pennsylvania
DEPARTMENT OF TRANSPORTATION

494-17-01

DATE: March 9, 2017

SUBJECT: Traffic Signal Backplate Standardization

TO: District Executives

FROM: Richard N. Roman, P.E., Director
Bureau of Maintenance and Operations

Richard Roman /s/

This Strike-off Letter (SOL) will update several publications in regards to standardizing traffic signal backplates, and will be effective on July 1, 2017 on all new and upgrades to existing traffic signal instalations. Prior to that date it is encouraged to follow this SOL whenever possible. This standardizing of traffic signal backplates was agreed upon at the April 6 – April 7, 2016 District Traffic Engineers Meeting held in State College, PA.

Safety benefits are anticipated as a result of this standardization, such as visibility being enhanced, and motorists expecting the same traffic signal setup at intersections. According to Institute of Transportation Engineers, traffic signal backplates with retroreflective borders ultimately leads to fewer crashes at signalized intersections (ITE Journal June 2015, Nabors et al).

The following publications have been updated as follows (attached are the revised pages with changes shown in red, and new pages with the changes to replace the old publication pages):

1) Publication 408 (pages 955-1, 1104-21, and 1124-2):
    a. Section 955 has been changed to follow the traffic signal backplate information relayed in section 1104.
    b. Section 1104 has been changed to state that traffic signal backplates shall be one piece aluminum, black, between 5 and 8 inches, and include yellow retroreflective tape around the edges among other items.
    c. Section 1124 has been changed to reference section 1104 in regards to backplates.
2) Publication 149 (pages 6-5, 16-12, and 20-14): changes are to reference the Publication 408, Section 1104 for how traffic signal backplates should be installed, along with showing several references to traffic signal backplates being standardized.
3) Publication 148 (TC-8805 page 1 of 1): change to section TC-8805 drawing diagram of a typical traffic signal backplate setup as described in Publication 408, section 1104.

This SOL and clearance transmittal process was reviewed in accordance with Publication 693: Specification Review Manual (Chapter 2.1 Standard Clearance Transmittal Process). Clearance transmittal process was performed for this as Clearance Transmittal CT T-16-014 for July 26, 2016 to August 26, 2016. Comment responses to all commenters were accepted per Publication 693.

Should you have any questions, please contact Benjamin Flanagan, Manager of the Traffic Operations Deployment and Maintenance Section at (717) 705-1448.

4940/DPF/hmq

cc: FHWA Pennsylvania Division Office
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Matthew DePaoli, Senior Civil Engineer, BOMO

SECTION 955—SIGNAL HEADS

955.1 DESCRIPTION— This work is the furnishing and installation of assemblies for the control and illumination of vehicular traffic signals, pedestrian signals, or lane control signals, which includes the appropriate housing and mounting hardware.

955.2 MATERIAL— Sections 1104.01 and 1104.06.

955.3 CONSTRUCTION— Section 1104.01, as shown on the Standard Drawings, and as follows:

(a) General. Arrange and display traffic signal heads in accordance with the approved plans. Variations to the permit should not be completed without approval of the District Traffic Engineer.

Securely mount signal heads, using signal mounting brackets, where indicated, and according to the regulations.

Install signal heads over roadways with the top of the housings at the same elevation and as shown on the Standard Drawings. Where vehicular and pedestrian signals are to be installed on the same support, separate the assemblies. Aim vehicular signal heads, as directed, toward a point approximately 150 feet in advance of the stop line and in the center of the traveled traffic approach. Install louvers where it is necessary to restrict the view of the signal indications from an adjacent approach as specified in Section 955.3(c). Aim pedestrian signals to the far side of the crosswalk they are to control.

Install backplates per Section 1104.06. ~~and~~ Install visors as directed on the approved plans.

Securely cover signals with an opaque material that covers and hides signal indicators from the view of traffic until the signal is put into operation. Use material that is sufficiently opaque to hide any lighted signal face indication. Burlap may be used as a hood material if the signal indications are not lighted and will not be until the hood is removed. Maintain the hood and replace or repair the hood if it becomes loose, torn, or removed.

(b) Light Emitting Diode (LED) Modules. Install, or retrofit into existing signal heads, according to manufacturer's instructions.

(c) Optically Programmed Signals. According to the manufacturer's instructions, program each signal head to restrict signal visibility to the area indicated.

955.4 MEASUREMENT AND PAYMENT—

(a) Vehicular Signal Heads. Each

For the type indicated.

The price includes, when indicated, traffic signal housing, louvers, ~~backplates,~~ and mounting hardware.

(b) Optically Programmed Signal Heads. Each

For the type indicated.

The price includes, when indicated, traffic signal housing, tunnel visors, louvers, ~~backplates,~~ and mounting hardware.

(c) Pedestrian Signal Heads. Each

For the type indicated.

The price includes, when indicated, traffic signal housing, louvers, and mounting hardware.

(d) Lane-Use Traffic Control Signal Heads. Each

(e) Programmable Louvered Head. Each

2. Reflectors. Polycarbonate or aluminum. When the reflector is attached to the door, provide a means by which opening the door disables the indication.

3. Backplates. Furnish backplates that conform to the following:

- Shall be one-piece aluminum with a minimum thickness of 0.06 inch (thickness does not include retroreflective border).
- Shall be powder coated dull black (Federal Standard 595-37038) on both the front and back sides.
- Top, bottom, and sides shall measure from five to eight inches in width.
- Shall have rounded outside corners.
- Shall include louvers with no louvers closer than 0.5 inch from the inner or 2.5 inches from the outer edge. Louver orientation shall be vertical on sides and horizontal on top and bottom.
- Shall provide a minimum of four corner mounting attachment points per section head and must not interfere with the operation of the section head doors.
- Shall include passivated stainless steel type 316 or 304 screws, washers, and other installation hardware required to mount securely.
- Shall be permanently marked on the back side with the manufacturer name, part/model number and date of manufacturer.
- Universal backplates shall fit all applicable PennDOT-approved products.
- Shall have a minimum 2 inch fluorescent yellow, Type IX retroreflective border, placed flush with the outer edge of the backplate and placed no closer than 0.5 inch from all louvers. No sheeting is allowed over any louvered area.

