Transportation Impact Analysis

University of Alaska Anchorage Sports Arena

Anchorage, Alaska

Draft

May 2011
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Section 1
Executive Summary
EXECUTIVE SUMMARY

The University of Alaska – Anchorage (UAA) is proposing to construct a 5,600 seat sports arena complex in a building approximately 196,000 square feet located in the southwest quadrant of the Elmore Road and Providence Drive intersection. This is currently an undeveloped parcel of land which has been designated for future development in the current UAA Master Plan. Access to the site is proposed to be at several locations along existing roads and a proposed new east-west roadway connecting Elmore Road to Wellness Street (formerly East Providence Loop). The University Lake Drive/Elmore Road intersection is proposed to be shifted south of its current location and aligned with the new roadway to create a four-leg intersection. Completion of the arena is anticipated in 2014.

A previous Traffic Impact Assessment (TIA) was performed by Kittelson & Associates, Inc. (KAI) in April 2009 for a 3,500 seat arena in a 150,000 square foot building at the same location. Since that time, several new roads in the vicinity of the project have been completed, new parking facilities have been constructed on campus, and plans for the arena and the events it will host have been modified. This study uses new traffic counts and new parking data to analyze updated plans for the arena.

The sports arena and complex will be used on a daily basis as a recreational center and office space for the UAA Athletic Department and it will also host special events such as UAA basketball games. This report analyzes traffic impacts of the arena on a typical day and during a reasonable worst-case special event. It is anticipated that a subsequent special event transportation management plan will be developed to refine operation of key intersections adjacent to the arena and parking management strategies.

Intersection Operations Analysis

Discussions with the Municipality of Anchorage (MOA) and the Alaska Department of Transportation & Public Facilities (ADOT&PF) (referred to herein as “the agencies”) led to the development of a scope of work for this TIA. The agencies required seven major intersections to be studied, as well several minor intersections such as the driveways to the site parking lot. Operations analysis results for the major intersections are shown in Table 1. The various analysis scenarios and key findings of each are described below.

2011 EXISTING CONDITIONS

All study intersections operate under capacity at LOS D or better today during the system and event peak periods.
Table 1  Operational Analysis of Major Study Intersections

<table>
<thead>
<tr>
<th>Year</th>
<th>Scenario</th>
<th>Signal Controlled</th>
<th>Control Varies¹</th>
<th>Control Varies²</th>
<th>Signal Controlled</th>
<th>Signal Controlled</th>
<th>Signal Controlled</th>
<th>Signal Controlled</th>
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<tr>
<td>2011 Existing</td>
<td>System Peak (4:45 – 5:45 p.m.)</td>
<td>D 41.7 0.75</td>
<td>C 24.6 0.43</td>
<td>C 22.4 0.72</td>
<td>C 26.2 0.68</td>
<td>C 29.5 0.68</td>
<td>B 13.6 0.20</td>
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</tr>
<tr>
<td></td>
<td>Event Peak (5:45 – 6:45 p.m.)</td>
<td>D 37.6 0.40</td>
<td>C 16.7 0.26</td>
<td>C 15.1 0.54</td>
<td>C 24.5 0.55</td>
<td>C 29.8 0.54</td>
<td>B 11.9 0.14</td>
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</tr>
<tr>
<td>2014 System Peak Background without site road</td>
<td>D 49.5 0.84</td>
<td>D 33.7 0.54</td>
<td>D 28.4 0.80</td>
<td>C 26.4 0.70</td>
<td>C 23.8 0.81</td>
<td>C 32.9 0.72</td>
<td>B 17.8 0.43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>System Peak Background with site road</td>
<td>D 49.4 0.84</td>
<td>B 18.8 0.42</td>
<td>C 23.9 0.75</td>
<td>C 26.8 0.70</td>
<td>C 23.3 0.79</td>
<td>C 33.0 0.72</td>
<td>B 19.2 0.46</td>
</tr>
<tr>
<td></td>
<td>Total – Typical Day</td>
<td>D 50.4 0.84</td>
<td>C 21.5 0.46</td>
<td>C 23.9 0.75</td>
<td>C 28.2 0.74</td>
<td>C 28.4 0.82</td>
<td>C 33.0 0.73</td>
<td>B 19.2 0.46</td>
</tr>
<tr>
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<td>Event Peak Background without site road</td>
<td>D 42.4 0.67</td>
<td>C 19.5 0.31</td>
<td>C 17.1 0.61</td>
<td>C 24.1 0.57</td>
<td>C 20.5 0.64</td>
<td>C 30.7 0.56</td>
<td>B 17.2 0.35</td>
</tr>
<tr>
<td></td>
<td>Event Peak Background with site road</td>
<td>D 42.3 0.67</td>
<td>B 18.1 0.33</td>
<td>C 15.7 0.57</td>
<td>C 24.6 0.57</td>
<td>C 20.4 0.64</td>
<td>C 30.8 0.57</td>
<td>B 21.5 0.38</td>
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<td>Total – Planned Special Event</td>
<td>D 46.9 0.75</td>
<td>C 23.5 0.50</td>
<td>C 19.2 0.70</td>
<td>C 21.8 0.61</td>
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<td>B 18.3 0.37</td>
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<td>Without</td>
<td>System Peak Background without site road</td>
<td>E 57.3 0.91</td>
<td>F &gt;50 &gt;0.82</td>
<td>E 42.1 0.91</td>
<td>C 22.8 0.75</td>
<td>C 27.9 0.84</td>
<td>D 41.4 0.69</td>
<td>B 16.8 0.51</td>
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<td>Northern</td>
<td>System Peak Background with site road</td>
<td>E 57.2 0.91</td>
<td>C 20.3 0.48</td>
<td>D 32.3 0.85</td>
<td>C 27.2 0.75</td>
<td>C 27.1 0.83</td>
<td>D 41.2 0.88</td>
<td>C 20.3 0.54</td>
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<td>Access to</td>
<td>Total – Typical Day</td>
<td>E 58.7 0.02</td>
<td>C 22.7 0.53</td>
<td>D 32.3 0.85</td>
<td>C 29.9 0.79</td>
<td>C 28.5 0.86</td>
<td>D 41.8 0.89</td>
<td>C 20.3 0.54</td>
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<td>UMED District</td>
<td>Event Peak Background without site road</td>
<td>D 45.5 0.73</td>
<td>D 26.0 0.45</td>
<td>C 20.8 0.69</td>
<td>C 25.0 0.61</td>
<td>C 21.2 0.68</td>
<td>C 34.0 0.71</td>
<td>B 17.9 0.41</td>
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<td>(Elmore Road</td>
<td>Event Peak Background with site road</td>
<td>D 45.4 0.75</td>
<td>B 19.3 0.38</td>
<td>C 18.4 0.65</td>
<td>C 25.3 0.61</td>
<td>C 21.0 0.66</td>
<td>C 34.0 0.71</td>
<td>C 22.9 0.44</td>
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<td>extension)</td>
<td>Total – Planned Special Event</td>
<td>D 51.6 0.84</td>
<td>C 24.8 0.56</td>
<td>C 23.7 0.78</td>
<td>C 23.0 0.66</td>
<td>C 32.9 0.90</td>
<td>D 35.2 0.79</td>
<td>C 22.9 0.44</td>
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<td>2024 System Peak Background without site road</td>
<td>F &gt;80 &gt;1.0</td>
<td>F &gt;50 &gt;0.87</td>
<td>C 33.4 0.86</td>
<td>C 31.4 0.79</td>
<td>C 23.0 0.70</td>
<td>D 44.6 0.91</td>
<td>C 20.3 0.54</td>
<td></td>
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<td>With Northern</td>
<td>System Peak Background with site road</td>
<td>F &gt;80 &gt;1.0</td>
<td>B 19.5 0.51</td>
<td>C 31.5 0.80</td>
<td>C 32.2 0.78</td>
<td>C 24.4 0.77</td>
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<td>C 21.3 0.57</td>
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<td>D 35.2 0.75</td>
<td>B 19.2 0.43</td>
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<tr>
<td>(Elmore Road</td>
<td>Event Peak Background with site road</td>
<td>D 51.3 0.84</td>
<td>B 18.4 0.41</td>
<td>C 27.1 0.64</td>
<td>C 27.7 0.64</td>
<td>C 20.3 0.61</td>
<td>D 35.2 0.75</td>
<td>B 20.0 0.40</td>
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<td>extension)</td>
<td>Total – Planned Special Event</td>
<td>E 55.1 0.87</td>
<td>C 21.7 0.57</td>
<td>C 28.1 0.72</td>
<td>C 32.1 0.91</td>
<td>C 31.4 0.77</td>
<td>D 45.8 0.75</td>
<td>B 19.9 0.40</td>
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LOS = Level of service  
V/C = volume to capacity ratio  
¹ Elmore Road/University Lake Drive intersection is two-way stop-controlled under existing and background without site road scenarios, and signalized under all other scenarios  
² Elmore Road/Providence Drive intersection is all-way stop-controlled under all scenarios except those with northern access to the UMED district in which it is signalized  
Note: Roundabouts were also analyzed at Elmore Road/University Lake Drive and Elmore Road/Providence Drive
2014

The projected opening year of the development is 2014. UAA is obligated to mitigate deficiencies that occur due to the development in this year. Under 2014 background conditions, all study intersections operate under capacity at LOS D or better for both the system and event peak hour periods. The site does not decrease LOS at any intersection on a typical day or event day. There are no impacts.

2024

By 2024, Elmore Road may be extended to Northern Lights Boulevard to create northern access to the UMED district. Due to the uncertainly of this project, 2024 analysis was conducted with and without it in place. As 2024 is beyond the opening year of the arena, no mitigations are required by UAA.

Under 2024 background conditions, the following intersections operate at LOS E or F:

- **Tudor Road/Elmore Road**
  - LOS E without northern access to UMED (*system peak hour only*)
  - LOS F and volume-to-capacity greater than 1 with northern access to UMED (*system peak hour only*)

- **Elmore Road/University Lake Drive**
  - LOS F with and without northern access to UMED during the system peak hour
  - LOS E with northern access to UMED during event peak hour

- **Elmore Road/Providence Drive**
  - LOS E without northern access to UMED (*system peak hour only*)
  - This intersection operates at LOS F under background conditions if it remains all-way stop-controlled. However, if controlled with a signal or roundabout, the intersection operates acceptably under background and total traffic conditions.

Typical day traffic from the arena creates one impact. Without northern access to UMED, operation of the Providence Drive/Wellness Drive intersection changes from LOS C to LOS D.

