

ANNEX 4

**CITY OF MARKHAM
ENGINEERING DEPARTMENT**

**TRAFFIC SIGNAL DESIGN AND INSTALLATION
STANDARDS**

TRAFFIC SIGNAL DESIGN AND INSTALLATION STANDARDS		September 2022
SECTION: Engineering Department		 Development Services Commission
SUBJECT: Traffic Control Signal Installation - Procedure		
The Standards and Procedures contained herein serve as a standard for new or modified traffic control signal installations.		
APPLICATION This document applies to engineering consultants, contractors and City departments that administer traffic control signal installation projects within the City right-of-way.		
RESPONSIBILITIES The Engineering consultants and City departments that identify a need for a traffic control signal installation will employ the procedure (see attached process map) and/or forward the applicable standards and specifications to the design consultant and the construction contractor. Traffic Engineering will ensure that this procedure is complied with and reserve the right to make modifications, as required.		
PURPOSE This document is meant to provide a credible, technically sound, sustainable and consistent method of following a standard process throughout the various phases of traffic control signal installation. This procedure will ensure the required standards and specifications are being adhered to and that the traffic signal installation will be completed to the satisfaction of the City.		
DESCRIPTION This document is structured to describe the implementation procedures for each component of the installation/modification of a traffic control signal. Each component shall be carried out in order, as listed below: 1) Design consultant to prepare traffic control signal design, as per required standards and specifications. 2) Design consultant to prepare signal timing plan, as per required standards and specifications outlined herein. 3) Traffic Engineering to review and comment on proposed signal design and signal timing plan. 4) Director of the associated department responsible for the project to sign-off on the final design drawing (certified by a Professional Engineer qualified in traffic signal electrical design), consenting to tender for construction. 5) Contact Traffic Engineering to make arrangements to inspect traffic signal prior to activation.		

Table of Contents

1.	Standards and Practices	4
1.1	Traffic Signal Design	4
1.2	Traffic Signal Timing	5
2.	Traffic Control Signal Installation Process Map	7
3.	Traffic Signal Equipment Specifications.....	8
4.	Traffic Signal Design/Construction Checklist	8

1. Standards and Practices

1.1 Traffic Signal Design

- 1) Accessible Pedestrian Signal (APS) Stations (York Region Standard E-3.30) required on all legs for all crossings at the intersection (Example: 8 APS stations at a 4-leg intersection).
- 2) Pedestrian Countdown Heads required at all pedestrian crossings (Example: 8 Pedestrian Countdown Heads at a 4-leg intersection).
- 3) Street Name Signs Item to be specified as a 'Supply & Install' Item (Refer to Engineering Standards, MR72A and MR72B).
- 4) Zebra crosswalks required for all pedestrian crosswalks at the intersection (including private entrances/driveways) (Refer to York Region Standard DS-408).
- 5) Where boulevard cycling facilities exist (multi-use pathways, cycle tracks), the appropriate crossing treatment at the intersection must be applied for that crossing, in accordance with Ontario Traffic Manual, Book 18.
- 6) Tactile walking surface indicators required for all sidewalk ramps at the intersection. (Refer to York Region Standard DS-119, DS-408, DS-410, and E-6.07).
- 7) Permanent Durable Pavement Markings must be used for stop bars, crosswalk lines/cross-ride lines, zebra pavement markings and symbols. Traffic paint may be used for all other types of pavement markings.
- 8) Traffic Controller cabinet must be supplied with log book, approved signal timing plan, programming charts and shop drawings.

1.2 Traffic Signal Timing

SIGNAL INDICATION	REQUIREMENT		
Minimum Green	Based on applicable traffic study		
Maximum Green			
Walk	7 seconds minimum		
Flashing Don't Walk (FDW)	Based on 1.0 metre per second walking speed and crossing distance		
Amber	Refer to Ontario Traffic Manual Book 12		
All-Red			
Left Turn Phase (s)	Minimum Green = 7 seconds	Amber = 3 seconds	All Red = 1 second
Total Cycle Length	60 – 120 seconds. Cycles should be evenly divisible by 5 (i.e. 70, 75, 80, 85, 90, etc.).		

