DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT OFFICE OF HIGHWAYS			**EDSM No: VI.3.1.6**
ENGINEERING DIRECTIVES AND STANDARDS			
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CHAPTER	3	EFFECTIVE DATE:	4/7/2008
SECTION	1	SUBJECT:	**Traffic Signals**
DIRECTIVE	6		

1. **PURPOSE.**

   This directive sets forth the Department of Transportation and Development's (DOTD) policy for the justification and approval to install new traffic signals and upgrade existing traffic signals. This policy assists DOTD in managing the number of traffic signals which helps DOTD improve safety and efficiency of the roadway.

   Proper traffic signal placement and spacing is a good Access Management strategy which promotes safe and efficient use of the transportation network. Controlling the spacing of traffic signals improves the flow of traffic on major arterials, reduces congestion, improves air quality for heavily traveled corridors and most importantly, protects the infrastructure investment. Studies have shown that signals spaced on a four lane divided roadway at ½ mile intervals have the same capacity as a six lane roadway with signals spaced at ¼ mile. (TRB Access Management Manual 2003 p144)

   During the planning and design process, DOTD has the opportunity to improve upon an intersection by reducing delay and improving safety for roadway users. A traffic study is needed to determine the most effective type of traffic control, and this study should be completed prior to the design process starting. If a traffic signal is justified, consideration should be given to alternative intersections (roundabouts, j-turns, etc.) to make the project safer and more efficient for road users by reducing delay and conflict points.

   Existing traffic signals should be evaluated periodically to determine that the equipment, layout and operation meet the current design requirements, as well as address any changes in the type and volume of traffic. A traffic signal study is important for assisting in the planning and design of future projects.

2. **SCOPE.**

   This policy applies to all new and existing traffic signals on the State highway system.

3. **DEFINITIONS.**

A. Corridor Study: A study of a series of adjacent intersections, which includes a travel time and level of service analysis of all signalized intersection. The limits of the study shall be approved by the District Traffic Operations Engineer. The study shall present results of the before and after travel time, level of service, and approach delay for each intersection of concern and the roadway as a whole.

B. Traffic Volumes: Actual volumes should be used for the warrant analysis; or if actual volumes are not available, the ITE Trip Generation manual shall be used and validated by a development of similar size and type in a similarly sized community to determine if the warrants will be met.

C. Restricted Crossing U-Turn (RCUT): Intersection is defined as a non-traditional intersection system that utilizes a combination of one partial median opening and two directional median openings. This type of intersection is typically the crossing of major and minor arterials where the left turn moves are relatively high. The openings must be appropriately spaced with one directional u-turn opening or one partial median opening on each side of the partial median opening. The distance between two of these systems is also critical. The intersection and u-turns may be unsignalized or signalized, depending on volumes.

D. Median U-Turn (MUT) Intersection: Intersection is defined as the use of two or four directional u-turn openings, placed on each side of an intersection, combined with the prohibition of all left turns at the intersection. This type of intersection is typically the crossing of two major arterials where the through move is heavier than the left turns. All through movements and right turns at the intersection are permitted. The openings must be appropriately spaced with one directional median opening on each side of the partial median opening. The distance between two of these treatments is also critical. The main intersection is typically signalized and the u-turns may be unsignalized or signalized, depending on volumes.

E. Full Access Traffic Signal: A traffic signal where all approaches are allowed to turn left out and left in.

F. Traffic Signal Upgrade: Work which involves any one of the following for non-emergency purposes; the installation of a new controller and cabinet, rewiring the entire signal, installing all new poles or changing the layout of the signal.

G. Traffic Signal Report: An engineering study which documents current and/or future conditions of the roadway and intersection. The study should include a recommendation for the geometric configuration, along with appropriate upgrades in equipment, layout and operation, or its removal.

