Memo To: Christina Wollman, Kittitas County Public Works

Memo From: Pat Deneen, Big Creek Trails

Re: Traffic Study

Date: November 2, 2015

Christina

Attached you will find the original traffic study that we did for the original high-density development that we were looking at for our Big Creek Property. The original plan for this property included the development of 380 parcels and the traffic study that we had done used that number for the traffic study.

We have now reduced the size of the development to 58 parcels.

The original traffic study was done in January of 2008.

Included with this submittal is a list of all of the new construction in the Nelson Siding / Big Creek area. This list was formed from the Kittitas County Data Base for building permits. During the period of 2008 through the first portion of 2015 there has been an additional 26 home built in the area.

In addition and as you know Nelson Siding Road has been improved during this time period.

We have completed an internal review of the 2008 Traffic Study with the additional 26 residential units in the area which we believe shows that, in total, no improvements are warranted to Nelson Siding Road.

Thank you for your consideration.

If you have any questions please contact me through my email as I will be out of country for most of the winter.

Pat Deneen
pat@patrickdeneen.com
509-260-0462

New Building Permits 2008-July 2015

2008

1 BP-08-00049
2160 NELSON SIDING RD
CLE ELUM WA 98922
Owner: SOMA, CHADWICK L
20-14-27030-0016

BP-08-00049 BP-08-00049

20-14-27030-001 20-14-27030-0016 y

2 BP-0800486
350 STORIE LN
CLE ELUM WA 98922
LIBBY, RUSSEL A ETUX
20-14-27056-0003

BP-0800486 BP-0800486

20-14-27056-000 20-14-27056-0003 y

2009

3 BP-08-00750
61 KAHUKU CT
CLE ELUM WA 98922
RIACH, ELLA F
20-14-35050-0208

BP-08-00750 BP-08-00750

20-14-35050-020 20-14-35050-0208 y

4 BP-0800163
00700 OLD CEDARS RD
CLE ELUM WA 98922
JACOBSON, ROGER J
20-14-19010-0023

BP-0800163 BP-0800163

20-14-19010-002 20-14-19010-0023 y

5 BP-09-00232
600 BIG CREEK RD
CLE ELUM WA 98922
FLORA, CHARLES ETUX
20-14-21055-0001

BP-09-00232 BP-09-00232

20-14-21055-000 20-14-21055-0001 y

2010

6 BP-10-00456
1191 ST ANDREWS DR
CLE ELUM WA 98922
GUIBERSON, MICHAEL ETUX
20-14-360500422

BP-10-00456 BP-10-00456

20-14-360500422 20-14-360500422 y

7 BP-10-00789
330 HERMITAGE DR
CLE ELUM WA 98922
BEQUETTE, RONALD E
20-14-35000-0009

BP-10-00789 BP-10-00789

20-14-35000-000 20-14-35000-0009 y

8 BP-10-00435
571 HERMITAGE DR
CLE ELUM WA 98922
DREYER, GARY ETUX
20-14-35051-0303

BP-10-00435 BP-10-00435

20-14-35051-030 20-14-35051-0303 y

9 BP-10-00563
BROECKEL, JEFFREY D
41 MYRTLE BEACH CT
CLE ELUM WA 98922
20-14-35052-0102

BP-10-00563 BP-10-00563

20-14-35052-010 20-14-35052-0102 y

2011

10 BP-11-00132
941 OAKMONT DR
CLE ELUM WA 98922
STRATTON, STACIA

BP-11-00132 BP-11-00132

20-14-35052-0088

20-14-35052-008 20-14-35052-0088 y

11 BP-11-00232
STEWARD, CLARA
822 FILBERT RD
CLE ELUM WA 98922
20-14-29052-0002

BP-11-00232 BP-11-00232

20-14-29052-000 20-14-29052-0002 y

2011

12 BP-11-00441
301 HERMITAGE DR
CLE ELUM WA 98922
THOMPSON, ROBERT
20-14-35000-0008

BP-11-00441 BP-11-00441

20-14-35000-000 20-14-35000-0008 y

13 BP-11-00508
10223 WESTSIDE RD
CLE ELUM WA 98922
WILSON, GORDON
20-14-35054-0008

BP-11-00508 BP-11-00508

20-14-35054-000 20-14-35054-0008 y

14 BP-12-00270
LARSON, BONNIE E
820 OAKMONT DR
CLE ELUM WA 98922
201220-14-35052-0036

BP-12-00270 BP-12-00270

20-14-35052-003 20-14-35052-0036 y

15 BP-12-00308
HOVELAND, CATHY
210 SUNSHINE WAY
CLE ELUM WA 98922
20-14-21050-0014

BP-12-00308 BP-12-00308

20-14-21050-001 20-14-21050-0014 y

16 BP-12-00383
SUN COUNTRY GOLF
230 HERMITAGE DR
CLE ELUM WA 98922
20-14-35059-0010

BP-12-00383 BP-12-00383

20-14-35059-001 20-14-35059-0010 y

2013

17 BP-13-00166
ESHE, ARTHUR L ETUX
941 OLD CEDARS RD
CLE ELUM WA 98922
20-14-19053-0002

BP-13-00166 BP-13-00166

20-14-19053-000 20-14-19053-0002 y

18 BP-13-00723
LEE, ALBERT G JR & HOLLY K
752 TALMADGE RD
CLE ELUM WA 98922
20-14-21052-0002

BP-13-00723 BP-13-00723

20-14-21052-000 20-14-21052-0002 y

2014

19 BP-14-00278
ANSELMO, GEORGE ETUX
309 HERMITAGE DR
CLE ELUM WA 98922
20-14-35000-0003

BP-14-00278 BP-14-00278

20-14-35000-000 20-14-35000-0003 y

20 BP-14-00440
80 ROCKY TOP LN
CLE ELUM WA 98922
COE, MATTHEW D
20-14-29051-0004

BP-08-00049 BP-08-00049

20-14-29051-000 20-14-29051-0004 y

21 BP-14-00468
1970 OLD CEDARS RD
CLE ELUM WA 98922
VICTOR, GREG
20-14-19010-0025

BP-08-00049 BP-08-00049

20-14-19010-002 20-14-19010-0025 y

2015

22 BP-14-00442
5171 NELSON SIDING RD.
DARLING, DAVID JOHN A
20-14-20040-0023

BP-08-00049 BP-08-00049

20-14-20040-002 20-14-20040-0023 y

23 BP-15-00024
531 SCOTT DR
CLE ELUM WA 98922
JACKSON, ANDREW ETUX
20-14-28061-0002

BP-08-00049 BP-08-00049

20-14-28061-000 20-14-28061-0002 y

24 BP-15-00207
941 OLD CEDARS RD
CLE ELUM WA 98922
IVERSON
20-14-19053-0002

BP-08-00049 BP-08-00049

20-14-19053-000 20-14-19053-0002 y

25 BP-15-00133
121 ST ANDREWS DR
CLE ELUM WA 98922
LANPHERE, RANDY ETUX
20-14-26000-0001

BP-08-00049 BP-08-00049

20-14-26000-000 20-14-26000-0001 y

26 BP-15-00291
323 BOOK LN
CLE ELUM WA 98922
ANDERSON, RICK
20-14-27063-0001

BP-08-00049 BP-08-00049