~~3~~4. **Miscellaneous.** Furnish cut-away visors unless otherwise indicated. Furnish louvers ~~and backplates~~ as indicated, with a non-reflective black finish.

~~4~~5. **Warranty.** Provide all warranty documentation to the Representative at final acceptance.

(b) LED Vehicular Signal Head Modules. Bulletin 15 manufacturer and conforming to the following:

- ITE Standard for "Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement"
- ITE "Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement"
- MUTCD

Also, conforming to the regulations, and as follows:

1. Housings. Section 1104.06(a)1

2. Miscellaneous. Section 1104.06(a)~~3~~4

3. Warranties. Provide all warranty documentation to the Representative at final acceptance.

(c) Optically Programmed Signal Heads. Bulletin 15 manufacturer and conforming to the following:

1. Optical. Incorporate an optical system, using LED modules for the green, yellow, and red signal indications, that limits the visibility zone internally and optically, without the use of hoods or louvers. The projected signal may be visible or selectively veiled anywhere within 15 degrees of the optical axis.

2. Sections. Provide an integral means for the incremental tilting of each section, from 0 degrees to 10 degrees above and below the horizontal. Unless directed otherwise, assemble vertically-mounted signals with a 4-degree tilt below the horizontal. Provide couplers, serrated locking rings, flanges, gaskets, and other hardware necessary to mate optically programmed signal sections together or to mate with nonoptically programmed sections, all in a secure and

Make any timing adjustments as directed by the Representative and document accordingly on the approved plans. Any modifications will require Representative authorization and the approved plans to be updated accordingly. Submit any proposed signal timing changes to the Representative for approval prior to implementation. Timing adjustments and/or other approved plan modifications will be considered incidental to this item.

1124.03 TEMPORARY TRAFFIC CONTROL SIGNALS ON PEDESTAL-MOUNTED PORTABLE TRAFFIC CONTROL SIGNAL SYSTEMS

(a) System Configuration and Application. Furnish each pedestal-mounted portable traffic control signal system consisting of a minimum of two pedestal-mounted signal head units per approach or as directed by the approved plans.

Use trailer- or pedestal-mounted portable traffic signals only for single-lane, alternating one-way traffic, short-term, stationary applications as directed in Publication 213, which includes: daylight work zones; emergency nighttime work where work is in active progress and authorized by the District Traffic Engineer; or work which begins during the daylight and continues in active progress during hours of darkness with authorization from the District Traffic Engineer.

(b) Pedestal Units.

1. Structural Adequacy. Provide a structurally adequate unit to support all pedestal-mounted equipment. Furnish units with adequate structural integrity to enable lifting and placing them as required.

2. Stability. Provide units with acceptable stability and a suitable means for ballasting.

3. Assembly Mechanisms. Equip each unit with tires and retractable handles to facilitate deployment, relocation, and removal. Mount signal heads on a retractable vertical upright equipped with a manual hand crank. Provide assembly mechanisms for simplicity and quick operation to keep set up and take down time to a minimum and to enable operation by one person.

4. Labels. Mark the manufacturer, serial number, and emergency phone number permanently on each using a decal, metal plate, or other means suitable to the Department.

(c) Signal Displays.

1. Vertical Clearance. Mount the bottom of the housing of a signal at least 8 feet but not more than 15 feet above the sidewalk. If there is no sidewalk, measure the mounting height above the pavement grade at the center of the roadway.

2. Size and Orientation. Mount each signal head vertically with indications 12 inches in diameter.

3. Signal Head Design. Furnish yellow signal head housings as specified in Section 1104.06(a)1. Provide signal heads with visors having a minimum depth of 9-1/2 inches. Equip all signal heads with backplates ~~extending at least 5 inches beyond each side of the signal face. Provide all backplates and the inside of visors with a non-reflective black finish.~~ as specified in Section 1104.06(a)3.

