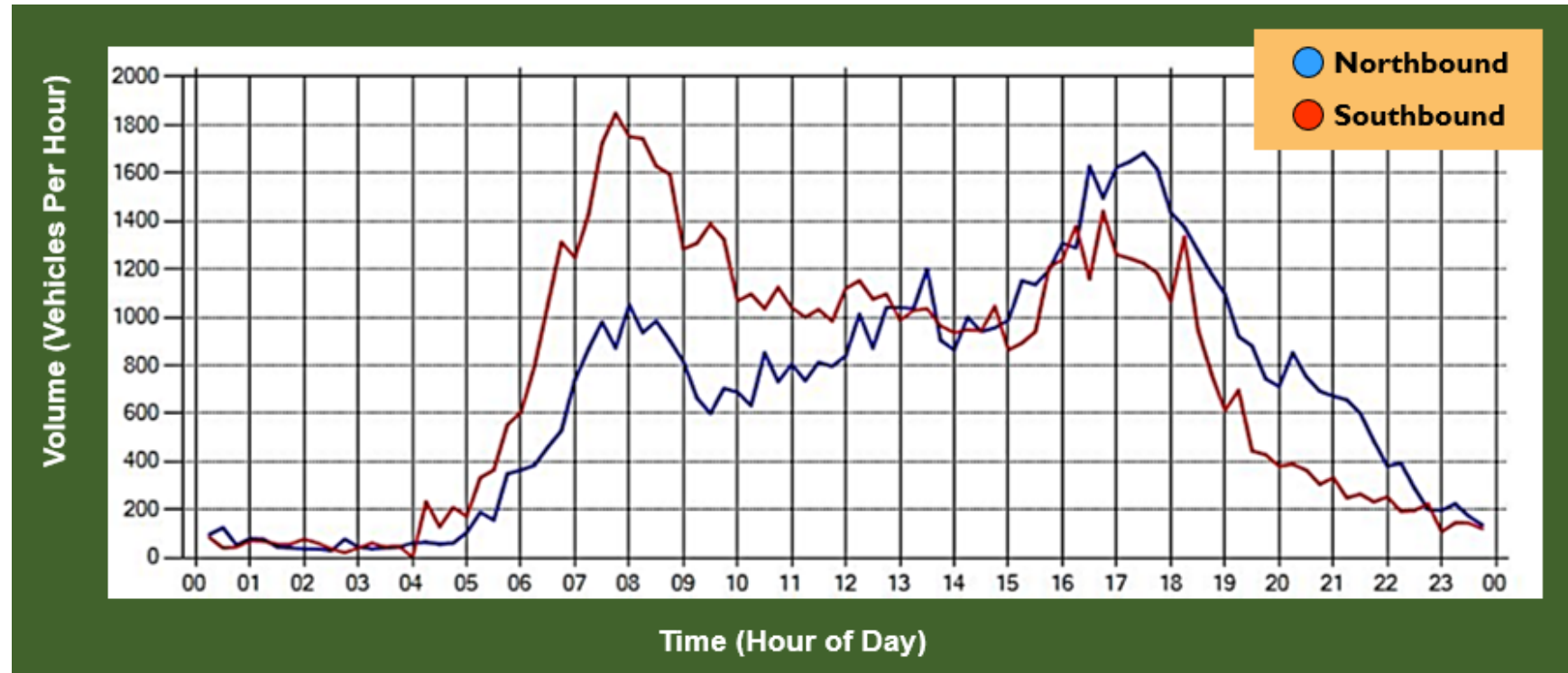


Vehicle Volumes Chart

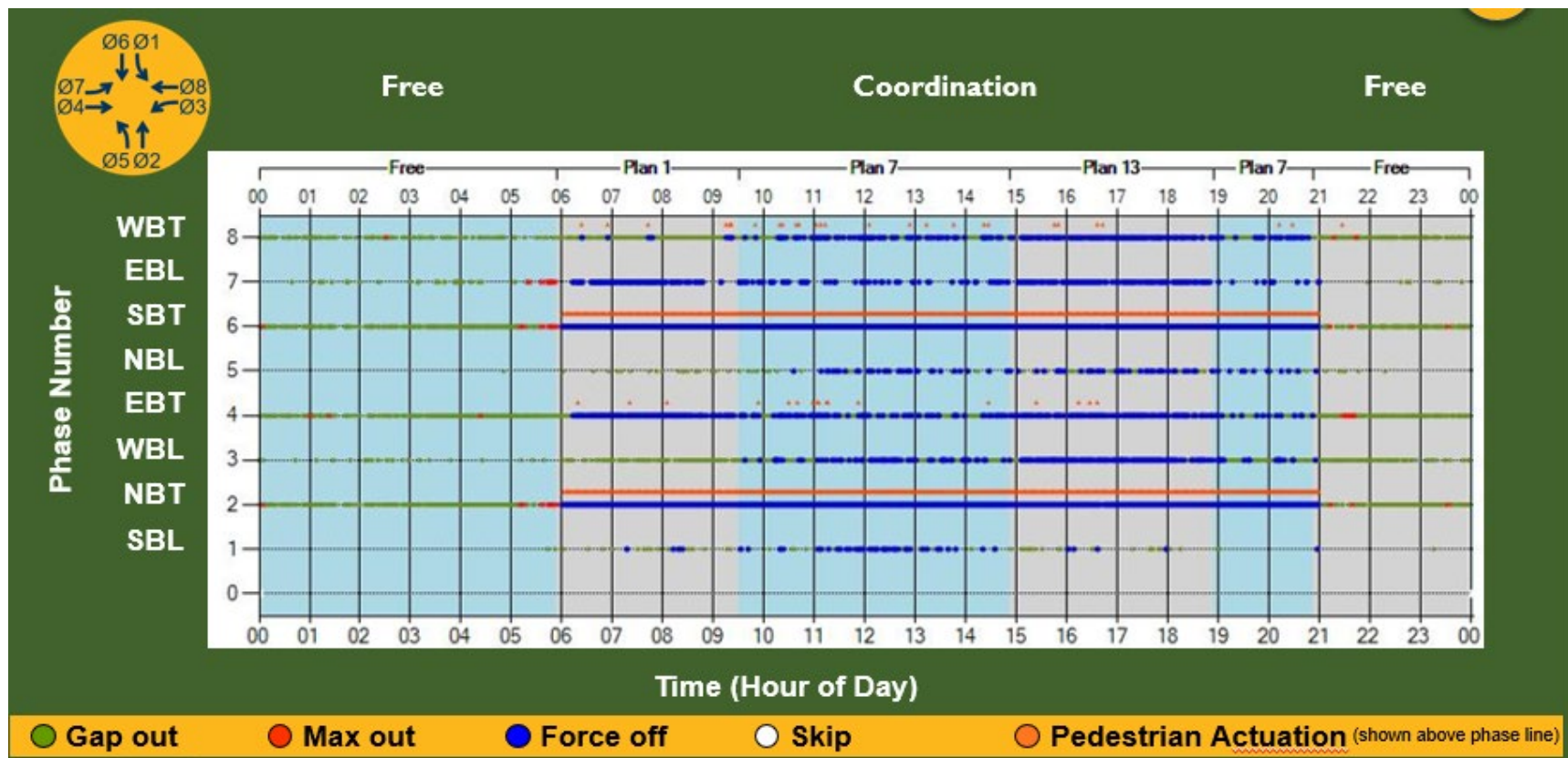
On the vehicle volume chart, the Y-axis notes the volume in vehicles per hour. The solid blue line represents the volume of northbound approaching traffic. The solid red line represents the volume of southbound approaching traffic. It is important to note that these are flowrates, not counts. To determine the count of vehicles during a given one hour period, the four 15-minute flowrates should be averaged together.



Phase Termination Chart

This is a typical Phase Termination chart that is generated using the ATSPMs. The bottom axis shows the time of day. One day, midnight-to-midnight, is represented here. Note that the time is displayed in military time. The left axis shows each phase at the intersection. The top axis displays the time-of-day plan with the Plan number when signals are running in coordination mode as well as the time they are running in free mode. From the bars on the top, you can see that the signal runs free until 6 a.m., a few time-of-day plans where signals are running under coordination until 9 p.m., and then it runs free again. To help interpret the Phase Termination report, top left displays the phase structure at this intersection, indicating a standard 8-phase signal with protected left turns for all approaches.

Each dot on the chart represents how the phase terminated in each cycle. The green dots indicate that the phase gapped out during that cycle. The red dots show when the phase maxed out during free operation. The blue represents a force off during coordination. Both a force off and a max out indicate that the phase used the maximum time it was allowed. The primary difference is that force off applies during coordination and max out applies when the signal runs free. A gap in the dots indicates that the phase did not time. You can see that Phase 5 only came up once before 6 a.m. An orange dot just above the phase line indicates that the pedestrian phase was actuated that cycle. Phases 2 & 6 are the coordinated phases. They force off every cycle during coordination and their pedestrian phases come up automatically since pedestrian phases are set to recall with the coordinated phases. All other phases show a mix of gap outs, skips, force offs, and some max outs throughout the day.