Under a reasonable worst-case event, the Tudor Road/Elmore Road intersection operations change from LOS D to LOS E during the event peak hour with the northern access to UMED. Additionally, without northern access to UMED, the Providence Drive/Piper Street intersection changes from LOS C to LOS D. The arena has no other impacts in 2024 with or without northern access to UMED.

**Parking Assessment**

Three sources to parking will be available for large events at the arena:
• Existing on-campus facilities – recent parking utilization surveys indicate approximately 1100 spaces will be available on-campus for a capacity event beginning at 7 p.m. on a weekday, with additional spaces becoming available later in the evening.
• Providence Alaska Medical Center (PAMC) – PAMC has agreed to provide 500 spaces for large events
• On-site parking lot – A new parking lot of up to 600 spaces will be needed to meet the demand of a capacity event beginning at 7 p.m. on a weekday.

Some existing on-campus parking lots, particularly the Arts Main Lot and facilities in the western portion of camps, are a 10-15 minute walk from the arena. It is recommended that shuttle bus service be used to transport patrons from these parking lots to the arena. Additionally, UAA should actively manage parking on event days to create large blocks of event parking at a few facilities (preferably near the arena) and assign specific parking facilities to patrons at the time they purchase event tickets.

Multimodal Assessment

The site is well-served by pedestrian-bicycle facilities and both UAA Seawolf campus buses and People Mover public transit buses. A major component of the large events will be the use of shuttle buses to bring patrons from outlying parking lots to the arena. It is estimated that in the peak hour leading up a capacity event, over 1,000 patrons would use shuttle service. This would require at least five 60-person buses (typical city bus size) or a greater number of smaller buses such as Seawolf Shuttle vehicles. Shuttle demand should be minimized by reserving campus parking lots near the arena for event parking and shifting regular day drivers (students, staff, etc.) to facilities in the northern and western portion of campus on major event days.

Recommendations

The following list provides a summary of recommendations and mitigations related to the proposed development.

• When the new east-west roadway between Elmore Road and Wellness Street is constructed, the relocated Elmore Road/University Lake Drive & site roadway intersection should be controlled with a roundabout or traffic signal.
• For events with fewer than 2,600 patrons, all parking demand can be met with the on-site and PAMC parking facilities and no manual traffic control is needed.
• For events with 2,600 to 5,600 patrons, parking facilities north of Providence Drive will need to be used and manual traffic control with flaggers should be used at Providence Drive/Wellness Street to safely and efficiently serve vehicular and pedestrian traffic.
• For events with 3,900 to 5,600 patrons, parking facilities west of UAA Drive will also need to be used and manual traffic control with flaggers should also be used at Providence Drive/UAA Drive to safely and efficiently serve vehicular and pedestrian traffic.

• Traffic signal timing should be monitored and adjusted to best serve traffic demand at all intersections in future years.

• A special event transportation management plan should be coordinated with UAA, MOA, and ADOT&PF staff members to ensure safe and efficient ingress and egress traffic flows for major planned special events.

Additional details of the study methodology, findings, and recommendations are provided within this report.
Section 2
Introduction
INTRODUCTION

Project Description

The University of Alaska-Anchorage (UAA) is proposing to construct a sports arena complex that will open in 2014, southwest of the intersection of Providence Drive and Elmore Road. This location is illustrated in Figure 1. Currently this is an undeveloped parcel of land that is designated for future development in the UAA Master Plan. The UAA is proposing to develop a 5,600-seat sports arena in a 196,000 square foot building, along with surface parking stalls to meet the demands of small events. The balance of parking to support large events is available in existing surface and structured facilities in the immediate vicinity, as detailed in the “Parking Needs” section of this report.

Access to the site will be provided by several existing roads and one new east-west roadway connecting Elmore Road to Wellness Street (formerly Providence East Drive). Direct access will be provided via one full-access driveway on Wellness Street tying into the intersection with Health Drive, one right-in/right-out driveway on Providence Drive, and two full-access driveways onto the new east-west roadway. A site plan showing these access points is shown in Figure 2. It is planned for University Lake Drive to be realigned approximately 500 feet south of its current location to connect with the new east-west roadway at a new intersection along Elmore Road.

A previous Traffic Impact Assessment (TIA) was performed by Kittelson & Associates, Inc. (KAI) in April 2009 for a 3,500 seat arena in a 150,000 sq. ft. building. Since that time, several new roads in the vicinity of the project have been completed, new parking facilities have been constructed on campus, and plans for the arena and the events it will host have been modified. This study uses new traffic counts and new parking data to analyze updated plans for the arena.

Scope of the Report

This analysis determines the transportation-related impacts associated with the proposed UAA Sports Arena and was prepared in accordance with the Municipality of Anchorage’s (MOA) requirements for traffic impact studies. The study intersections and scope of this project were determined in consultation with MOA and ADOT&PF staff (see Appendix 1 for the agreed upon Scoping Memorandum). The operational analyses were performed at these intersections:
• E. Tudor Road/Elmore Road
• Elmore Road/University Lake Drive/New east-west roadway
• Providence Drive/Elmore Road
• Providence Drive/Wellness Street/Alumni Drive
• Providence Drive/UAA Drive
• Providence Drive/Piper Street
• Piper Street/E. 40th Avenue
• Wellness Street/Health Drive/New east-west roadway

Additionally, to better understand traffic patterns and operations in the immediate vicinity of the site, operations analysis was performed at the following parking facility accesses:

• Wellness Street/South PAMC Parking Deck Access
• Wellness Street/PAMC Surface Lot Access
• Wellness Street/Arena West Access (total traffic scenarios only)
• Providence Drive/Arena North Access (total traffic scenarios only)
• Site Road/Arena Southwest Access (total traffic scenarios only)
• Site Road/Arena Southeast Access (total traffic scenarios only)

This report evaluates the following transportation issues:

• Year 2011 existing transportation-system conditions within the site vicinity during the weekday p.m. system peak period (4:45 to 5:45 p.m.)
• Year 2011 existing transportation system conditions within the site vicinity during the peak hour of traffic generated by the arena on the day of a capacity event (5:45 p.m. to 6:45 p.m.),
• In-process development traffic,
• Redistribution of traffic due following the opening the 40th Avenue extension to Lake Otis Road prior to 2014,
• Background growth in p.m. system and event peak trips through 2014 (the build out year) and 2024,
• Forecast year 2014 background traffic conditions during the p.m. system and event peak periods,
• Forecast year 2014 background traffic conditions with the proposed site roadway during the p.m. system and event peak periods,
• Trip generation for a typical day at the proposed UAA Sports Arena,
• Trip generation and distribution estimates for a reasonable worst case event scenario at the proposed UAA Sports Arena,
• Planned special event parking management,
• Transit service to the site and other multimodal considerations,
• Forecast year 2014 total traffic conditions for the typical day use during the weekday p.m. system peak period

• Forecast year 2014 total traffic conditions for an event scenario during the weekday p.m. event peak period,

• Forecast year 2024 background traffic conditions during the weekday system and event p.m. peak periods with build-out of the site for four different proposed roadway configurations:
  o Same road network as 2014 and no site road,
  o Same road network as 2014 plus site road,
  o Northern Access to UMED District and no site road, and
  o Northern Access to UMED District plus site road.

• Forecast year 2024 total traffic conditions for the typical day use during the weekday p.m. system peak period.

• Forecast year 2024 total traffic conditions for an event scenario during the weekday p.m. event peak period for the full-build proposed roadway configuration, and

• Traffic analysis of roundabouts at two intersections:
  o Proposed Elmore Road/realigned University Lake Drive/Site Access Roadway and
  o Elmore Road/Providence Drive.
Section 3
Existing Conditions
EXISTING CONDITIONS

The existing conditions analysis identifies current operational and geometric characteristics of the transportation system within the study area. These conditions will be compared with future conditions later in this report. The extents of the existing conditions analysis is documented in a scoping letter associated with the February 2009 TIA. This scoping letter is included in Appendix 1.

As part of the previously performed impact assessment, Kittelson & Associates, Inc. (KAI) staff visited and inventoried the proposed UAA Sports Arena development site and surrounding study area in December 2008. At that time, KAI staff members collected information regarding site conditions, adjacent land uses, and transportation facilities in the study area. As part of this update the site was revisited in February 2011 by KAI staff.

Site Conditions and Adjacent Land Uses

The proposed site is within the Municipality of Anchorage (MOA) and on the UAA campus. The site is currently vacant. The land uses in the vicinity of the site are vacant forested lands, UAA campus buildings and parking lots, and the Providence Alaska Medical Center (PAMC) campus.

Transportation Facilities

Table 2 summarizes the existing transportation facilities and roadways in the study area.

Table 2  Existing Transportation Facilities and Roadway Designations

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Maintenance</th>
<th>Ownership</th>
<th>Number of Lanes</th>
<th>Posted Speed (mph)</th>
<th>Sidewalks</th>
<th>Bicycle Lanes</th>
<th>On-Street Parking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tudor Road</td>
<td>ADOT</td>
<td>ADOT</td>
<td>5</td>
<td>50</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Elmore Road</td>
<td>ADOT (summer), MOA (winter)</td>
<td>ADOT</td>
<td>4</td>
<td>45</td>
<td>Yes2</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Providence Drive</td>
<td>MOA</td>
<td>MOA</td>
<td>4</td>
<td>35</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

1 Mph represents miles per hour
2 Multiuse path on east side

ROADWAY FACILITIES

As indicated in Figure 1, Elmore Road and Providence Drive border the site. Tudor Road is located approximately half a mile south of the site.
Tudor Road and Elmore Road are both owned by the Alaska Department of Transportation (ADOT). Tudor Road is maintained by ADOT year round, and Elmore Road is maintained by ADOT in the summer and MOA in the winter. Providence Drive is owned and maintained by MOA. Tudor Road serves traffic traveling east/west through Anchorage. Elmore Road and Providence Road primarily provide access to UAA and the PAMC and other developments in the UMED District.

Figure 3 illustrates the existing lane configurations and traffic control devices in place at the study intersections.

OTHER TRANSPORTATION FACILITIES

Pedestrian and Bicycle

Sidewalks are present along Tudor Road and Providence Drive. Multiuse paths are present on the south side of Tudor Road, the east side of the Elmore Road, north of Providence Drive, and on the west side of the site along the PAMC parking lots. This path system includes a bridge over Tudor Road at the Elmore Road intersection and a tunnel under Elmore Road near the University Lake Drive intersection. (Reference 1)

The multiuse paths are the only bicycle facilities present in the study area.

Cross-Country Ski

UAA maintains a network of cross country ski trails, although none lie within the study area (Reference 1).

