MEMORANDUM

To:    Brad Sweet, Granite Construction; Aaron Jensen & Aaron Robertson, Blue Ox Development
From:  Avenue Consultants
Date:  April 9, 2019
Subject: South Willard Development Traffic Study

INTRODUCTION

Avenue evaluated the traffic impacts associated with the proposed South Willard Development with its extraction activities. The development plan phases out the extraction activities over a 15-year period as a funding mechanism for infrastructure. The proposed development would access US-89 near mile point (MP) 426.2. This report summarizes the traffic operations analyses for the build out and phasing plans of the project to identify any traffic impacts on the surrounding roadway network. This traffic impact study includes the following sections:

- Existing & Historic Traffic Conditions
- Historic Crashes
- Surrounding Zoning & Current Land Use Plans
- Project Trips
- Anticipated Future Traffic

Also included as an appendix to this memo are the boards which were prepared for a work session with the Box Elder County Planning Commission.

EXISTING & HISTORIC TRAFFIC CONDITIONS


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**Figure 1:** AADT and Annual Truck Traffic Trends on US-89
The historic AADT trend shows that traffic on US-89 grew from 9,665 daily vehicles in 2011 to 11,312 in 2017 (2.8% per year). The percent of trucks over the same period is 8% of the daily traffic. To understand traffic conditions on US-89, Avenue extracted turning movement volumes at 750 N and US-89 intersection (located at about MP 428.7) using the UDOT Automated Traffic Signal Performance Measures (ATSPM) website (https://udottraffic.utah.gov/ATSPM/). AM and PM peak hour traffic data were downloaded for three separate weekdays December 20, 2018; January 8, 2019; and January 10, 2019. The intersection volume data were reviewed, and the AM peak hour occurs from 7:15 to 8:15 AM and the PM peak hour occurs from 4:30 to 5:30 PM. The average AM northbound peak hour volumes were 303 with 302 vehicles traveling southbound. Whereas, the average PM northbound peak hour traffic volumes were 530 with 426 vehicles traveling southbound. The existing peak traffic volumes operate at level of service A with less than 10 seconds of delay per vehicle.

3 HISTORIC CRASHES

Avenue investigated the crashes on US-89 from 2013 to 2018 in geographical context within the vicinity of this project (from 750 North to the Junction with SR-126, near 8700 South). Of the 172 crashes which occurred within the past five years, 4 crashes involved 3+ axle trucks, and 70 crashes were caused by wild animals. Additional crash attributes are shown in Table 1.

<table>
<thead>
<tr>
<th>Crash Attributes</th>
<th>Total Crashes</th>
<th>DUI</th>
<th>3+ Axle Truck</th>
<th>Drowsy Driving</th>
<th>Speed</th>
<th>Distracted</th>
<th>Wild Animal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>172</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>12</td>
<td>18</td>
<td>70</td>
</tr>
</tbody>
</table>

Crash rates along the corridor for each 0.1-mile segment were determined based on the crash counts and AADT. The corridor crash rates and the number crashes occurring within a 100-foot buffer are presented in Figure 2.

![Figure 2: Crash Map](image)
4 SURROUNDING ZONING & CURRENT LAND USE PLANS

The anticipated land use of the study site and surrounding area is presented at Figure 3. This map includes parcels with proposed site plans and the current zoning plan for Box Elder County. This map shows most of the surrounding land is zoned as single-family residential.

![Anticipated Land Use](image)

Figure 3: Anticipated Study Area Land Use

5 PROJECT TRIPS

The project trip generation was derived from the Institute of Transportation Engineer’s (ITE) publication, Trip Generation, 10th Edition. This report provides standards and recommendations for the probable vehicle trip generation for various land uses based upon nationwide studies of existing developments in comparable settings. Avenue selected the single-family detached housing land use type (ITE Code 210), which most accurately reflects the proposed development of the project site. The trip generation rates used are shown in Table 2.

<table>
<thead>
<tr>
<th>ITE Land Use</th>
<th>ITE Code</th>
<th>Intensity</th>
<th>Units</th>
<th>Weekday Daily</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Family Detached Housing</td>
<td>210</td>
<td>270</td>
<td>Dwelling Units</td>
<td>9.44</td>
<td>0.74</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.56</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.62</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Table 2. Development Land Uses and Trip Generation Rates
The trips projected for this development are shown in Table 3. The total number of new vehicle trips for the development for the AM peak hour was 200 trips and 268 trips for the PM peak hour. The total number of daily projected vehicle trips was 2,594. These values only represent the number of trips anticipated from this project and do not capture the total anticipated growth on US-89.

