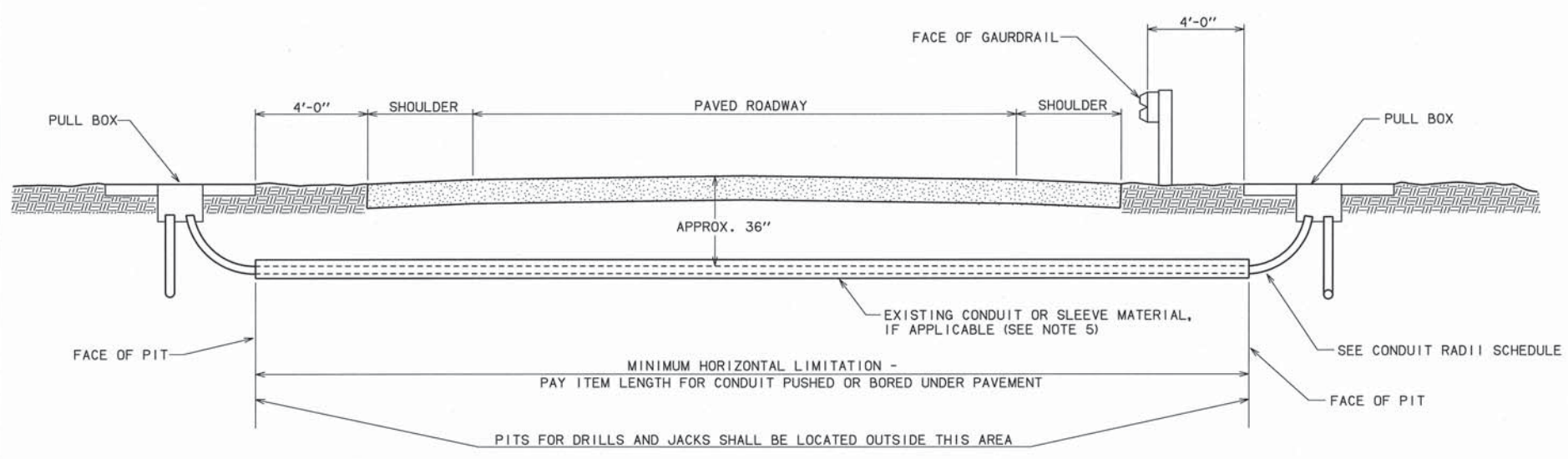
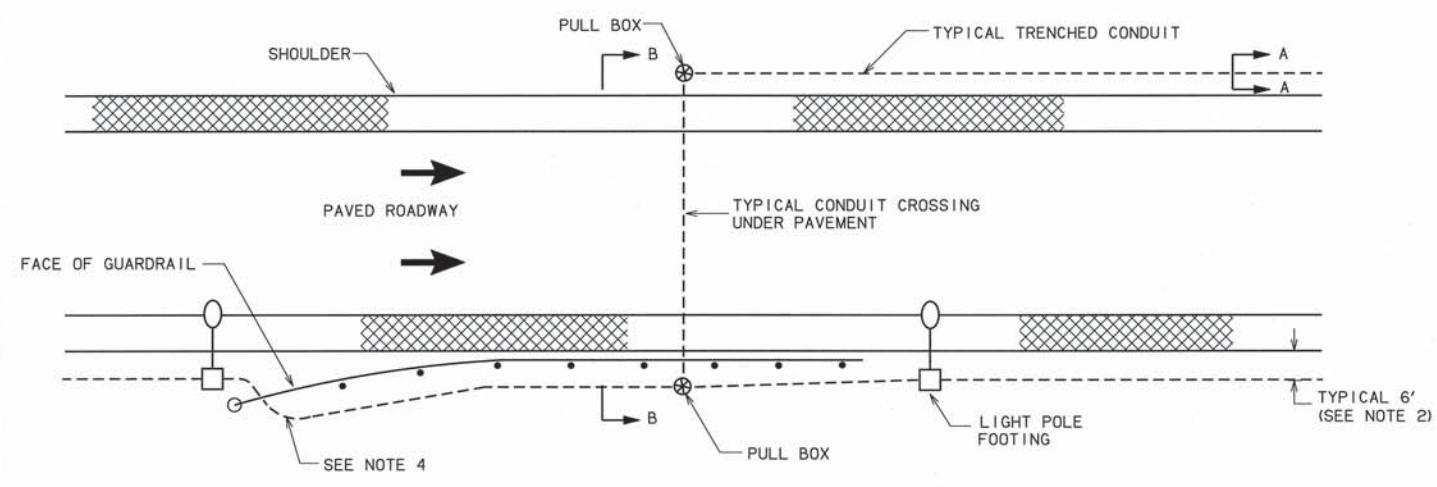


DESCRIPTION	REVISIONS	DATE

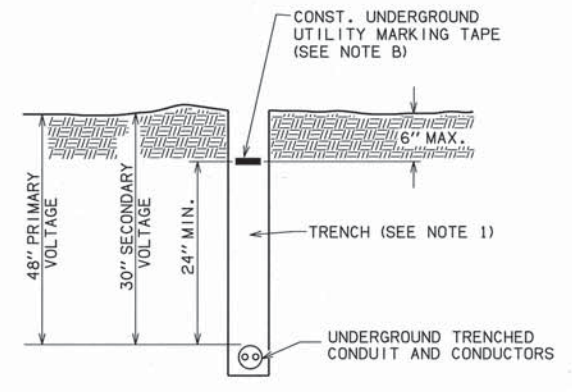


**CONDUIT CROSSING UNDER PAVEMENT**

SECTION B-B



**CONDUIT DETAILS**



**SECTION "A-A"**

**CONDUIT RADII SCHEDULE**

NOMINAL CONDUIT OR SLEEVE DIAMETER (INCHES)	MINIMUM RADIUS (INCHES)
1/2, 3/4, 1, 1-1/4	12
1-1/2	18
2	24
2-1/2, 3	30
4	36
5	48

**MATERIALS SPECIFICATIONS**

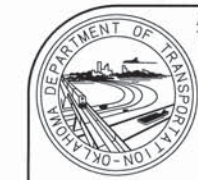
- MATERIAL FOR CABLE IN DUCT CONDUIT SHALL BE RIGID GALVANIZED STEEL OR SCHEDULE 40 PVC PLASTIC.
- THE UNDERGROUND UTILITY MARKING TAPE SHALL BE A MINIMUM OF 4 MIL THICKNESS, 6" WIDE, POLYETHYLENE TAPE, COLOR SHALL BE IN ACCORDANCE WITH AWPB UNIFORM COLOR CODE. TAPE USED TO MARK UNDERGROUND ELECTRICAL CABLE SHALL BE SAFETY RED COLOR WITH PRINTED LEGEND "CAUTION-ELECTRICAL LINE BURIED BELOW". THE TAPE SHALL BE SIMILAR TO REEF INDUSTRIES, INC. STOCK NO. 0571415 OR APPROVED EQUAL. THE COST OF THE TAPE SHALL BE INCLUDED IN THE TRENCHING.
- THE CONTRACTOR SHALL INSTALL A PULL LINE IN ALL CONDUIT BETWEEN LIGHT POLE FOOTINGS THAT IS TO BE USED FOR A FUTURE LIGHTING SYSTEM. MATERIAL SHALL BE POLYESTER TAPE OR ROPE, GALVANIZED STEEL WIRE, OR ANY OTHER APPROVED MATERIAL THAT HAS A MINIMUM BREAKING STRENGTH OF 1250 LBS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING THE PULL LINE AT EACH END OF THE CONDUIT AND ALSO FOR CAPPING THE CONDUIT ENDS TO PREVENT DEBRIS FROM PLUGGING THE CONDUIT. INSTALLATION, CAPPING AND SECURING PROCEDURES SHALL BE APPROVED BY THE ENGINEER. THE COST OF ALL MATERIAL, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THIS WORK SHALL BE INCLUDED IN THIS ITEM OF WORK.

**GENERAL NOTES**

- THE TRENCH SHALL BE BACKFILLED IN APPROX. 6" LAYERS, AND TAMPED TO 95% DENSITY OF THE SURROUNDING EARTH.
- THERE SHALL BE APPROXIMATELY 6'-0" BETWEEN THE PAVEMENT AND THE TRENCHED CONDUIT, UNLESS OTHERWISE SPECIFIED IN THE PLANS.
- ALL CONDUIT SHALL BE INSTALLED TO FIT THE EXISTING FIELD CONDITIONS. HOWEVER, IF MAJOR RELOCATIONS ARE NECESSARY THAT MAY AFFECT THE OVERALL DESIGN OF THE ELECTRICAL SYSTEM, THE CONTRACTOR SHALL RECEIVE APPROVAL OF THE ENGINEER PRIOR TO MAKING THE RELOCATIONS.
- IF TRENCHED CONDUIT MUST CROSS UNDER EXISTING GUARDRAIL IT SHOULD BE BETWEEN POSTS AND AS CLOSE TO PERPENDICULAR TO THE RAIL AS FEASIBLE.
- C.I.D. CONDUIT MAY BE INSTALLED THROUGH EXISTING CONDUIT IF AVAILABLE, OTHERWISE THE CONTRACTOR SHALL PROVIDE AN ADEQUATE SIZED SLEEVE FOR CROSSING BELOW PAVED SURFACES. ALL COSTS OF SLEEVE MATERIAL AND INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR "BORED" CONDUIT.
- THERE SHALL BE NO MORE THAN FOUR (4) 90 DEG. BENDS OR 360 DEG. TOTAL OF ALL THE BENDS IN A SINGLE RUN OF CONDUIT.
- ALL TRENCHED CONDUIT SHALL BE FOR SECONDARY VOLTAGES, UNLESS OTHERWISE SPECIFIED IN THE PLANS.
- CONDUCTORS HAVING UNLIKE VOLTAGES SHALL HAVE SEPARATE CONDUITS AND PULL BOXES.
- THE CONDUIT MUST BE INSTALLED TO FIT EXISTING CONDITIONS AND ALL DISTURBED AREAS MUST BE REPAIRED OR RESTORED TO ORIGINAL CONDITION BY THE CONTRACTOR. THERE WILL BE NO PAY ITEM FOR THIS WORK.
- WHEN CONDUIT IS INSTALLED FOR FUTURE, ALL CONDUIT ENDS SHALL BE CAPPED.

**BASIS OF PAYMENT**

ITEM NO.	ITEM	UNIT
802(A)	GALVANIZED STEEL ELECTRICAL CONDUIT	LF
802(B)	POLYVINYL CHLORIDE (PVC) CONDUIT	LF
802(C)	HIGH DENSITY POLYETHYLENE (HDPE) CONDUIT	LF
802(D)	ALUMINUM CONDUIT	LF



APPROVED BY TRAFFIC ENGINEER: *[Signature]* DATE: 8/31/2010

**TRAFFIC STANDARD**

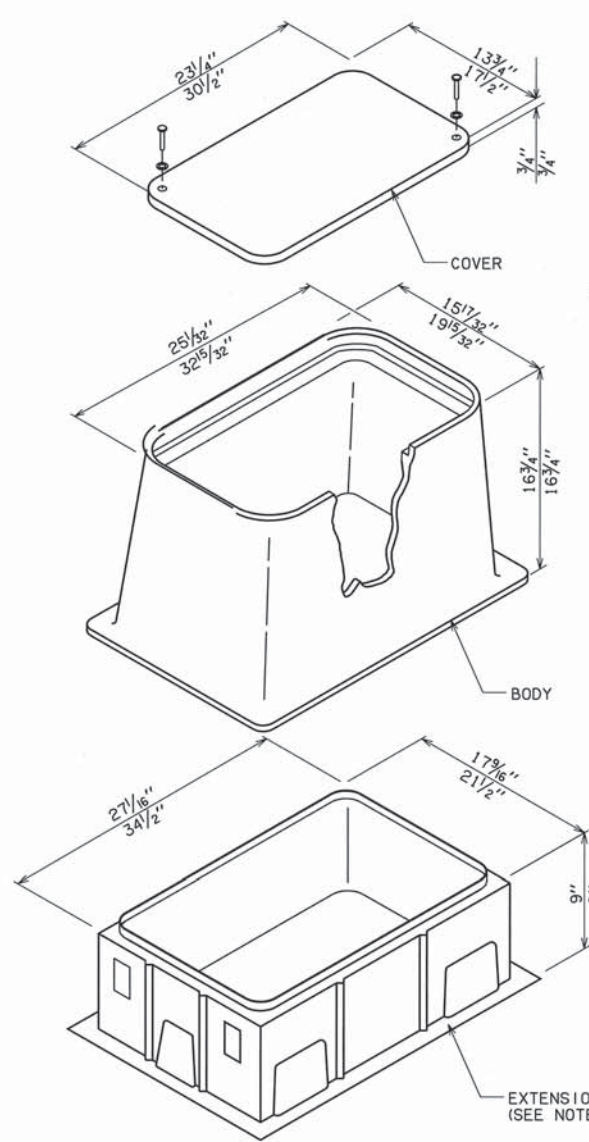
**TYPICAL CONDUIT CONSTRUCTION DETAILS (FOR UNDERGROUND CONDUIT INSTALLTION)**

2009 SPECIFICATIONS

CCD1-1 00  
T-301

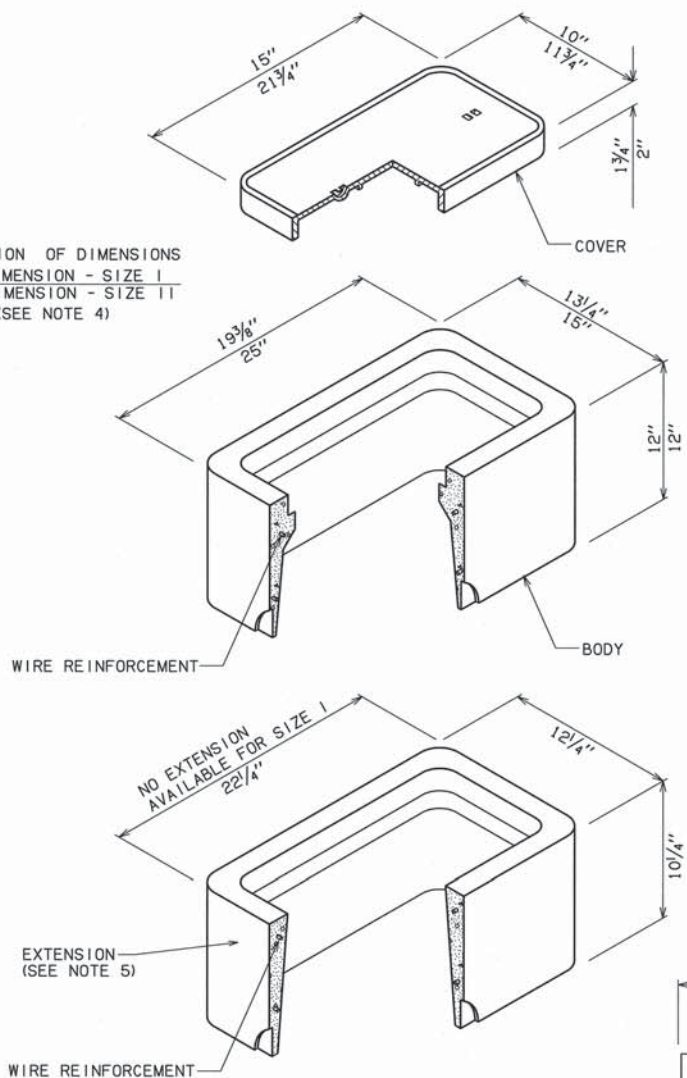


DESCRIPTION	REVISIONS	DATE
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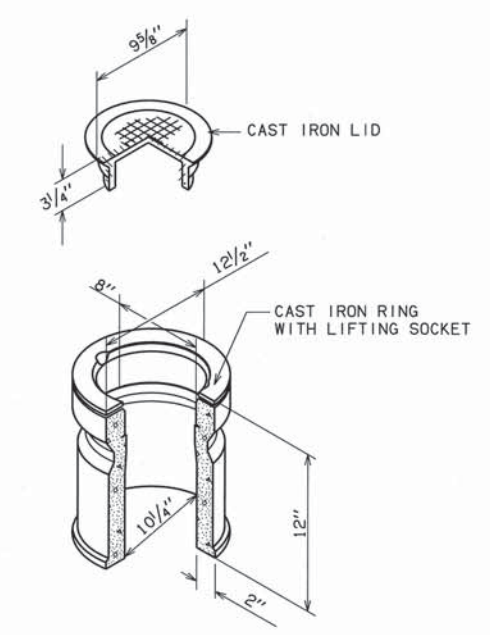


**PLASTIC PULL BOX  
SIZE I & II**

EXPLANATION OF DIMENSIONS  
TOP DIMENSION - SIZE I  
BOTTOM DIMENSION - SIZE II  
(SEE NOTE 4)



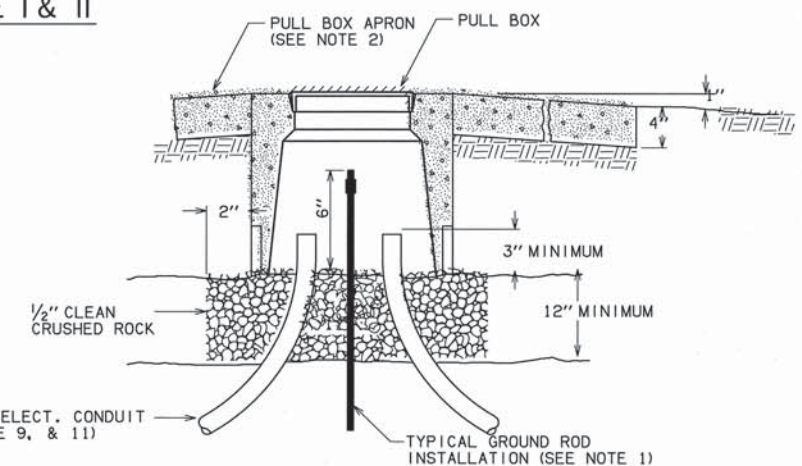
**CONCRETE PULL BOX  
SIZE I & II**



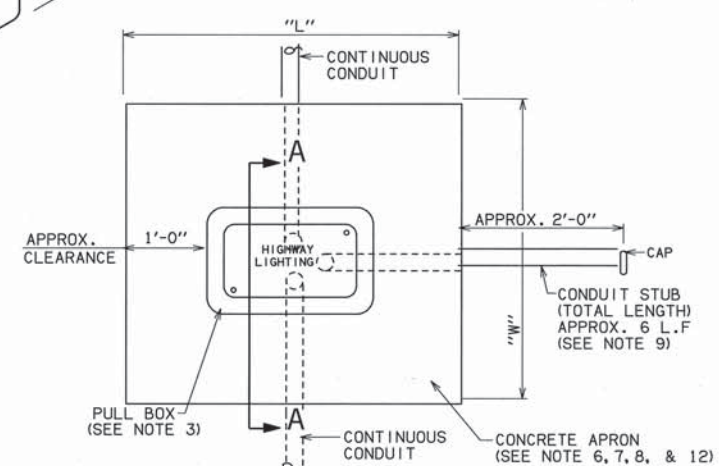
**CONCRETE PULL BOX  
SIZE III**

- MATERIAL SPECIFICATIONS**
- THE PRE-CAST CONCRETE BODY AND THE PRE-CAST REINFORCED PLASTIC PULL BOX BODY AND COVER SHALL CONFORM TO THE 2009 STANDARD SPECIFICATIONS OR SPECIAL PROVISIONS.
  - THE GRAY IRON CAST COVER & ELECTRICAL CONDUITS SHALL CONFORM TO THE 2009 STANDARD SPECIFICATIONS.
  - THE CONCRETE APRON SHALL BE CLASS "A" CONCRETE.
  - THE GRAVEL OR CRUSHED ROCK BASE SHALL BE CLEAN, TOUGH, DURABLE, PRACTICALLY FREE FROM CLAY OR OTHER FOREIGN SUBSTANCES AND SHALL PASS A 5/8" SIEVE 100%.
  - THE WIRE REINFORCEMENT SHALL BE 9 GAUGE WELDED WIRE FABRIC.