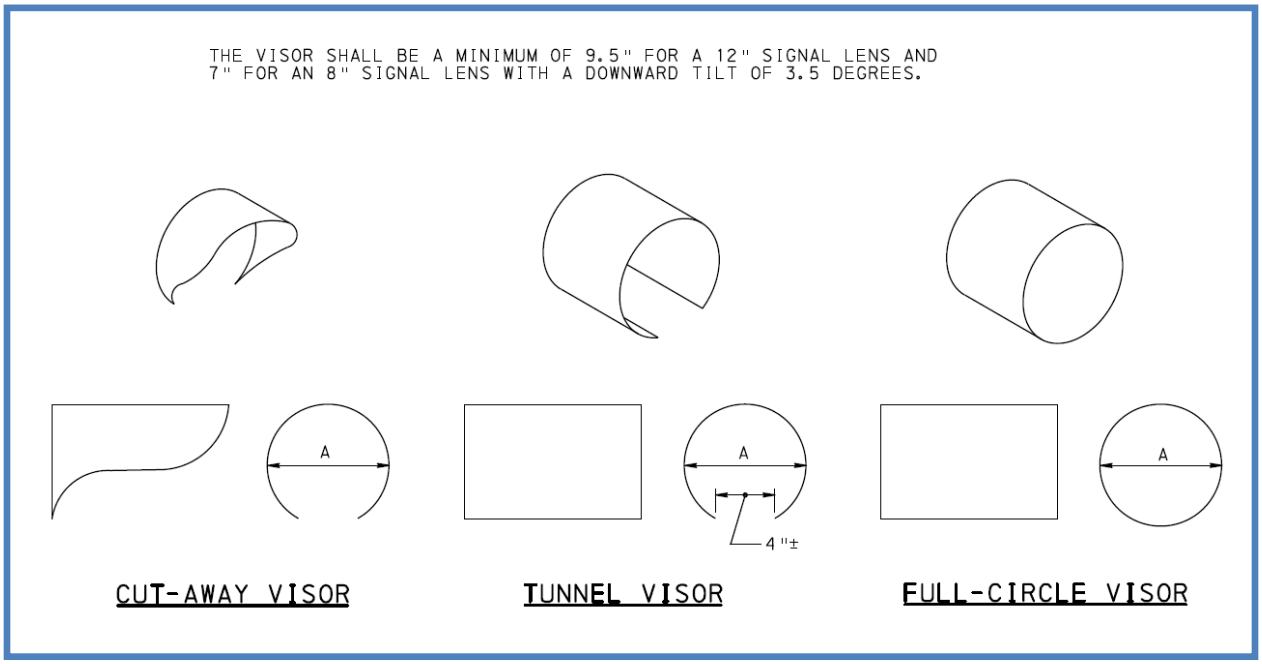
4. Approved Material Types. Furnish all signal heads with light emitting diode (LED) modules. Provide all LED modules and signal housings from a Bulletin 15 manufacturer.

5. Supplemental Signal Indicator Lamps. Provide these lamps on the back side of each unit for a visual status of the signal indications. The lamp should display red to indicate oncoming traffic is provided with a green indication and the indication should remain off if oncoming traffic is provided with a red indication.

(d) Environmental Requirements. Provide a portable traffic control signal system capable of operating acceptably over an ambient temperature range of -30F to 165F, and a relative humidity range of 0 to 95 percent.

(e) Power Supply. Provide a battery-powered, portable traffic control signal system. Furnish a power supply

Exhibit 6-2 Approved Visor Drawings

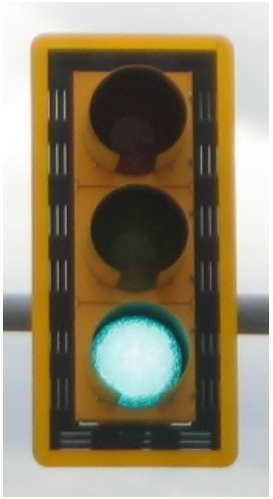


Backplates

For additional information not provided in this chapter, consult Section 4D.12 of the MUTCD .

~~The front surface of backplates should have a dull black finish. A yellow retroreflective strip with a minimum width of 3 inches may be placed along the perimeter of the face of a signal backplate to project a rectangular appearance at night.~~

Backplates shall be one one-piece aluminum and have a minimum 2-inch fluorescent yellow retroreflective border. See Section 1104.06 of the Publication 408 for more information.



Louvers

Louvers are full-circle inserts with one or more built-in fins or vanes that restrict the viewing angle of the signal. When used, louvers should be installed with tunnel or full-circle visors. Louvers are used to decrease the possibility of motorists seeing signals which are not intended for them, especially at locations where roads intersect at acute angles. Louvers shall be considered for other special applications such as vehicular signals installed for pedestrians when their indication is in conflict with other vehicular signals. For the louvered signal, as viewed by the intended user, indicate the degree of cut-off and which side the cut-off is to occur, right or left.

Lateral Positioning of Signal Faces

For additional information not provided in this Publication, consult Publication 46, Chapter 4; and the MUTCD, Section 4D.13. Referenced below is Figure 4D-4 of the MUTCD.

☐ Indicate type of visors.
☐ Indicate if backplates are to be installed.
☐ Indicate louvers (if required).

Pedestrian Signals

☐ Diagram of signal faces.
☐ Show signal numbers as they appear on the plans.
☐ Indicate messages and location.
  Upraised hand indication
  Walking person indication
  Countdown digits indication

☐ Indicate size of message.

Legend

☐ Located at bottom right of page.
☐ Indicate all symbols here which appear on the intersection representation that need explanation in addition to those indicated on the sample plan.
☐ After each symbol, give a definition of what it represents.
☐ Indicate existing equipment and items as hollow and/or with slanted text.
☐ Indicate proposed equipment and items as filled in solid and/or with upright text.

Title Block

☐ Located at bottom right corner.
☐ Locate in the top quarter of the box the following categories:
  ☐ County: insert respective county
  ☐ Municipality: insert respective municipality
  ☐ Intersection of: insert street name/number of roads.
  ☐ Locate in the second quarter, the following:
  ☐ Approved By:_____ _____
  Municipal Official Date
  ☐ Locate in the third quarter, the following:
  ☐ Recommended_____ _____
  District Traffic Engineer Date
☐ Locate at bottom quarter of box, the following:
  ☐ Scale: (Bar Type) either 1 inch = 20 feet or 1 inch = 25 feet.

For all of the above, the respective information must be filled in for each project.

Notes

☐ Locate general notes on right hand side of sheet.

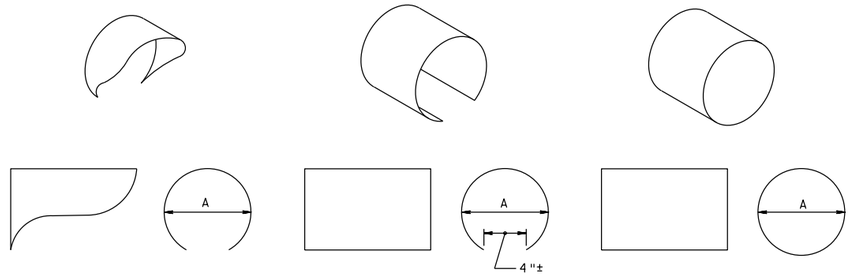
Signal Wiring Diagram (Construction Plan ONLY)

☐ Locate where able on sheet or place on additional sheet.
☐ Provide diagram of wire routing through the intersection.
☐ Indicate location of wire splices.
☐ Indicate wire conductor and size.

