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DETECTION FOR RIGHT TURN SLIP LANES

Figure 1 shows a typical detection layout for a side street approach with a right turn "slip lane". A premature gap-out problem can arise with this detection layout if the right conditions exist. The following example illustrates the problem.

Figure 2 shows the queuing situation at the beginning of side street green. Vehicles marked with an L are turning left at the intersection while those marked with an R are turning right. Once the first 3 cars clear the detection area, you have the situation depicted in Figure 3. The three cars turning right will undoubtedly cause a gap of more than the 3 second extension to occur between vehicle L3 and L4, which will cause phase 4 to gap out even though L4 and L5 have not cleared the intersection. The premature gap out is undesirable since it will strand vehicles L4 and L5 for an entire cycle.

Not only does this premature gap out increase motorist delay but it also upsets motorist, who often call in to complain. The difficult thing about troubleshooting the problem is that it occurs on a random basis and might not re-occur when the intersection is being observed by a troubleshooter. Motorists continue to complain but, unless the troubleshooter is on-site at the right time (and is smart enough to recognize what is happening), he or she will probably not figure out what is wrong.

Once the problem is recognized, how do we solve it? We could increase the extension time to a large value, such as 7 seconds. This would reduce the probability of premature gap-out; however, it would not eliminate it. If enough vehicles turn right consecutively then premature gap out will still occur. In addition, the use of a high extension interval will lead to wasted green time once the last vehicle leaves the detection area.

An efficient way to avoid this slip-lane detection problem is to install a small loop at the beginning of the slip lane and connect it to a delay detector that is set to about 20 seconds of delay. The loop will extend the green regardless of the number of vehicles in a row that turn right and, because it is a delay loop, vehicles using the slip lane will not place a call for the green during the side street red interval (unless the slip lane queue reaches this loop and stays on it for longer than the 20 second delay period). Figure 4 depicts this solution.