- GENERAL NOTES**
- IF SPECIFIED IN THE PLANS, A GROUND ROD SHALL BE INSTALLED AND ALL COSTS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE "PULL BOX".
  - THE PULL BOX SHALL BE BUILT TO FIT THE EXISTING FIELD CONDITION AND BE PRESENTED WITH A NEAT WORKMAN LIKE APPEARANCE. EACH PULL BOX SHALL BE INSTALLED WITH THE APPROPRIATE SIZED CONCRETE APRON. IF THE PULL BOX IS TO BE INSTALLED IN A SIDEWALK OR OTHER PAVED AREA, NO APRON WILL BE REQUIRED UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
  - THE PULL BOX COVER SHALL HAVE THE APPROPRIATE LEGEND. WHEN A PULL BOX IS INSTALLED BY THE GRADING OR SURFACING CONTRACTOR THE LEGEND FOR THE COVER SHALL READ "TRAFFIC SIGNALS", UNLESS OTHERWISE SPECIFIED IN THE PLANS. OTHER APPROPRIATE LEGENDS ARE: "HIGHWAY LIGHTING", "STREET LIGHTING", "DANGER", ETC... NO ADVERTISING OTHER THAN THE MANUFACTURERS LOGO WILL BE ALLOWED ON THE PULL BOX COVER.
  - THE DIMENSIONS FOR THE PULL BOXES ARE NOMINAL AND MAY VARY SLIGHTLY BY THE MANUFACTURER'S DESIGN.
  - PULL BOX BODY EXTENSIONS SHALL BE INSTALLED BELOW THE PULL BOX BODY AT THE LOCATION SHOWN IN THE PLANS.
  - THE COST OF THE CONCRETE APRON AND GRAVEL SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PULL BOX UNLESS OTHERWISE SPECIFIED.
  - A CIRCULAR CONCRETE APRON MAY BE USED IN LIEU OF THE SQUARE APRON SHOWN PROVIDING THE 1'-0" MINIMUM CLEARANCE IS MAINTAINED.
  - THE CONCRETE APRON THICKNESS AND SIZE MAY BE ALTERED AT THE DIRECTION OF THE ENGINEER. IF ALTERED, THE ADDITIONAL CONCRETE WILL BE PAID FOR AS "STRUCTURAL CONC." C.Y.
  - THE NUMBER, SIZE, TYPE AND LOCATION OF THE CONDUIT STUBS FOR FUTURE CONDUIT RUNS SHALL BE AS SHOWN ON THE PLANS, SEE STANDARD CCD1-1 (LATEST REVISION).
  - CONDUCTORS HAVING UNLIKE VOLTAGES SHALL HAVE SEPARATE CONDUITS AND PULL BOXES.
  - FOR BENDING RADIUS OF CONDUIT, SEE STANDARD CCD1-1 (LATEST REVISION).
  - A CONCRETE APRON SHALL BE INSTALLED AROUND ANY RESET PULLBOX OR EXISTING PULLBOX THAT DOES NOT HAVE AN APRON OR IS NOT INSTALLED IN A PAVED AREA. THE CONCRETE AND THE INSTALLATION OF THE APRON SHALL BE PAID FOR IN OTHER ITEMS OF WORK.



**SECTION "A-A"**

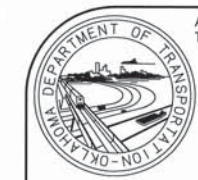


**PULL BOX APRON AND CONDUIT STUB DETAIL**

PULL BOX SIZE	"L"	"W"	CLASS "A" CONCRETE C.Y. **
I	3'-6"	3'-6"	.13
II	4'-0"	4'-0"	.17
III	3'-0"	3'-0"	.11

\*\*FOR INFORMATION ONLY

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
803(A)	PULL BOX	EA

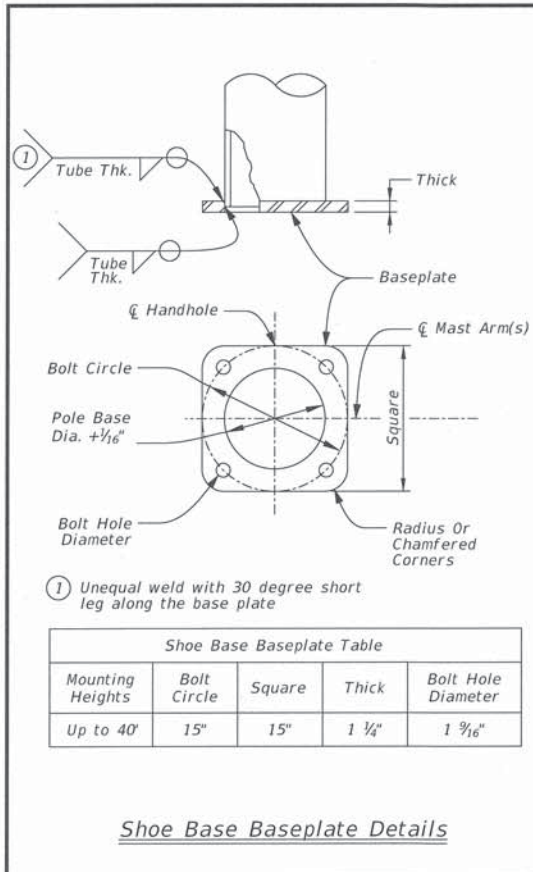


APPROVED BY  
TRAFFIC ENGINEER: *David G. Gandy* DATE: 8/31/2010  
TRAFFIC STANDARD

**TYPICAL PULL BOX DETAILS**

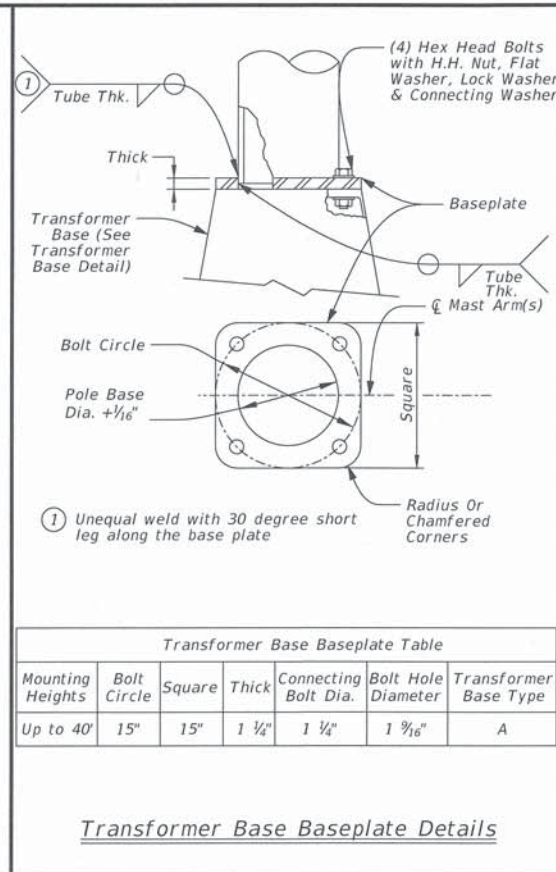
2009 SPECIFICATIONS





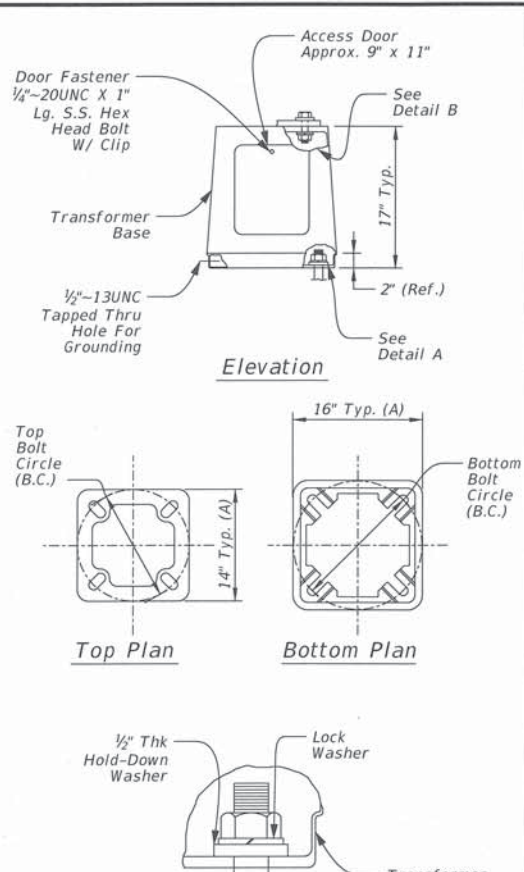
Mounting Heights	Bolt Circle	Square	Thick	Bolt Hole Diameter
Up to 40'	15"	15"	1 1/4"	1 1/16"

Shoe Base Baseplate Details



Mounting Heights	Bolt Circle	Square	Thick	Connecting Bolt Dia.	Bolt Hole Diameter	Transformer Base Type
Up to 40'	15"	15"	1 1/4"	1 1/4"	1 1/16"	A

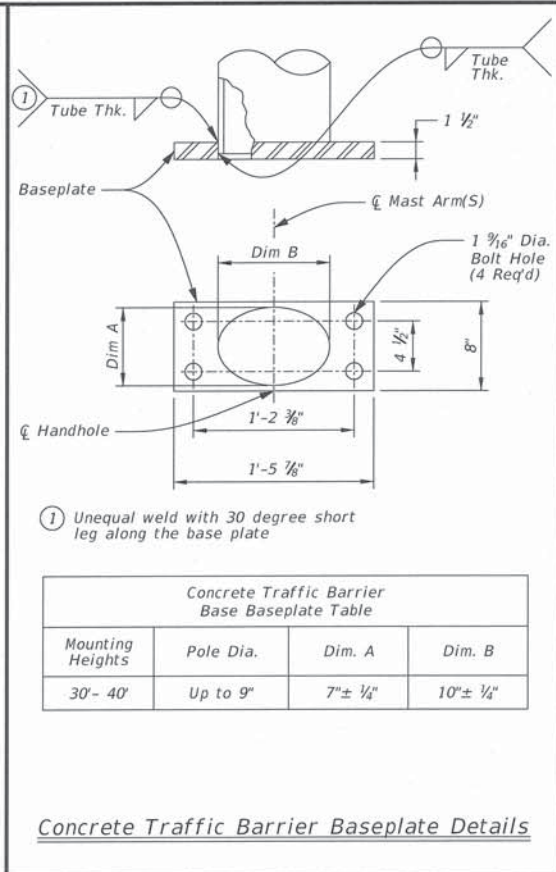
Transformer Base Baseplate Details



Base Type	Top B.C.		Bottom B.C.	
	Min.	Max.	Min.	Max.
A	13"	15"	15"	17"

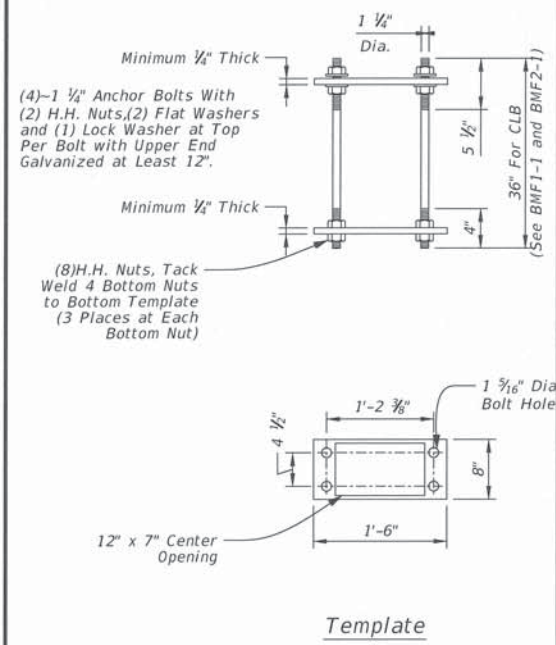
Transformer Base Bolt Circle Table

Transformer Base Details



Mounting Heights	Pole Dia.	Dim. A	Dim. B
30' - 40'	Up to 9"	7" ± 1/4"	10" ± 1/4"

Concrete Traffic Barrier Baseplate Details

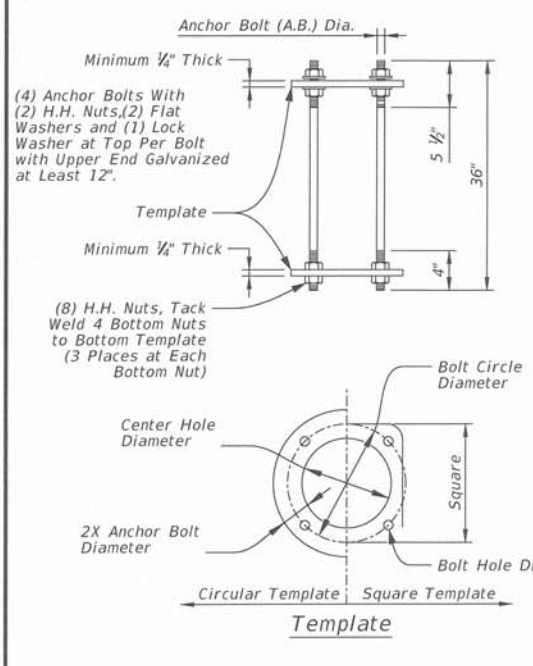


Dimension	Tolerance
Length	± 1/2"
Threaded Length	± 1/2"
Galvanized Length (If Required)	- 1/4"

Anchor Bolt Tolerances

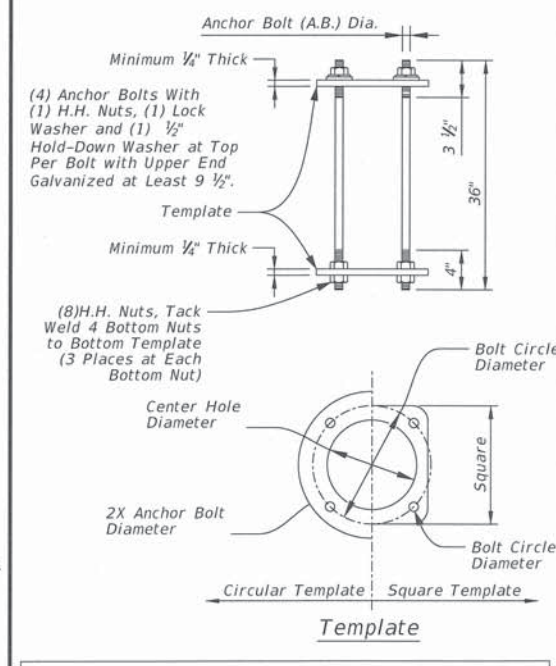
Item No.	Item	Unit
807(A)	Breakaway Base	EA

Basis of Payment



Mounting Heights	A.B. Dia.	Bolt Circle Diameter	Square	Ctr. Hole Diameter	Bolt Hole Diameter
Up to 40'	1 1/4"	15"	15"	12 1/2"	1 1/16"

Shoe Base Anchor Bolt Assembly Details



Mounting Heights	A.B. Dia.	Bolt Circle Diameter	Square	Ctr. Hole Diameter	Bolt Hole Diameter
Up to 40'	1 1/4"	16 1/2"	16 1/2"	14"	1 1/16"

Transformer Base Anchor Bolt Assembly Details

- General Notes:**
- For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
  - All breakaway bases shall meet the breakaway requirements of the 2013 Edition of the AASHTO "Standard Specifications For Structural Supports For Highway Signs, Luminaires and Traffic Signals," and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
  - Transformer bases shall be cast from aluminum, ASTM B108 or B26 alloy 356.0-T6, or other material approved by the Engineer. Four hex head bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 Grade DH galvanized.
  - Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
  - Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

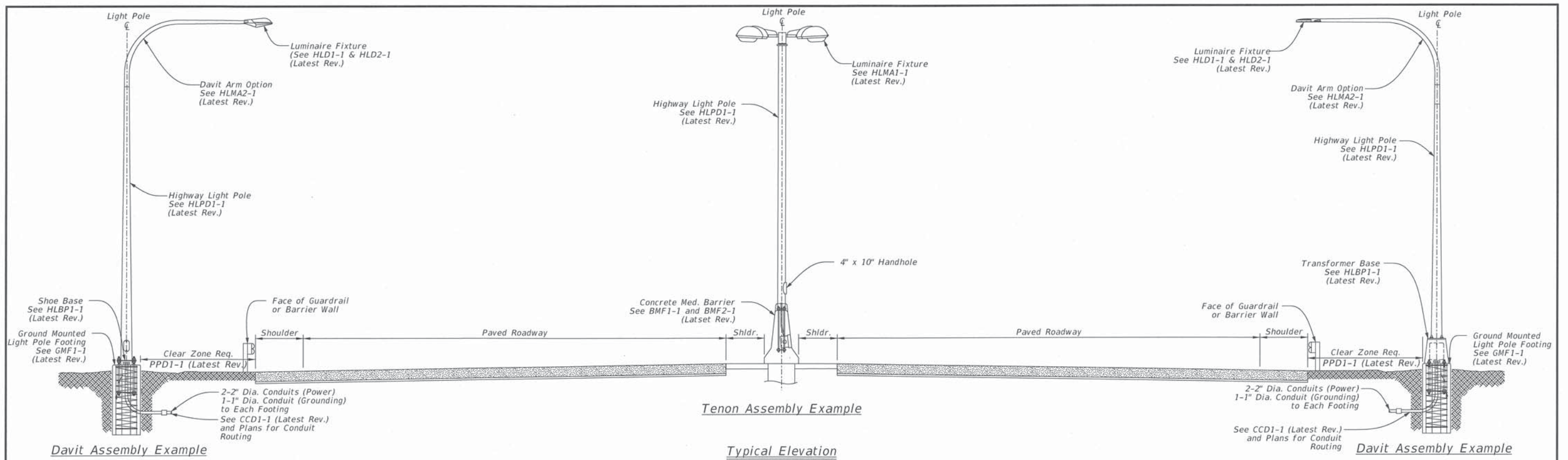
**Material Specifications:**

- Provide anchor bolt and their assemblies in accordance with Section 724, "Structural Steel." Meet the following:  
 Anchor Bolts: 4 required and shall meet the requirements of ASTM F1554 Grade 55 and have a minimum yield strength of 55,000 PSI for shoe base assembly. Provide ASTM A325 anchor bolts for transformer base assembly with a minimum yield strength of 92,000 PSI.  
 Hex Nuts: 4 required and shall meet the requirements of ASTM A-563 Grade A for heavy hex type.  
 Flat Washers: 4 required and shall meet the requirements of ASTM F436 for hardened steel washers. Note: If breakaway base design A or B is to be installed, additional extra thick flat washers required. See Standard HLBP1-1.  
 Lock Washers: 4 required and shall meet the requirements of ASTM F436 for hardened steel washers.
- All bolts, nuts and washers shall be galvanized in accordance with ASTM A-153 (AASHTO M-232).
- Anchor bolts, nuts, and washers shall be furnished with each anchor base and transformer base mounted pole.

Approved By Bridge Engineer: *[Signature]* Date: 3-24-16  
 Approved By Traffic Engineer: *[Signature]* Date: 3/10/2016

**DOT**  
 Traffic Standard  
 Typical Highway  
 Light Pole  
 Base Plate Details





**General Notes**

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, Contractor shall furnish to the Department such warranties or guarantees. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Erection and/or removal of poles and luminaires located near overhead electrical lines shall be accomplished using established industry and utility safety practices and in accordance with laws governing such work. The Contractor shall consult with the appropriate utility company prior to beginning such work.
- A. Standard Steel Pole Designs:  
Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings for standard designs are required for project records but does not require ODOT approval.
- B. Optional Steel Pole Designs:  
Multi-sided steel poles may be allowed as optional designs for high-mast poles only. Other steel pole designs if permitted or required, pending approval by the Department as outlined below.
  1. Shop Drawings:  
Optional designs require submission of shop drawings and design calculations bearing the seal of an Engineer registered in the State of Oklahoma, in accordance with Section 724, "Structural Steel." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the ODOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
  2. Structural Support Design for Luminaires:  
Lighting support structures shall be designed for a 50 year design life in accordance with the 2013 edition of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." All poles shall be designed for 90 MPH 3-second gust wind speeds at 33 FT above ground for Exposure C Category. An additional 1.14 gust factor shall be applied to the wind loads. For transformer base poles, Fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist 150% of the design moment. Certification of the load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
  3. Mast Arm Attachments:  
All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 50-pound luminaire having an effective projected area of 2.0 square feet.
  4. Anchor Bolt Assembly:  
Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.
- C. Special Designs:  
Poles with architectural treatments or ornamental designs shall meet the requirements shown elsewhere in the plans and will require shop drawing submission to the Department for review and approval.