#VALUE! 20-14-27063-0001 y

TIA

Transportation
Impact
Analysis

BIG CREEK

RESIDENTIAL DEVELOPMENT

JANUARY 2008

Prepared for Terra Design Group and Kittitas County

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Summary

This report summarizes the traffic impact analysis performed for a proposed residential development project off of Nelson Siding Road in Kittitas County, Washington, just south of Interstate 90. The analysis considered existing roadway and traffic conditions and future conditions with the Big Creek development in place.

An inventory of existing roadway conditions was conducted in July, 2006. Traffic volumes were obtained with midweek tube counts at two locations on Nelson Siding Road, one just south of West Nelson Road and one just north of Westside Road. These tube counts indicated that the average PM peak hour volume at location #1 is 50 vehicles, with 72 vehicles at location #2. More detailed existing traffic volume data can be found in Appendix A.

The Big Creek development, anticipated to be occupied in 2008, will add 356 net PM peak hour trips to the local road network. This development will not significantly affect traffic patterns and all local intersections are forecasted to remain at LOS-B or better. (The Kittitas County standard is LOS-C for rural roads.) Since there is no significant impact to the road network, no mitigation is necessary. Level of service reports are included as Appendix C.

New roads built to provide access to the residential lots in the Big Creek development will be required to be built according to current Kittitas County Road Standards, as cited in this report. Kittitas County Road Standards are not exhaustive on road design criteria; instead, AASHTO and WSDOT design criteria are included by reference.

1 Introduction

This report outlines findings of a traffic impact analysis performed for a proposed residential development project off of Nelson Siding Road in Kittitas County, Washington. This project is located near the City of Cle Elum, just south of Interstate 90.

This analysis is formatted to document the transportation-related impacts of the proposed project. This includes developing vehicle trip generation rates for the project and analyzing the impacts of these trips on the local road network in terms of intersection level of service and site access. This study also documents existing road conditions, planned improvements and other significant project in the vicinity. A vicinity map is included as Figure 1.

Preliminary design considerations and recommendations to mitigate traffic impacts are included in this report.

2 Project Description

Terra Design Group is proposing a residential development south of Nelson Siding Road in Kittitas County, Washington. The Big Creek development consists of 380 single-family homes. Primary access to the development will be via Lund Lane.

3 Existing Conditions

Existing conditions evaluated at the project site include the road network, current traffic volumes and patterns, and the collision history at locations near the site. Existing land uses and the associated traffic generated by these uses were also considered.

3.1 Existing Road Network

The following roads are in the vicinity of the project site:

- **I-90:** Interstate 90 is the major east/west freeway through this part of Washington, and is located approximately half a mile north of these project sites. Exits 74 and 78 would serve these sites by way of Nelson Siding Road.

- **Nelson Siding Road:** This is a two-lane county road that parallels I-90 in the vicinity of the projects. Nelson Siding Road connects directly to I-90 at Exit 74 (to the west) and via Golf Course Road at Exit 78 (to the east).

- **Lund Lane:** Lund Lane is a private gravel road connecting to Nelson Siding Road and is the proposed access for the Big Creek site.

3.2 Existing Traffic Volumes

The capacity of the local road network at locations determined to be significantly impacted by these development was analyzed. Existing traffic volumes were collected at the locations listed in Table 1 below, and depicted in Figure 3 along with the average weekday PM peak hour (5pm to 6pm) traffic volumes. For additional traffic volume data, see Appendix A.

Table 1. Existing (2006) Average Traffic Volume Data

Location #	Location Description	Northbound	Southbound	Total
1	Nelson Siding Road east of W. Nelson Rd	13	37	50
2	Nelson Siding Road west of Westside Rd	38	34	72

3.3 Existing Trip Generation

There are currently no residences or other vehicle trip generating uses on the project site. There are approximately 5 residences currently accessing Lund Lane, and these are assumed to remain for the purposes of this study.

3.4 Existing Intersection Operations

Existing traffic conditions in the vicinity of the site are based on the tube count data described above and the assignment of the existing traffic according to the distribution shown in Figure 2. It was assumed that 70% of the traffic though tube count location #1 had an origin/destination past the Big Creek site. From tube count location #2, 30% of the traffic though tube count location #2 was assumed to have an origin/destination past the Big Creek site.