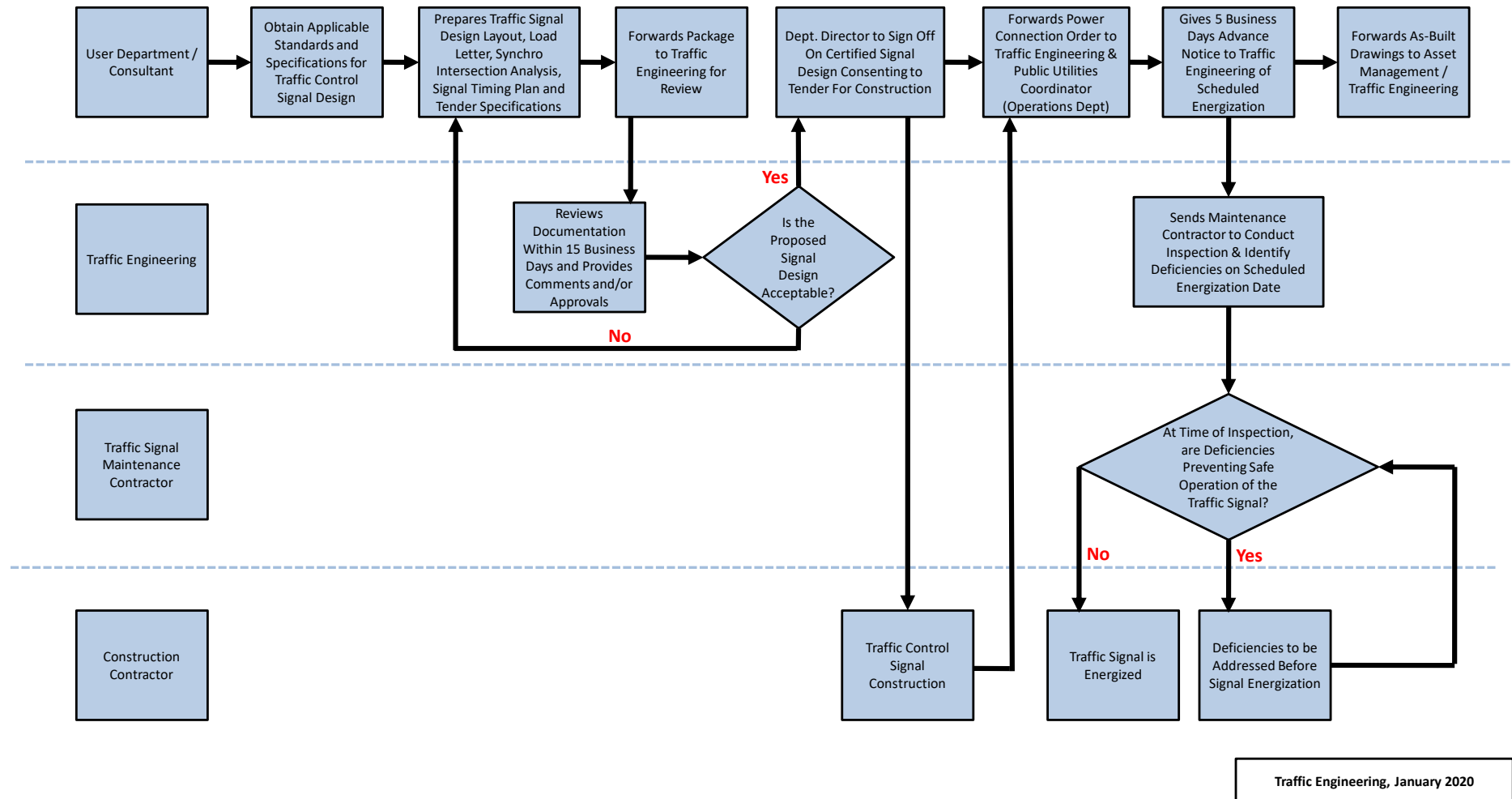
Notes:

- 1) Design consultant shall refer to relevant traffic studies when developing a proposed signal timing plan. In the event there are no relevant traffic studies, the design consultant must conduct and submit the results of an intersection operation analysis completed using Synchro.
- 2) Design consultant shall consider the feasibility of traffic signal coordination prior to the development of the traffic signal timing plan.

Annex 4 – Traffic Signal Design and Installation Standards

- 3) The scope of the tender contract for the installation of the traffic signals shall require the Contractor to program the controller, including implementation of the approved signal timing plan.

2. Traffic Control Signal Installation Process Map



3. Traffic Signal Equipment Specifications

Traffic signal equipment specifications must adhere to the most current York Region Standards and Specifications.

4. Traffic Signal Design/Construction Checklist

This document shall be used to supplement the requirements set out in Annex 4 of the Engineering Design Criteria. The checklist (see Attachment “A”) shall be submitted to Traffic Engineering at each phase of design/construction. The items identified are minimum requirements and additional information may be required.

Attachment “A”

	Preliminary Design Submission	Final Design Submission	Construction Phase	Comments
Traffic Signal Design Layout and Wiring Diagram				
Traffic Management Plan				
Tender Specifications, Quantities, and Cost Estimate				
Signal Timing Plan				
Load Letter				
Power Connection Order				
Written Notification for Signal Activation (5 business days required)				
As-Built Drawings				

Annex 4 – Traffic Signal Design and Installation Standards☐ **Preliminary Design Submission**

- The preliminary design submission is the first submission to Traffic Engineering and should include all the necessary drawings and documents to allow for a comprehensive review. These items shall include, at a minimum and are not limited to,
 - traffic signal design layout
 - wiring diagrams
 - traffic management plans
 - tender specifications
 - tender quantities
 - tender cost estimates.
- Traffic Engineering provides comments to be addressed in subsequent submissions.
- The consultant shall re-submit the designs adequately addressing the comments provided by Traffic Engineering.

☐ **Final Design Submission**

- The designs and tender specifications shall be finalized via correspondence from Traffic Engineering.
- The consultant shall confirm on the drawings that there are no conflicts with existing utilities.

☐ **Signal Timing Plan**

- The consultant shall submit a proposed signal timing plan based on the accepted Traffic Impact Study submission.
- The signal timing plan shall follow the guidelines outlined in “Annex 4” of the Engineering Design Criteria.
- Traffic Engineering shall provide comments to be addressed in subsequent submissions.

☐ **Load Letter**

- The consultant is responsible for load calculations and submitting to Alectra Utilities.
- The load letter should be submitted to Traffic Engineering for record.

Annex 4 – Traffic Signal Design and Installation Standards

- ☐ Power Connection Order
 - Power Connection Order to be submitted to Traffic Engineering.
- ☐ Written confirmation of planned date to Traffic Engineering for signal energization
 - 5 business days required.
- ☐ As-Built Drawings
 - Drawings to be completed by the consultant upon approval and acceptance by the City.