



8100 Southpark Way Unit A-10  
Littleton, CO 80120  
Tel: 720-348-6925  
Fax: 720-348-6950

*Representing quality manufacturers of traffic related equipment*

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8/23/2019

Department of Public Works  
City and County of Denver, Colorado

**RE: Connected Pedestrian**

To whom it may concern,

AM Signal, Inc. is pleased to provide this response to the City and County of Denver's request for comments on the technical specifications for Pedestrian Detection and Advance Warning Sign technologies. AM Signal, Inc. partnered with Traffic and Parking Control Products (TAPCO) to review the specifications provided.

AM Signal and TAPCO do not have any further recommendations for the Pedestrian Detection specification provided for this project. We do not feel this specification favors any one technology over another and should be attainable as written.

We do, however, have an alternate suggested solution regarding the Advance Warning Sign. In the following pages TAPCO has provided a recommended modification to the proposed specification in order to comply with MUTCD guidelines, ensure greater public safety, reduce power consumption and in turn provide cost savings.

We thank you in advance for taking the time to consider AM Signal and TAPCO's recommendations. We are enthusiastic about the potential of this cutting-edge technology deployment and what this means for Denver residents and businesses.

Regards,

A handwritten signature in blue ink, appearing to read 'Brooke Hageny'.

Brooke Hageny  
Estimator

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August 20, 2019

**Subject:** Specification for Advance Warning Sign at Mid-Block Pedestrian Crossing as it applies to the Advanced Transportation Congestion Management Technology Deployment (ATCMTD)

To Whom it may concern,

After reviewing the specification, TAPCO would like to recommend a different solution for the Advance Warning Sign for this application. We'd like to suggest that, instead of a blank out sign or dynamic message sign, a W11-2 static sign or LED enhanced static sign be used. Detail is outlined in MUTCD section 2A.07 for Retroreflectivity and Illumination. Following guidelines with an "AHEAD" sign as detailed in section 2C.50 for Non-Vehicular Warning Signs is also important. If a static W11-2 sign is utilized, supplementing the sign further with an RRFB as noted in the MUTCD IA-21 Memorandum, Section 2d would bring additional attention to the active crossing.

There are a couple of reasons for suggesting this modification. We understand that the suggested change is significant, but the benefits are important:

1) Safety.

- a. While a blank out or dynamic message sign are both effective visual communication tools, when either is not active, it provides no warning for the motorist of an approaching pedestrian crossing. However, a static or LED enhanced W11-2 sign with "AHEAD" plaque is always there communicating that a crosswalk is ahead. In addition, an active crossing can begin after a driver passes the advance warning signage. Having knowledge that a crosswalk is ahead can add to the pedestrian safety.
- b. If an advance warning blank out or dynamic message sign is malfunctioning, there is no communication to the motorist of a crosswalk or an active pedestrian crossing ahead.
- c. A blank out or dynamic message sign are heavy and can be more of a safety issue because of the weight should the supporting pole be knocked down in a traffic accident. Blank out sign estimated at 50-70 lbs, dynamic message sign will weigh more.

2) Amount and weight of equipment.

- a. Blank out and dynamic message signs are heavy and they both can demand much more power to light than an RRFB or LED enhanced static sign. It is understood that it is desired to have the ability to power the Advance Warning notification equipment via either AC or Solar charged battery. When using solar charged battery power, the following estimated average power draws are associated with the equipment:
  - i. RSU with DSRC sign activation – 12 watts, running 24/7
  - ii. LED enhanced W11-2 Sign (300 qty 20 second activations) - < 0.5 watts
  - iii. RRFB (300 qty 20 second activations) - <0.5 watts
  - iv. 36" Amber Blank Out sign ~ 1 watt
  - v. 36" Dynamic Message sign > 5 watts

Every watt of power draw will require approximately 15W of PV in order to maintain at least a 1.2 minimum ALR and 0% LOLP. In addition, every watt of power draw will require approximately 6Ah of battery to maintain a minimum of 7 days of autonomy. The PV and battery requirements increase the overall system weight.

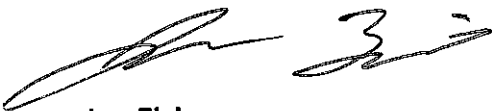
- b. For the RSU alone, a pair of 85W solar panels are required (estimated total weight with mounting bracketry - 50 lbs) along with 2 -3 quantity 99Ah batteries (65 lbs each) to provide sufficient solar charged battery power. Mounting the equipment on the same pole as the advance warning sign becomes an issue due to room constraints.

3) Economy.

- a. An LED enhanced W11-2 Sign with accompanying RRFB and static "AHEAD" placard approximate pricing would be in the \$2.5K range
- b. A W11-2 Blank out Sign would be in the \$4K - \$5K range
- c. A DMS would be double to triple a blank out Sign
- d. These costs do not take into account the increase in solar charged battery power required for each or the activation equipment.

Please take into consideration what is being suggested as an alternative to the blank out or dynamic message sign for the advance pedestrian warning equipment.

Regards,



**Jon Zick**

Director of Engineering and Marketing

Office: (262) 649-4466

Cell: (414) 345-7376

[Jon.zick@tapconet.com](mailto:Jon.zick@tapconet.com)