The PM peak hour level of service (LOS) was calculated for the selected intersections using the 2000 Highway Capacity Manual (Transportation Research Board, Special Report 209) methodology. For signalized intersections, the LOS is defined by seconds of average vehicle delay at the intersection. The seconds of delay are divided into several categories or grade levels, ranging from LOS-A, which is very good, to LOS-F, which reflects a breakdown in traffic flow. Although these letter designations provide a simple basis for comparison, seconds of average vehicle delay should be used as the exact measure of comparison. For *unsignalized* intersections, the level of service is defined in terms of stopped time delay for the controlled movements, and is divided into LOS categories A through F. The findings are summarized in Table 2 below. LOS worksheets are included in Appendix C.

Table 2. Existing LOS

Nelson Siding Road Intersection	Approach	LOS	Delay (sec)
Big Creek Access *(Unsignalized)*	NB	A	8.6

Kittitas County has set its level of service standard for rural roads at LOS-C. The intersection at the project access point currently operates at LOS-A.

3.5 Collision History

A record of the collisions along Nelson Siding Road since 2003 was provided by Kittitas County. This data is summarized below in Table 3.

Table 3. Collision Data for Nelson Siding Road

Cross Street	Milepost	Year	Injury Class
Talmadge Road	3.05	2003	Non-Disabling
Westside Road	1.60	2003	--
Lund Lane	3.50	2003	Possible Injury
Pioneer Trail Road	2.93	2005	Non-Disabling, Possible Injury
Secret Valley Road	1.05	2005	No Injury
Golf Course Road	0.02	2005	--
Westside Road	0.79	2005	Non-Disabling

With only seven accidents since 2003, Nelson Siding Road is not an accident-prone corridor. Only one accident was recorded at Lund Lane itself (the project's primary access point).

