Chapter 11: Traffic Signals

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Traffic signals shall be designed in accordance with the most current edition of the Ohio Manual of Uniform Traffic Control Devices (OMUTCD), Part 4, ODOT specifications, applicable ODOT standard drawings, the ODOT Office of Traffic Operations (OTO) Signal Design Reference Packet, and the following COD requirements.

1. Design Criteria

The following concepts are to be considered in making engineering decisions in design and operation of traffic signal installations. Most of them are in addition to those of the OMUTCD. In any case, the intersection's condition must be taken into account as part of the decision-making process.

A. Vehicular Signal Heads

1. Size: Twelve (12) inch polycarbonate heads with backplates shall be used.

2. Signalization of Protected Only Turn Movements

   Use a three (3) section head with red arrow, yellow arrow and green arrow indication. Two three (3) sections heads are to be used if two turn lanes exist.

3. Location

   Signal heads shall be placed per ODOT specifications and the most current edition of the ODOT Office of Traffic Operations (OTO) Signal Design Reference Packet.

   Signs to be placed in conjunction with the signal head shall be installed as follows:

   a. For a single left-turn-only lane, the sign should be placed 1.5 feet to the right of the center of the lane.
   b. For a single right-turn-only lane, the sign should be placed 1.5 feet to the left of the center of the lane.
   c. For two left-turn-only lanes, the sign should be placed on the lane line between the two turn lanes.
   d. For two right-turn-only lanes, the sign should be placed on the lane line between the two turn lanes.

4. Mounting Height

   The mounting height for all signal heads shall be placed per ODOT specifications and the most current edition of the ODOT Office of Traffic Operations (OTO) Signal Design Reference Packet.

5. Horizontal Signal Faces

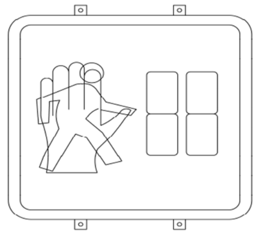
   The horizontal location of signal faces must be per Figure 4D-2 of the OMUTCD.

B. Pedestrian Signal Heads

1. Pedestrian signal heads shall be as specified in the most current edition of the OMUTCD.
2. Installation of pedestrian signal heads and push buttons shall be as specified on ODOT Standard Drawing TC-85.10.
3. At all locations where crossing is prohibited the "No Pedestrian Crossing

Symbol" Sign (R9-3) is required.

4. Marked crosswalks shall be installed where pedestrian signal heads are installed.
    a. Other locations of marked crosswalks are at the discretion of the COD.
    b. The type of crosswalk shall be determined per the *Crosswalk Installation & Enhancement Design Guide.*
    c. All pedestrian signal heads shall be LED, Type D2 with countdown timer, as illustrated below:



    d. Pedestrian Interval Timing shall be as specified in the most current edition of the OMUTCD.

C. **Pedestrian Clearance Intervals**

Pedestrian clearance intervals at any signalized intersection, with or without pedestrian signal heads, shall be as specified in the most current edition of the OMUTCD.

D. **Maintenance of Traffic (MOT) for Signals**

1. Temporary detection must be provided if existing detection will be disturbed during construction. The type of temporary detection must be specified on the approved plans.
2. ODOT Maintaining Traffic Standard Construction Drawing MT-120.00 shall be followed upon the installation of a new signal.
3. A Signal Operation Changed Sign shall be used when an existing signal has been modified (i.e. timing change, phasing change, etc.).

E. **Traffic Control Signs at Signalized Intersections**

Signs shall be placed on the span wire/mast arm adjacent to the appropriate signal head, preferably to the right of the right-most head and to the left of the left-most head (whichever is applicable).

1. "Left on Green Arrow Only" sign (R10-5) shall be used when signalizing for protected left turn movement
2. "Left Turn Yield on Green" sign (R10-12) shall be used when signalizing for a permissive left turn movement
3. Appropriate signage shall be used when signalizing for protected right turn movement; signage shall be R10-10R, R10-11B, R10-11C, or R10-11D, depending upon the configuration.
4. "No Turn on Red" sign (R10-11) shall be evaluated and used when an engineering study finds conditions specified in the most current edition of the OMUTCD, Part 2 are met.

F. **Detector Design**

Intersections where a new signal is be installed or an existing signal is to be modified shall have detection for all approaches of all lanes. Type of detection (video or radar) shall be determined by the COD.

1. Left turn detection
    a. For presence operation (non-lock operation using 5-section head) of a left turn phase:
        i) on a main street second car detection should be utilized in most instances (front of zone should be 26-FT from center of stop line)
        ii) On a side street first and second car detection should be utilized
    b. If left turn lanes are offset such as on a divided highway, then only first car detection should be used, this is applicable on both a main street and a side street.
    c. If the left turn phase is a protected only phase, presence operation should be used to avoid false calls during light traffic conditions, this is applicable for both a main street and a side street. Non-locking versus locking operation shall be determined by COD on a case-by-case basis.

