB. V2 was WB. D1 lost control on snow & ice and spun around as V2 was passing. V1 sidewiped V2.	
5	Hwy 68 RP 2.92 47.6893 -103.9858	316565 11/21/2014 Friday 7:28 PM	InjA Clear Dry Dark	Sideswipe (Opp. Dir.) Non-Junction Straight (On Grade) No	V1 V2	25 35	M M	Sidney, MT Ryegate, MT	Improper Overtaking	N N	N N	Pickup - Van - Utility Pickup - Van - Utility	West East	No Passing Zone Passing Zone	Mv In Transport Mv In Transport	V1 was WB. V2 was EB. D1 attempted to pass a truck in a NPZ as V2 was approaching. D1 struck V2 on the front driver's side.	
6	Hwy 68 RP 5.74 47.682 -103.9296	315086 11/9/2014 Sunday 6:50 PM	PDO Snow Snow Dark	Single Veh. Non-Junction Curve (On Grade) No	V1	25	F	Hamilton, MT	To Fast For Conditions	N	N	Pickup - Van - Utility	West	None	Overturn / Rollover	D1 was WB and hit a patch of ice, lost control and overturned.	
7	Hwy 68 RP 6.67 47.6834 -103.9099	315307 11/9/2014 Sunday 12:42 AM	InjC Cloudy Ice / Snow Daylight	Single Veh. Non-Junction Straight (On Grade) No	V1	58	F	Glendive, MT	Weather	N	N	Pickup - Van - Utility	West	None	Overturn / Rollover	V1 was WB when the driver lost control in icy roads. V1 entered the ditch and rolled several times.	
8	Hwy 68 RP 6.68 47.6834 -103.9096	295428 1/1/2014 Wednesday 8:26 AM	PDO Blowing Snow Frost Daylight	Single Veh. Non-Junction Hillcrest No	V1	28	M	Woodland Hills, Ut	Mv Mechanical Failure	N	N	Pickup - Van - Utility	West	None	Fire / Explosion	V1 was WB towing a pick-up on a trlr. when it caught fire underneath the engine.	
9	Hwy 68 RP 6.99 47.6846 -103.9032	316572 11/28/2014 Friday 7:00 AM	InjC Blowing Snow Ice / Snow Dark	Angle Non-Junction Straight (On Level) No	V1 V2	62	M	Sidney, MT Maumee, Oh	Weather Other	N	N	Truck Tractor Truck Tractor	East West	None None	Mv In Transport Overturn / Rollover	V2 was WB. V1 was parked on the EB shoulder/lane facing west. D2 braked to avoid hitting V1 but started sliding striking V1 & causing it to overturn. V2 ran off the road.	
10	Hwy 68 RP 7.25 47.6846 -103.8978	316240 11/28/2014 Friday 6:15 AM	PDO Blowing Snow Ice / Snow Dark	Single Veh. Non-Junction Straight (On Level) No	V1	53	M	Sidney, MT	To Fast For Conditions	N	N	Truck Tractor	West	None	Jackknife	D1 was WB on icy roads and braked to slow down. V1 then jacknifed and ran off the roadway.	

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Crash Summary Sheets

Total Crashes: 36 **Location Description:** ND 68 from State Line to Jct US 85
Length: 28.124 **Start RP:** 0.000
Sorted By: Longitude **End RP:** 28.124

	M	D	Year
Start Date:	6	1	2010
End Date:	5	31	2015

# of Years: 5.00

Notes: Animal crashes were not included.

	Hwy / Ref Pt / Lat. / Long.	Crash # / Date / Day / Time	Severity / Weather / Surf Cond / Lighting	Manner of Coll. / Relation to Jct. / Road Geom. / Under Constr.	Veh #	Age	Sex	Address	Contributing Factors	Ejected	A.D.I.	Unit Config.	Direction of Travel	Traffic Control	Most Harmful Event	Shortened Narrative	Inter. of Crash
11	Hwy 68 RP 9.66 47.6749 -103.8491	238434 9/18/2011 Sunday 3:20 AM	InjB Clear Dry Dark	Sideswipe (Opp. Dir.) Non-Junction Straight (On Level) No	V1 V2	20 35	M M	Pavillion, Wy Glendive, MT	Driving Left Of Center	N N	Y N	Passenger Car Pickup - Van - Utility	East West	None None	Mv In Transport Mv In Transport	V1 was EB and V2 was WB. V1 crossed the centerline and struck V2.	
12	Hwy 68 RP 10.1 47.674 -103.8403	232746 6/12/2011 Sunday 2:30 PM	PDO Clear Dry Daylight	Rear End Non-Junction Hillcrest No	V1 V2	32 66	M M	Robbins, Ca Melfort, Sk	Following Too Close	N N	N N	Pickup - Van - Utility Passenger Car	West West	None None	Mv In Transport	V2 was WB behind V1. D1 slowed due to the rough roadway and V2 rear ended V1.	
13	Hwy 16 RP 137.92 47.6749 -103.8128	247969 2/24/2012 Friday 8:34 AM	InjB Clear Ice / Snow Daylight	Single Veh. Intersection Related Straight (On Level) No	V1	46	M	Lockwood, Ny	To Fast For Conditions	N	N	Truck Tractor	North	Stop Sign	Overturn / Rollover	D1 was NB and unable to stop on the icy road. V1 slid into the ditch and rolled.	ND 68 & ND 16
14	Hwy 16 RP 137.92 47.6749 -103.8128	247756 2/24/2012 Friday 9:18 AM	PDO Clear Ice / Snow Daylight	Single Veh. Intersection Related Straight (On Level) No	V1 V2	28	M	Dickinson, ND	To Fast For Conditions	N	N	Pickup - Van - Utility Truck Tractor	North West	Stop Sign None	Parked Motor Vehicle Mv In Transport	V1 was NB and unable to stop at the intersection due to icy roads. D1 lost control and ran off the roadway and struck the rear trailer of V2 that was unoccupied in the ditch.	ND 68 & ND 16
15	Hwy 16 RP 137.92 47.6749 -103.8128	247071 2/24/2012 Friday 9:20 AM	PDO Clear Ice / Snow Daylight	Single Veh. Intersection Straight (On Level) No	V1	52	M	Joshua, Tx	To Fast For Conditions	N	N	Truck Tractor	North	Stop Sign	Jackknife	D1 was NB and unable to stop at the intersection due to icy roads. V1 entered the north ditch and jacknifed.	ND 68 & ND 16
16	Hwy 16 RP 137.91 47.6749 -103.8128	276061 3/22/2013 Friday 8:10 AM	PDO Blowing Snow Ice / Snow Daylight	Single Veh. Intersection Straight (On Level) No	V1	28	M	Wibaux, MT	Weather	N	N	Pickup - Van - Utility	North	Stop Sign	Overturn / Rollover	D1 was NB approaching the intersection and lost visibility due to blowing snow. D1 attempted to turn but slid sideways thru the intersection and slid off the road.	ND 68 & ND 16
17	Hwy 68 RP 11.43 47.6749 -103.8128	299308 2/26/2014 Wednesday 8:27 PM	InjB Clear Dry Dark	Single Veh. Intersection Straight (On Grade) No	V1	56	M	Lake Charles, La	Mv Mechanical Failure	N	N	Truck Tractor	North	Stop Sign	Overturn / Rollover	D1 was NB and attempted to brake but was unable to slow down enough to make the turn. V1 entered the north ditch and rolled down an embankment.	ND 68 & ND 16
18	Hwy 16 RP 137.92 47.6749 -103.8128	319781 12/22/2014 Monday 12:30 PM	InjC Cloudy Ice / Snow Daylight	Angle Intersection Straight (On Grade) No	V1 V2	33 40	M M	Williston, ND Cowen, Wv	To Fast For Conditions	N N	N N	Passenger Car 3+ Axle	North West	Stop Sign None	Mv In Transport Mv In Transport	V1 was NB and V2 was WB. D1 failed to stop at the intersection and struck V2.	ND 68 & ND 16
19	Hwy 68 RP 14.01 47.6749 -103.8006	301436 4/3/2014 Thursday 2:00 PM	InjB Cloudy Ice / Snow Daylight	Single Veh. Non-Junction Straight (On Level) No	V1	28	F	Alexander, ND	Weather	N	N	Pickup - Van - Utility	West	None	Fence	V1 was WB on wet and slushy roads. V1 ran off the road and entered the ditch.	
20	Hwy 68 RP 13.99 47.6747 -103.7577	274927 2/28/2013 Thursday 10:15 AM	InjC Clear Dry Daylight	Sideswipe (Opp. Dir.) Non-Junction Straight (On Level) No	V1 V2	29 37	M M	Vernal, Ut Sheridan, Wy	Other	N N	N N	Truck Tractor Truck Tractor	West East	None None	Mv In Transport Mv In Transport	V1 was WB. V2 was EB. V1's load was not secure and obstructing the EB lane. V1's unsecured load struck V2 causing damage to the truck and driver.	

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	Hwy / Ref Pt / Lat. / Long.	Crash # / Date / Day / Time	Severity / Weather / Surf Cond / Lighting	Manner of Coll. / Relation to Jct. / Road Geom. / Under Constr.	Veh #	Age	Sex	Address	Contributing Factors	Ejected	A.D.I.	Unit Config.	Direction of Travel	Traffic Control	Most Harmful Event	Shortened Narrative	Inter. of Crash
21	Hwy 68 RP 14.61 47.6747 -103.7444	318063 12/8/2014 Monday 9:54 PM	InjC Cloudy Wet Dark	Sideswipe (Opp. Dir.) Non-Junction Straight (On Grade) No	V1 V2	29 50	M M	Herriman, Ut Kalispell, MT	Other	N N	N N	Truck Tractor Truck Tractor	West East	None None	Mv In Transport Mv In Transport	V1 was WB. V2 was EB. V1 began losing it's load as V2 passed causing damage to V2.'s truck from the load and to the tires from the debris. V3 was also disabled from running over debris on the road.	
22	Hwy 68 RP 15.34 47.6747 -103.7289	299313 1/3/2014 Friday 12:11 PM	InjB Rain Ice / Snow Daylight	Single Veh. Non-Junction Straight (On Grade) No	V1	33	M	Deland, Fl	Weather	N	N	Pickup - Van - Utility	West	None	Overturn / Rollover	D1 was WB and lost control. V1 entered the ditch and rolled.	
23	Hwy 68 RP 16.09 47.6747 -103.7129	305579 5/21/2014 Wednesday 5:20 AM	InjC Clear Dry Dawn	Sideswipe (Opp. Dir.) Non-Junction Straight (On Grade) No	V1 V2	52	M	Sidney, MT	Speed Mv Mechanical Failure	N	N	Pickup - Van - Utility Pickup - Van - Utility	East Southwest	None Officer/flagperson	Mv In Transport Mv In Transport	V1 was EB. V2 was stopped partially in the EB lane but was disabled after striking a farm animal. D2 tried to flag down V1 as it approached but V1 struck the front of V2.	
24	Hwy 68 RP 17.01 47.6747 -103.6935	230793 6/14/2011 Tuesday 1:40 AM	InjC Rain Wet Dark	Single Veh. Non-Junction Straight (On Level) No	V1	28	M	Minot, ND	Improper Evasive Action	N	Y	Pickup - Van - Utility	West	None	Overturn / Rollover	V1 was WB and began fishtailing. V1 entered the ditch and overturned.	
25	Hwy 68 RP 18.75 47.6747 -103.656	291209 11/12/2013 Tuesday 5:43 AM	PDO Clear Dry Dark	Single Veh. Non-Junction Straight (On Level) No	V1	20	F	Arnegard, ND	Attn Distracted-Inside	N	N	Pickup - Van - Utility	East	None	Overturn / Rollover	D1 was EB and became distracted and lost control. V1 entered the ditch and skidded then rolled onto it's side.	
26	Hwy 68 RP 18.95 47.6754 -103.6519	231665 7/1/2011 Friday 12:00 AM	InjC Clear Dry Dusk	Single Veh. Non-Junction Curve (On Level) No	V1	24	F	Billings, MT	Fail Keep In Proper Lane	N	N	Passenger Car	East	None	Mail Box	D1 was EB and lost control on a curve. V1 crosed the road and entered the ditch striking a set of mailboxes.	
27	47.7036 -103.6501	322756 2/16/2015 Monday 6:13 PM	PDO Cloudy Ice / Snow Dark	Sideswipe (Opp. Dir.) Intersection Related Straight (On Grade) No	V1 V2	53 45	F M	Lewisburg, Tn Montrose, Co	Improper Turn	N N	N N	3+ Axle Pickup - Van - Utility	South East	None None	Mv In Transport Mv Tran In Other Rdwy	V1 was SB and turned west. V2 was EB on 20th St and unable to slow down due to icy conditions. D1 made a sharp turn in order to pick up speed for the hill on 20th St and struck V2.	ND 68 & 20th St NW
28	Hwy 68 47.7583 -103.648	244523 10/29/2011 Saturday 9:49 PM	PDO Clear Dry Dark	Sideswipe (Opp. Dir.) Non-Junction Straight (On Grade) No	V1 V2	26 36	M M	Williston, ND Sidney, MT	Driving Left Of Center	N N	Y N	Passenger Car 3+ Axle	South North	None None	Mv In Transport Mv In Transport	V1 was SB and crossed into the NB roadway. V2 was NB and drove into the ditch to avoid the collision.V1 struck V2 and continued north. D1 was cited for DUI.	
29	Hwy 68 47.7861 -103.6478	249133 3/25/2012 Sunday 4:30 AM	PDO Clear Dry Dark	Single Veh. Non-Junction Straight (On Level) No	V1	28	F	Sidney, MT	Fail Keep In Proper Lane	N	N	Passenger Car	South	None	Overturn / Rollover	V1 ran off the roadwaya nd rolled onto it's roof. D1 reportedly blacked out.	
30	47.7326 -103.6478	283898 7/30/2013 Tuesday 7:25 PM	PDO Clear Dry Daylight	Rear End Intersection Straight (On Grade) No	V1 V2	23 53	M M	Miles City, ND New Bern, Nc	Following Too Close	N N	N N	Pickup - Van - Utility Truck Tractor	South South	None None	Mv In Transport Mv In Transport	V1 was SB approaching V2. V2 was slowed to turn west on 22nd St. D1 was not able to react in time and struck the rear of V2.	ND 68 & 22nd St NW

For Crash Severity: Fatal = Fatility, InjA = Incapacitating Injury, InjB = Non-Incapacitating Injury, InjC = Possible Injury, PDO = Property Damage Only
ADI = Alcohol or Drug Involvment

Crash Summary Sheets

Total Crashes: 36 **Location Description:** ND 68 from State Line to Jct US 85
Length: 28.124 **Start RP:** 0.000
Sorted By: Longitude **End RP:** 28.124

	M	D	Year
Start Date:	6	1	2010
End Date:	5	31	2015

# of Years: 5.00

Notes: Animal crashes were not included.

23 USC § 409 Documents NDDOT Reserves All Objections

	Hwy / Ref Pt / Lat. / Long.	Crash # / Date / Day / Time	Severity / Weather / Surf Cond / Lighting	Manner of Coll. / Relation to Jct. / Road Geom. / Under Constr.	Veh #	Age	Sex	Address	Contributing Factors	Ejected	A.D.I.	Unit Config.	Direction of Travel	Traffic Control	Most Harmful Event	Shortened Narrative	Inter. of Crash
31	Hwy 68 RP 22.98 47.7326 -103.6478	304723 4/4/2014 Friday 3:59 PM	PDO Clear Dry Daylight	Single Veh. Intersection Straight (On Grade) No	V1	54	M	Miles City, MT	Other	N	N	3+ Axle	North	None	Mail Box	V1 was NB on ND 68. V2 was EB on 22nd St. V2 failed to yield and pulled out in front of V1. V1 drove into the ditch to avoid the collision striking several mailboxes & a mile marker.	ND 68 & 22nd St NW
32	Hwy 68 RP 27.92 47.804 -103.6478	302029 4/7/2014 Monday 10:10 AM	PDO Clear Dry Daylight	Rear End Intersection Straight (On Level) No	V1 V2	43 33	M M	Garrison, MT Belle Fourche, SD	Failed To Yield	N N	N N	Pickup - Van - Utility Pickup - Van - Utility	North North	Stop Sign Stop Sign	Mv In Transport Mv In Transport	V1 and V2 were both leaving the truck stop approaching US 85. V2 was stopped at the stop sign and was rear ended by V1.	ND 68 & truck stop approach
33	Hwy 68 RP 24.41 47.7532 -103.6478	309624 8/13/2014 Wednesday 10:55 AM	InjB Clear Dry Daylight	Single Veh. Non-Junction Straight (On Level) No	V1 V2	48 54	M M	Faulkner, Ar Watford City, ND	Over Correct/steering Wrong Way	N N	N N	Pickup - Van - Utility 3+ Axle	North South	None None	Overturn / Rollover Thrown/falling Object	V1 was NB. V2 was SB. A tank came loose from V2 and struck V1. D1 ran off the road then overcorrected and went across the road, into the ditch and rolled.	
34	47.7036 -103.6477	324621 3/26/2015 Thursday 7:45 AM	PDO Snow Ice / Snow Daylight	Other Intersection Straight (On Grade) No	V1 V2	22	M	Hopkins, Tx Cape Coral, Fl	Careless/reckless Driving Weather	N	N	Pickup - Van - Utility Pickup - Van - Utility	West West	None None	Mv In Transport Mv In Transport	V1 was SB and turned onto 20th St but couldn't make it up the hill. V2 went around V1 but spun out and was stopped in front of V1. V3 came off the hwy and went around both vehicles, lost control & slid backwards striking V1 & V2.	ND 68 & 20th St NW
35	Hwy 68 RP 28 47.8051 -103.6472	297024 12/10/2013 Tuesday 1:13 PM	PDO Clear Ice / Snow Daylight	Sideswipe (Opp. Dir.) Intersection Straight (On Level) No	V1 V2	26 27	M M	Poplar, MT Powell, Wy	Driving Left Of Center Speed	N N	N N	Truck Tractor Pickup - Van - Utility	South West	None Stop Sign	Mv In Transport Mv In Transport	V1 was SB turning east into the truck stop. V2 was westbound coming out of the truck stop. V2 was in the driveway in V1's turning path and was struck by V1's trlr.	ND 68 & truck stop approach
36	Hwy 68 RP 28 47.8051 -103.6472	297035 12/15/2013 Sunday 11:11 PM	PDO Cloudy Ice / Snow Dark	Left Turn Alley/driveway Curve (On Level) No	V1 V2	59 21	M M	Phoenix, Az Billings, MT		N N	N N	3+ Axle Pickup - Van - Utility	East West	None None	Mv In Transport Mv In Transport	V1 was SB turning east into the truck stop. V2 was westbound coming out of the truck stop. V2 was in the driveway in V1's turning path and was struck by V1's trlr.	ND 68 & truck stop approach
37																	
38																	
39																	
40																	

For Crash Severity: Fatal = Fatility, InjA = Incapacitating Injury, InjB = Non-Incapacitating Injury, InjC = Possible Injury, PDO = Property Damage Only
ADI = Alcohol or Drug Involvment

APPENDIX B

Intersection Traffic Volumes

North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

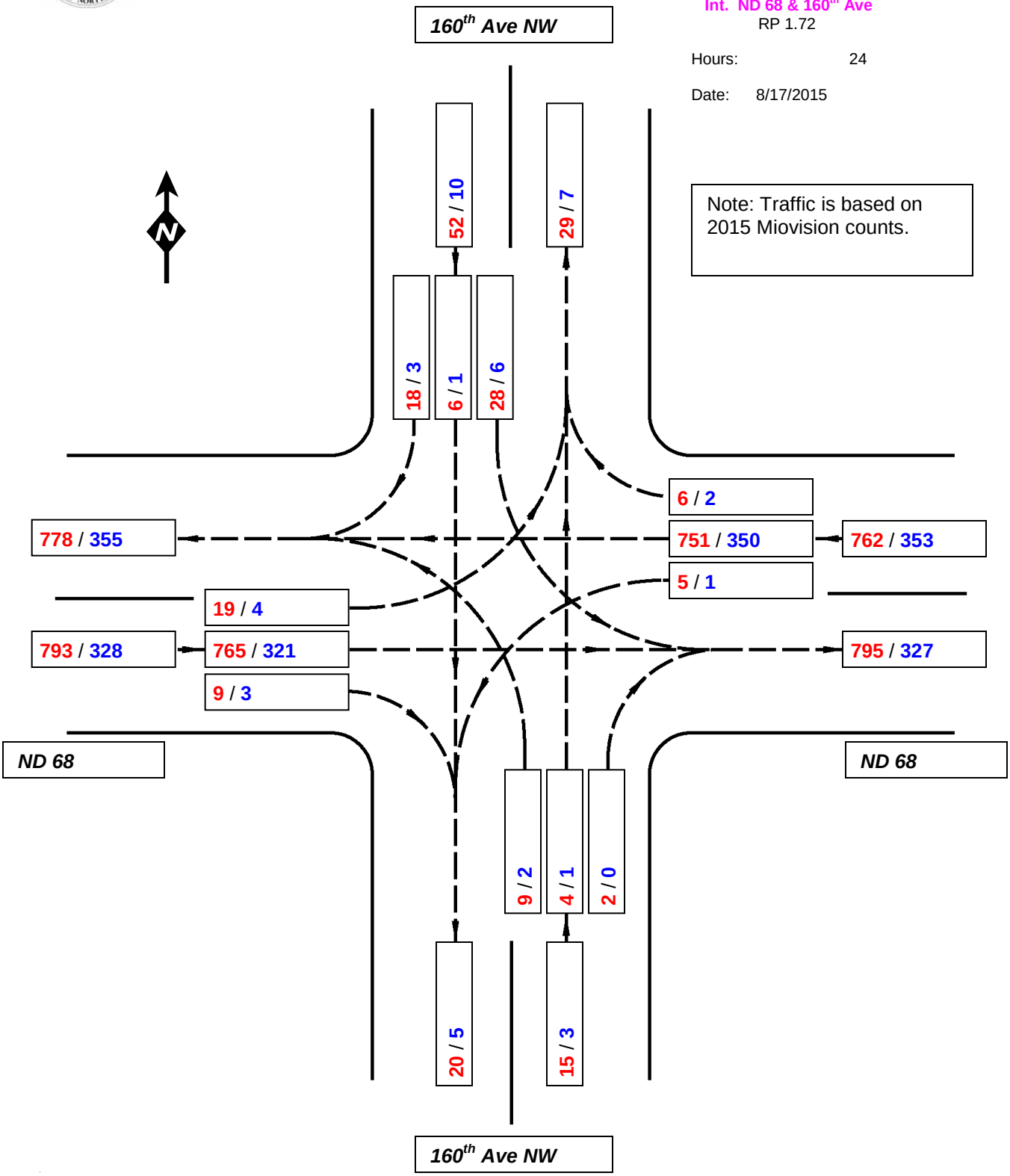
Intersection No: 1

Description
Int. ND 68 & 160th Ave
RP 1.72

Hours: 24

Date: 8/17/2015

Note: Traffic is based on 2015 Miovision counts.



LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

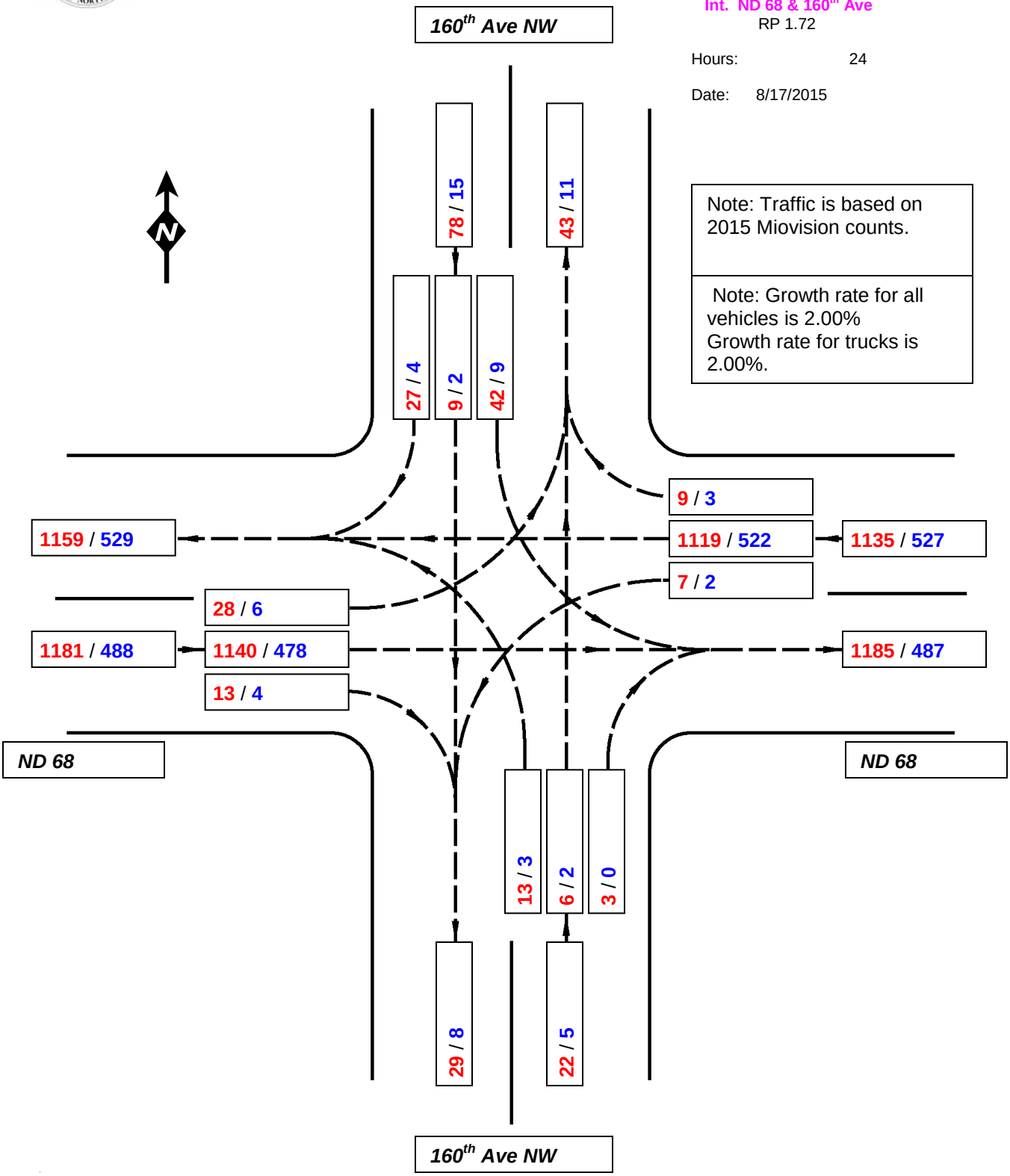
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No: 1

Description
Int. ND 68 & 160th Ave
RP 1.72

Hours: 24

Date: 8/17/2015



Note: Traffic is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00%
Growth rate for trucks is 2.00%.