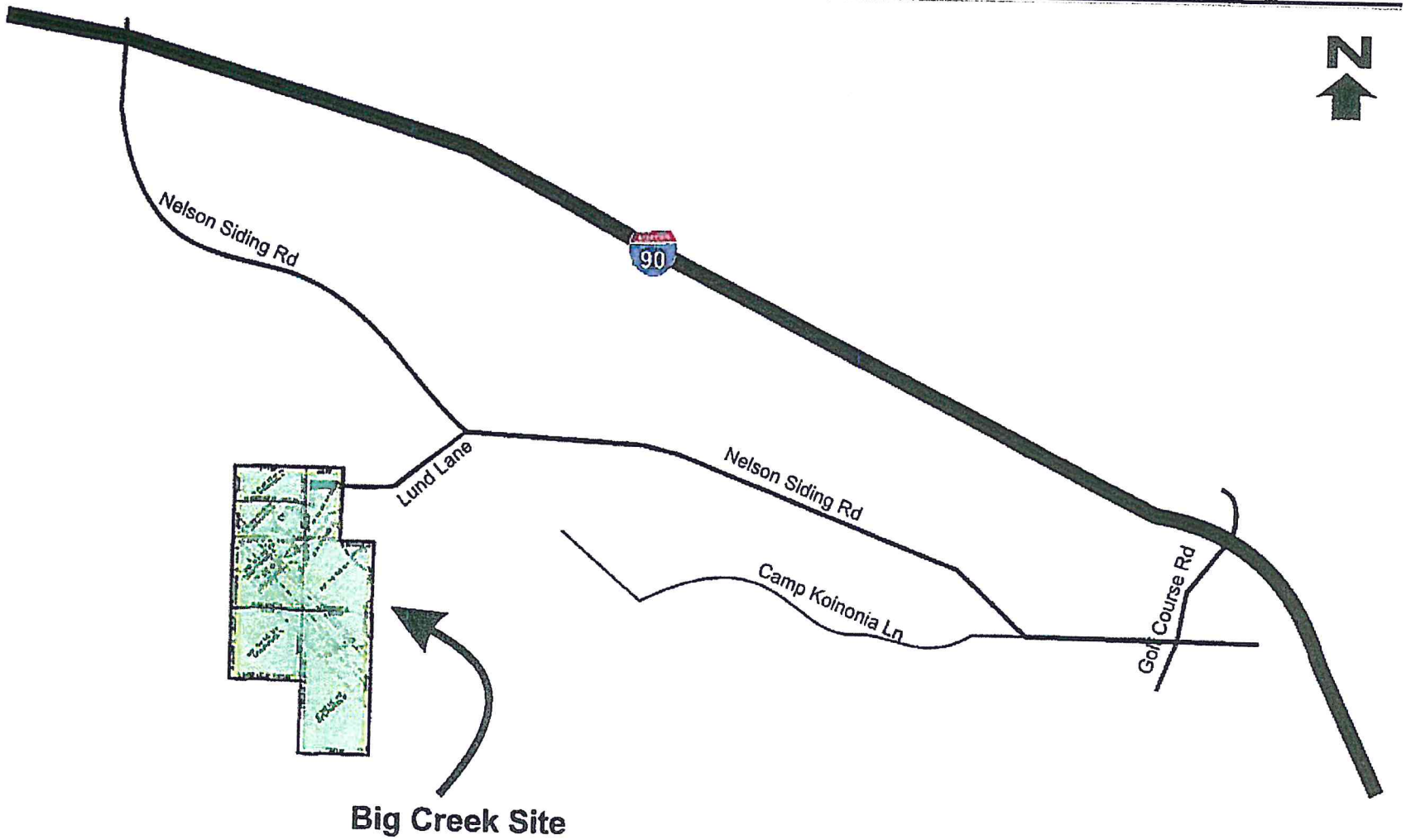

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Figure 1
Vicinity Map

Big Creek
Development
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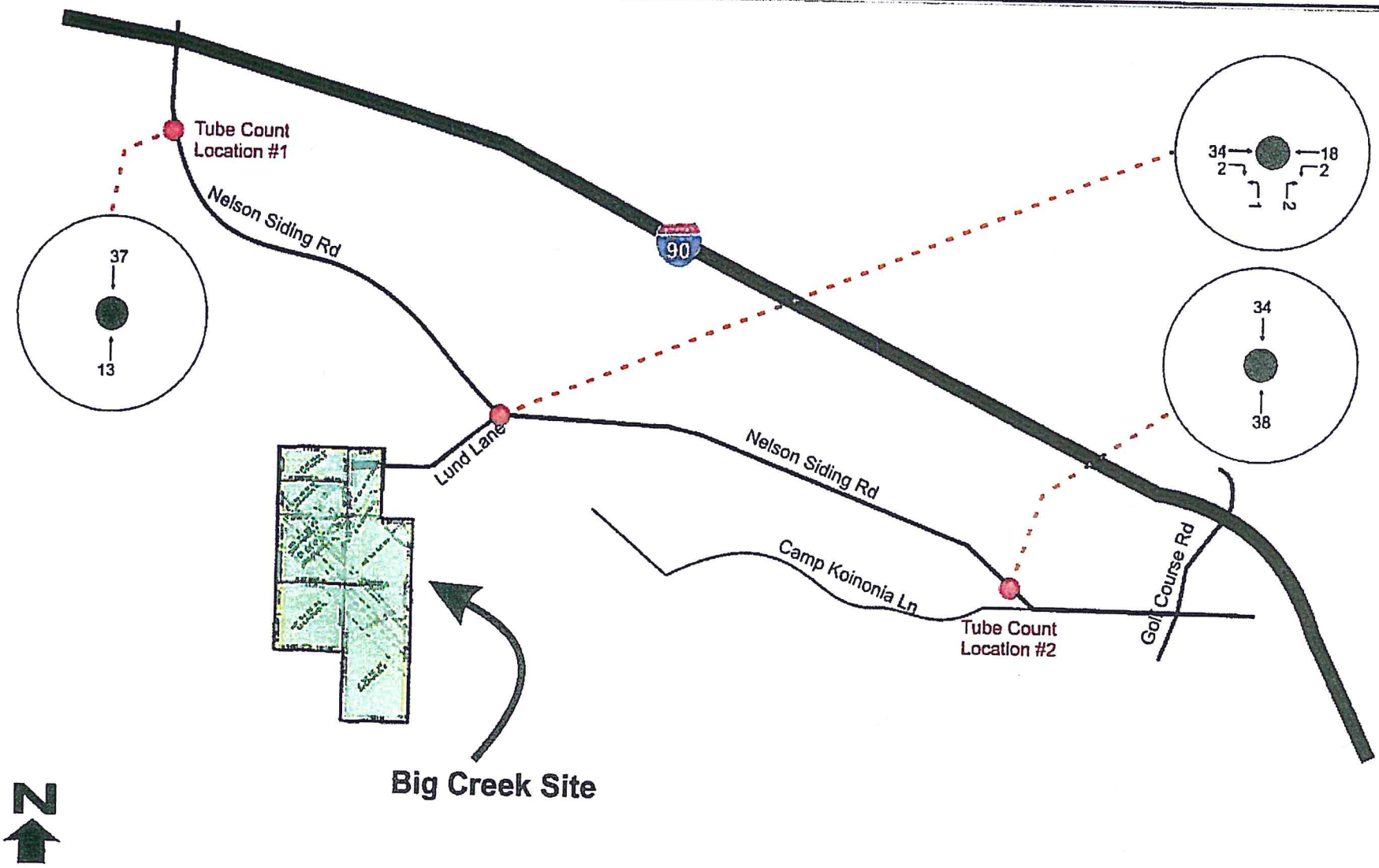

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Figure 2
2006 Existing Conditions
PM Peak Hour Volumes

Big Creek
Development
TIA

4 Project Trip Generation and Distribution

4.1 Trip Generation

The proposed Big Creek development will include 380 single family residential homes. The 7th edition of the *Institute of Transportation Engineers (ITE) Trip Generation Manual* lists a fitted-curve equation for calculating the appropriate vehicle trip generation per unit for LUC-210, "Single-Family Detached Housing," for the weekday PM peak hour of adjacent street traffic (between 4p.m. and 6p.m.). The directional distribution is 63% entering and 37% exiting. These factors were used to calculate the net project trips included in Table 4 below.

Table 4. Net New Project Trips

LUC-210 Single-Family Detached Housing		Distribution		Vehicle Trips		
		In	Out	In	Out	Total
Big Creek	Existing	63%	37%	0	0	0
	Proposed	63%	37%	225	132	356
Net New Trips				225	132	356

4.2 Trip Distribution and Assignment

The PM peak hour project trips generated as calculated above were distributed on the local road network according to the same distribution used for the existing trips. That is, 70% of the traffic though tube count location #1 had an origin/destination past the Big Creek site. From tube count location #2, 30% of the traffic though tube count location #2 was assumed to have an origin/destination past the Big Creek site. This distribution is included as Figure 3. The traffic volume spreadsheet is included as Appendix B.