Transit Facilities

Transit service in the area is provided by UAA's Seawolf Shuttle and the Municipality's People Mover bus system.

The Seawolf Shuttle has six routes. The Campus Loop route is the only one that passes by the site. The Campus Loop operates on Providence Drive and Elmore Road on weekdays from 7:45 a.m. to 8:45 p.m., with service ending earlier on Fridays. Headways are 10-15 minutes at most times and 21-30 minutes in the evening and on Friday. There is no shuttle stop adjacent to the site.
Campus route maps for the Seawolf Shuttle and the People Mover are shown in Figures 4 and 5. These maps were obtained from References 2 and 3 respectively.

**Traffic Volumes and Peak Hour Operations**

Current turning movement counts were collected on February 16, 2011 (Wed) at the ten existing study intersections. A summary of the existing turning movement counts are included in Appendix 2. These observed counts were used for the weekday p.m. system peak hour analysis. These counts were then proportionally adjusted to estimate the existing conditions during the event peak hour using 24-hour counts provided by MOA. The 24-hour counts were obtained from detectors at two of the (signalized) study intersections and provided a total of 11 weekdays worth of data. These counts show that the event peak hour (5:45-6:45 p.m.) intersection volumes are 80% of the volumes during the weekday p.m. system peak hour (4:45-5:45 p.m.). Therefore, all observed turning movements were multiplied by 0.80 to estimate the existing traffic volumes during the event peak hour. Volumes in 15-minute bins from 3 p.m. to 8 p.m. are shown in Table 3, and a comparison of system peak and event peak volumes is shown in Table 4.
Table 3  Total Entering Vehicles During Late Afternoon/Early Evening Period at Select Intersections

<table>
<thead>
<tr>
<th>Time</th>
<th>Elmore/Tudor</th>
<th>Providence/Wellness</th>
<th>Average - Weighted by # of days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average of 4 weekdays</td>
<td>Average of 7 weekdays</td>
<td></td>
</tr>
<tr>
<td>3:00</td>
<td>1698</td>
<td>736</td>
<td>1086</td>
</tr>
<tr>
<td>3:15</td>
<td>1761</td>
<td>777</td>
<td>1135</td>
</tr>
<tr>
<td>3:30</td>
<td>1760</td>
<td>770</td>
<td>1130</td>
</tr>
<tr>
<td>3:45</td>
<td>1970</td>
<td>1002</td>
<td>1354</td>
</tr>
<tr>
<td>4:00</td>
<td>2078</td>
<td>1166</td>
<td>1497</td>
</tr>
<tr>
<td>4:15</td>
<td>2143</td>
<td>932</td>
<td>1373</td>
</tr>
<tr>
<td>4:30</td>
<td>2103</td>
<td>803</td>
<td>1276</td>
</tr>
<tr>
<td>4:45</td>
<td>2233</td>
<td>919</td>
<td>1397</td>
</tr>
<tr>
<td>5:00</td>
<td>2169</td>
<td>902</td>
<td>1363</td>
</tr>
<tr>
<td>5:15</td>
<td>2420</td>
<td>1153</td>
<td>1613</td>
</tr>
<tr>
<td>5:30</td>
<td>2343</td>
<td>1192</td>
<td>1610</td>
</tr>
<tr>
<td>5:45</td>
<td>2185</td>
<td>989</td>
<td>1424</td>
</tr>
<tr>
<td>6:00</td>
<td>1933</td>
<td>837</td>
<td>1235</td>
</tr>
<tr>
<td>6:15</td>
<td>1847</td>
<td>697</td>
<td>1115</td>
</tr>
<tr>
<td>6:30</td>
<td>1752</td>
<td>623</td>
<td>1034</td>
</tr>
<tr>
<td>6:45</td>
<td>1702</td>
<td>727</td>
<td>1082</td>
</tr>
<tr>
<td>7:00</td>
<td>1603</td>
<td>828</td>
<td>1109</td>
</tr>
<tr>
<td>7:15</td>
<td>1482</td>
<td>555</td>
<td>892</td>
</tr>
<tr>
<td>7:30</td>
<td>1279</td>
<td>450</td>
<td>751</td>
</tr>
<tr>
<td>7:45</td>
<td>1242</td>
<td>462</td>
<td>745</td>
</tr>
</tbody>
</table>

Table 4  Comparison of System Peak and Event Peak Intersection Volumes

<table>
<thead>
<tr>
<th>Time</th>
<th>Elmore/Tudor</th>
<th>Providence/Wellness</th>
<th>Average - Weighted by # of days</th>
<th>Percent of System Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average of 4 weekdays</td>
<td>Average of 7 weekdays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:45 - 5:45</td>
<td>9164</td>
<td>4165</td>
<td>5983</td>
<td>100.0%</td>
</tr>
<tr>
<td>5:45 - 6:45</td>
<td>7716</td>
<td>3145</td>
<td>4807</td>
<td>80.3%</td>
</tr>
</tbody>
</table>

Detailed traffic count data used to develop the tables above is shown in Appendix 3.

CURRENT LEVELS OF SERVICE

All level-of-service analyses described in this report were performed in accordance with the procedures stated in the 2000 *Highway Capacity Manual* (Reference 4). A description of level of service
and the criteria by which they are determined is presented in Appendix 4. Appendix 4 also indicates how level of service is measured and what is generally considered the acceptable range of level of service. Intersection level of service (LOS) is analogous to the letter grades in a school report card. Motorists using an intersection that operates at LOS A experience very little delay, while those using an intersection that operates at LOS F will experience intolerably long delays. Analysis was conducted with Traffix software.

ADOT’s Driveway Design Standards and Regulations (17 AAC 10.070) (Reference 5) define minimum acceptable LOS for a development’s construction and design years. If LOS C exists at the time a driveway permit application is filed, LOS C must be maintained in the construction and design years to be acceptable. If LOS D exists at the time a driveway permit application is filed, LOS D must be maintained in the construction and design years to be acceptable. If LOS E or F exists at the time a driveway permit application is filed, delay or other measures of effectiveness must not decrease by more than 10 percent in the construction or design years to be acceptable. ADOT staff has indicated that, for planned special events occurring only a handful of times a year, there is flexibility within these standards.

All intersection level-of-service evaluations used the peak 15-minute flow rate during the weekday p.m. peak hour and the event peak hour. Using the peak 15-minute flow rate ensures that this analysis is based on a reasonable worst-case scenario. For this reason, the analysis reflects conditions that are only likely to occur for 15 minutes out of each average peak hour. The transportation system will likely operate under conditions better than those described in this report during all other time periods.

0 summarizes the level-of-service analysis for the study intersections under the weekday p.m. peak hour and event peak hour under existing traffic conditions. Most of the study intersections currently operate at LOS C or better during the weekday p.m. system and event peak hours except for the Tudor Road/Elmore Road intersection, which operates at LOS D for both periods.

Appendix 5 and Appendix 6 include the level-of-service worksheets under year 2014 existing traffic conditions.

**Crash Data Review**

The crash histories of the study intersections were reviewed in an effort to identify potential intersection safety deficiencies. ADOT provided crash records for the period from January 2004 to December 2008. The summary crash data in Table 5 includes the crash rate, severity, and type of crashes that occurred over the 5-year analysis period.
Generally, a crash rate of greater than 1 per million entering vehicles (MEV) is considered an indicator that a potential geometric or operational issue may exist and that further evaluation should be considered. As seen in the table above, none of the study intersections had a rate higher than 0.77 crashes per MEV. The intersections of Piper Street and UAA Drive with Providence Drive were the two highest locations in terms of crash rate. There were no fatal crashes at any of the intersections during the analysis period.

**PROVIDENCE DRIVE & UAA DRIVE**

This intersection has one of the highest crash rates among the study intersections. Closer inspection of the crash history shows a high number of angle crashes. Of the 34 crashes at that intersection over the analysis period, 15 were angle crashes. Signal operations, lack of adequate gaps or geometric characteristics are possible contributors to this type of crash. The eastbound left turn is controlled by a protected-permitted signal. Permitted signal phases leave left-turning vehicles more vulnerable to conflicting traffic than a protected signal phase.

**PROVIDENCE DRIVE & PIPER STREET**

Similar to the intersection of Providence and UAA Drives, this intersection has one of the highest crash rates among the study intersections with a large portion (14 of 35) being angle crashes. The east and
westbound left turns have protected movements and the north and south movement are served by a protected-permitted phase. This intersection also had a relatively high number of rear-end crashes during the analysis period; 17 of 35. All 17 rear-end crashes were reported in the eastbound or westbound direction. Similar to the intersection with UAA drive above, sight-distance could contribute to both of these crash types. Providence Drive has some vertical and horizontal curves as well as trees on the side and in the median that could create sight-distance issues with seeing other vehicles as well as signal heads. Also, as Providence Drive runs in a general east-west direction, it is possible that a low sun could create visibility issues for motorists.

PROVIDENCE DRIVE & ALUMNI DRIVE

The intersection of Providence and Alumni Drives has the 3rd highest crash rate of 0.57 MEV, however the greater concern is the high number of angle crashes. In the 5-year analysis period there were 12 angle crashes out of a total of 24 collisions. With the exception of the eastbound movement, all left turns are served by permitted phases. Without a protected phase, if there is a lack of acceptable gaps in opposing traffic, motorists are more likely to accept smaller gaps out of frustration. In addition, it is possible that sight distance is a factor at this intersection as well for the same reasons as the two previously discussed intersections; road geometry, median and shoulder vegetation, and low sun.

PROVIDENCE DRIVE & ELMORE ROAD

Despite the low crash rate shown in Table 5, past ADOT studies have identified safety issues at the Providence Drive/Elmore Road intersection and have nominated it for upgrade to a roundabout through HSIP. Analysis later in this report considers a roundabout at this intersection for safety and operational benefits.