LEGEND: AADT / TRUCKS - 2035

Completed by NR

Intersection Traffic Volumes

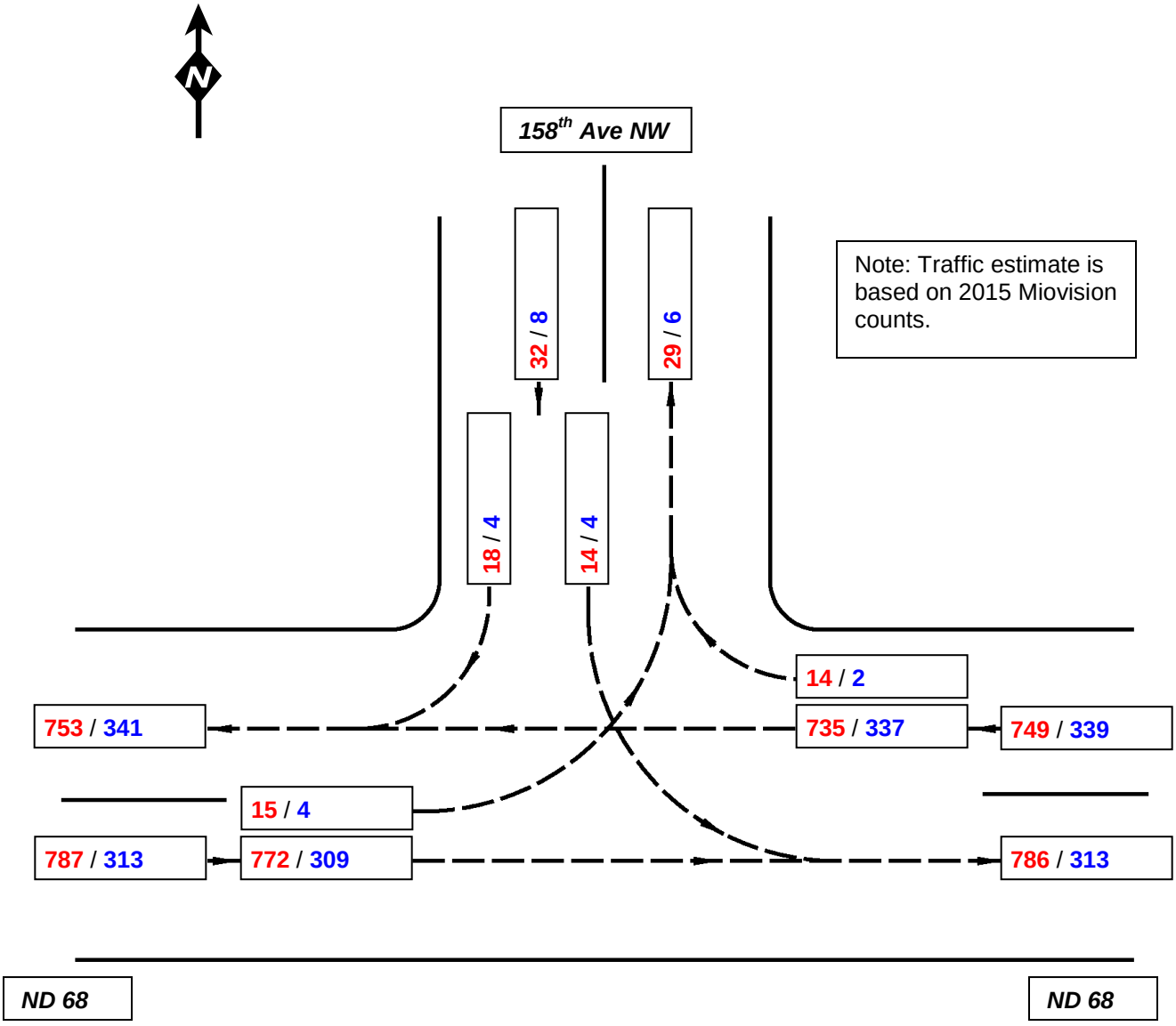
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 2

Description Int. ND 68 & 158th Ave NW
Ref. Pt. 6.90

Hours 24

Date 8/17/2015



Note: Traffic estimate is based on 2015 Miovision counts.

LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

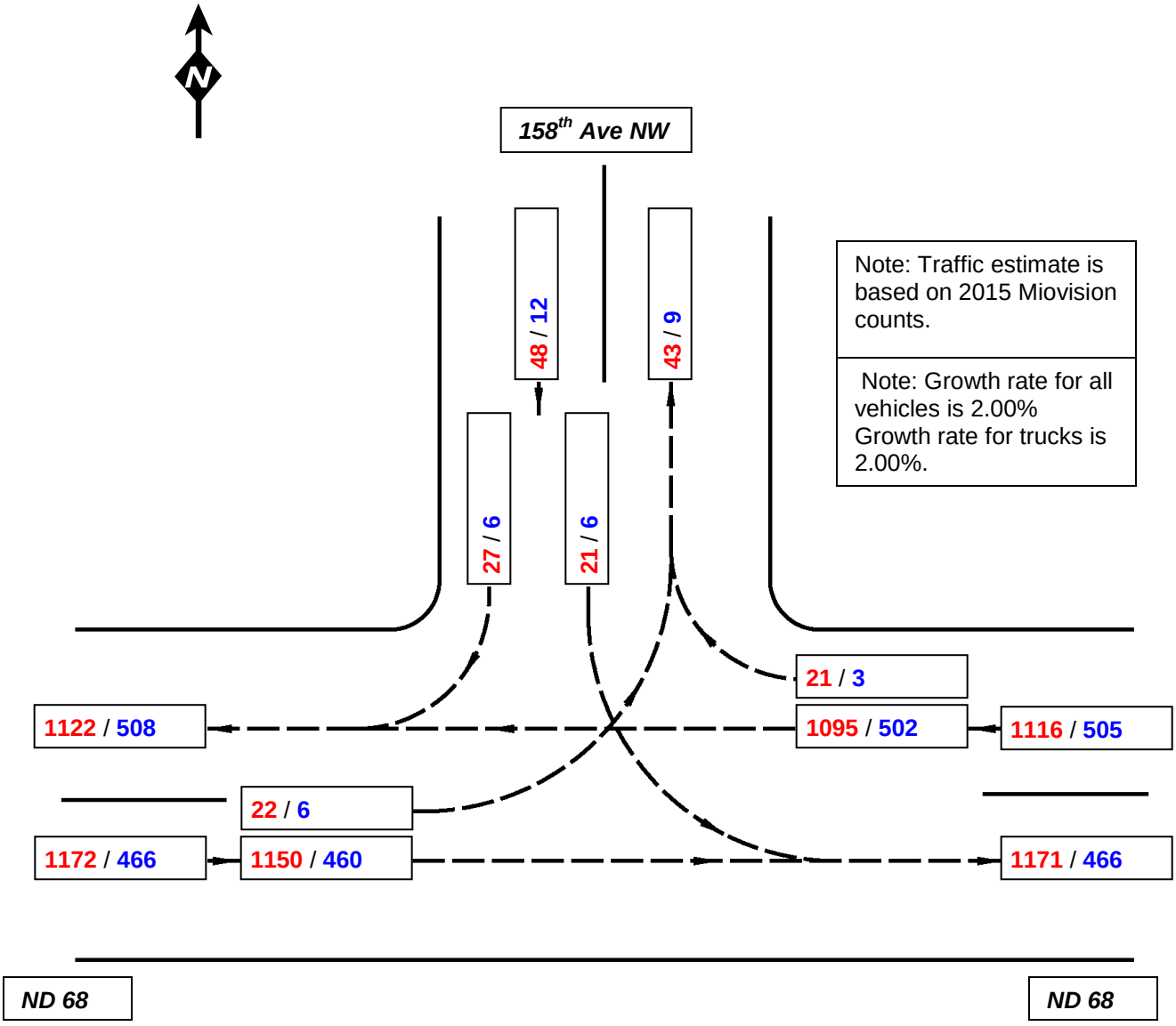
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 2

Description Int. ND 68 & 158th Ave NW
Ref. Pt. 6.90

Hours 24

Date 8/17/2015



Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00% Growth rate for trucks is 2.00%.

LEGEND: AADT / TRUCKS - 2035

Completed by NR

Intersection Traffic Volumes

North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

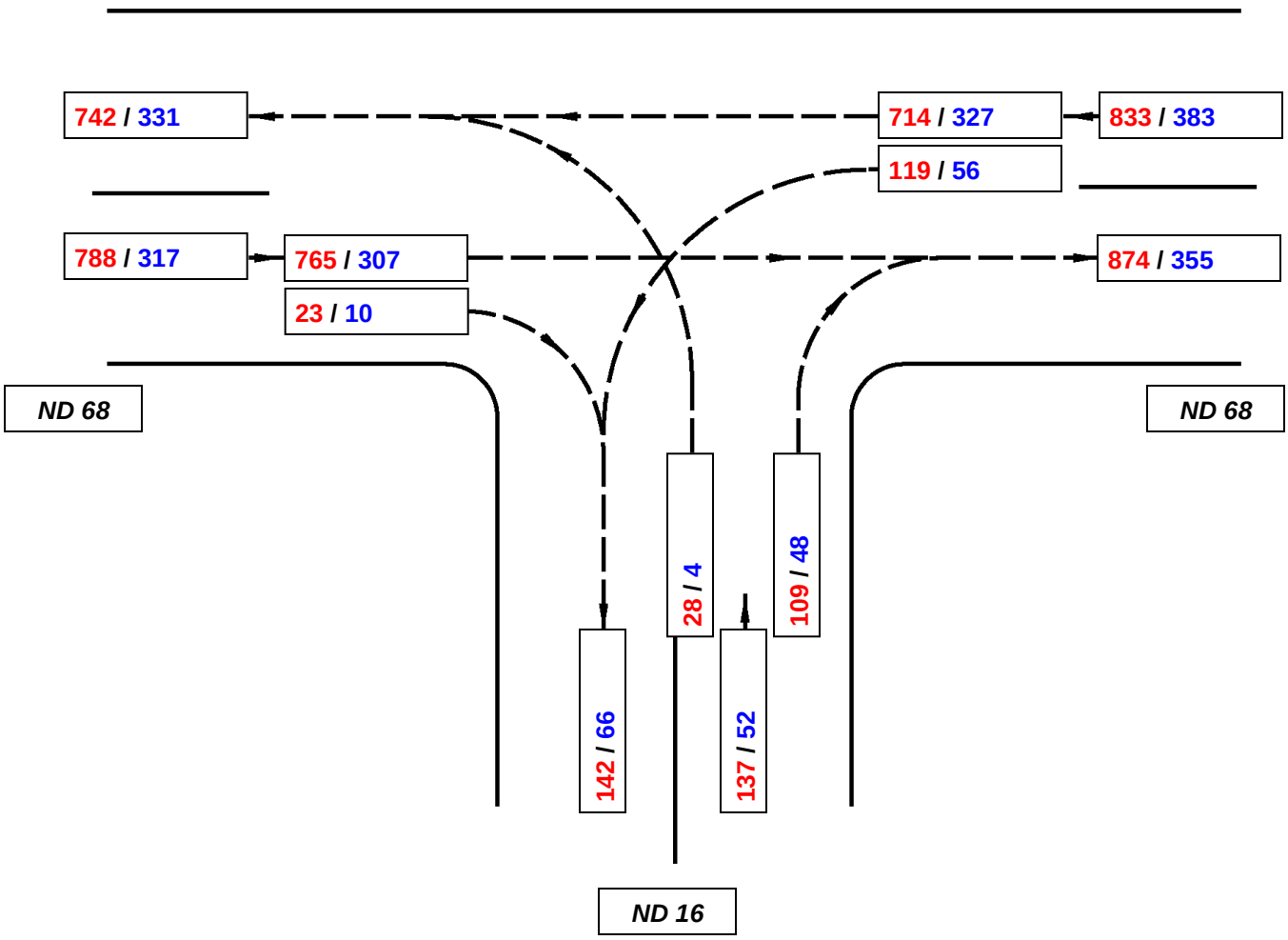
Intersection No. 3

Description
Int. ND 16 & ND 68
RP 11.441 (ND 16) & RP 137.915 (ND 68)

Hours 24

Date 8/17/2015

Note: Traffic estimate is based on 2015 Miovision counts.



LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 3

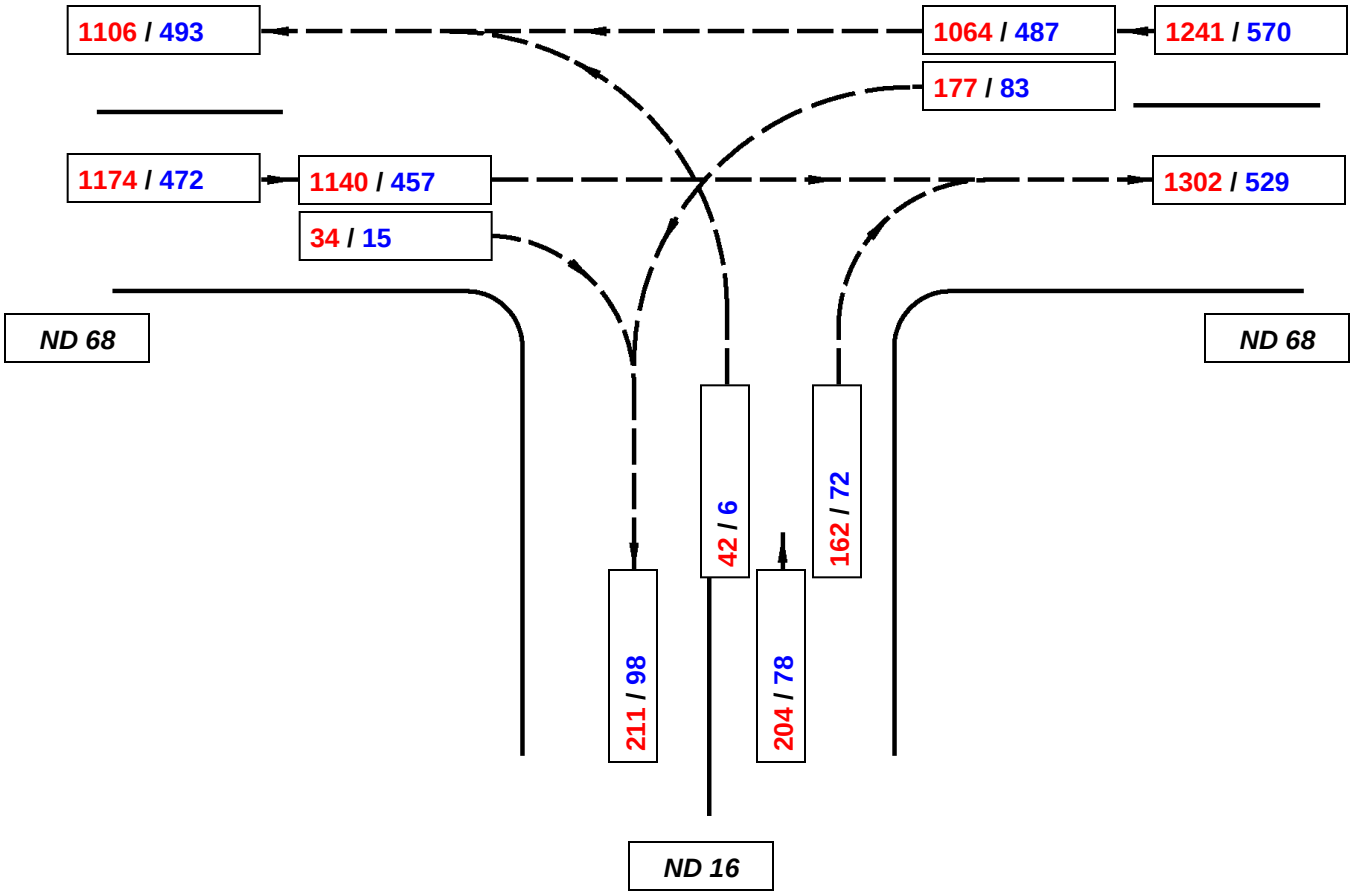
Description Int. ND 16 & ND 68
RP 11.441 (ND 16) & RP 137.915 (ND

Hours 24

Date 8/17/2015

Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00% Growth rate for trucks is 2.00%.



LEGEND: AADT / TRUCKS - 2035

Completed by NR

Intersection Traffic Volumes

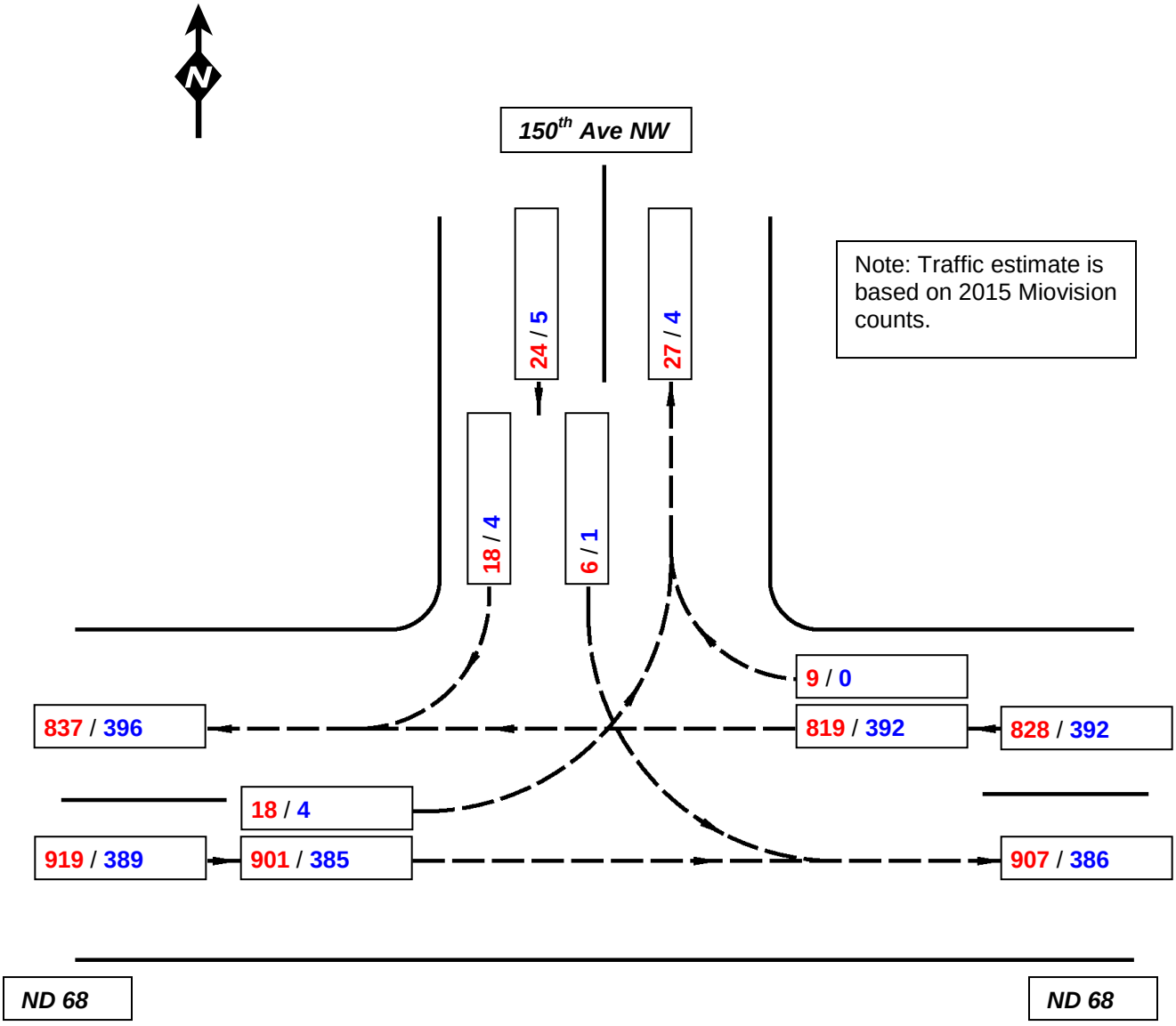
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 4

Description Int. ND 68 & 150th Ave NW
Ref. Pt. 12.14

Hours 24

Date 8/17/2015



Note: Traffic estimate is based on 2015 Miovision counts.

LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

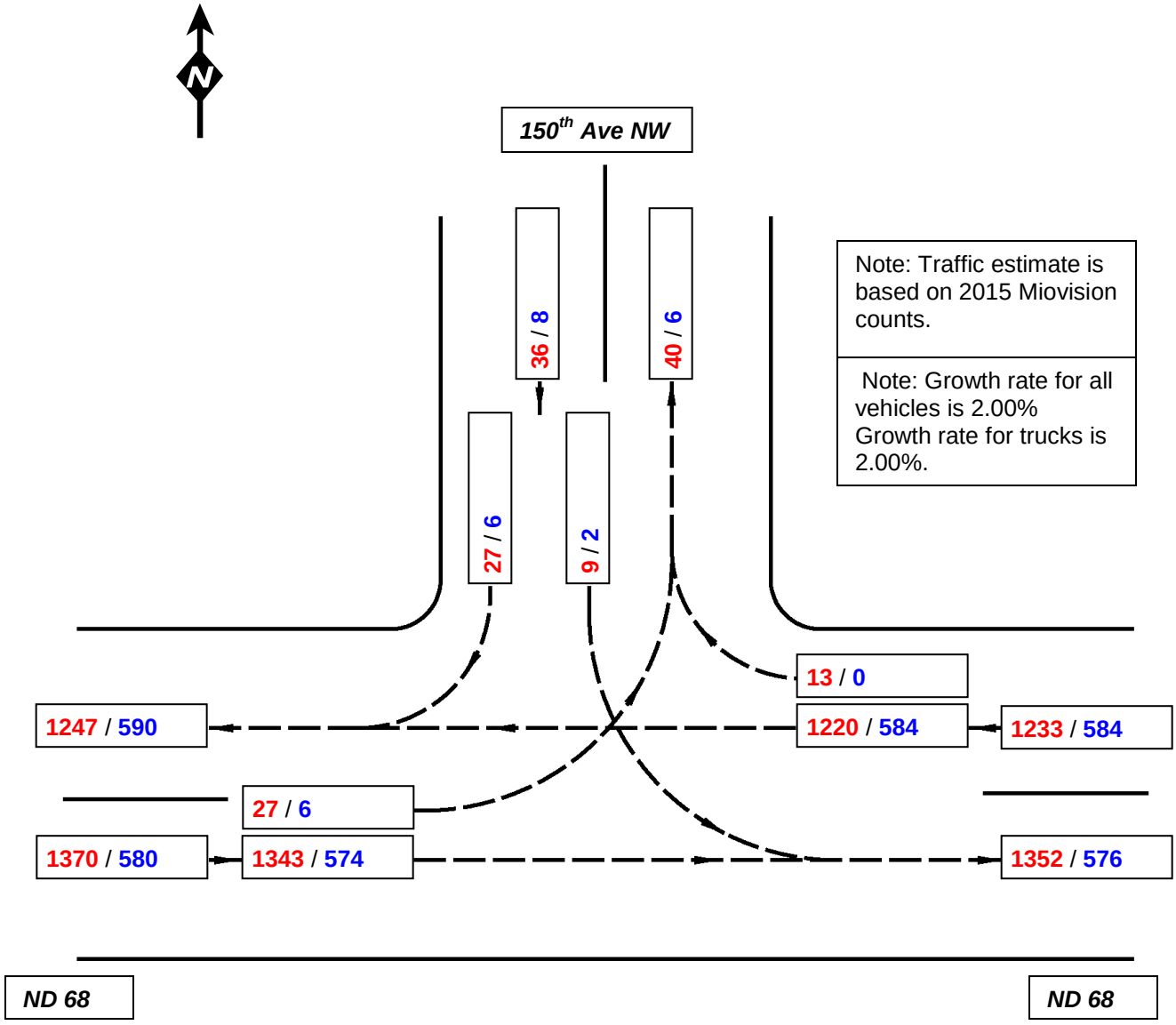
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 4

Description Int. ND 68 & 150th Ave NW
Ref. Pt. 12.14

Hours 24

Date 8/17/2015



Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00% Growth rate for trucks is 2.00%.