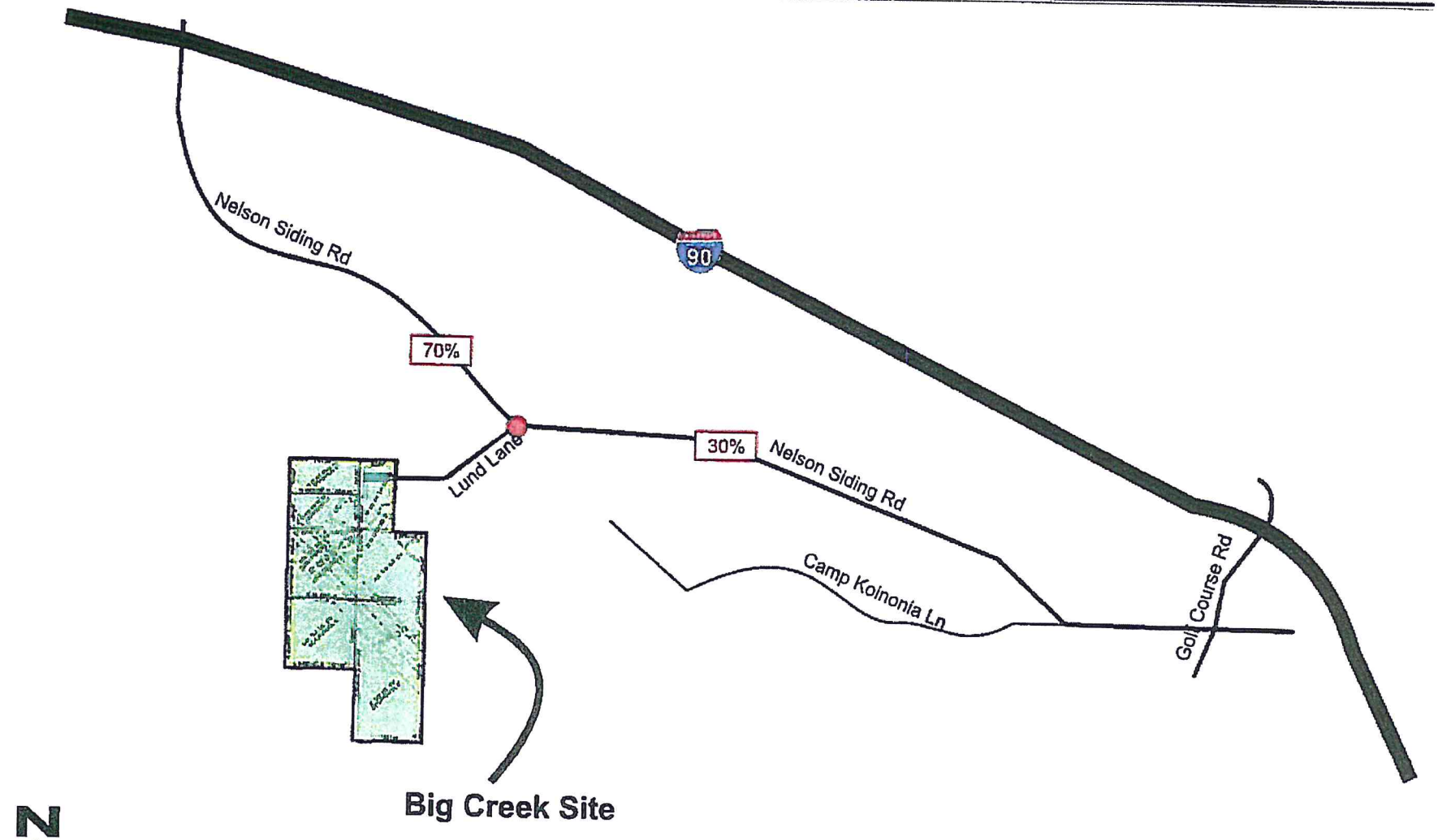

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Figure 3
PM Peak Hour Trip Distribution

Big Creek Development TIA

5 Future Conditions with Project

Future conditions were considered assuming initial occupancy in 2008. To determine background traffic volumes, an annual growth rate of 2% was assumed, per Kittitas County. There are no other known significant development in the area that would impact the local road network. The only road improvement project being planned for this area is a County project scheduled for Nelson Siding Road that will widen the road to 28 feet. No other improvements to Nelson Siding Road or other locations affecting the site accesses were indicated.

Figure 4 depicts the projected future PM peak hour turning movement volumes with the project in place at the project access location. A level of service analysis was performed to establish future conditions with the project at this intersection. The results of this analysis are summarized in Table 5. Existing LOS is included for comparative purposes.

Table 5. LOS with Project		Existing		Future w/ Project	
Nelson Siding Road Intersection	**Approach**	**LOS**	**Delay (sec)**	**LOS**	**Delay (sec)**
Big Creek Access *(Unsignalized)*	NB	A	8.6	B	11.4

The controlled approach to this unsignalized intersection (northbound) is forecasted to operate at LOS-B and 11.4 seconds of delay with the project in place. The level of service standard is LOS-C, so no mitigation would be required due to the level of service.

