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**Date:** February 8, 2016  
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John Semrau, P.E.  
Semrau Engineering and Surveying  
**From:** Gary A. Norris, P.E., P.T.O.E.  
DN Traffic Consultants  
**Subject:** Grip Road Gravel Pit  
Preliminary Traffic Information

Pursuant to your request, I have conducted preliminary traffic analysis focusing on existing turning movement counts and intersection sight distance at the critical analysis intersections impacted by the proposed Grip Road Gravel Pit operation. The result of the evaluation is discussed in this memo. The initial data collection studies were conducted in July 2013. This memo was subsequently updated with the proposed alternative mitigation commiserate with the impact created by the "proposed action".

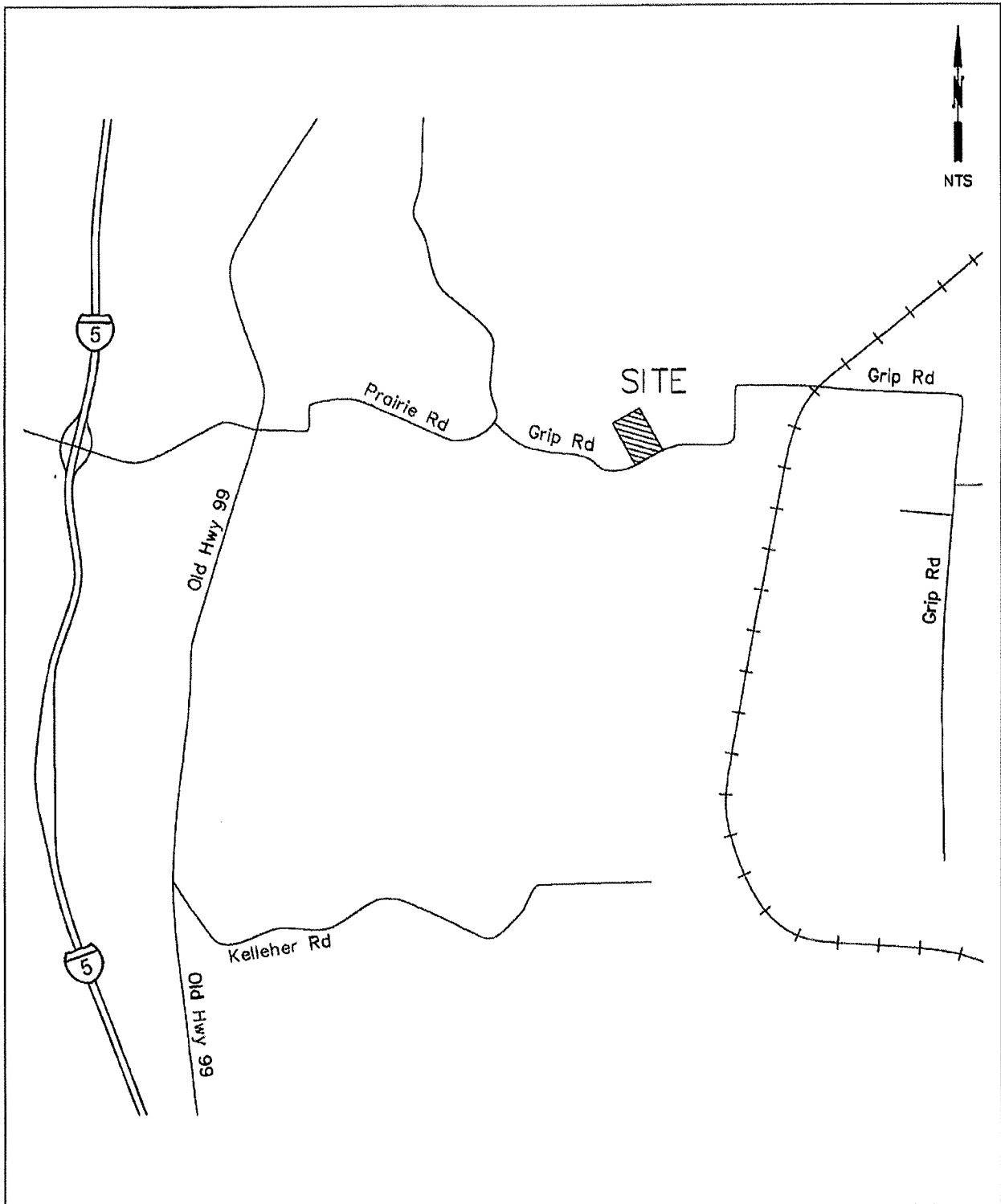
**Proposal**

The proposed Grip Road gravel pit is located on Grip Road approximately 0.70 miles east of the Prairie Road/Grip Road intersection. A vicinity map is presented in Figure 1.