LEGEND: AADT / TRUCKS - 2035

Completed by NR

Intersection Traffic Volumes

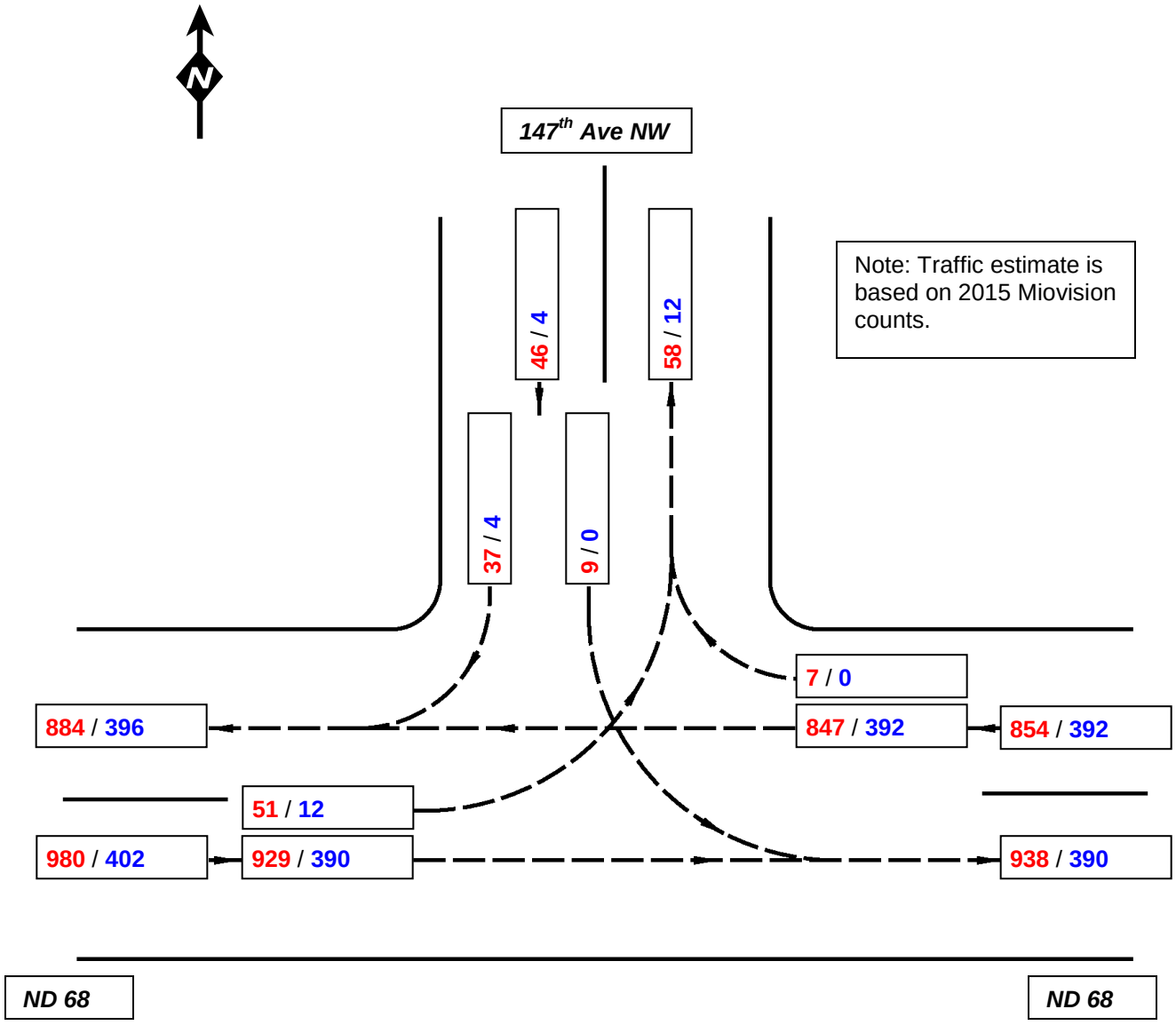
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 5

Description Int. ND 68 & 147th Ave NW
Ref. Pt. 15.13

Hours 24

Date 8/17/2015



Note: Traffic estimate is based on 2015 Miovision counts.

LEGEND: AADT / TRUCKS - 2015

Completed by NR

23 USC § 409 Documents
NDDOT Reserves All Objections

Intersection Traffic Volumes

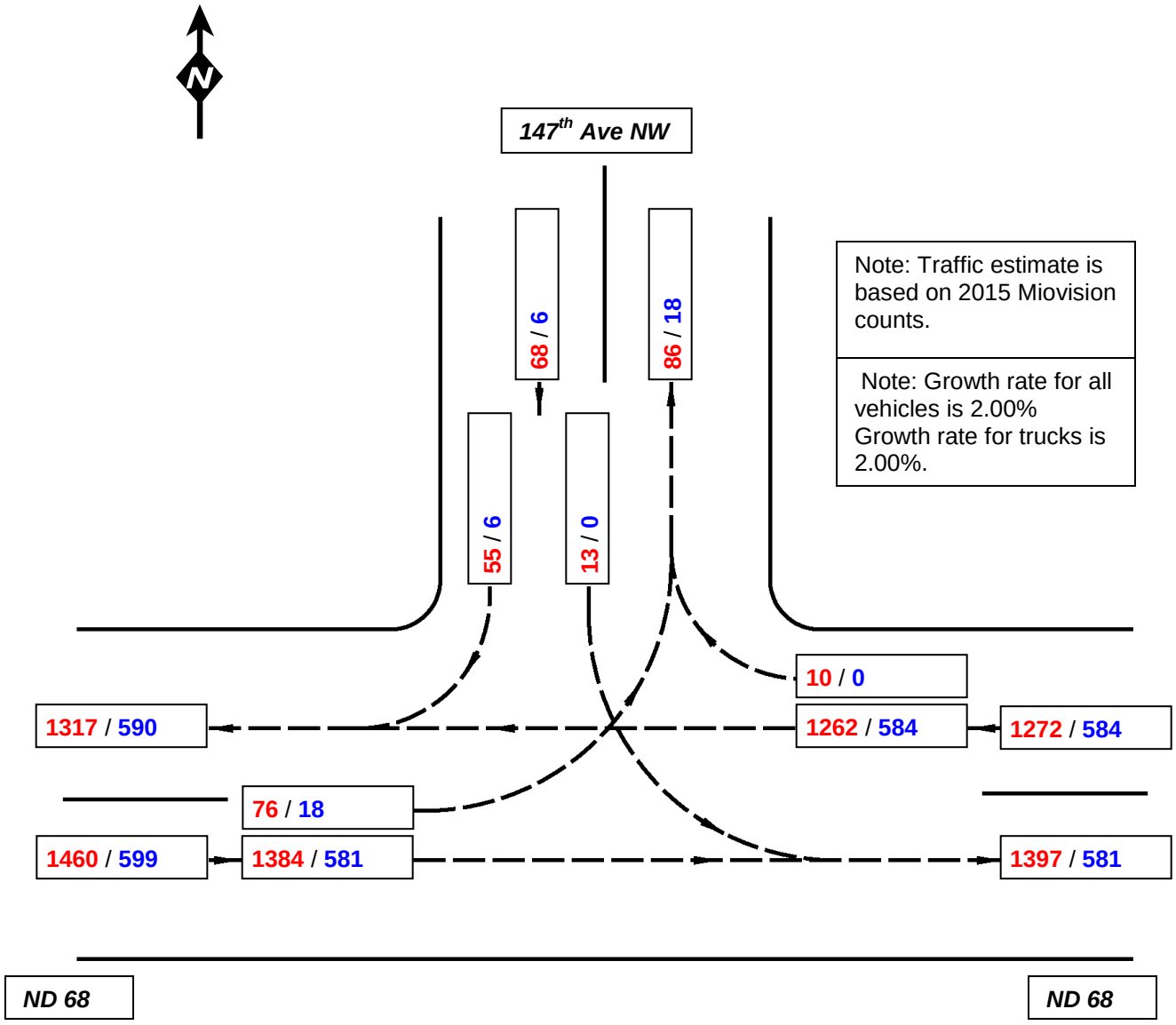
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 5

Description Int. ND 68 & 147th Ave NW
Ref. Pt. 15.13

Hours 24

Date 8/17/2015



Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00% Growth rate for trucks is 2.00%.

LEGEND: AADT / TRUCKS - 2035

Completed by NR

Intersection Traffic Volumes

North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

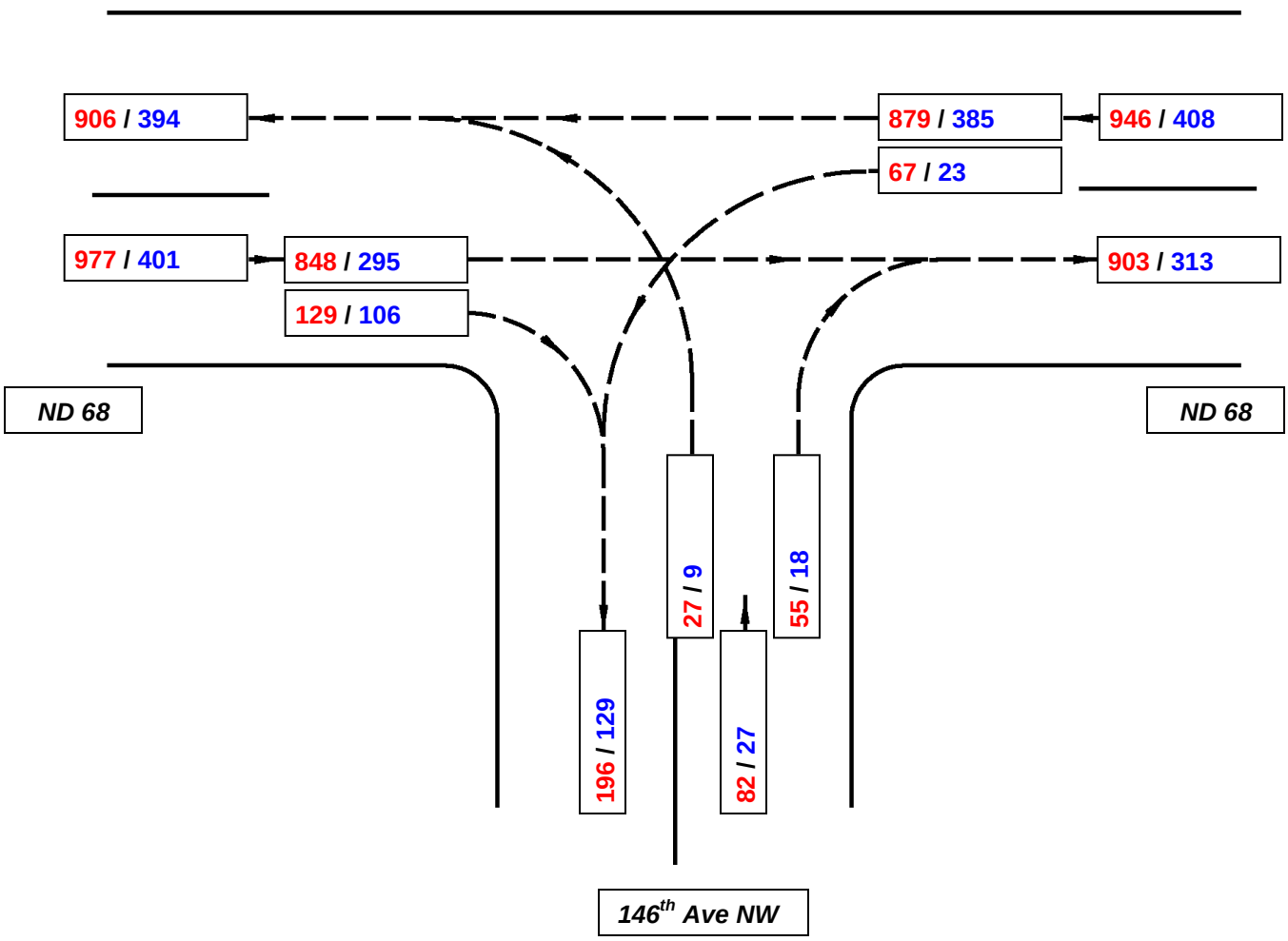
Intersection No. 6

Description
Int. ND 68 & 146th Ave NW
RP 18.957

Hours 24

Date 8/18/2015

Note: Traffic estimate is based on 2015 Miovision counts.



LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 6

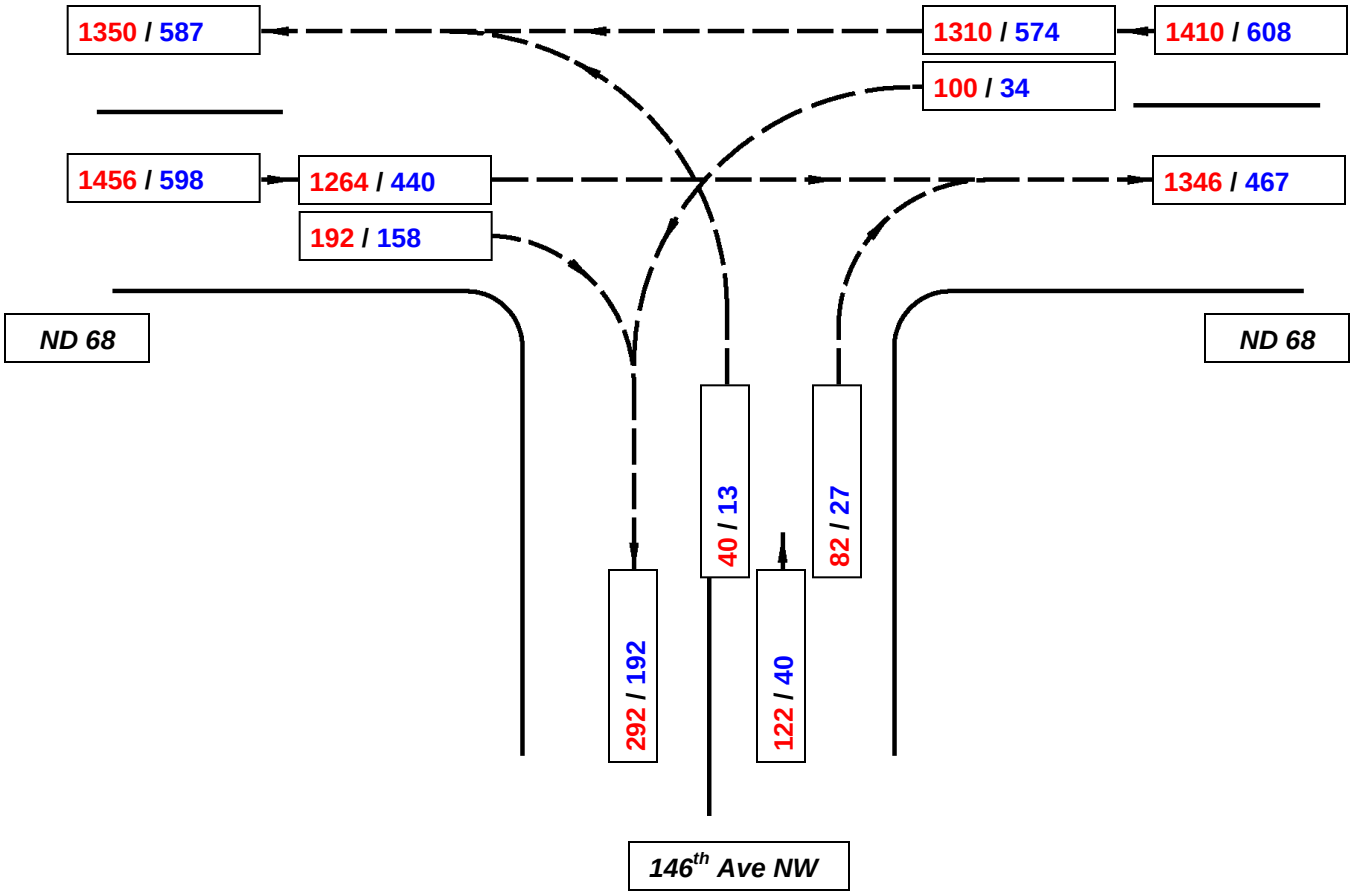
Description
Int. ND 68 & 146th Ave NW
RP 18.957

Hours 24

Date 8/18/2015

Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00% Growth rate for trucks is 2.00%.



LEGEND: AADT / TRUCKS - 2035

Completed by NR

23 USC § 409 Documents
NDDOT Reserves All Objections

Intersection Traffic Volumes

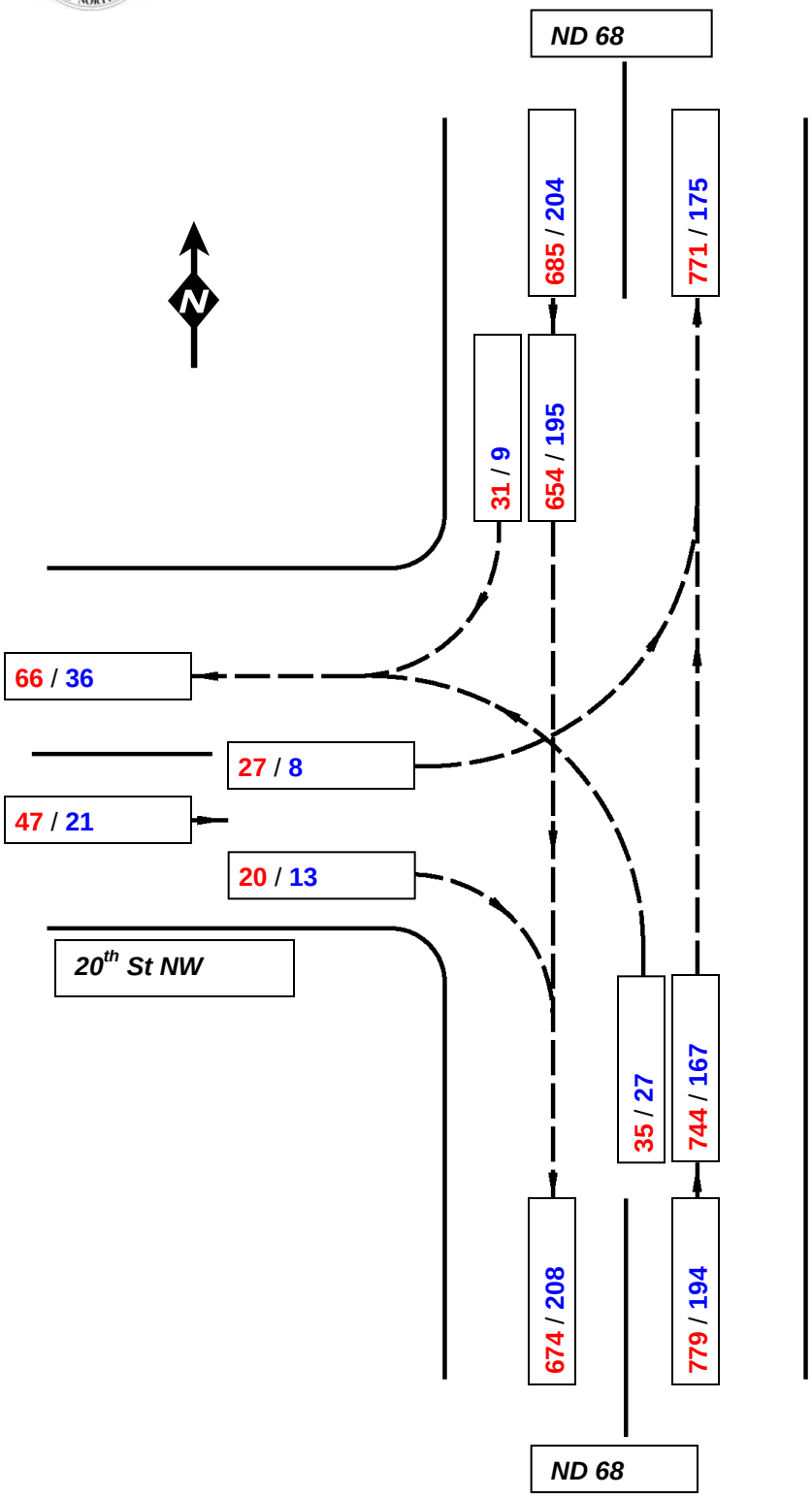
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 7

Description:
Int. ND 68 & 20th St NW
RP 21.00

Hours 24

Date 8/17/2015



Note: Traffic estimate is based on 2015 Miovision counts.

LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

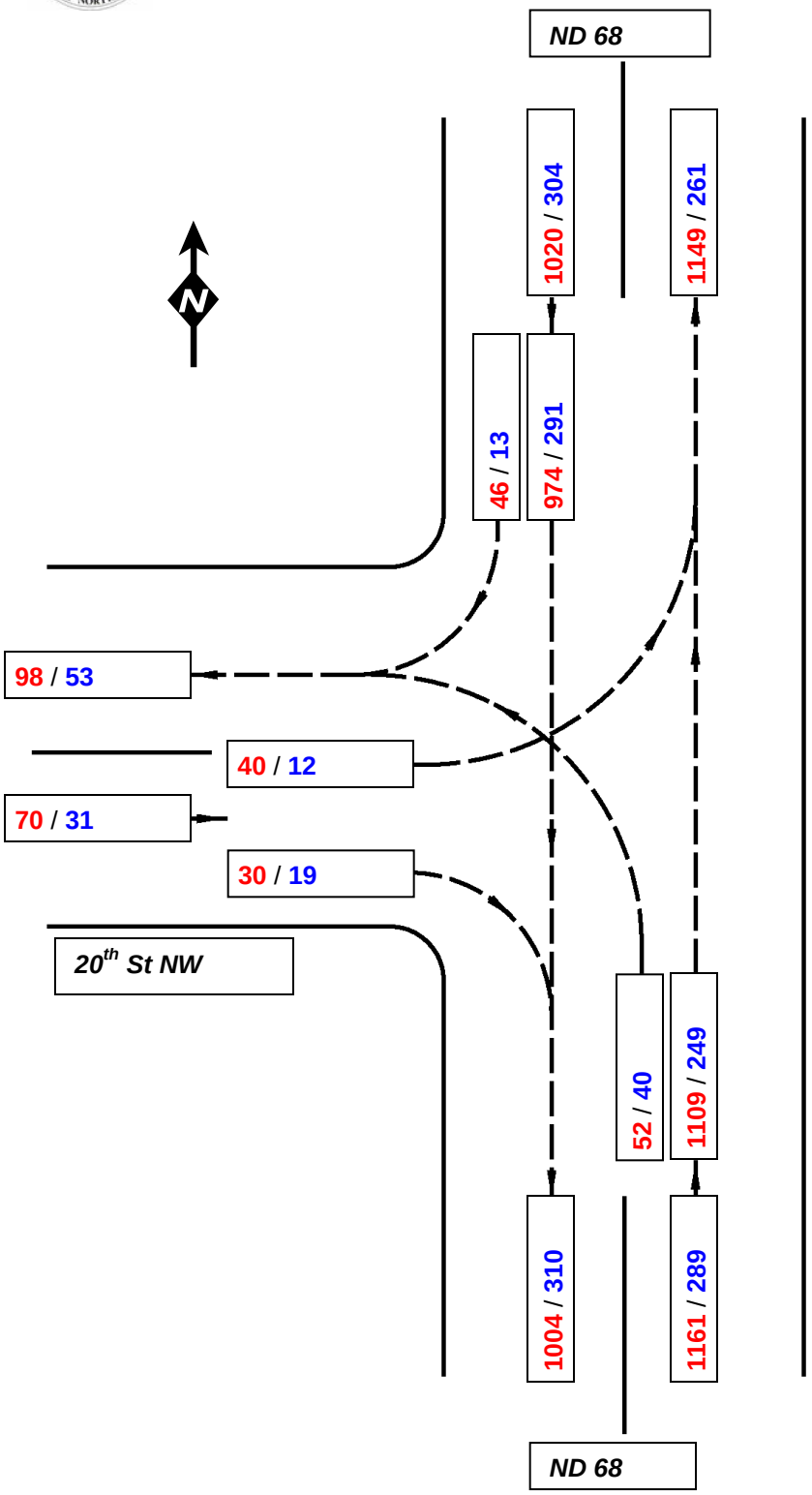
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 7

Description:
Int. ND 68 & 20th St NW
RP 21.00

Hours 24

Date 8/17/2015



Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00% Growth rate for trucks is 2.00%.

