

## CHANGE LIST for

### MDOT Traffic and Safety, Traffic Signals, 0-Design Guides

**Note:** Located at <http://mdotwas1.mdot.state.mi.us/public/tands/plans.cfm>

**November 18, 2014:** The following updates were made to the web site:

Added an E = 2' minimum to SIG-DESIGN-120-A

**February 21, 2012:** The following updates were made to the web site:

**Revised SIG-DESIGN-120-A: Deleted Sheets 1 thru 4. Revised Sheet 5** to show new criteria for the placement of pedestrian pushbuttons with respect to the pushbutton landings.

Renumbered Sheet 5 of 5 to **Sheet 1 of 2. New Sheet 2 of 2** consists of notes. Changed title of the design guide from "Recommended Pushbutton Locations for Accessible Pedestrian Signals" to "**Pushbutton Design**".

### **Added SIG-DESIGN-030-F: HAWK Signal Sample Plan**

**November 15, 2011:** The following updates were made to the web site:

**Revised:** Signal Design SS to change cable to 7/C for a one-way, four color traffic signal head.

**August 16, 2011:** The following updates were made to the web site:

**Revised:** Signal Design SS to add wattages for LED street name signs. Revised the cable size for 2-way and 4-way 24x30 LED case signs.

**Added:** deliverables\_and\_planhalf.pdf. This document includes a sample PLANHALF of signal contract plans and a consultant scope of service for signal design which specifies deliverables at all stages of design.

**February 15, 2011:** The following updates were made to the web site:

**Created:** "0-Design Guides". Moved any design related files from "Correspondence/Guidelines" to the "0- Design Guides" area. Moved any operations related files from "Correspondence/Guidelines" to the "0- Operation Guides" area.

**Removed: Contract Lists:** Check Lists for Signal Plan/Proposal/Typical Details. The check list was removed from the Correspondence/Guidelines area and added as the statewide special details index/checklist.

**Added design guide: SIG-Design-120-A Sheets 1 thru 5:** "Recommended Pushbutton Locations for Accessible Pedestrian Signals".

**Added design guide: SIG-Design-153-A Sheet 1 of 1:** "Traffic Signal Strain Pole Foundation Design Table"

**Removed: Design Table Strain Pole Foundation:** Strain Pole Foundation Design Table (Box Span)

**Added design guide: SIG-Design-284-A Sheet 1 of 1: "Traffic Signal Mast Arm Pole Foundation Design Table"**

January 18, 2011: The following updates were made to the web site:

- The point of contact is defined as the height from the top of the pole foundation rather than from the grade center line.
- Two poles foundation elevations to be entered.
- Grade center-line elevation to be entered.
- Updated signal equipment loads and span and cable weight.

November 16, 2010: The following updates were made to the web site.

**Revised**

The requirements for preliminary geotechnical investigation for signal foundations:

- The power auger borings to extend to 25 feet instead of 20 feet.
- Referenced the latest editions of MDOT Standard Specification for Road Construction and the Michigan Manual for Uniform Traffic Control Devices.

October 20, 2009: The following updates were made to the web site.

**Added:**

Traffic Signal Head Placement Diagrams (Box Span).

**Changed:**

Changed name of Traffic Signal Head Placement Diagrams to Traffic Signal Head Placement Diagrams (Diagonal Span).

June 23, 2009: The following updates were made to the web site.

**Signal Design SS:**

- Added incandescent signs tab.
- In "Wattages" tab: Changed "Statewide LED" tab to "Wattages" and included LED Case Sign wattages.
- Revised "Main Span", "Sheet1", "Sheet2", "Sheet3" tabs.

April 21, 2009: The following updates were made to the web site.

**Signal Design SS:** Changed the conductors sizes in the wiring tab in signal design calculator spreadsheet.

**Michigan Timing Plan Preparation Guidelines, 3<sup>rd</sup> Edition** is now superseded by the **Michigan Timing Plan Preparation Guidelines, 4<sup>th</sup> Edition** (dated October 2008). (document: [mdot\\_michigan\\_timing\\_plan\\_preparation\\_guidelines\\_4th\\_edition.pdf](#))

The *Michigan Timing Plan Preparation Guidelines 4<sup>th</sup> Edition* contains many changes from the previous edition. The most significant changes are as follows:

- This document has been reformatted to include a section (1.7) where common permit information is presented to eliminate the duplicate nature of the previous document.

- The EPIC/EF-140 Permit's Cycle Sequence section has been revised to include additional information regarding:
  - EF-140 duplicate intervals, Correction intervals, and Into/Out-of Flash intervals
  - Flash operation, Spot numbers, and Remarks
- A more detailed description of closed loop systems is provided.
- Short Way for EPIC and EPAC Permit's is detailed and confirmed as the preferred method of correction where possible.
- The coding of Pedestrian crosswalks on all permits has been updated.
- Preempt Selective Clearances are discussed in greater detail for EPIC and EPAC Permits.
- The Preempt Signal Drivers for vehicles and pedestrians have been changed from numbers to letters for both EPIC and EPAC Permits.
- The Preempt Dwell Green for EPAC's has been standardized.
- A separate section has been added to clarify the determination of flash schedules and time of day plans.