The current proposal for the operation of the Grip Road gravel pit calls for up to 200,000 tons of gravel to be processed on an annual basis. Assuming each truck (dump truck plus trailer) can haul approximately 34 tons of gravel, the annual truck volume is estimated to be approximately 5,883 trips ( $200,000/34 = 5,882.35$ ) or a round trip volume of 11,765 ( $5,882.35 * 2 = 11,764.70$ ) vehicles per year. Assuming this volume is spread evenly across the 260 working days a year, the resultant daily volume would be approximately 46 vehicles per day ( $11,765/260 = 45.25$ ). If the hauling operation were limited to off peak hours (9 am to 3 pm), the end result would be up to a total of eight (8) vehicles per hour ( $46/6 = 7.67$ ) or four (4) trucks in each direction per hour during off peak times.

**Traffic Counts**

PM peak hour turning movement traffic counts were taken at the intersection of Prairie Road/Grip Road and Prairie Road/Old Highway 99 during the PM peak period (4:00 PM – 6:00 PM) in the month of July 2013. The results of the turning movement counts are presented in Figure 2. The peak hour at each location was determined to be 4:45 PM to 5:45 PM.

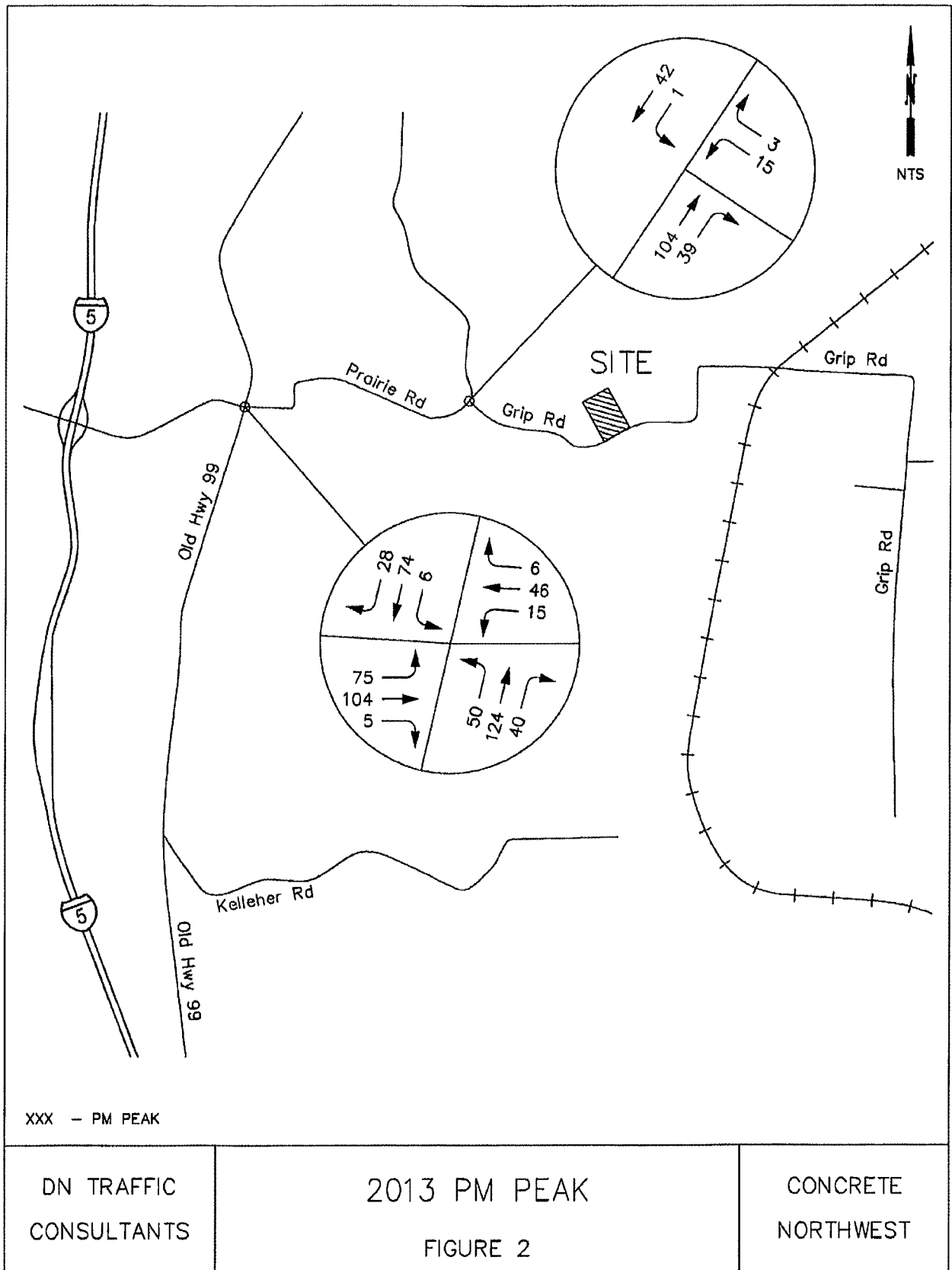


DN TRAFFIC  
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VICINITY MAP

FIGURE 1

CONCRETE  
NORTHWEST



DN TRAFFIC  
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2013 PM PEAK  
FIGURE 2

CONCRETE  
NORTHWEST

**Level of Service Analysis**

A level of service analysis at the Old Highway 99/Prairie Road intersection and the Prairie Road/Grip Road intersection was conducted using Synchro 7.0. *Skagit County Road Standards, 2000* indicate the acceptable level of service is LOS C. The result of the level of service analysis is presented in Table 1.