We have encountered this detection snafu at a number of intersections in Florida and you may be experiencing a similar problem in your locale. The above discussion should be of help in correcting the problem. And if you are a designer that's going to use right turn slip lanes, you should be aware of this potential operational problem as you develop your design.
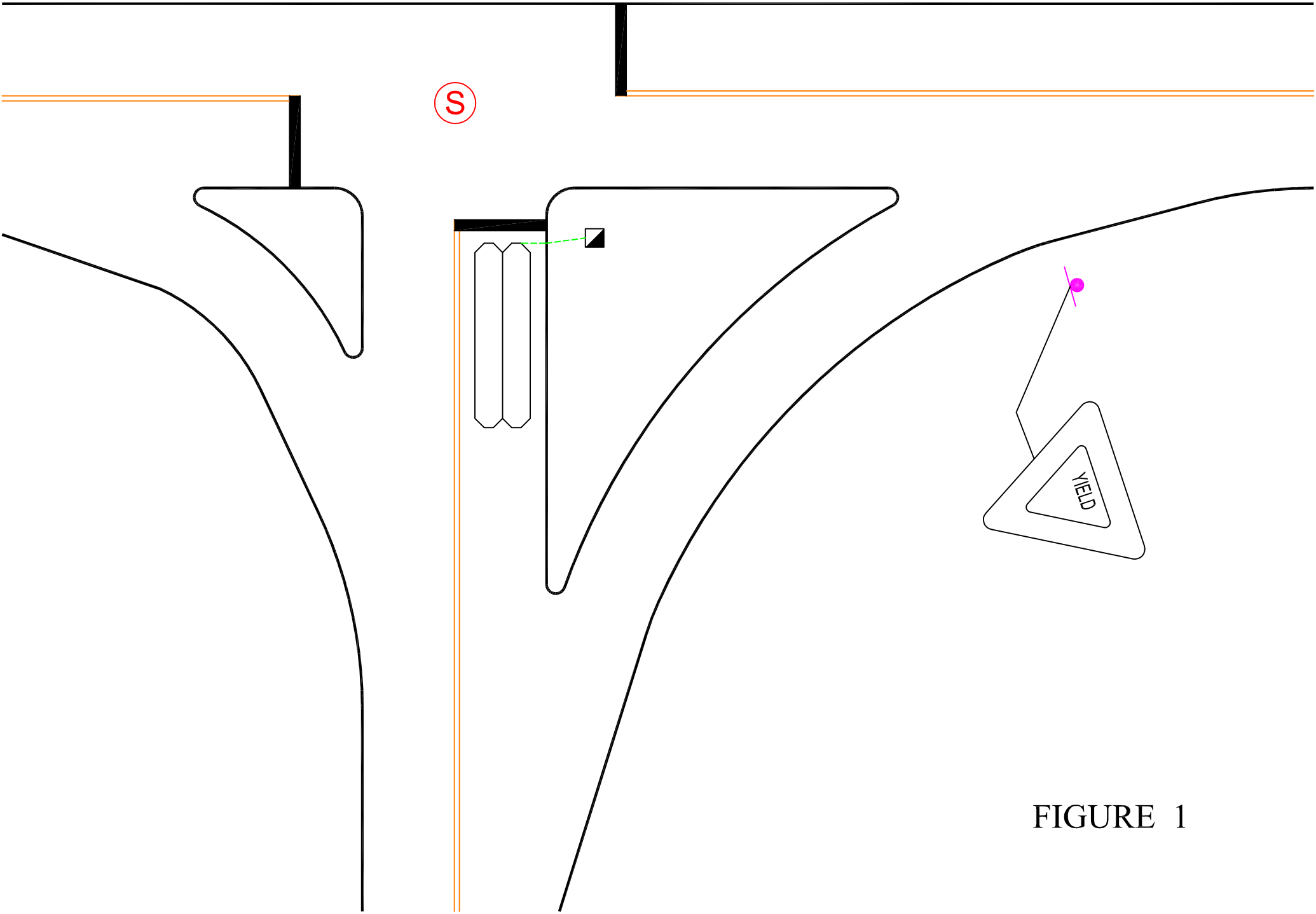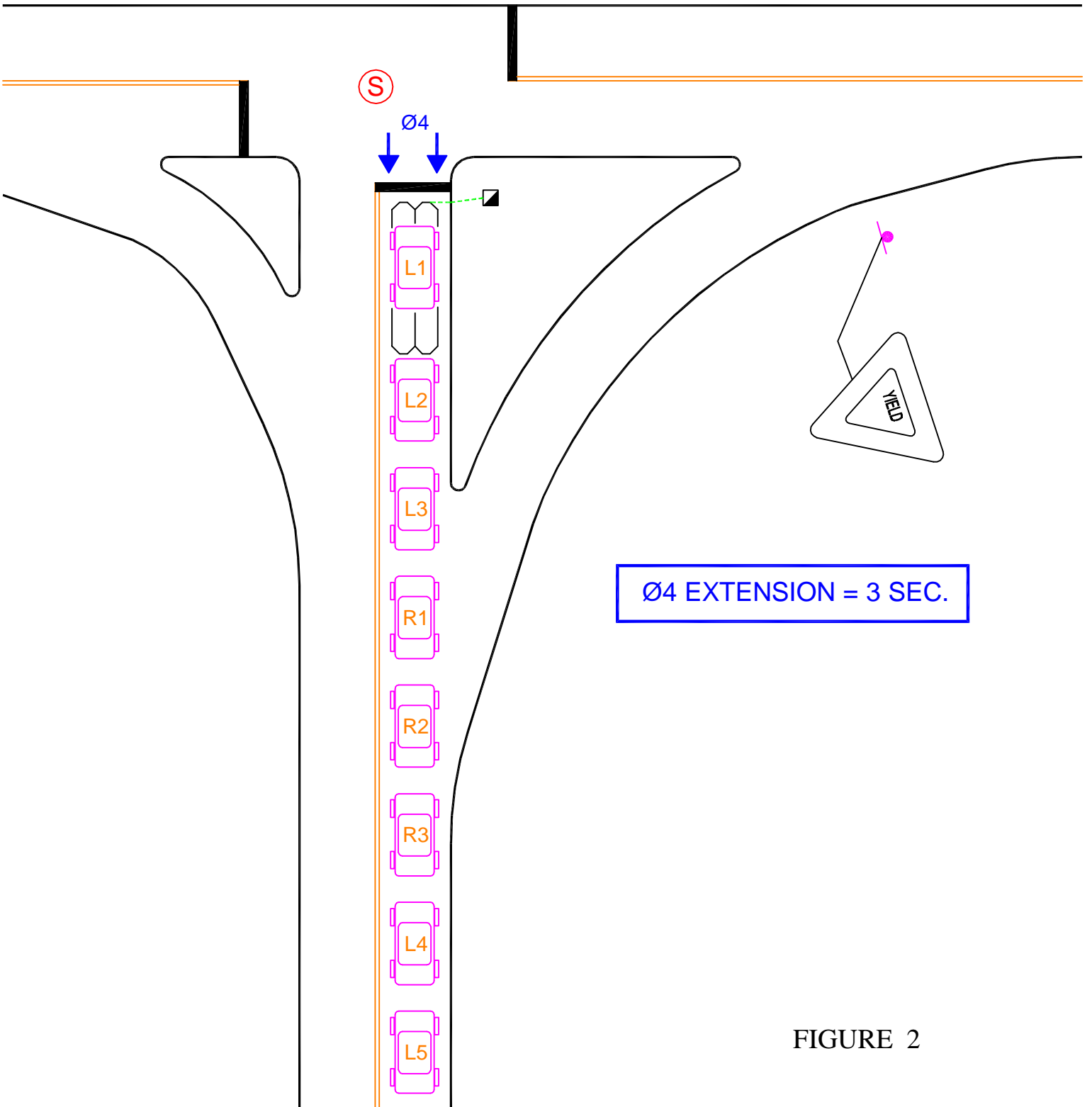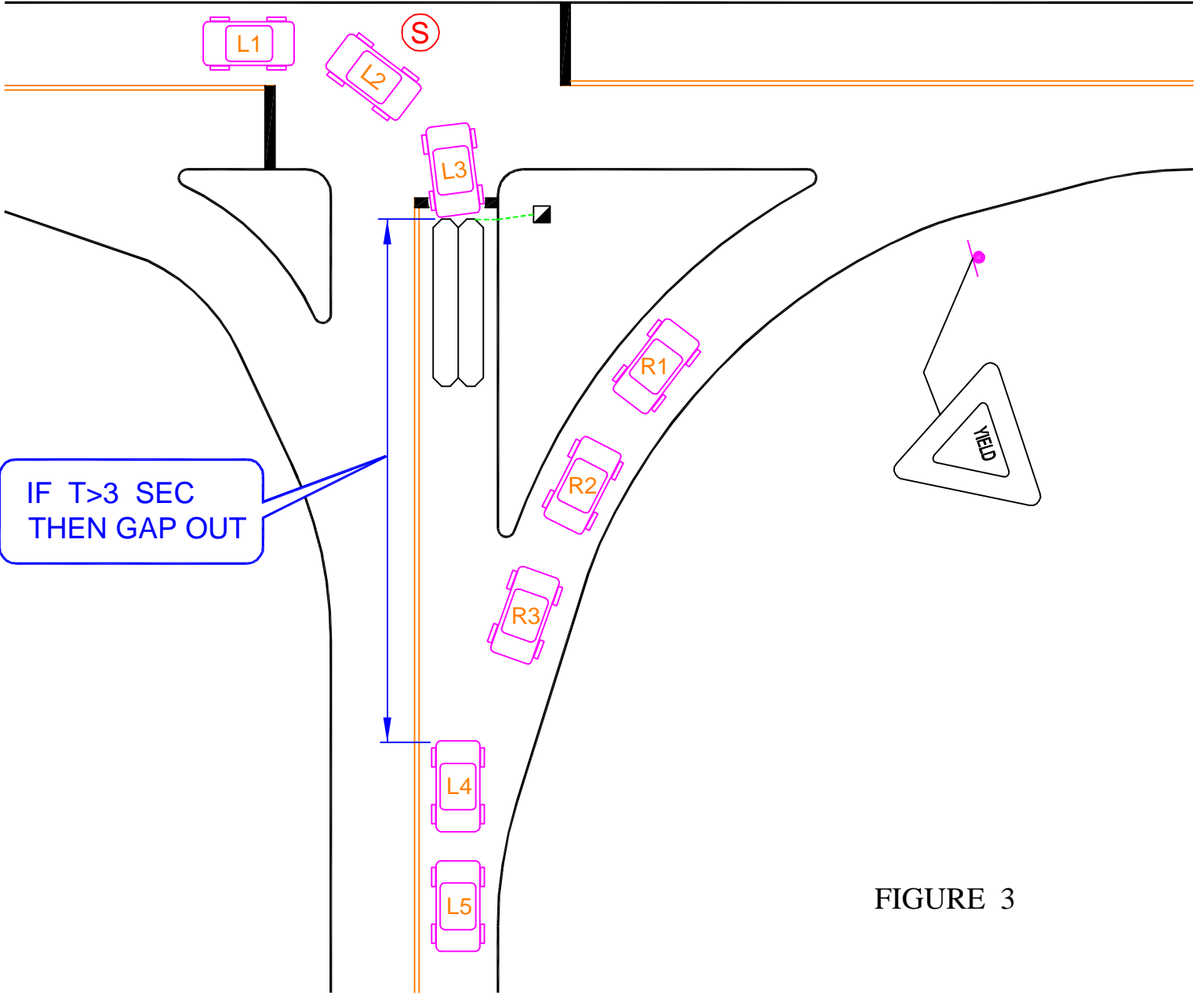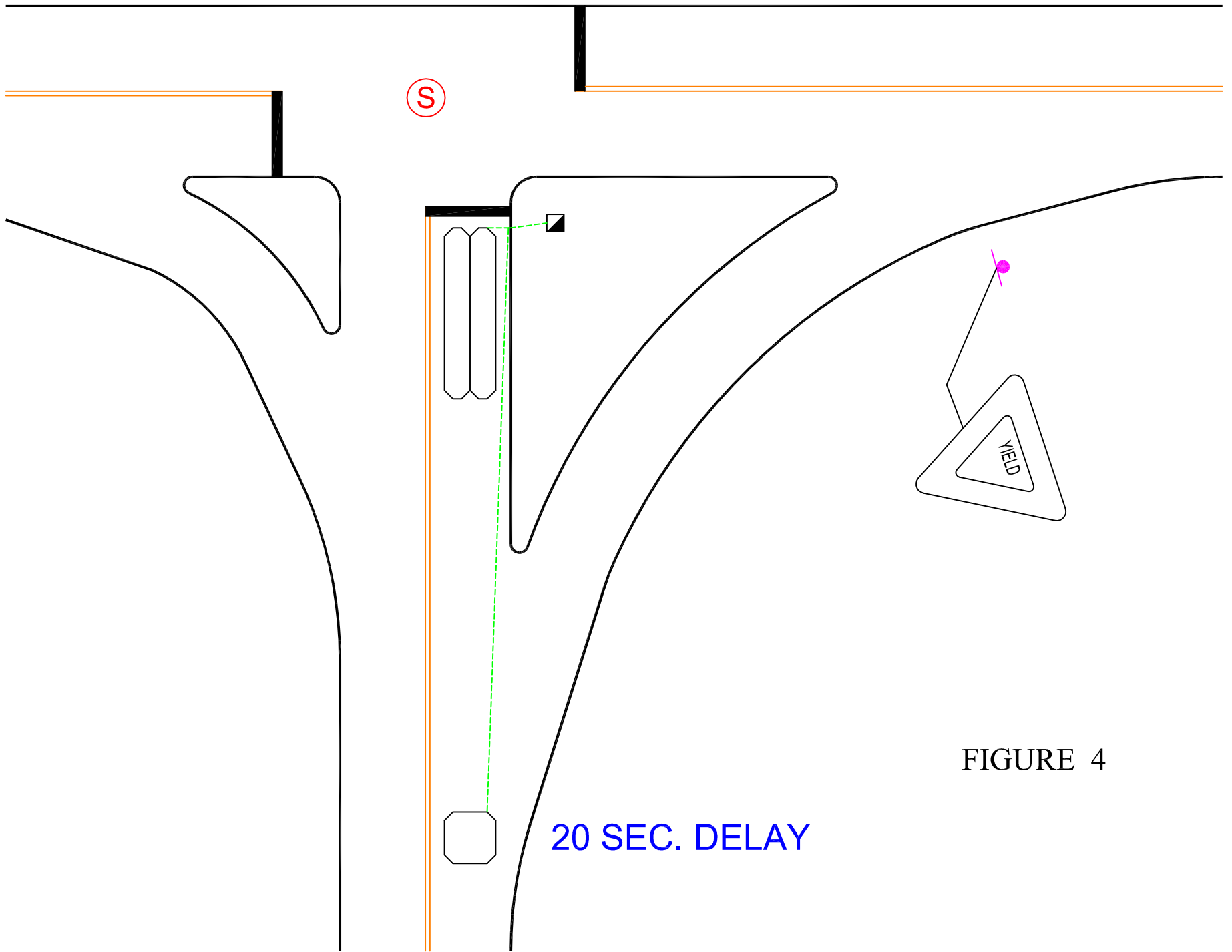
S

YIELD

FIGURE 1

S

Ø4

L1

L2

L3

R1

R2

R3

L4

L5

YIELD

Ø4 EXTENSION = 3 SEC.

FIGURE 2

L1

L2

S

L3

IF T>3 SEC
THEN GAP OUT

R1

R2

YIELD

R3

L4

L5

FIGURE 3

(S)

YIELD

20 SEC. DELAY

FIGURE 4