UDOT Signal Performance Metrics: New and Upcoming Metrics

Jamie Mackey
UDOT Statewide Signal Engineer
jamiemackey@utah.gov
Split Monitor

Foothill Drive Sunnyside SIG#7219 Phase 5
Tuesday, September 01, 2015 12:00 AM - Tuesday, September 01, 2015 11:59 PM

<table>
<thead>
<tr>
<th>Plan</th>
<th>Free</th>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
<th>Plan 4</th>
<th>Plan 5</th>
<th>Plan 6</th>
<th>Plan 7</th>
<th>Plan 8</th>
<th>Plan 9</th>
<th>Plan 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5 - 85 Percentile Split</td>
<td>18%</td>
<td>25.8 - 85%</td>
<td>74%</td>
<td>18.9 - 85 Percentile Split</td>
<td>25.0 - 85 Percentile Split</td>
<td>18.9 - 85 Percentile Split</td>
<td>13.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.8 Avg. Split</td>
<td>17%</td>
<td>19.2 Avg.</td>
<td>19%</td>
<td>18.5 Avg. Split</td>
<td>21.6 Avg. Split</td>
<td>18.5 Avg. Split</td>
<td>11.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0% MaxOuts</td>
<td>70%</td>
<td>0.0% ForceOffs</td>
<td>0%</td>
<td>89.9% ForceOffs</td>
<td>38.8% ForceOffs</td>
<td>87.4% ForceOffs</td>
<td>0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.9% GapOuts</td>
<td>0%</td>
<td>96.4% GapOuts</td>
<td>95%</td>
<td>4.1% GapOuts</td>
<td>58.2% GapOuts</td>
<td>5.4% GapOuts</td>
<td>33.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>88.1% Skips</td>
<td>30%</td>
<td>3.6% Skips</td>
<td>4.2%</td>
<td>6.1% Skips</td>
<td>2.0% Skips</td>
<td>7.2% Skips</td>
<td>66.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Phase Duration (Seconds)

Time (Hour of Day)
Purdue Split Failure

Purdue Split Failure
SIG#7219 – Foothill & Sunnyside
Phase 5
11:00 a.m. to 1:00 p.m.

Split Fail Rate: 16% (9/57 cycles)
Max Consecutive Failures: 3
Purdue Split Failure – 24-hr format
Purdue Split Failure – 24-hr format
Purdue Split Failure – 24-hr format

Foothill Drive Sunnyside Signal 7219 Phase: 5 Southbound
Tuesday, September 01, 2015 12:00 AM - Wednesday, September 02, 2015 12:00 AM

Plan 10

Occupy Ratio (%)

Time (Hour of Day)

GOR - MaxOut
GOR - GapOut
GOR - ForceOff
GOR - Unknown
ROR - MaxOut
ROR - GapOut
ROR - ForceOff
ROR - Unknown
Purdue Split Failure – 24-hr format

Foothill Drive Sunnyside Signal 7219 Phase: P Southbound
Tuesday, September 01, 2015 12:00 AM - Wednesday, September 02, 2015 12:00 AM

Plan 10

Occupancy Ratio (%) vs Time (Hour of Day):
- GOR - MaxOut
- GOR - GapOut
- GOR - ForceOff
- GOR - Unknown
- ROR - MaxOut
- ROR - GapOut
- ROR - ForceOff
- ROR - Unknown
Purdue Split Failure – 24-hr format
Detection for Purdue Split Failure
## New Metrics

<table>
<thead>
<tr>
<th>Metric Type</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach Delay</td>
<td></td>
</tr>
<tr>
<td>Approach Volume</td>
<td></td>
</tr>
<tr>
<td>Arrivals On Red</td>
<td></td>
</tr>
<tr>
<td>Purdue Coordination Diagram</td>
<td></td>
</tr>
<tr>
<td>Purdue Split Failure</td>
<td></td>
</tr>
<tr>
<td>Pedestrian Delay</td>
<td></td>
</tr>
<tr>
<td>Transitions</td>
<td></td>
</tr>
<tr>
<td>Purdue Phase Termination</td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td></td>
</tr>
<tr>
<td>Split Monitor</td>
<td></td>
</tr>
<tr>
<td>Turning Movement Counts</td>
<td></td>
</tr>
<tr>
<td>Yellow and Red Actuations</td>
<td></td>
</tr>
<tr>
<td>Preemption Details</td>
<td></td>
</tr>
<tr>
<td>Transit Signal Priority Details</td>
<td></td>
</tr>
</tbody>
</table>
Pedestrian Delay

EVENT CODES
45 – Ped Call on
21 – Ped Walk on
Pedestrian Delay

Event Codes

45 – Ped Call on
21 – Ped Walk on

Phase 2
Coordinated phase

Phase 4
Side street
Transition

State St & Orem Center St - SIG#6311
12/9/2015 0:00 to 12/9/2015 23:59

EVENT CODES
150, Param 1 – In Step
150, Param 2 – Transition Add
150, Param 3 – Transition Subtract
150, Param 4 – Transition Dwell

Pattern Change

Add  Subtract  Dwell
## Transition

### State St & Orem Center St - SIG#6311
12/9/2015 0:00 to 12/9/2015 23:59

<table>
<thead>
<tr>
<th>Transition Type</th>
<th>Number Transitions</th>
<th>Total Duration</th>
<th>Average Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2 - Add</td>
<td>1</td>
<td>01:04</td>
<td>Type 2 - Add</td>
</tr>
<tr>
<td>Type 3 - Subtract</td>
<td>107</td>
<td>14:15</td>
<td>Type 3 - Subtract</td>
</tr>
<tr>
<td>Type 4 - Dwell</td>
<td>0</td>
<td>00:00</td>
<td>Type 4 - Dwell</td>
</tr>
</tbody>
</table>

