

Ohio Department of Transportation - District 6

Traffic Signal Design Specifications

June 30, 2022

1. The type of signal supports used at an intersection is to be determined by the D6 Traffic Engineer.
2. Mast arm attachment heights shall be calculated and modified as per the elevation of the roadway and designed for a clearance height of 18.0' to ensure the signal head clearance height requirements of 17'-19' are met above the pavement. Signal heads shall be rigid mounted with the yellow lens centered on the mast arm and must be level within 6" of one another. Survey data and elevation calculations shall be submitted to the District to confirm proper design of the mast arms.
3. If it is determined that traffic signal shall be a box span it shall be tethered in accordance with current applicable SCD's and/or Plan Insert Sheets. Signals shall be installed at a 17' mounting height. Calculations shall be provided with the updated SWISS software that accommodates signal back plates for review. D-06 uses only design 10 or larger poles per TC-81.11.
4. Support poles shall be located outside the roadway clear zone; see ODOT Location and Design Manual Volume 1, section 600 for clear zone requirements.
5. ODOT may specify intersection lighting, if required the signal supports should be designed with adequate light pole extensions.
 - a. Bracket Arms, As Per Plan shall be adjustable type so field relocation is possible if a utility conflict exists during construction.
 - b. All lighting shall be controlled by one photo cell located on the signal support closest to the cabinet and greater than 8 feet above the ground.
 - c. Item 632, Power Service, As Per Plan. Plan note shall specify the power service design shall include one disconnect switch with one leg of the 120/240 volt service powering the traffic signal and the other powering the highway lighting (requires 3 conductors from the disconnect to the cabinet). Within the cabinet the lighting shall have a unique circuit breaker and the photo electric relay/contactors with hand/on/auto controls. Highway lighting shall not be powered through the UPS.
6. Service cable from the power source should be overhead unless requested to be underground.
7. Item 632, Vehicular Signal Head, (LED), By Type, With Back plate. Black polycarbonate signal heads with cutaway visors including fluorescent yellow reflective back plates in accordance with CMS 732.22 for all signal heads. Open bottom tunnel visors should only be used in areas where the roadway skew causes side street motorists to clearly view the opposite approach signal heads.
8. When the Planning Dept determines that there is a reasonable expectation of pedestrians pedestrian facilities including lighting are to be provided. District Traffic will specify whether or not pedestrian signal heads and pushbuttons are required.
 - a. If required, Item 632, Pedestrian Signal Heads, LED, Countdown, (Type D2), As Per Plan shall be provided. The signal heads shall be black polycarbonate plastic. ADA complaint pushbuttons are required for all installations.
 - b. When pedestrian pushbuttons are installed, pedestrian pushbutton signs shall be R10-3e.

- c. ADA curb ramps are required with concrete sidewalks between multiple ramps. Concrete should be provided up to the pedestrian pushbuttons so they are fully accessible to a wheelchair.
 - d. Where pedestrian facilities are not included, the NO PEDESTRIAN CROSSING (R9-3a) sign(s) shall be used on all applicable crossings.
9. Vehicular signal heads shall be placed according to the attached D-6 standard drawing.
 10. Traffic signal heads shall be located a minimum of 40' to a maximum of 180' away from the front of the stop bar on the far side of the intersection. Signal heads farther than 180' away from the stop bar or locations with sight distance issue require a near sided supplemental signal head.
 11. The District may specify near side supplemental signal heads to be provided on roadways with 2 or more thru lanes or roadways in which the truck volumes exceed 20%.
 12. 7/c signal cable shall be installed to each signal head for future wiring modifications. Signal heads operating on the same phase can be jumpered with 7/c signal cable. Supplemental heads are to be wired separately from the required signal heads.
 13. 3" minimum half blind coupling shall be installed on strain poles when applicable.
 14. Power cable shall be 1 conductor, No. 6 AWG – 3 runs.
 15. Item 633, Cabinet, type TS2, as per plan. The cabinet shall be type "7R" and include 16 load switch bays, a pull out laptop shelf, LED under-shelf lighting, surge suppression in a modular package containing a 12 pin beau connector with LED failure indication, power harnesses for both TS2 type 1 & type 2 controllers and an 8 port SDLC communication panel for easy integration of other hardware. A 12" Cabinet riser shall be supplied with the traffic signal unless a size 7R cabinet is used.
 16. Item 809, ATC V6.24 Controller, as per plan. The controller shall be an Econolite Cobalt latest version provided by ODOT and programmed by the contractor.
 17. Item 633 Uninterruptible Power Supply, (UPS), 1000 watt, As Per Plan shall be included as per the attached D-06 specifications for all new signals. The UPS cabinet shall be mounted and sealed next to the TS2 controller cabinet type "R" and it shall include an auxiliary power panel. Intersections where UPS units exist shall be upgraded with new batteries if they are or will be 5 years or older at the time of construction. A 12" Cabinet riser shall be supplied UPS cabinets.
 18. Cabinet work pad and cabinet foundation shall be as per the attached Plan Insert Sheet.
 19. Traffic signal phasing should be designed per the attached ODOT D-06 standard layout.
 20. Yellow change and all red clearance intervals shall be calculated with the formula found in TEM Section 403-2. Yellow times should be between 3-5 seconds and the all red intervals should be between 0-3 seconds. The maximum time for the all red interval is 3 seconds.
 21. Pull boxes next to the controller cabinet shall all be 24" concrete per CMS 725.08 without underdrains. Other pull boxes can be 18" concrete without underdrains.