LEGEND: AADT / TRUCKS - 2035

23 USC § 409 Documents
NDDOT Reserves All Objections

Completed by NR

Intersection Traffic Volumes

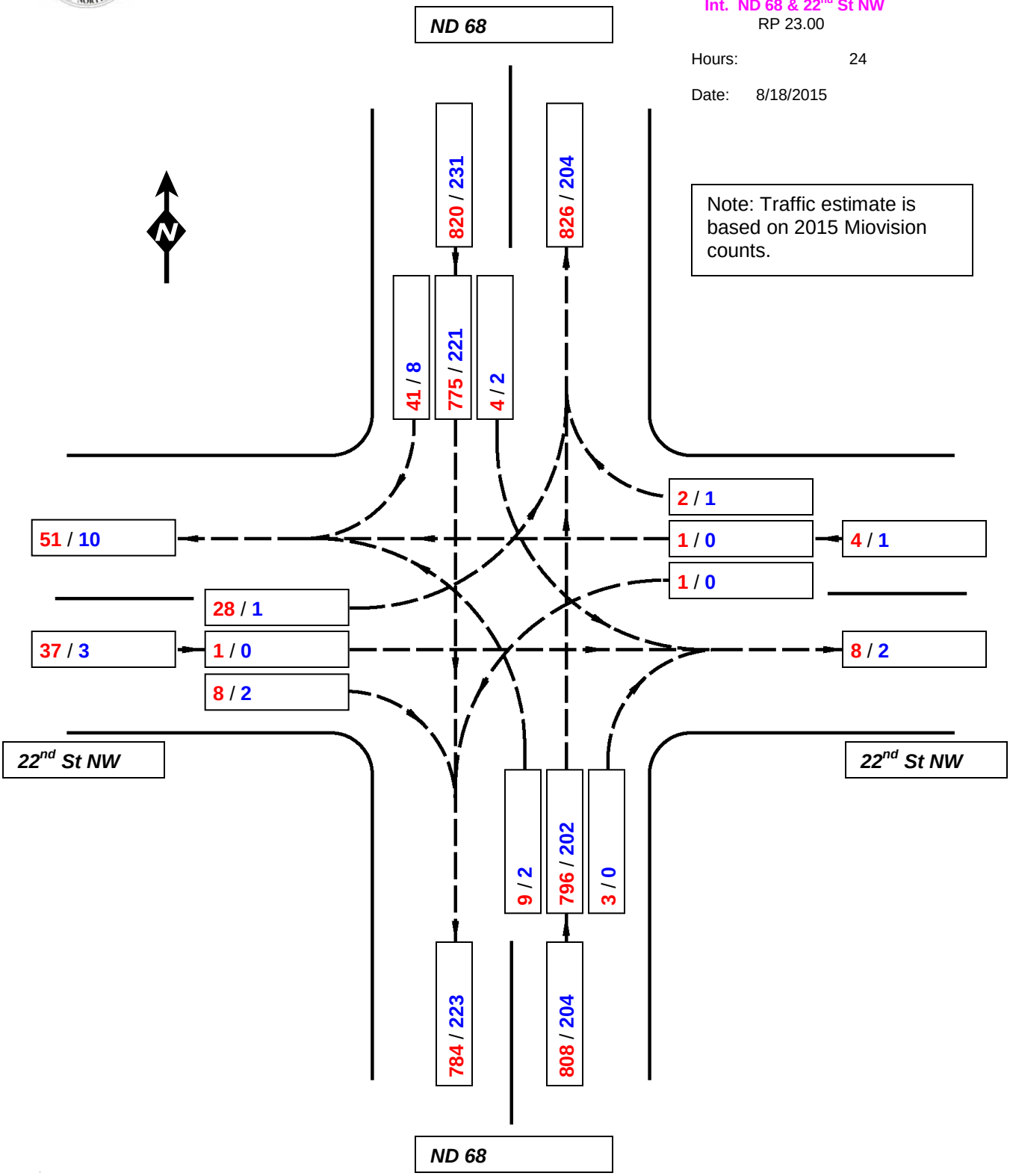
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No: 8

Description
Int. ND 68 & 22nd St NW
RP 23.00

Hours: 24

Date: 8/18/2015



Note: Traffic estimate is based on 2015 Miovision counts.

LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

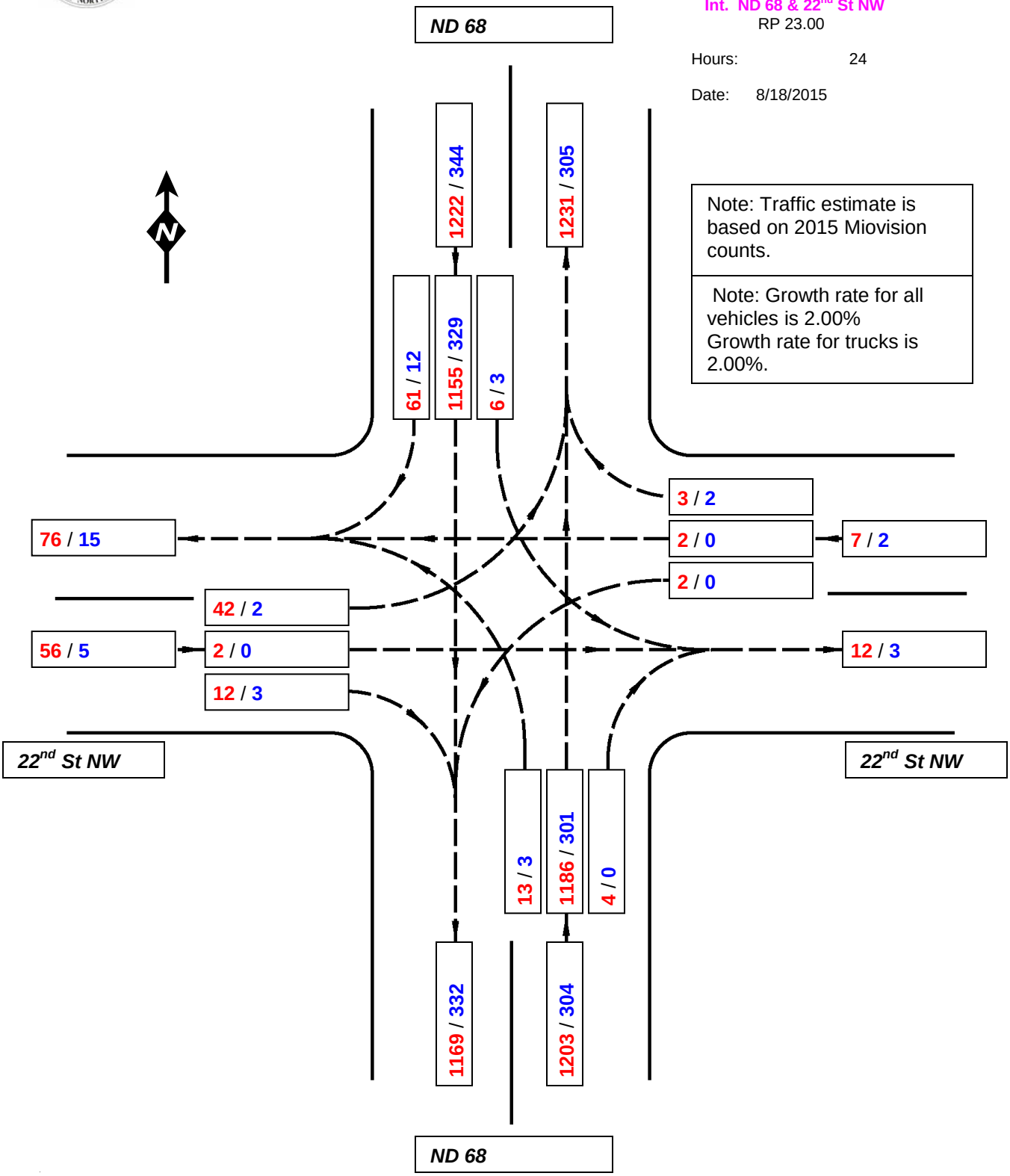
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No: 8

Description
Int. ND 68 & 22nd St NW
RP 23.00

Hours: 24

Date: 8/18/2015



Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00%
Growth rate for trucks is 2.00%.

LEGEND: AADT / TRUCKS - 2035

Completed by NR

Intersection Traffic Volumes

North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

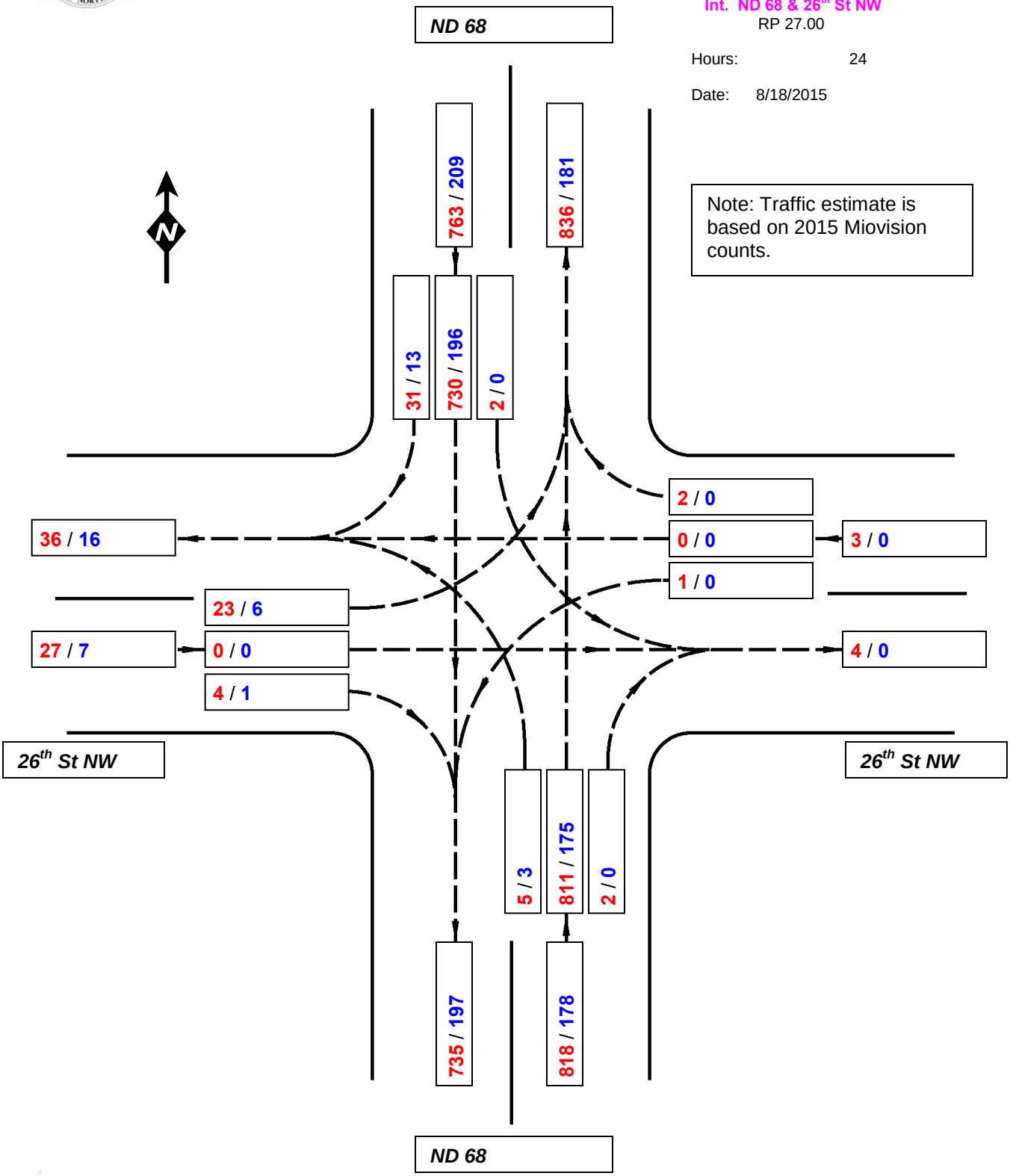
Intersection No: 9

Description
Int. ND 68 & 26th St NW
RP 27.00

Hours: 24

Date: 8/18/2015

Note: Traffic estimate is based on 2015 Miovision counts.



LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

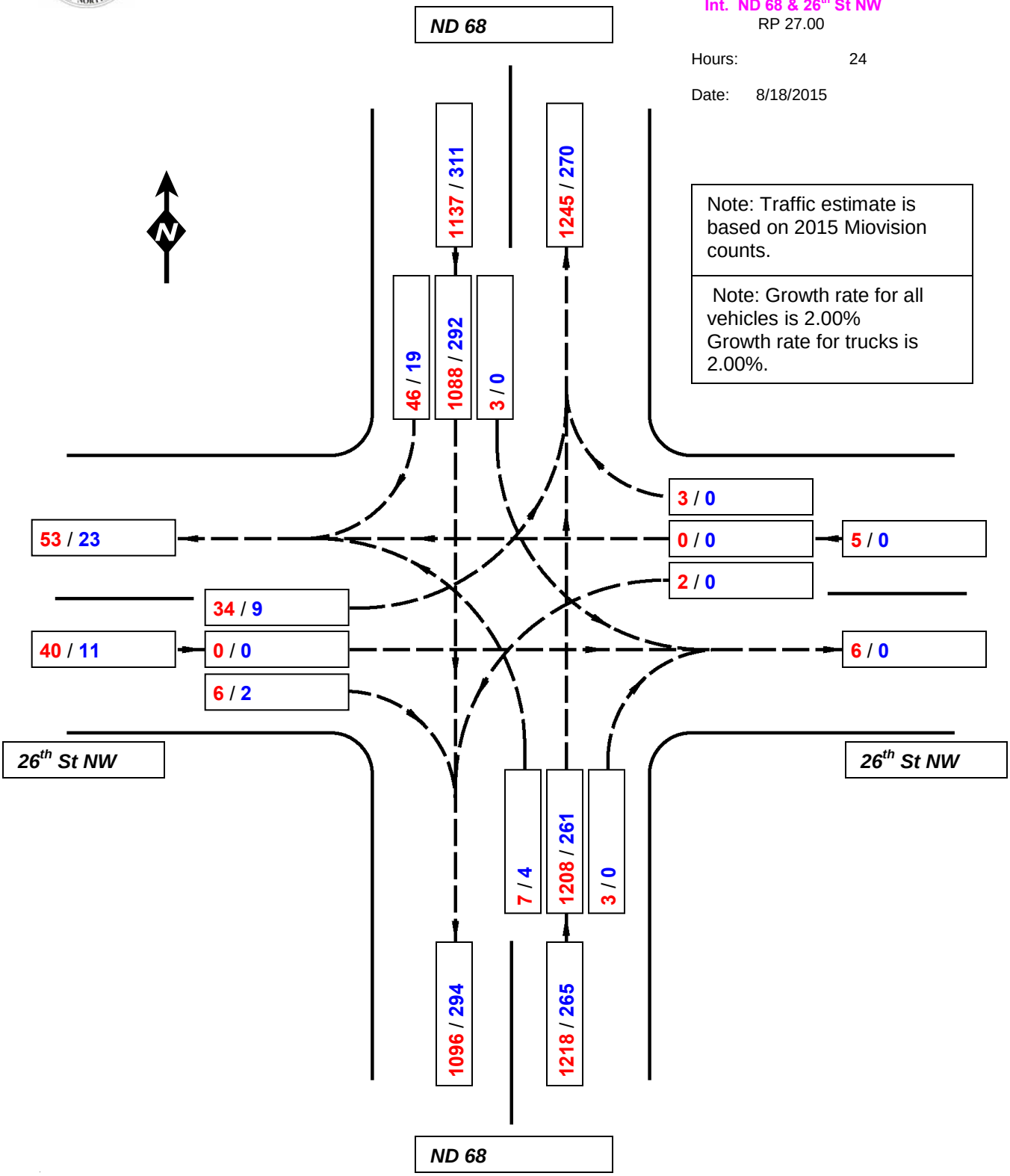
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No: 9

Description
Int. ND 68 & 26th St NW
RP 27.00

Hours: 24

Date: 8/18/2015



Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00%
Growth rate for trucks is 2.00%.

LEGEND: AADT / TRUCKS - 2035

Completed by NR

Intersection Traffic Volumes

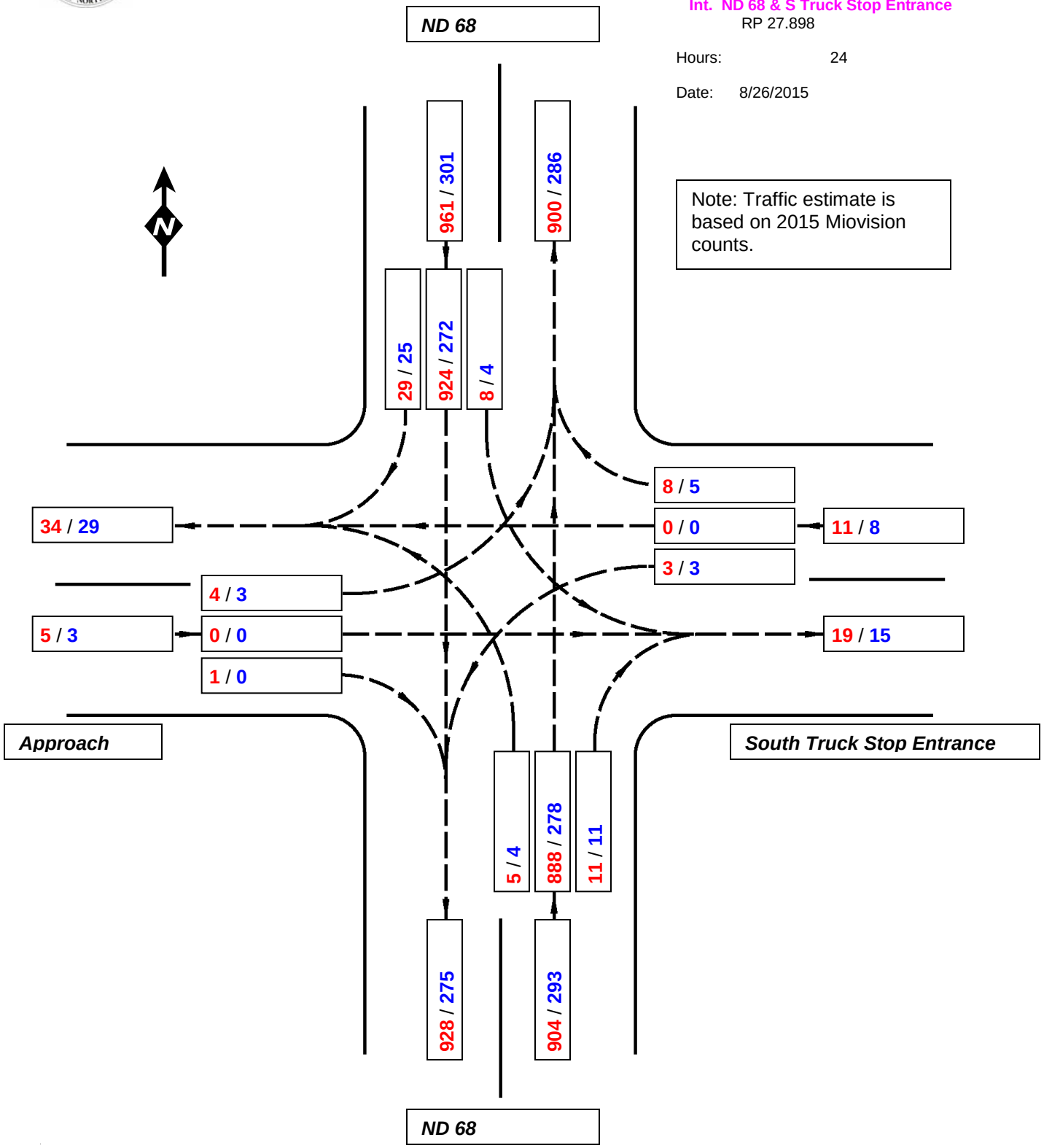
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No: 10

Description
Int. ND 68 & S Truck Stop Entrance
RP 27.898

Hours: 24

Date: 8/26/2015



LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

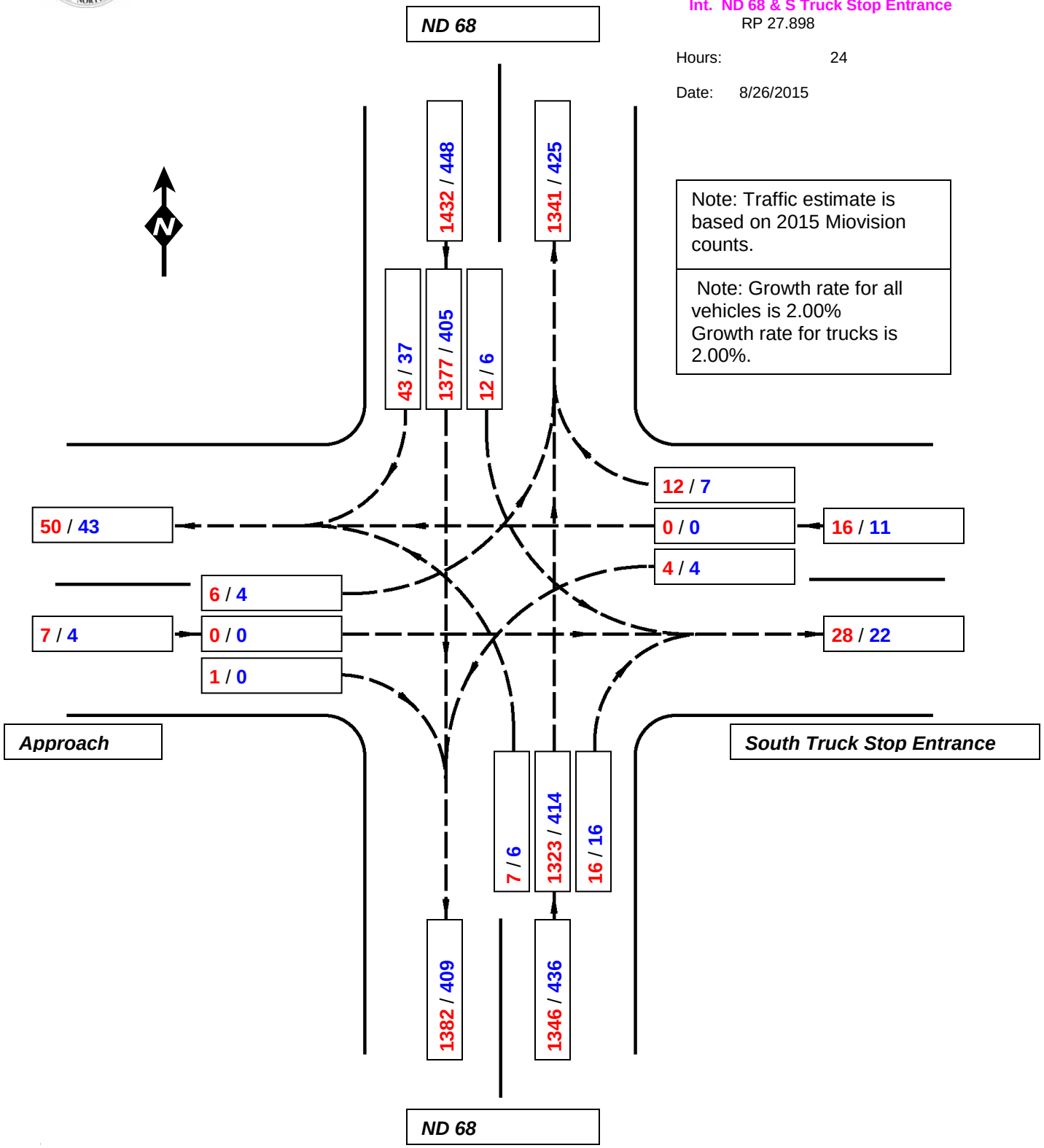
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No: 10

Description
Int. ND 68 & S Truck Stop Entrance
RP 27.898

Hours: 24

Date: 8/26/2015



Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00%
Growth rate for trucks is 2.00%.

LEGEND: AADT / TRUCKS - 2035

Completed by NR

Intersection Traffic Volumes

North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 11A

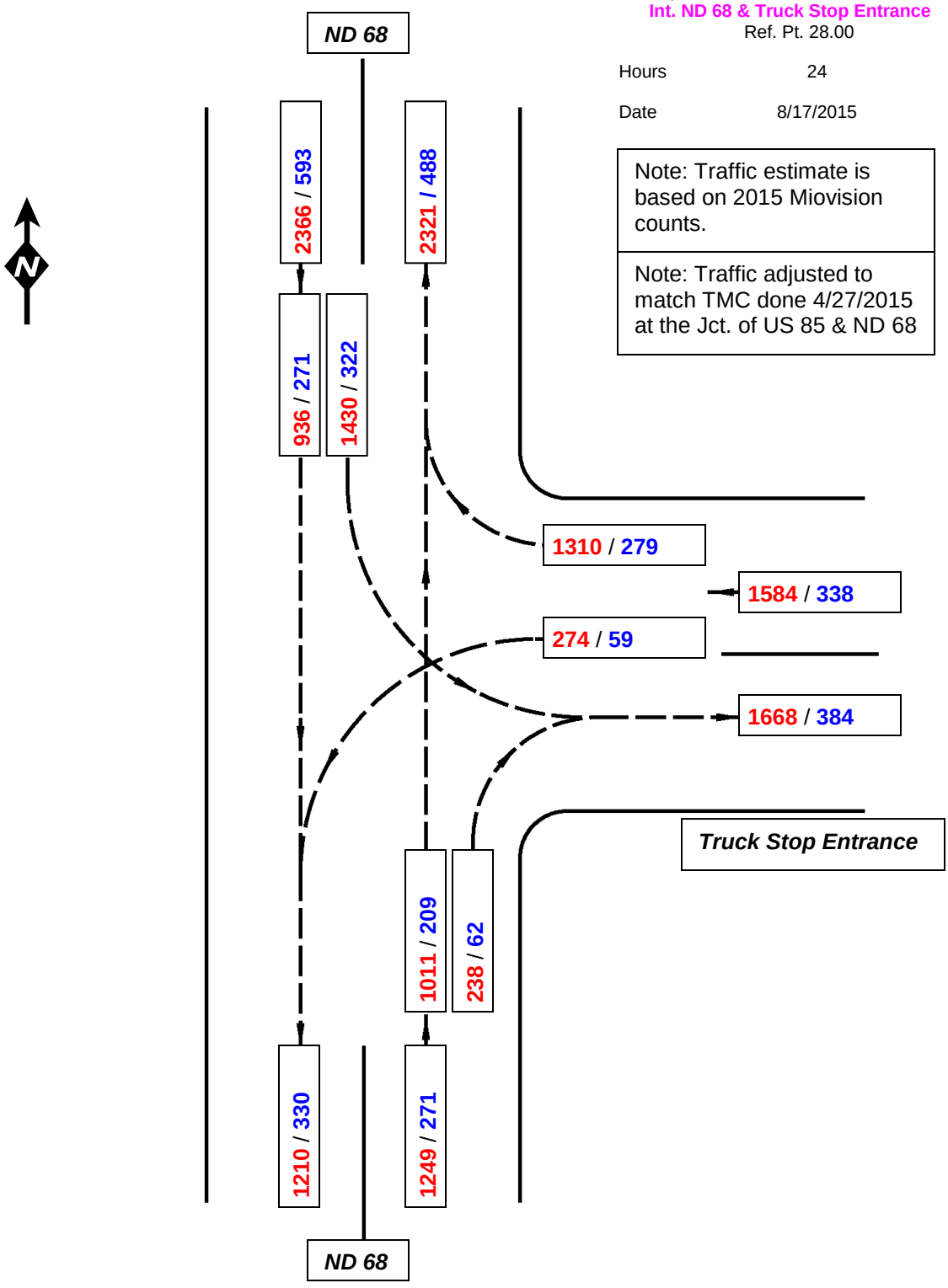
Description
Int. ND 68 & Truck Stop Entrance
Ref. Pt. 28.00

Hours 24

Date 8/17/2015

Note: Traffic estimate is based on 2015 Miovision counts.