ELMORE ROAD & SHARON GAGNON LANE

Though not a study intersection, this intersection is proposed to be removed as part of the proposed UAA Sports Arena. Past ADOT studies have also identified a safety problem at the Elmore Road/Sharon Gagnon Lane intersection due to sight distance and lack of adequate gaps. The closure of this intersection and connection of Sharon Gagnon Lane to the site roadway would eliminate this safety issue.
CRASH SUMMARY

None of the crash rates of the study intersections exceed 1.0 crashes per MEV. As discussed above, Providence Drive corridor experiences a relatively high number of angle crashes and the Providence Drive and Piper Street intersection experiences a relatively high number of rear-end crashes.
Section 4
Transportation Impact Analysis
TRANSPORTATION IMPACT ANALYSIS

The transportation impact analysis identifies how the study area’s transportation system will operate in the year the proposed development is expected to be fully built (year 2014) and ten years hence (year 2024). The impact of traffic generated by the proposed UAA Sports Arena during the weekday p.m. system peak hour on a typical day and during the event peak hour on the day of a capacity event was examined as follows:

- Approved developments (i.e., Tudor Center Trust Campus Improvements) and transportation improvements (i.e. 40th Avenue extension) planned in the site vicinity were identified.
- Background weekday p.m. peak hour and event peak hour traffic conditions for the years 2014 (build-out year of the UAA Sports Arena) and 2024 (future planning-level analysis) were analyzed at each of the study intersections. Both years included background scenarios with and without the site road. Year 2024 analysis also included a second roadway scenario (with and without the site road): northern access to the UMED District via an extension of Elmore Road to Northern Lights Blvd.
- Background conditions were developed by applying annual, link-specific growth rates to the existing traffic volumes to account for regional growth in the site vicinity and change of traffic patterns due to changes in the transportation system. The annual growth rate and changes in traffic patterns were calculated based on model data provided by MOA for the April 2009 TIA and preliminary results of MOA’s AMATS model which were provided more recently.
- Site-generated trips for typical daily use were determined from the Institute of Transportation Engineers (ITE) Trip Generation Manual (Reference 6).
- Site-generated trips for sporting event scenarios were determined based on the number of seats at the arena, a mode split based on the current campus mode split, typical vehicle occupancy rates of special events, and an arrival pattern.
- Site-generated trip-distribution patterns were derived from ADT of area roadways and the MOA’s travel demand model.
- Year 2014 (build-out year of the UAA Sports Arena) and 2024 (future planning-level analysis) total traffic conditions were analyzed at each of the study intersections and site-access points during the weekday p.m. system and event peak hours. Year 2024 analysis included scenarios with and without northern access to the UMED District via an extension of Elmore Road to Northern Lights Blvd.

Year 2014 Background Traffic Conditions

The year 2014 background traffic analysis identifies how the study area’s transportation system will operate without the proposed UAA Sports Arena development. This analysis includes traffic attributed to planned developments within the study area and to general growth in the region, but does not include traffic from the proposed development. Background traffic scenarios for year 2014 are presented with and without the site road.
PLANNED DEVELOPMENTS AND TRANSPORTATION IMPROVEMENTS

Transportation improvements and planned developments within the site vicinity were identified and reviewed. The transportation improvements consist of several new roadways identified in discussions with agency staff. In addition, the traffic analysis included trips from the Tudor Center Trust Campus Improvements planned development.

Tudor Center Trust Campus Improvements

Agency staff identified one in-process development - Improvements to the Tudor Center Trust. This development is located east of Elmore Road between Tudor Road and University Lake Drive. The proposed improvements include the Primary Care Center IV, South Central Foundation Corporate Offices, and Alaska Native Tribal Health Consortium expansions. The traffic impact analysis for this development was obtained (Reference 7) and trips from this development were added to the background traffic volume for all future years. The system peak hour trips were then multiplied by 0.8 to estimate the event peak hour in in-process trips from this development. In-process trips for scenarios without Northern Access to UMED are shown in Figure 6.

Roadway Improvement Projects

Roadway improvement projects were identified in the site vicinity that would be constructed in the near-term future. These projects are illustrated in Figure 8.

40th Avenue Extension

40th Avenue is an intermittent east/west roadway, with a segment missing between Lake Otis Parkway and Piper Street. Construction of the missing segment, between Lake Otis Parkway and Piper Street, is currently underway and is expected to be completed prior to the arena’s opening in 2014. Redistribution of trips throughout the study network and turning movement volumes at the 40th Avenue/Piper Street intersection were estimated using the 40th Avenue Extension Design Study Report (Reference 8) and travel demand model data provided by MOA for the 2009 TIA. This is project #1 in Figure 7.

With the extension of 40th Avenue to Lake Otis Parkway, it is expected that some of that traffic that typically used residential streets such as Piper Street and Dale Street to access UAA and PAMC from Tudor Road will divert. It is expected to draw traffic from 42nd Avenue as well, especially for accessing Lake Otis Parkway. In the p.m. system peak hour, the 40th Avenue extension is estimated to remove about approximately 200 vehicles from 42nd Avenue and 350 vehicles from Tudor Road west of Dale Street. Less than 50 vehicles are removed from Providence Drive and Elmore Road.
Site Roadway

To provide access to the southern portion of the site, a new east/west roadway is proposed. This roadway will have its western terminus at Wellness Street (formerly Providence East Loop) connecting to Health Drive, and its eastern terminus at Elmore Road between the existing Elmore Road/University Lake Drive intersection and the existing Elmore Road/Sharon Gagnon Lane intersection. As part of the construction of this new roadway, University Lake Drive will be relocated to the south to form the eastern leg of the new Elmore Road/Site Access Road intersection. This new intersection will likely be controlled with a roundabout, although a traffic signal is possible as well. This is project #2 in Figure 8.

Northern Access to UMED District

There are long term plans to extend Elmore Road north of Providence Drive to Northern Lights Boulevard. Elmore Road and Bragaw Street would then form a continuous north/south roadway. This is project #3 in Figure 7.

Given the uncertain timeframe of this project, it was not included in 2014 analysis but it is assumed that it will occur prior to 2024. The 2024 future year analysis was conducted both with and without this improvement project. It is assumed that once the Elmore extension is completed, the Providence Drive/Elmore Road intersection will be upgraded to a traffic signal or roundabout.

Other Projects Identified in 2009 TIA

The previous traffic study for the UAA Sports Arena identified three other planned roadway projects: southern extension of Boniface Parkway from Tudor Road to (planned) 48th Avenue, 48th Avenue extension from Elmore Road to (planned) Boniface Parkway, and southern extension of Tudor Center Drive to (planned) 48th Avenue. These projects have now been completed and their impact is reflected in the turning movement counts collected for this project in February 2011.

GROWTH RATE AND MODEL DATA

Two sources of travel demand model data were utilized to forecast volumes – the latest data from the ongoing AMATS project and model runs previously conducted by MOA for the 2009 TIA.

MOA Model Data from previous TIA

In 2009, MOA conducted custom runs of their 2007 and 2017 models for use in the previous TIA. MOA staff added traffic analysis zones (TAZs) and roadway links within the UMED area. Several model runs were conducted for each year to gauge the impact of various roadway projects, including the site road, the northern access to UMED (2017 only), and other various planned roadways in the area (most of
which have now been built). The MOA’s model contains 3-hour volumes for the 3 to 6 p.m. peak period, and peak hour volumes were estimated from this. In this report, MOA model data was used to identify annual growth on the minor roadways not included in the AMATS Model and to redistribute trips onto the site road. Appendix 7 includes the MOA Model Data.

AMATS Model

The MOA is currently building a new regional travel demand model, known as the AMATS model, for use in the Highway-to-Highway project and other regional planning efforts. This model contains p.m. peak period roadway link volumes for the years 2010 and 2035. A February 2011 output from this model was obtained and used to identify annual growth on major roadways in the study area: Tudor Road, Elmore Road, Providence Drive, UUA Drive, and a portion of Piper Street. Appendix 8 includes the AMATS Model.

Resulting Growth Rates

Annual straight-line growth rates for roadways within the study area are shown in Figure 8. The AMATS model was used for the Tudor Road, Elmore Road, Providence Drive, UUA Drive, and a portion of Piper Street. Three years of growth was applied to 2011 turning movement counts for all 2014 scenarios, and 13 years of growth was applied to 2011 turning movement counts for all 2024 scenarios. The methodology of NCHRP Report 255 (Reference 9) was used to apply the link growth rates to the turning movement counts. This methodology applies the relative difference in existing and future model volumes, and uses an iterative process to equally apply changes to inflow and outflow intersection volumes.

SCENARIOS

System and event peak hour volumes for two different 2014 background traffic scenarios were estimated based on the model data:

- **Background conditions without site roadway**: This scenario includes three years of regional growth (2011 to 2014), the opening of the 40th Avenue extension, and the in-process development.

- **Background conditions with site roadway**: This scenario includes everything noted in the previous bullet plus redistribution of traffic related to the site road and two related projects that are assumed to occur when the site road is built. The related projects are the realignment of University Lake Drive to form a four-leg intersection on Elmore Road, and the change of
access to Sharon Gagnon Drive (from Elmore Road to the site road). It is assumed that the intersection of Elmore Road/University Lake Drive & Site Road is controlled with a traffic signal or roundabout when it is constructed.

2014 Background Traffic Conditions Without Site Road

Figure 10 shows lane configurations and traffic control devices for future background conditions without the site road. Figures 11A and 11B show the 2014 background traffic conditions without the site road for a weekday p.m. system and event peak hours, respectively. As shown in Figures 11A and 11B, all of the study intersections were forecasted to operate at LOS D or better during the weekday p.m. system and event peak hours. Appendix 9 and Appendix 10 include the level-of-service worksheets under year 2014 background without site road traffic conditions.

2014 Background Traffic Conditions With Site Road

As previously noted, the construction of a new east-west roadway from Elmore Road to Wellness Street will change traffic patterns in the area. Therefore, a second “background” scenario with this site roadway was analyzed. In conjunction with the roadway connection, University Drive will be realigned to the south to form the eastern leg of the new Elmore Road/University Drive/Site Access Road intersection. The eastern intersection (on Elmore Road) will be controlled with either a roundabout or traffic signal. The western intersection (on Wellness Street) will be signalized. Analysis of roundabouts is reported later in this study. Traffic patterns in this immediate area are expected to change once the site road is completed. The change in traffic volume was estimated by comparing the differences between link volumes 2017 MOA models with and without the site road. 2017 data was used because it was the closest data available to year 2014. The use of same-year data allowed for the impact of the site road to be estimated independent of growth, which was previously calculated. The NCHRP Report 255 methodology was then used to adjust turning movement counts according to model link volume changes with and without the site road.