22. Rigid metal conduit per CMS 725.04 is required. Minimum size shall be 2". All wires shall be installed in conduit, no direct burial. Conduit sizes shall meet the requirements of TEM Section 450-3.4. Calculations for conduit sizing shall be submitted to the District for review.
23. ODOT D-6 does not permit open cutting of pavement; conduit runs that cross the roadway shall be jacked or drilled under the pavement. Minimum size for conduit under roadway pavement shall be 3".
24. Advance/Dilemma Zone Detection shall be Wavetronix Advance Extended Range Smart Sensors.
25. Stop line detection shall be Wavetronix Smart Sensor Matrix detection units.
26. If the traffic signal is a brand new installation new signal activation signs are required as per standard construction drawing MT-120.00.
27. Ethernet communications to the intersection shall be provided for all traffic signals and provide a means to connect to the controller, UPS, MMU and Wavetronix. The method of communications will be specified by the District prior to the consultant beginning the signal design.
28. The traffic signal general notes/details attached to this document shall be used as necessary on a project-by-project basis.
29. The traffic signal plan view sheet and wiring diagram shall include a legend describing the utilized symbols.
30. Plans shall include a field hookup chart verses the color sequence chart.
31. ODOT D-6 requires stage 2 and 3 plan submittals for review as per the TEM section 440-7. All calculations shall be submitted to D-06 for review, including the support pole calculations, yellow & all red intervals, conduit fill, etc.
32. Final plan submission shall include the electronic files in each of the following formats, PDF, Microstation, and Synchro 8 signal timing files shall be provided to ODOT District 6 via email or CD.
33. A Signal Agreement is required for the construction of a new traffic control signal at a developer's driveway as per TEM Section 401-7. The agreement is a maintenance agreement for the traffic signal between the Developer and ODOT. The agreement shall be signed and in the possession of ODOT prior to obtaining an ODOT permit and beginning the construction of the new traffic signals.

ODOT Standard Drawings:

The following SCD's will typically be used on signal plans:

TC-21.20	TC-84.20
TC-22.10	TC-84.21
TC-41.20	TC-85.10
TC-42.20	TC-85.20
TC-81.11	HL-10.12
TC-81.21	HL-30.11
TC-82.10	HL-30.22
TC-83.10	MT-120.00
TC-83.20	

All other pertinent SCD's shall be included on the Title Sheet. All SCD's must be the current revision.

Proposal Notes and Supplemental Specifications:

PN 621 – Signal Maintenance Personnel Requirements (632, 633) ?

SS 800 – Revisions to the current CMS

SS 809 -

Reference Manuals:

ODOT Construction and Materials Specifications

ODOT Traffic Engineering Manual, (TEM)

Ohio Manual of Uniform Traffic Control Devices, (OMUTCD)

ODOT Standard Construction Drawings

ODOT Location & Design Volumes 1 and 3

ODOT Plan Insert Sheets

All Manuals must be the current revision.

Websites:

All ODOT reference manuals and specifications can be found on the ODOT Design Reference Resource Center website: <http://www.dot.state.oh.us/drrc/>

Traffic signal design assistance can be found by downloading the ODOT Signal Design Reference Packet and associated files:

<http://www.dot.state.oh.us/Divisions/Operations/Traffic/miscellaneous/Pages/Signal-Design-Reference-Packet.aspx>

District 6 Contacts:

For questions concerning District 6's traffic signal specifications contact:

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