4. POLICY FOR NEW FULL ACCESS TRAFFIC SIGNALS

A. The initial study for a traffic control device at an intersection may come from a field study, Stage 0 or Stage 1 investigation, request by a DOTD customer, perceived need or permit application and shall include, at a minimum, the following:

1. Crash history of the site with a chart/sketch illustrating the number of correctable crashes that occurred within a consecutive 12 month period of the last three years;

2. 7 day 24 hour count on each approach with 15 minute and hourly subtotals, including classification counts identifying truck volumes;

3. A warrant analysis of MUTCD Warrant 1A 100% and Warrant 7 for each of the seven days.

B. If the study above shows that Warrant 1A 100% or Warrant 7 have been met at the proposed signal location, then a comprehensive investigation and report of traffic conditions and physical characteristics shall be made of the location prior to a full access traffic signal being approved. A report shall be prepared by a professional engineer from a local government entity, consultant or DOTD staff. This report may come from a Stage 0 or Stage 1 investigation, request by a DOTD customer, perceived need or permit application. This report shall include, at a minimum, the following:

1. Crash history of the site with a chart/sketch illustrating the number of correctable crashes that occurred within a consecutive 12 month period of the last three years. Each crash report shall be reviewed to verify location and type of crash.

2. Traffic Volumes below:
   a. Manual counts, including demand volume, for peak hour AM and PM (also noon and weekend if determined applicable from the volume counts);
   b. Projected peak hour counts for a 15 year design life (Traffic Engineering Division Administrator to approve waivers to design year);
   c. Pedestrian Volumes during peak hours, if applicable.

3. Speed study for the state route approach(s).

4. Peak hour queue lengths, delay, operational issues and safety concerns must be documented in the study. The intersection shall be observed by a licensed engineer during peak hour operations.

5. Analysis of operation for current year and 15 year design life from alternatives noted in section a or b below, which is determined by location, site and volume (section c may be required and analysis from sections a and b shall not be compared to each other):

a. The following intersection types shall be evaluated and compared in Sidra Intersection (Akcelik & Associates):
    i. Roundabouts;
    ii. Two way stop;
    iii. All way stop;
    iv. Full Access Signal.
b. The following intersection types shall be evaluated and compared in Synchro (Trafficware) or Vistro (PTV):
    i. Median U-turns (signalized or unsignalized);
    ii. Restricted Crossing U-turns (signalized or unsignalized);
    iii. Full Access Signal.

c. For some locations, VisSim™ (Visual Solutions, Inc.) animation may be required due to the complexity of the project. For example, closely spaced roundabouts or a proposed roundabout in, or adjacent to, a coordinated signal system. The purpose of using this software is to show an animation of the corridor's predicted operation, therefore full calibration of the model is not required.

6. Analysis of the following shall be compared for build year and design year to determine the preferred alternative for the intersection control:

    a. Study area delays (s/veh) (average);
    b. Study area throughput (veh/hr) (average);
    c. Service life before v/c=1;
    d. Cost of construction;
    e. Right-of-way costs;
    f. Safety Analysis from the Highway Safety Manual or other approved source;
    g. Maintenance cost over 15 years.

7. Nearby land use shall be considered and noted in the alternative evaluation. Right-of-Way issues may include:

    a. Access issues;
    b. Operational issues;
    c. Drainage issues;
    d. Utility issues.

C. Approval:

The District Administrator may approve a new traffic signal, if the following is met:

1. The report is recommended by the District Traffic Operations Engineer;
2. The full access signal will be the preferred alternative from the categories listed above;

3. Meet Warrant 1A 100% for build year volumes or Warrant 7 from the MUTCD, but if requesting installation because the location meets Warrant 7, then a report must be prepared listing the trial of alternatives that have been tried and failed;
4. Must meet spacing requirements of ½ mile from nearest signalized intersection;
5. Service a public road on at least one minor approach;
6. Have the required turn lanes installed prior to signal turn on.