Figure 12 shows lane configurations and traffic control devices for future background conditions with the site road. Figures 13A and 13B show the 2014 background traffic conditions with the site road for a weekday p.m. system and event peak hours. The changes in turning movement volumes due to the site road are also shown in Figures 13A and 13B. As shown in these figures, all of the study intersections were forecasted to operate at LOS D or better during the weekday p.m. peak hour. Additionally, level of service is improved at the Elmore Road/University Lake Drive intersection (due to the signal accompanying the site road) and at the Elmore Road/Providence Drive intersection (due to diversion
onto the site road). Appendix 11 and Appendix 12 include the level-of-service worksheets under year 2014 background with site road traffic conditions.
Proposed Development Plan

UAA is proposing to develop a 5,600 seat sports arena in a 196,000 square foot building in the southwest quadrant of the intersection of Providence Drive (also named University Drive) and Elmore Road (also named Bragaw Street). This land is part of the UAA campus but is currently undeveloped. Access to the site will be provided by several new and existing roads. It is proposed that two access driveways be located along an access roadway that connects Elmore Road to Wellness Street (formerly Providence East Loop). A third access driveway is proposed along Wellness Street and a fourth access driveway is proposed along Providence Drive. The latter access point is proposed to be a right-in only and serve a drop-off area for the facility as well as an access point for the new surface parking lot. Construction of the proposed sports arena is expected to begin in 2013 and be completed by 2014.

The UAA Sports Arena will be used by UAA staff and students on a daily basis and also host UAA athletic events and other special events. To represent these dual uses, two scenarios were analyzed. The first was a typical weekday, and the second scenario was a reasonable worst case scenario for a sporting event.

TYPICAL DAY TRIP GENERATION

The projected weekday daily and p.m. peak-hour vehicle trip ends for the proposed development on a typical day were based on the *Trip Generation Manual*, 8th Edition (Reference 6). A recreation and community center was chosen as the land use type as this best describes the regular day use of the facility. The 2009 TIA analyzed a 130,000 square-foot building. Although size of the proposed arena has now increased to 196,000 square feet, the additional size is due to the increased event seating and will have no impact on typical day trip generation. Therefore, this study uses the same typical day trip generation as the previous TIA.

Table 6 summarizes the anticipated number of trips that will be generated by the proposed UAA Sports Arena development when no special events are taking place (all trip ends shown in Table 6 have been rounded to the nearest five trips).

<table>
<thead>
<tr>
<th>Land Use</th>
<th>ITE Code</th>
<th>Trip-Generating Size</th>
<th>Daily Trips</th>
<th>Weekday PM Peak Hour Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Recreational Community Center</td>
<td>495</td>
<td>130,000</td>
<td>2,980</td>
<td>150</td>
</tr>
</tbody>
</table>
Table 6 shows that the proposed development is estimated to generate 2,980 net new trips on a typical weekday; 150 net new trips (60 inbound, 90 outbound) are projected to occur during the weekday p.m. peak hour. These typical use trips were added to the background weekday system p.m. peak hour traffic volumes to formulate the volumes used in the total weekday p.m. system peak hour analysis.

PLANNED SPECIAL EVENTS

The UAA Sports Arena will host a number of events throughout the year, including athletic camps and UAA team practices with relatively low attendance and trip generating characteristics. It is estimated that the UAA Sports Arena will host approximately 83 planned events throughout the year; 67 of these will occur on weekdays and 16 of these will occur on weekends. Exhibit 1 shows expected attendance at all of the special events that will be held at the UAA Sports Arena in a year sorted by estimated attendance size. Events such as boat shows and home shows are not planned for the UAA Sports Arena and are intended to remain at the Sullivan Arena. A complete list of special events and projected attendance is shown in Appendix 13.
The 2009 TIA analyzed a women's/men's basketball doubleheader (at a smaller 3,500 seat arena) as a reasonable worst-case transportation scenario. The university has since indicated that they plan to eliminate doubleheader events and instead play single games that begin later in the evening. UAA has developed a preliminary schedule of events and corresponding attendance, but the final schedule will depend in part upon the results of this study. This study analyzes a capacity (5,600 attendee) event beginning at 7 p.m., the planned start time for men's basketball games. This is considered to be the reasonable worst-case event. As shown in Exhibit 1, there are a wide variety of planned special events expected at the facility ranging in attendance from 5,600 to 1,500 patrons. Although the attendance at a men's basketball game is estimated at 2,500 patrons, significant variability is expected. The occasional major game or tournaments could have significantly higher attendance, potentially up to capacity. No trips associated with the typical day use of the site are assumed to be present on the day of a capacity event. The building will be closed to typical uses at these times.

Patron Auto Usage and Vehicle Occupancy

Patrons are expected to arrive at the UAA Sports Arena by three major modes; by automobile, by transit, or by walking. Based on the UAA Campus Master Plan (Reference 1), about 85-percent of trips on campus are currently made via automobiles. For a planned special event, fewer trips are typically made by automobile in comparison to everyday conditions as event patrons seek alternative modes to avoid traffic congestion and parking. It can be assumed that UAA students and staff already on campus could walk or ride the Seawolf Shuttle to reach the arena. Additionally, several high-ridership routes on MOA's People Mover bus system serve the site. For purposes of this analysis an auto mode split was kept at 85-percent to be conservative.

Patrons driving to a planned special event will generally not drive alone. Based on data collected by KAI at other planned special events and FHWA's Managing Travel for Planned Special Events (Reference 10), vehicle occupancy for planned special events generally ranges from 2.3 to 2.8 persons per vehicle. For analysis of the proposed UAA Sports Arena, a vehicle occupancy of 2.3 was used as this allows for the analysis to be conservative.

Patron Auto Trips

Based on the vehicle occupancy of 2.3 patrons per vehicle, it is estimated that filling the arena would generate 2,070 net new trips. This was determined as follows:
• 5,600 patrons travel to the arena for an event
• 85-percent or 4,760 people, travel by automobile.
• Vehicle occupancy averages 2.3 persons per vehicle, resulting in approximately 2,070 vehicles trips to fill the arena

Patron Trip Arrival and Departure Patterns and Peak Hour Trips

Trips associated with a 7 p.m. capacity event will be spread over a period of time longer than one hour. While most patrons can be expected to arrive in the hour leading up to the game, a few will arrive more than one hour early and many will arrive late. It is estimated that 70% of the 2,070 vehicle trips required to fill the arena would occur between 5:45 and 6:45. As a result, this hour will be used as the event peak hour to determine the impact of event traffic on the background traffic operations. The flowchart shown in Exhibit 2 illustrates the calculations used to reach this total.
On the day of a large planned special event, an event traffic management plan will be in place. The goal of this plan will be to facilitate, as efficiently as possible, traffic coming to and from the UAA Sports Arena for an event. One aspect of such a plan will be to not have any employees or other normal day users of the facility arriving or departing during the peak hour. These normal day users of the UAA Sports Arena can leave prior to peak hour, eliminating all outbound trips during the peak hour on an event day.

PARKING MANAGEMENT FOR SPECIAL EVENTS

Patron parking will be served by a combination of new parking spaces at the UAA Sports Arena and existing nearby parking. This “shared-use” approach to relying on existing and available spaces is inherently more resource efficient and much less impactful than constructing all new spaces only to support this use. Special routes on the Seawolf Shuttle system will be available during the major events to help facilitate a patron’s transportation to/from the UAA Sports Arena for those who park off-site. As previously noted, the campus currently has a mode split of 85 percent automobile and 15 percent other modes.

It is initially planned that event patrons will be assigned to a specified parking lot or deck at the time they purchase event tickets as part of the parking and event management plan. This will enable patrons to drive directly to a parking facility with guaranteed space available. Patrons could be provided with parking passes that are checked by a staff member upon entry to a parking lot or deck. This strategy allows event traffic to be distributed across the network and minimize traffic impacts to the system. A special events transportation management plan should be developed to refine parking management issues.

Available Parking Facilities

In order to accommodate a capacity event in early evening hours and minimize on-site parking needs, nearly all available parking on UAA’s campus and parking that has been offered by PMAC will need to be used. Table 7 presents an overview of available parking on campus during the time patrons would arrive for a 7 p.m. event. This information is also shown in Exhibit 3. Table 7 presents the raw number of spaces available as well as the effective number. It is assumed that only 90% of available spaces in parking decks and 85% of available spaces in surface lots will be used. A lower rate of usage is assumed for surface lots due to the potential for piled snow and snow-covered parking stall markings. Active management of parking facilities by UAA staff leading up the events could increase these utilization rates.
Table 7  Off-site Parking Availability at 6 p.m. on weekday

<table>
<thead>
<tr>
<th>Parking Area</th>
<th>Raw # of Spaces Available</th>
<th>Effective Spaces Available</th>
<th>Source of Availability Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAMC</td>
<td>500</td>
<td>442</td>
<td>UAA/PAMC agreement</td>
</tr>
<tr>
<td>East Campus Area</td>
<td>574</td>
<td>495</td>
<td>March 2011 Survey by UAA Staff</td>
</tr>
<tr>
<td>South Parking Lot</td>
<td>153</td>
<td>130</td>
<td>Walker Study and UAA Master Plan</td>
</tr>
<tr>
<td>West Campus Area</td>
<td>505</td>
<td>429</td>
<td>Walker Study and UAA Master Plan</td>
</tr>
<tr>
<td>University Lake Building</td>
<td>76</td>
<td>64</td>
<td>Walker Study and UAA Master Plan</td>
</tr>
<tr>
<td><strong>TOTAL OFF-SITE SPACES</strong></td>
<td><strong>1808</strong></td>
<td><strong>1560</strong></td>
<td>-</td>
</tr>
</tbody>
</table>

Providence Alaska Medical Center (PAMC)

PAMC has agreed to share its available parking, accessible by Wellness Street, for events in return for shared parking in the proposed UAA Sports Arena parking lot during non-event times. PAMC has agreed to provide 150 spaces in its Tower A lot and another 350 spaces in its PS 2 lot; a total of 500 spaces. Parking in an additional parking garage, PS3, has yet to be determined by PAMC. For purposes of this study, it was assumed that no parking was available from PS3. PAMC parking facilities are within walking distance of the UAA Sports Arena. A copy of the UAA/PAMC parking agreement is included as Appendix 14.

University Lake Building

Past campus parking studies (References 1 & 11) have identified 76 available parking spaces at the University Lake Building. These spaces are within walking distance of the UAA Sports Arena. UAA staff should direct these patrons to cross Elmore Road at the intersection with Providence Drive than use the sidewalk on the south side of Providence Drive to access the site.