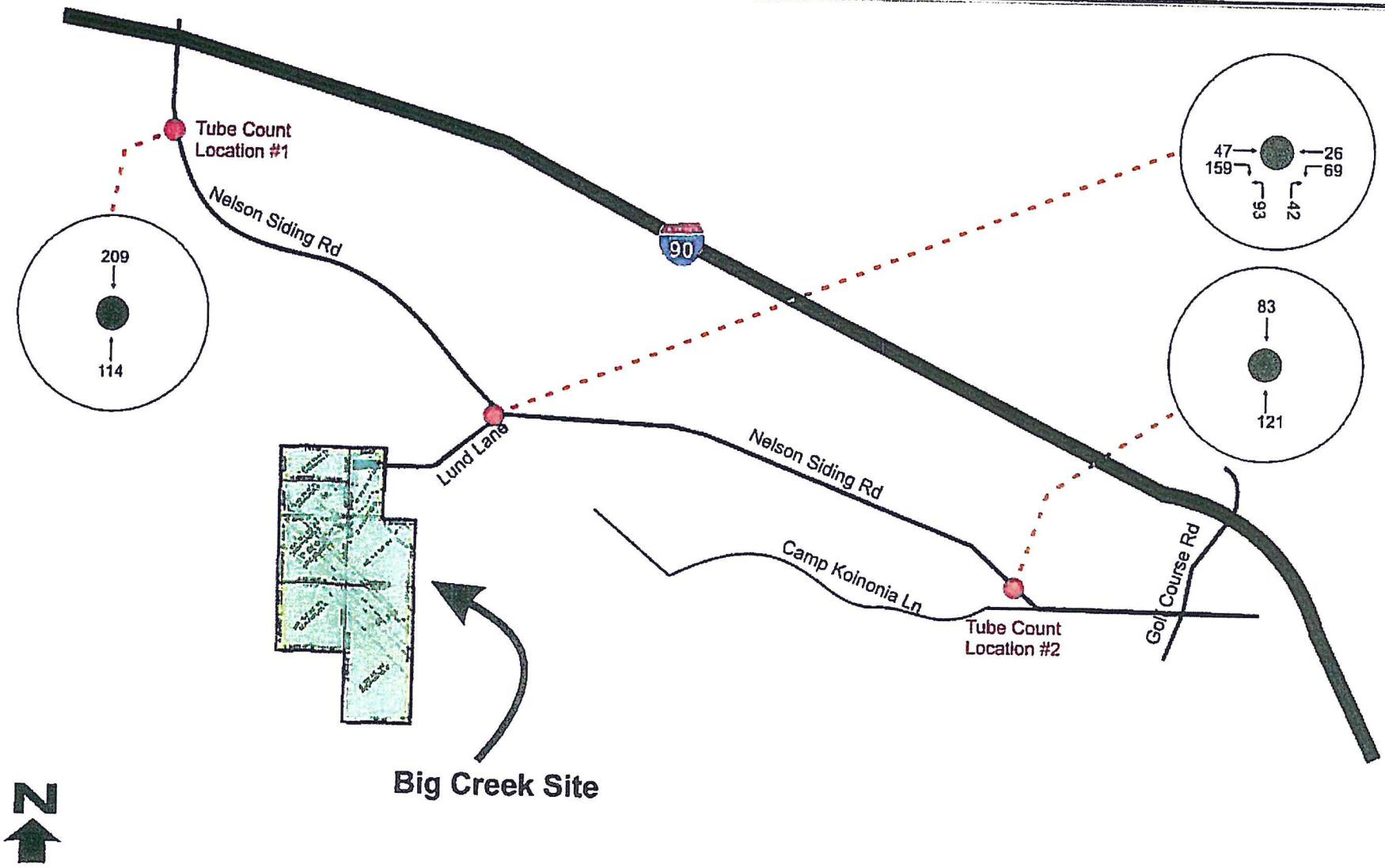

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Figure 4
2008 With Project Conditions
PM Peak Hour Volumes

Big Creek
Development
TIA

6 Preliminary Design Guidelines

6.1 New Roadways

New private roads will be constructed as part of this project to service the lots in the development. All new road construction is subject to Title 12 of the Kittitas County Code. Table 12-1 from the County Code is included below, indicating private road minimum design standards.

Table 12-1
Private Road Minimum Design Standards

	Private Roads					
	Driveway		High-Density			Low Density
Design Elements	Single	Joint-Use	0 - 5 Acres Average Lot Size			5.01 Acres and Larger Average Lot Size[1]
Number of Lots Served	1	2	3 -14	15 - 40	40+[2]	3 -40+
Minimum Easement Width	0	20	40	60	60	60
Paved Apron[3]	N/A	N/A	Req'd	Req'd	Req'd	Req'd
Roadway Width	8	12	20	22	AASHTO	20
Graveled Shoulder Width	N/A	N/A	1	1	AASHTO	1
Minimum Centerline Radius (ft)	N/A	N/A	60	60	AASHTO	60
Surfacing Requirements[4]	Gravel	Gravel	Gravel	BST/ACP	AASHTO	Gravel
Minimum Crushed Stone Depth	N/A	6"	6"	6"	AASHTO	6"
Maximum Grade %[5]						
Flat	N/A	N/A	8	8	8	12
Rolling	N/A	N/A	12	12	12	
Mountainous	N/A	N/A	12	12	12	
County Road Approach Permit	Req'd	Req'd	Req'd	Req'd	Req'd	Req'd
Stopping Site Distance	N/A	N/A	AASHTO	AASHTO	AASHTO	AASHTO
Entering Site Distance	N/A	N/A	AASHTO	AASHTO	AASHTO	AASHTO
Ditch Slope (inside slope)	Slopes steeper than 2:1 should only be used when achieving a 2:1 slope is impractical					

[1] Residual lots within a proposed development shall not be considered when computing average lot size
[2] Engineer design per AASHTO and/or WSDOT required for 40+ High-Density lots
[3] Applies to all roads accessing existing paved roadway
[4] All private roadways serving three or more lots shall achieve 95% compaction and shall be inspected and certified by a licensed engineer prior to surfacing
[5] A variance request is required for grades above 12%.

6.2 Existing Roadways

Mitigation to address the impact of a new development on the existing road network is required where the impact results in a level of service below County standards.

Nelson Siding Road and the intersections at I-90, as they exist, have excess capacity and the level of service at these locations will remain above the level of service standard established for rural areas, LOS-C. Thus, no improvements to the existing road network will be required.

7 Conclusions

The residential development south of Nelson Siding Road proposed by the Terra Design Group will add 356 net PM peak hour trips to the local road network. Because the traffic volumes on the local roads are well below capacity, the level of service at the site access point as well as other local intersections is forecasted to remain at or near LOS-B. The County's standard for rural roads is LOS-C, so no improvements are necessary to mitigate these impacts.

Access roads to the proposed residential lots will be required to be built according current Kittitas County Road Standards, as cited in this report. This will include providing an appropriate roadway surface and right-of-way and pavement widths, as well as meeting standards for design speed, sight triangles and other factors. Traffic circulation within the development is to be consistent with guidelines outlined in the road standards and included above. Where the Kittitas County Road Standards are not specific, the Kittitas County Code refers to AASHTO and WSDOT design criteria.