Chief Engineer approval is required for a new traffic signal that does not meet the above requirements and the following requirements are met:

1. The report is recommended by the District Traffic Operations Engineer, the District Administrator and the Traffic Engineering Division Administrator;
2. A corridor study performed in either Synchro or Vistro of the entire signalized corridor results in no less than one level of service drop at each intersection in build year and the mainline through movements of each intersection operate at equal or improved delay in the design year from the no build alternative.
3. The full access traffic signal will be the preferred alternative.

5. POLICY FOR UPGRADE OF EXISTING FULL ACCESS TRAFFIC SIGNALS ON CONSTRUCTION PROJECTS FOR EXISTING OR PROPOSED DIVIDED HIGHWAYS

A. Study Requirements: Prior to a full access traffic signal being upgraded, a comprehensive investigation and report of traffic conditions and physical characteristics shall be made of the location. A report shall be prepared and stamped by a Louisiana registered professional engineer from a local government entity, consultant or DOTD staff. This report may come from a Stage 0, Stage 1 investigation or permit application. This report shall include, at a minimum, the following:

1. Crash history of the site with a chart/sketch illustrating the number of correctable crashes that occurred within a consecutive 12 month period of the last three years. Each crash report shall be reviewed to verify location and type of crash.

2. Traffic Volumes below:
    a. 7 day 24 hour count on each approach with 15 minute and hourly subtotals, including classification counts identifying truck volumes;
    b. Manual counts, including demand volume, for peak hour AM and PM (also noon and weekend if determined applicable from the volume counts);
    c. Projected peak hour counts for a 15 year design life (Traffic Engineering Division Administrator to approve waivers to design year);
    d. Pedestrian Volumes during peak hours, if applicable.

3. Speed study for the state route approach(s).

4. Peak hour queue lengths, delay, operational issues and safety concerns must be documented in the study. The intersection shall be observed by a licensed professional engineer during peak hour operations.

5. An analysis of operation of the following intersection types shall be evaluated and compared in Synchro (Trafficware) or Vistro (PTV) for construction projects on divided highways or where a new divided highway is proposed;

    a. Median U-turns (signalized or unsignalized);
    b. Restricted Crossing U-turns (signalized or unsignalized);
    c. Full Access Signal.

6. Analysis of the following shall be compared to determine the preferred alternative for the intersection control:
    a. Study area delays (s/veh) (average);
    b. Study area throughput (veh/hr) (average);
    c. Service life before saturation;
    d. Right-of-way costs;
    e. Safety Analysis from the Highway Safety Manual or other approved source;

B. Approval:

The District Administrator may approve, if the report is recommended by the District Traffic Operation Engineer and a full analysis shows that the full access traffic signal will be the preferred alternative.

6. POLICY FOR UPGRADE OF EXISTING TRAFFIC SIGNALS COMPLETED BY IN HOUSE FORCES, CONTRACT OR NON DIVIDED ROADWAY CONSTRUCTION PROJECT

A. Prior to a traffic signal upgrade, a Signal Report shall be approved by the District Traffic Operations Engineer. At a minimum, this report shall include:

1. Crash history of the site with a chart/sketch illustrating the number of correctable crashes that occurred within a consecutive 12 month period of the last three years. Each crash report shall be reviewed to verify location and type of crash.
2. 24 hour count volumes from all approaches;
3. Manual counts for A.M. and P.M. peak hours, as well as noon and weekend counts if determined applicable from the volume counts;
4. A revised Traffic Signal Inventory form showing the recommended layout and signal operations;
5. The study recommending the traffic signal upgrade shall be signed and stamped by a Louisiana registered professional engineer and approved by the DTOE.

B. No signal shall be upgraded by DOTD forces, permit or inclusion in a construction project without the Signal Report as defined above.

7. **APPLICATION OF STANDARDS.**

These standards shall apply immediately to all new installations and existing upgrades.

8. **OTHER ISSUANCES AFFECTED.**

All directives, memoranda or instructions issued heretofore in conflict with this directive are hereby rescinded.

9. **IMPLEMENTATION.**

This directive will become effective immediately upon issuance.

Janice P. Williams

Chief Engineer