G. **Pullboxes**

Size and location of all pullboxes must be specified on the plans. Those that are utilized are:

1. Loop Lead-ins – 18" pullboxes (if applicable)
2. Multiple conduits joining – 24" pullboxes (at the discretion of the Engineer)
3. Fiber (reference the Fiber Optic Conduit Chapter of this Design Guide for details)

H. **Conduit**

1. Specify the size of all conduit on the plans and verify the capacity of each conduit with respect the conductor(s) proposed to be within, per ODOT specifications and the most current edition of the ODOT Office of Traffic Operations (OTO) Signal Design Reference Packet.
2. All ODOT OTO Signal Calculations-Conduit Sizing documents shall be provided to the COD.
3. An additional empty 3" conduit with tracer wire shall be provided under all disturbed approaches, i.e., drives, streets, bike paths, etc., in addition to other required signal conduits.

I. **Interconnect**

Interconnect communication shall be included with all new traffic signal installations and existing signal upgrades utilizing either fiber or radio as directed by the COD. Reference the Traffic General Notes for details.

J. **Preemption**

Preemption shall be required with all signal upgrades, modifications, or new signal installations utilizing Opticom Radio/GPS Model as manufactured by Global Traffic technologies. Preemption at signals in close proximity to active railway lines may be required on a case by case bases depending on the distance from the railway and and/or based on the Fire Departments requirements. Reference the Traffic General Notes for details.

2. Signal Plan Format

These traffic signal plan sheets shall contain all Traffic Signal General Notes, as well as the following information with all appropriate elements clearly dimensioned and labeled:

A. Mast Arm and Signal Pole Color

All traffic signals in the City of Delaware shall be rigid mounted on a mast arm. In special circumstances or in a phased project, a strain pole with span wire configuration may be considered; appropriate design including tethering will be required. The design engineer must submit the request for the exemption in writing and the variance must be approved by the City Engineer.

1. Arm Types: The Arm types should be either an arched arm type (in the Downtown District, or in other locations as specified by the City of Delaware) or a straight arm type (typical) as shown below.

Figure 11-1*: Arched Arm Type (Downtown District)

*Backplates and rigid mounting are required, not shown in these figures.

Figure 11-2: Straight Arm Type (Typical Installation)

2. Luminaire Type: The Luminaire should be either a conventional box luminaire, cobra head luminaire, or a decorative luminaire (in the Downtown District or in other locations as specified by the City of Delaware), as shown below. All shall be LED and approved by the City of Delaware.

   All street lights must be mounted at a height of 37-FT or less in order to maintained by the City of Delaware. Any exceptions to this must be submitted and approved by the City of Delaware.

Figure11-3: Conventional Box Luminaire

Figure 11-4: Cobra Head Luminaire

Figure 11-5: Decorative Luminaire (Downtown District)

3. Pole Color: The standard color of the poles and arm shall be powder coated black or as directed by the City, See Chapter 12 Street Lighting Standards. Reference table below for additional details.

Table 11-1:
Mast Arm and Luminaire Details

District	Arm Type	Luminaire Type
Downtown District	Arched	MainStreet
US 23 Corridor	Straight	Cobra
US 42 Corridor west of US 23	Straight	Cobra
US 36 west of Downtown	Straight	Cobra/Conventional
US 36/SR 37 east of Railroad	Straight	Cobra
US 36 east of Downtown to Railroad	Arched	MainStreet
SR 37 east of Downtown to Railroad	Arched	MainStreet
SR 37 West of Downtown	Straight	Cobra/Conventional

B. **Quantities**

All items associated with the installation and operation of the traffic signal shall be quantified in tabular form on the plan sheets. An extra support shall be provided per installation. The size of this extra support will be chosen by the Public Works Director.

C. **Signal Plan Required Items**

The following items shall be included in the signal plan, per the current edition of the ODOT Office of Traffic Operations (OTO) Signal Design Reference Packet:

1. All Tables and Diagrams
2. All items in the plan view
    a. All items shall be located in relation to the station and offset distance of the street centerline.
    b. Details shall also be provided for the Generator Power Panel Enclosure, reference the City of Delaware Traffic Signal General Notes Plan Insert Sheet.
3. Signal Head and Cabinet Field Wiring Hookup Chart
4. Phasing and Wiring Diagram
5. Signal Timing Chart
6. Detector Assignments Chart with Loop Description
7. Signal Coordination.

a. On request, the City will provide the existing timing plans of any existing traffic signal under the direct jurisdiction of the City.

D. **Color Chart**

All wiring for the signal controller and signal heads must be per NEMA Standards, and per the wiring color chart below.