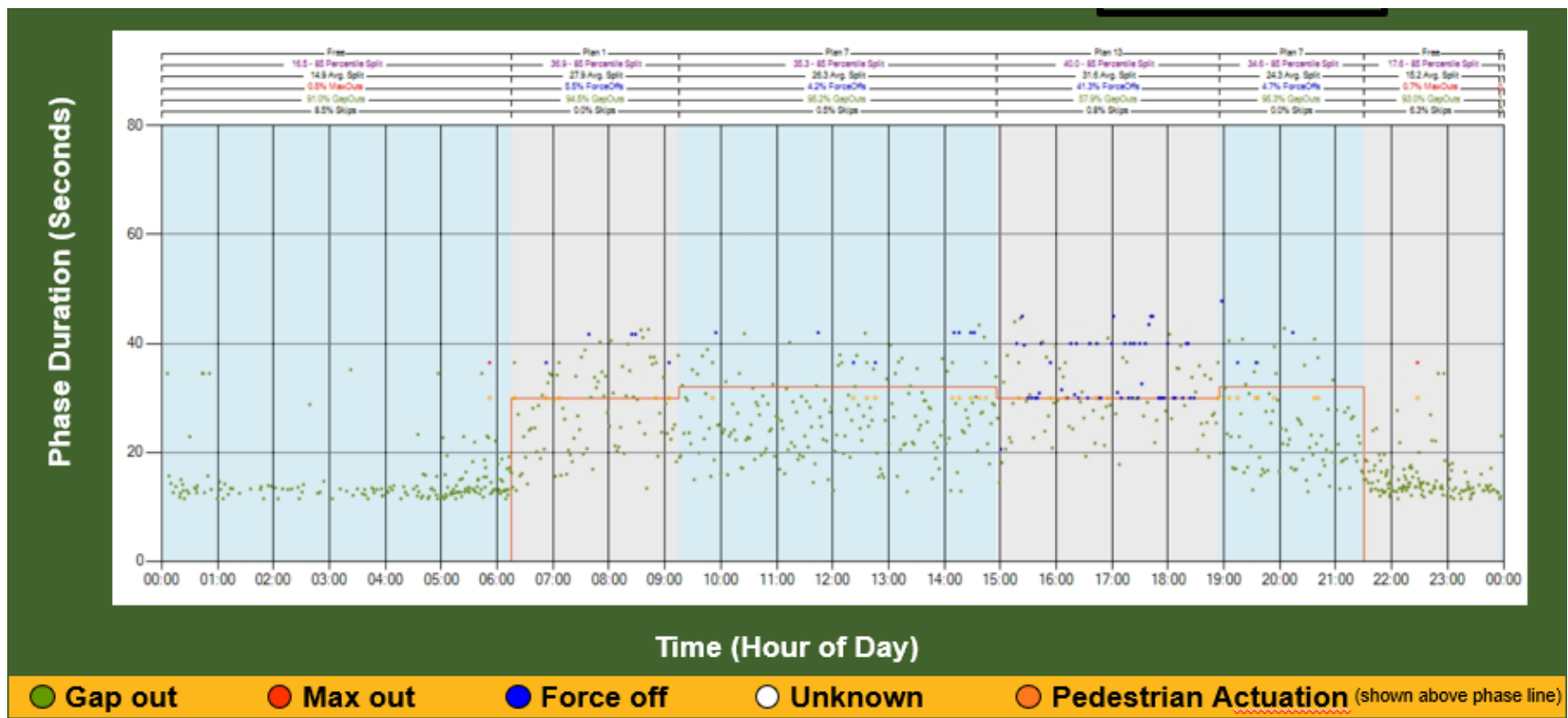


Split Monitor Chart

This chart shows Split Monitor for Phase 8. The bottom axis shows the time of day. This example is from a single day, midnight-to-midnight. The left axis shows phase duration in seconds. The top axis displays the time-of-day plan with the Plan number when signals are running in coordination mode as well as the time they are running in free mode. Descriptive statistics for each phase are also provided here as we will discuss later.

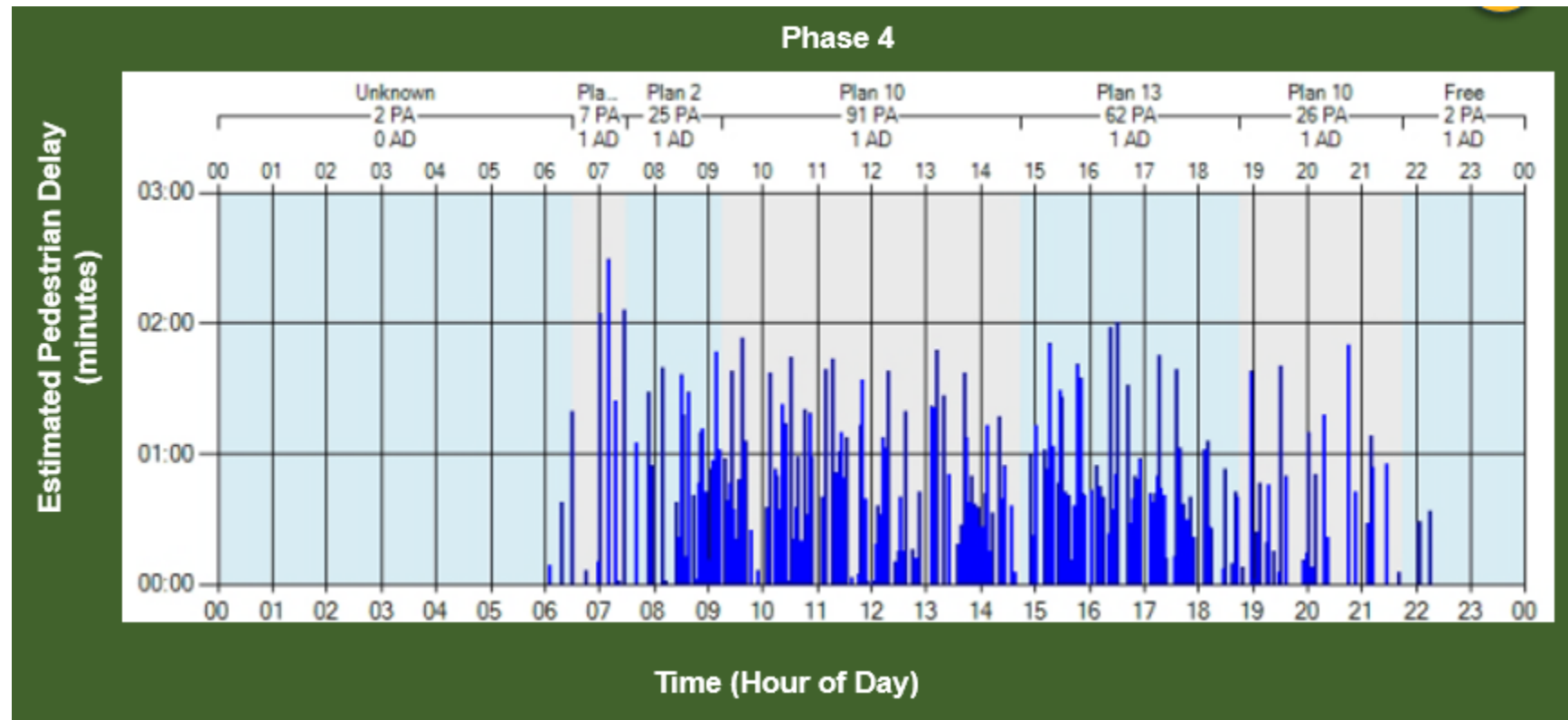
Each dot on the chart represents how the phase terminated in each cycle. The green dots indicate that the phase gapped out during that cycle. You can see that during free operation at night, most phases gapped out for Phase 8 as expected. The red dots show when the phase maxed out during free operation. The blue represents a force off during coordination. Both a force off and a max out indicate that the phase used the maximum time it was allowed. The primary difference is that force off applies during coordination and max out applies when a signal runs free. You can see that in the morning peak when intersection is running with coordination under Plan 1, only blue dots, which represent force offs, are displayed on the figure. Black dots show unknown phase termination when a phase is terminated, and the termination cause cannot be identified in the controller. Unknown terminations are typically rare as can also be observed in this example where there were no unknown terminations for Phase 8. An orange dot indicates that the pedestrian phase was actuated that cycle.