**Explanation of Roadway Lighting Assembly Pay Items**

Type 40 MTG - ST - S (A1 - A2) - D

Two Numerical Digits Denote Nominal Mounting Height in Feet

ST: Pole and Mast Arm Must be Galvanized Steel  
SP: Galvanized Steel Pole for Installing on Barrier (CLB). See Standard BMF1-1 or BMF2-1 (Latest Revision)

Type of Base, (S-Shoe Base, T-Transformer Base, or B-Shoe Base Barrier Mount)

First Number Denotes Primary Mast Arm Length (FT)


Use of Second Mast Arm is Indicated by Second Dashed Number Denoting Length (FT)

Mast Arm Mount Type  
D: Davit  
T: Tenon

Basis of Payment		
Item No.	Item	Unit
806(C)	Highway Lighting Pole and Mast Arm	EA
806(D)	Highway Lighting Post Top Pole (Tenon Mount)	EA

Approved By Bridge Engineer: *St. Am.* Date: 3-24-16

Approved By Traffic Engineer: *Held Smith* Date: 3/10/2016

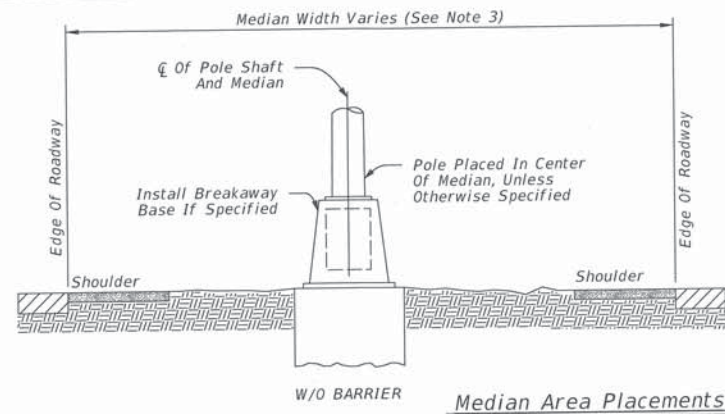


Traffic Standard  
Typical Highway  
Light Pole  
General Information

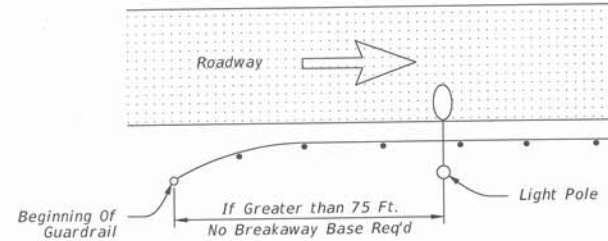
2009 Specifications

HLGN1-1	00
T-309	

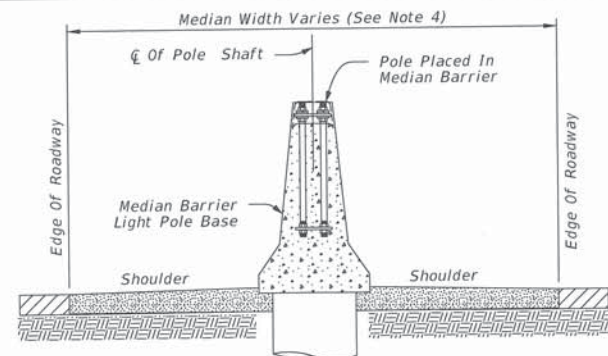




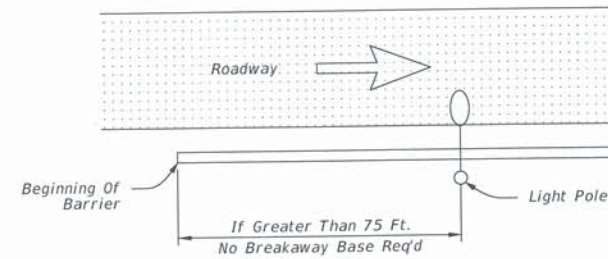
W/O BARRIER Median Area Placements



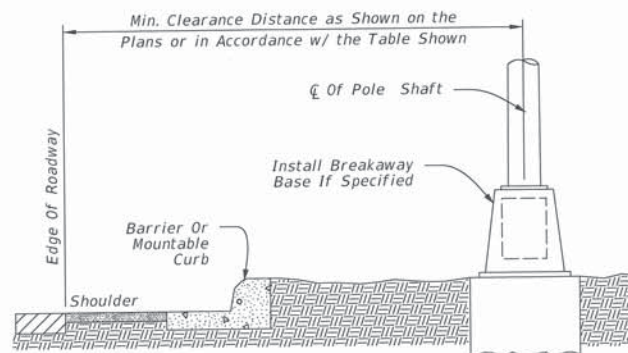
Plan View



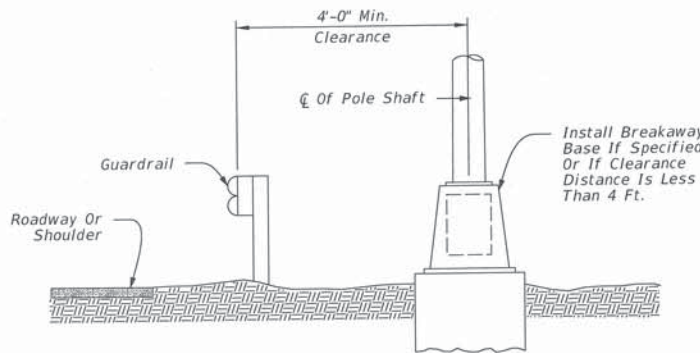
W/ BARRIER Typical Median Barrier Design X Median Area Placements



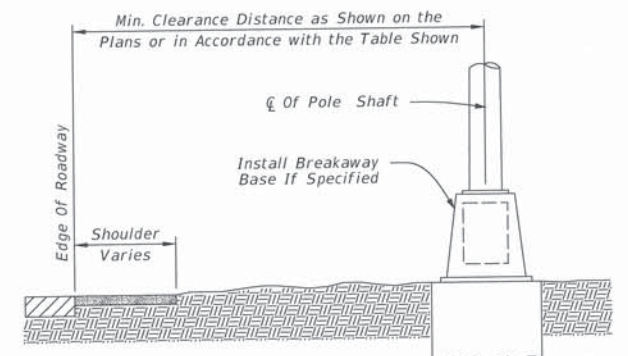
Plan View



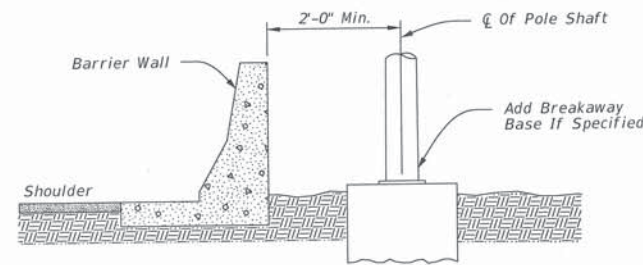
Roadway With Curb Placements



Roadway With Curb Placements



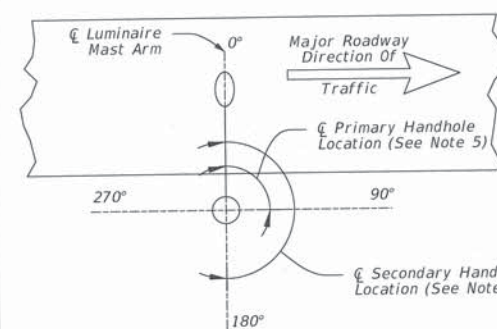
Roadway With Shoulder Placements



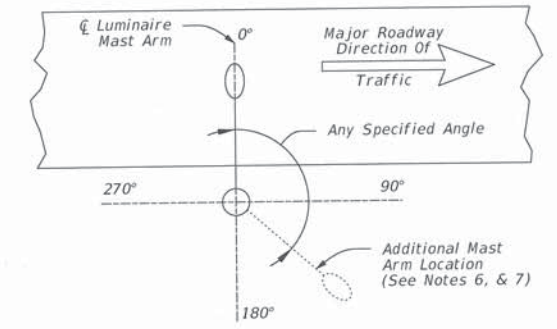
Roadway With Shoulder Placements

**General Notes:**

1. For construction and installation details of footings and poles, see the Standards PMBD1-1 (Latest Revision).
2. If the clearance distance of clear zone on the plans contradicts what the light pole clearance distance table shows, then the contractor shall install the light poles according to what is specified in the table on this standard.
3. Median width must be greater than pole shaft height unless otherwise specified on the plans.
4. Normally the shoulder width must be wide enough, 10 Ft. or more, to park a maintenance vehicle.
5. All poles, except transformer base poles, shall have hand holes with reinforcing frames and covers. Except for poles mounted on a concrete traffic barrier, hand holes shall be placed 90 degrees to mast arm and opposite the direction of traffic flow unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier.
6. If an additional luminaire mast arm is specified, the normal location is at 180 degrees.
7. For signal pole and mast arm and for combination signal pole with luminaire arm orientations, see signal pole standards or the plans.



Handhole Orientation Detail



Mast Arm Orientation Detail

Light Pole Clearance Distance Table				
Speed Limit or Operating Speed (MPH)	Recommended Clearance Distance or Clear Zone Breakaway Base Not Required (FT)	Minimum Clearance Distance or Clear Zone		
		Roadways With Shoulder or Mountable Curb Breakaway Base Required (FT)	Roadways With Barrier Curb Breakaway Base Required (FT)	Roadways With Barrier Curb Breakaway Base Not Required (FT)
55 or More	30	16	16	NR
50	25	14	14	NR
45	20	12	10	14
40	15	10	8	12
35 Or Less	10	8	4	8

NR = Not Recommended

Approved By Bridge Engineer: *[Signature]* Date: 3-24-16  
 Approved By Traffic Engineer: *[Signature]* Date: 3/14/2016  
**DOT**  
 Traffic Standard  
 Typical Light Pole Placement Detail

2009 Specifications

PPD1-2 00



**GENERAL SPECIFICATIONS FOR  
HIGH-INTENSITY DISCHARGE LUMINAIRES**

**DESCRIPTION**

THE LUMINAIRE SHALL BE A HORIZONTAL OR VERTICAL BURNING AS APPLICABLE, HIGH INTENSITY DISCHARGE, OUTDOOR LUMINAIRE COMPLETE WITH HOUSING, APPROPRIATE MOUNTING, BUILT IN BALLAST, MOGUL SOCKET, LAMP, GASKETED, REFLECTOR AND GLASS REFRACTOR, UNLESS OTHERWISE SPECIFIED.

**MATERIALS:**

**1) LAMP:**

- A. THE HIGH-INTENSITY DISCHARGE LAMP SHALL BE OF THE SIZE AND TYPE SPECIFIED IN THE PLANS.
- B. THE LAMP BASE SHALL BE NICKEL PLATED BRASS WITH A DATE CODING FEATURE.
- C. THE LAMP SHALL BE CAPABLE OF STARTING 90% OF THE TIME AT -29°C.

**2) MOUNTING:**

- A. LUMINAIRES FOR MAST ARM MOUNTING SHALL BE EQUIPPED WITH A SLIP FITTER DESIGNED TO ACCEPT 1-1/4" TO 2" SCHEDULE 40 PIPE AND PROVIDE A METHOD OF LEVELING THE LUMINAIRE AND VERTICAL ADJUSTMENTS +/- 5 DEGREES USING EXTERNALLY ACCESSIBLE BOLTS. THE SLIP FITTER SHALL BE EQUIPPED WITH A PIPE STOP.
- B. LUMINAIRES FOR POST TOP MOUNTING SHALL BE EQUIPPED WITH A SLIP FITTER DESIGNED TO ACCEPT A 2-3/8" TO 3" O.D. POLE OR TENON AND SHALL BE EQUIPPED WITH LEVELING SCREWS.

**3) GASKETS:**

THE GASKETS SHALL BE MADE OF HEAT RESISTANT NONMOISTURE ABSORBING POLYESTER, SILICON RUBBER OR DACRON FELT. THE GASKET SHALL BE CONTINUOUS OR ONE PIECE AND INSTALLED WITH NO BUTT ENDS OR GAPS.

**4) LAMP SOCKET:**

THE LAMP SOCKET SHALL BE A COMPLETELY PORCELAIN ENCLOSED NICKEL PLATED BRASS MOGUL TYPE SHELL WITH INTERNAL LAMP GRIPS TO ASSURE ELECTRICAL CONTACT UNDER CONDITIONS OF NORMAL VIBRATION AND RESIST THE REMOVAL OF THE LAMP. THE SOCKET SHALL HAVE WELDED INTERNAL CONNECTIONS, AND BE IN COMPLIANCE WITH THE LATEST REVISION OF EEI PUBLICATION NO. TDJ-147.

**5) SOCKET SUPPORT:**

THE SOCKET SUPPORT SHALL CONTAIN IDENTIFYING MARKS SO THE SOCKET MAY BE EASILY ADJUSTED, BOTH HORIZONTALLY AND VERTICALLY TO PROVIDE THE SPECIFIED IES LIGHT DISTRIBUTION.

**6) BALLAST:**

- A. BALLASTS SHALL BE BOBBIN WOUND AND HAVE A HIGH POWER FACTOR (90% OR BETTER), BE CAPABLE OF OPERATING THE HIGH INTENSITY DISCHARGE LAMP SPECIFIED FROM A SINGLE PHASE, GROUNDING, 480 VOLT NOMINAL, MULTIPLE SYSTEM, UNLESS OTHERWISE SPECIFIED. THE BALLAST, CAPACITOR AND STARTING AID, IF REQUIRED, SHALL BE PREWIRED TO THE LAMP SOCKET AND TERMINAL BOARD AND BE MODULAR CONSTRUCTED AND DESIGNED FOR EASY REMOVAL AND INSTALLATION BY USING QUICK DISCONNECT FEATURES. THE BALLAST SHALL BE DESIGNED TO START THE LAMP AT -29°C (MERCURY AND METAL HALIDE) OR AT -35°C (HIGH PRESSURE SODIUM). FOR LUMINAIRES USED IN CONJUNCTION WITH TRAFFIC SIGNALS, THE BALLAST SHALL BE DESIGNED FOR 120/240 VOLT OPERATION.
- B. METAL HALIDE BALLAST SHALL BE A CONSTANT WATTAGE AUTO-TRANSFORMER TYPE CAPABLE OF OPERATING THE LAMP WITHIN +/- 10% OF RATED WATTS WITH +/- 10% LINE VOLTAGE VARIATION.
- C. HIGH PRESSURE SODIUM BALLAST SHALL BE A CONSTANT WATTAGE OR MAGNETIC REGULATOR TYPE CAPABLE OF OPERATING THE LAMP WITHIN THE LIMITS DEFINED BY ANSI STANDARDS WITH +/- 10% LINE VOLTAGE VARIATION. ARC TUBE VOLTAGE SHALL BE 100 VOLT DESIGN.

**7) TERMINAL BOARD:**

THE TERMINAL BOARD SHALL BE OF PHENOLIC RESIN, MOLDED PLASTIC OR PORCELAIN WITH PROTECTIVE BARRIERS BETWEEN TERMINALS. THE SCREW TERMINALS SHALL BE CAPTIVE TYPE, COMPATIBLE WITH ALUMINUM OR COPPER CONDUCTORS AND CAPABLE OF ACCEPTING UP TO A NO. 6 AWG CONDUCTOR.

**8) ELECTRICAL:**

- A. ALL ELECTRICAL COMPONENTS SHALL BE INSULATED TO A MINIMUM OF 10 KV BIL.
- B. TERMINATION CONNECTORS SHALL MEET OR EXCEED TWICE THE RATED CURRENT VALUE FOR EEI-TDJ162 CLASS A HEAT CYCLE TEST.
- C. ALL WIRE SHALL BE UL APPROVED AND THE INSULATION CAPABLE OF WITHSTANDING THE DESIGNED OPERATING TEMPERATURES OF THE LUMINAIRE.

**9) HARDWARE:**

ALL NUTS BOLTS, SCREWS, CLIPS, WASHERS, SPRINGS AND ATTACHING HARDWARE SHALL BE FABRICATED FROM NON-CORROSIVE ALLOYS. CADMIUM PLATING WILL NOT BE CONSIDERED ADEQUATE WEATHER PROOFING. ALL THREADED SURFACES USED IN ALUMINUM HOUSING SHALL BE LUBRICATED WITH SILICONE GREASE.

**10) FINISH:**

UNLESS OTHERWISE SPECIFIED, THE LUMINAIRE SHALL HAVE A LIGHT GREY BAKED-ON ENAMEL FINISH, SIMILAR TO THE MUNSSELL #58G-ASA#70.

**11) PHOTO CELL AND RECEPTACLE:**

IF SPECIFIED, THE LUMINAIRE SHALL BE EQUIPPED WITH THE FOLLOWING:

- A. THE PHOTOELECTRIC CONTROL SHALL BE A HERMETICALLY SEALED CADMIUM SULFIDE PHOTOCELL, DETACHABLE TYPE, 105-285 VOLT, 50/60 HERTZ AC, OUTDOOR CONTROL COMPLETE, IN ACCORDANCE WITH EEI-NEMA STANDARDS, RELAY LOAD CONTRACTS RATED 1000 WATTS OR 1800 VOLT-AMPERE REACTIVE, SINGLE-POLE, SINGLE-THROW CONTACT, NORMALLY CLOSED FOR "FAIL SAFE" OPERATION, ENCLOSED POSITIVE LIGHTNING AND SURGE PROTECTION, HOUSED IN A HIGH IMPACT ACRYLIC HOUSING WHICH HAS A BASE PLATE GASKET AND 3-POLE POLARIZED TWIST-LOCK PLUG. TURN-ON SHALL OCCUR AT ONE FOOT-CANDLE AND TURN-OFF AT 5 FOOT-CANDLES APPROXIMATELY.
- B. THE THREE POLE LOCKING RECEPTACLE SHALL BE IN ACCORDANCE WITH THE LATEST EEI AND NEMA STANDARDS AND BE PREWIRED TO THE TERMINAL BOARD.

**12) MISCELLANEOUS:**

- A. EACH LUMINAIRE SHALL BE SUPPLIED WITH A PERMANENTLY ATTACHED NAME PLATE INSIDE THE HOUSING AND/OR ON THE BALLAST. THIS LABEL SHALL INDICATE THE MANUFACTURER, CATALOG NO., LAMP TYPE, WATTAGE, LINE VOLTAGE RATING AND CONNECTION DIAGRAM.
- B. EACH LUMINAIRE MAY BE MARKED IN ACCORDANCE WITH EEI-NEMA STANDARDS FOR "FIELD IDENTIFICATION OF HIGH-INTENSITY DISCHARGE LAMPS IN LUMINAIRES USED IN ROADWAY LIGHTING EQUIPMENT" EEI PUB. NO. TDJ-150 AND NEMA PUB. NO. OD150.
- C. FOLLOWING THE INSTALLATION OF THE HIGH MAST AND POST TOP (OFFSET DESIGN) LUMINAIRES, AIMING SHALL BE UNDER THE DIRECTION OF THE HIGHWAY LIGHTING ENGINEER.

**13) PHOTOMETRIC DATA:**

THE LUMINAIRE MANUFACTURER SHALL FURNISH PHOTOMETRIC DATA FOR COMPARING LIGHT QUALITY PRIOR TO RECEIVING INSTALLATION APPROVAL FROM THE ENGINEER.

THE PHOTOMETRIC DATA SHALL BE IN ACCORDANCE WITH THE UNIFORM COMPUTER INPUT FORMAT SPECIFIED IN THE LATEST EDITION OF THE "IES APPROVED METHOD FOR PHOTOMETRIC TESTING OF ROADWAY LUMINAIRES."

**14) TESTING:**

IF REQUESTED, A SAMPLE LUMINAIRE AND LAMP OF EACH TYPE AND SIZE SHALL BE SUPPLIED FOR TESTING PURPOSES.

**15) CERTIFICATION:**

THE LUMINAIRE AND/OR LAMP MANUFACTURER SHALL PROVIDE A TYPE "D" CERTIFICATION IN ACCORDANCE WITH SUBSECTION 106.4C OF THE "2009 STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION."

**ADDITIONAL INDIVIDUAL LUMINAIRE SPECIFICATIONS  
FOR HIGH-INTENSITY DISCHARGE LUMINAIRES**

**DESCRIPTION:**

LUMINAIRES SHALL COMPLY WITH THE GENERAL SPECIFICATIONS FOR HIGH INTENSITY DISCHARGE LUMINAIRES ON STD. HLD1-1 (LATEST REVISION), AND THE FOLLOWING SPECIFICATIONS:

**1.0 ROADWAY LUMINAIRES (GENERAL):**

- A. HOUSING: THE HOUSING SHALL BE PRECISION DIE-CAST ALUMINUM AND BE OF ADEQUATE SIZE TO CONTAIN THE BALLAST COMPONENTS, REFLECTOR LAMP AND SOCKET, TERMINAL BOARD, SLIP FITTER AND ALLOW ALL THE ELECTRICAL COMPONENTS TO OPERATE WITHIN THEIR DESIGNED TEMPERATURE RANGE. THE HOUSING SHALL BE DESIGNED TO ACCOMMODATE AT LEAST A 400 WATT HIGH PRESSURE SODIUM LAMP.
- B. REFLECTOR: THE REFLECTOR SHALL BE OF SPECULAR FINISHED, HYDRO-FORMED, ANODIC COATED ALUMINUM WITH A MINIMUM COAT THICKNESS OF 0.00015 INCHES AND WEIGHING 7.5 MILIGRAMS PER SQUARE INCH TO PROVIDE A MINIMUM REFLECTIVITY OF 82%. THE REFLECTOR SHALL HAVE A REVERSE FLANGE AND MOUNTED WITHIN THE HOUSING TO ASSURE A FIRM SURFACE FOR PROPER GASKET SEALING WHEN THE REFRACTOR DOOR IS CLOSED.

- C. REFRACTOR: THE REFRACTOR SHALL BE PRESSED, HEAT RESISTANT, CRYSTAL CLEAR BOROSILICATE GLASS, ANNEALED, HOMOGENOUS AND FREE FROM IMPERFECTIONS AND STRIATIONS. REFRACTING PRISMS SHALL BE INCORPORATED IN THE REFRACTOR TO ASSURE MAXIMUM UTILIZATION OF THE LIGHT GENERATED AND PROVIDE THE REQUIRED PHOTOMETRIC DISTRIBUTION.
- D. DOOR: THE REFRACTOR DOOR SHALL BE PRECISION DIE-CAST ALUMINUM WITH CLIPS FOR PROPER POSITIONING OF THE REFRACTOR. THE DOOR SHALL BE EASILY DETACHED FROM THE HOUSING BY OPERATING THE SPRING LOADED LATCH OR LATCHES AND SEPARATING THE HINGE HALVES WHILE WEARING LINEMEN'S GLOVES.