COLOR CHART

PED UNIT FIELD WIRIING HOOKUP

PED UNIT LOCATION	*CROSSWALK DISPLAY*	*WIRE COLOR*
South Crosswalk	*Walk*	*Black*
	Don't Walk	*Orange*
West Crosswalk	*Walk*	*Green*
	Don't Walk	*Red*
North Crosswalk	*Walk*	*Blue*
	Don't Walk	*White w/Black Tracer*
East Crosswalk	*Walk*	*Green w/Black Tracer*
	Don't Walk	*Red w/Black Tracer*

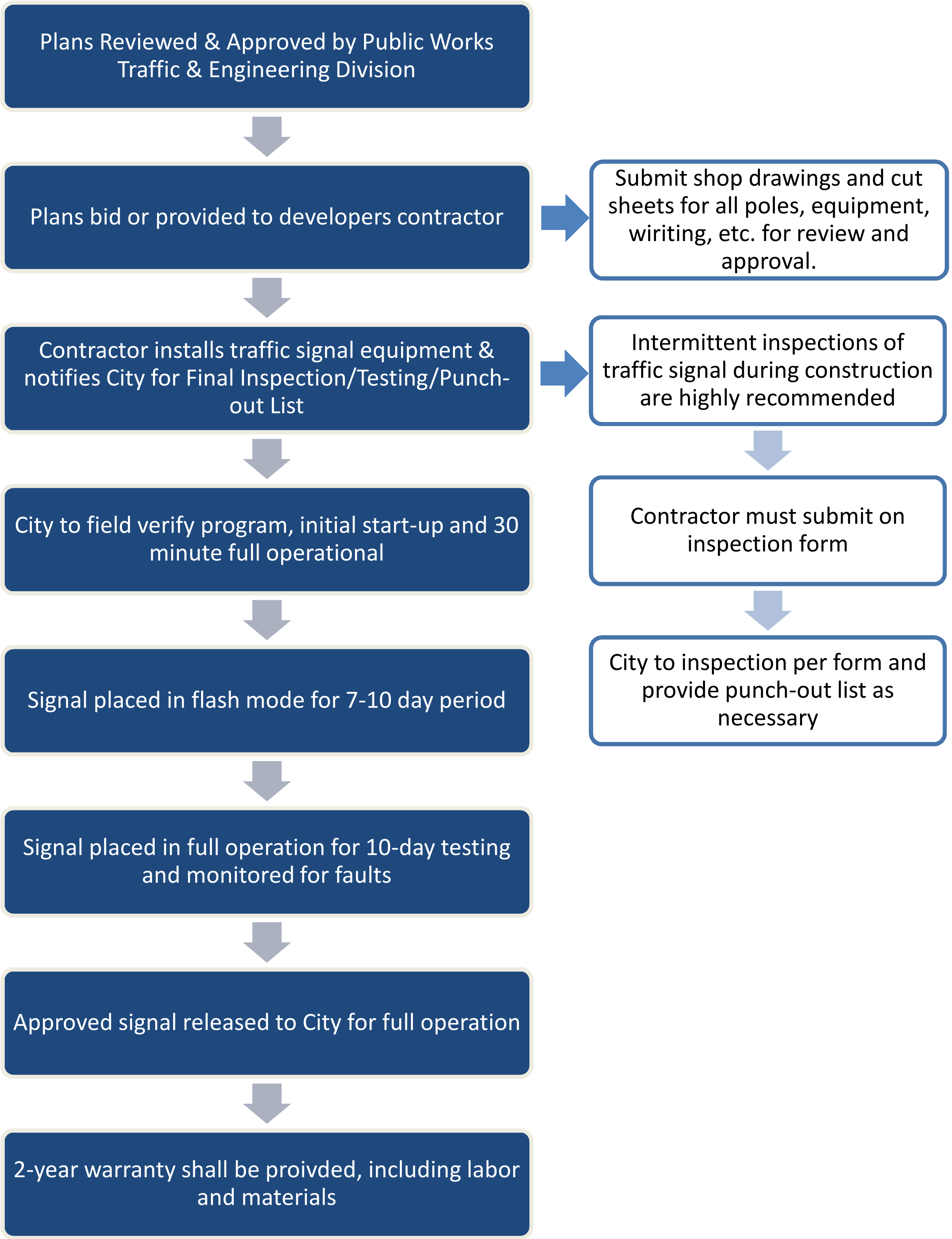
SIGNAL HEAD & CABINET FIELD WIRING HOOKUP

SIGNAL DISLPAY	*WIRE COLOR PER APPROACH*
THRU R	*RED*
THRU Y	*ORANGE*
THRY G	*GREEN*
L/T R	*BLACK (FUTURE USE ONLY)*
L/T ~~Y~~	*WHITE W/BLACK TRACER*
L/T ~~G~~	*BLUE*
R/T R	*NOT USED BY CITY*
R/T ~~Y~~	*RED W/BLACK TRACER*
R/T ~~G~~	*GREEN W/BLACK TRACER*

E. **New Traffic Signal Installation**

When installing a new traffic signal the following process must be followed:

<u>City or Developer Installation of New Traffic Signals</u>



F. **Inspection Form**

The inspection form is attached herein at the end of the chapter and referenced as Exhibit 11-1 (12 Pages total).

3. Traffic Signal General Notes

The Traffic Signal General Notes shall be included in any plan set in which a new or existing traffic signal shall be installed or improved, or as directed by the City of Delaware. The Traffic Signal General Notes can be found under separate cover, titled “Plan Notes”.