The horizontal solid orange lines show programmed split during coordinated operation for that phase. For example, from 6:15 AM until about 9:15 AM, the programmed split for this phase is 30 seconds, increasing by only a few seconds to 32 seconds at 9:15 AM and remains the same until the PM plan is active. Finally, as briefly discussed before, the top axis displays the time-of-day plan and phase termination type percentage for the given plan, along with descriptive statistics. For example, during midday operation with Plan 7, Phase 8's 85 percentile split duration was 35.3 seconds with an average green of 26.3 seconds. During this time period, it forced off 4.2% of the cycles, gapped out 95.2% of the time, and did not time only about 0.5%. The actual split timing longer than the programmed split indicates the used of a fixed force off combined with a previous phase gapping out.



Estimated Pedestrian Delay Chart

This chart shows Estimated Pedestrian Delay from a single day, midnight-to-midnight for Phase 4. The left axis shows estimated pedestrian delay in each cycle. The top axis displays the time-of-day plan with the Plan number when signals are running in coordination mode as well as the time they are running in free mode along with a summary information. For example, during Plan 10, there were 91 pedestrian actuations for this plan with an average estimated pedestrian delay of one minute. Each vertical blue line indicates estimated pedestrian delay in a given cycle, displaying the duration in minutes after the first actuation until the pedestrian receives a Walk indication



Purdue Coordination Diagram (PDC) Chart

At the top of the chart is the phase. Directly above the chart in standard text is the time-of-day plan. Charts may have multiple sections/plans depending on the time scale. One day, midnight-to-midnight, is shown here.

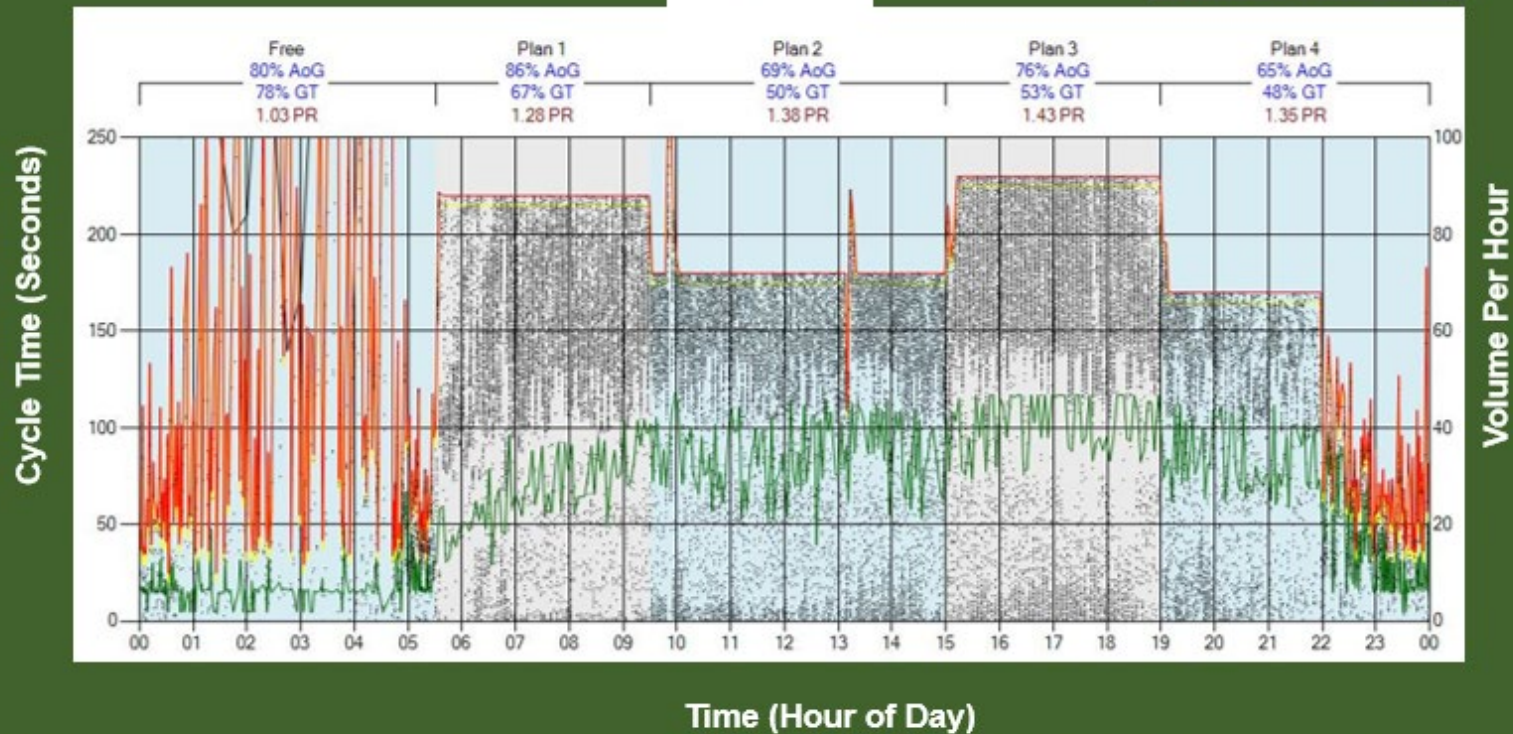
Above each chart section in the first line is blue text displaying the percentage of vehicles that arrive on green, or AOG, for this plan. The blue text in the second line is the percentage of the cycle length that was green for this plan. The brown text in the third line is the Platoon Ratio for this plan. The primary Y-axis on the left notes the cycle time in seconds. On the secondary axis is the volume per hour, shown on the graph with a black line. A green line graphically represents the point in the cycle when the phase changes to green. A yellow line graphically represents the point in the cycle when the phase changes to yellow. A red line graphically represents the point in the cycle when the phase changes to red. Variation in this line during a plan may indicate unique calls placed during the cycle such as preemption or a pedestrian phase timing that exceeded the coordinated time. Enumerations captured in the next cycle are then visualized in the next column. Each black dot represents a single vehicle arriving at the stop bar. Because the detectors are upstream, the software adjusts the detector actuations, accounting for speed and distance, to estimate when the vehicle arrives at the stop bar. This adjustment, however, is not able to account for standing queues; that is, the arrival time is only accurate if the vehicle is able to travel between the advanced detector and the stop bar without delay. Dots that appear between the bottom of the chart and the line denoting the beginning of green represent vehicles that arrive on red. Dots that appear between the line denoting the beginning of green and the line denoting the beginning of red represent vehicles that arrive on green.