Note: Traffic adjusted to match TMC done 4/27/2015 at the Jct. of US 85 & ND 68



LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No. 11A

Description
Int. ND 68 & Truck Stop Entrance
Ref. Pt. 28.00

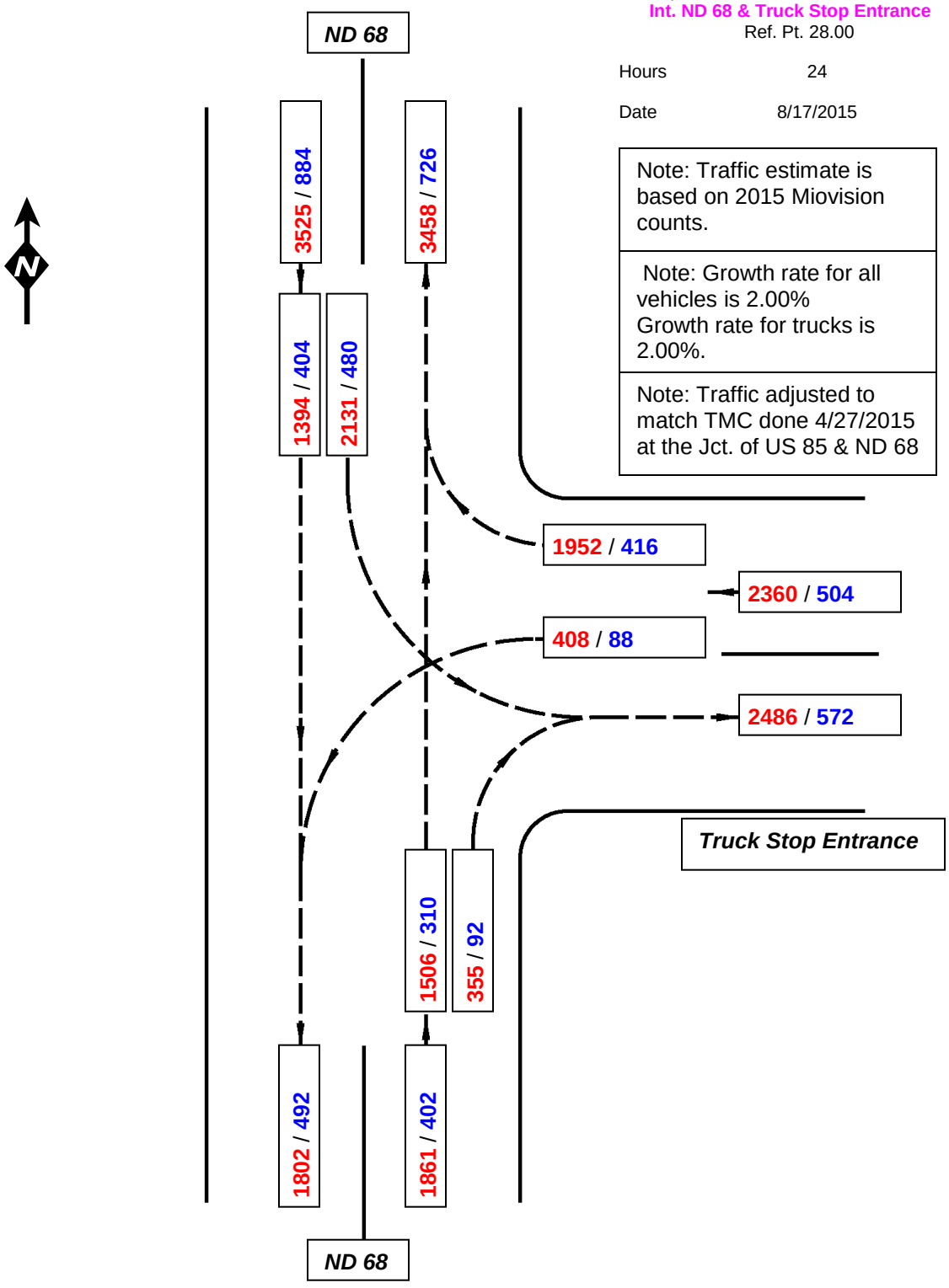
Hours 24

Date 8/17/2015

Note: Traffic estimate is based on 2015 Miovision counts.

Note: Growth rate for all vehicles is 2.00%
Growth rate for trucks is 2.00%.

Note: Traffic adjusted to match TMC done 4/27/2015 at the Jct. of US 85 & ND 68



LEGEND: AADT / TRUCKS - 2035

Completed by NR

Intersection Traffic Volumes

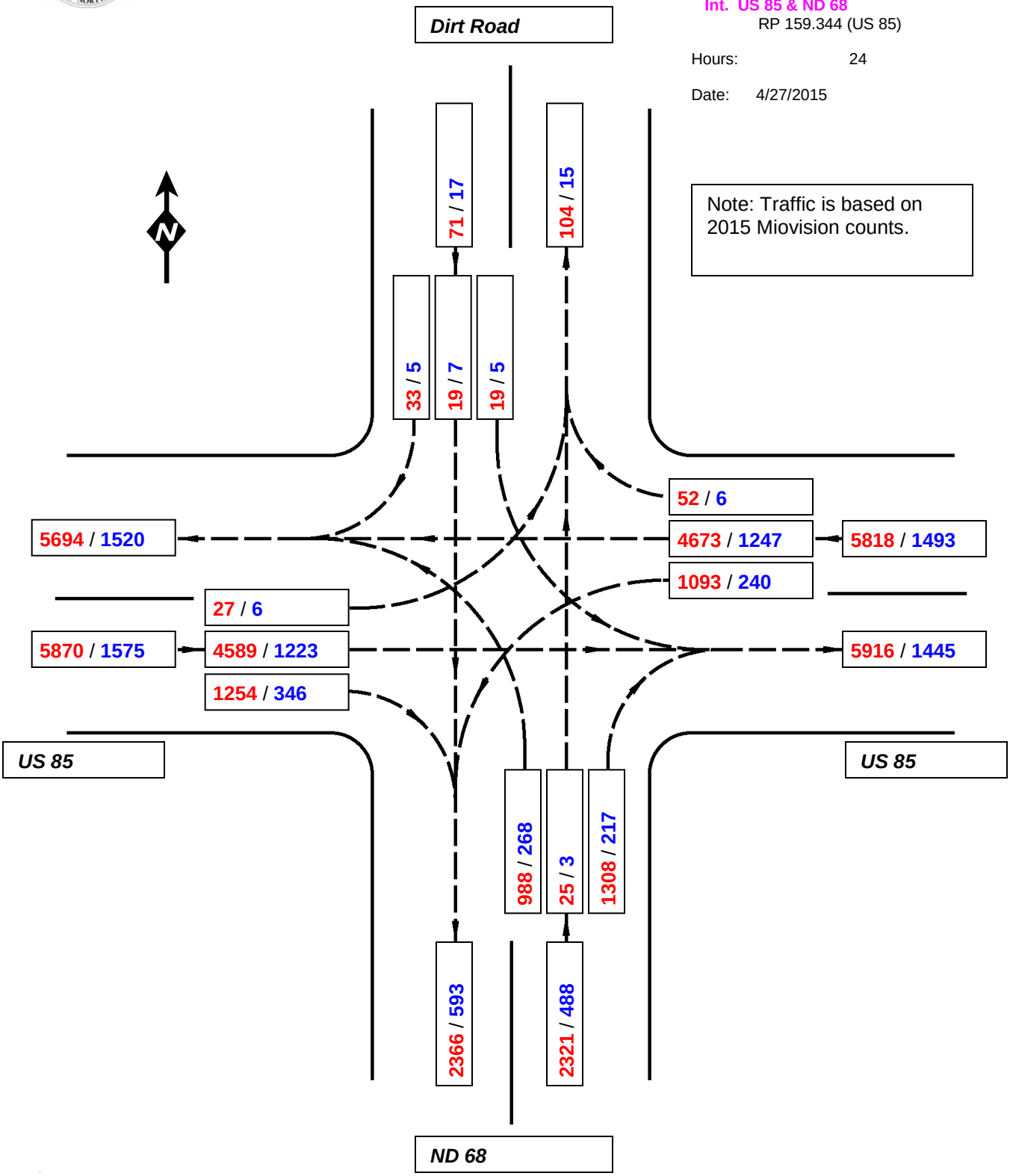
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No: 12

Description
Int. US 85 & ND 68
RP 159.344 (US 85)

Hours: 24

Date: 4/27/2015



LEGEND: AADT / TRUCKS - 2015

Completed by NR

Intersection Traffic Volumes

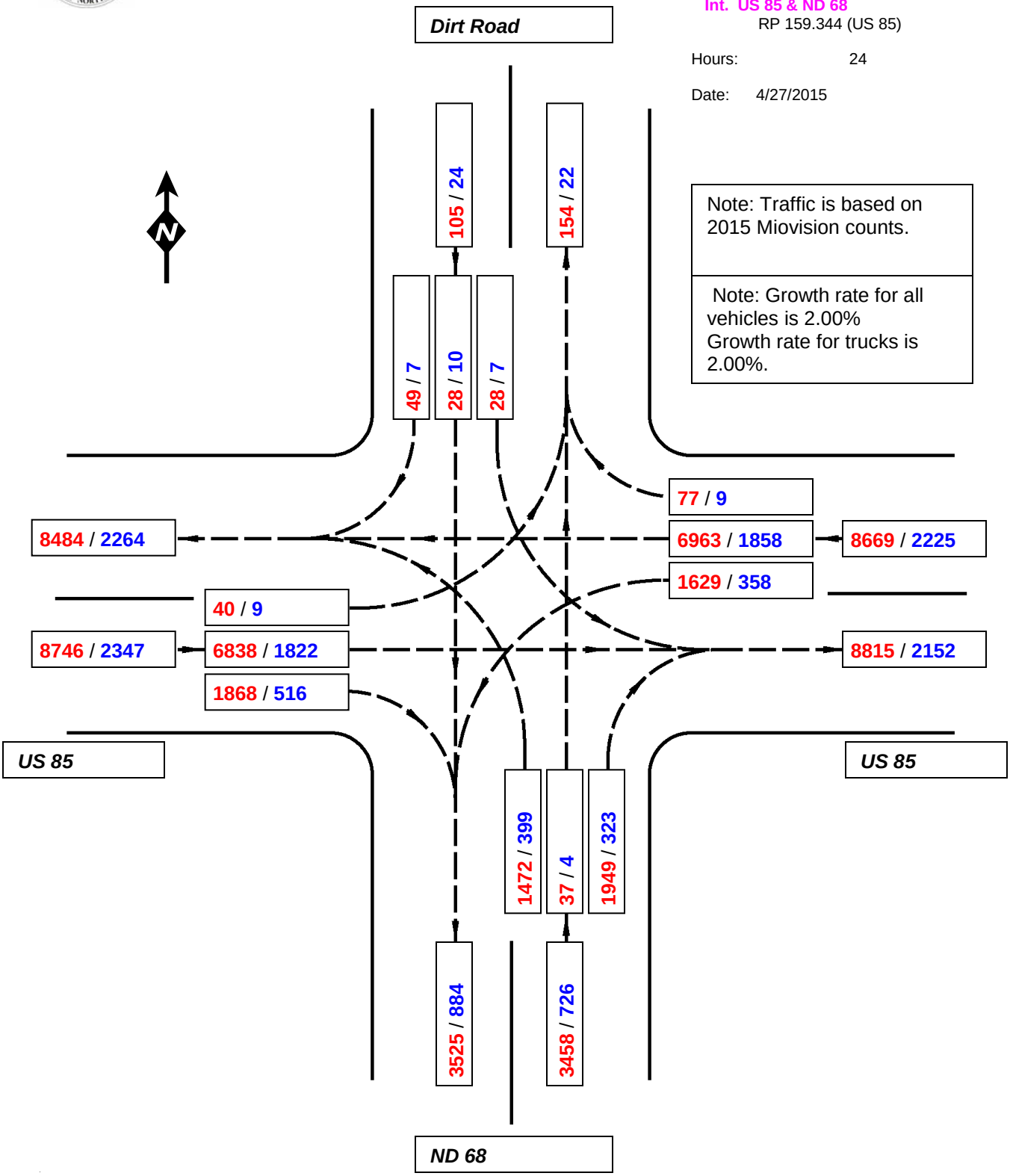
North Dakota Department of Transportation
SFN 7921 (Rev. 4-85)

Intersection No: 12

Description
Int. US 85 & ND 68
RP 159.344 (US 85)

Hours: 24

Date: 4/27/2015



LEGEND: AADT / TRUCKS - 2035

Completed by NR

APPENDIX C

ND 68 / Co Rd 1 – 160th Ave NW

Project Info

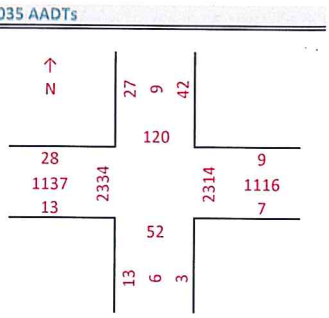
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

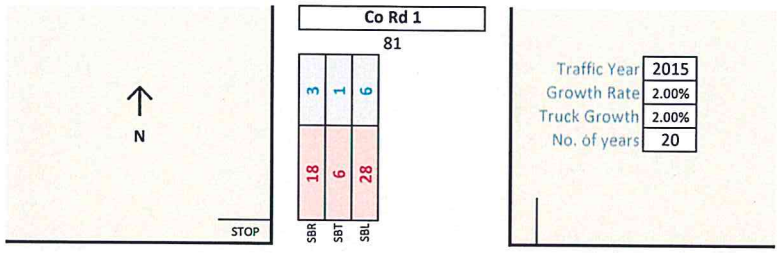
Intersection Info

	Major Road	Minor Road
Reference Points	1.72	
Speed Limits (mph)	65	55
Select Major Road Directions	East-West	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

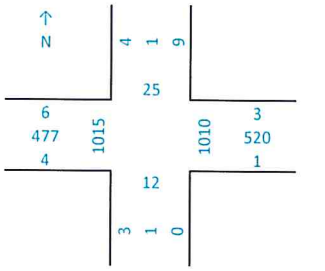
E_T = 2.5

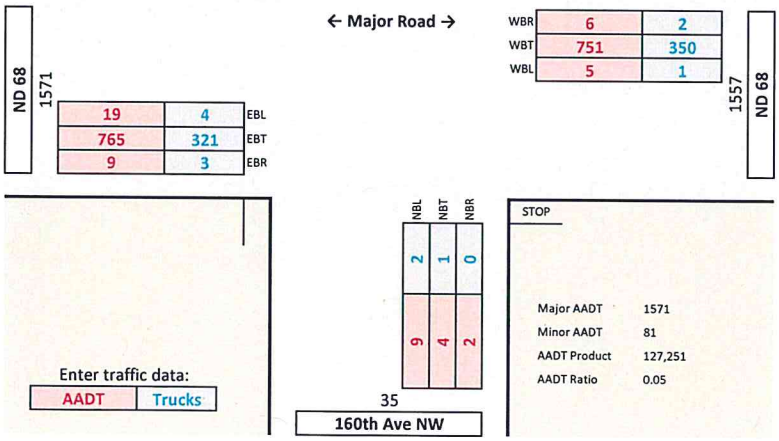
2035 AADTs



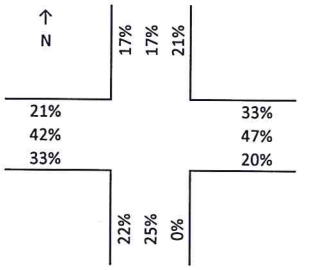


2035 TAADTs





2035 Truck %

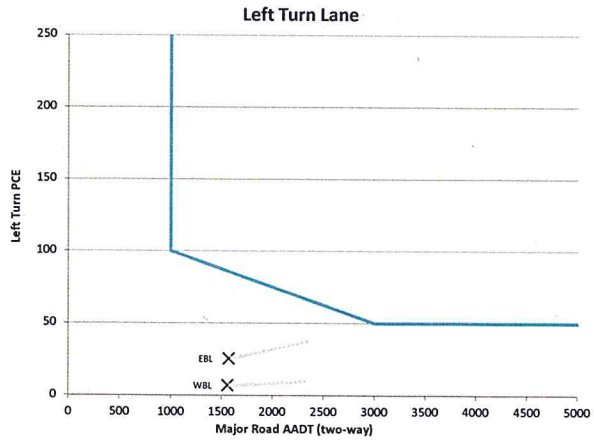


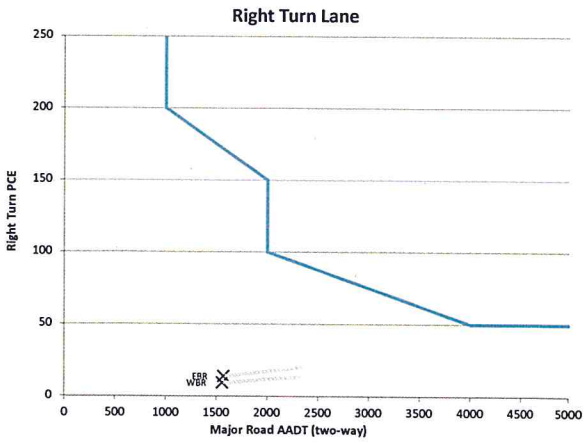
LEFT Turn Lane Volume Criteria (1.A)

EBL	WBL
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{LT} = 19	V_{LT} = 5
P_T = 0.21	P_T = 0.20
PCE = 25	PCE = 7
AADT = 1571	AADT = 1557
Met? No	Met? No

RIGHT Turn Lane Volume Criteria (1.A)

EBR	WBR
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{RT} = 9	V_{RT} = 6
P_T = 0.33	P_T = 0.33
PCE = 14	PCE = 9
AADT = 1571	AADT = 1557
Met? No	Met? No





ND 68 / 158th Ave NW (Co Rd 3) –

Project Info

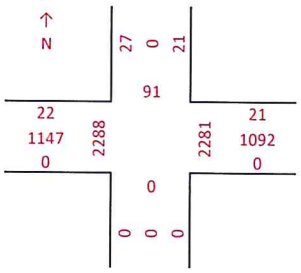
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

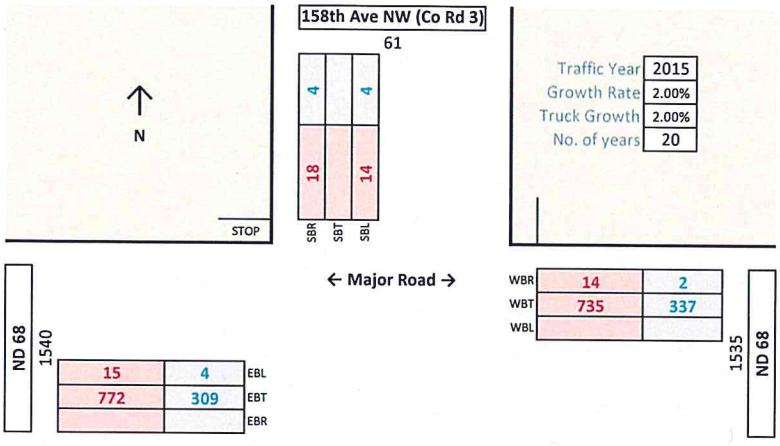
Intersection Info

	Major Road	Minor Road
Reference Points	6.90	
Speed Limits (mph)	65	55
Select Major Road Directions	East-West	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

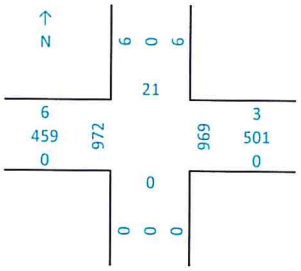
E_T= 2.5

2035 AADTs

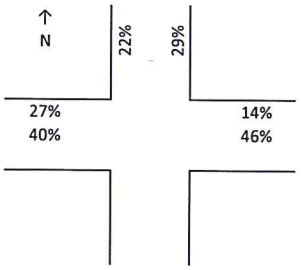




2035 TAADTs



2035 Truck %

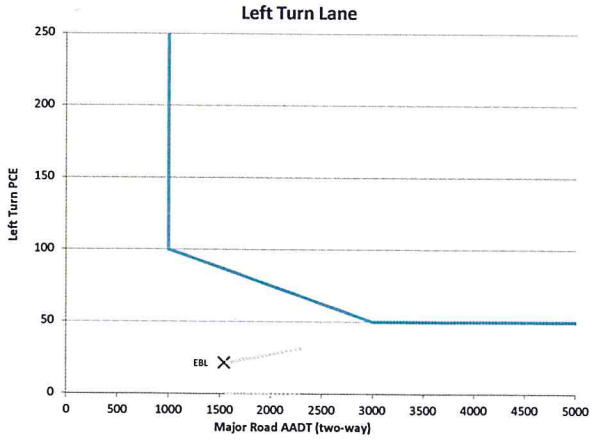


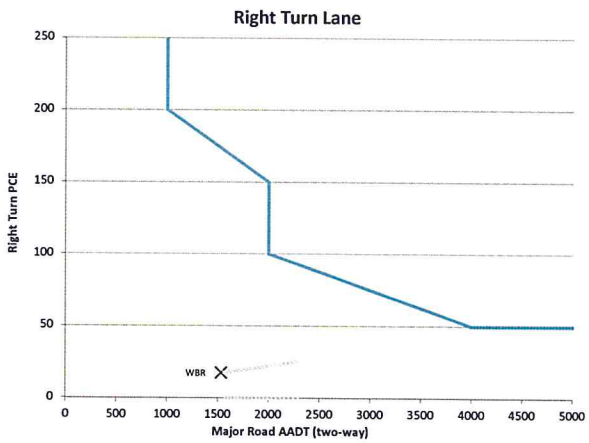
LEFT Turn Lane Volume Criteria (1.A)

EBL	WBL
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{LT} = 15	V_{LT} = 0
P_T = 0.27	P_T =
PCE = 21	PCE =
AADT = 1540	AADT = 1535
Met? No	Met?