Exhibit 20-5 Loads and Projected Wind Areas for Traffic Signal Heads

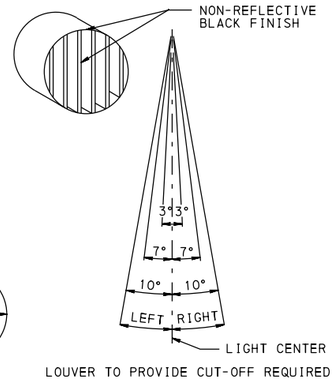
Lens Size– in All Sections	Signal Configuration (1) (See Exhibit 20-6)	Signal Sections Each Direction	Directions	Load-Pound (lb) Without backplate (2)	Wind Area - Square feet (ft^2) Without Backplate (3),(4)	Load - Pound (lb) With Backplate (2)	Wind Area - Square feet (ft^2) With Backplate 5 in Border (3),(5)	Wind Area - Square feet (ft^2) With Backplate 8 in Border (3),(5)
8	A	5	1	58	3.99	69	9.17	12.46
8	B	3	2	82	2.4	88	5.97	8.79
8	C	3	2	84	5.12	90	8.69	11.51
8	B	4	2	101	3.19	109	7.42	10.69
8	C	4	2	103	6.82	111	11.09	14.32
8	B	5	2	110	3.99	131	9.17	12.46
8	D	3	3	120	5.12	129	8.69	11.51
8	E	3	3	120	7.84	129	11.41	14.23
8	D	4	3	147	6.82	159	11.09	14.32
8	E	4	3	147	10.45	159	14.72	17.95
8	F	3	4	156	7.84	168	11.41	14.23
8	F	4	4	193	10.45	209	14.72	17.95
12	A	3	1	66	4.17	70	8.76	12.23
12	A	4	1	84	5.55	89	11.04	15.09
12	A	5	1	90	6.94	97	13.89	17.9
12	B	3	2	121	4.17	129	8.76	12.23
12	C	3	2	123	8.82	131	13.41	16.88
12	B	4	2	155	5.55	165	11.04	15.09
12	C	4	2	157	11.75	167	17.24	21.29
12	B	5	2	179	6.94	189	13.89	17.9
12	D	3	3	178	8.82	190	13.41	16.88
12	E	3	3	178	13.47	190	18.06	21.53
12	D	4	3	227	11.75	242	17.24	21.29
12	E	4	3	227	17.95	242	23.44	27.49
12	F	3	4	233	13.47	249	18.06	21.53
12	F	4	4	299	17.95	318	23.44	27.49
12PED	A	2	1	43	2.77	-	-	-
12PED	C	2	2	86	6.93	-	-	-
18PED	A	1	1	40	2.47	-	-	-
18PED	C	1	2	80	5.14	-	-	-

THE VISOR SHALL BE A MINIMUM OF 9.5" FOR A 12" SIGNAL LENS AND 7" FOR AN 8" SIGNAL LENS WITH A DOWNWARD TILT OF 3.5 DEGREES.



CUT-AWAY VISOR TUNNEL VISOR FULL-CIRCLE VISOR

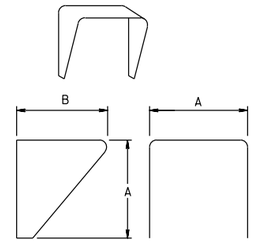
VISOR TYPES FOR VEHICULAR SIGNAL HEAD



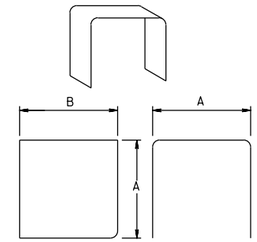
LOUVER TO PROVIDE CUT-OFF REQUIRED

LOUVER FOR VEHICULAR SIGNAL HEAD

(DO NOT USE WITH CUT-AWAY VISOR)

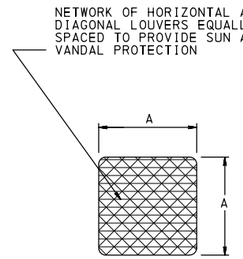


CUT-AWAY VISOR



DIMENSION A AS REQUIRED.
DIMENSION B ≈ DIMENSION A

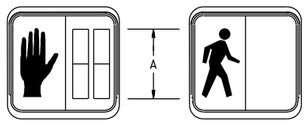
TUNNEL VISOR



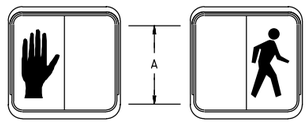
LOUVER VISOR

(FOR PEDESTRIAN SIGNAL HEAD ONLY)