- E. CUT-OFF VISOR: IF SPECIFIED ON THE PLANS, EACH LUMINAIRE SHALL BE EQUIPPED WITH A CUT-OFF VISOR. CUT-OFF SHALL OCCUR FULL CIRCUMFERENCE OF THE LUMINAIRE AT APPROXIMATELY 75 DEGREES FROM THE VERTICAL AXIS. THE VISOR SHALL BE SIMILAR IN COLOR TO THE LUMINAIRE.
- F. BALLAST: THE BALLAST SHALL BE DOOR MOUNTED ON ALL LUMINAIRES 400 WATT OR LESS.

**1.1 ROADWAY LUMINAIRE (CUTOFF DESIGN)**

- A. REFRACTOR: THE REFRACTOR SHALL BE FLAT STRIPPLED HEAT AND IMPACT RESISTANT GLASS.
- B. DISTRIBUTION CONTROL: DISTRIBUTION CONTROL SHALL BE CUTOFF.

**LEGEND FOR "LUMINAIRES"**

LAMP TYPE	LAMP COLOR	LUMENS	VERT. DIST.	LATERAL DIST.	CONTROL STYLE
LAMP WATT		100, 250, 310, 400, 1000, ETC...			
LAMP TYPE		MH = METAL HALIDE HPS = HIGH PRESSURE SODIUM			
LAMP COLOR		CL = CLEAR CI = COLOR IMPROVED			
NOMINAL LAMP LUMEN RATING		9, 500/22, 000/27, 5000/37, 000/50, 000/ 140, 000/ETC...			
VERTICAL DISTRIBUTION		S = SHORT M = MEDIUM L = LONG			
LATERAL DISTRIBUTION		TYPE 1, 2, 3, 4, 5			
DISTRIBUTION CONTROL		C = CUTOFF S = SEMICUTOFF N = NONCUTOFF			
STYLE		A1 = STANDARD DESIGN A2 = CUTOFF DESIGN			



STYLE A1  
(STANDARD DESIGN)



STYLE A2  
(CUTOFF DESIGN)

**TYPICAL ROADWAY LUMINAIRES**

NOMINAL LAMP WATTAGE	METAL HALIDE			HIGH PRESSURE SODIUM		
	COLOR	NOMINAL LUMENS	RATED AVG. LIFE, HRS.	COLOR	NOMINAL LUMENS	RATED AVG. LIFE, HRS.
100	CL			CL	9,500	20,000
	COATED			COATED	8,800	20,000
200	CL			CL	22,000	24,000
	COATED			COATED	26,000	24,000
250	CL	20,500	7,500	CL	27,500	24,000
	COATED	20,500	7,500	COATED	26,000	24,000
310	CL			CL	37,000	24,000
	COATED			COATED		
400	CL	34,000	15,000	CL	50,000	24,000
	COATED	34,000	15,000	COATED	47,500	24,000
1000	CL	110,000	10,000	CL	140,000	24,000
	COATED	105,000	10,000	COATED		

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
B08(A)	ROADWAY LUMINAIRE	EA



APPROVED BY: *David J. Smith* DATE: 4/8/13  
TRAFFIC ENGINEER

TRAFFIC STANDARD

TYPICAL HIGHWAY LUMINAIRE DETAILS



**General Specifications For Luminaires:**

**Description**

The luminaire shall be a horizontal or vertical burning as applicable, high intensity discharge, outdoor luminaire complete with housing, appropriate mounting, built in ballast, Mogul socket, lamp, gasketed, reflector and glass refractor, unless otherwise specified.

**Materials:**

**Lamp:**

1. The high-intensity discharge lamp shall be of the size and type specified in the plans.
2. The lamp base shall be nickel plated brass with a date coding feature.
3. The lamp shall be capable of starting 90% of the time at -29 C.

**Mounting:**

1. Luminaires for mast arm mounting shall be equipped with a Slip fitter designed to accept 1-1/4" to 2" schedule 40 pipe and provide a method of leveling the luminaire and vertical adjustments ± 5 degrees using externally accessible bolts. The Slipfitter shall be equipped with a pipe stop.
2. Luminaires for post top mounting shall be equipped with a Slipfitter designed to accept a 2-3/8" to 3" O.D. pole or Tenon and shall be equipped with leveling screws.

**Gaskets:**

1. The gaskets shall be made of heat resistant nonmoisture absorbing polyester, silicon rubber or dacron felt. The gasket shall be continuous or one piece and installed with no butt ends or gaps.

**Lamp Socket:**

1. The lamp socket shall be a completely porcelain enclosed nickel plated brass mogul type shell with internal lamp grips to assure electrical contact under conditions of normal vibration and resist the removal of the lamp. The socket shall have welded internal connections, and be in compliance with the latest revision of EEI publication no. TDJ-147.

**Socket Support:**

1. The socket support shall contain identifying marks so the socket may be easily adjusted, both horizontally and vertically to provide the specified IES light distribution.

**Ballast:**

1. Ballasts shall be bobbin wound and have a high power factor (90% or better), be capable of operating the high intensity discharge lamp specified from a single phase, grounded, 480 volt nominal, multiple system, unless otherwise specified. The ballast, capacitor and starting aid, if required, shall be rewired to the lamp socket and terminal board and be modular constructed and designed for easy removal and installation by using quick disconnect features. The ballast shall be designed to start the lamp at -29 C (mercury) or at -35 C (high pressure sodium). For luminaires used in conjunction with traffic signals, the ballast shall be designed for 120/240 volt operation.
2. High pressure sodium ballast shall be a constant wattage or magnetic regulator type capable of operating the lamp within the limits defined by ANSI standards with ± 10% line voltage variation. arc tube voltage shall be 100 volt design.

**Terminal Board:**

1. The terminal board shall be of phenolic resin, molded plastic or porcelain with protective barriers between terminals. The screw terminals shall be captive type, compatible with aluminum or copper conductors and capable of accepting up to a No. 6 AWG conductor.

**Electrical:**

1. All electrical components shall be insulated to a minimum of 10 KV BIL.
2. Termination connectors shall meet or exceed twice the rated current value for EEI-TDJ162 Class A Heat Cycle Test.
3. All wire shall be UL approved and the insulation capable of withstanding the designed operating temperatures of the luminaire.

**Hardware:**

1. All nuts bolts, screws, clips, washers, springs and attaching hardware shall be fabricated from non-corrosive alloys. Cadmium plating will not be considered adequate weather proofing. All threaded surfaces used in aluminum housing shall be lubricated with silicone grease.

**Finish:**

1. Unless otherwise specified, the luminaire shall have a light grey baked-on enamel finish, similar to the Munsell #SBG-ASA#70.

**Photo Cell and Receptacle:**

If specified, the luminaire shall be equipped with the following:

1. The photoelectric control shall be a hermetically sealed cadmium sulfide photocell, detachable type, 105-285 volt, 50/60 hertz ac, outdoor control complete, in accordance with EEI-NEMA standards, relay load contracts rated 1000 watts or 1800 volt-ampere reactive, single-pole, single-throw contact, normally closed for "fail safe" operation, enclosed positive lightning and surge protection, housed in a high impact acrylic housing which has a base plate gasket and 3-pole polarized twist-lock plug. Turn-on shall occur at one foot candle and turn-off at 5 foot-candles approximately.
2. The three pole locking receptacle shall be in accordance with the latest EEI and NEMA standards and be prewired to the terminal board.

**Miscellaneous:**

1. Each luminaire shall be supplied with a permanently attached name plate inside the housing and/or on the ballast. This label shall indicate the manufacturer, catalog no., lamp type, wattage, line voltage rating and connection diagram.
2. Each luminaire may be marked in accordance with EEI-NEMA standards for "Field Identification of High-Intensity Discharge Lamps in Luminaires Used in Roadway Lighting Equipment" EEI Pub. No. TDJ-150 and NEMA Pub. No. OD150.
3. Following the installation of the high mast and post top (offset design) luminaires, aiming shall be under the direction of the highway lighting engineer.

**Photometric Data:**

1. The luminaire manufacturer shall furnish photometric data for alternative fixture or light levels not contained on the standard for approval.
2. The photometric data shall be in accordance with the uniform computer input format specified in the latest edition of the "IES Approved Method for Photometric Testing of Roadway Luminaires."

**Testing:**

1. If requested, a sample luminaire and lamp of each type and size shall be supplied for testing purposes.

**Certification:**

1. The luminaire and/or lamp manufacturer shall provide a Type "D" certification in accordance with Subsection 106.4C of the "2009 Standard Specifications for Highway Construction."

**Additional Individual Luminaire Specifications For High- Intensity Discharge Luminaires**

**Description:**

Luminaires shall comply with the general specifications for high intensity discharge luminaires on STD. HLD1-1 (Latest Revision), and the following specifications:

**Roadway Luminaires (General):**

1. **Housing:**  
The housing shall be precision die-cast aluminum and be of adequate size to contain the ballast components, reflector lamp and socket, terminal board, Slipfitter and allow all the electrical components to operate within their designed temperature range. The housing shall be designed to accommodate at least a 400 watt high pressure sodium lamp.
2. **Reflector:**  
The reflector shall be of specular finished, hydro-formed, anodic coated aluminum with a minimum coat thickness of 0.00015 inches and weighing 7.5 milligrams per square inch to provide a minimum reflectivity of 82%, the reflector shall have a reverse flange and mounted within the housing to assure a firm surface for proper gasket sealing when the refractor door is closed.
3. **Refractor:**  
The refractor shall be pressed , heat resistant, crystal clear borosilicate glass, annealed, homogenous and free from imperfections and striations. Refracting prisms shall be incorporated in the refractor to assure maximum utilization of the light generated and provide the required photometric distribution.
4. **Door:**  
The refractor door shall be precision die-cast aluminum with clips for proper positioning of the refractor. The door shall be easily detached from the housing by operating the spring loaded latch or latches and separating the hinge halves while wearing linemen's gloves.
5. **Cut-off visor:**  
If specified on the plans, each luminaire shall be equipped with a cut-off visor. Cut-off shall occur full circumference of the luminaire at approximately 75 degrees from the vertical axis. The visor shall be similar in color to the luminaire.
6. **Ballast:**  
The ballast shall be door mounted on all luminaires 400 watt or less.

**Roadway Luminaire (Cutoff Design)**

1. **Refractor:**  
The refractor shall be flat stripped heat and impact resistant glass.
2. **Distribution control:**  
Distribution control shall be cutoff.

**Additional Individual Luminaire Specifications For Light Emitting Diode Luminaires**

**Description:**

Luminaires shall comply with Specification Section 809 for Light Emitting Diode Luminaires (Latest Revision) and the following specification requirements.

**LED Luminaires (General Requirements)**

1. Provide LED luminaires listed to UL1598 and suitable for use in wet locations. Ensure that optical compartment meets IEC STD. 60529-IP66. Supply NRTL certification to verify listing. Do not place fuses in pole-mounted luminaires. Provide wall- or underpass-mounted luminaires with internal 10-amp, time delay fuses and fuse holders.
2. Housing reflector, refractor, and door shall be constructed from 96% copper free diecast aluminum. Provide for luminaire mounting to a 1 1/4 in. pipe arm, capable of adjustments 0 - 45 degrees from level. Meet ANSI 136.31, 3.0 G vibration requirements. Equip luminaire with a three-prong ANSI 136.10 rotatable and shorting cap. Ensure weight of the luminaire is less than 60 LB. and the effective projected area is less than 2.1 SQ. FT.
3. **Mounting:** Attach a level indicator to the fixture housing. Ensure that indicator is sensitive to 1 degree changes in position at any point within 5 degrees of the level position. Ensure that indicator is clearly visible from the ground up to a 40-ft. mounting height. Ensure that indication of level corresponds to a level of fixture housing.
4. **LED drivers.** Provide luminaire with replaceable LED driver that will operate at 120 v, 240 v, or 480 v line voltages as shown in the plans. Provide LED drivers meeting the performance specifications described in Specification Section 809 for Light Emitting Diode Luminaires.
5. **LED optical assembly:** Provide LED optical assembly with nominal color temperature of 4000K. For verification testing, CCT within the range of 3700K to 4300K is allowable. Provide LED optical assembly with a minimum CRI (Color Rendering Index) of 70. Provide a passive thermal management system. Do not use fans or other mechanical cooling systems.
6. **Finish:** Paint luminaires light gray with initial gloss of 30-60% (semi-gloss) when installing on galvanized poles. For all other poles, paint luminaires to match the color of the pole as directed. Use a thermoset powder-coat paint system. Provide ASTM testing documentation that meets the painting performance requirements set forth in Specification Section 809 for Light Emitting Diode Luminaires.

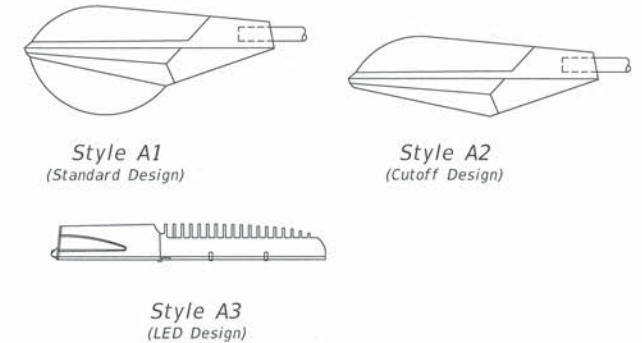
Typical Lamp Schedule						
Nominal Lamp Wattage	High-Intensity Discharge Lamp Types			LED Type		
	High Pressure Sodium			Light Emitting Diode		
	Color	Nominal Lumens	Rated Avg. Life, Hrs.	Color	Nominal Lumens	Rated Avg. Life, Hrs.
100	CL	9,500	20,000	4000k	6,000	70,000
	Coated	8,800	20,000	4000k	6,000	70,000
200	CL	22,000	24,000	4000k	10,000	70,000
250	CL	27,500	24,000	4000k	14,000	70,000
	Coated	26,000	24,000	4000k	14,000	70,000
310	CL	37,000	24,000	4000k	17,000	70,000
400	CL	50,000	24,000	4000k	22,000	70,000
	Coated	47,500	24,000	4000k	22,000	70,000
1000	CL	140,000	24,000	-	-	-

Typical Lamp Schedule

**Legend For "Luminaires"**

Lamp Type	Lamp Color	Lumens	Vert. Dist.	Lateral Dist.	Control Style
Lamp Watt		100, 250, 310, 400, 1000, Etc...			
Lamp Type		HPS = High Pressure Sodium LED = Light Emitting Diode			
Lamp Color		CL = Clear CI = Color Improved			
Nominal Lamp Lumen Rating		9,500/22,000/27,500/37,000/50,000/ 140,000/Etc...			
Vertical Distribution		S = Short M = Medium L = Long			
Lateral Distribution		Type 1, 2, 3, 4, 5			
Distribution Control		C = Cutoff S = Semicutoff N = Noncutoff			
Style		A1 = Standard Design A2 = Cutoff Design A3 = LED Design			

Legend For Luminaires



**Legend For Luminaires**

Approved By Bridge Engineer: *[Signature]* Date: 3-21-16

Approved By Traffic Engineer: *[Signature]* Date: 3/19/2016



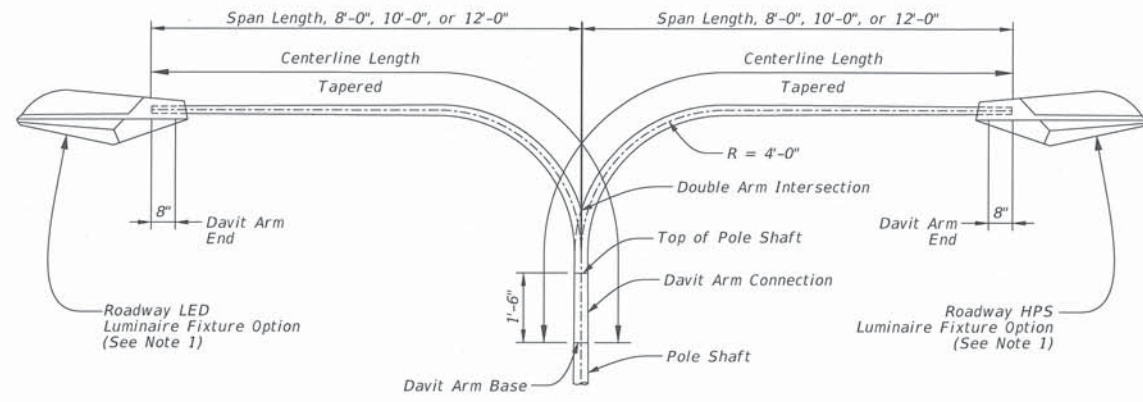
Traffic Standard

Typical Highway Luminaire Details

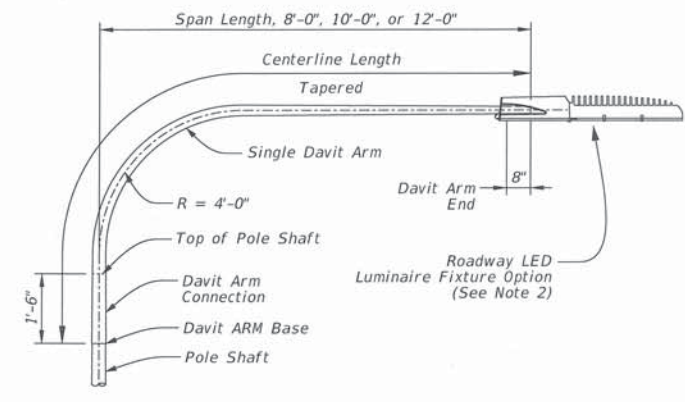
2009 Specifications

HLD1-2 00

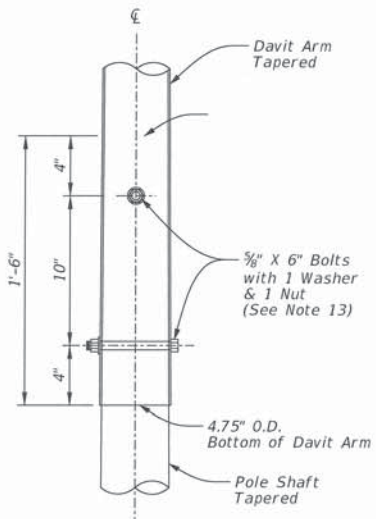




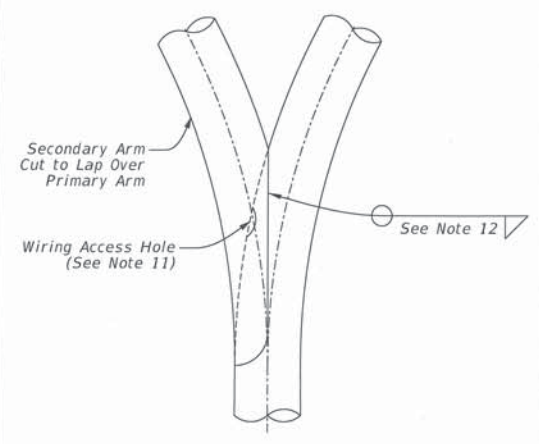
**Double Davit Arm**



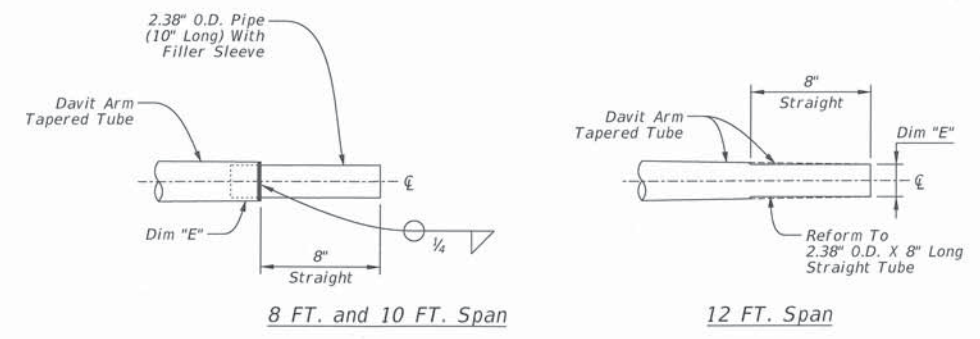
**Single Davit Arm Detail**



**Davit Arm Connection**

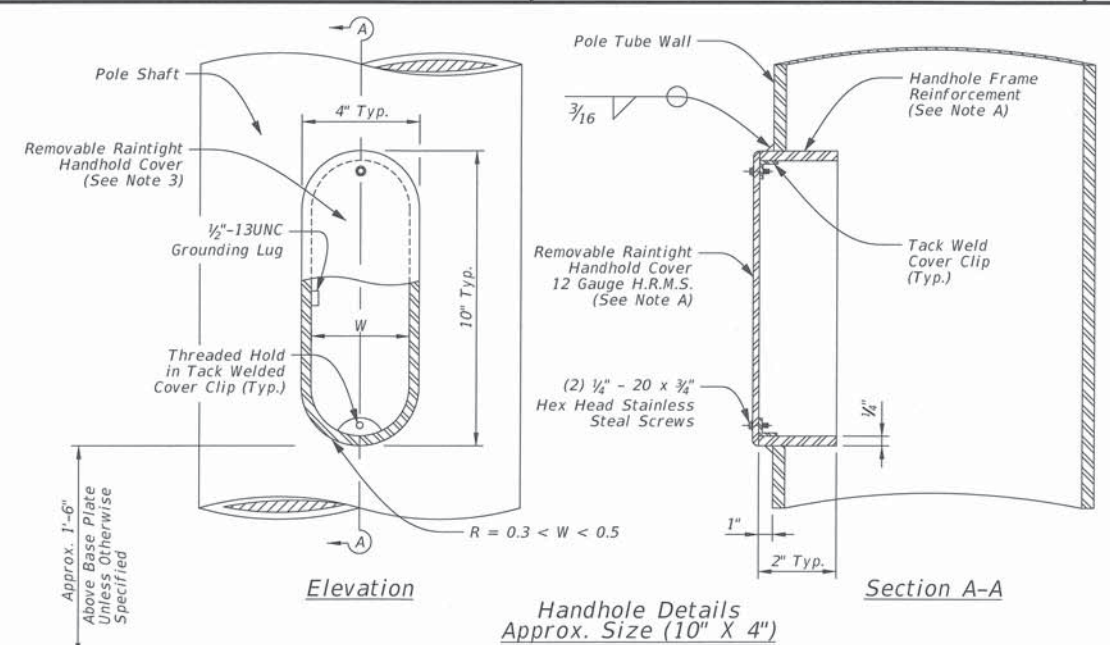


**Double Arm Intersection**



**Davit Arm End Details  
Davit Arm Dimensions Table**

Davit Arm Dimensions							
Mounting Height (FT)	Span Length (FT)	Centerline Length (FT)	Rise Height (FT)	Thickness (IN)	Base O.D. (IN)	Taper Rate (IN)	Dim "E" (IN)
20 - 40	8	12.78	6.5	0.1196	4.75	0.14	2.96
20 - 40	10	14.78	6.5	0.1196	4.75	0.14	2.68
30 - 40	12	16.78	6.5	0.1196	4.75	0.14	2.40