In this chart, we see large clusters of dots above the green line but below the red line, and relatively few dots between the bottom of the chart and the green line. This indicates this intersection has a high proportion of arrival on green. We can also see that during Plan 2, the signal transitioned twice, once at approximately 9:50 am and once at approximately 1:10 pm. This is indicated by the variation in the line denoting the beginning of red.

Phase 2: EBT Ph2

AoG = 79%

Each phase and movement has its own PCD graphic



● Change to Green

● Change to Yellow

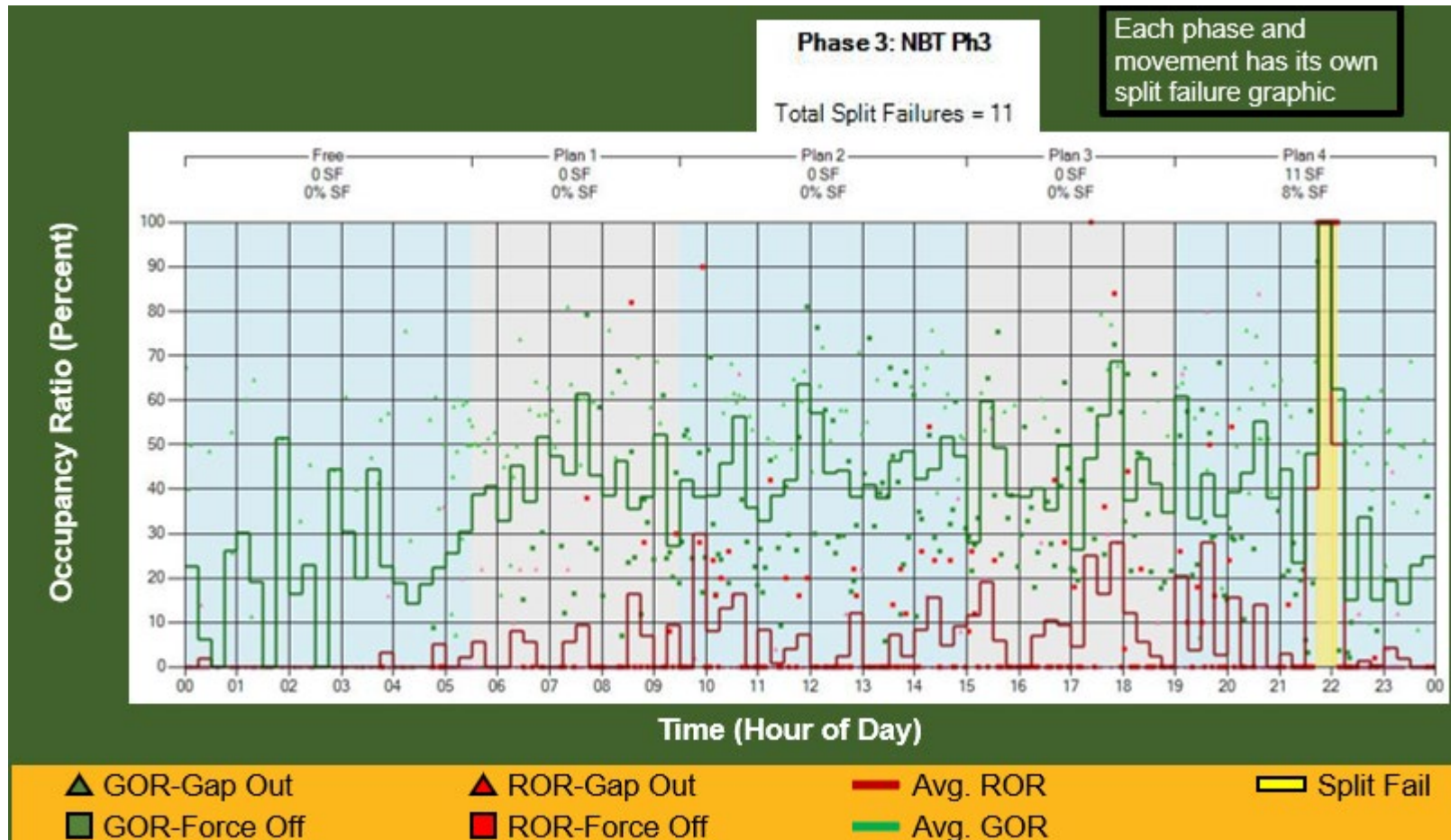
● Change to Red

● Detector Actuation

Split Failure Chart

At the top of the chart is the phase. Directly above each chart section, the first line shows the time-of-day plan the intersection signal controller was using for each bracketed section of the chart. Charts may have multiple plans depending on the time scale. Above each chart section, the second line is the number of split failures during the plan. Above each chart section the third line is the percentage of cycles in which split failure occurred during the plan.