RIGHT Turn Lane Volume Criteria (1.A)

EBR	WBR
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{RT} = 0	V_{RT} = 14
P_T =	P_T = 0.14
PCE =	PCE = 17
AADT = 1540	AADT = 1535
Met?	Met? No





ND 68 / – ND 16

Project Info

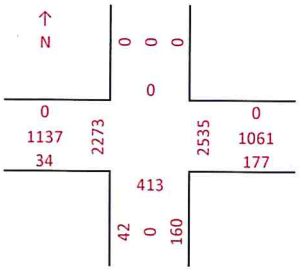
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

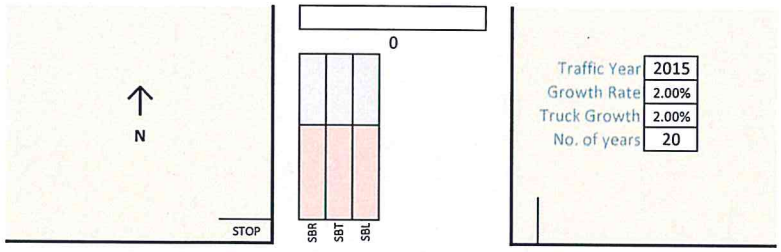
Intersection Info

	Major Road	Minor Road
Reference Points	11.441	137.915
Speed Limits (mph)	65	65
Select Major Road Directions	East-West	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

E_T= 2.5

2035 AADTs





Traffic Year	2015
Growth Rate	2.00%
Truck Growth	2.00%
No. of years	20

← Major Road →

WBR		
WBT	714	327
WBL	119	56

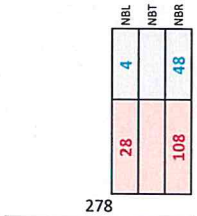
ND 68 1530

		EBL
765	307	EBT
23	10	EBR

1706 ND 68

Enter traffic data:

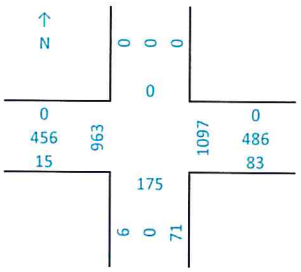
AADT	Trucks



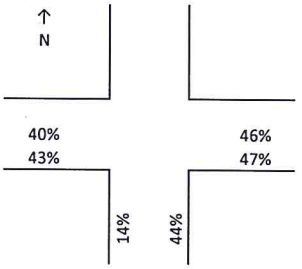
STOP

Major AADT	1706
Minor AADT	278
AADT Product	474,268
AADT Ratio	0.16

2035 TAADTs



2035 Truck %

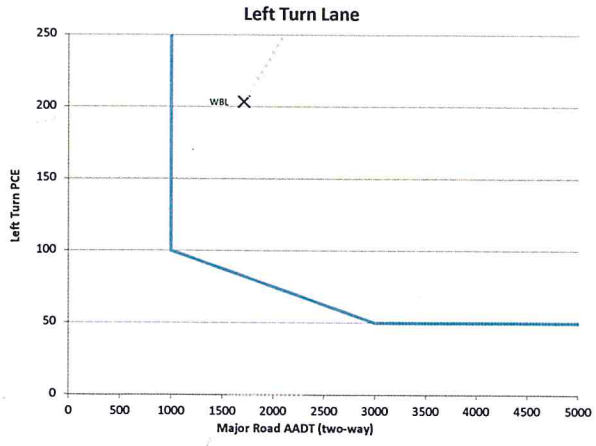


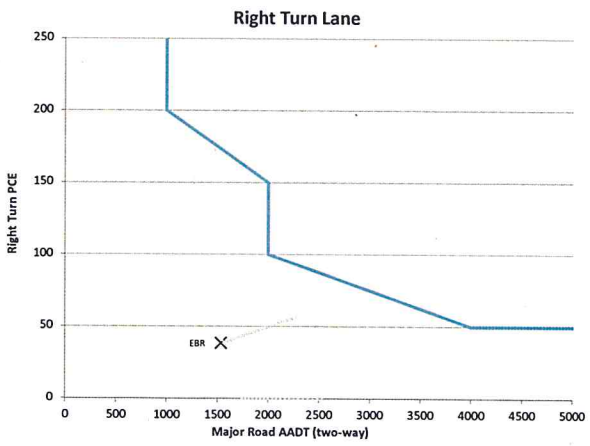
LEFT Turn Lane Volume Criteria (1.A)

EBL	WBL
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{LT} = 0	V_{LT} = 119
P_T =	P_T = 0.47
PCE =	PCE = 203
AADT = 1530	AADT = 1706
Met?	Met? Yes

RIGHT Turn Lane Volume Criteria (1.A)

EBR	WBR
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{RT} = 23	V_{RT} = 0
P_T = 0.43	P_T =
PCE = 38	PCE =
AADT = 1530	AADT = 1706
Met? No	Met?





ND 68 / 150th Ave NW (CO Rd 13) –

Project Info

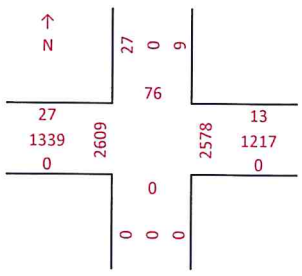
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

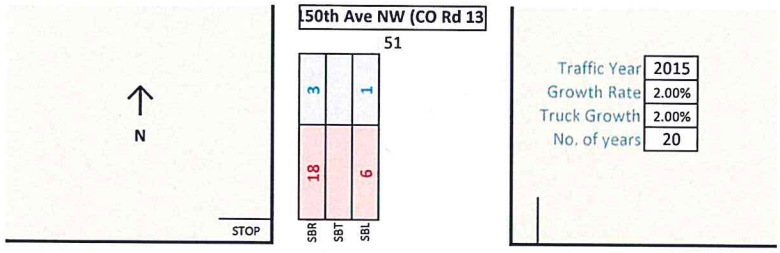
Intersection Info

	Major Road	Minor Road
Reference Points	12.14	
Speed Limits (mph)	65	55
Select Major Road Directions	East-West	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

E_T= 2.5

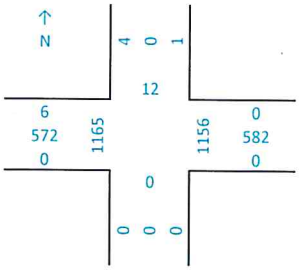
2035 AADTs



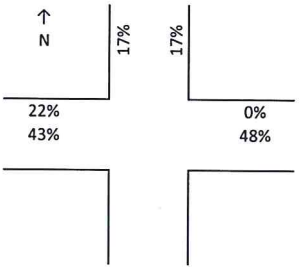


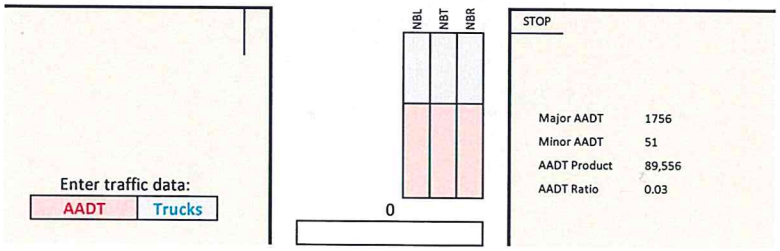
Traffic Year	2015
Growth Rate	2.00%
Truck Growth	2.00%
No. of years	20

2035 TAADTs



2035 Truck %



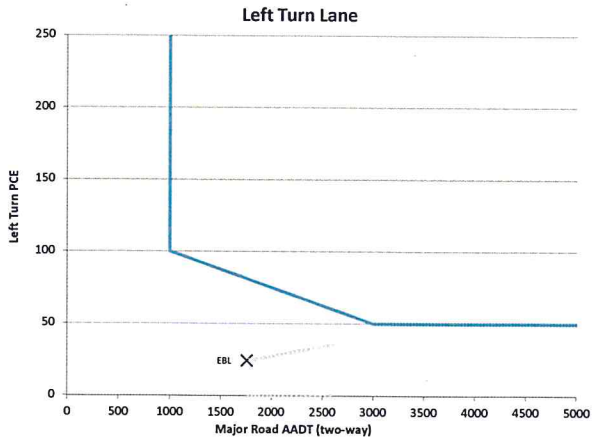


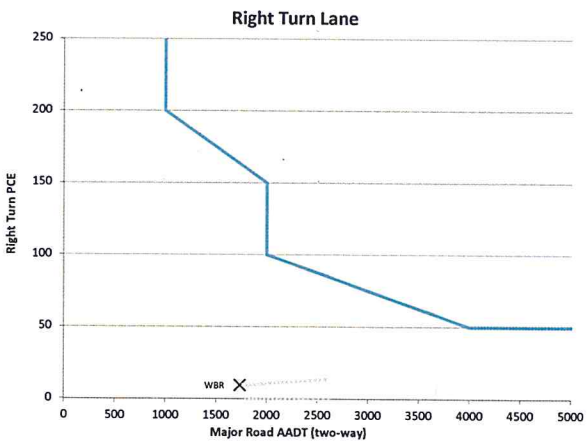
LEFT Turn Lane Volume Criteria (1.A)

EBL	WBL
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{LT} = 18	V_{LT} = 0
P_T = 0.22	P_T =
PCE = 24	PCE =
AADT = 1756	AADT = 1735
Met? No	Met?

RIGHT Turn Lane Volume Criteria (1.A)

EBR	WBR
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{RT} = 0	V_{RT} = 9
P_T =	P_T = 0.00
PCE =	PCE = 9
AADT = 1756	AADT = 1735
Met?	Met? No





ND 68 / 147th Ave NW (Co Rd 15) –

Project Info

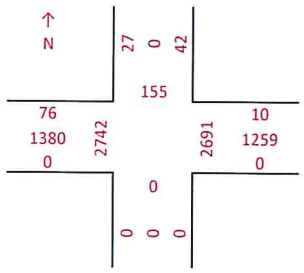
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

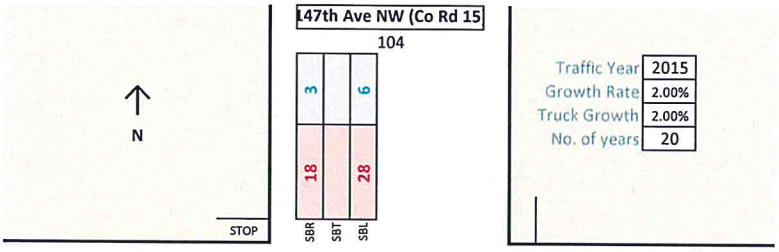
Intersection Info

	Major Road	Minor Road
Reference Points	15.13	
Speed Limits (mph)	65	55
Select Major Road Directions	East-West	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

E_T = 2.5

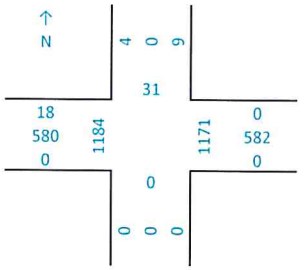
2035 AADTs



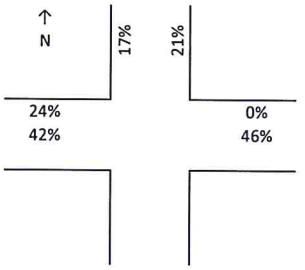


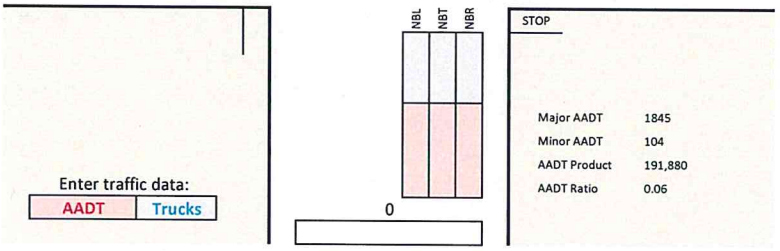
Traffic Year	2015
Growth Rate	2.00%
Truck Growth	2.00%
No. of years	20

2035 TAADTs



2035 Truck %



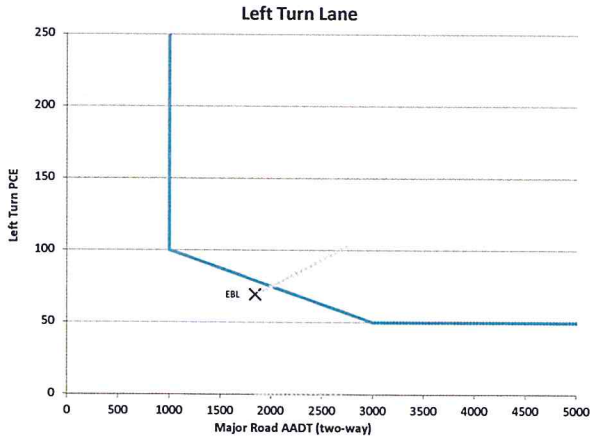


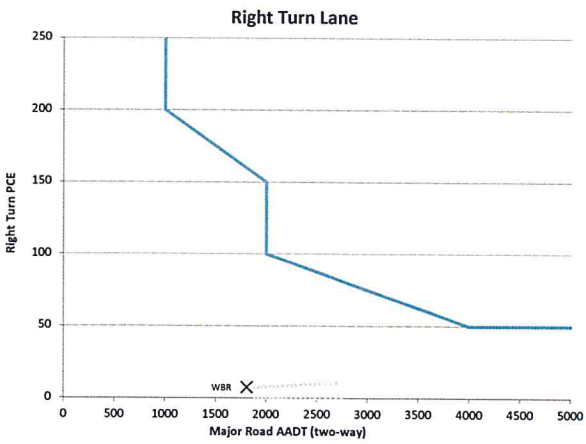
LEFT Turn Lane Volume Criteria (1.A)

EBL	WBL
PCE = $V_{LT}(1+P_T(E_T-1))$	PCE = $V_{LT}(1+P_T(E_T-1))$
V_{LT} = 51	V_{LT} = 0
P_T = 0.24	P_T =
PCE = 69	PCE =
AADT = 1845	AADT = 1811
Met? No	Met?
(may be met in 2020)	

RIGHT Turn Lane Volume Criteria (1.A)

EBR	WBR
PCE = $V_{LT}(1+P_T(E_T-1))$	PCE = $V_{LT}(1+P_T(E_T-1))$
V_{RT} = 0	V_{RT} = 7
P_T =	P_T = 0.00
PCE =	PCE = 7
AADT = 1845	AADT = 1811
Met?	Met? No





ND 68 / – 18 St NW (Co Rd 30)

Project Info

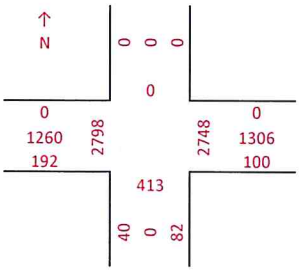
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

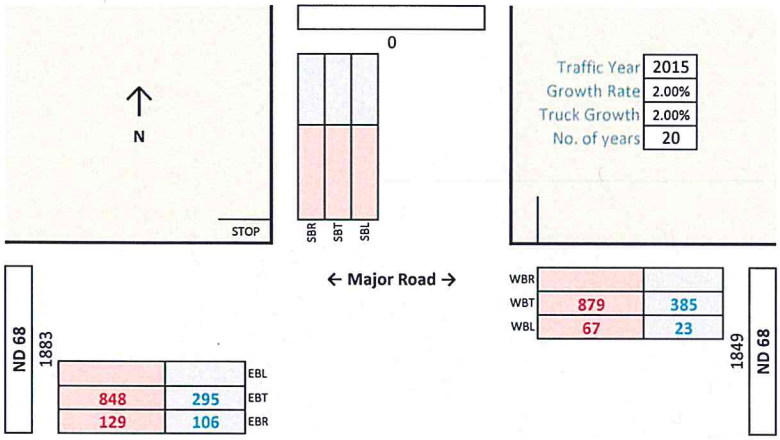
Intersection Info

	Major Road	Minor Road
Reference Points	18.957	
Speed Limits (mph)	65	55
Select Major Road Directions	East-West	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

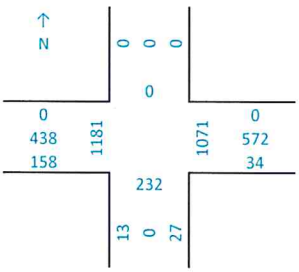
E_T= 2.5

2035 AADTs

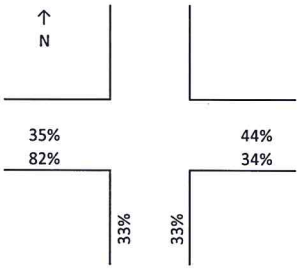




2035 TAADTs



2035 Truck %

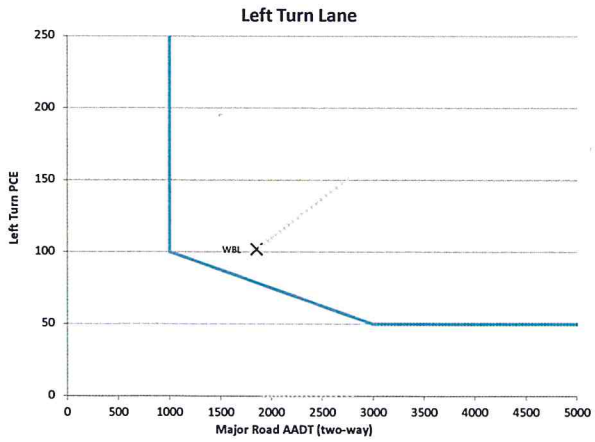


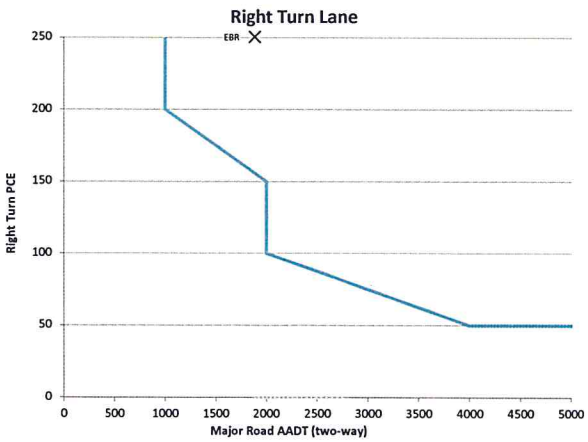
LEFT Turn Lane Volume Criteria (1.A)

EBL	WBL
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{LT} = 0	V_{LT} = 67
P_T =	P_T = 0.34
PCE =	PCE = 102
AADT = 1883	AADT = 1849
Met?	Met? Yes

RIGHT Turn Lane Volume Criteria (1.A)

EBR	WBR
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{RT} = 129	V_{RT} = 0
P_T = 0.82	P_T =
PCE = 288	PCE =
AADT = 1883	AADT = 1849
Met? Yes	Met?





ND 68 / 20th St NW –

Project Info

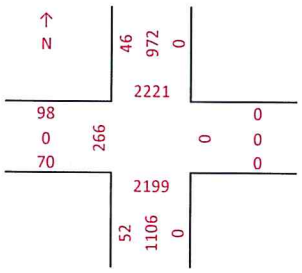
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

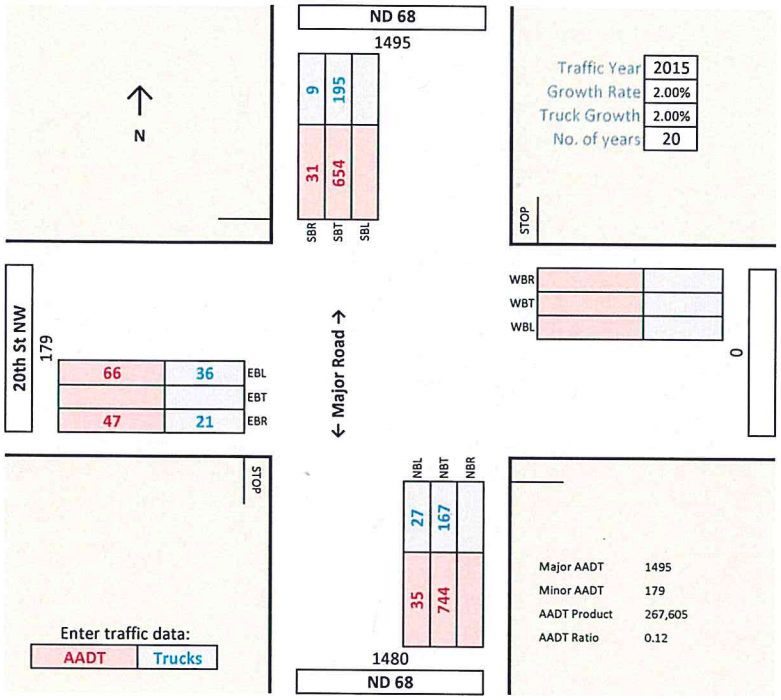
Intersection Info

	Major Road	Minor Road
Reference Points	21.00	
Speed Limits (mph)	65	55
Select Major Road Directions	North-South	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

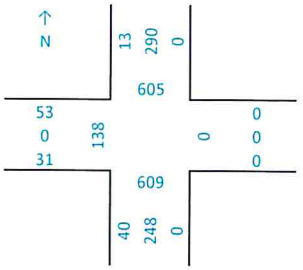
E_T= 2.5

2035 AADTs

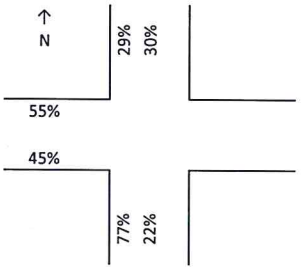




2035 TAADTs



2035 Truck %



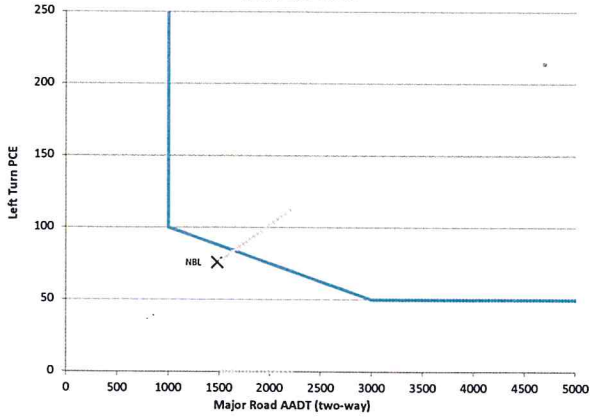
LEFT Turn Lane Volume Criteria (1.A)

SBL	NBL
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{LT} = 0	V_{LT} = 35
P_T =	P_T = 0.77
PCE =	PCE = 76
AADT = 1495	AADT = 1480
Met?	Met? No
	(may be met in 2021)

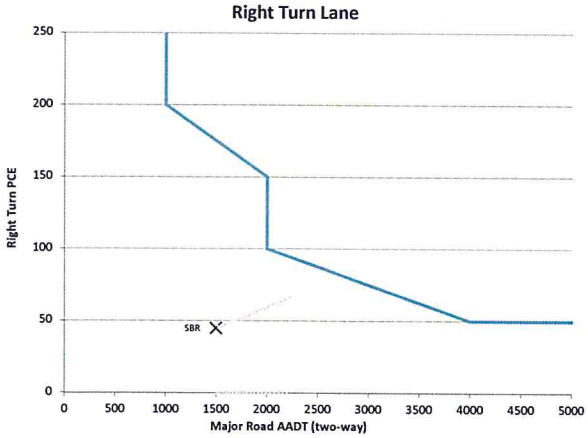
RIGHT Turn Lane Volume Criteria (1.A)

SBR	NBR
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{RT} = 31	V_{RT} = 0
P_T = 0.29	P_T =
PCE = 45	PCE =
AADT = 1495	AADT = 1480
Met? No	Met?