**Handhole Details  
Approx. Size (10" X 4")**

**General Notes:**

- Luminaires shall be LED, medium, semi-cutoff distribution. See Standard HLD1-1 AND HLD2-1 (Latest Revision) for more details.
- Luminaires shall be HPS Type IV, medium, semi-cutoff distribution. See Standard HLD1-1 AND HLD2-1 (Latest Revision) for more details.
- Handholes on centerline poles shall be mounted on the same side as pole number. All pole numbers and handholes shall face the same direction.
- Dimensional limits are given to show acceptable variation in design. All of a fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
- Each pole arm plate shall be supplied with bolts and lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.
- Proposed deviations in arm connector dimensions or materials must be submitted to the Department for approval.
- The handhole reinforcement shall be welded to the pole shaft in the 0 deg. location unless otherwise specified, prior to galvanizing the pole shaft.
- When aerial conductors are required, the pole shall be designed to meet the loading requirements of the National Electric Safety Code (NESC Latest Edition) for the aerial cable specified. Submit design and calculations for approval confirming the standard pole design is adequate for aerial cable installation or submit design and calculations for an optional pole design for approval.
- All poles with aerial conductors shall be equipped with a handhole and should not be installed on a breakaway base.
- If aerial conductors are specified, construct the items as shown.
- Hole shall be at least 2" diameter. Deburr edges inside and out.
- Weld shall be at least 0.13" x 0.25" unequal legs. Weld may be larger to accommodate fit up.
- Holes drilled into pole and Davit arm assembly to ensure secure fit of slip connection may be factory or field drilled. When field drilling, repair damage to galvanization by use of zinc-based solders or zinc-rich paint.

**Material Specifications**

- The handhole reinforcement shall be forged from steel conforming to ASTM A-576, Grade 1021: fabricated from 1/2" wall tubing conforming to ASTM A-36: or cast from steel conforming to ASTM A-27, Grade 65-35. The handhole cover shall be 12 gauge H.R.M.S. galvanized according to ASTM A-153, and equipped with two (2) AISI 302 stainless steel 1/4" - 20 x 3/4" hex cap screws and two (2) captive washers. Handhole cover to have neoprene gasket.
- Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
- A572, A1008 HSLAS-F, and A1011 HSLAS-F, materials may have higher yield strengths but shall not have less elongation than the grade indicated.

Approved By Bridge Engineer: *St. J.* Date: 3-24-16

Approved By Traffic Engineer: *Hold Umah* Date: 3/14/2016

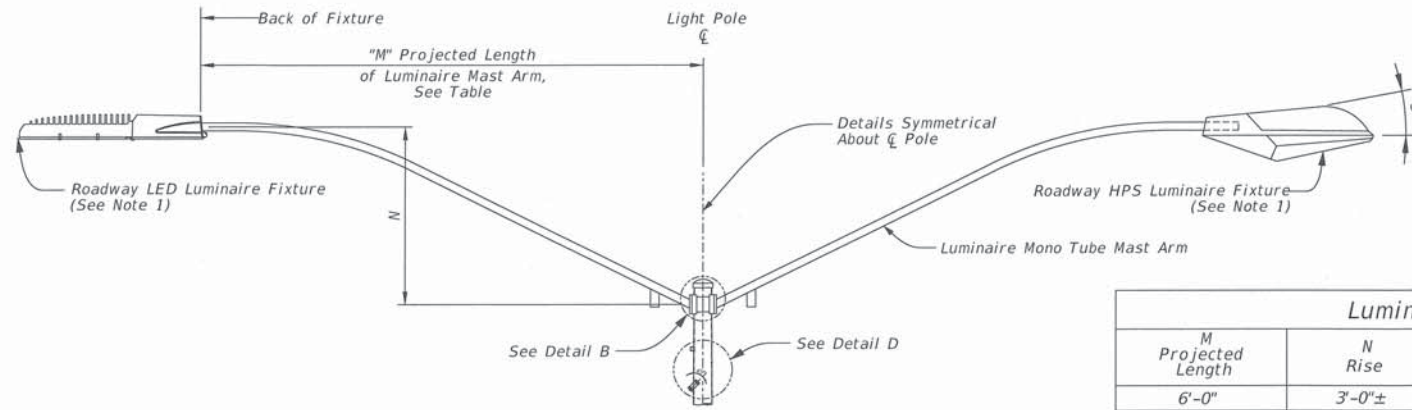
Traffic Standard  
Typical Highway  
Light Pole Davit  
Mast Arm Details

2009 Specifications

HLMA2-1	00
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T-316A

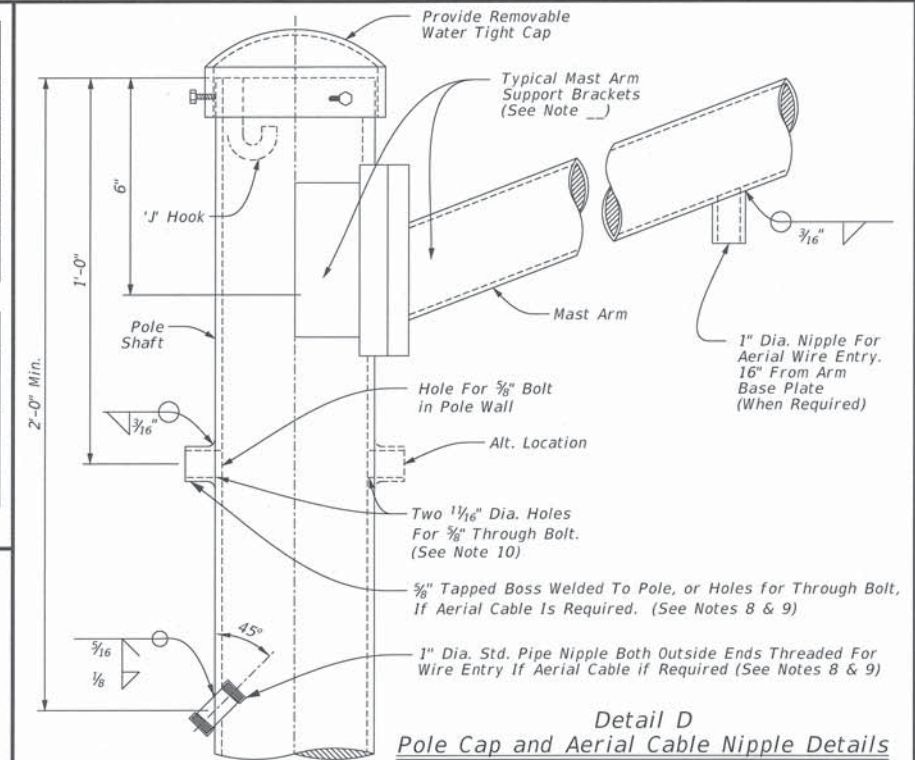




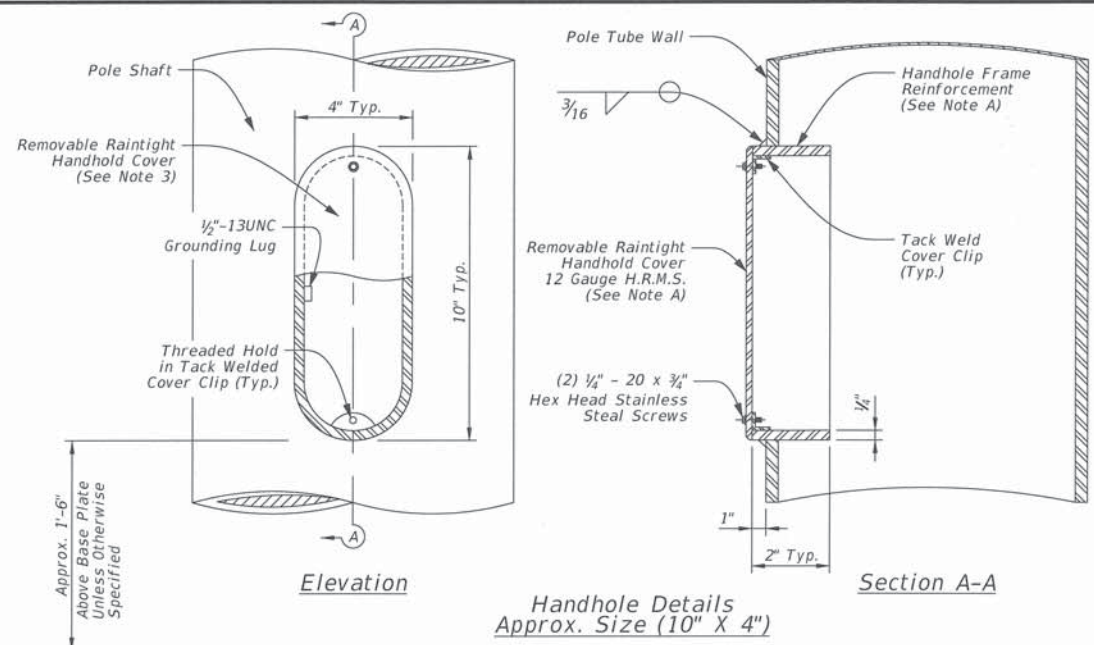
Pole Assembly Fabrication Tolerances Table	
Dimension	Tolerance
Arm Length	± 3"
Arm Rise	± 3/4" in 10 Ft
Arm Diameter	+ 3/16"
Overall Length or Width	+ 1/4"
Thickness	+ 1/4", - 1/16"
Deviation From Flat	1/8" in 12"
Spacing Between Holes	+ 3/32"
Bolt Hole Size	± 1/16"
Strut Location in Truss Arms	± 1 1/2"

Luminaire Mast Arm Data				
M Projected Length	N Rise	Min O.D. at Pole	O.D. at End	Nominal Thickness
6'-0"	3'-0"±	2 3/8"	2 3/8"	0.1196"
8'-0"	3'-0"±	2 3/8"		
10'-0"	3'-0"±	3 1/8"		
12'-0"	4'-0"±	4 1/4"		

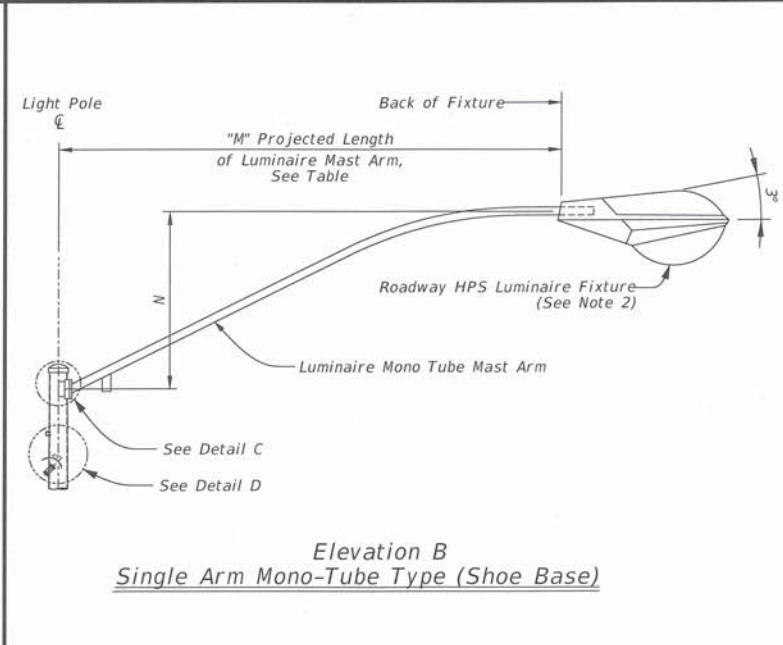
Elevation A  
Two Arm Mono-Tube Type (Shoe Base)



Detail D  
Pole Cap and Aerial Cable Nipple Details



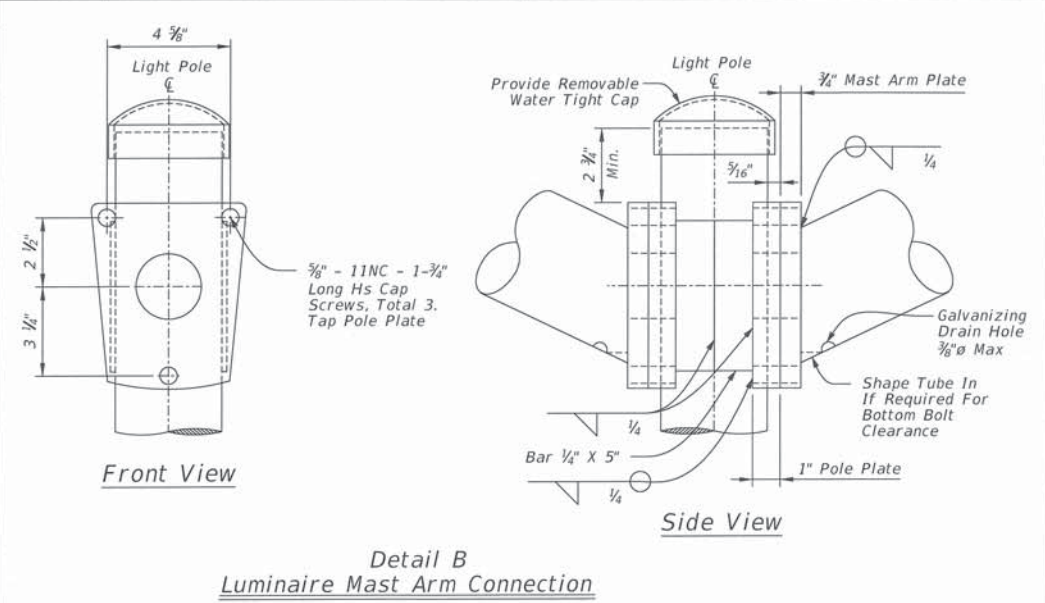
Handhole Details  
Approx. Size (10" X 4")



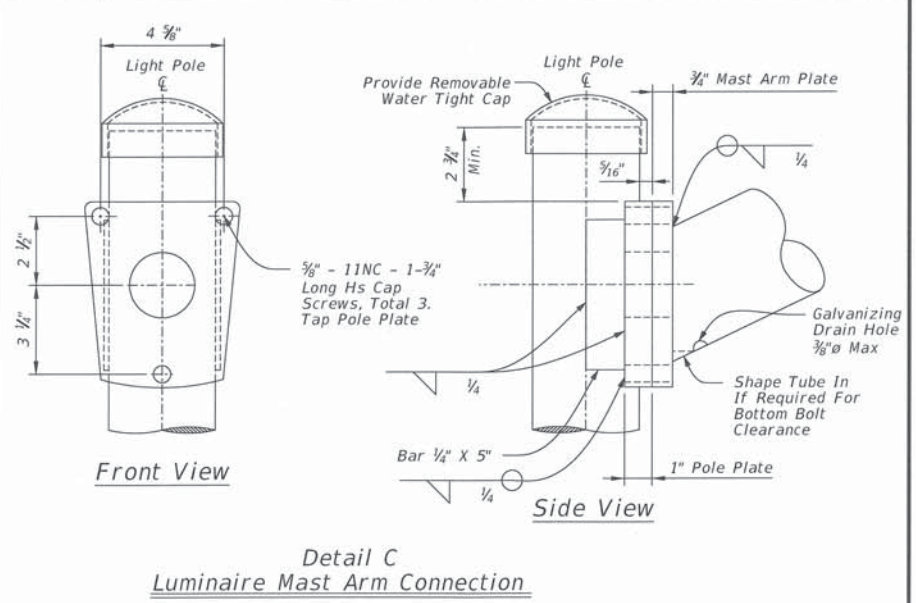
Elevation B  
Single Arm Mono-Tube Type (Shoe Base)

- General Notes:**
- Luminaires shall be LED, medium, semi-cutoff distribution. See Standard HLD1-2 and HLD2-2 (Latest Revision) for more details.
  - Luminaires shall be HPS Type IV, medium, semi-cutoff distribution. See Standard HLD1-2 and HLD2-2 (Latest Revision) for more details.
  - Handholes on centerline poles shall be mounted on the same side as pole number. All pole numbers and handholes shall face the same direction.
  - Dimensional limits are given to show acceptable variation in design. All of a fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
  - Each pole arm plate shall be supplied with bolts and lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.
  - Proposed deviations in arm connector dimensions or materials must be submitted to the Department for approval.
  - The handhole reinforcement shall be welded to the pole shaft in the 0 deg. location unless otherwise specified, prior to galvanizing the pole shaft.
  - When aerial conductors are required, the pole shall be designed to meet the loading requirements of the National Electric Safety Code (NECS Latest Edition) for the aerial cable specified. Submit design and calculations for approval confirming the standard pole design is adequate for aerial cable installation or submit design and calculations for an optional pole design for approval.
  - All poles with aerial conductors shall be equipped with a handhole and should not be installed on a breakaway base.
  - If aerial conductors are specified, construct the items as shown.

- Material Specifications**
- The handhole reinforcement shall be forged from steel conforming to ASTM A-576, Grade 1021; fabricated from 1/4" wall tubing conforming to ASTM A-36; or cast from steel conforming to ASTM A-27, Grade 65-35. The handhole cover shall be 12 gauge H.R.M.S. galvanized according to ASTM A-153, and equipped with two (2) AISI 302 stainless steel 1/4" - 20 x 3/4" hex cap screws and two (2) captive washers. Handhole cover to have neoprene gasket.
  - Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
  - A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
  - A572, A1008 HSLAS-F, and A1011 HSLAS-F, materials may have higher yield strengths but shall not have less elongation than the grade indicated.