**Event Codes**
- 150, Param 1 – In Step
- 150, Param 2 – Transition Add
- 150, Param 3 – Transition Subtract
- 150, Param 4 – Transition Dwell
Preemption Requests & Services

EVENT CODES
102 – Preempt Call On
105 – Preempt Entry Started
Preemption Details (Rail)

Preemptor #1 Event Details
Geneva Pkwy & 400 S - SIG#6312
12/9/2015 0:00 to 12/9/2015 23:59

EVENT CODES
102 – Preempt Call On
103 – Gate Down
104 – Preempt Call Off
105 – Preempt Entry Started
106 – Begin Track Clearance
111 – Begin Exit Interval
150, Param 1 – In Step
Preemption Details (Rail)

Preemptor #1 Event Details
Geneva Pkwy & 400 S - SIG#6312

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Preempt Requests</td>
<td>63</td>
</tr>
<tr>
<td>Preempt 1</td>
<td>63</td>
</tr>
<tr>
<td>Number of Preempt Services</td>
<td>63</td>
</tr>
<tr>
<td>Preempt 1</td>
<td>63</td>
</tr>
<tr>
<td>Number of Preempt Max Outs</td>
<td>0</td>
</tr>
<tr>
<td>Preempt 1</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Dwell Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preempt 1</td>
<td>1:13</td>
<td>7:03</td>
<td>1:50</td>
<td>1:56:06</td>
</tr>
<tr>
<td>Request Duration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preempt 1</td>
<td>1:12</td>
<td>7:03</td>
<td>1:42</td>
<td>1:47:17</td>
</tr>
</tbody>
</table>

EVENT CODES
102 – Preempt Call On
103 – Gate Down
104 – Preempt Call Off
105 – Preempt Entry Started
106 – Begin Track Clearance
111 – Begin Exit Interval
150, Param 1 – In Step
Preemption Requests & Services

EVENT CODES
102 – Preempt Call On
105 – Preempt Entry Started
Preemption Details (EMV)

EVENT CODES
102 – Preempt Call On
104 – Preempt Call Off
105 – Preempt Entry Started
107 – Begin Dwell
110 - Preempt Max Out
111 – Begin Exit Interval

Preemtior #3 Event Details
Geneva Pkwy & 400 S - SIG#6312
12/9/2015 0:00 to 12/9/2015 23:59

Preemtior #4 Event Details
Geneva Pkwy & 400 S - SIG#6312
12/9/2015 0:00 to 12/9/2015 23:59

Preemtior #5 Details
Geneva Pkwy & 400 S
12/9/2015 0:00 to 23:59
Transit Signal Priority Requests & Services

Priority Request
3500 S & 3450 W - SIG#7284
12/9/2015 0:00 to 12/9/2015 23:59

EVENT CODES
112 – TSP Check In
113 – Early Green
114 – Extend Green

Priority Number

Time of Day

Priority Service

TSP Plan Number

Time of Day

- Early Green
- Green Extend
Transit Signal Priority – Request Duration

**EVENT CODES**

- 112 – TSP Check In
- 115 – TSP Check Out

Transit Signal Priority Request Duration
3500 S & 3450 W - SIG#7284
12/9/2015 0:00 to 12/9/2015 23:59
Transit Signal Priority – Request Duration

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Transit Signal Priority Request Duration</th>
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</thead>
<tbody>
<tr>
<td>0:00</td>
<td>Minimum 00:06</td>
</tr>
<tr>
<td></td>
<td>Maximum 01:59</td>
</tr>
<tr>
<td></td>
<td>Average 00:45</td>
</tr>
<tr>
<td></td>
<td>01:59</td>
</tr>
<tr>
<td></td>
<td>00:23</td>
</tr>
</tbody>
</table>

**EVENT CODES**
- 112 – TSP Check In
- 115 – TSP Check Out

**Number of Priority Requests**
- TSP 1: 62
- TSP 2: 64

**Number of Priority Services**
- Priority 1: 106
  - Early Green: 84
  - Extend Green: 22

**Priority Request Duration**
- TSP 1
  - Minimum: 00:06
  - Maximum: 01:59
  - Average: 00:45
- TSP 2
  - Minimum: 00:00
  - Maximum: 01:59
  - Average: 00:23
Transit Signal Priority – Request Duration

Priority Service
3500 S & 3450 W - SIG#7284
12/9/2015 0:00 to 12/9/2015 23:59

EVENT CODES
112 – TSP Check In
115 – TSP Check Out

Number of Priority Requests
TSP 1: 62
TSP 2: 64

Number of Priority Services
Priority 1: 106
Early Green: 84
Extend Green: 22

TSP Plan Number
TSP Plan Number

Priority Number
Priority Number

Time of Day
Time of Day

0:00 01:00 02:00
6 7 8 9 10 11 12

TSP #1
TSP #2
Early Green
Green Extend

0:00
01:00
02:00

Case Study: Impact of Fully Actuated Coordination on Arrivals on Green

US-89 & 200 N – SIG#5382
11/11/2015

US-89 & 200 N – SIG#5382
1/13/2016
Arrivals on Green SB / NB

<table>
<thead>
<tr>
<th></th>
<th>AM</th>
<th>MD</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>82 / 93</td>
<td>88 / 91</td>
<td>93 / 94</td>
</tr>
<tr>
<td>Split Ext = 0</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>AM</th>
<th>MD</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>After</td>
<td>82 / 90</td>
<td>87 / 91</td>
<td>92 / 93</td>
</tr>
<tr>
<td>Split Ext = 25/20/25</td>
<td></td>
<td></td>
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</table>