Left Turn Lane



Right Turn Lane



ND 68 / 22nd St NW

Project Info

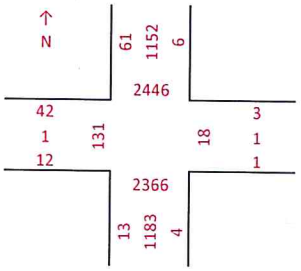
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

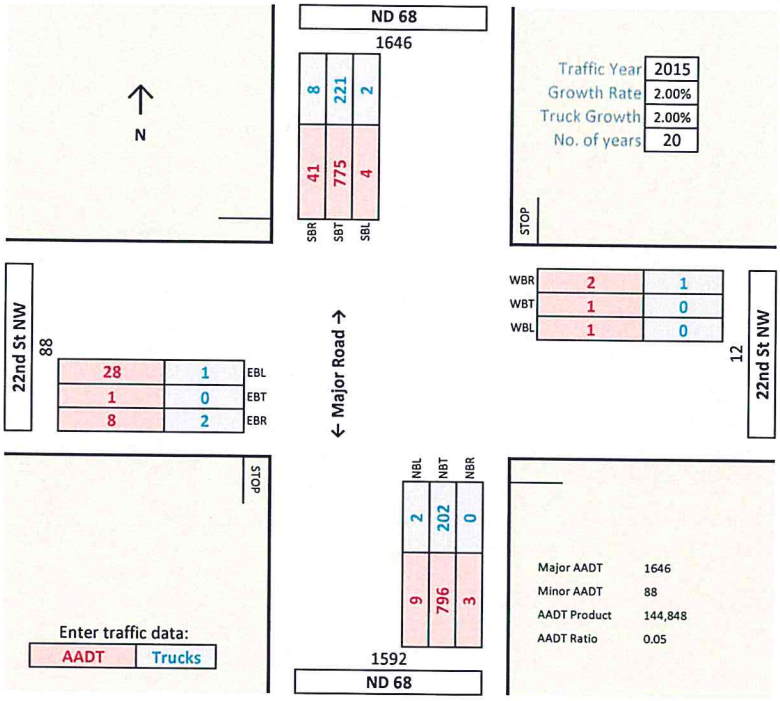
Intersection Info

	Major Road	Minor Road
Reference Points	23.00	
Speed Limits (mph)	65	55
Select Major Road Directions	North-South	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

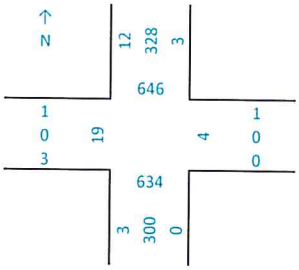
E_T= 2.5

2035 AADTs

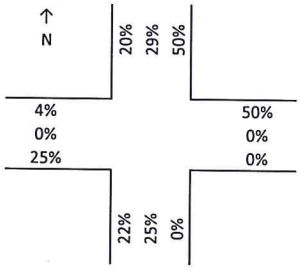




2035 TAADTs



2035 Truck %



LEFT Turn Lane Volume Criteria (1.A)

SBL

$PCE = V_{LT}(1+P_T(E_T-1))$

V_{LT} = 4

P_T = 0.50

PCE = 7

AADT = 1646

Met? No

NBL

$PCE = V_{LT}(1+P_T(E_T-1))$

V_{LT} = 9

P_T = 0.22

PCE = 12

AADT = 1592

Met? No

RIGHT Turn Lane Volume Criteria (1.A)

SBR

$PCE = V_{LT}(1+P_T(E_T-1))$

V_{RT} = 41

P_T = 0.20

PCE = 53

AADT = 1646

Met? No

NBR

$PCE = V_{LT}(1+P_T(E_T-1))$

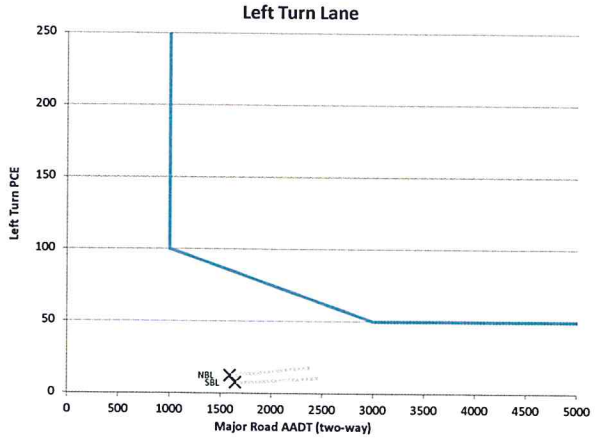
V_{RT} = 3

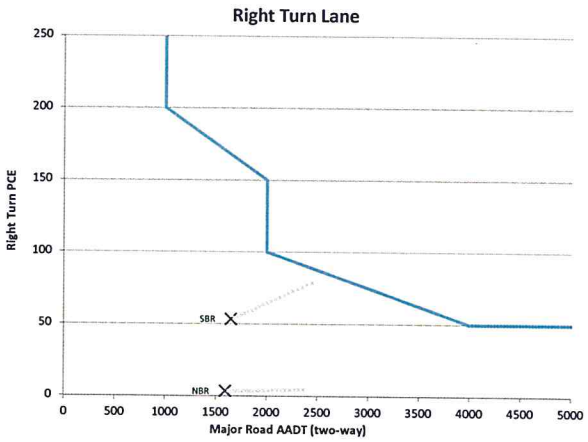
P_T = 0.00

PCE = 3

AADT = 1592

Met? No





ND 68 / 26th St NW

Project Info

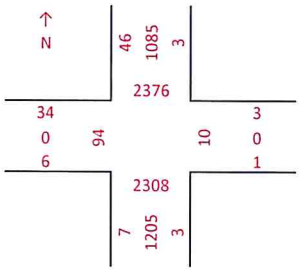
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

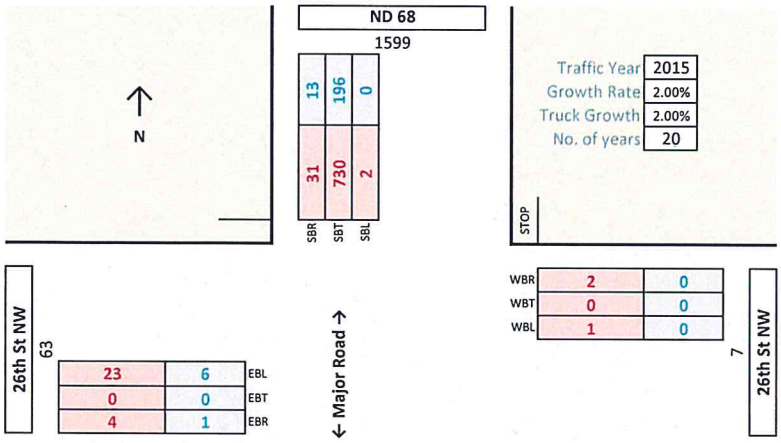
Intersection Info

	Major Road	Minor Road
Reference Points	27.00	
Speed Limits (mph)	65	55
Select Major Road Directions	North-South	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

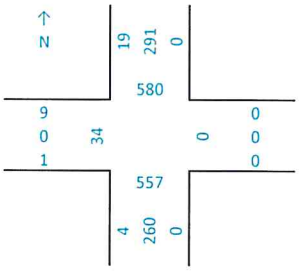
E_T= 2.5

2035 AADTs

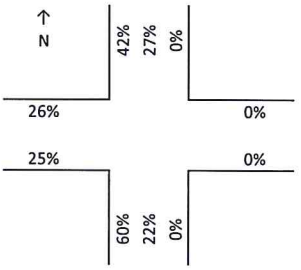




2035 TAADTs



2035 Truck %

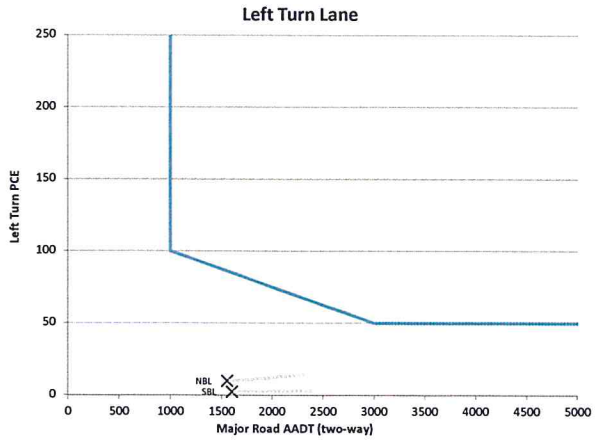


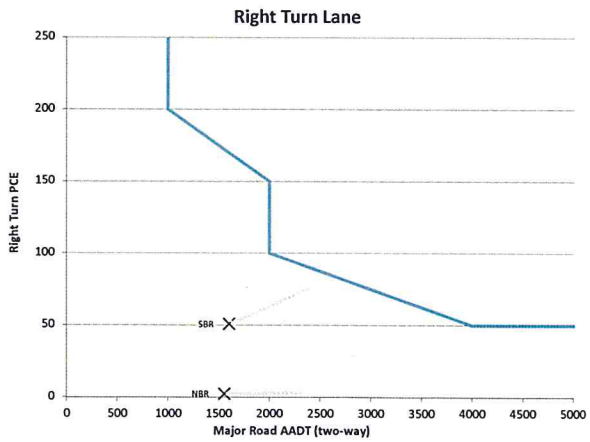
LEFT Turn Lane Volume Criteria (1.A)

SBL	NBL
PCE = $V_{LT}(1+P_T(E_T-1))$	PCE = $V_{LT}(1+P_T(E_T-1))$
V_{LT} = 2	V_{LT} = 5
P_T = 0.00	P_T = 0.60
PCE = 2	PCE = 10
AADT = 1599	AADT = 1553
Met? No	Met? No

RIGHT Turn Lane Volume Criteria (1.A)

SBR	NBR
PCE = $V_{LT}(1+P_T(E_T-1))$	PCE = $V_{LT}(1+P_T(E_T-1))$
V_{RT} = 31	V_{RT} = 2
P_T = 0.42	P_T = 0.00
PCE = 51	PCE = 2
AADT = 1599	AADT = 1553
Met? No	Met? No





ND 68 / Private Appr – S Truck Stop Entrance

Project Info

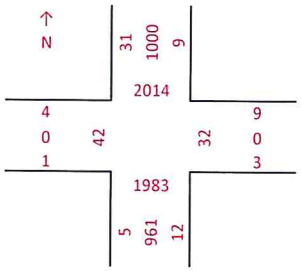
PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

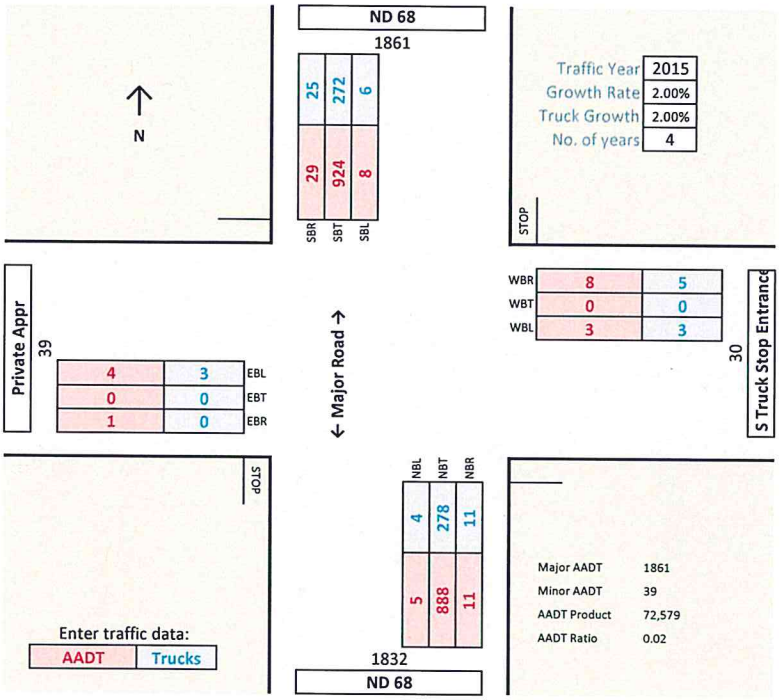
Intersection Info

	Major Road	Minor Road
Reference Points	27.898	
Speed Limits (mph)	65	
Select Major Road Directions	North-South	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

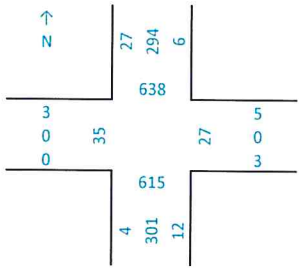
E_T= 2.5

2019 AADTs

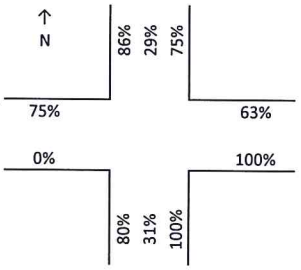




2019 TAADTs



2019 Truck %

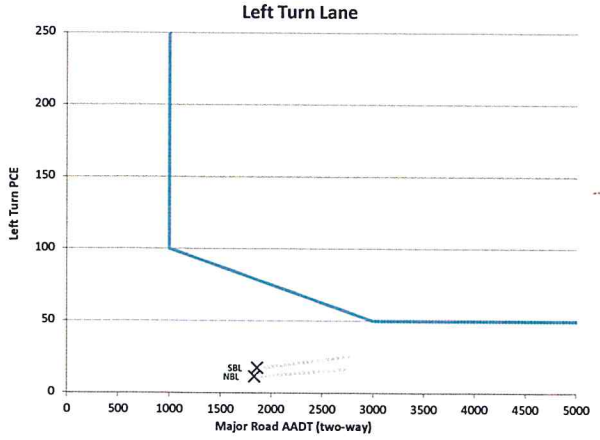


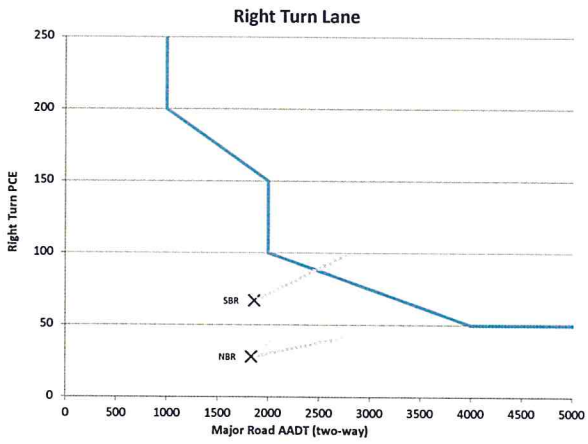
LEFT Turn Lane Volume Criteria (1.A)

SBL	NBL
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{LT} = 8	V_{LT} = 5
P_T = 0.75	P_T = 0.80
PCE = 17	PCE = 11
AADT = 1861	AADT = 1832
Met? No	Met? No

RIGHT Turn Lane Volume Criteria (1.A)

SBR	NBR
$PCE = V_{LT}(1+P_T(E_T-1))$	$PCE = V_{LT}(1+P_T(E_T-1))$
V_{RT} = 29	V_{RT} = 11
P_T = 0.86	P_T = 1.00
PCE = 67	PCE = 28
AADT = 1861	AADT = 1832
Met? No	Met? No
(may be met in 2030)	





ND 68 / – N Truck Stop Entrance

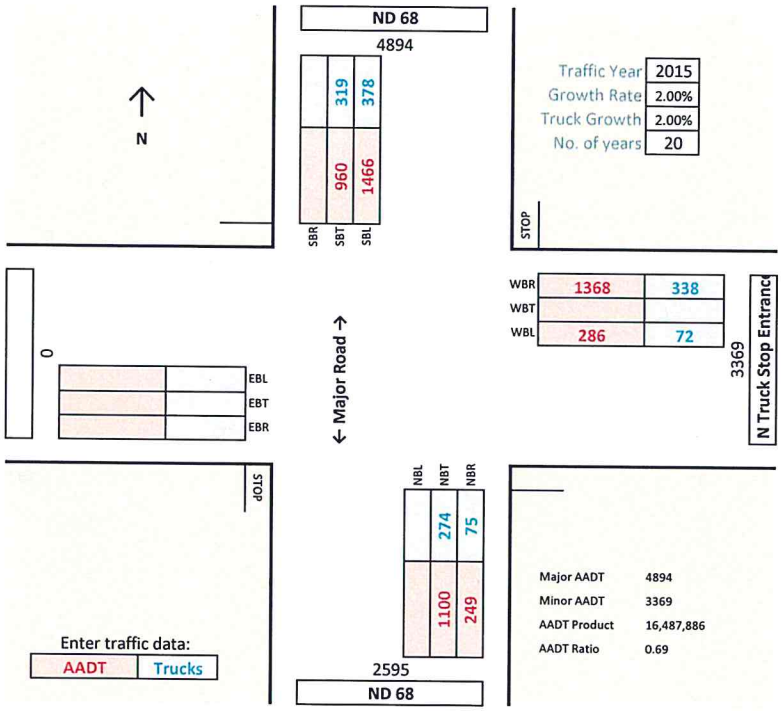
Project Info

PCN	21180
Ref#	
HSIP #	
Study Date	9/21/2015

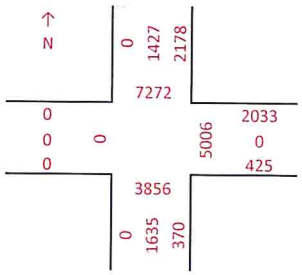
Intersection Info

	Major Road	Minor Road
Reference Points	28.00	
Speed Limits (mph)	65	55
Select Major Road Directions	North-South	
Intersection/Junction Traffic Control	Stop on Minor Road	
Major Road a Divided Highway?	No	
Terrain	Rolling (>2%)	

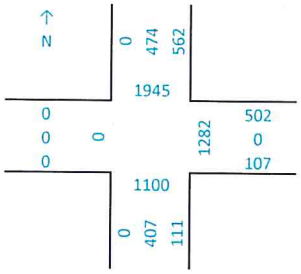
E_T= 2.5



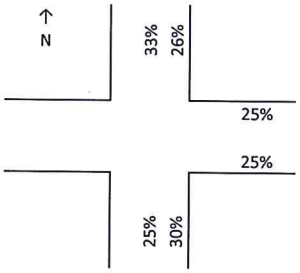
2035 AADTs



2035 TAADTs



2035 Truck %

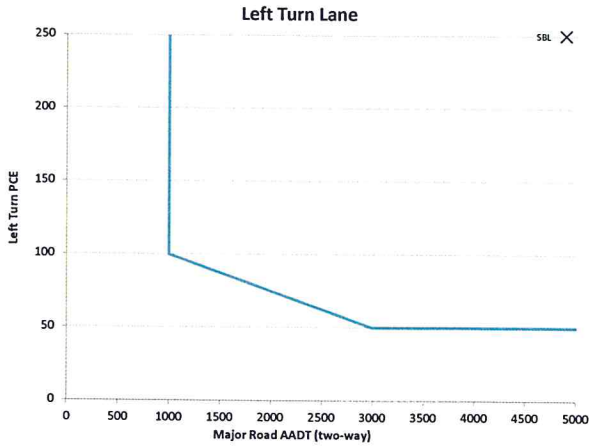


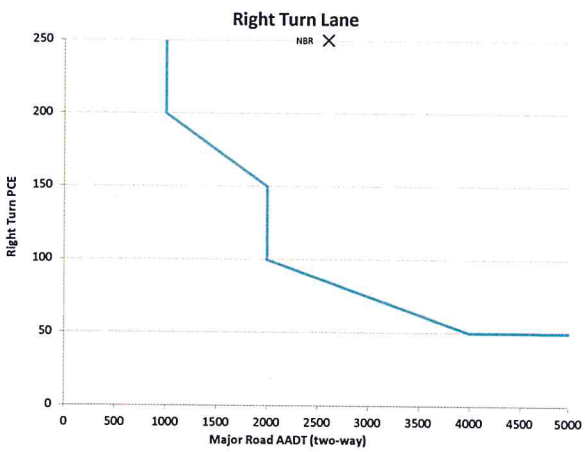
LEFT Turn Lane Volume Criteria (1.A)

SBL	NBL
PCE = $V_{LT}(1+P_T(E_T-1))$	PCE = $V_{LT}(1+P_T(E_T-1))$
V_{LT} = 1466	V_{LT} = 0
P_T = 0.26	P_T =
PCE = 2033	PCE =
AADT = 4894	AADT = 2595
Met? Yes	Met?

RIGHT Turn Lane Volume Criteria (1.A)

SBR	NBR
PCE = $V_{LT}(1+P_T(E_T-1))$	PCE = $V_{LT}(1+P_T(E_T-1))$
V_{RT} = 0	V_{RT} = 249
P_T =	P_T = 0.30
PCE =	PCE = 362
AADT = 4894	AADT = 2595
Met?	Met? Yes





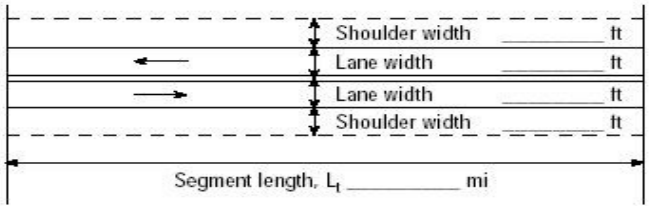
APPENDIX D

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Lora Norby*	Highway / Direction of Travel	*ND 68*
Agency or Company	*NDDOT*	From/To	*RP 0.00 to RP 28.124*
Date Performed	*9/14/2015*	Jurisdiction	*Williston District*
Analysis Time Period		Analysis Year	*2015*

Project Description: *State Line E & N to Jct US 85*

Input Data



Analysis direction vol., V_d *36*veh/h

Opposing direction vol., V_o *37*veh/h

Shoulder width ft *1.5*

Lane Width ft *12.0*

Segment Length mi *28.1*

☑ Class I highway ☐ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *34%*

% Trucks and Buses , P_T *44 %*

% Recreational vehicles, P_R *4%*

Access points *mi* *4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*2.7*	*2.7*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.1*	*1.1*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.571*	*0.571*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*0.67*	*0.67*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*107*	*110*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*65.0 mi/h*
Total demand flow rate, both directions, v		Adj. for lane and shoulder width,[4] f_{LS} (Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.5 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*59.8 mi/h*
		Average travel speed, ATS_d=FFS-0.00776 ($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*56.6 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.9*	*1.9*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*

Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.716*	*0.716*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*0.73*	*0.73*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*78*	*80*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*9.3*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*39.1*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*28.6*	
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	*A*	
Volume to capacity ratio, *v/c*	*0.07*	
Capacity, $C_{d,ATS}$ (Equation 15-12) pc/h	*0*	
Capacity, $C_{d,PTSF}$ (Equation 15-13) pc/h	*0*	
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*94.7*	
Bicycle Level of Service		
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*40.9*	
Effective width, Wv (Eq. 15-29) ft	*24.57*	
Effective speed factor, S_t (Eq. 15-30)	*5.07*	
Bicycle level of service score, BLOS (Eq. 15-31)	*32.12*	
Bicycle level of service (Exhibit 15-4)	*F*	
Notes		

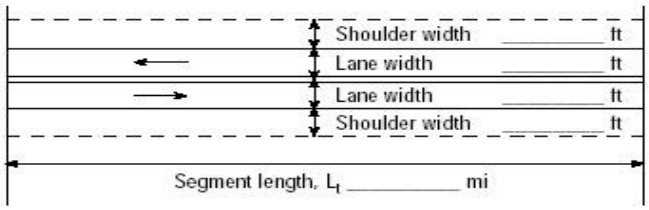
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Lora Norby*	Highway / Direction of Travel	*ND 68*
Agency or Company	*NDDOT*	From/To	*RP 0.00 to 28.124*
Date Performed	*9/21/2015*	Jurisdiction	*Williston District*
Analysis Time Period	*2035*	Analysis Year	*2035*

Project Description: *State Line E & N to Jct US 85*

Input Data



☑ Class I highway ☐ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling
Grade Length mi Up/down
Peak-hour factor, PHF *0.88*
No-passing zone *34%*
% Trucks and Buses , P_T *44 %*
% Recreational vehicles, P_R *4%*
Access points *mi* *4*/mi

Analysis direction vol., V_d *56*veh/h
Opposing direction vol., V_o *56*veh/h
Shoulder width ft *2.0*
Lane Width ft *12.0*
Segment Length mi *28.1*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*2.7*	*2.7*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.1*	*1.1*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.571*	*0.571*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*0.67*	*0.67*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*166*	*166*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*65.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS} (Exhibit 15-7)	*2.6 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.3 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*61.4 mi/h*
		Average travel speed, ATS_d=FFS-0.00776 ($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*56.5 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.9*	*1.9*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*

Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.716*	*0.716*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*0.73*	*0.73*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*122*	*122*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*13.9*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*41.6*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*34.7*	
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	*A*	
Volume to capacity ratio, *v/c*	*0.11*	
Capacity, $C_{d,ATS}$ (Equation 15-12) pc/h	*0*	
Capacity, $C_{d,PTSF}$ (Equation 15-13) pc/h	*0*	
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*92.0*	
Bicycle Level of Service		
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*63.6*	
Effective width, Wv (Eq. 15-29) ft	*24.08*	
Effective speed factor, S_t (Eq. 15-30)	*4.79*	
Bicycle level of service score, BLOS (Eq. 15-31)	*29.74*	
Bicycle level of service (Exhibit 15-4)	*F*	
Notes		

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=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. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Existing Traffic, Existing Geometry

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Lora Norby*	Intersection	*ND 68 & ND 16*
Agency/Co.	*NDDOT*	Jurisdiction	*Williston District*
Date Performed	*9/23/2015*	Analysis Year	*2015*
Analysis Time Period	*24 hr*		

Project Description	*AC-SS-7-068(011)000*
East/West Street: *ND 68*	North/South Street: *ND 16*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*77*	*2*	*12*	*71*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*87*	*2*	*13*	*80*	*0*
Percent Heavy Vehicles	*0*	--	--	*47*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*3*		*11*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*3*	*0*	*12*	*0*	*0*	*0*
Percent Heavy Vehicles	*14*	*0*	*44*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*13*		*15*				
C (m) (veh/h)		*1266*		*844*				
v/c		*0.01*		*0.02*				
95% queue length		*0.03*		*0.05*				
Control Delay (s/veh)		*7.9*		*9.3*				
LOS		*A*		*A*				
Approach Delay (s/veh)	--	--		*9.3*				
Approach LOS	--	--		*A*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Lora Norby*	Intersection	*ND 68 & ND 16*
Agency/Co.	*NDDOT*	Jurisdiction	*Williston District*
Date Performed	*9/23/2015*	Analysis Year	*2015*
Analysis Time Period	*24 hr*		

Project Description *AC-SS-7-068(011)000*

East/West Street: *ND 68* | North/South Street: *ND 16*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*77*	*2*	*12*	*71*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*87*	*2*	*13*	*80*	*0*
Percent Heavy Vehicles	*0*	--	--	*47*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*3*		*0*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*3*	*0*	*0*	*0*	*0*	*0*
Percent Heavy Vehicles	*14*	*0*	*44*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*13*		*3*				
C (m) (veh/h)		*1266*		*761*				
v/c		*0.01*		*0.00*				
95% queue length		*0.03*		*0.01*				
Control Delay (s/veh)		*7.9*		*9.7*				
LOS		*A*		*A*				
Approach Delay (s/veh)	--	--		*9.7*				
Approach LOS	--	--		*A*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Lora Norby*	Intersection	*ND 68 & ND 16*
Agency/Co.	*NDDOT*	Jurisdiction	*Williston District*
Date Performed	*9/23/2015*	Analysis Year	*2035*
Analysis Time Period	*24 hr*		

Project Description *AC-SS-7-068(011)000*

East/West Street: *ND 68* | North/South Street: *ND 16*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*114*	*3*	*18*	*106*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*129*	*3*	*20*	*120*	*0*
Percent Heavy Vehicles	*0*	--	--	*47*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*4*		*16*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*4*	*0*	*18*	*0*	*0*	*0*
Percent Heavy Vehicles	*14*	*0*	*44*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*20*		*22*				
C (m) (veh/h)		*1217*		*787*				
v/c		*0.02*		*0.03*				
95% queue length		*0.05*		*0.09*				
Control Delay (s/veh)		*8.0*		*9.7*				
LOS		*A*		*A*				
Approach Delay (s/veh)	--	--		*9.7*				
Approach LOS	--	--		*A*				

Future Traffic, Revised Geometry

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Lora Norby*	Intersection	*ND 68 & ND 16*
Agency/Co.	*NDDOT*	Jurisdiction	*Williston District*
Date Performed	*9/23/2015*	Analysis Year	*2035*
Analysis Time Period	*24 hr*		