ODOT TRAFFIC SIGNAL INSPECTION CHECKLIST

Project Number ______________________________ Date ____________

Project Engineer / Supervisor ______________________________

Signal Contractor ______________________________

Final Inspector ______________________________

Intersection ______________________________

Note: Checklist based on 2016 Construction Material Specifications.

OSIS No: ____________

Controller/Make/Model No: ______________________ S/N: ______________________

MMU: ______________________ S/N: ______________________

Cabinet Type: ______________________ S/N: ______________________

Meets	Deficient	N/A	**WARRANTY INFORMATION:**
☐	☐	☐	1. Ensure that each unit has a permanent label or stamp indicating the date of shipment. Controller, Monitor, BIU, 2070 CPU board, field I/O module, Front Panel (CMS 733.02B)
☐	☐	☐	2. CMS 733.02B

Furnish 60-month warranties or the manufacturers' standard warranty, whichever is greater for the following equipment:

1. **NEMA Controller Equipment**
   a. TS-2 Controller Units
   b. Bus Interface Units
   c. Malfunction Management Units
   d. TS-1 Conflict Monitors
2. **CalTrans Controller Equipment**
   a. Model 2010 Conflict Monitor Units
   b. 2070L and 2070E Controller Units including the following subassembly units:
      (1) 2070-1C, 2070-1E, 2070-1B CPU Board
      (2) 2070-2A Field I/O Module
      (3) 2070-3B Front Panel.
      (4) 2070-6A,B.

Ensure that the warranty period begins on the date of shipment to the project. **Ensure that each unit has a permanent label or stamp indicating the date of shipment.**

Comments:

Meets	Deficient	N/A	CONTROLLER & CABINET:
☐	☐	☐	1. Is the cabinet sealed to the concrete base (and/or riser) with waterproof material? (TC-83.20 & CMS633.08 & 633.09)
☐	☐	☐	2. Are all tags or labels properly installed and legible including the service wire, phase numbers and directions? (CMS 632.05)
☐	☐	☐	3. Are the connectors soldered on the loop lead in wires? (CMS 632.23)
☐	☐	☐	4. Is all field wiring neatly arranged and routed to prevent being pinched when the cabinet door is closed and free of debris? (CMS 633.08)
☐	☐	☐	5. Is the work pad in place? (CMS 633.11)
☐	☐	☐	6. Was the work pad poured separate from the foundation pour? (CMS 633.11)
☐	☐	☐	7. Is all wiring (except power) fitted with spade terminals? (CMS 633.08)
☐	☐	☐	8. Is all power wiring fitted into spade, screw, or spring terminals? (CMS 633.08)
☐	☐	☐	9. Is there LED lighting in the cabinet? (CMS 733)
☐	☐	☐	10. Is the controller properly grounded (max 10 ohms)? (CMS 625.16) Ground Rod Readings=
☐	☐	☐	11. When shorted, does the conflict monitor cause the intersection to go to flash? (CMS 733.03)
☐	☐	☐	12. Is the control equipment, terminal blocks, or shelves no closer than 6" to the top of the foundation? (CMS 633.08)
☐	☐	☐	13. Is there ½" preformed joint filler between foundation and adjacent paved areas (this includes work pad)? (TC-83.20)
☐	☐	☐	14. Does the enclosure include a vent, fan and thermostat? (CMS 733.03)
☐	☐	☐	15. Is the conduit sealed with a removable sealing compound? *No foam sealer!* (CMS 633.08)
☐	☐	☐	16. Are the proper diodes cut on the permissive card (2070)? Additional diodes shall not be allowed to be removed.
☐	☐	☐	17. Are there two (2) sets of equipment lists, operation and maintenance manuals, and board-level schematic and wiring diagrams of the UPS, and the battery data sheets? (CMS 633.05 and UPS Note)
☐	☐	☐	18. Data key present?
☐	☐	☐	19. Does the cabinet have the proper finish inside and out as per plan (CMS 733.03)
☐	☐	☐	20. Is all the equipment as per plan or ODOT approved? (CMS 733.03)
☐	☐	☐	21. Is the pole-mounted cabinet at the proper height? Less than 36” high cabinet equal 30” +/- 3”. Over 36” high cabinet equals 23” +/- 3”. (TC-83.10)
☐	☐	☐	22. Are all wire terminals tight? (CMS 632.28)
☐	☐	☐	23. Is the cabinet air filter in place and clean? Front and/or Back (CMS 733.03)
☐	☐	☐	24. Are all unused conductors grounded in the controller cabinet?
☐	☐	☐	25. In a TS-1 cabinet, are the neutral (AC-) and grounding bars in the controller cabinet NOT connected together? (CMS 733.03.A.2.g) In a TS-2 cabinet, are the neutral (AC-) and grounding bars in the controller cabinet connected together? (CMS 733.03.B.1.b)

Comments:

Meets	Deficient	N/A	CABINET:
☐	☐	☐	1. Do all empty conduits have a #10 AWG pull wire installed and then have all the ends sealed? (CMS 625.12)