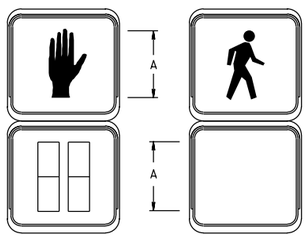
VISOR TYPES FOR PEDESTRIAN SIGNAL HEAD AND LANE-USE TRAFFIC CONTROL SIGNAL HEAD



ONE-SECTION



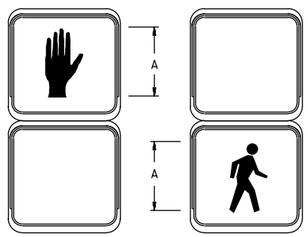
ONE-SECTION



TWO-SECTIONS

TYPE A

(COUNTDOWN) *



TWO-SECTIONS

TYPE B

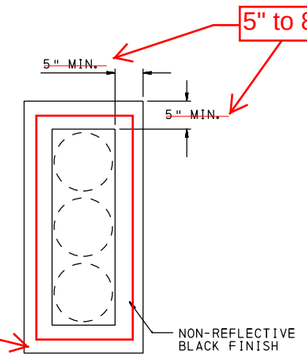
(SYMBOL) **

TYPE	DIMENSION A
A	6" *
B	6" **

* COUNTDOWN PEDESTRIAN SIGNALS SHALL CONSIST OF PORTLAND ORANGE NUMBERS THAT ARE AT LEAST 6" IN HEIGHT. FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE COUNTDOWN PEDESTRIAN SIGNAL DISPLAY, THE NUMBERS SHOULD BE AT LEAST 9" IN HEIGHT.

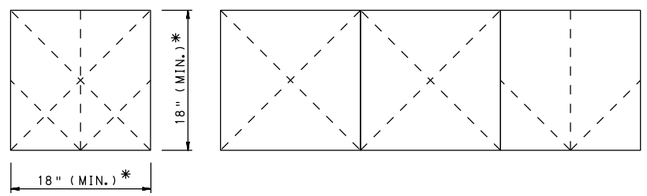
** FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE PEDESTRIAN SIGNAL HEAD INDICATIONS, DIMENSION "A" SHOUD BE AT LEAST 9" HIGH.

PEDESTRIAN SIGNAL HEAD



BACKPLATE FOR VEHICULAR SIGNAL ~~HEAD~~ HEAD*

*BACKPLATE SHALL BE ONE-PIECE ALUMINUM



ONE-SECTION TWO OR THREE SECTIONS

* NOMINAL. ACTUAL DIMENSIONS ARE AS REQUIRED TO PROVIDE SYMBOLS IN ACCORDANCE WITH ITE STANDARD FOR "LANE-USE TRAFFIC CONTROL SIGNAL HEADS" AND CURRENT ADDITION OF MUTCD.

LANE-USE TRAFFIC CONTROL SIGNAL HEAD

NOTE:

1. PEDESTRIAN SIGNALS MAY INCLUDE A COUNTDOWN TIMER THAT OPERATES DURING THE "FLASHING UPRAISED HAND" PHASE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

SIGNAL HEADS

RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHT. 1 OF 1
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8805

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Install backplates per Section 1104.06. Install visors as directed on the approved plans.

Securely cover signals with an opaque material that covers and hides signal indicators from the view of traffic until the signal is put into operation. Use material that is sufficiently opaque to hide any lighted signal face indication. Burlap may be used as a hood material if the signal indications are not lighted and will not be until the hood is removed. Maintain the hood and replace or repair the hood if it becomes loose, torn, or removed.

(b) Light Emitting Diode (LED) Modules. Install, or retrofit into existing signal heads, according to manufacturer’s instructions.

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2. Reflectors. Polycarbonate or aluminum. When the reflector is attached to the door, provide a means by which opening the door disables the indication.

3. Backplates. Furnish backplates that conform to the following:

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- Shall be powder coated dull black (Federal Standard 595-37038) on both the front and back sides.
- Top, bottom, and sides shall measure from five to eight inches in width.
- Shall have rounded outside corners.
- Shall include louvers with no louvers closer than 0.5 inch from the inner or 2.5 inches from the outer edge. Louver orientation shall be vertical on sides and horizontal on top and bottom.
- Shall provide a minimum of four corner mounting attachment points per section head and must not interfere with the operation of the section head doors.
- Shall include passivated stainless steel type 316 or 304 screws, washers, and other installation hardware required to mount securely.
- Shall be permanently marked on the back side with the manufacturer name, part/model number and date of manufacturer.
- Universal backplates shall fit all applicable PennDOT-approved products.
- Shall have a minimum 2 inch fluorescent yellow, Type IX retroreflective border, placed flush with the outer edge of the backplate and placed no closer than 0.5 inch from all louvers. No sheeting is allowed over any louvered area.

4. Miscellaneous. Furnish cut-away visors unless otherwise indicated. Furnish louvers as indicated, with a non-reflective black finish.

5. Warranty. Provide all warranty documentation to the Representative at final acceptance.

(b) LED Vehicular Signal Head Modules. Bulletin 15 manufacturer and conforming to the following:

- ITE Standard for "Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement"
- ITE "Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement"
- MUTCD

Also, conforming to the regulations, and as follows:

1. Housings. Section 1104.06(a)1

2. Miscellaneous. Section 1104.06(a)4

3. Warranties. Provide all warranty documentation to the Representative at final acceptance.

(c) Optically Programmed Signal Heads. Bulletin 15 manufacturer and conforming to the following:

1. Optical. Incorporate an optical system, using LED modules for the green, yellow, and red signal indications, that limits the visibility zone internally and optically, without the use of hoods or louvers. The projected signal may be visible or selectively veiled anywhere within 15 degrees of the optical axis.

2. Sections. Provide an integral means for the incremental tilting of each section, from 0 degrees to 10 degrees above and below the horizontal. Unless directed otherwise, assemble vertically-mounted signals with a 4-degree tilt below the horizontal. Provide couplers, serrated locking rings, flanges, gaskets, and other hardware necessary to mate optically programmed signal sections together or to mate with nonoptically programmed sections, all in a secure and

Make any timing adjustments as directed by the Representative and document accordingly on the approved plans. Any modifications will require Representative authorization and the approved plans to be updated accordingly. Submit any proposed signal timing changes to the Representative for approval prior to implementation. Timing adjustments and/or other approved plan modifications will be considered incidental to this item.