Project Description *AC-SS-7-068(011)000*

East/West Street: *ND 68* | North/South Street: *ND 16*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*114*	*3*	*18*	*106*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*129*	*3*	*20*	*120*	*0*
Percent Heavy Vehicles	*0*	--	--	*47*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*4*		*16*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*4*	*0*	*18*	*0*	*0*	*0*
Percent Heavy Vehicles	*14*	*0*	*44*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*20*		*22*				
C (m) (veh/h)		*1217*		*787*				
v/c		*0.02*		*0.03*				
95% queue length		*0.05*		*0.09*				
Control Delay (s/veh)		*8.0*		*9.7*				
LOS		*A*		*A*				
Approach Delay (s/veh)	--	--	*9.7*					
Approach LOS	--	--	*A*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Lora Norby*	Intersection	*ND 68 & Co Rd 30*
Agency/Co.	*NDDOT*	Jurisdiction	*Williston District*
Date Performed	*9/23/2015*	Analysis Year	*2015*
Analysis Time Period	*24 HR*		

Project Description	*AC-SS-7-068(011)000*
East/West Street: *ND 68*	North/South Street: *Co Rd 30*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*85*	*13*	*7*	*88*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*96*	*14*	*7*	*100*	*0*
Percent Heavy Vehicles	*0*	--	--	*34*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*3*		*6*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*3*	*0*	*6*	*0*	*0*	*0*
Percent Heavy Vehicles	*33*	*0*	*33*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
v (veh/h)		*7*	*3*		*6*			
C (m) (veh/h)		*1303*	*703*		*874*			
v/c		*0.01*	*0.00*		*0.01*			
95% queue length		*0.02*	*0.01*		*0.02*			
Control Delay (s/veh)		*7.8*	*10.1*		*9.1*			
LOS		*A*	*B*		*A*			
Approach Delay (s/veh)	--	--	*9.5*					
Approach LOS	--	--	*A*					

Existing Traffic, Revised Geometry

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Lora Norby*	Intersection	*ND 68 & Co Rd 30*
Agency/Co.	*NDDOT*	Jurisdiction	*Williston District*
Date Performed	*9/23/2015*	Analysis Year	*2015*
Analysis Time Period	*24 hr*		

Project Description	*AC-SS-7-085(011)000*
East/West Street: *ND 68*	North/South Street: *ND 68*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*85*	*13*	*7*	*88*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*96*	*14*	*7*	*100*	*0*
Percent Heavy Vehicles	*0*	--	--	*34*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*3*		*6*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*3*	*0*	*6*	*0*	*0*	*0*
Percent Heavy Vehicles	*33*	*0*	*33*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*7*	*3*		*6*			
C (m) (veh/h)		*1303*	*710*		*882*			
v/c		*0.01*	*0.00*		*0.01*			
95% queue length		*0.02*	*0.01*		*0.02*			
Control Delay (s/veh)		*7.8*	*10.1*		*9.1*			
LOS		*A*	*B*		*A*			
Approach Delay (s/veh)	--	--	*9.4*					
Approach LOS	--	--	*A*					

Future Traffic, Existing Geomtry

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Lora NOrby*	Intersection	*ND 68 & Co Rd 30*
Agency/Co.	*NDDOT*	Jurisdiction	*Williston District*
Date Performed	*9/23/2015*	Analysis Year	*2035*
Analysis Time Period	*24 hr*		

Project Description	*AC-SS-7-085(011)000*
East/West Street: *ND 68*	North/South Street: *Co Rd 30*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*126*	*19*	*10*	*131*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*143*	*21*	*11*	*148*	*0*
Percent Heavy Vehicles	*0*	--	--	*34*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*4*		*8*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*4*	*0*	*9*	*0*	*0*	*0*
Percent Heavy Vehicles	*33*	*0*	*33*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
v (veh/h)		*11*	*4*		*9*			
C (m) (veh/h)		*1242*	*606*		*817*			
v/c		*0.01*	*0.01*		*0.01*			
95% queue length		*0.03*	*0.02*		*0.03*			
Control Delay (s/veh)		*7.9*	*11.0*		*9.5*			
LOS		*A*	*B*		*A*			
Approach Delay (s/veh)	--	--	*9.9*					
Approach LOS	--	--	*A*					

Future Traffic, Revised Geomtry

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Lora Norby*	Intersection	*ND 68 & Co Rd 30*
Agency/Co.	*NDDOT*	Jurisdiction	*Williston District*
Date Performed	*9/23/2015*	Analysis Year	*2035*
Analysis Time Period	*24 hr*		

Project Description	*AC-SS-7-085(011)000*
East/West Street: *ND 68*	North/South Street: *Co Rd 30*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*126*	*19*	*10*	*131*	
Peak-Hour Factor, PHF	*1.00*	*0.88*	*0.88*	*0.88*	*0.88*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*143*	*21*	*11*	*148*	*0*
Percent Heavy Vehicles	*0*	--	--	*34*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*4*		*8*			
Peak-Hour Factor, PHF	*0.88*	*1.00*	*0.88*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*4*	*0*	*9*	*0*	*0*	*0*
Percent Heavy Vehicles	*33*	*0*	*33*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*11*	*4*		*9*			
C (m) (veh/h)		*1242*	*615*		*829*			
v/c		*0.01*	*0.01*		*0.01*			
95% queue length		*0.03*	*0.02*		*0.03*			
Control Delay (s/veh)		*7.9*	*10.9*		*9.4*			
LOS		*A*	*B*		*A*			
Approach Delay (s/veh)	--	--	*9.9*					
Approach LOS	--	--	*A*					

Intersection	
Int Delay, s/veh	5.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	27	131	101	24	143	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	22	21	21	26	23	29
Mvmt Flow	29	142	110	26	155	102

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	523	110	0	0	110	0
Stage 1	110	-	-	-	-	-
Stage 2	413	-	-	-	-	-
Critical Hdwy	6.62	6.41	-	-	4.33	-
Critical Hdwy Stg 1	5.62	-	-	-	-	-
Critical Hdwy Stg 2	5.62	-	-	-	-	-
Follow-up Hdwy	3.698	3.489	-	-	2.407	-
Pot Cap-1 Maneuver	481	894	-	-	1359	-
Stage 1	867	-	-	-	-	-
Stage 2	627	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	423	894	-	-	1359	-
Mov Cap-2 Maneuver	423	-	-	-	-	-
Stage 1	867	-	-	-	-	-
Stage 2	551	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	4.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	751	1359	-
HCM Lane V/C Ratio	-	-	0.229	0.114	-
HCM Control Delay (s)	-	-	11.2	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.9	0.4	-

HCM 2010 TWSC
6: ND 68 & N Trk Stop

Proposed Geometry, Existing Traffic
10/1/2015

Intersection	
Int Delay, s/veh	5.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	27	131	101	24	143	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	22	21	21	26	23	29
Mvmt Flow	29	142	110	26	155	102

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	523	110	0	0	110	0
Stage 1	110	-	-	-	-	-
Stage 2	413	-	-	-	-	-
Critical Hdwy	6.62	6.41	-	-	4.33	-
Critical Hdwy Stg 1	5.62	-	-	-	-	-
Critical Hdwy Stg 2	5.62	-	-	-	-	-
Follow-up Hdwy	3.698	3.489	-	-	2.407	-
Pot Cap-1 Maneuver	481	894	-	-	1359	-
Stage 1	867	-	-	-	-	-
Stage 2	627	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	426	894	-	-	1359	-
Mov Cap-2 Maneuver	426	-	-	-	-	-
Stage 1	867	-	-	-	-	-
Stage 2	555	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.2	0	4.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	753	1359	-
HCM Lane V/C Ratio	-	-	0.228	0.114	-
HCM Control Delay (s)	-	-	11.2	8	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.9	0.4	-

HCM 2010 TWSC
6: ND 68 & N Trk Stop

Future Traffic, Existing Geometry
10/1/2015

Intersection	
Int Delay, s/veh	6.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	41	195	151	36	213	139
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	22	21	21	26	23	29
Mvmt Flow	45	212	164	39	232	151

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	778	164	0	0	164	0
Stage 1	164	-	-	-	-	-
Stage 2	614	-	-	-	-	-
Critical Hdwy	6.62	6.41	-	-	4.33	-
Critical Hdwy Stg 1	5.62	-	-	-	-	-
Critical Hdwy Stg 2	5.62	-	-	-	-	-
Follow-up Hdwy	3.698	3.489	-	-	2.407	-
Pot Cap-1 Maneuver	338	833	-	-	1296	-
Stage 1	819	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	272	833	-	-	1296	-
Mov Cap-2 Maneuver	272	-	-	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	405	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15	0	5.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	613	1296	-
HCM Lane V/C Ratio	-	-	0.418	0.179	-
HCM Control Delay (s)	-	-	15	8.4	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.1	0.6	-

HCM 2010 TWSC
6: ND 68 & N Trk Stop

Proposed Geometry, Future Traffic
10/1/2015

Intersection	
Int Delay, s/veh	6.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	41	195	151	36	213	139
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	100	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	22	21	21	26	23	29
Mvmt Flow	45	212	164	39	232	151

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	778	164	0	0	164	0
Stage 1	164	-	-	-	-	-
Stage 2	614	-	-	-	-	-
Critical Hdwy	6.62	6.41	-	-	4.33	-
Critical Hdwy Stg 1	5.62	-	-	-	-	-
Critical Hdwy Stg 2	5.62	-	-	-	-	-
Follow-up Hdwy	3.698	3.489	-	-	2.407	-
Pot Cap-1 Maneuver	338	833	-	-	1296	-
Stage 1	819	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	277	833	-	-	1296	-
Mov Cap-2 Maneuver	277	-	-	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	413	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.9	0	5.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	618	1296	-
HCM Lane V/C Ratio	-	-	0.415	0.179	-
HCM Control Delay (s)	-	-	14.9	8.4	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	2	0.6	-

HCM 2010 Signalized Intersection Summary
US 85 & ND 68

Existing Traffic, Existing Geometry
10/7/2015

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	3	459	125	109	467	5	99	3	131	2	2	3
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1557	1496	1484	1557	1498	1900	1900	1501	1624	1900	1527	1900
Adj Flow Rate, veh/h	3	499	136	118	508	5	108	3	142	2	2	3
Adj No. of Lanes	1	2	1	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	22	27	28	22	27	27	12	12	17	37	37	37
Cap, veh/h	6	1033	459	144	1317	13	384	8	245	156	103	100
Arrive On Green	0.00	0.36	0.36	0.10	0.46	0.46	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1483	2843	1262	1483	2887	28	1104	44	1380	173	591	574
Grp Volume(v), veh/h	3	499	136	118	250	263	111	0	142	7	0	0
Grp Sat Flow(s),veh/h/ln	1483	1421	1262	1483	1423	1493	1147	0	1380	1338	0	0
Q Serve(g_s), s	0.1	5.0	2.8	2.9	4.3	4.3	3.1	0.0	3.5	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.1	5.0	2.8	2.9	4.3	4.3	3.2	0.0	3.5	0.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.02	0.97		1.00	0.29		0.43
Lane Grp Cap(c), veh/h	6	1033	459	144	649	681	392	0	245	358	0	0
V/C Ratio(X)	0.49	0.48	0.30	0.82	0.39	0.39	0.28	0.00	0.58	0.02	0.00	0.00
Avail Cap(c_a), veh/h	261	2351	1044	784	1679	1761	1013	0	998	1040	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.3	9.1	8.4	16.3	6.6	6.6	13.9	0.0	13.9	12.7	0.0	0.0
Incr Delay (d2), s/veh	50.8	0.4	0.4	10.9	0.4	0.4	0.4	0.0	2.2	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	2.0	1.0	1.6	1.7	1.8	1.1	0.0	1.5	0.1	0.0	0.0
LnGrp Delay(d),s/veh	69.1	9.4	8.7	27.2	7.0	7.0	14.3	0.0	16.1	12.7	0.0	0.0
LnGrp LOS	E	A	A	C	A	A	B		B	B		
Approach Vol, veh/h		638			631			253			7	
Approach Delay, s/veh		9.5			10.8			15.3			12.7	
Approach LOS		A			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.1	17.9		10.9	4.7	21.3		10.9
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	19.5	30.5		26.5	6.5	43.5		26.5
Max Q Clear Time (g_c+I1), s	4.9	7.0		5.5	2.1	6.3		2.2
Green Ext Time (p_c), s	0.2	6.4		0.9	0.0	7.0		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.0
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
US 85 & ND 68

Future Traffic, Existing Geometry
10/7/2015

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	4	684	187	163	697	8	147	4	195	3	3	5
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1545	1496	1484	1557	1498	1900	1900	1501	1624	1900	1545	1900
Adj Flow Rate, veh/h	4	743	203	177	758	9	160	4	212	3	3	5
Adj No. of Lanes	1	2	1	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	23	27	28	22	27	27	11	11	17	36	36	36
Cap, veh/h	8	971	431	210	1376	16	263	5	479	66	59	55
Arrive On Green	0.01	0.34	0.34	0.14	0.48	0.48	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1471	2843	1262	1483	2881	34	500	15	1380	18	173	160
Grp Volume(v), veh/h	4	743	203	177	374	393	164	0	212	11	0	0
Grp Sat Flow(s),veh/h/ln	1471	1421	1262	1483	1423	1492	515	0	1380	351	0	0
Q Serve(g_s), s	0.2	18.0	9.7	9.0	14.4	14.4	0.8	0.0	9.1	0.2	0.0	0.0
Cycle Q Clear(g_c), s	0.2	18.0	9.7	9.0	14.4	14.4	25.4	0.0	9.1	25.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.02	0.98		1.00	0.27		0.45
Lane Grp Cap(c), veh/h	8	971	431	210	680	713	268	0	479	180	0	0
V/C Ratio(X)	0.52	0.77	0.47	0.84	0.55	0.55	0.61	0.00	0.44	0.06	0.00	0.00
Avail Cap(c_a), veh/h	124	1124	499	375	803	842	270	0	482	182	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	38.3	22.6	19.9	32.3	14.3	14.3	25.5	0.0	19.4	19.4	0.0	0.0
Incr Delay (d2), s/veh	44.4	2.8	0.8	8.9	0.7	0.7	4.0	0.0	0.6	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	7.4	3.5	4.2	5.7	6.0	3.8	0.0	3.5	0.2	0.0	0.0
LnGrp Delay(d),s/veh	82.6	25.4	20.7	41.2	15.0	14.9	29.4	0.0	20.0	19.5	0.0	0.0
LnGrp LOS	F	C	C	D	B	B	C		C	B		
Approach Vol, veh/h		950			944			376			11	
Approach Delay, s/veh		24.6			19.9			24.1			19.5	
Approach LOS		C			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.4	30.9		30.9	4.9	41.4		30.9
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	19.5	30.5		26.5	6.5	43.5		26.5
Max Q Clear Time (g_c+I1), s	11.0	20.0		27.4	2.2	16.4		27.1
Green Ext Time (p_c), s	0.3	6.5		0.0	0.0	11.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	22.6
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
US 85 & ND 68

Proposed Geometry, Existing Traffic
10/7/2015

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	3	459	125	109	467	5	99	3	131	2	2	3
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1557	1496	1484	1557	1498	1900	1900	1501	1624	1900	1527	1900
Adj Flow Rate, veh/h	3	499	136	118	508	5	108	3	142	2	2	3
Adj No. of Lanes	1	2	1	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	22	27	28	22	27	27	12	12	17	37	37	37
Cap, veh/h	6	1033	459	144	1317	13	384	8	245	156	103	100
Arrive On Green	0.00	0.36	0.36	0.10	0.46	0.46	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1483	2843	1262	1483	2887	28	1104	44	1380	173	591	574
Grp Volume(v), veh/h	3	499	136	118	250	263	111	0	142	7	0	0
Grp Sat Flow(s),veh/h/ln	1483	1421	1262	1483	1423	1493	1147	0	1380	1338	0	0
Q Serve(g_s), s	0.1	5.0	2.8	2.9	4.3	4.3	3.1	0.0	3.5	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.1	5.0	2.8	2.9	4.3	4.3	3.2	0.0	3.5	0.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.02	0.97		1.00	0.29		0.43
Lane Grp Cap(c), veh/h	6	1033	459	144	649	681	392	0	245	358	0	0
V/C Ratio(X)	0.49	0.48	0.30	0.82	0.39	0.39	0.28	0.00	0.58	0.02	0.00	0.00
Avail Cap(c_a), veh/h	261	2351	1044	784	1679	1761	1013	0	998	1040	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.3	9.1	8.4	16.3	6.6	6.6	13.9	0.0	13.9	12.7	0.0	0.0
Incr Delay (d2), s/veh	50.8	0.4	0.4	10.9	0.4	0.4	0.4	0.0	2.2	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	2.0	1.0	1.6	1.7	1.8	1.1	0.0	1.5	0.1	0.0	0.0
LnGrp Delay(d),s/veh	69.1	9.4	8.7	27.2	7.0	7.0	14.3	0.0	16.1	12.7	0.0	0.0
LnGrp LOS	E	A	A	C	A	A	B		B	B		
Approach Vol, veh/h		638			631			253			7	
Approach Delay, s/veh		9.5			10.8			15.3			12.7	
Approach LOS		A			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.1	17.9		10.9	4.7	21.3		10.9
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	19.5	30.5		26.5	6.5	43.5		26.5
Max Q Clear Time (g_c+I1), s	4.9	7.0		5.5	2.1	6.3		2.2
Green Ext Time (p_c), s	0.2	6.4		0.9	0.0	7.0		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.0
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
US 85 & ND 68

Proposed Geometry, Future Traffic
10/7/2015

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	4	684	187	163	696	8	147	4	195	3	3	5
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1545	1496	1484	1557	1498	1900	1900	1501	1624	1900	1545	1900
Adj Flow Rate, veh/h	4	743	203	177	757	9	160	4	212	3	3	5
Adj No. of Lanes	1	2	1	1	2	0	0	1	1	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	23	27	28	22	27	27	11	11	17	36	36	36
Cap, veh/h	8	971	431	210	1376	16	263	5	479	66	59	55
Arrive On Green	0.01	0.34	0.34	0.14	0.48	0.48	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	1471	2843	1262	1483	2881	34	500	15	1380	18	173	160
Grp Volume(v), veh/h	4	743	203	177	374	392	164	0	212	11	0	0
Grp Sat Flow(s),veh/h/ln	1471	1421	1262	1483	1423	1492	515	0	1380	351	0	0
Q Serve(g_s), s	0.2	18.0	9.7	9.0	14.4	14.4	0.8	0.0	9.1	0.2	0.0	0.0
Cycle Q Clear(g_c), s	0.2	18.0	9.7	9.0	14.4	14.4	25.4	0.0	9.1	25.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.02	0.98		1.00	0.27		0.45
Lane Grp Cap(c), veh/h	8	971	431	210	680	713	268	0	479	180	0	0
V/C Ratio(X)	0.52	0.77	0.47	0.84	0.55	0.55	0.61	0.00	0.44	0.06	0.00	0.00
Avail Cap(c_a), veh/h	124	1124	499	375	803	842	270	0	482	182	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	38.2	22.6	19.9	32.3	14.3	14.3	25.5	0.0	19.4	19.4	0.0	0.0
Incr Delay (d2), s/veh	44.4	2.8	0.8	8.9	0.7	0.7	4.0	0.0	0.6	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	7.4	3.5	4.2	5.7	6.0	3.8	0.0	3.5	0.2	0.0	0.0
LnGrp Delay(d),s/veh	82.6	25.4	20.7	41.2	15.0	14.9	29.4	0.0	20.0	19.5	0.0	0.0
LnGrp LOS	F	C	C	D	B	B	C		C	B		
Approach Vol, veh/h		950			943			376			11	
Approach Delay, s/veh		24.6			19.9			24.1			19.5	
Approach LOS		C			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.4	30.9		30.9	4.9	41.4		30.9
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	19.5	30.5		26.5	6.5	43.5		26.5
Max Q Clear Time (g_c+I1), s	11.0	20.0		27.4	2.2	16.4		27.1
Green Ext Time (p_c), s	0.3	6.5		0.0	0.0	11.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	22.6
HCM 2010 LOS	C

3: ND 68 Performance by approach

Approach	SE	NW	NE	SW	All
Denied Del/Veh (s)	0.8	0.7	0.0	0.1	0.6
Total Del/Veh (s)	13.6	9.0	12.7	9.1	11.6

6: ND 68 & N Trk Stop Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	176.0	1.0	7.7	25.8
Total Del/Veh (s)	34.6	1.5	7.6	9.7

Total Network Performance

Denied Del/Veh (s)	15.6
Total Del/Veh (s)	17.9

Intersection: 3: ND 68

Movement	SE	SE	SE	SE	NW	NW	NW	NE	NE	SW
Directions Served	L	T	T	R	L	T	TR	LT	R	LTR
Maximum Queue (ft)	25	257	211	140	189	167	163	198	181	59
Average Queue (ft)	2	124	78	46	85	58	36	64	48	5
95th Queue (ft)	15	222	181	109	166	130	106	148	126	28
Link Distance (ft)		1670	1670			1872	1872	616	616	1296
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	415			590	950					
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 6: ND 68 & N Trk Stop

Movement	WB	NB	SB
Directions Served	LR	T	LT
Maximum Queue (ft)	130	8	380
Average Queue (ft)	85	0	97
95th Queue (ft)	134	6	300
Link Distance (ft)	56	478	616
Upstream Blk Time (%)	60		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

3: ND 68 Performance by approach

Approach	SE	NW	NE	SW	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.3	0.2	0.1	0.0	0.6

6: ND 68 & N Trk Stop Performance by approach

Approach	WB	NB	SB	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.0	0.1

Total Network Performance

Denied Delay (hr)	0.0
Total Delay (hr)	0.9

Intersection: 3: ND 68

Movement	SE	SE	SE	NW	NW	NW	NE	NE	SW
Directions Served	T	T	R	L	T	TR	LT	R	LTR
Maximum Queue (ft)	103	83	62	84	64	46	78	72	4
Average Queue (ft)	76	42	29	54	34	22	43	38	1
95th Queue (ft)	117	93	65	98	74	55	89	80	8
Link Distance (ft)	1664	1664			1866	1866	613	613	1295
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			590	950					
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 6: ND 68 & N Trk Stop

Movement	WB	SB	SB
Directions Served	LR	L	LT
Maximum Queue (ft)	76	10	46
Average Queue (ft)	51	2	18
95th Queue (ft)	85	14	58
Link Distance (ft)	51		613
Upstream Blk Time (%)	7		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)		150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

3: ND 68 Performance by approach

Approach	SE	NW	NE	SW	All
Denied Del/Veh (s)	0.8	0.7	0.0	0.1	0.6
Total Del/Veh (s)	18.9	12.1	17.2	12.1	15.8

6: ND 68 & N Trk Stop Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	3.6	1.0	0.0	1.4
Total Del/Veh (s)	6.6	2.1	5.9	5.2

Total Network Performance

Denied Del/Veh (s)	1.1
Total Del/Veh (s)	22.8

Intersection: 3: ND 68

Movement	SE	SE	SE	SE	NW	NW	NW	NE	NE	SW
Directions Served	L	T	T	R	L	T	TR	LT	R	LTR
Maximum Queue (ft)	24	376	564	200	267	222	246	273	215	84
Average Queue (ft)	2	192	164	64	118	89	78	119	77	10
95th Queue (ft)	14	324	390	137	224	183	179	221	168	45
Link Distance (ft)		1670	1670			1872	1872	616	616	1296
Upstream Blk Time (%)			0							
Queuing Penalty (veh)			0							
Storage Bay Dist (ft)	415			590	950					
Storage Blk Time (%)		0								
Queuing Penalty (veh)		0								

Intersection: 6: ND 68 & N Trk Stop

Movement	WB	NB	NB	SB
Directions Served	LR	T	R	LT
Maximum Queue (ft)	130	17	7	252
Average Queue (ft)	89	1	0	69
95th Queue (ft)	135	11	4	173
Link Distance (ft)	56	478		616
Upstream Blk Time (%)	19			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)			100	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 0

3: ND 68 Performance by approach

Approach	SE	NW	NE	SW	All
Denied Del/Veh (s)	0.7	0.6	0.0	0.1	0.6
Total Del/Veh (s)	14.9	9.8	16.6	9.1	13.0

6: ND 68 & N Trk Stop Performance by approach

Approach	WB	NB	SB	All
Denied Del/Veh (s)	4.4	1.6	0.0	1.8
Total Del/Veh (s)	5.1	1.7	3.6	3.7

Total Network Performance

Denied Del/Veh (s)	1.2
Total Del/Veh (s)	16.4

Queuing and Blocking Report
Baseline

Proposed Geometry, Future Traffic
10/1/2015

Intersection: 3: ND 68

Movement	SE	SE	SE	NW	NW	NW	NE	NE	SW
Directions Served	T	T	R	L	T	TR	LT	R	LTR
Maximum Queue (ft)	255	154	96	145	141	82	147	170	24
Average Queue (ft)	148	127	52	87	61	42	92	66	12
95th Queue (ft)	239	158	95	136	146	100	175	166	30
Link Distance (ft)	1664	1664			1866	1866	613	613	1295
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			590	950					
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 6: ND 68 & N Trk Stop

Movement	WB	SB	SB
Directions Served	LR	L	LT
Maximum Queue (ft)	85	50	90
Average Queue (ft)	67	22	30
95th Queue (ft)	86	53	84
Link Distance (ft)	51		613
Upstream Blk Time (%)	17		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)		150	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0