Comments:

Meets	Deficient	N/A	OPERATIONAL CHECKS:
☐	☐	☐	1. Upload timings from controller. Are they per plan?
☐	☐	☐	2. Do the detectors work for the assigned detector in the proper phase?
☐	☐	☐	3. Do the detectors place a call to the controller on the proper phase?
☐	☐	☐	4. Does the controller call in the proper direction and movement?
☐	☐	☐	5. Do all movements come in when a call is placed on a detector for that movement?
☐	☐	☐	6. Do ped push buttons put a call into the controller through the DC isolator?
☐	☐	☐	7. Does the controller receive the pedestrian call and call in the proper movement?
☐	☐	☐	8. Hook up generator and make sure generator panel works correctly.
☐	☐	☐	9. Do the left turn phases not conflict with WALK indication on intersecting street and/or driveway?
☐	☐	☐	10. Is the controller programmed properly for the UPS alarms? (ON Battery, Battery 2 Hour Timer, Low Battery)
☐	☐	☐	11. Flash All Red (or Y/R) as per plan?
☐	☐	☐	12. Countdown peds go to zero on yellow?

Comments:

Meets	Deficient	N/A	RADAR DETECTION:
☐	☐	☐	1. Are the radar sensors aimed/aligned properly?
☐	☐	☐	2. Are the detection zones at the proper location? Confirm in software.
☐	☐	☐	3. Are the controller detector channels assigned to the proper detection zone?

☐	☐	☐	4. Are the sensors grounded?
☐	☐	☐	5. Was dielectric grease used on the sensor's electrical connections? (inside the military connector)
☐	☐	☐	6. Are all conduit entrances, ends of bracket arms, etc. sealed? Grommets in place, if necessary?
☐	☐	☐	7. Is the cabinet interface panel properly installed?
☐	☐	☐	8. Are the cables tagged?
☐	☐	☐	9. Is the Ethernet module in place?
☐	☐	☐	10. Is all mounting hardware tight and none missing?
☐	☐	☐	11. Has strain relief been provided for the pigtail between the splice box and the sensor?
☐	☐	☐	12. Was the existing Loop Lead-In Cable removed per the plan note?

Comments:

Meets	Deficient	N/A	**UPS:**
☐	☐	☐	1. Does the UPS have lightning surge protection? (CMS 733.09)
☐	☐	☐	2. Does the UPS include a backlit LCD display that includes an event counter, hour meter, line and battery voltages/percentages and fault status? (CMS 733.09)
☐	☐	☐	3. Are the UPS alarms wired to the controller backpanel? (ON Battery, Battery 2 Hour Timer, Low Battery)

Comments:

Meets	Deficient	N/A	**UPS OPERATIONAL CHECKS:**
☐	☐	☐	1. Does UPS take over when disconnect is opened?
☐	☐	☐	2. Does Manual Bypass switch remove power from the UPS input on the terminal block?
☐	☐	☐	3. Check line voltage of cabinet with AC power and after UPS is tripped.
☐	☐	☐	4. Confirmation light installed and functioning?

Comments:

Meets	Deficient	N/A	**LOOP DETECTORS:**
☐	☐	☐	1. Were the corners, cracks, and/or joints drilled with a minimum diameter 1-1/4" drill bit? (TC-82.10)
☐	☐	☐	2. Is the lead-in conduit installed a minimum of 2 feet from edge of pavement (not shoulder, normally the white line) or edge of full depth shoulder? Conduit shall not go through curb and/or gutter (TC-82.10)
☐	☐	☐	3. Is the Lead-in-Cable twisted 3 to 5 turns per foot from the loop to the splice? (CMS 632.23)
☐	☐	☐	4. Is cured loop sealant flush with or higher than the pavement surface? (CMS 632.11)
☐	☐	☐	5. Are all adjacent loop slots a minimum of 1'-0" apart? (TC-82.10)
☐	☐	☐	6. If loop crosses joint in concrete pavement, was a 3"x3" square of material removed and filled with elastic join material or asphalt across joint? (TC-82.10)
☐	☐	☐	7. Are the detector loops installed at the proper location as per plan?

Comments:

Meets	Deficient	N/A	**TRENCHING:**
☐	☐	☐	1. Is the trench at final grade and restored? (CMS 107.10) a. If noted in the plans, is the area seeded?
☐	☐	☐	2. Is the trench in paved areas restored? (CMS 625.13)
☐	☐	☐	3. Is the trench 24 inches deep and less than 12 inches wide? CMS 625.13
☐	☐	☐	4. Have the conduit threads been protected with zinc paint? (CMS 625.12)

Comments:

Meets	Deficient	N/A	**BATTERIES:**
☐	☐	☐	1. Are batteries deep cycle, sealed prismatic lead-calcium based AGM/VRLA (Absorbed Glass Mat / Valve Regulated Lead Acid)? (CMS 733.09)
☐	☐	☐	2. Are batteries rated for 105 Ahrs? (CMS 733.09)
☐	☐	☐	3. Are batteries labeled to operate over a temperature range of -13 °F to +165 °F (– 25 °C to +74 °C)? (CMS 733.09)

