

## SPEED LIMIT signs - Maintenance Support

Four signs were installed in February 2021

It is expected that the sign lighting systems will last for over 10 years.

There are no expendable items (batteries) in the system - It runs when the sun shines.

A paper schematic and PC board layout may be found in each Flasher Board Housing.

The Flasher Board Housing is a hand-snug fit, a slight twist and pull will disengage the housing leaving the Flasher PC board dangling on the wire-nutted wires.

All wiring connections to the Solar Panel and Lamp Assemblies are wire-nutted.

Care must be taken when accessing that the wires aren't pulled loose from the wire nuts.

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has the following spares:

8 - Lamp Assemblies as of 11/20/23

1 - Flasher Board assembly

### Flashing Sign Maintenance History

2-11-21 Installed 4 signs.

2/19/22: East DH Dr sign: Replaced Upper left lamp assy. had 3 LED's out.

2/19/22 Reordered Amazon 10 pcs Partsam Amber 9 LE Trailer light @\$45.93+ \$2.80 tax = \$48.73 (Gen 2)

6-20-22 West Entry sign: Lower-Left center vertical column dead. Drops out at low voltage.

Replaced 7/18/22 with newer chip style (Gen 2) LED assy.

6-20-22 Central DR sign: Each top & bottom set hiccuping - double or triple pulsing just before sunset.

12/5/22 Simulated on bench with a pair of each generation LEDs and by setting current limit at 33 ma.

Gen 1 LEDS threshold: 5.75v. Stuttered at 10.0v to 8.4v. - Gen 2 LEDs threshold 7.7v.

Cause: As sunlight decreases panel output voltage decreases and the source impedance also goes UP.

Problem is much worse with 1st generation discrete-LEDs due to their higher current demands.

Solution: (Not done due to major board rework) is to add parts (naturally) Change R6 to feed a new Z1 5.1v zener.

Connect Q1 & Q2 gates directly to U1d & U1a, Move LEDs 1 & 2 to Q1 & Q2 drains add new series Rs.

12/5/22 Didn't Replace Upper-Right LED assy. At 969 DH Dr (middle) and Upper-Right LED assy. At 1089 DH Dr (west). Only happens at low sunlight levels.

9/22/23 SE Entry sign: Lower Right LED assy. Two rows out... when I replaced 2 days later only one was out. (Replaced with Gen 2).

10/21/23: At 1089 DH Dr West Entry sign: Replaced both upper & lower right-hand lamp assys. (Gen 2)

11/20/23 Replaced Upper-Right LED assy. At 969 DH Dr (middle) (Replaced with Gen 1) 1 row finally failed in full sun.