East Campus Area

UAA staff conducted a parking utilization study in March 2011 in the portion of the campus north of Providence Drive and east of UAA Drive. The complete results of the survey are included in Appendix 15. The survey indicated that, on an average weekday, 574 parking spaces in this area are available at 4:30 p.m. By 7 p.m., this increases to 825 available spaces. To be conservative, this analysis was based on 574 available spaces to ensure capacity for the earliest arrivals. The majority of these spaces are in the garage in the northeast quadrant of the Providence Drive/UAA Drive intersection, the east parking garage, and the Arts Main Lot. On days of major events, it is recommended that UAA staff cordon off a total of 574 spaces early in the morning in one or more of these three lots. This will ensure that large blocks of spaces are available and readily identifiable to event attendees. If necessary, a small number of normal daytime users of a condoned lot could park in an adjacent lot that is not reserved for event attendees.
Exhibit 3  Approximate Parking Availability at 6 p.m. on a Weekday
Parking facilities in the east campus area lie within a 6 to 9 minute walk to the arena, as shown below in Exhibit 4. It is likely that some patrons parking this area would prefer to walk to the arena, while others would prefer to ride a shuttle bus. It is recommended that a special Seawolf shuttle route operate clockwise on the Providence Drive/UAA Drive/Alumni Drive loop, and that patrons walking to the site be directed to cross Providence Drive on the east side of the Wellness Drive intersection. Transit and pedestrian access are discussed in greater detail in a later section of this report.

Exhibit 4   Walking Distances from Proposed UAA Sports Arena

South Parking Lot

Previous campus parking studies (References 1 & 11) have identified 153 available parking spaces at the South Parking Lot. This lot is approximately a 9 minute walk from the arena, and it is recommended as a 2nd special Seawolf Shuttle route serve this lot and the west campus area.

West Campus Area

Past campus parking studies (References 1 & 11) have identified approximately 505 available parking spaces in the west campus area. Similar to the east campus area, UAA staff should cordon off a total 505 spaces in the west campus area early in the morning on the day of a major event. Parking facilities in
the west campus area lie more than 9 minute walk from the arena, and it is recommended that this area be served by a special Seawolf Shuttle route along with the South Parking Lot.

On-Site Parking Needs

As previously noted in Table 7, the facilities noted above have an effective total of 1560 parking spaces. With 2070 total vehicle trips expected for a capacity event, this indicates the need for 510 effective parking spaces at the site. Again using the assumption of 85 percent utilization of a surface parking lot, this indicates a need for a 600-space parking lot at the arena if capacity event is to begin at 7 p.m. on a weekday. Assume the same mode split (85% auto) and vehicle occupancy (2.3 persons/vehicle), a 600-space on-site parking lot could accommodate a 1600-person event without using off-site parking.

SHUTTLE SERVICE FOR SPECIAL EVENTS

As previously noted, the Seawolf Shuttle should operate two special routes before and after large events to connect arena patrons with outlying parking facilities. These two routes are shown below in Exhibit 5 and Exhibit 6.
Exhibit 6  Recommended Event Shuttle for West Campus Parking (including South Parking Lot)

The east campus parking areas are expected to hold 495 vehicles for a special event, and these vehicles would contain a total of 1140 patrons. Since some parking facilities in the east campus area are close to the arena, half of the 1140 patrons could be expected to walk and half would utilize shuttle service. The resulting demand of 570 riders would occur over more than one hour (consistent with the overall arrival pattern), with 70%, or 400 riders per (peak) hour utilizing shuttle service. The route is approximately 1.5 miles in length and would take 10-15 minutes for a bus to travel with loading, unloading, and event traffic. A typical city bus can hold approximately 60 riders, thus requiring 7 bus trips per hour to transport all 400 patrons. The east campus shuttle route could be effectively served by two city buses or a greater number of existing Seawolf Shuttle vehicles. The appropriate vehicle for this shuttle service should be determined as part of a special event transportation management plan. Some maneuvers along the route and within parking lots may be more suitable for smaller vehicles like the Seawolf Shuttle.

The west campus parking areas, including the South Parking Lot, are expected to hold 559 vehicles for a special event, and these vehicles would contain a total of 1290 patrons. If three-quarters of patrons parking in these lots utilize shuttle service, the resulting demand for shuttle service is 965 riders (675...
in the peak hour). The route is approximately 1.75 miles in length and would take 10-15 minutes for a bus to travel with loading, unloading, and event traffic. A typical city bus can hold approximately 60 riders, thus requiring 12 bus trips per hour to transport all 675 patrons. The east campus shuttle route could be effectively served by three city buses or a greater number of existing Seawolf shuttle vehicles, shown below in Exhibit 7.

![Existing Seawolf Shuttle vehicle](image)

**Exhibit 7**  
Existing Seawolf Shuttle vehicle

**SITE TRIP DISTRIBUTION AND ASSIGNMENT**

The site-generated trips were distributed onto the study area roadway system according to the existing traffic patterns, average daily traffic (ADT) of major roadways near the site, and data from MOA’s model. The traffic generated by the proposed UAA Sports Arena is expected to follow this trip distribution pattern:

- 15 percent to the west on Northern Lights Boulevard
- 5 percent to the north on Lake Otis Road
- 10 percent to the north on Bragaw Street
- 5 percent to the north on Boniface Parkway
- 10 percent to the east on Northern Lights Boulevard
- 5 percent to the east on Tudor Drive
- 15 percent to the south on Elmore Road
- 15 percent to the south on Lake Otis Road
- 5 percent to the west on 36th Avenue (Providence Drive west of Lake Otis Road)

Figure 14 illustrates the estimated trip distribution pattern for the proposed development for both typical day operations and events, and the number of event, site generated trips that would enter the campus at each entry point. It is noted that the sum of the site-generated entering volumes shown in Figure 14 is equal to the 1450 vehicle trips previously noted in Exhibit 2.
Figure 15 illustrates the site-generated trips that are expected to use the roadway system during the weekday p.m. system peak hour for a typical day and the event peak hour for a special event. It is noted that the sum of event site-generated trips at the gateway intersections (Numbers 1, 5, 6, and 7 in Figure 15) is less than the 1450 trips shown in Exhibit 2 and Figure 15 because some trips reach outlying parking lots before reaching the gateway intersections.

**Year 2014 Total Traffic Conditions**

The total traffic conditions analysis forecasts how the study area's transportation system will operate with the traffic generated by the proposed UAA Sports Arena under both the typical daily use and a large attendance sporting event. As previously documented, the development of the site will require the construction of the site access roadway between Providence East Drive and Elmore Road resulting in the rerouting of background volumes, as shown in Figures 13A and 13B. The site-generated traffic volumes were added to the background with site road volumes to arrive at the total traffic volumes that are illustrated in Figure 16. Appendix 16 and Appendix 17 include the level-of-service worksheets under year 2014 total traffic conditions.

As shown in Figure 16, all intersections are forecast to operate acceptably under typical day total traffic conditions and capacity event total traffic conditions.
PEDESTRIAN ACCESS AND OPERATIONS

It is anticipated that a large number of pedestrians will walk from parking facilities on the north side of Providence Drive to the arena and will require a safe and efficient means of crossing Providence Drive. Additionally, some pedestrians will walk along Providence Drive to access parking facilities in the western portion of the campus. With a relatively high pedestrian volume, there is a potential for the pedestrian activity to significantly degrade intersection vehicular operations. To manage intersection operations, it is recommended that pedestrians be prohibited from crossing Providence Drive at UAA Drive before and after an event and instead be directed to cross Providence Drive on the east side of the Wellness Street intersection. This temporary restriction minimizes potential vehicle/pedestrian conflicts and allows the intersection to operate effectively and efficiently.

Providence Drive/Wellness Street Operations Analysis

A large walkway will connect the arena to the southeast quadrant of the Providence Drive/Wellness Street intersection. It is recommended that flaggers provide manual control at this intersection during large events. Pedestrians should be prohibited from crossing the south and west legs, and be given a dedicated pedestrian “interval” to cross the east and north legs of the intersection. Crossings of these legs would serve the major pedestrian movement between the arena and parking lots north of Providence Drive.

The Providence Drive/Wellness Street intersection was modeled in Synchro under 2014 event total traffic. Within Synchro, the phasing at the intersection was changed to mimic manual control and “protected” pedestrian crossings of the north and east legs, as shown in Exhibit 8. Additionally, right turns on red were prohibited for some movements and the central business district capacity reduction factor was applied.

Manual control should be used at this intersection for events that require the use of parking facilities north of Providence Drive. With 600 on-site spaces and 500 spaces at PAMC, as well as the same mode split, vehicle occupancy, and effective parking facility capacity assumptions as a 5600-person event, manual control should be used at this intersection for events with 2,600 to 5,600 attendees.
Table 8 below compares the Traffix analysis of this intersection with the more robust Synchro analysis.

<table>
<thead>
<tr>
<th></th>
<th>Traffix Analysis</th>
<th>Synchro Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay</td>
<td>21.8</td>
<td>26.8</td>
</tr>
<tr>
<td>LOS</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>V/C</td>
<td>0.61</td>
<td>0.63</td>
</tr>
</tbody>
</table>

Providence Drive/UAA Drive Operations Analysis

At this intersection, pedestrians will predominately be on the north side of Providence Drive. Manual control should be used to limit conflicts between pedestrians crossing UAA Drive and vehicles making a westbound right turn from Providence Drive to UAA Drive. Additionally, during large events, it is recommended that the lane configuration on the westbound approach be modified. Currently, this approach consists of a through and a shared through/right lane. With a heavy pedestrian volume crossing the north leg while Providence Drive receive a green indication, right-turning vehicles have the potential to impede through traffic while waiting for pedestrians to clear the crosswalk. Therefore, it is recommended that the westbound lane configuration be modified to a through-only lane and an exclusive right-turn-only lane. Flaggers should be used to only allow westbound right turn concurrently with UAA Drive vehicular movements, similar to an overlap phase on a traffic signal. This control is shown in Exhibit 9. Table 8 below compares the Traffic analysis of this intersection with the more robust Synchro analysis.

Manual control should be used at this intersection for events that require the use of parking facilities west of UAA Drive. This corresponds to an event with 3,900 to 5,600 attendees.
Exhibit 9  Mimic of Manual Control at Providence Drive/UAA Drive. Pedestrians cross the north leg with Phase 2.

Table 9  2014 Event Total Traffic At Providence Drive/Wellness Street intersection

<table>
<thead>
<tr>
<th></th>
<th>Traffix Analysis</th>
<th>Synchro Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay</td>
<td>29.8</td>
<td>34.8</td>
</tr>
<tr>
<td>LOS</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>V/C</td>
<td>0.85</td>
<td>0.93</td>
</tr>
</tbody>
</table>

As shown in Table 8 and 8, the manual control and high pedestrian volume at these intersections will have an impact on vehicular operations that is not reflected in the Traffix analysis, but the intersections will still operate acceptably. Appendix 19 provides detailed outputs of the Synchro analysis.

**Year 2024 Traffic Conditions - No Northern Access to UMED**

The purpose of the 10-year, year 2024 traffic conditions analysis is to provide MOA with a planning-level analysis of the study area and to fulfill ADOT requirements for a Road Approach permit. Two sets of analyses were conducted for 2024 – one with the same road network as the 2014 analyses, and one with Northern Access to the UMED District (Elmore Road Extension).