☐	☐	☐	4. Are batteries **placed on** battery heater mats in the enclosure? (CMS 733.09)
☐	☐	☐	5. Disconnect and load test each battery

Comments:

Meets	Deficient	N/A	**POLES:**
☐	☐	☐	1. Is all the hardware on the poles: caps, covers, etc. (TC-81.10 & TC-81.21)
☐	☐	☐	2. Is pole essentially vertical or slightly raked away from intersection? (CMS 632.16)
☐	☐	☐	3. Is the pole properly grounded (max 25 ohms)? Table below. (CMS 625.16)
☐	☐	☐	4. Are all scratches coated with zinc coating? *Do not use galvanizing spray* (CMS 711.02)
☐	☐	☐	5. Are all required washers and nuts in place? (CMS 630.06) *Leveling nut underneath. Plain structural washer & anchor nut on top.*
☐	☐	☐	6. Does it appear that anaerobic adhesive (lock-tite) was used on anchor bolt? (CMS 630.06)
☐	☐	☐	7. Are all conduits 2" minimum above foundation but less than the height of the anchor bolts? (TC-21.20)
☐	☐	☐	8. Are all conduits into the pole sealed? (CMS 625.12)
☐	☐	☐	9. Are the anchor bolts the proper height above the foundation? (TC-81.10 & TC-81.21) *The top of the bolt should be one full bolt thread above the nut so that water does not sit in there.*
☐	☐	☐	10. Is there at least one conduit ell in addition to the grounding PVC, even if not used (minimum 2" conduit) (TC-21.20)
☐	☐	☐	11. (*Only if there is a plan note requiring it*) Do all the poles contain permanent legible markings indicating month/date of fabrication, pole gauge, bottom diameter, pole height, bolt circle, anchor bolt diameter, flange bolt diameter, quadrant and intersection? Do all the arms contain permanent legible markings indicating month/date of fabrication, arm gauge, arm diameter, arm length, connecting flange bolt diameter, quadrant and intersection?
☐	☐	☐	12. Are the cable support assembles in place and the correct size? (CMS 732.17). Cable and wire inside of poles shall include cable support assemblies. (CMS 632.21 and TC-84.20)
☐	☐	☐	13. Does the strain pole have at least one 2-inch cable entrance with a weather head and a welded blind half-coupling? (CMS 732.12)
☐	☐	☐	14. Is the pole properly grounded, cad welded with 2 coats of varnish applied over the welds and exposed cable? (CMS 625.09)
☐	☐	☐	15. Are all unused holes plugged? (CMS 732.11, TC-81.20)
☐	☐	☐	16. Are the pole identification tags present? (TC-81.10, TC-81.21)

Pole Ground Readings							
NW		NE		SW		SE	

Comments:

Meets	Deficient	N/A	PEDESTRIAN SIGNALS:
☐	☐	☐	1. Is the bottom of the pedestrian signal head 8' to 9' above the walk? (TC-85.10)
☐	☐	☐	2. Is the front of the signal head visor (or sun shade) more than 2' from the face of the curb? (TC-85.10)
☐	☐	☐	3. Is the signal head properly oriented to its crosswalk? (CMS 632.08)
☐	☐	☐	4. There should be no visible wiring on the pedestrian push button? (CMS 632.09)
☐	☐	☐	5. Are the signs installed and oriented correctly? (CMS 632.09)
☐	☐	☐	6. Is the bottom of the pedestrian push button 3'-6" to 4'-0" above the walk? (TC-85.10)
☐	☐	☐	7. On steel poles the push button and pedestrian heads must have a ¾" diameter rubber grommet installed where the signal cable passes through the pole. (TC-85.10)
☐	☐	☐	8. The cover assembly shall be attached to the housing by stainless machine screws resulting in a weatherproof and shock proof assembly. (CMS 732.06)
☐	☐	☐	9. Any unused conduit attachment holes shall be plugged. (CMS 632.08 and CMS 632.09)
☐	☐	☐	10. Are the Pedestrian Push Button Signs in place on all corner and as per plan? (CMS 632.09)
☐	☐	☐	11. Are all signal heads visors and lenses of the proper material and color as per plan? (CMS 732.05)
☐	☐	☐	12. Are the pedestrian push buttons operational?
☐	☐	☐	13. Do the pedestrian push buttons call the proper phase?
☐	☐	☐	14. Do countdown peds go to zero on yellow?