Detail B  
Luminaire Mast Arm Connection



Detail C  
Luminaire Mast Arm Connection

Approved By  
Bridge Engineer: *S. L. ...* Date: 3-24-16

Approved By  
Traffic Engineer: *Hold ...* Date: 3/14/2016

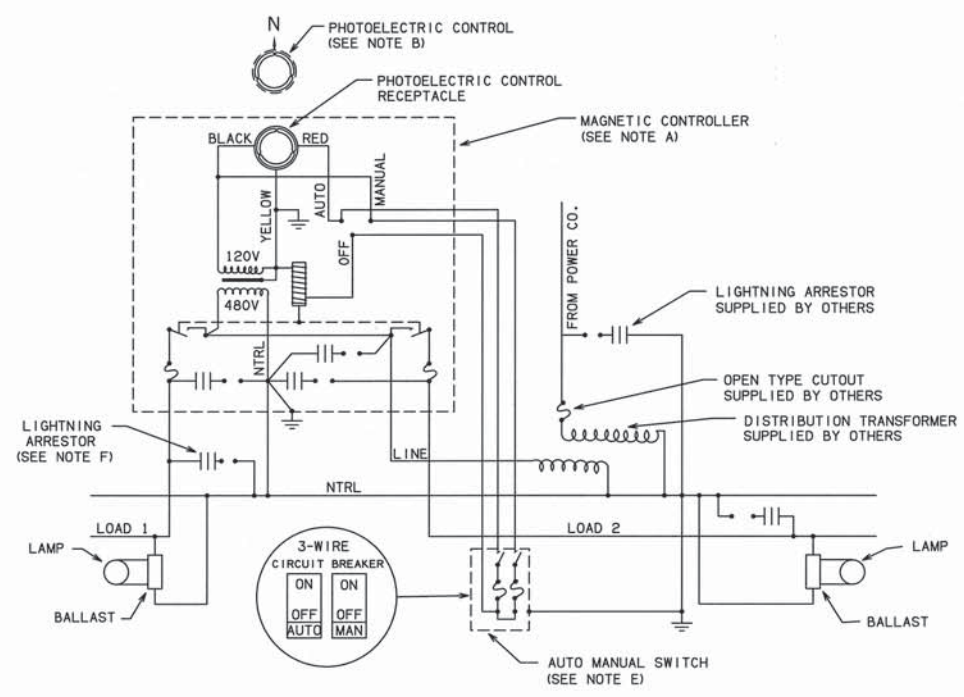
Traffic Standard  
Typical Highway  
Light Pole Mono Tube  
Mast Arm Details

2009 Specifications

HLMA3-1	00
T-3168	

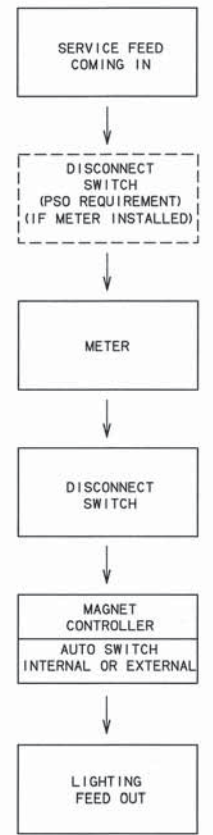


DESCRIPTION	REVISIONS	DATE



**TYPICAL WIRING DIAGRAM USING 1-480V  
MAGNETIC CONTROLLER (2-CIRCUITS)**

**WIRING FLOW DIAGRAM**

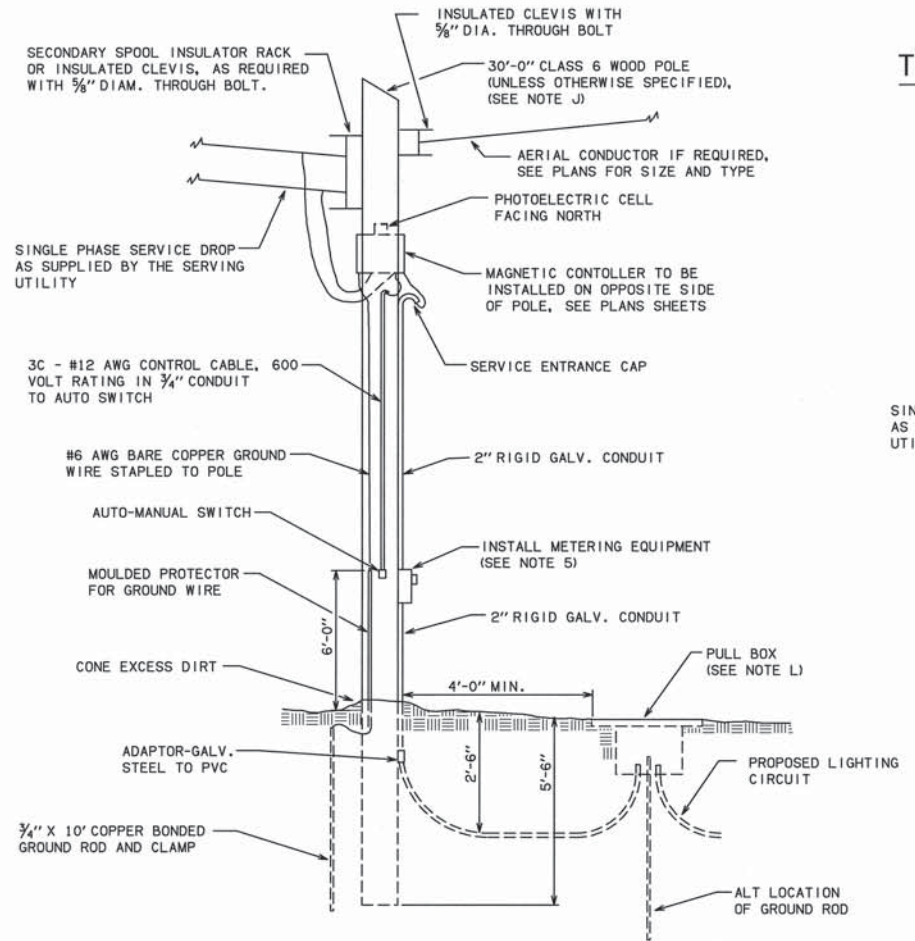


**MATERIAL SPECIFICATIONS**

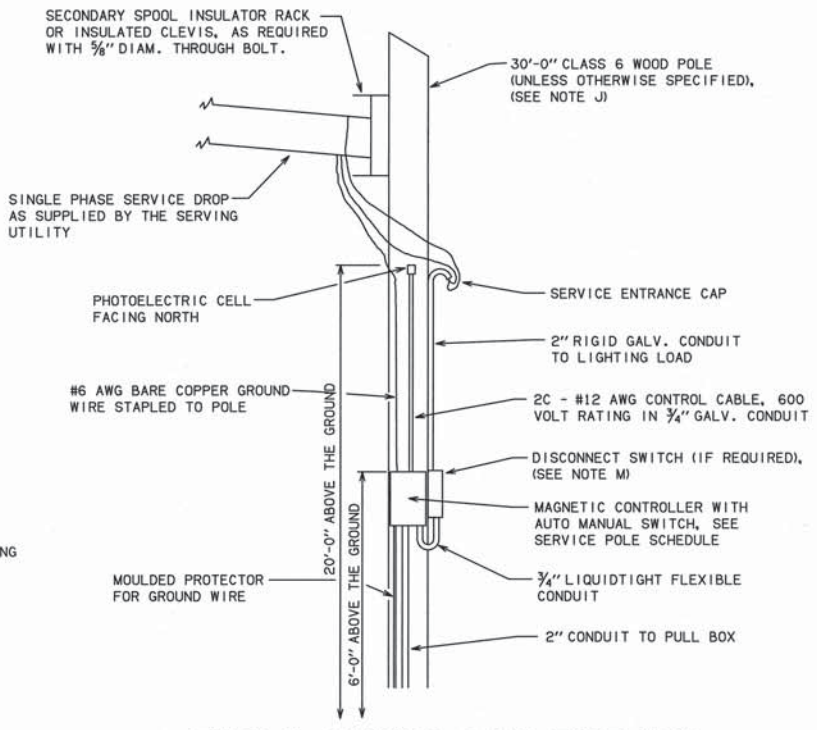
- THE MAGNETIC CONTROLLER FOR 480 VOLT SECONDARY SHALL BE IN A CAST ALUMINUM RAIN TIGHT ENCLOSURE COMPOSED OF: 480/120 VOLT POTENTIAL TRANSFORMER; MAGNETIC RELAY HAVING A 120 VOLT OPERATING COIL AND NORMALLY OPEN 480 VOLT DPST CONTACTS RATED AS SHOWN IN THE PLANS; 3-POLE POLARIZED TWIST LOCK PHOTOELECTRIC CONTROL; FUSE CLIPS FOR TWO RENEWABLE LINK TYPE FUSES; LABELED TERMINALS SUITABLE FOR NO. 10 OR 12 AWG STANDARD COPPER CONDUCTORS; CABLE GRIP INLETS: LINE, LOAD AND NEUTRAL TERMINALS SHALL BE SUITABLE FOR NO. 1/0 AWG STRANDED COPPER OR ALUMINUM CONDUCTORS; LINE AND LOAD LIGHTNING ARRESTORS SHALL BE EXTERNALLY MOUNTED. CIRCUITRY IN THE CONTROLLER SHALL BE ACCORDING TO THE WIRING DIAGRAM SHOWN. THE ENCLOSURE SHALL HAVE A HINGED DOOR WITH TWO DOOR FASTENERS AND LOCKING CAPABILITIES AND A MOUNTING BRACKET FOR ATTACHMENT TO THE POLE WITH TWO 5/8" DIAMETER LAG SCREWS. SIMILAR TO AN R.C.O.C MODEL MR-HHF SPEC. 6651 OR APPROVED EQUAL. IF THE SECONDARY VOLTAGE IS 120 OR 120/240, THE MAGNETIC CONTROLLER SHALL BE THE SAME AS THE ABOVE DESCRIBED UNIT EXCEPT THE POTENTIAL TRANSFORMER MAY BE ELIMINATED AND THE MODEL NUMBER CHANGED ACCORDINGLY.
- PHOTOELECTRIC CONTROL SHALL BE EITHER A FISHER-PIERCE MODEL 6690B-ELS, TORK MODEL NO. 2007, OR APPROVED EQUAL. IN ACCORDANCE WITH TYPICAL LUMINAIRE DETAILS, SEE STANDARD HLP1-1-LATEST REVISION.
- ALL CONDUCTORS SHALL BE, UNLESS OTHERWISE SPECIFIED, COPPER THAT IS PROPERLY SIZED FOR THE LOAD, AND COMPLY WITH TYPICAL LUMINAIRE DETAILS, SEE STANDARD HLP1-1-LATEST REVISION.
- ALL CONNECTIONS SHALL BE OF EITHER BOLTED TYPE OR COMPRESSION TYPE.
- THE "AUTO-MANUAL" TEST SWITCH SHALL BE A 3 WIRE, 2 POLE, 20 AMP OUTDOOR CIRCUIT BREAKER IN A NEMA 3R OR 4 ENCLOSURE WITH PROVISIONS FOR PADLOCKING.
- LIGHTNING ARRESTOR SHALL BE A 1-POLE, 600 OR 650 VOLT RATED WITH 3/4" NPT PIPE NIPPLE W/LOCK NUT AND BRUSHING WASHER AND 1'-6" LONG LEADS.
- ALL POLE LINE HARDWARE SHALL BE HOT DIP GALVANIZED.
- ALL OTHER MATERIALS SHALL BE IN ACCORDANCE WITH SECTION 810 OF THE 2009 STANDARD SPECIFICATIONS.
- ALL WOOD POLES SHALL BE TREATED FULL LENGTH IN ACCORDANCE WITH THE AMERICAN WOOD PRESERVERS ASSOCIATION SPECIFICATIONS, TO BE AT LEAST 7.5 LB PER CUBIC FT RETENTION OF CREOSOTE OR 0.38 LB PER CUBIC FT PENTACHLOROPHENOL MEASURED BY THE EMPTY CELL PROCESS. WOOD POLES SHALL COMPLY WITH THE LATEST REVISIONS OF ANSI STANDARD O5.1.
- ALL CONDUITS SHALL BE RIGID GALVANIZED STEEL, UNLESS OTHERWISE SPECIFIED.
- THE PULL BOX, IF REQUIRED, SHALL COMPLY WITH STANDARD PBD1-1-LATEST REVISION.
- THE DISCONNECT SWITCH SHALL BE A FUSIBLE 2-POLE, 600 VOLT, IN A NEMA 3R ENCLOSURE WITH PROVISIONS FOR PADLOCKING THE SWITCH HANDLE AND DOOR. THE SWITCH SHALL BE PROVIDED WITH THE APPROPRIATE SIZE FUSE TO FIT THE LOAD AND SHALL BE EQUIPPED WITH THE APPROPRIATE CONDUIT HUBS.

**GENERAL NOTES**

- CONDUITS SHALL BE STRAPPED TO POLE AT INTERVALS NOT TO EXCEED 4'-0".
- SEE PLANS SHEETS FOR SERVICE POLE LOCATIONS, NUMBER OF CONTROLLERS REQUIRED, AND CONTACT RATINGS.
- THE PRIMARY WIRING WILL BE PROVIDED BY THE LOCAL UTILITY CO., UNLESS OTHERWISE SPECIFIED.
- IF THE SERVICE POLE IS TO BE LOCATED MORE THAN 75 FEET FROM THE UTILITY COMPANY'S POLE, A DOWN GUY MAY BE REQUIRED. CONTACT THE UTILITY CO. FOR THEIR REQUIREMENTS.
- IF SPECIFIED IN THE PLANS, THE CONTRACTOR SHALL INSTALL THE REQUIRED METERING EQUIPMENT FURNISHED BY THE LOCAL UTILITY COMPANY.



**TYPICAL SERVICE POLE TYPE-UG/1  
(FOR UNDERGROUND WIRING SYSTEM)  
OG&E PREFERENCE**



**TYPICAL SERVICE POLE TYPE-UG/2  
(FOR UNDERGROUND WIRING SYSTEM)  
PSO PREFERENCE**  
FOR ADDITIONAL POLE INSTALLATION DETAILS,  
SEE TYPICAL SERVICE POLE TYPE-UG/1



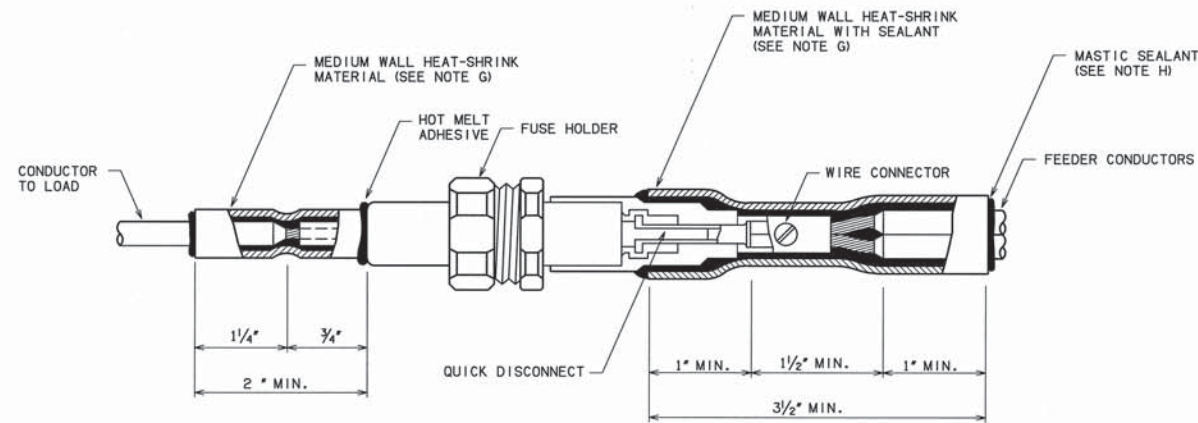
APPROVED BY  
TRAFFIC ENGINEER: *[Signature]* DATE: 8/15/2010  
TRAFFIC STANDARD

**TYPICAL SERVICE POLE DETAILS**

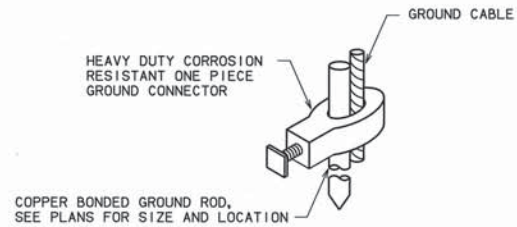
2009 SPECIFICATIONS

SPD1-1	00
T-319	

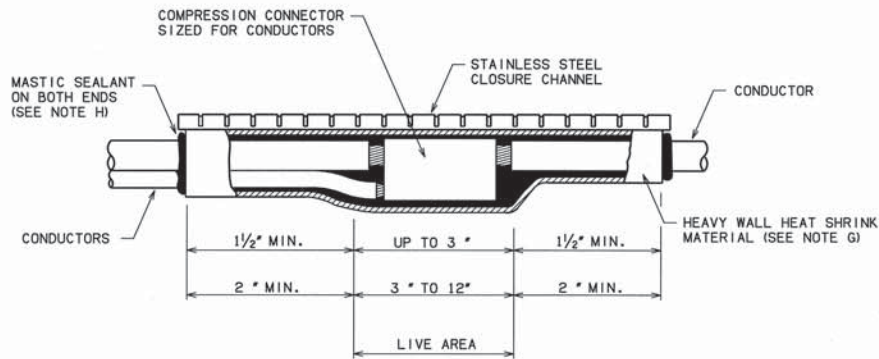




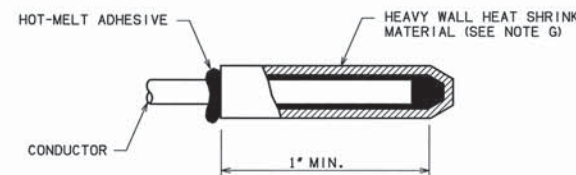
**TYPICAL QUICK DISCONNECT "Y" FUSED CONNECTORS**



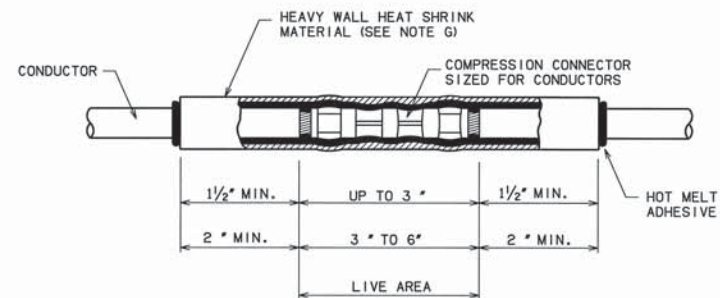
**TYPICAL GROUND ROD AND CONNECTOR**



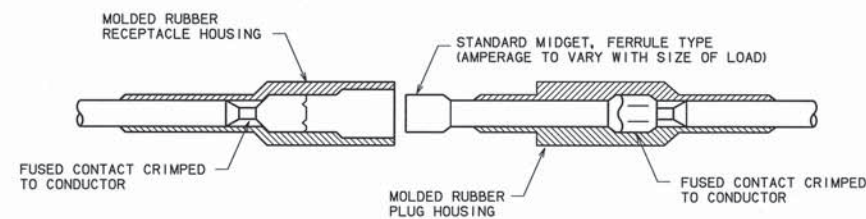
**TYPICAL CONDUCTOR TAP AND/OR SPLICE WITH HEAT SHRINK WRAP AROUND SLEEVE**  
(MIN. LENGTH 6" FOR NO. 4 AWG. CONDUCTORS)



**TYPICAL CONDUCTOR END TERMINATION**



**TYPICAL CONDUCTOR SPLICE WITH HEAT SHRINK SLIP-ON SLEEVE**  
(MIN. LENGTH 6" FOR NO. 4 AWG. CONDUCTORS)



**TYPICAL IN-LINE FUSED HOLDER**

**MATERIAL SPECIFICATIONS**

- (A) GROUND RODS SHALL BE UL LISTED AND/OR R.E.A. APPROVED.
- (B) CONDUCTORS SHALL BE IN ACCORDANCE WITH SECTION 811 OF THE 2009 STANDARD SPECIFICATIONS.
- (C) ALL CONDUCTOR SPLICES SHALL BE MADE WITH PROPERLY SIZED COMPRESSION TYPE CONNECTORS, UNLESS OTHERWISE SPECIFIED. CONNECTORS SHALL BE COMPATIBLE WITH THE CONDUCTOR MATERIAL AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. "WIRE NUT/SPRING CONNECTORS" ARE NOT ACCEPTABLE CONNECTORS TO BE USED AS A SPLICING DEVICE.
- (D) ALL IN LINE AND QUICK/BREAKAWAY DISCONNECT FUSED "Y" HOLDERS SHALL BE WATERPROOF, RATED AT 600 VOLTS, 30 AMPS AND CAPABLE OF HOLDING A KTK TYPE FUSE (13/32" X 1-1/2" FUSE). FUSED HOLDERS MANUFACTURED BY BUSSMANN MANUFACTURING OR HOMAC MFG. CO. OR OTHER APPROVED EQUAL MAY BE USED.
- (E) FUSES SHALL BE CURRENT-LIMITING TYPE, PREFERABLY BUSSMANN MANUFACTURING MODEL KTK, SIZED AS SPECIFIED IN THE PLANS.
- (F) LINE/LOAD CONDUCTORS SPLICES AND FUSE HOLDERS CONNECTIONS SHALL BE INSULATED AND MADE WATERPROOF.
- (G) CROSS LINKED POLYOLEFIN HEAT SHRINK COMPOSITION MATERIAL WITH A HOT-MELT ADHESIVE THICKNESS OF AT LEAST 0.06", APPROVED FOR DIRECT BURIAL TO 600V/90 DEG. CELCIUS IN ACCORDANCE WITH ANSI C119.1-1986 (LATEST REVISION).
- (H) MASTIC SEALANT SHALL BE NON-CORROSIVE AND IN ACCORDANCE WITH ASTM D-2671.

