CA4PRS Case Study

Anderson Junction to Black Ridge

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UDOT  
UDOT  
UDOT  
Wilson & Company
Project Location

- Southwest Utah
- 21 miles N of St. George, UT
- 141 miles NE of Las Vegas, NV
- Between Milepost 27 & 34
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- Primary Freight Corridor
- 2500+ Trucks per day
- 21% to 33% Truck Traffic
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Existing Roadway Characteristics
• Rural two-lane freeway with variable width median
• Two 12 ft lanes in each direction
• 4 ft left shoulders and 10 ft right shoulders
Existing Roadway Characteristics

- Asphalt Pavement
- Rolling to Mountainous terrain with grades between 3% - 6%
- 4 – Interchange Structures within project limits
Proposed Pavement Rehabilitation

- 2” Mill
- 3” Cold-in-place recycle
- 1 ½” HMA
- 1 ½” SMA
• Dig out and replace 15” of asphalt at existing structures to meet AASHTO vertical clearance at underpass structures
• Improve ramp geometry and lengths
• Construction Schedule: (between June and October 2010)
Existing Traffic Conditions

- AADT ≈ 21,760 (2009)
- 21% Trucks (4% single & 17% Combo Trucks)
- Monthly Hourly Traffic Reports obtained from UDOT (2009)
- Three months selected for Traffic Pattern Comparison (April, August, & October)
Existing Traffic Conditions Southbound
Existing Traffic Conditions Northbound

![Graph showing traffic volume (VPH) over time of day for different days and months.](image)

- **Time of Day**
- **Volume (VPH)**

Legend:
- Red: NB Week (Aug)
- Black: NB Fri (Apr)
- Cyan: NB Sun (Oct)
Goals and Objectives for using CA4PRS

• Compare construction strategies to optimize staging plans
• Reduce construction schedule
• Develop less disruptive lane closure schemes and traffic management plans
• Minimize total project cost
Median Crossover Closure
Construction Alternatives

- Median Crossover Closure
- 24/6 Closure (Open on Sundays)
Construction Alternatives

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- 24/6 Closure (Open on Sundays)
- Nighttime Closure (7pm to 5 am)
## Summary of CA4PRS Analysis Results

<table>
<thead>
<tr>
<th></th>
<th>Median Cross-over Closure</th>
<th>24/6 Closure</th>
<th>Nighttime Closure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SCHEDULE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Closure Duration (working-days)</td>
<td>119</td>
<td>154</td>
<td>199</td>
</tr>
<tr>
<td>Project Duration (Month)</td>
<td>7</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td><strong>TRAFFIC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WZ Capacity (vphpl)</td>
<td>1,050</td>
<td>930</td>
<td>850</td>
</tr>
<tr>
<td>Max Delay - Average weekday</td>
<td>Minor</td>
<td>Minor</td>
<td>Minor</td>
</tr>
<tr>
<td>Max Delay - Sunday (minutes)</td>
<td>30 min (SB)</td>
<td>No lane closure (85 min SB / 120 min NB)**^</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>60 min (NB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Queue - Sunday (mile)</td>
<td>3 mile (SB)</td>
<td>5 mile (SB)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>5 mile (NB)</td>
<td>7 mile (NB)</td>
<td></td>
</tr>
<tr>
<td><strong>COST</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction ($M)</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Traffic Control ($M)</td>
<td>1.2</td>
<td>0.75</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Project Cost ($M)</strong></td>
<td>19.2</td>
<td>18.75</td>
<td>19</td>
</tr>
</tbody>
</table>

**^No lane closures on Sunday for 24/6 closure, but max delay is estimated as if the lane closure remains.**

Project Construction cost was obtained from the Engineer's Estimate generated by UDOT’s PDBS System.
Summary of CA4PRS Analysis Results

- CA4PRS indicated that the Median Crossover closure alternative provides the shortest project construction Schedule but not necessarily the least impacts to traffic. Also, the Road User Cost and Total Project Costs were higher given the extra traffic control costs and expenses to build the crossovers.

- CA4PRS indicated that both the 24/6 closure alternative and the Nighttime Closure Alternative minimized work zone traffic delay and lowered the road user cost and traffic control costs.
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  - Factor for Passenger Car Equivalent (Level= 1.5, Rolling =2.5, or Mountainous Terrain = 4.5)
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  - Police activity and speed enforcement impeded traffic
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  ✔ Lengths of contractor operations adjacent to traffic was a distraction to drivers
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➢ When the data was entered correctly, the calculated results better reflected the observed conditions
Lessons Learned

• Avoid exceeding capacity by using a factor of safety
• Develop support from DOT management regarding implementation of CA4PRS recommendations
• Use detailed and relevant traffic data for input variables
• Use Real-Time data to make adjustments
• Consider a Performance Based Work-Zone specification
• Listen to the recommendations of the Resident Engineer for paving operations
Conclusions

• CA4PRS results and recommendations were useful when the program is used correctly.

• Be sure to evaluate the project entirely and consider even minor factors to be relevant and influential.

• Develop confidence and familiarity in the use of the CA4PRS program.