Appendix A: PM Peak Hour Traffic Volumes

Volume
Site Code: 02
Location 2: NELSON SIDING RD N/O CAMP KOINONIA LN

Date	Time	NB	SB	Total
8/15/2006	12:00 AM	1	0	1
8/15/2006	01:00 AM	1	0	1
8/15/2006	02:00 AM	0	2	2
8/15/2006	03:00 AM	0	1	1
8/15/2006	04:00 AM	4	3	7
8/15/2006	05:00 AM	4	10	14
8/15/2006	06:00 AM	4	19	23
8/15/2006	07:00 AM	15	17	32
8/15/2006	08:00 AM	17	23	40
8/15/2006	09:00 AM	8	15	23
8/15/2006	10:00 AM	16	19	35
8/15/2006	11:00 AM	21	20	41
8/15/2006	12:00 PM	29	21	50
8/15/2006	01:00 PM	25	32	57
8/15/2006	02:00 PM	16	11	27
8/15/2006	03:00 PM	30	22	52
8/15/2006	04:00 PM	21	26	47
8/15/2006	05:00 PM	35	43	78
8/15/2006	06:00 PM	33	21	54
8/15/2006	07:00 PM	19	10	29
8/15/2006	08:00 PM	17	10	27
8/15/2006	09:00 PM	8	4	12
8/15/2006	10:00 PM	7	4	11
8/15/2006	11:00 PM	0	2	2
8/16/2006	12:00 AM	3	0	3
8/16/2006	01:00 AM	1	0	1
8/16/2006	02:00 AM	0	0	0
8/16/2006	03:00 AM	2	1	3
8/16/2006	04:00 AM	5	2	7
8/16/2006	05:00 AM	6	8	14
8/16/2006	06:00 AM	2	22	24
8/16/2006	07:00 AM	16	21	37
8/16/2006	08:00 AM	10	21	31
8/16/2006	09:00 AM	12	20	32
8/16/2006	10:00 AM	22	15	37
8/16/2006	11:00 AM	11	16	27
8/16/2006	12:00 PM	18	20	38
8/16/2006	01:00 PM	22	17	39
8/16/2006	02:00 PM	17	19	36
8/16/2006	03:00 PM	25	19	44
8/16/2006	04:00 PM	29	23	52
8/16/2006	05:00 PM	41	28	69
8/16/2006	06:00 PM	22	16	38
8/16/2006	07:00 PM	23	14	37
8/16/2006	08:00 PM	13	16	29
8/16/2006	09:00 PM	7	5	12
8/16/2006	10:00 PM	4	5	9
8/16/2006	11:00 PM	0	0	0
8/17/2006	12:00 AM	3	0	3
8/17/2006	01:00 AM	2	1	3
8/17/2006	02:00 AM	1	2	3
8/17/2006	03:00 AM	2	2	4
8/17/2006	04:00 AM	5	2	7
8/17/2006	05:00 AM	5	5	10
8/17/2006	06:00 AM	7	16	23
8/17/2006	07:00 AM	6	24	30
8/17/2006	08:00 AM	14	24	38
8/17/2006	09:00 AM	13	16	29
8/17/2006	10:00 AM	13	18	31
8/17/2006	11:00 AM	25	26	51
8/17/2006	12:00 PM	32	15	47
8/17/2006	01:00 PM	17	29	46
8/17/2006	02:00 PM	22	14	36
8/17/2006	03:00 PM	21	24	45
8/17/2006	04:00 PM	28	21	49
8/17/2006	05:00 PM	39	31	70
8/17/2006	06:00 PM	26	16	42
8/17/2006	07:00 PM	18	10	28
8/17/2006	08:00 PM	10	10	20
8/17/2006	09:00 PM	8	4	12
8/17/2006	10:00 PM	4	2	6