**Table 1. Existing Level of Service**

Intersection	Traffic Control	Level of Service
Old Highway 99/Prairie Road	EB/WB Stop	C (17.2)
Prairie Road/Grip Road	WB Stop	A (9.4)

WB – westbound  
 EB – eastbound  
 (xx.x) – seconds of delay

As shown in Table 1, the two primary intersections impacted by the proposed gravel pit operate at an acceptable level of service in accordance with Skagit County Road Standards.

**Intersection Sight Distance**

Sight distance was analyzed at the Prairie Road/Grip Road intersection and the site access intersection with Grip Road. The result of the sight distance analysis is presented in Table 2.

**Table 2. Intersection Sight Distance**

Intersection	Direction	Stopping Sight Distance <sup>1</sup>		Entering Sight Distance <sup>1</sup>	
		Observed	Required <sup>2</sup>	Observed	Required <sup>2</sup>
Prairie Road/Grip Road	Northbound	342	305	489	445
	Southbound	162	305	202	445
Grip Road/Site Access	Eastbound	401	305	419	445
	Westbound	533	305	523	445

- 1) Measured in feet
- 2) Source: AASHTO based on 40 mph posted speed.

As shown in Table 2, the analysis intersections have sight distance values below current standards. The Prairie Road/Grip Road intersection has sub-standard observed distances for both the stopping and entering sight distance in the southbound direction whereas the Grip Road/Site Access has a sub-standard value for entering sight distance in the eastbound direction. Of specific concern are the values for the Prairie Road/Grip Road intersection in the southbound direction.

*Alternative Mitigation*

Possible mitigation for the adverse sight distance at the Prairie Road/Grip Road intersection include the following:

- Re-grading the west side shoulder north of the intersection to provide adequate sight distance through the curve; or
- Widening Prairie Road north of the intersection to provide a southbound left turn lane for southbound Prairie Road traffic turning onto Grip Road and a west bound acceleration lane for traffic turning left from Grip Road.

These two options would be an ultimate fix to the sight distance deficiency at the Prairie Road/Grip Road intersection which Skagit County should consider as development occurs in this

area. Obviously, the cost of either option would be beyond what would be commiserate with the mitigation required to address the traffic impact created by of the Grip Road Gravel Pit operation.

Because of the cost of the foregoing alternatives, other low cost mitigation measures should be considered to provide safe operation for the gravel dump trucks using this intersection. Low cost mitigation measures to improve safety and efficient traffic operations could include the following:

- A temporary pro-active solution to the sight distance constraint could include operating the intersection under Flagger control when gravel trucks are exiting (westbound) Grip Road. Under this approach, a Flagger (card carrying) would be stationed on the north leg of the intersection, where adequate stopping sight distance (SSD) exists, to control traffic approaching the intersection from the north when trucks are entering Prairie Road from Grip Road. The Flagger would be supplemented with a "Spotter" stationed at the intersection who would direct truck traffic to proceed after notice from the Flagger that oncoming traffic was stopped. Of course, this operation would be supported with appropriate advance signing notifying drivers of the flagging operation. Signing would be removed or covered when there was no active hauling.

Assuming 46 truck trips per day with 23 westbound on Grip Road, it is estimated one (1) Flagger and one (1) Spotter would be required for six (6) hours per day. The cost of this operation would be approximately \$126,000 per year (Labor Cost = 260 days \* 6 hours per day \* 2 flaggers per day \* \$40.00 per hour = 124,800 = Signing Cost = \$1,200.).

- A second low-cost option would be to install advance warning signs with flashing beacons on the north leg of the intersection. The flashing beacons could be designed to operate only when traffic westbound on Grip Road approaches the intersection. The flasher could be activated by a roadway detector located on Grip Road. The estimated cost of this solution would be approximately \$25,000.

The above alternatives to intersection reconstruction are only offered as potential interim solutions until the County has sufficient funds to improve the sight distance at this location or the gravel pit operation justifies the cost of the necessary road improvements.

It is expected that additional traffic analysis will be required as the proposed gravel pit operation is defined.

If you have any questions, please give me a call at (425)765-5721.

Thanks,  
Gary