Comments:

Meets	Deficient	N/A	SERVICE:
☐	☐	☐	1. Can the service be padlocked in the ON or OFF position? (CMS 732.21)
☐	☐	☐	2. Is conduit of the size and type shown on the plans? (CMS 625.12)
☐	☐	☐	3. Were all conduit nipples coated with zinc paint? (CMS 625.12)
☐	☐	☐	4. All service hardware shall have connections sealed as to have no water leaks? (TC-83.10)
☐	☐	☐	5. Is disconnect furnished with a padlocked keyed to the maintaining agency? (CMS 631.06)
☐	☐	☐	6. Is power feed run through a disconnect before it is run inside the signal pole? (TC-83.10)
☐	☐	☐	7. Is the ground rod and cable connected by an exothermic weld over the weld and exposed cable? (CMS 625.16)

☐	☐	☐	8. Are the cable tags attached to all services wires except bare ground bonding cables? (CMS 625.17)
☐	☐	☐	9. Conduit risers mounted on painted poles shall be painted to match the poles. (CMS 632.24)
☐	☐	☐	10. All conduit fittings in steel poles for the service disconnect switch shall be a welded blind half coupling. (TC-83.10)
☐	☐	☐	11. Is the lock in place on the "Service Disconnect" switch? (CMS 631.06)
☐	☐	☐	12. Is the disconnect switch the proper height? (TC-83.10)
☐	☐	☐	13. Is the neutral bar in the "Service Disconnect Switch connected directly to the pole grounding lug? (CMS 725.19.F)
☐	☐	☐	14. Is the ground wire connected from the ground rod directly to the disconnect switch neutral (AC-) then to the pole? (G&B Note and TC-83.10)

Comments: Meter #

Meets	Deficient	N/A	**SPAN WIRE AND SIGNAL CABLES:**
☐	☐	☐	1. Are bull rings located as per plan? (CMS 632.22)
☐	☐	☐	2. Is the wire chafing against any span hanger or other type of mounting brackets? (TC-85.20)
☐	☐	☐	3. Is the messenger wire sag between 3% and 5%? Check using a tension force gauge. (CMS 632.22)
☐	☐	☐	4. Are the drip loops greater than 6"? TC-84.20
☐	☐	☐	5. Were 3 bolt clamps used to attach the span wire to the shackle? (TC-84.20)
☐	☐	☐	6. Is the lashing rod the proper size for the conductors being wrapped? (CMS 632.22, 732.18)
☐	☐	☐	7. Are there no splices in the wire, except between: A) Detector wire and lead-in-cable (CMS 632.23) B) Power cable and power supply source or service cable (CMS 632.23) C) Long lengths of interconnect or service cable (CMS 632.23)
☐	☐	☐	8. Tag end of span wire shall be Min. of 12 inches long and Max. of 24 inches long and be served or clamped. (TC-84.20)
☐	☐	☐	9. Have the Cable Support Assemblies (Grips) been properly installed? (CMS 632.21) Max 4 cables per grip.

Comments:

Meets	Deficient	N/A	SIGNAL HEADS:
☐	☐	☐	1. Is the signal head height between 16 and 18 feet? (TC-81.21) *Non-ODOT maintained signals are allowed to be between 15 and 19 feet if the maintaining agency agrees.*
☐	☐	☐	2. Are the signal heads hanging plumb? (CMS 632.06 & TC-85.20)
☐	☐	☐	3. Are all LEDs oriented correctly installed in the UP position?
☐	☐	☐	4. Are signal heads more than 8 feet apart? (OMUTCD 4D-15-(F))
☐	☐	☐	5. Is each signal face oriented to its traffic approach? (CMS 632.06)
☐	☐	☐	6. Are spade terminals used, not wires wrapped around the screw? (CMS 632.05)
☐	☐	☐	7. Are all wire entrances facing the direction of the controller housing? (Our preference)
☐	☐	☐	8. Are signal heads sealed with silicone against water leakage? (CMS 732.01, 732.02, 732.03, 732.05)
☐	☐	☐	9. Is all hardware used to join optical sections together (tri-stud) stainless steel? (CMS 732.01) *Not zinc plated. Zinc plated is shiny like it is chromed. Stainless steel is barely magnetic. Test with a magnet*
☐	☐	☐	10. Do all signal heads have at least 6-inch drip loops? (TC-85.20)
☐	☐	☐	11. Are all set screws and locking nuts tight?
☐	☐	☐	12. Are all unused openings plugged?
☐	☐	☐	13. Are balance adjusters required by the Plans? (CMS 632.06)
☐	☐	☐	14. Are all signal heads visors and lenses of the proper material and color as per plan? (CMS 732.01)
☐	☐	☐	15. Are the “optically programmed” heads masked properly or according to the plan? (CMS 732.02, 732.03)
☐	☐	☐	16. Do the OPTICOM receiver heads have a weep hole drilled in the bottom?
☐	☐	☐	17. Are all signal heads placed as per plan?
☐	☐	☐	18. Are the signals installed using an extender hanger at the top of the signal? Bottom tether anchor extenders shall only be used if there is interference between the backplate and tether wire.
☐	☐	☐	19. Are supplemental, pole mounted signals installed 11’ to 12’ above the pavement?