The Y-axis notes the Occupancy Ratio (percent). The occupancy ratio is the percent of a certain time period that the detector was on. A green triangle notes the green occupancy ratio for each cycle in which the phase terminated by gapping out. A green square notes the green occupancy ratio for each cycle in which the phase terminated by forcing off. A red triangle notes the red occupancy ratio for the first five second of red in a cycle where the phase terminated by gapping out. A red square notes the red occupancy ratio for the first five second of red in a cycle where the phase terminated by forcing off. A solid red line depicts the 15 minute average percentage of ROR. A solid green line depicts the 15 minute average percentage of GOR. A yellow vertical line represents a cycle when a split failure occurred.



Actuations on Yellow and Red Chart

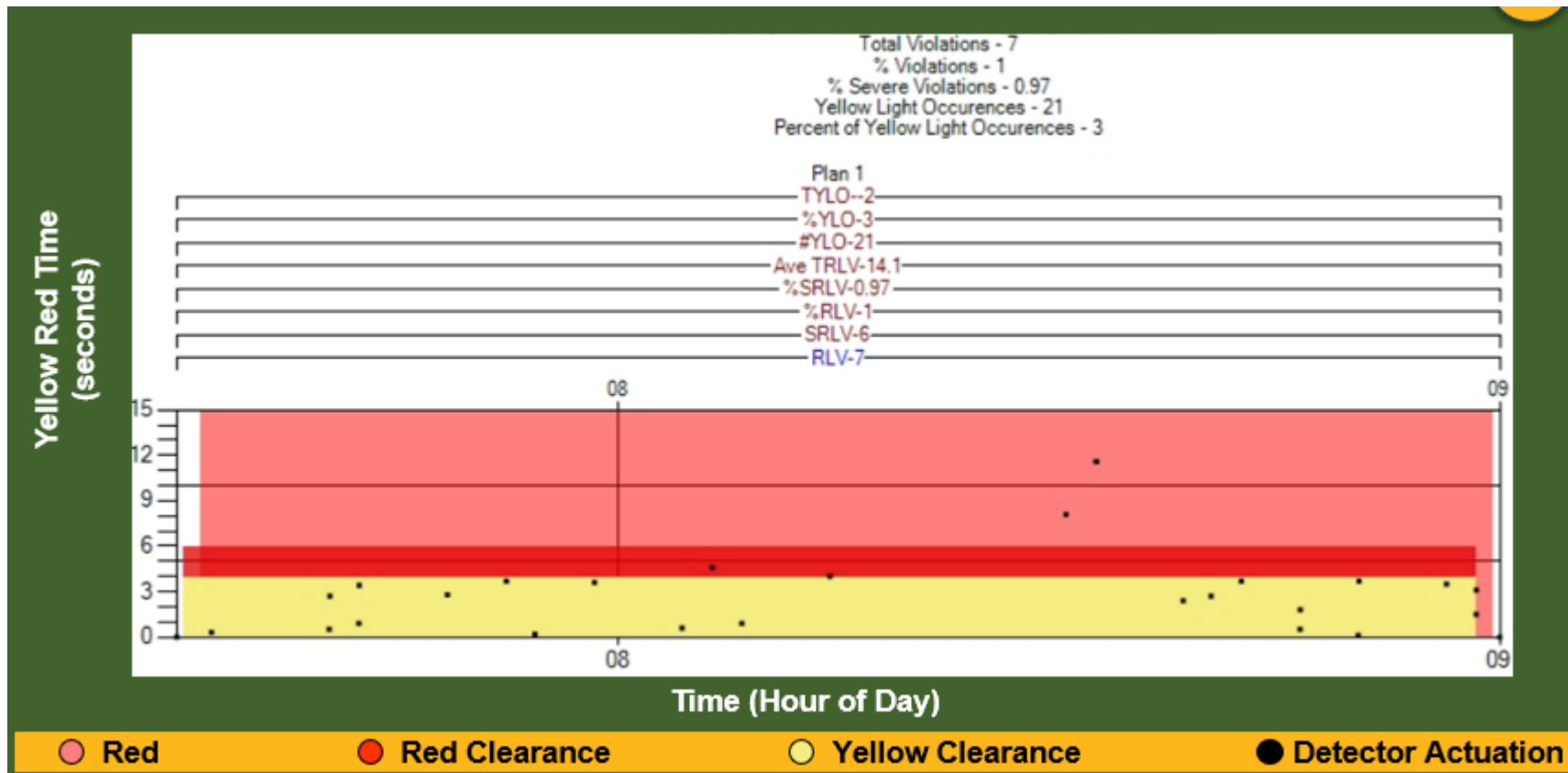
The Y-axis notes the time elapsed, in seconds, since the start of yellow. The period of yellow clearance is represented by a solid yellow color. The period of red clearance is represented by a solid red color. The period of red is represented by a solid pink color. Each black dot represents a detector activation in which the speed of the vehicle was above the speed threshold.