1124.03 TEMPORARY TRAFFIC CONTROL SIGNALS ON PEDESTAL-MOUNTED PORTABLE TRAFFIC CONTROL SIGNAL SYSTEMS

(a) System Configuration and Application. Furnish each pedestal-mounted portable traffic control signal system consisting of a minimum of two pedestal-mounted signal head units per approach or as directed by the approved plans.

Use trailer- or pedestal-mounted portable traffic signals only for single-lane, alternating one-way traffic, short-term, stationary applications as directed in Publication 213, which includes: daylight work zones; emergency nighttime work where work is in active progress and authorized by the District Traffic Engineer; or work which begins during the daylight and continues in active progress during hours of darkness with authorization from the District Traffic Engineer.

(b) Pedestal Units.

1. Structural Adequacy. Provide a structurally adequate unit to support all pedestal-mounted equipment. Furnish units with adequate structural integrity to enable lifting and placing them as required.

2. Stability. Provide units with acceptable stability and a suitable means for ballasting.

3. Assembly Mechanisms. Equip each unit with tires and retractable handles to facilitate deployment, relocation, and removal. Mount signal heads on a retractable vertical upright equipped with a manual hand crank. Provide assembly mechanisms for simplicity and quick operation to keep set up and take down time to a minimum and to enable operation by one person.

4. Labels. Mark the manufacturer, serial number, and emergency phone number permanently on each using a decal, metal plate, or other means suitable to the Department.

(c) Signal Displays.

1. Vertical Clearance. Mount the bottom of the housing of a signal at least 8 feet but not more than 15 feet above the sidewalk. If there is no sidewalk, measure the mounting height above the pavement grade at the center of the roadway.

2. Size and Orientation. Mount each signal head vertically with indications 12 inches in diameter.

3. Signal Head Design. Furnish yellow signal head housings as specified in Section 1104.06(a)1. Provide signal heads with visors having a minimum depth of 9-1/2 inches. Equip all signal heads with backplates as specified in Section 1104.06(a)3.

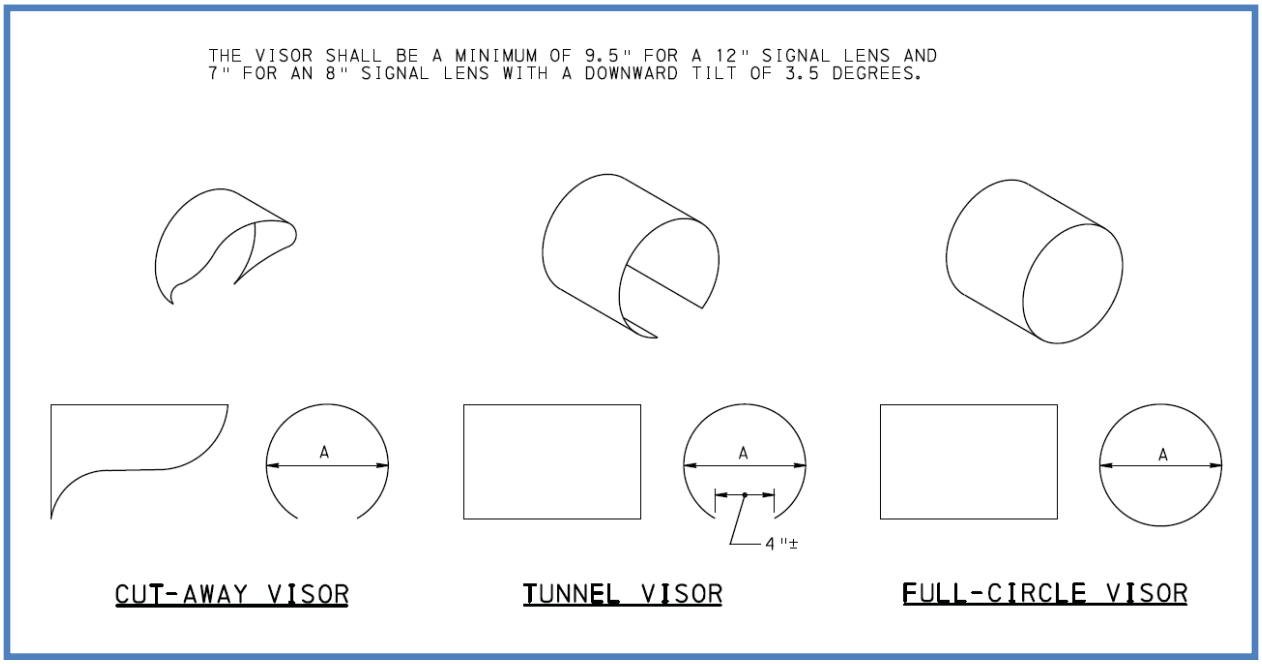
4. Approved Material Types. Furnish all signal heads with light emitting diode (LED) modules. Provide all LED modules and signal housings from a Bulletin 15 manufacturer.

5. Supplemental Signal Indicator Lamps. Provide these lamps on the back side of each unit for a visual status of the signal indications. The lamp should display red to indicate oncoming traffic is provided with a green indication and the indication should remain off if oncoming traffic is provided with a red indication.

(d) Environmental Requirements. Provide a portable traffic control signal system capable of operating acceptably over an ambient temperature range of -30F to 165F, and a relative humidity range of 0 to 95 percent.

(e) Power Supply. Provide a battery-powered, portable traffic control signal system. Furnish a power supply with sufficient capacity to power each unit for 7 days at 72F without charging. Equip each unit with batteries and a

Exhibit 6-2 Approved Visor Drawings



Backplates

For additional information not provided in this chapter, consult Section 4D.12 of the MUTCD .