**GENERAL NOTES**

- 1. ALL INSTALLERS OF HEAT SHRINK MATERIALS SHALL BE TRAINED AND CERTIFIED BY THE MANUFACTURER OF THE MATERIAL. A COPY OF THIS CERTIFICATION SHALL BE FURNISHED TO THE ENGINEER, IF REQUESTED.
- 2. CONNECTORS ATTACHED TO THE GROUND ROD BY THE GROUND ROD MANUFACTURER MAY BE ACCEPTED.
- 3. AN APPROVED QUICK DISCONNECTED FUSED "Y" CONNECTOR SHALL BE INSTALLED ON THE LINE SIDE CONDUCTOR OF EACH HIGHWAY LIGHT POLE AND OVERHEAD SIGN STRUCTURE EQUIPPED WITH SIGN LIGHTS. THESE CONNECTORS SHALL BE INSTALLED AT THE HANDHOLE LOCATED AT THE BASE OF THE STRUCTURE OR AT THE LOCATION SHOWN ON THE PLANS.
- 4. A BRANCH CIRCUIT TAP MAY BE USED WITH EITHER A "MADE-UP" OR AN APPROVED MANUFACTURED CONNECTOR KIT. FUSING MAY OR MAY NOT BE REQUIRED. SEE THE PLANS FOR LOCATIONS AND FUSE SIZE.
- 5. ALL HEAT SHRINK DIMENSIONS ARE BASED ON FINAL INSTALLED CONDITION.
- 6. FUSED "Y" CONNECTORS SHALL BE APPROVED BY THE ENGINEER AND INSTALLED AT EACH POLE BASE OR BRANCH CIRCUIT AS REQUIRED. THE COST OF THESE CONNECTORS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE INSULATED CABLES.



APPROVED BY  
TRAFFIC ENGINEER: *David Smith* DATE: 9/15/2010

TRAFFIC STANDARD

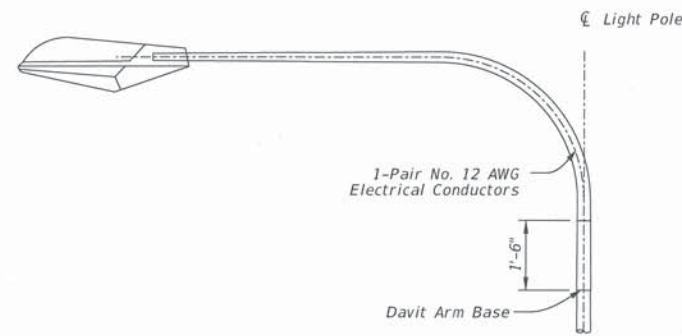
TYPICAL SPLICE AND CONNECTOR DETAILS  
(FOR ELECTRICAL CONDUCTORS)



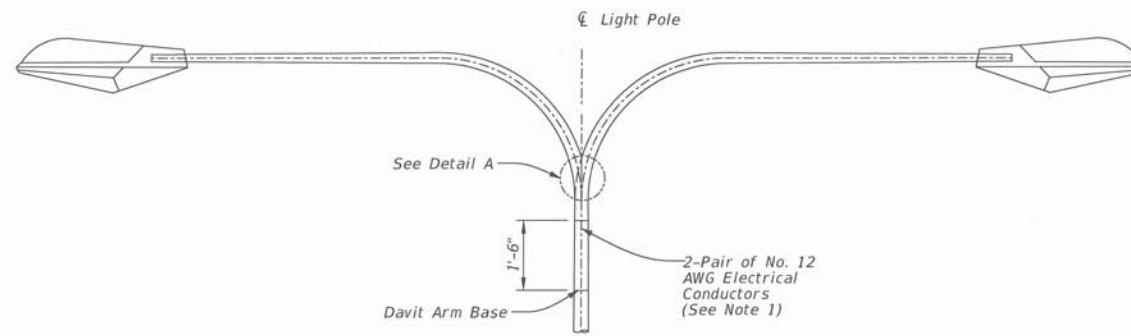
PLOT DRIVER: \$PLTDRV\$\$  
 PENTABLE: \$PENTBL\$\$

SCALE: \$SCALESHORT\$\$  
 USER: \$USERS

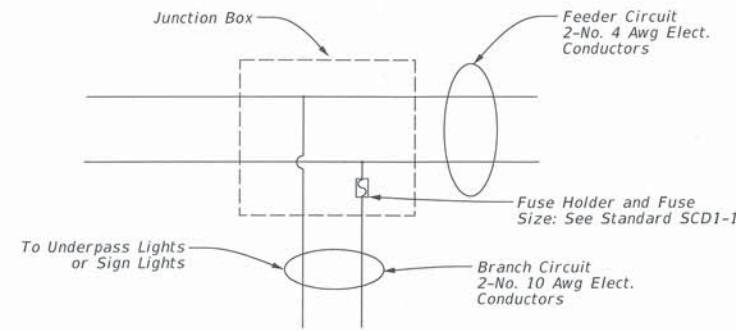
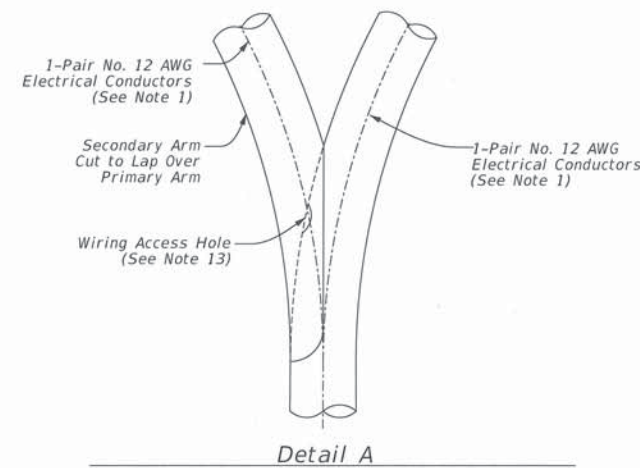
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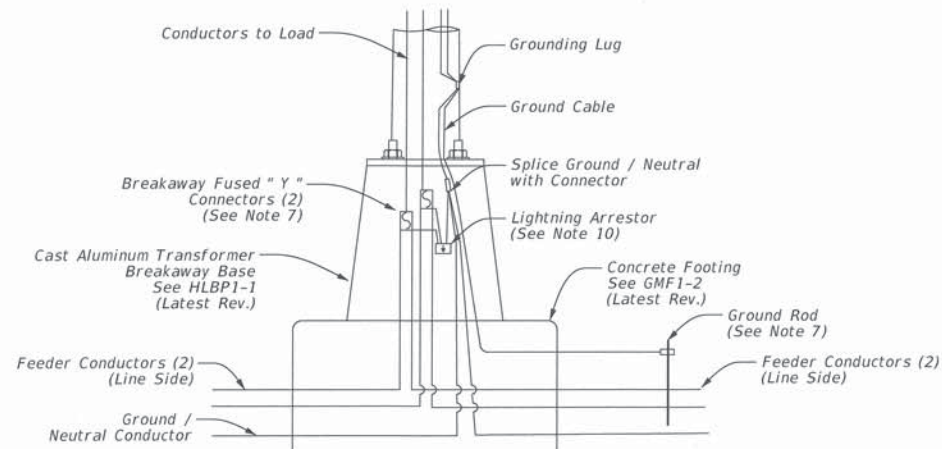
Typical Wiring For Single Luminaire Poles



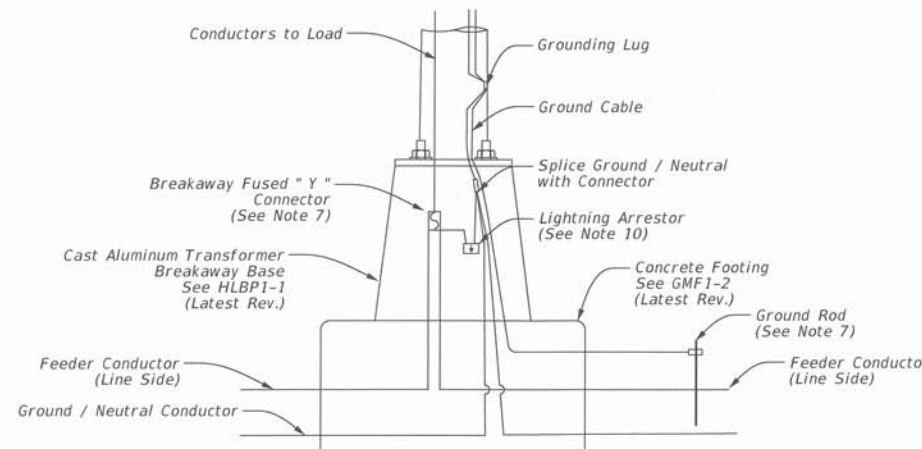
Typical Wiring For Twin Luminaire Poles



Typical Wiring Diagram to Underpass Or Bridge Mounted Overhead Sign Lights



Typical 240 V, Three Wire, Grounded Neutral Detail



Typical 480 V, Two Wire, Grounded Neutral Detail

General Notes:

1. Conductor shall be in accordance with Section 811, "Electrical Conductors Highway Lighting," of the 2009 Standard Specifications, and all connections and splices shall be in accordance with Standard SCD1-1 (Latest Revision).
2. The branch circuit conductors shall be solid or stranded copper No. 10 or No. 12 AWG Type THW or THWN 75 degrees Celsius, 600 volt unless otherwise specified. An alternate type insulation may be used if approved by the Engineer prior to installation.
3. The feeder circuit conductors shall be stranded copper No. 4 AWG Type XHHW 75 degrees Celsius, 600 volt unless otherwise specified in the plans. An alternate type insulation may be used if approved by the Engineer prior to installation.
4. The lightning arrestor shall be UL 96 and UL 467 compliant and installed in accordance with NFPA 780 and UL 96A requirements. Lightning arrestor shall be single pole for 480 volt circuits or two pole for 240 volt circuits, rated 600 or 650 volts, with a 3/4" NPT pipe nipple, locknut, bushing washer and 18" long copper leads. The lightning arrestor device shall use metal oxide varistors (MOV). An alternate arrestor device may be used if approved by the Engineer prior to installation.
5. If twin luminaires are specified, one pair of conductors shall be installed for each luminaire, starting from the base of the pole and extending to the luminaire.
6. Provide sufficient slack (approx. 3'-0" above the footing) in all cables to permit pulling the splice kits outside of pole through the handhole of a shoe base pole or the door of a transformer base pole.
7. Fuses installed in light pole bases shall be rated at 15 Amps and placed in a breakaway type fuse holder. For more information regarding splice connectors and grounding requirements refer to Standard SCD1-1 and GMF1-2 (Latest Revision) and the NEC.
8. Conductors, ground rods, etc... shall be of the same size and type as specified in the plans. All similar electrical system components supplied for the project shown in the plans shall be of the same type and manufacturer.
9. All costs related to splices, connectors, fuses, ground rods, etc... shall be subsidiary to other items of work.
10. Lightning arrestors shall be installed as follows :  
 (A) At first pole nearest the point of service for each circuit.  
 (B) At each pole on the end of a circuit.  
 (C) Between (A) and (B) at intervals not to exceed 1,000 feet.  
 (D) Tape lightning arrestor to the insulated cable with plastic tape or heavy duty wire ties.
11. All costs of installing the lightning arrestor shall be subsidiary to other items of work.
12. The neutral conductor shall be marked for identification in accordance with the NEC and the following color code:  
 (A) 3-Wire - 240V = 1-Black, 1-Red, 1-White or Gray  
 (B) 2-Wire - 480V = 1-Black, 1-White or Gray.
13. Hole shall be at least 2" diameter. Deburr edges inside and out.

Approved By: *S. S. Smith* Bridge Engineer: \_\_\_\_\_ Date: 3-24-16  
 Approved By: *W. J. Smith* Traffic Engineer: \_\_\_\_\_ Date: 3/19/2016

**DOT** Traffic Standard  
 Typical Electrical Wiring Details

2009 Specifications



ALL GENERAL NOTES SHOWN BELOW SHALL APPLY TO ALL OF THE STANDARD DRAWINGS IN TCS SERIES

DESCRIPTION	REVISIONS	DATE
MODIFIED NOTES		3/15/2011

**CONTRACTOR**

ON CONSTRUCTION PROJECTS IT WILL BE THE CONTRACTORS RESPONSIBILITY TO INSTALL THE NECESSARY TRAFFIC CONTROL BEFORE CONSTRUCTION BEGINS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL DEVICES TO ASSURE A HIGH DEGREE OF BOTH DAY AND NIGHT VISIBILITY, WHICH WILL INCLUDE ANY WASHING, REPLACEMENT AND/OR REPOSITIONING WHERE DEEMED NECESSARY BY THE ENGINEER.

THE CONTRACTOR SHALL REPAIR OR REPLACE ANY NEW OR EXISTING PERMANENT STATE OWNED SIGNS WHICH ARE DAMAGED DUE TO HIS NEGLIGENCE OR CARELESS HANDLING DURING THE CONSTRUCTION OF THIS PROJECT. THIS SHALL BE DONE AT THE CONTRACTORS EXPENSE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING TEMPORARY TRAFFIC CONTROL WORK ZONE AND EXISTING PAVEMENT MARKINGS ON ALL ROADWAYS OPEN TO TRAFFIC WITHIN THE PROJECT. SUFFICIENT QUANTITIES HAVE BEEN PROVIDED FOR MAINTAINING PAVEMENT MARKINGS FOR PRESCRIBED DETOUR ROUTES WHEN DEEMED NECESSARY BY THE ENGINEER.

**SIGN MATERIALS**

ALL SIGN BLANK MATERIALS SHALL BE THE OPTION OF THE CONTRACTOR BUT SHALL BE OF SUCH MATERIAL THAT WILL RETAIN A SATISFACTORY APPEARANCE THROUGHOUT THE LIFE OF THE PROJECT.

ALL SIGNS, LIGHTS, FLAGS, ETC. SHALL CONFORM IN SIZE, SHAPE, COLOR, LEGENDS AND APPLICATIONS TO THE STANDARDS SET FORTH IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND/OR OKLAHOMA STATE STANDARD DRAWINGS FOR SIGNS. STANDARD DRAWINGS ARE AVAILABLE FROM THE DEPARTMENT OF TRANSPORTATION. INTERPRETATIONS THAT MAY BE NECESSARY SHALL BE REFERRED TO THE ENGINEER.

**SIGN SHEETING**

REFLECTORIZATION OF TRAFFIC CONTROL DEVICES SHALL BE BY MEANS OF WIDE ANGLE, FLAT TOP REFLECTIVE SHEETING MEETING THE REQUIREMENTS OF 2009, OKLAHOMA STANDARD SPECIFICATIONS.

**SIGN INSTALLATION**

ALL SIGNS SHALL BE SECURELY PLACED OR WEIGHTED TO PREVENT BLOWING OVER. ROCKS, BROKEN CONCRETE OR OTHER SUCH OBJECTS SHALL NOT BE CONSIDERED AN ACCEPTABLE SUBSTITUTE FOR SAND BAGS WHEN USED TO OBTAIN ADDED STABILITY FOR MOVABLE SIGNS AND BARRICADES.

SPACING OF SIGNING, ON THE PLANS OR TCS STANDARDS, SHOULD BE NO LESS THAN THE DISTANCES SHOWN. THE DISTANCE BETWEEN SIGNS SHOULD BE INCREASED ON HIGH SPEED OR MORE HEAVILY TRAVELED HIGHWAYS, OR WHERE SIGHT DISTANCE IS RESTRICTED.

IN ALL CONSTRUCTION ZONES, THE 48 INCH X 48 INCH WARNING SIGNS SHALL HAVE ATTACHED THERETO FLORESCENT FLAGS AND TYPE "A" WARNING LIGHTS. THIS SHALL ALSO APPLY WHEN SIGNS ARE USED ON BOTH SIDES OF THE ROADWAY. ADDITIONAL FLASHING LIGHTS MAY BE REQUIRED WHEN SO DESIRED BY THE ENGINEER.

ALL DIAMOND SHAPED CONSTRUCTION WARNING SIGNS ON EXPRESSWAYS OR FREEWAYS SHALL BE 48 INCH X 48 INCH, WITH THE APPROPRIATE ADVISORY SIGN WHERE REQUIRED UNLESS OTHERWISE NOTED IN THE PLANS.

DUE TO THE TEMPORARY NATURE OF CONSTRUCTION, SIGNS WHICH ARE 33 S.F. AND OVER WILL HAVE NO REINFORCING STEEL IN THEIR FOOTINGS.

ALL SIGNS AND SIGN ASSEMBLIES WITH A TOTAL SURFACE AREA OF 10 S.F. OR MORE SHALL BE INSTALLED ON TWO (2) POSTS. THE EXCEPTION BEING SINGLE ROUTE MARKER ASSEMBLIES.

SIGNS MOUNTED ON BARRICADES SHALL BE MOUNTED AS HIGH AS NECESSARY TO BE VISIBLE.

**BARRICADES**

ONE (1) WING BARRICADE SHALL BE SET ON EACH SIDE OF THE ROADWAY IN ADVANCE OF THE FIRST ADVANCE WARNING SIGN. THE EXCEPTIONS ARE MINOR CROSS STREETS AND SECTION LINE ROADS WHICH INTERSECT THE WORK AREA.

WING BARRICADES SHALL BE INSTALLED ON TWO (2) BREAKAWAY POSTS.

**WORK DURATION**

THE FIVE CATEGORIES OF WORK DURATION AND THEIR TIME AT A LOCATION SHALL BE:  
 A) LONG-TERM STATIONARY IS WORK THAT OCCUPIES A LOCATION MORE THAN 3 DAYS.  
 B) INTERMEDIATE-TERM STATIONARY IS WORK THAT OCCUPIES A LOCATION MORE THAN ONE DAYLIGHT PERIOD UP TO 3 DAYS, OR NIGHTTIME WORKLASTING MORE THAN 1 HOUR.  
 C) SHORT-TERM STATIONARY IS DAYTIME WORK THAT OCCUPIES A LOCATION FOR MORE THAN 1 HOUR WITHIN A SINGLE DAYLIGHT PERIOD.  
 D) SHORT DURATION IS WORK THAT OCCUPIES A LOCATION UP TO 1 HOUR.  
 E) MOBILE IS WORK THAT MOVES INTERMITTENTLY OR CONTINUOUSLY.

**LIGHTING**

TYPE "A" WARNING LIGHTS SHALL BE USED ON BARRICADES (AS REQUIRED) AND WARNING SIGNS.

TYPE "C" WARNING LIGHTS MAY BE USED ON VERTICAL PANELS (OPTIONAL).

**CONSTRUCTION NOTES**

SHOULD THE REQUIRED WORK ON ANY PROJECT, INCLUDING ANY TRAFFIC CONTROL, OVERLAP OR OTHERWISE INTERFERE WITH THE ON-GOING WORK OR TRAFFIC CONTROL OF ANOTHER PROJECT, IT SHALL BE THE RESPONSIBILITY OF THE RESPECTIVE CONTRACTORS TO COORDINATE THEIR WORK ACTIVITIES TO FACILITATE THE SAFE MOVEMENT OF TRAFFIC THROUGHOUT OR AROUND THEIR COLLECTIVE WORK AREAS. ANY SUCH RECOMMENDED CHANGES SHALL BE SUBMITTED IN WRITING TO EACH PROJECT RESIDENT ENGINEER FOR REVIEW AND APPROVAL.

ALL TRAFFIC CONTROL DEVICES NOT REQUIRED FOR THE SAFE CONDUCT OF TRAFFIC THROUGH THE TEMPORARY TRAFFIC CONTROL ZONE SHALL BE PROMPTLY REMOVED, COMPLETELY COVERED, TURNED AWAY FROM TRAFFIC OR OTHERWISE TAKEN OUT OF SERVICE. DEVICES SHALL NOT BE STORED ALONG THE ROADWAY WITHIN 15 FEET (15') OF AN OPEN DRIVING LANE, EITHER BEFORE OR AFTER THEY ARE TO BE USED UNLESS PROTECTED BY GUARDRAIL, BRIDGE RAIL, AND/OR BARRIERS INSTALLED FOR OTHER PURPOSES. THESE DEVICES SHALL BE REMOVED FROM THE TEMPORARY TRAFFIC CONTROL ZONE WHEN THE ENGINEER DETERMINES THEY ARE NO LONGER NEEDED. WHERE THERE IS INSUFFICIENT RIGHT-OF-WAY TO PROVIDE FOR THIS 15 FEET (15') SETBACK, THE CONTRACTOR SHALL DETERMINE ALTERNATE LOCATIONS AND REQUEST THE ENGINEERS APPROVAL TO USE THEM.

TRAFFIC CONTROL DEVICES, WARNING DEVICES, AND BARRIERS SHALL BE KEPT IN CORRECT POSITION, PROPERLY DIRECTED, CLEARLY VISIBLE AND CLEAN AT ALL TIMES. DAMAGED, DEFACED OR DIRTY DEVICES OR BARRICADES SHALL IMMEDIATELY BE REPAIRED, REPLACED OR CLEANED BY THE CONTRACTOR AND APPROVED FOR USE BY THE ENGINEER.