Above the chart, the first line displays the time-of-day plan. Charts may have multiple sections/plans depending on the time scale.

The number of Yellow Light Occurrences and Red Light Violations is the count of vehicles that entered the intersection on yellow clearance or red and red clearance, respectively. The number of Severe Red Light Violations is the count of vehicles that entered the intersection a specific number of sections after the start of yellow. This number is a user defined input.

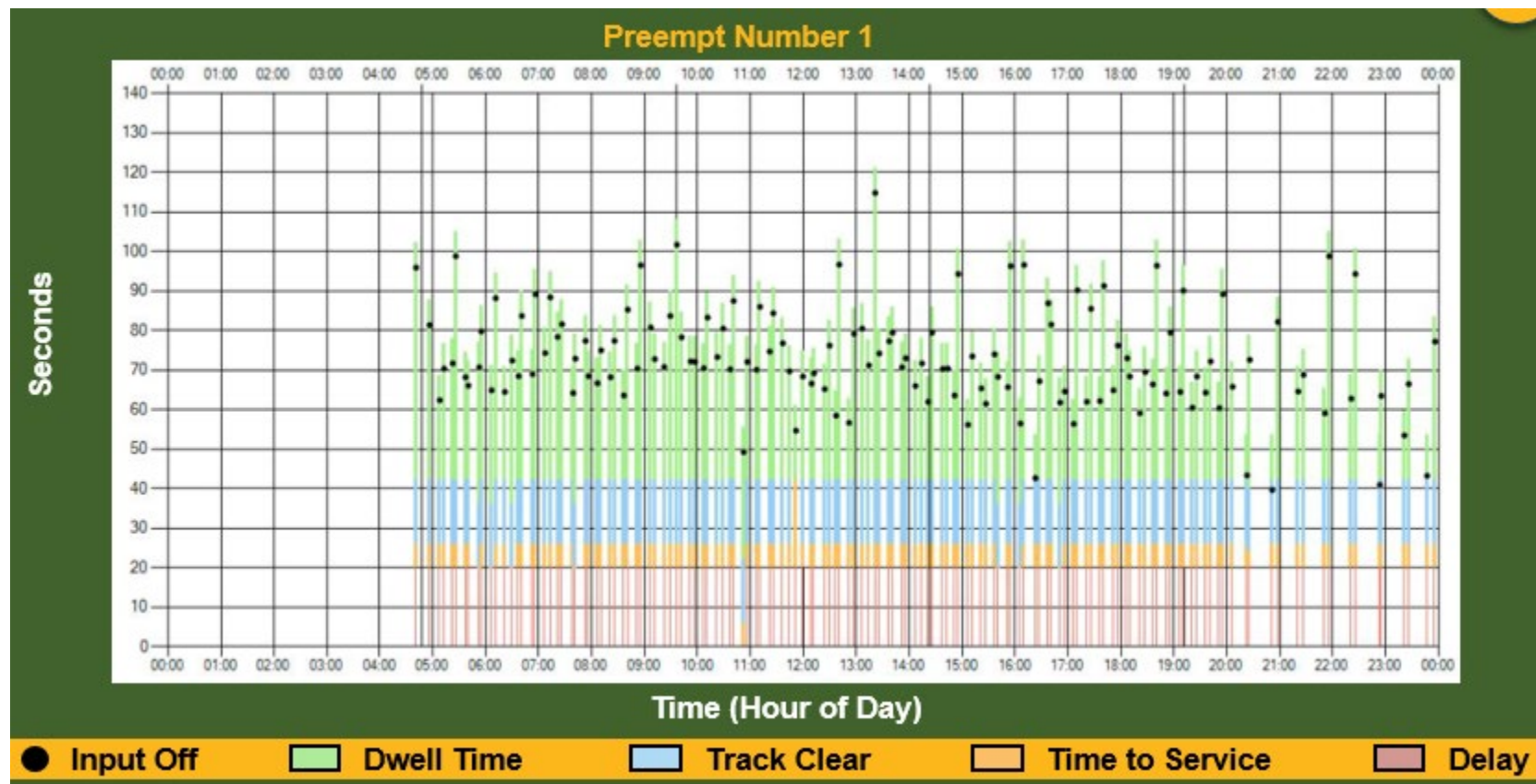
The Percent Yellow Light occurrences and Percent Red Light Violations report the percent of vehicles that enter the intersection on yellow clearance or red and red clearance, respectively, as compared to the total vehicular volume for the plan. The Percent Severe Red Light Violations is the percent of vehicles that enter the intersection a specific number of seconds after the start of yellow.

The Average Time Yellow Occurrences, and Average Time Red Light Violations report the average time in seconds after the start of yellow that a vehicle enters the intersection on yellow clearance or red and red clearance, respectively.



Preemption Details Chart

This chart shows preemption details for a midblock rail preemption. At the top of the chart is the preemption channel number. The Y-axis notes the time elapsed, in seconds, since the call was placed. The red bar is the delay or the time between when a preemption call is placed and when the preemption phase sequence initiates. The yellow bar is the Time to Service or the right-of-way transfer time when conflict phase are terminated so that the intersection can enter the track clearance phase. The blue bar is the track clear, or the time when the movement across the tracks is given a green indication to clear vehicles from the tracks prior to the train's arrival. Following the track clear is the dwell time where the signal indication provides green to movements not conflicting with the tracks. This is shown with the green line. The black dot is the input off or the point at which the preemption request is terminated.