The same in-process development that was included in the year 2014 background traffic conditions has been included in this analysis. No other developments are known to be planned for the area. The same improvement projects were identified to occur within the analysis timeframe. Similar to the analysis for year 2014, year 2024 background traffic volumes were developed based on MOA model data which accounts for the anticipated regional growth in the study area.

Background with No Site Road

Figures 17A and 17B show the 2024 background traffic conditions without the site road for a weekday p.m. system and event peak hours, respectively. As shown in Figure 17A, most of the study intersections were forecasted to operate at LOS D or better during the weekday p.m. system peak hour.
Three intersections, Tudor Road/Elmore Road, Elmore Road/University Lake Drive, and Elmore Road/Providence Drive were forecasted to operate at a LOS E or F. It should be noted that the latter two intersections operate under stop-control and would operate acceptably if controlled with a traffic signal or roundabout. These improvement projects are discussed in the roundabout section of this report. Improvements to Tudor Road/Elmore Road will be more complex, as this intersection already has two through lanes and two left turn lanes on all approaches and right-of-way is limited.

Figure 17B shows that all study intersections were forecasted to operate at LOS D or better during the weekday p.m. event peak hour. Appendix 20 and Appendix 21 include the level-of-service worksheets under year 2024 background traffic conditions without the site road.

Background with Site Road

Figures 18A and 18B show the 2024 background traffic conditions with the site road for a weekday p.m. system and event peak hours, respectively. As shown in Figure 18A, weekday p.m. system peak hour operations at Elmore Road/University Lake Drive and Elmore Road/Providence Drive improve with the addition of the site road. Elmore Road/University Lake Drive is assumed to be signalized in conjunction with the site road being built, and the site road relieves Elmore Road/Providence Drive.

Figure 18B shows that all study intersections were forecasted to operate at LOS D or better during the weekday p.m. event peak hour. Appendix 22 and Appendix 23 include the level-of-service worksheets under year 2024 background traffic conditions with the site road.

Total Traffic

Figure 19 shows the 2024 total traffic conditions (without northern access to the UMED district) for both a typical day and an event. The typical day has no LOS impacts to the background traffic operations. Under event traffic, an impact occurs at two intersections:

- Providence Drive/Piper Street changes from LOS C to D,
- Wellness Street/Arena Lot West access changes from LOS A to D.

Appendix 24 and Appendix 25 include the level-of-service worksheets under year 2024 total traffic conditions on a typical day and during a planned special event.
Year 2024 Traffic Conditions – With Northern Access to UMED

A second set of scenarios was analyzed for Year 2024 which included the extension of Elmore Road north from the UAA campus from its present terminus at Providence Drive to Northern Lights Boulevard. This roadway extension would form the fourth leg of the existing Northern Lights Boulevard/Bragaw Street intersection and provide a new four lane north/south roadway through the U-Med District. This road improvement is shown in Figure 8 with the other planned improvements in the area. It is assumed that the Providence Drive/Elmore Road intersection would be signalized as part of this scenario, although a roundabout is also under consideration and is discussed later in this report. With either control device, this intersection would consist of two through lanes along Elmore Road and one through lane along Providence Drive with the appropriate number of turn lanes for each approach.

Traffic volumes were developed based on the AMATS and MOA model data. The models provided link volumes associated with the extension of Elmore Road/Bragaw Street from Providence Drive to Northern Lights Boulevard. This model was compared to the other scenarios to determine the relative change of link volumes as a result of the roadway extension. The relative change was then applied to the previously calculated 2024 background traffic volumes without the Elmore extension to determine a new set of background traffic volumes with and without the site road. The NCHRP Report 255 methodology was used to make these adjustments. In process trips, shown in Figure 20, were redistributed. A significant number of vehicles were rerouted from Providence Drive and UAA Drive and assigned to the Elmore Road extension. Additionally, a significant increase of background volume occurs along Elmore Road.

Background with No Site Road

Figure 21 shows the background lane configurations and traffic control devices without the site road and with the Northern Access to UMED. Figures 22A and 22B show traffic operations for this same scenario. The Tudor Road/Elmore Road and Elmore Road/University Lake Drive intersections operate at LOS F during the weekday p.m. system peak hour and at LOS D (Tudor Road/Elmore Road) or LOS E (Elmore Road/University Lake Drive) during the event peak hour. Tudor Road/Elmore Road experiences additional congestion due to increased volumes on Elmore Road associated with the extension. The Elmore Road/Providence Drive intersection operates acceptably because the AWSC is removed and replaced with a traffic signal or roundabout. All other study intersections operate at LOS D or better during both study periods. Appendix 26 and Appendix 27 include the level-of-service worksheets under year 2024 background traffic conditions with northern access to UMED.
Background with Site Road

Figure 23 shows the background lane configurations and traffic control devices with the site road and with the Northern Access to UMED. Figures 24A and 24B show traffic operations for this scenario. Results are similar to the scenario without the site road, except for the improved Elmore Road/University Lake Drive intersection, which operates as LOS B during the system and event peak hours. Appendix 28 and Appendix 29 include the level-of-service worksheets under year 2024 background with site road traffic conditions.

Total Traffic

The extension of Elmore Road will provide a more direct route to destinations north and east of the site. The traffic generated by the proposed UAA Sports Arena is expected to follow the same trip distribution as previous scenarios, but with major changes to routing. The trip distribution pattern is shown again in Figure 25 with inflow volumes that reflect changes in place with the northern access to UMED. Figure 26 shows the corresponding site-generated trips.

Figure 27 shows the 2024 total traffic operations under these conditions for the system and event peak hours. The project traffic impacts the Providence Drive/Wellness Street intersection, changing its operation from LOS C to LOS D under weekday p.m. system peak conditions. The Tudor Road/Elmore Road intersection maintains the background operations of LOS F during the weekday p.m. system peak hour. During the event peak hour, the project impacts the Tudor Road/Elmore Road intersection by changing the LOS from D to E. However, the intersection remains under capacity.

Appendix 30 and Appendix 31 include the level-of-service worksheets under year 2024 total traffic conditions with northern access to UMED on a typical day and during a planned special event.
Roundabouts

In the future, upgrades to the Elmore Road & University Lake Drive intersection (currently two-way stop-controlled) and the Elmore Road & Providence Drive intersection (currently all-way stop-controlled) will be needed. Elmore Road & University Lake Drive, which currently operates at LOS C, will operate at LOS D under 2014 system peak background conditions and LOS F under 2024 system peak background conditions. The intersection of Providence Drive & Elmore Road will operate at LOS D under 2014 system peak background conditions and LOS E under 2024 system peak background conditions (without the extension of Elmore Road).

It is expected that when the proposed UAA Sports Arena and associated site roadway are constructed, University Lake will be realigned to create a 4-legged intersection with Elmore Road and the site roadway. It is at this time that a roundabout or traffic signal should be constructed here.

Roundabouts are becoming an increasingly popular form of intersection control in the United States. They generally have lower accident rates than signalized or stop-controlled intersections, reduce intersection delay, and can aesthetically enhance a community’s transportation system.

Accident reduction at roundabouts can be attributed to several factors. Roundabouts have fewer conflict points than traditional intersections, and no conflict points that would result in right angle collisions. Speeds are lower through roundabouts, and the speed differential between vehicles at a roundabout is minimal. This reduces the likelihood of crashes occurring, and reduces the likelihood of an injury when there is a crash. Both of the proposed roundabouts, described in greater detail below, would be two-lane roundabouts. A national study of TWSC intersections in urban and suburban areas converted into double lane roundabouts found an 18 percent decrease in all accidents and a 72 percent decrease in injury accidents after the roundabout was constructed. Accident reductions were also observed at signalized intersections converted to roundabouts. (Reference 12)

Roundabout intersections typically have less delay and shorter queues than signalized intersections. At a signal, there is control delay experienced by drivers who must decelerate, stop, and accelerate when faced with a red signal. At a roundabout, there is geometric delay experienced by all drivers who must pass through the intersection due to the need to slow down and circulate. When a vehicle is present in the circulatory roadway and an entering vehicle must yield, control delay is also experienced. The maximum speed that a major street vehicle can travel while passing through a double lane roundabout is 30 mph. The speed limit on Elmore Road is 45 mph, requiring at least a 15 mph reduction in speed for several hundred feet. However, under most traffic volumes this delay is less than the control delay that would be experienced at a signal.
Construction of roundabouts at Elmore Road & realigned University Lake Drive and Elmore Road & Providence Drive would create two roundabouts on Elmore Road approximately 800 feet apart. As with closely spaced traffic signals, spillback of queues from one intersection into the other is a concern at closely spaced roundabouts. Queues between the two intersections under signal and roundabout control in the year 2024 are shown below in Table 10. Year 2014, when traffic volumes will be lower, is omitted for brevity. Queues are 95\textsuperscript{th} percentile, and expressed in feet.

### Table 10  95% Back of Queue Between Proposed Roundabout Sites (feet)

<table>
<thead>
<tr>
<th>Approximate Distance to Upstream Intersection</th>
<th>Elmore Road Southbound at Elmore/Site Access/University Lake Intersection (Southbound Queue)</th>
<th>Elmore Road Northbound at Elmore/Providence Intersection (Northbound Queue)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>Signal</td>
<td>AWSC/Signal</td>
</tr>
<tr>
<td>2014 Total Traffic - Typical Day</td>
<td>405</td>
<td>125*</td>
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<td>395</td>
<td>100*</td>
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<td>145*</td>
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<td>2024 Total Traffic – Typical Day w/ Elmore Rd Extension</td>
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<td>2024 Total Traffic – Planned Special Event w/ Elmore Rd Extension</td>
<td>425</td>
<td>475</td>
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*Elmore/Providence intersection is analyzed as AWSC until Elmore Road is extended. Assumed 95\textsuperscript{th} percentile queue at AWSC intersection is 2.00 times the average queue length and average queued vehicle length of 25 feet. (Traffix does not report 95\textsuperscript{th} percentile queues for AWSC)

As shown in Table 10, traffic volumes on Elmore Road are low enough that queues will not spill back through upstream intersections with roundabouts. Overall, 95\textsuperscript{th} percentile queues will be much shorter with roundabouts than with signals or AWSC in the case of Elmore Road/Providence Drive. Appendix 32 includes the queuing worksheets for signals, and Appendix 33 and Appendix 34 includes the queuing for roundabouts.