**Michigan Signal Optimization Guidelines, 4<sup>th</sup> Edition** is now superseded by the **Michigan Signal Optimization Guidelines, 5<sup>th</sup> Edition** (dated October 2008)

(document: [mdot\\_michigan\\_signal\\_optimization\\_guidelines\\_5th\\_edition.pdf](#))

The *Michigan Signal Optimization Guidelines 5th Edition* contains the following changes from the previous edition:

- Revised collection of 24-hour Volume counts for boulevard intersections (Section 1.1.2)
- Updated guidance on coding pedestrian calls (Section 1.1.4)
- Updated guidance on travel time run requirements (Section 1.2)
- Provided naming convention for the Intersection Inventory forms (Section 1.3)
- Added a new section providing instruction on completing an Intersection Inventory form (Section 1.3.1)
- Provided naming convention and document layout for intersection photograph submittals (Section 1.3.2)
- Added a new section providing instruction on Signal Warrant Analysis (Section 2.0)
- Revised Synchro file naming structure when multiple control sections are present (Section 3.1)
- Updated guidance for volume balancing (Section 3.2.4)
- Updated guidance for determining the peak hour factor for crossovers (Section 3.2.5)
- Updated figures to reflect Synchro upgrades (Section 3.0, Section 4.0, and Section 6.0)
- Updated guidance on determining cycle lengths during optimization (Section 5.5)
- Revised which validation reports need to be completed (Section 6.2)
- Updated guidance on completing the project benefits analysis (Section 7.3)
- Revised final report Table of Contents order and contents (Section 7.4.2)
- Revised Appendix B to reflect updates.

February 10, 2009: The following updates were made to the web site.

*(\*New Document)* **2005 MMUTCD Signal Warrant Spreadsheet template.xls**

(document: [mdot\\_2005\\_mmutcd\\_signal\\_warrant\\_spreadsheet\\_template.xls](#)) was added to the website.

**Clearance Interval Calculations.xls**

(document: [mdot\\_clearance\\_interval\\_calculations.xls](#) ) was added to the website.

*(\*New Document)* **Inventory Form\_10-14-08.pdf** (document:

[mdot\\_inventory\\_form.pdf](#)) was added to the website.

*(\*New Document)* **Volumes Spreadsheet.xls**

(document: [mdot\\_volumes\\_spreadsheet.xls](#)) was added to the website.

*(\*New Document)* **BC Template SimTraffic Version 2.xls**

(document: [mdot\\_bc\\_template\\_simtraffic\\_version\\_2.xls](#)) was added to the website.

(\*New Document) **Flash Schedule and TOD Analysis Template 9-11-08.xls**  
(document: mdot\_flash\_schedule\_and\_tod\_analysis\_template\_9-11-08.xls) was added to the website.

(\*New Document) **SigOptBC Template Version 1-3.xls**  
(document:mdot\_sigoptbc\_\_template\_version\_1-3.xls) was added to the website.

December 9, 2008: The following updates were made to the web site.

- Strain Pole Foundation Design Table box span.pdf: This strain pole foundation design table was added to assist in the design of strain pole foundations for box span traffic signals.
- mdot\_signal\_contract\_check-list.pdf (and .doc): The contract checklists were updated as follows:
  1. Added the following items to the plans/proposal submittal checklist:
    - ADA compliant ramp and pushbutton designs
    - Utility contact plan sheet
    - Scale: Proposed plan 1"=30' when plotted on 11"x17"
  2. Revised the construction details checklist per the new details.

April 22, 2008: The following updates were made to the web site.

- MDOT\_Signal\_Design\_mm-dd-yy.xls: A tabbed page was added; titled: "Wiring". This page was in previous versions but was mistakenly left out of the last update. The page gives information on the typical number of wires and cable sizes used to wire any given signal device.
- "MDOT\_Signal\_Design\_02-19-08.xls" was renamed with an updated date to "MDOT\_Signal\_Design\_04-22-08.xls"

February 19, 2008: The following updates were made to the web site.  
Signal Span Calculator has been merged, updated and renamed.

- The Signal Span Calculator has been merged with another spread sheet that calculates signal wattages for cyclic and steady wattages as well as the number of openings.
- Changes made to span calculator portion include:
  - 1) The head weights and heights of the signal equipment have been updated and corrected.
  - 2) A new user friendly drop down signal list that automatically fills in weights and heights, thus aiding in avoiding human error.
  - 3) The ability to select major signal parts and obtain correct weights for unusual signal head combinations.

- Additional updates include:
  - 1) A conduit fill calculator, to ensure that the conduits in use are not over filled beyond Nation Electric Code standards.
  - 2) Guidelines for estimating the overhead, labor and equipment costs associated with Transportation Work Authorizations completed by the Statewide Signals crew.
  
- Due to this new spreadsheet becoming a comprehensive design aid, it has been renamed to “MDOT\_Signal\_Design\_02-19-08.xls”. As further updates and revisions occur the document name will change to include the latest revision date within the name.