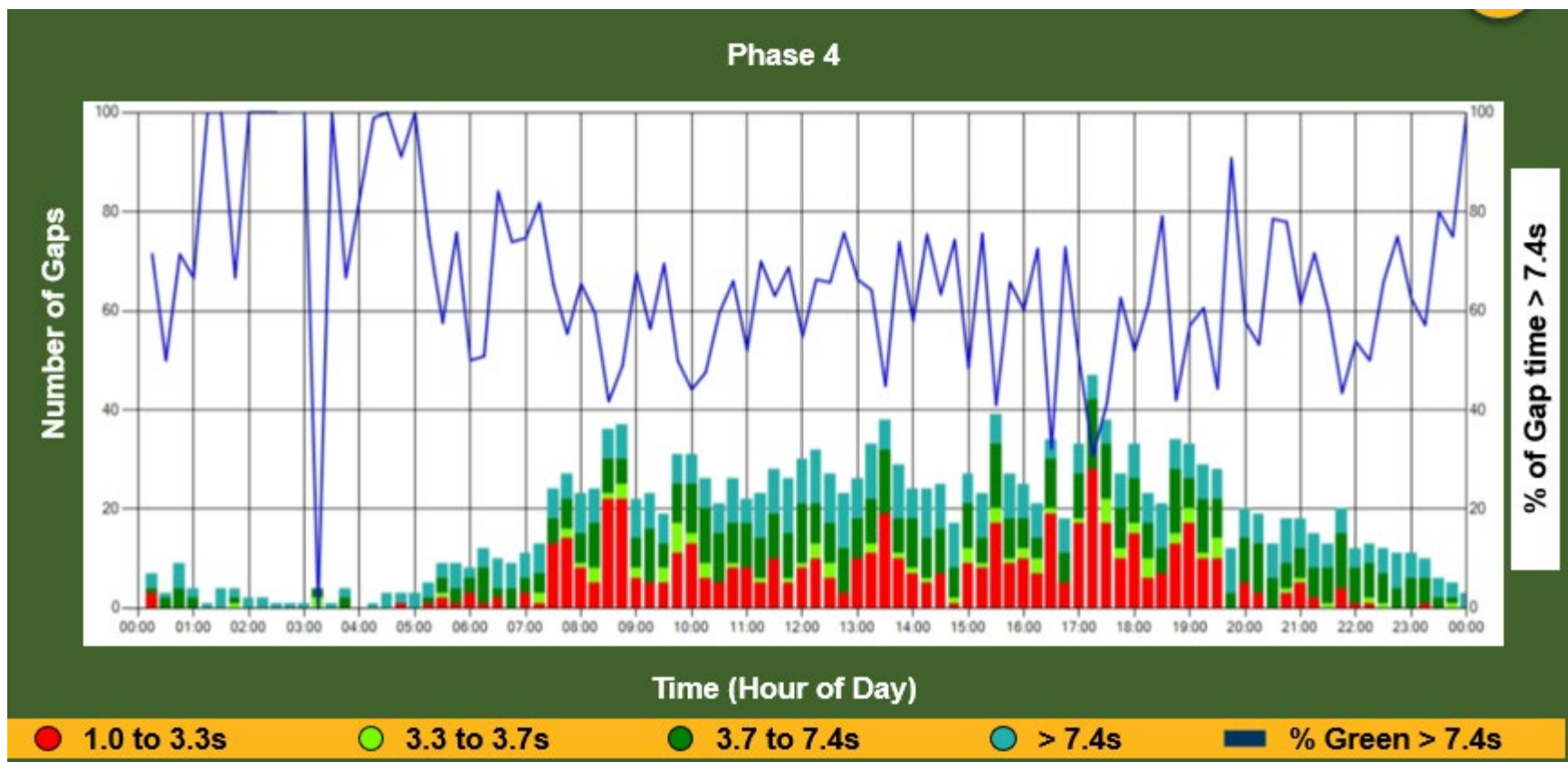


Left Turn Gap Analysis Charts

At the top of the chart is the phase. It is the thru movement associated with that phase for which the gaps are measured. In this chart, the gaps for the thru movement associated with phase 4 are shown which would be the gaps accepted or rejected by the opposing minor street left turning drivers.

The primary Y axis is a count of gaps while the secondary Y axis represents the percent of gaps time greater than 7.4 seconds. That is to say, of all the time in the phase, what percent occurred after 7.4 seconds of gap time had elapsed. For example, a gap of 10 seconds would have 2.6 seconds of gap time greater than 7.4 seconds.

The stacked columns are counts of defined gap sizes, binned at 15 minute intervals. Depending on the ATSPM software, the number and size of the gap groups may be user defined. For this chart, there are four gap groups. The red columns represent gaps between 1 and 3 seconds. The light green columns represent gaps between 3.3 and 3.7 seconds. The dark green columns represent gaps between 3.7 and 7.4 seconds and the turquoise columns represent gaps greater than 7.4 seconds. The blue line represents the percent of gaps which are greater than 7.4 seconds. The higher this percentage is, the more long gaps there are in opposing traffic, giving drivers more comfortable opportunities to make permitted left turns.



Offset Adjustment Diagram Chart

On the chart, the Y-axis notes the number of vehicles which would arrive on green, or AOG. The X-axis is the adjustment to the existing offset. The solid blue line represents the arrivals on green for vehicles in the downstream direction. The solid green line represents the arrivals on green for vehicles in the upstream direction. The solid black line represents the sum of arrivals on green for vehicles in both directions. The current number of total arrivals on green is the point where the black line intersects the y-axis, shown here as approximately 21,000 vehicles. The upstream and downstream directions are defined when configuring a route in the ATSPM software.