It is common for two roundabouts to be spaced much closer than 800 feet apart, often at diamond interchanges where roundabouts are located at the ramp terminals and traffic volumes are high. Multiple roundabouts may calm traffic along Elmore Road in the campus area, as the geometry of the roundabouts will force drivers to slow to 30 mph or less while passing through them. The roundabouts will also create a gateway and make drivers aware they are entering a campus area, which may have safety benefits.
ELMORE ROAD/UNIVERSITY LAKE DRIVE/SITE ACCESS

At the proposed intersection of Elmore Road, realigned University Lake Parkway, and the site access road, a roundabout was evaluated as an alternative to signal control. Construction of this roundabout is contingent upon University Lake Drive being realigned and the site roadway being constructed. The roundabout, shown below in Exhibit 10, would have two entering and through lanes on Elmore Road in both directions and a single entering lane on University Lake Drive and the Site Access Roadway. This roundabout would have a maximum inscribed circle diameter (ICD) of approximately 160 to 200 feet. The ICD is measured from the outside curb to the outside curb of the circulatory roadway. For comparison, the roundabouts at the nearby Dowling Road interchange have an ICD of approximately 134 feet which is near the lower end of the range of diameters typically used for double-lane roundabouts.

Generally, roundabouts are considered to operate acceptably at a v/c of 0.85 or less. As shown in Table 11, the roundabout depicted in Table 11 will operate acceptably with the proposed UAA Sports Arena on a typical day or the day of a planned special event.
<table>
<thead>
<tr>
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<tr>
<td></td>
<td>Critical Movement</td>
<td>Delay (sec)</td>
<td>V/C Ratio</td>
<td>LOS</td>
<td>Critical Movement</td>
<td>Delay (sec)</td>
</tr>
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<td>SBT</td>
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<td>0.46</td>
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<td>SBT</td>
<td>23.5</td>
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<tr>
<td>Roundabout</td>
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<td>0.29</td>
<td>A</td>
<td>SBR</td>
<td>5.9</td>
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As shown in Table 11, a roundabout will reduce delay at the proposed Elmore Road/University Lake Drive/Site Access intersection during the p.m. peak hour with the proposed UAA Sports Arena. Appendix 33 includes the level-of-service worksheets for each of the roundabout alternatives analysis. Operational analysis was conducted with Sidra 3.2, an Australian software package commonly used to analyze American roundabouts.

PROVIDENCE DRIVE/ELMORE ROAD

At the intersection of Elmore Road and Providence Drive, a roundabout was evaluated as an alternative to all-way stop-control (AWSC), which currently exists at the intersection. The roundabout, shown below in Exhibit 11, would have two lanes for the eastbound right and a dedicated northbound left – the two major movements. This roundabout would have a maximum inscribed circle diameter of approximately 160 to 200 feet. Providence Drive currently has 2 lanes departing westbound from the intersection, however, the Exhibit 11 layout is expected to provide better than acceptable operations through 2024. Assuming the northbound right turn lane becomes a shared left and right lane, another westbound departure lane would require additional width for the circulating lanes as well. In that particular scenario, for lane balance purposes it would likely be preferred to separate the westbound through and left movements into individual approach lanes.
As shown in Table 12, the roundabout depicted in Exhibit 11 will operate acceptably with the proposed UAA Sports Arena in 2024 on a typical day or the day of a planned special event.

To provide northern access to the University Medical district (UMED), Elmore Road may be extended north from Providence Drive to form a 4th leg of the intersection by 2024. A roundabout at Elmore/Providence under this road configuration is shown below in Exhibit 12. Lane configurations have been changed in comparison to the above 3-legged roundabout to reflect different traffic volumes. In Table 12, operational comparisons are made to a traffic signal when Elmore Road has been extended north, as it is assumed the existing AWSC would be upgraded to a signal (if not a roundabout) at that time.
Exhibit 12   Elmore Road/Providence Drive Intersection Conceptual Roundabout – with Northern Access to UMED

Table 12    Elmore Road/Providence Drive Roundabout - Analysis Summary

<table>
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<tr>
<th>Traffic Control</th>
<th>Critical Movement</th>
<th>Delay (sec)</th>
<th>V/C Ratio</th>
<th>LOS</th>
<th>Critical Movement</th>
<th>Delay (sec)</th>
<th>V/C Ratio</th>
<th>LOS</th>
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<tr>
<td>2024 Total Traffic – Typical Day</td>
<td>2024 Total Traffic – Planned Special Event</td>
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<td>V/C Ratio</td>
<td>LOS</td>
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<td>Delay (sec)</td>
<td>V/C Ratio</td>
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<tr>
<td>2024 Total Traffic – With Elmore Road Extension</td>
<td>2024 Total Traffic – With Elmore Road Extension Planned Special Event</td>
<td></td>
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<tr>
<td>Traffic Control</td>
<td>Critical Movement</td>
<td>Delay (sec)</td>
<td>V/C Ratio</td>
<td>LOS</td>
<td>Critical Movement</td>
<td>Delay (sec)</td>
<td>V/C Ratio</td>
<td>LOS</td>
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</table>

As shown in Table 12, a roundabout will reduce delay at the proposed Elmore Road/Providence Drive intersection during the p.m. peak hour in comparison to AWSC without the Elmore Road extension and
in comparison to a traffic signal with the Elmore Road extension. Appendix 34 includes the level-of-service worksheets for each of the roundabout alternatives analysis.

ROUNDABOUT SUMMARY

Roundabouts are gaining favor nationally for their safety and operational advantages. At the Elmore Road/Site Access Road/University Lake Drive intersection and the Elmore Road/Providence Drive intersection, roundabouts will have less delay than traffic signals and shorten the queues between the two intersections. Roundabouts at these intersections can also create a gateway into the UAA Campus for traffic on Elmore Road.
Section 5
Conclusions and Recommendations
CONCLUSIONS AND RECOMMENDATIONS

The results of the traffic impact analysis indicate that the proposed University of Alaska Anchorage Sports Arena development can be constructed while maintaining acceptable traffic operations and safety on the surrounding transportation system with parking management efforts, manual traffic control at some intersections during major events, and no roadway or intersection mitigation projects. The findings of this analysis and our recommendations are discussed below.

Findings

YEAR 2011 EXISTING CONDITIONS

- All of the study intersections operate at acceptable levels of service during the weekday and p.m. peak hours.

YEAR 2014 BACKGROUND TRAFFIC CONDITIONS

- Traffic volumes were grown by a rate equal to that forecast in the AMATS regional travel demand model for each of the study area roadways within the site vicinity.
- All study intersections are estimated to operate at acceptable levels of service during the weekday p.m. peak hour with and without the site road.

PROPOSED DEVELOPMENT PLAN

- On a typical day when no planned special events are scheduled, the proposed development is estimated to generate 2,980 daily net new trips; 150 net new peak hour trips (60 inbound, 90 outbound) are projected to occur during the weekday p.m. peak hour.
- A variety of planned special events will take place at the arena. A reasonable worst-case situation was analyzed in this study: a capacity (5,600) person event beginning at 7 p.m. Such an event is expected to generate 1450 net new peak hour trips (1450 inbound, 0 outbound).

YEAR 2014 TOTAL TRAFFIC CONDITIONS

- All of the study intersections are forecast to operate with acceptable levels of service during the weekday p.m. peak hour on a typical day and a reasonable worst-case event

YEAR 2024 BACKGROUND TRAFFIC CONDITIONS (WITHOUT NORTHERN ACCESS TO UMED)

- Traffic volumes were grown by a rate equal to that forecast in the AMATS regional travel demand model for each of the study area roadways within the site vicinity.
- The Tudor Road/Elmore Road is forecast to operate at LOS E under background system peak conditions with or without the site road.
• The Elmore Road/University Lake Drive and Elmore Road/Providence Drive intersections operate at LOS F and E, respectively, during the background system peak hour without the site road. The introduction of the site road reduces these intersections to an acceptable LOS by signalizing Elmore Road/University Lake Drive (or constructing a roundabout) as part of site road construction and by diverting trips from the Elmore Road/Providence Drive intersection.

YEAR 2024 TOTAL TRAFFIC CONDITIONS (WITHOUT NORTHERN ACCESS TO UMED)

• The Tudor Road/Elmore Road intersection will continue to operate at LOS E under typical day traffic conditions

• The Providence Drive/Piper Street intersection will change from LOS C to LOS D operation during event traffic conditions.

YEAR 2024 BACKGROUND TRAFFIC CONDITIONS (WITH NORTHERN ACCESS TO UMED)

• The Tudor Road/Elmore Road is forecast to operate at LOS under background system peak conditions with or without the site road.

• The Elmore Road/University Lake Drive intersection operates at LOS F and LOS E under background system and event peak conditions, respectively, without the site road. The introduction of the site road reduces this intersection to an acceptable LOS by signalizing it (or constructing a roundabout) as part of site road construction.

YEAR 2024 TOTAL TRAFFIC CONDITIONS (WITH NORTHERN ACCESS TO UMED)

• The Tudor Road/Elmore Road intersection will continue to operate at LOS F during the system peak hour and change to LOS E during the event peak hour.

ALTERNATIVE INTERSECTION CONTROL ANALYSIS

• Roundabouts are a feasible traffic control device for the Providence Drive/Elmore Road and Elmore Road/University Lake Drive/Site Access Road intersections.

PARKING AND SHUTTLE NEEDS

If a capacity event is held at 7 p.m. on a weekday, existing campus and shared PAMC parking facilities will be able to accommodate the majority of parking needs. However, a 600-space lot will still be needed at the arena. Approximately five city-size buses (approximate capacity of 60 passengers) or a greater number of smaller vehicles will be needed to shuttle patrons from outlying parking facilities to the site.

Recommendations

The following list provides a summary of the mitigation measures recommended as part of this proposed development.
• Traffic signals or roundabouts should be installed at the following intersections:
  • Elmore Road and Site Access/realigned University Lake Drive.
  • Elmore Road/Providence Drive with the conjunction of the Elmore Road (Bragaw Road) extension to Northern Lights Boulevard.
• Manual traffic control with flaggers should be used at the Providence Drive/Wellness Street intersection for events with 2,600 to 5,600 attendees.
• Manual traffic control with flaggers should be used at the Providence Drive/UAA Drive intersection for events with 3,900 to 5,600 attendees.
• Traffic signal timing should be monitored and adjusted to best serve traffic demand at all intersections in future years.
• A special event transportation management plan should be coordinated with UAA, MOA, and ADOT&PF staff members to ensure safe and efficient ingress and egress traffic flows for major planned special events.
Section 6
References
REFERENCES