3-Day PM Peak Hour Average		
NB	SB	TOTAL
38	34	72

Volume
Site Code: 01
Location 1: NELSON SIDING RD S/O W NELSON RD

3-Day PM Peak Hour Average		
NB	SB	TOTAL
13	37	50

Date	Time	NB	SB	TOTAL
8/15/2006	12:00 AM	0	0	0
8/15/2006	01:00 AM	1	1	2
8/15/2006	02:00 AM	1	0	1
8/15/2006	03:00 AM	0	0	0
8/15/2006	04:00 AM	16	0	16
8/15/2006	05:00 AM	21	1	22
8/15/2006	06:00 AM	14	4	18
8/15/2006	07:00 AM	15	11	26
8/15/2006	08:00 AM	11	11	22
8/15/2006	09:00 AM	15	14	29
8/15/2006	10:00 AM	18	19	37
8/15/2006	11:00 AM	15	14	29
8/15/2006	12:00 PM	15	13	28
8/15/2006	01:00 PM	13	10	23
8/15/2006	02:00 PM	15	17	32
8/15/2006	03:00 PM	12	18	30
8/15/2006	04:00 PM	10	21	31
8/15/2006	05:00 PM	12	34	46
8/15/2006	06:00 PM	12	22	34
8/15/2006	07:00 PM	10	19	29
8/15/2006	08:00 PM	5	8	13
8/15/2006	09:00 PM	2	5	7
8/15/2006	10:00 PM	2	3	5
8/15/2006	11:00 PM	0	3	3
8/16/2006	12:00 AM	1	0	1
8/16/2006	01:00 AM	0	0	0
8/16/2006	02:00 AM	1	0	1
8/16/2006	03:00 AM	2	0	2
8/16/2006	04:00 AM	15	1	16
8/16/2006	05:00 AM	26	1	27
8/16/2006	06:00 AM	16	5	21
8/16/2006	07:00 AM	19	5	24
8/16/2006	08:00 AM	10	9	19
8/16/2006	09:00 AM	11	7	18
8/16/2006	10:00 AM	12	9	21
8/16/2006	11:00 AM	11	9	20
8/16/2006	12:00 PM	14	10	24
8/16/2006	01:00 PM	13	22	35
8/16/2006	02:00 PM	10	12	22
8/16/2006	03:00 PM	9	19	28
8/16/2006	04:00 PM	15	21	36
8/16/2006	05:00 PM	14	34	48
8/16/2006	06:00 PM	11	28	39
8/16/2006	07:00 PM	9	9	18
8/16/2006	08:00 PM	2	13	15
8/16/2006	09:00 PM	3	7	10
8/16/2006	10:00 PM	3	3	6
8/16/2006	11:00 PM	0	2	2
8/17/2006	12:00 AM	2	0	2
8/17/2006	01:00 AM	3	2	5
8/17/2006	02:00 AM	2	2	4
8/17/2006	03:00 AM	2	0	2
8/17/2006	04:00 AM	18	0	18
8/17/2006	05:00 AM	16	1	17
8/17/2006	06:00 AM	24	2	26
8/17/2006	07:00 AM	11	7	18
8/17/2006	08:00 AM	16	8	24
8/17/2006	09:00 AM	12	7	19
8/17/2006	10:00 AM	10	17	27
8/17/2006	11:00 AM	20	8	28
8/17/2006	12:00 PM	15	10	25
8/17/2006	01:00 PM	17	11	28
8/17/2006	02:00 PM	9	15	24
8/17/2006	03:00 PM	12	22	34
8/17/2006	04:00 PM	9	31	40
8/17/2006	05:00 PM	13	42	55
8/17/2006	06:00 PM	12	26	38
8/17/2006	07:00 PM	6	14	20
8/17/2006	08:00 PM	5	6	11
8/17/2006	09:00 PM	4	4	8
8/17/2006	10:00 PM	1	4	5

Appendix B: PM Peak Hour Traffic Volumes Worksheets

Big Creek

20050

PM Peak Hour Traffic Volumes

Intersection	Dir.	Mvmt.	Existing Volumes	Growth Rate	Future Growth Volumes	Pipeline Projects In Distr.	Pipeline Projects Out Distr.	Pipeline Projects Total Distr.	Pipeline Projects In Assign.	Pipeline Projects Out Assign.	Pipeline Projects Total Assign.	Future Background Volumes	Big Creek In Distr.	Big Creek Out Distr.	Big Creek Total Distr.	Big Creek In Assign.	Big Creek Out Assign.	Big Creek Total Assign.	Future Volumes With Project
			2008	2.00%	2008	63.0%	37.0%	100%	25	16	44	2008	63.0%	37.0%	100%	225	132	356	2008
	EB	L																	
		T																	
		R																	
	WB	L																	
		T																	
1		R																	
Tube Count Location #1	NB	L																	
		T	15	2.00%	1		50.0%	50%	0	8	8	22		70.0%	70%	0	92	92	114
		R																	
	SB	L																	
		T	37	2.00%	1	50.0%		50%	14	0	14	52	70.0%		70%	157	0	157	209
		R																	
			52	0.00%	2	50.0%	50.0%	100%	14	8	22	74	70.0%	70.0%	140%	157	92	250	323
	EB	L																	
		T																	
		R																	
	WB	L																	
		T																	
2		R																	
Tube Count Location #2	NB	L																	
		T	38	2.00%	2	50.0%		50%	14	0	14	53	30.0%		30%	67	0	67	121
		R																	
	SB	L																	
		T	34	2.00%	1		50.0%	50%	0	8	8	43		30.0%	30%	0	40	40	83
		R																	
			72	0.00%	3	50.0%	50.0%	100%	14	8	22	97	30.0%	30.0%	60%	67	40	107	204
	EB	L																	
		T	32	2.00%	1	50.0%		50%	14	0	14	47			0%	0	0	0	47
		R	2	2.00%	0			0%	0	0	0	2	70.0%		70%	157	0	157	159
	WB	L	2	2.00%	0			0%	0	0	0	2	30.0%		30%	67	0	67	69
		T	18	2.00%	1		50.0%	50%	0	8	8	26			0%	0	0	0	26
3		R																	
Big Creek Access (Lund Lane)	NB	L	1	2.00%	0			0%	0	0	0	1							
		T												70.0%	70%	0	92	92	93
		R	2	2.00%	0			0%	0	0	0	2		30.0%	30%	0	40	40	42
	SB	L																	
		T																	
		R																	
			57	0.00%	2	50.0%	50.0%	100%	14	8	22	81	100.0%	100.0%	200%	225	132	356	437

Appendix C: Level of Service Worksheets

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	47	159	69	26	93	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	51	173	75	28	101	46
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			224		316	138
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			224		316	138
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		84	95
cM capacity (veh/h)			1345		639	911

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	224	103	147
Volume Left	0	75	101
Volume Right	173	0	46
cSH	1700	1345	705
Volume to Capacity	0.13	0.06	0.21
Queue Length (ft)	0	4	20
Control Delay (s)	0.0	5.8	11.4
Lane LOS		A	B
Approach Delay (s)	0.0	5.8	11.4
Approach LOS			B

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	32	2	2	18	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	2	2	20	1	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			37		60	36
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			37		60	36
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1574		946	1037

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	37	22	3
Volume Left	0	2	1
Volume Right	2	0	2
cSH	1700	1574	1004
Volume to Capacity	0.02	0.00	0.00
Queue Length (ft)	0	0	0
Control Delay (s)	0.0	0.7	8.6
Lane LOS		A	A
Approach Delay (s)	0.0	0.7	8.6
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		