Backplates shall be one-piece aluminum and have a minimum 2-inch fluorescent yellow retroreflective border.
See Section 1104.06 of the Publication 408 for more information.

Louvers

Louvers are full-circle inserts with one or more built-in fins or vanes that restrict the viewing angle of the signal. When used, louvers should be installed with tunnel or full-circle visors. Louvers are used to decrease the possibility of motorists seeing signals which are not intended for them, especially at locations where roads intersect at acute angles. Louvers shall be considered for other special applications such as vehicular signals installed for pedestrians when their indication is in conflict with other vehicular signals. For the louvered signal, as viewed by the intended user, indicate the degree of cut-off and which side the cut-off is to occur, right or left.

Lateral Positioning of Signal Faces

For additional information not provided in this Publication, consult Publication 46, Chapter 4; and the MUTCD, Section 4D.13. Referenced below is Figure 4D-4 of the MUTCD.

- ☐ Indicate type of visors.
- ☐ Indicate backplates are to be installed.
- ☐ Indicate louvers (if required).

Pedestrian Signals

- ☐ Diagram of signal faces.
- ☐ Show signal numbers as they appear on the plans.
- ☐ Indicate messages and location.
  - Upraised hand indication
  - Walking person indication
  - Countdown digits indication
- ☐ Indicate size of message.

Legend

- ☐ Located at bottom right of page.
- ☐ Indicate all symbols here which appear on the intersection representation that need explanation in addition to those indicated on the sample plan.
- ☐ After each symbol, give a definition of what it represents.
- ☐ Indicate existing equipment and items as hollow and/or with slanted text.
- ☐ Indicate proposed equipment and items as filled in solid and/or with upright text.

Title Block

- ☐ Located at bottom right corner.
- ☐ Locate in the top quarter of the box the following categories:
  - ☐ County: insert respective county
  - ☐ Municipality: insert respective municipality
  - ☐ Intersection of: insert street name/number of roads.
  - ☐ Locate in the second quarter, the following:
  - ☐ Approved By:_____ _____
    Municipal Official Date
  - ☐ Locate in the third quarter, the following:
  - ☐ Recommended_____ _____
    District Traffic Engineer Date
- ☐ Locate at bottom quarter of box, the following:
  - ☐ Scale: (Bar Type) either 1 inch = 20 feet or 1 inch = 25 feet.

For all of the above, the respective information must be filled in for each project.

Notes

- ☐ Locate general notes on right hand side of sheet.

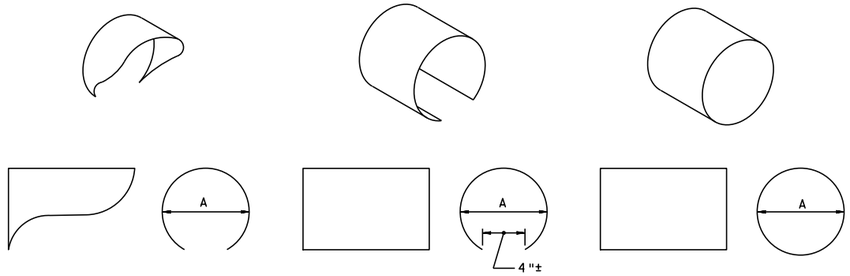
Signal Wiring Diagram (Construction Plan ONLY)

- ☐ Locate where able on sheet or place on additional sheet.
- ☐ Provide diagram of wire routing through the intersection.
- ☐ Indicate location of wire splices.
- ☐ Indicate wire conductor and size.

Exhibit 20-5 Loads and Projected Wind Areas for Traffic Signal Heads

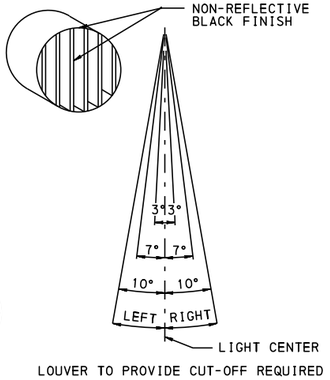
Lens Size– in All Sections	Signal Configuration (1) (See Exhibit 20-6)	Signal Sections Each Direction	Directions	Load - Pound (lb) With Backplate (2)	Wind Area - Square feet (ft^2) With Backplate 5 in Border (3),(5)	Wind Area - Square feet (ft^2) With Backplate 8 in Border (3),(5)
8	A	5	1	69	9.17	12.46
8	B	3	2	88	5.97	8.79
8	C	3	2	90	8.69	11.51
8	B	4	2	109	7.42	10.69
8	C	4	2	111	11.09	14.32
8	B	5	2	131	9.17	12.46
8	D	3	3	129	8.69	11.51
8	E	3	3	129	11.41	14.23
8	D	4	3	159	11.09	14.32
8	E	4	3	159	14.72	17.95
8	F	3	4	168	11.41	14.23
8	F	4	4	209	14.72	17.95
12	A	3	1	70	8.76	12.23
12	A	4	1	89	11.04	15.09
12	A	5	1	97	13.89	17.9
12	B	3	2	129	8.76	12.23
12	C	3	2	131	13.41	16.88
12	B	4	2	165	11.04	15.09
12	C	4	2	167	17.24	21.29
12	B	5	2	189	13.89	17.9
12	D	3	3	190	13.41	16.88
12	E	3	3	190	18.06	21.53
12	D	4	3	242	17.24	21.29
12	E	4	3	242	23.44	27.49
12	F	3	4	249	18.06	21.53
12	F	4	4	318	23.44	27.49
12PED	A	2	1	-	-	-
12PED	C	2	2	-	-	-
18PED	A	1	1	-	-	-
18PED	C	1	2	-	-	-

THE VISOR SHALL BE A MINIMUM OF 9.5" FOR A 12" SIGNAL LENS AND 7" FOR AN 8" SIGNAL LENS WITH A DOWNWARD TILT OF 3.5 DEGREES.