Comments:

Meets	Deficient	N/A	PULL BOXES:
☐	☐	☐	1. Are pull boxes installed to grade? (CMS 625.11)
☐	☐	☐	2. Is the pull box installed on a 6" gravel base? (CMS 625.11)

☐	☐	☐	3. Are all tags/labels in place and legible? (CMS 632.05)
☐	☐	☐	4. Is there duct seal in all the conduits entering the base of a signal pole, sign support, light pole, light tower or pad mounted equipment? (CMS 625.12)
☐	☐	☐	5. Is the proper ID “TRAFFIC” or “ELECTRIC” on the pull box lid? (CMS 725.08)
☐	☐	☐	6. Are there bolts in the pull box lid? *Shall be countersunk hex head or socket head cap screws* (HL-30.11)
☐	☐	☐	7. Splice kits are completely filled with sealant and air voids are less than 1/4"? (TC-82.10)
☐	☐	☐	8. Are all the openings, around conduits or knockouts, sealed? (HL-30.11)
☐	☐	☐	9. If necessary, are drains installed to under drains or side slopes? (HL-30.11)
☐	☐	☐	10. Are all ends of rigid metal conduits capped with proper bushings? (CMS 625.12)
☐	☐	☐	11. Are bolt holes in metal diagonal pieces not in the concrete pull box itself? (HL-30.11)
☐	☐	☐	12. Is the equipment grounding conductor attached to the frame diagonal? (CMS 625.11)
☐	☐	☐	13. Is there a durable label reminding of the need to lubricate the threads of the cover hold down screws with grease or anti-seize compound on the inside of the frame or upper wall? (HL-30.11)
☐	☐	☐	14. Are all metallic items enclosing electrical conductors bonded together and to a good earth ground? (CMS 625.12)
☐	☐	☐	15. Are the Splice Kits ODOT approved? (CMS 632.23)
☐	☐	☐	16. Is “cement grout” in place around the conduits that enter the pull box? (HL-30.11)
☐	☐	☐	17. Are the pull boxes the correct size and type according to the plan? (HL-30.11)
☐	☐	☐	18. Is the final grade and seeding complete around the pull boxes? (CMS 625.01,625.11,632.01,HL-30.22, and HL-30.11)
☐	☐	☐	19. Do all empty conduits have a #10 AWG pull wire installed and then have all the ends sealed? (CMS 625.12)

Comments:

Meets	Deficient	N/A	**TETHER & BACKPLATES:**
☐	☐	☐	1. Is S-hook and turnbuckle at least at one end of simple span or at all ends of complex span?
☐	☐	☐	2. Is S-hook closed at pole end?
☐	☐	☐	3. Is 1/8” stainless steel wire wound around turnbuckle to prevent turning of turnbuckle?
☐	☐	☐	4. Is tether installed horizontally?
☐	☐	☐	5. Is S-hook properly sized? 3 / 8” for Pole Design No 1-4 1 / 2” for Pole Design No. 5-14
☐	☐	☐	6. Is safety tie installed at each turnbuckle?
☐	☐	☐	7. Is safety tie 1x19, 1 / 8” stainless steel wire?

☐	☐	☐	8. Is safety tie slack but not so slack that it touches pole?
☐	☐	☐	9. Does the safety tie have three clips per end at 3-1/4" spacing?
☐	☐	☐	10. Is safety tie thimble clamp less than 6" from messenger wire clamp?
☐	☐	☐	11. Does tether wire have a vertical clearance of 17 feet to 19 feet over the roadway?
☐	☐	☐	12. Is tether wire 1 / 4" ASTM A475 Utilities Grade wire?
☐	☐	☐	13. If heads have backplates, is the tether wire below the backplate? (TC-85.20)
☐	☐	☐	14. Is tether wire in the bottom of the breakaway clamp?
☐	☐	☐	15. Do backplates have 2" wide continuous fluorescent yellow reflective border? (TC-85.20)
☐	☐	☐	16. Are backplates aluminum? (CMS 732.22)
☐	☐	☐	17. Does backplate extend 5" beyond the outside of the signal assembly on all sides? (CMS 732.22)
☐	☐	☐	18. Are there no gaps between the backplate and the signal head or between signal sections? (CMS 732.22)
☐	☐	☐	19. Is all assembly and mounting hardware stainless steel? (CMS 732.22)
☐	☐	☐	20. If used, are machine nuts thread-deforming or nylon locknuts? (CMS 732.22)
☐	☐	☐	21. Rivets shall not be used for mounting the backplate. (CMS 732.22)
☐	☐	☐	22. Were a minimum of four mounting points used on each signal section for attaching the backplate? (CMS 732.22)
☐	☐	☐	23. Is the tether wire tension adjusted to minimize movement of signal heads in high winds? Typical tension is 600-800 lbs (check with tension gauge).

Comments:

ODOT DISTRICT 6
TRAFFIC SIGNAL INSPECTION
CONTRACTOR CERTIFICATION

Project Number ____ Date _______________

Project Engineer / Supervisor ____

Signal Contractor ____

Intersection ____

I ____ request a final inspection of the work completed at the signal
Print Name (Contractor Representative)
noted above. I have verified by checking all applicable boxes above that all work has been completed as per the contract requirements.

____
Contractor Representative Signature

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