Table 3. Development Trip Generation

<table>
<thead>
<tr>
<th>ITE Land Use</th>
<th>ITE Code</th>
<th>Intensity</th>
<th>Unit Type</th>
<th>Weekday Daily</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Family Detached Housing</td>
<td>210</td>
<td>270</td>
<td>Dwelling Units</td>
<td>2,594</td>
<td>200</td>
<td>268</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
<td>169</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td>99</td>
</tr>
</tbody>
</table>

6  **ANTICIPATED FUTURE TRAFFIC IMPACTS**

Avenue evaluated the project impact of the anticipated future traffic on US-89 by analyzing two scenarios: (1) background 2035 traffic without the site traffic and (2) 2035 traffic with added site traffic. The regional travel demand model (TDM) developed by the Wasatch Front Regional Council projects the traffic volume growth on US-89 between now and 2050 to be approximately 0.16% per year (640 more vehicles). Due to the low TDM growth, Avenue calculated an annual growth rate which accommodates the anticipated growth of the region’s approved zoning plan with a single-family residential land use. This total anticipated increase is 4,500 additional vehicles per day from 2019 to 2035, which equates to be 2.5% per year. Figure 4 shows the anticipated AADT based upon the anticipate growth rate with a projected 3+ axle truck volume based upon the historical truck percentage on US-89.

![US-9 Projected Traffic Volume](image)

**Figure 4:** Anticipated Traffic Growth Along US-89

According to the extraction plan, 8,000,000 tons of gravel will be extracted over 15 years and that will add around 87 trucks per day and 11 trucks per hour on US-89.

Table 4. Extraction Plan

<table>
<thead>
<tr>
<th>Tons of gravel</th>
<th>Total truck loads in 15 years (using a 30 ton truck)</th>
<th>Truck loads per year</th>
<th>Truck loads per day (205 days per year)</th>
<th>Trucks per hour (8 hour work day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8,000,000</td>
<td>266,667</td>
<td>17,778</td>
<td>87</td>
<td>11</td>
</tr>
</tbody>
</table>
7 CONCLUSIONS

The current configuration of US-89 adequately serves the existing traffic of the South Willard area with minimal delay and little congestion. The existing crash rate for the entire stretch of US-89 (423.30 to MP 428.80) is 1.26, which is below UDOT’s expected crash rate for a rural principal arterial roadway (1.35). Only 4 of the 172 crashes along this roadway involved a 3+ axle truck and none of these crashes resulted in an incapacitating injury or fatality. With the anticipated traffic growth, this stretch of US-89 will continue to perform with minimal delay and little congestion.
US-89 Traffic Conditions

2017 Average Annual Daily Traffic: 11,400 Vehicles

3+ Axle Percent Trucks: 8%

NORTHBOUND
AM Peak (7:15 to 8:15) 303 vehicles
PM Peak (4:30 to 5:30) 530 vehicles
Speed Limit: 55 mph
Average Speed: 51 mph

SOUTHBOUND
AM Peak (7:15 to 8:15) 302 vehicles
PM Peak (4:30 to 5:30) 426 vehicles
Speed Limit: 55 mph
Average Speed: 51 mph

Blue Ox Development
Granite Construction Co.
Subject Property

US-89 Average Annual Daily Traffic (AADT)
2011 to 2017

Number of Vehicles

Year
Crash Data
2013 to Current
172 Total Crashes (750 N to 8700 S)
7 Truck Crashes
70 Crashes with Wild Animals
12 Speed Related Crashes

Crash Proximity (within 100')
1 Crash
2 - 3 Crashes
4 - 7 Crashes
8 - 12 Crashes
12+ Crashes

Segment Crash Rate
- Over 20.00
- 10.00 to 20.00
- 4.00 to 10.00
- 2.00 to 4.00
- 1.00 to 2.00
- Less Than 1.00

Total Crashes (750 N to 8700 S): 7
Truck Crashes: 70
Crashes with Wild Animals: 12
Speed Related Crashes: 12
Anticipated Traffic
2035 Average Annual Daily Traffic 15,700 Vehicles
Annual Percent Growth 2.5%

Extraction Plan
8,000,000 tons of gravel
266,667 total truck loads (using a 30 ton truck)
17,778 truck loads per year (15 years)
87 truck loads per day (205 days per year)
11 trucks per hour (8 hour work day)

Residential Development Generated Trips
270 homes
2594 Daily Trips
1297 in
1297 out
200 AM
50 in
150 in
169 out
99 in
268 PM

Phase 1
Extraction - None
Development - Year 1 - 2
Leasing - Starting Year 2

Phase 2
Extraction - Year 1 - 5
Development - Year 6
Sales - Starting Year 7

Phase 3
Extraction - Years 1 - 15
Development - Starting Year 16
Leasing - Starting Year 17

US-89 Projected AADT
- 2011: 0
- 2015: 2,000
- 2020: 4,000
- 2025: 6,000
- 2030: 8,000
- 2035: 10,000