CUT-AWAY VISOR TUNNEL VISOR FULL-CIRCLE VISOR

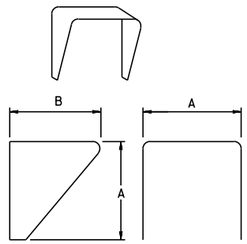
VISOR TYPES FOR VEHICULAR SIGNAL HEAD



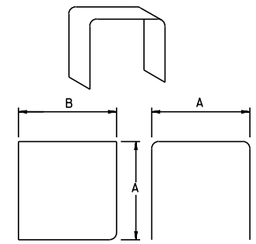
LOUVER TO PROVIDE CUT-OFF REQUIRED

LOUVER FOR VEHICULAR SIGNAL HEAD

(DO NOT USE WITH CUT-AWAY VISOR)

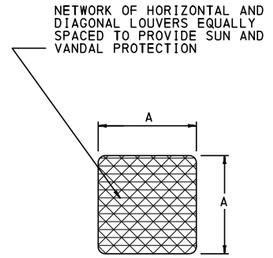


CUT-AWAY VISOR



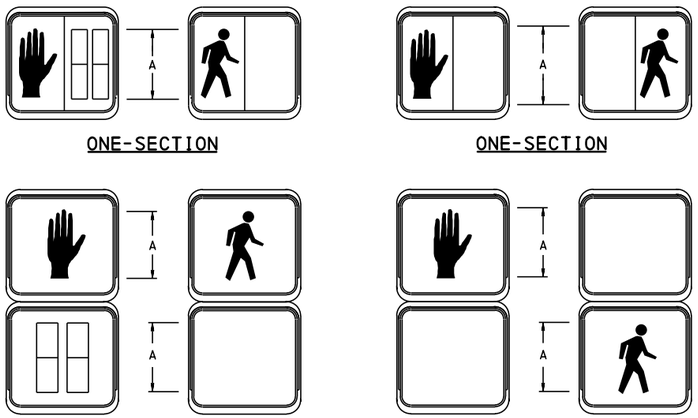
DIMENSION A AS REQUIRED.
DIMENSION B ≈ DIMENSION A

TUNNEL VISOR



LOUVER VISOR
(FOR PEDESTRIAN SIGNAL HEAD ONLY)

VISOR TYPES FOR PEDESTRIAN SIGNAL HEAD AND LANE-USE TRAFFIC CONTROL SIGNAL HEAD



ONE-SECTION ONE-SECTION

TWO-SECTIONS TWO-SECTIONS

TYPE A
(COUNTDOWN) ✳

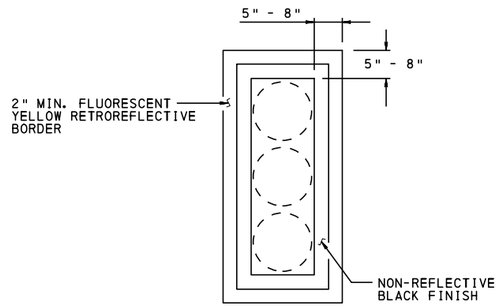
TYPE B
(SYMBOL) ✳✳

TYPE	DIMENSION A
A	6" ✳
B	6" ✳✳

✳ COUNTDOWN PEDESTRIAN SIGNALS SHALL CONSIST OF PORTLAND ORANGE NUMBERS THAT ARE AT LEAST 6" IN HEIGHT. FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE COUNTDOWN PEDESTRIAN SIGNAL DISPLAY, THE NUMBERS SHOULD BE AT LEAST 9" IN HEIGHT.

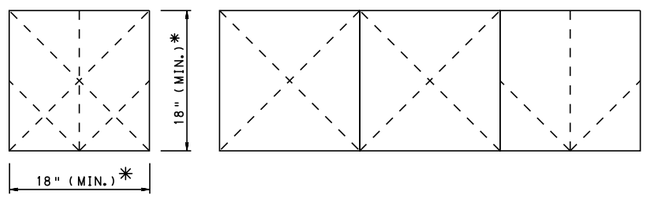
✳✳ FOR CROSSWALKS WHERE THE PEDESTRIAN ENTERS THE CROSSWALK MORE THAN 100' FROM THE PEDESTRIAN SIGNAL HEAD INDICATIONS, DIMENSION "A" SHOUD BE AT LEAST 9" HIGH.

PEDESTRIAN SIGNAL HEAD



BACKPLATE FOR VEHICULAR SIGNAL HEAD✳✳

✳✳ BACKPLATE SHALL BE ONE-PIECE ALUMINUM



ONE-SECTION TWO OR THREE SECTIONS

✳ NOMINAL. ACTUAL DIMENSIONS ARE AS REQUIRED TO PROVIDE SYMBOLS IN ACCORDANCE WITH ITE STANDARD FOR "LANE-USE TRAFFIC CONTROL SIGNAL HEADS" AND CURRENT ADDITION OF MUTCD.

LANE-USE TRAFFIC CONTROL SIGNAL HEAD

NOTE:

1. PEDESTRIAN SIGNALS MAY INCLUDE A COUNTDOWN TIMER THAT OPERATES DURING THE "FLASHING UPRAISED HAND" PHASE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS

STANDARD

SIGNAL HEADS

RECOMMENDED DEC. 12, 2011	RECOMMENDED DEC. 12, 2011	SHT. 1 OF 1
CHIEF, TRAFFIC OPERATIONS SECTION	CHIEF, HIGHWAY SAFETY AND TRAFFIC OPERATIONS DIVISION	TC-8805