MEMORANDUM STATE OF ALASKA

Department of Transportation & Public Facilities
Design and Engineering Services – Central Region
Highway Design Section - Traffic and Safety

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DATE: February 6, 2017

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SUBJECT: Left Turn Signalization Guidance for Design

With the advent of Flashing Yellow Arrow (FYA) left turn (LT) indications protected vs permissive LT operation can now be considered for all hours of the day, not just the peak. Designers should install a 4 section FYA head at locations that require protected phasing only during peak periods. This permits permissive phasing during off-peak times of the day when protected-only criteria is not met. (For example, hours judged as likely to be level of service LOS A or B may be good candidates for permissive turns).

The following criteria indicate when a design engineering study of Protected-only (PO) phasing should be documented for a signalized intersection. One or more of these critera do not require PO phasing, but do require further study:

1) horizontal or vertical stopping sight distance restrictions are below minimum when adjusted for grade, or
2) left turns must cross four or more lanes, or
3) left turns operate as dual left turns or greater, or
4) there are three opposing-conflicting traffic lanes (thru+RT) and the opposing speed limit is 45 mph or greater, or
5) for any 3 year period during the 4 hour period with the lowest number of crashes, the permissive left turn crash rate:
    a. exceeds 0.26 per 1,000 hours of protected-permissive (P/P) or permissive operation, or
    b. any individual hour exceeds 0.77 per 1,000 hours of operation, or
6) Other site factors (such as local lead-lag procedures), gap observations, and the engineering judgement of the maintaining agency document the desirability of protected-only (PO) phasing at the site.

FYA heads and FYA hours of use are selected by the maintaining agency with supporting documentation from the designer. FYA is intended to be used where lower

volumes and traffic gaps allow, with an allowance for site specific consideration. The final selection of FYA heads resides with the owning agency.

These guidelines should be used when the project scope allows the reconstruction of existing PO installations. Locations with a previous history of permissive crashes leading to PO installation should be evauluated for hours of PO operation to be implemented upon conversion.

The operations and maintenance agency, as well as field staff, should be consulted early in the engineering study phase.

Background:

The guidance above removes the peak volume and delay considerations from the ITE Traffic Engineering Handbook 5th Edition, Chapter 13 p 477. Before the advent of FYA LT equipment all LT treatment decisions were based on the worst case scenario, the peak hour. Because FYA can be used selectively by time of day (TOD), using the worst case scenario is no longer justified. In addition, unlike the 5 Section P/P head, the operators of FYA heads have the option of omitting the permissive phase entirely, without expensive hardware modifications. The additional cost of a 4 section P/P FYA head, wiring, and electronics, is minimal when compared to a 3 section PO installation. Because of these considerations, some additional flexibility in favor of P/P FYA LT is appropriate.

Crash rate guidelines are established based upon a sampling of average rates of "Left turn failure to yield" crashes at Alaska intersections through HSIP Program analysis.

Distribution:

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