October 5, 2007:

### **Flashing Yellow Arrow Left-Turn Signal Guidelines**

These guidelines are new.

**Flashing Yellow Arrow Letters** – to CRAM (County Road Association of Michigan) and MML (Michigan Municipal League).

These letters are new.

July, 2007:

### **Michigan Timing Plan Preparation Guidelines, 3<sup>rd</sup> Edition.**

The following changes were made:

- The EPIC/EF-14 Permit has been revised to include additional information.
- The EPIC/EF-14 Permit has been revised to include additional information.
- The Advance Timing Parameters Form has been revised to include additional information.
- A separate page for Preemption information has been created for both the EPIC/EF-140 and EPAC Controllers.

July, 2007:

**Michigan Signal Optimization Guidelines, 4<sup>th</sup> Edition.**

The following changes were made:

- Revised guidance on Heavy Vehicle Volume
- Provided direction on coding parking maneuvers
- Updated guidance on link speed limits
- Provided direction for measuring and coding turn lane storage distances
- Updated guidance for calculating clearance intervals
- Updated guidance for calculating all-red clearance intervals
- Updated direction for measuring pedestrian cross-walk distances
- Updated guidance on minimum green times for left-turn phases
- Updated guidance for calculating minimum splits
- Updated guidance for setting offsets when there is a pedestrian push button
- Updated guidance for setting up the flash schedule hours

The “Change Interval Guidelines” document has been eliminated, this information is now incorporated into the Optimization Guidelines.

May 1, 2007: In **TRAFFIC SIGNALS – A GUIDE FOR THEIR PROPER USE**, the following sections were added or revised:

1. Warrants – Guidelines for Traffic Signal Installation. This section has been updated to include revised traffic signal warrants.
2. The New Box Span Traffic Signal. This section explains the advantages of the new box span design and when / where the new design will be implemented.
3. Understanding the New Flashing Yellow Left-Turn Signal. This new section explains the advantages of using the new flashing yellow left-turn signal display over old the flashing red left-turn signal. This section also explains how the new signal head will operate and where it will be installed.
4. Understanding Pedestrian Signals and How They Work. This section has been revised to include Countdown Pedestrian Signals.
5. Transportation Service Centers (TSCs) and Regional Offices. This area has been revised to include updated addresses and phone numbers.

December 22, 2006: The following update was made to the MDOT Traffic and Safety web site under the **Traffic Signals Correspondence/Guidelines** Category.

#### Added LEFT-TURN SIGNAL PHASING GUIDELINES

In an effort to provide guidance and consistency of left-turn phasing on state trunkline the attach guidelines have been developed. These guidelines will provide a better understanding by department staff when to consider left-turn phasing and what type of phasing to implement. The attach guidelines were drafted in response to department's evaluation of the use of the flashing yellow arrow in lieu of the flashing red ball as part of left-turn phasing.

November 30, 2006: The following update was made to the MDOT Traffic and Safety web site under the **Traffic Signals Correspondence/Guidelines** Category.

Revised GUIDELINES FOR THE USE AND OPERATION OF PEDESTRIAN SIGNALS by adding criteria.

May 30, 2006: The following updates have been made to the MDOT Traffic and Safety web site.

#### **MICHIGAN SIGNAL OPTIMIZATION GUIDELINES - 3rd Edition**

- 1) Revised guidance on calculating and applying peak hour factors (Section 1.1.3)
- 2) Direction on preparation of existing conditions analysis (Section 2.0)
- 3) Updated guidance for calculating yellow clearance intervals (Section 3.1.1)
- 4) Revised guidelines on minimum green times (Section 3.2.3)
- 5) New section providing guidance on optimum splits (Section 4.4)
- 6) New section discussing optimization techniques and MDOT preferred practices (Section 4.5)
- 7) Updated guidance on determining flash schedules (Section 4.7)
- 8) Revised project summary requirements (6.4.1)

#### **MICHIGAN TIMING PLAN PREPARATION GUIDELINES - 2nd Edition**

- 1) Revised guidelines on minimum intervals (Pg 3 - Section D and Pg 10 - Section B)
- 2) Direction on entering Trail Green information on EPAC timing permit (Pg 15 - Miscellaneous)

If you have any questions about these documents, please contact Jason Firman at 517.241.4793 or [firmanj@michigan.gov](mailto:firmanj@michigan.gov) .

April 4, 2006: The following updates were made to the web site.

The Signal Design Procedure has been updated to reflect the two types of signal designs processes for MDOT - the recommended design steps to develop signal plans for large traditional multi-location signal modernizations projects but also the recommended steps necessary to develop signal plans for individual, short design time Indefinite Delivery type installation projects.

March 10, 2006: The following updates were made to the web site.

Signal Span Calculator Spreadsheet  
Signal Span Calculator Directions, (dated 3-8-06)

This Spreadsheet replaces the outdated SigSpan Program.

If you have any questions about the Signal Span Calculator, please contact Paula Corlett at 517-373-2324 or [CorlettP@michigan.gov](mailto:CorlettP@michigan.gov).