NO EQUIPMENT OR VEHICLES BELONGING TO THE CONTRACTOR, HIS SUB-CONTRACTORS OR EMPLOYEES SHALL BE PARKED OR STOPPED WITHIN 30 FEET (30') OF A LANE CARRYING TRAFFIC, AT ANY TIME, UNLESS REQUIRED BY ONGOING WORK OPERATIONS.

ALL DETOURS AND DIVERSIONS SHOULD BE IN PLACE, WITH SIGNING, STRIPING AND CHANNELIZING DEVICES, AS SHOWN IN THE PLANS OR STANDARD DRAWINGS, BEFORE THEY ARE OPENED TO TRAFFIC.

WHEN IT BECOMES NECESSARY TO CLOSE THE ROAD TO THROUGH TRAFFIC, NO LESS THAN SEVEN DAYS PRIOR TO THE CLOSURE, THE CONTRACTOR SHALL NOTIFY THE FOLLOWING INDIVIDUALS OR AGENCIES DESCRIBING THE AFFECTED ROAD AND THE APPROXIMATE DURATION OF THE CLOSURE. THOSE TO BE NOTIFIED INCLUDE BUT ARE NOT LIMITED TO 1) LOCAL LAW ENFORCEMENT OFFICIALS, 2) LOCAL FIRE OFFICIALS, 3) AMBULANCE SERVICES, 4) LOCAL SCHOOL SUPERINTENDENT, 5) UNITED STATES POSTAL SERVICE, AND 6) CITY OR COUNTY ROAD SUPERINTENDENT.

ALL TEMPORARY TRAFFIC CONTROL DEVICES, AND THEIR CONDITIONS THROUGHOUT THE LIFE OF THE CONSTRUCTION PROJECT, SHALL MEET O.D.O.T.'S LATEST "QUALITY STANDARDS FOR TEMPORARY TRAFFIC CONTROL DEVICES". THE O.D.O.T. RESIDENT ENGINEER WILL MAKE FINAL DECISION OF ALL TEMPORARY TRAFFIC CONTROL DEVICES BASED ON THE O.D.O.T. GUIDELINES.

NO GENDER BIAS SIGNS ARE ALLOWED.

**ARROW DISPLAY**

USE OF AN ARROW DISPLAY, IN THE ARROW OR CHEVRON MODE, SHALL BE LIMITED TO STATIONARY OR MOVING LANE CLOSURES.

AN ARROW DISPLAY, IN THE CAUTION MODE, SHALL BE USED ONLY FOR SHOULDER WORK, BLOCKING THE SHOULDER, ROADSIDE WORK NEAR THE SHOULDER, OR FOR MOBILE OPERATIONS (I.E. STRIPING).

AN ARROW DISPLAY IN THE ARROW OR CHEVRON MODE, SHALL NOT BE USED ON A TWO-LANE, TWO-WAY ROADWAY FOR TEMPORARY ONE-LANE OPERATION.

AN ARROW DISPLAY SHALL NOT BE USED ON A MULTI-LANE ROADWAY TO LATERALLY SHIFT TRAFFIC.

**CHANNELIZING DEVICES**

IN THOSE AREAS WHERE DRIVERS ARE ASKED TO MAKE A DECISION OR MUST BE GUIDED THROUGH A PRECISE MOVEMENT, BY USE OF CHANNELIZING DEVICES, IT IS ESPECIALLY IMPORTANT TO PROVIDE A CLEARLY DEFINED PATH. EXAMPLES OF THIS COULD BE IN DELINEATING A TEMPORARY GORE OR TURNING RADIUS. IN SUCH AREAS THE SPACING OF CHANNELIZING DEVICES MAY BE REDUCED TO 10 FEET FOR SPEEDS OF 40 M.P.H. OR LESS, AND 20 FEET FOR SPEEDS GREATER THAN 40 M.P.H.

WHEN CHANNELIZING DEVICES ARE USED TO DIRECT TRAFFIC ACROSS EXISTING LANE LINES OR EDGE LINES, THE SPACING BETWEEN CHANNELIZING DEVICES SHALL BE REDUCED 50%. SPACING SHOULD ALSO BE REDUCED WHEN CHANNELIZING DEVICES ARE PLACED ON CURVES, HILLS, OR NEXT TO POTENTIAL HAZARDS.

ALL TRAFFIC CONTROL CHANNELIZING DEVICES SHALL MEET MUTCD COLOR REQUIREMENTS.

**FLAGGERS**

FLAGGERS MUST BE CLEARLY VISIBLE TO APPROACHING TRAFFIC FOR A DISTANCE SUFFICIENT TO PERMIT PROPER RESPONSE BY MOTORISTS TO THE FLAGGING INSTRUCTIONS, AND TO PERMIT TRAFFIC TO REDUCE SPEED OR STOP BEFORE ENTERING THE TEMPORARY TRAFFIC CONTROL ZONE. FLAGGERS SHALL BE POSITIONED TO MAINTAIN MAXIMUM COLOR CONTRAST BETWEEN THE FLAGGER'S REFLECTIVE CLOTHING AND EQUIPMENT AND THE WORK AREA BACKGROUND.

DURING HOURS OF DARKNESS, FLAGGER STATIONS SHALL BE ILLUMINATED SUCH THAT THE FLAGGER WILL BE CLEARLY VISIBLE TO APPROACHING TRAFFIC. LIGHTS TO BE USED FOR ILLUMINATING THE STATION SHALL BE APPROVED BY THE ENGINEER. REFLECTORIZED PADDLES AND REFLECTORIZED VESTS, SHIRTS OR JACKETS SHALL BE USED FOR NIGHTTIME FLAGGING.

UNLESS OTHERWISE SPECIFIED IN THE PLANS, THE COST OF FLAGGING OPERATIONS SHALL BE INCLUDED IN OTHER ITEMS OF WORK.

**MINIMUM STANDARDS FOR TRAFFIC CONTROL DEVICES**

- (1) WARNING LIGHTS (TYPE A FLASHERS AND TYPE C STEADY BURN)
  - (A) NOT LESS THAN NINETY (90) PERCENT OF THE TOTAL NUMBER OF LIGHTS BEING USED AT ANY ONE TIME SHALL BE FULLY OPERATIONAL
  - (B) NOT MORE THAN THREE (3) LIGHTS ADJACENT TO ONE ANOTHER SHALL BE FAILING.
- (2) ARROW DISPLAY
  - (A) WHEN IN ARROW MODE, NO MORE THAN TWO (2) LAMPS IN THE STEM AND ZERO (0) LAMPS IN THE HEAD SHALL BE FAILING. THE DIMMING FUNCTION SHALL BE OPERATING PROPERLY.
  - (B) WHEN IN CAUTION MODE (CORNERS), A MINIMUM OF FOUR (4) LAMPS SHALL BE OPERATIONAL. THE DIMMING FUNCTION SHALL BE OPERATING PROPERLY.
  - (C) ANY LAMP WHICH IS LIGHTED BUT IMPROPERLY ALIGNED SHALL NOT BE CONSIDERED OPERATIONAL.
- (3) CHANGEABLE MESSAGE SIGNS
  - (A) NOT LESS THAN NINETY (90) PERCENT OF THE PIXELS SHALL BE FUNCTIONAL IN EACH CHARACTER MODULE.
  - (B) NO SANDBAG BALLASTING OVER 3 FEET IN HEIGHT.
- (4) PAVEMENT MARKING TAPE
  - (A) NOT MORE THAN TEN (10) PERCENT OF ALL TAPE, PAINT, MESSAGE OR SYMBOL SHALL BE MISSING
  - (B) NOT MORE THAN TWO (2) CONSECUTIVE DASHED LINES SHALL BE MISSING.
  - (C) NOT MORE THAN FIFTY (50) CONTINUOUS FEET OF A SOLID LINE SHALL BE MISSING.
- (5) CONSTRUCTION ZONE PAVEMENT MARKERS
  - (A) NOT MORE THAN TEN (10) PERCENT OF THE TOTAL NUMBER OF MARKERS SHALL BE MISSING.
  - (B) NOT MORE THAN THREE (3) CONSECUTIVE MARKERS SHALL BE MISSING.

**STRIPING**

WHENEVER THE WORK CAUSES THE OBLITERATION OF PAVEMENT MARKINGS, EITHER TEMPORARY OR PERMANENT MARKINGS SHALL BE IN PLACE PRIOR TO OPENING THE ROADWAY TO TRAFFIC. CENTERLINE PAVEMENT MARKINGS SHALL BE PROVIDED AT ALL TIMES FOR ROADWAYS OPEN TO TRAFFIC.

THE APPLICATION SURFACES FOR PAVEMENT MARKINGS SHALL BE FREE OF DUST, DIRT, MOISTURE OR OTHER FOREIGN MATTER WHICH WOULD INTERFERE WITH ADHESION. INSTALLATION OF ALL PAVEMENT MARKINGS SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

ALL TEMPORARY PAVEMENT MARKINGS SHALL BE REMOVED IMMEDIATELY AHEAD OF THE PERMANENT STRIPING OPERATIONS OR RE-STRIPING FOR FOLLOWING CONSTRUCTION PHASES.

WHEN REMOVABLE PAVEMENT MARKINGS TAPE IS TO BE INSTALLED ON NEW CONCRETE PAVEMENT, THE CURING COMPOUND SHALL BE REMOVED PRIOR TO INSTALLATION.

IF REMOVABLE PAVEMENT MARKING TAPE IS INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS AND FAILS DURING THE FIRST SIX MONTHS OF SERVICE, IT SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. REPLACEMENT SHALL BE ACCOMPLISHED IN A TIMELY MANNER UPON BEING NOTIFIED, BY THE ENGINEER, OF SUCH FAILURE.

**PILOT CAR**

WHEN LANE CLOSURES ARE REQUIRED ON TWO-LANE /TWO-WAY ROADWAYS, THE CONTRACTOR MAY, AT HIS OPTION, UTILIZE A PILOT CAR. IF THE CONTRACTOR ELECTS TO USE A PILOT CAR, CHANNELIZING DEVICES ALONG THE CENTERLINE WILL NOT BE REQUIRED. THE PILOT CAR OPERATOR SHALL BE IN RADIO CONTACT WITH PERSONNEL IN THE TEMPORARY TRAFFIC CONTROL ZONE. MAXIMUM SPEED OF THE PILOT CAR THROUGH THE WORK AREA SHALL BE 25 M.P.H. FULL COMPENSATION FOR FURNISHING AND OPERATING THE PILOT CAR, (INCLUDING DRIVER, RADIOS, AND ANY OTHER EQUIPMENT OR LABOR REQUIRED) SHALL BE CONSIDERED AS INCLUDED IN THE COST OF OTHER ITEMS OF WORK.

**MISCELLANEOUS**

TRAFFIC CONDITIONS MAY NECESSITATE CHANGES IN THE USE AND/OR QUANTITIES OF THE TRAFFIC CONTROL DEVICES AS SHOWN IN THE PLANS OR IN THE STANDARDS. ANY SUCH CHANGES ARE SUBJECT TO APPROVAL BY THE ENGINEER.

ALL CHANNELIZING DEVICES PROVIDED ON THIS PROJECT SHALL BE IN GOOD CONDITION AND SHALL BE APPROVED FOR USE ON THIS PROJECT BY THE ENGINEER.

THE REGULATORY SPEED LIMITS THROUGH THE WORK ZONE MAY BE ADJUSTED AT THE DISCRETION OF THE ENGINEER WITH THE DOCUMENTED APPROVAL OF THE DIVISION ENGINEER IN ACCORDANCE WITH TITLE 47 OF THE OKLAHOMA MOTOR VEHICLE LAWS.

THE TERMINATION AREA EXTENDS FROM THE DOWNSTREAM END OF THE WORK AREA TO THE TEMPORARY TRAFFIC CONTROL DEVICE SUCH AS "END ROAD WORK" SIGNS. IF POSTED, A SPEED SIGN, OR OTHER SIGNS MAY BE USED TO INFORM ROAD USERS THAT THEY CAN RESUME NORMAL OPERATIONS.

THE CONSTRUCTION SIGNING AND BARRICADE CONTRACTOR SHOULD AFFIX THEIR COMPANY NAME AND/OR LOGO INCONSPICUOUSLY ON EACH TRAFFIC CONTROL DEVICE.



APPROVED BY TRAFFIC ENGINEER: *Sheld Gandy* DATE: 3/21/11

TRAFFIC STANDARD  
 TRAFFIC CONTROL STANDARD  
 TRAFFIC CONTROL CONSTRUCTION NOTES

2009 SPECIFICATIONS

TCS1-1	01
T-501	

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DESCRIPTION	REVISIONS	DATE
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### TAPER LENGTH CRITERIA FOR WORK ZONES

SPEED LIMIT M.P.H.	"L" FORMULA	"L" TAPER LENGTH (MINIMUM) (FT)			NUMBER OF CHANNELIZING DEVICES REQUIRED (MINIMUM)			SPACING CHANNELIZING DEVICES (MAXIMUM)		MAXIMUM HORIZONTAL ALIGNMENT THRU DETOUR (DEGREE) (S=0)	SPEED LIMIT M.P.H.
		10' OFFSET	11' OFFSET	12' OFFSET	10' OFFSET	11' OFFSET	12' OFFSET	① THRU TAPER SECTION (FT.)	② THRU TANGENT SECTION (FT.)		
20	$L = \frac{W \times S^2}{60}$	70	75	80	5	5	5	20	40	—	20
25		105	115	125	6	6	6	25	50	—	25
30		150	165	180	6	7	7	30	60	15	30
35		205	225	245	7	8	8	35	70	11	35
40	$L = W \times S$	265	295	320	8	9	9	40	80	8	40
45		450	495	540	11	12	13	45	90	6	45
50		500	550	600	11	12	13	50	100	5	50
55		550	605	660	12	14	15	50	100	4	55
60		600	660	720	13	15	16	50	100	3	60
65		650	715	780	14	16	17	50	100	2.5	65
70		700	770	840	15	17	18	50	100	2	70
75		750	825	900	16	18	19	50	100	1.8	75

**NOTES:**

① RECOMMENDED SIGNING TO BE USED THRU LANE TAPER IS (1) CW1-8 ON EVERY OTHER DRUM.

② RECOMMENDED SIGNING TO BE USED THRU TANGENT LANES IS (1) R4-7A(R) OR (1) R4-7A(L) (AS APPLIES) ON EVERY OTHER DRUM.

L = TAPER LENGTH IN FEET  
W = WIDTH OF OFFSET IN FEET  
S = POSTED SPEED OR OFF-PEAK 85 PERCENTILE SPEED IN MPH

**TYPE OF TAPER**  
UPSTREAM TAPERS  
MERGING TAPER  
SHIFTING TAPER  
SHOULDER TAPER  
TWO-WAY TRAFFIC TAPER

**TAPER LENGTH**  
L MINIMUM  
1/2 L MINIMUM  
1/3 L MINIMUM  
100 FEET MAXIMUM  
100 FEET PER LANE

DOWNSTREAM TAPERS (USE IS OPTIONAL)

### FLARE RATES FOR CONCRETE MEDIAN BARRIER IN TEMPORARY TRAFFIC CONTROL ZONES

SPEED *	FLARE RATE (MINIMUM)
40 M.P.H.	9 TO 1
45 M.P.H.	10 TO 1
50 M.P.H.	11 TO 1
55 M.P.H.	12 TO 1
60 M.P.H.	13 TO 1
65 M.P.H.	14 TO 1
70 M.P.H.	15 TO 1
75 M.P.H.	16 TO 1

\* POSTED SPEED LIMIT PRIOR TO CONSTRUCTION

### PAVEMENT MARKINGS THROUGH TEMPORARY TRAFFIC CONTROL ZONE

DRIVING SURFACE		FLEX TAB MARKERS	TAPE (REMOVABLE)	TAPE (NON-REMOVABLE)	PAINT	CONSTRUCTION ZONE PAVEMENT MARKERS
ASPHALT	EXISTING PAVEMENT TO BE REMOVED OR OVERLAYED IN THE NEXT PHASE	X	X	X	X	X
	EXISTING PAVEMENT TO BE LEFT IN PLACE THRU THE NEXT PHASE	X	X			X
	INTERMEDIATE LIFT	X	X	X	X	X
	MILLED SURFACE	X	X	X	X	X
FINAL LIFT		X	X			
CONCRETE	EXISTING PAVEMENT TO BE REMOVED OR OVERLAYED IN THE NEXT PHASE	X	X	X	X	X
	EXISTING PAVEMENT TO BE LEFT IN PLACE THRU THE NEXT PHASE	X	X			X
	FINAL SURFACE	X	X		X	X

NOTE: USE OF NON-REMOVABLE TAPE (FOILBACK) SHALL BE LIMITED TO THOSE CONDITIONS SHOWN IN THE TABLE.

### RECOMMENDED CLEAR ZONE DISTANCE (FT) (CONSTRUCTION WORK ZONES)

DESIGN SPEED	DESIGN ADT	FILL SLOPES			CUT SLOPES		
		6:1 OR FLATTER	5:1 OR 4:1	3:1	3:1	4:1 OR 5:1	6:1 OR FLATTER
40 MPH OR LESS	UNDER 750	4	4	SEE NOTE 3	4	4	4
	750-1500	5	6		5	5	5
	1500-6000	6	7		6	6	6
	OVER 6000	7	8		7	7	7
45-50 MPH	UNDER 750	5	6		4	4	5
	750-1500	7	8		5	6	7
	1500-6000	8	10		6	7	8
	OVER 6000	10	12		7	9	10
55 MPH	UNDER 750	6	7		4	5	5
	750-1500	8	10		5	7	8
	1500-6000	10	12	7	8	10	
	OVER 6000	11	13	8	10	11	
60 MPH	UNDER 750	8	10	5	6	7	
	750-1500	10	13	6	8	10	
	1500-6000	13	16 *	7	9	12	
	OVER 6000	15	18 *	10	12	13	
65-70 MPH	UNDER 750	9	10	5	7	7	
	750-1500	12	14	6	9	10	
	1500-6000	14	17 *	8	11	13	
	OVER 6000	15	19 *	11	13	14	

**NOTES:**

\* THE CLEAR ZONE MAY BE LIMITED TO 15 FEET FOR PRACTICALITY AND TO PROVIDE A CONSISTENT ROADWAY TEMPLATE.

(1) ALL DISTANCES ARE MEASURED FROM EDGE OF THE TRAVEL LANE.

(2) FOR CLEAR ZONES, THE "DESIGN ADT" WILL BE THE TOTAL ADT ON TWO-WAY ROADWAYS AND DIRECTIONAL ADT ON ONE-WAY ROADWAYS (E.G., RAMPS AND ONE ROADWAY OF A DIVIDED HIGHWAY).

(3) FILL SLOPES WHICH ARE 3:1 OR STEEPER ARE CRITICAL AND MAY REQUIRE A BARRIER. THEREFORE THERE IS NOT A CLEAR ZONE APPLICATION.

### STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

SPEED * (MPH)	LENGTH (FEET)
20 M.P.H.	115
25 M.P.H.	155
30 M.P.H.	200
35 M.P.H.	250
40 M.P.H.	305
45 M.P.H.	360
50 M.P.H.	425
55 M.P.H.	495
60 M.P.H.	570
65 M.P.H.	645
70 M.P.H.	730
75 M.P.H.	820

\* POSTED SPEED, OFF-PEAK 85th PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED.

### CROSSOVER CRITERIA FOR WORK ZONES

WIDTH OF MEDIAN (W) (FT)	LATERAL SHIFT - (P) (FT)	LENGTH OF CROSSOVER - LC * (FT)											
		V.	30 M.P.H.	35 M.P.H.	40 M.P.H.	45 M.P.H.	50 M.P.H.	55 M.P.H.	60 M.P.H.	65 M.P.H.	70 M.P.H.	75 M.P.H.	
		D.	15°	11°	8°	6°	5°	4°	3°	2.5°	2°	1.8°	
20	32	R.	382	521	716	955	1146	1433	1910	2292	2865	3183	
30	42		219	256	301	348	382	427	493	541	605	637	
40	52		250	293	344	398	437	489	565	619	692	730	
50	62		277	325	382	443	485	543	628	688	770	812	
60	72		301	354	417	483	529	593	685	751	841	886	
70	82		324	381	448	519	570	638	738	809	905	955	
80	92		344	405	478	554	608	681	787	863	966	1,018	
90	102		363	428	505	586	643	720	833	914	1,023	1,078	
100	112		381	450	531	616	676	758	877	962	1,076	1,135	
110	122		398	470	555	644	708	793	918	1,007	1,127	1,189	
120	132		414	489	578	672	738	827	958	1,050	1,176	1,240	
			429	508	601	698	767	860	995	1,092	1,223	1,290	

\* CROSSOVER = REVERSE CURVE CONNECTION TYING TWO (2) PARALLEL ROADWAYS.

### RECOMMENDED DISTANCE BETWEEN SIGNS (MIN.)

ROAD TYPE	A (FT)	B (FT)	C (FT)
URBAN (LOW SPEED)	100	100	100
URBAN (HIGH SPEED)	350	350	350
RURAL	500	500	500
EXPRESSWAY / FREEWAY	1,000	1,500	2,640



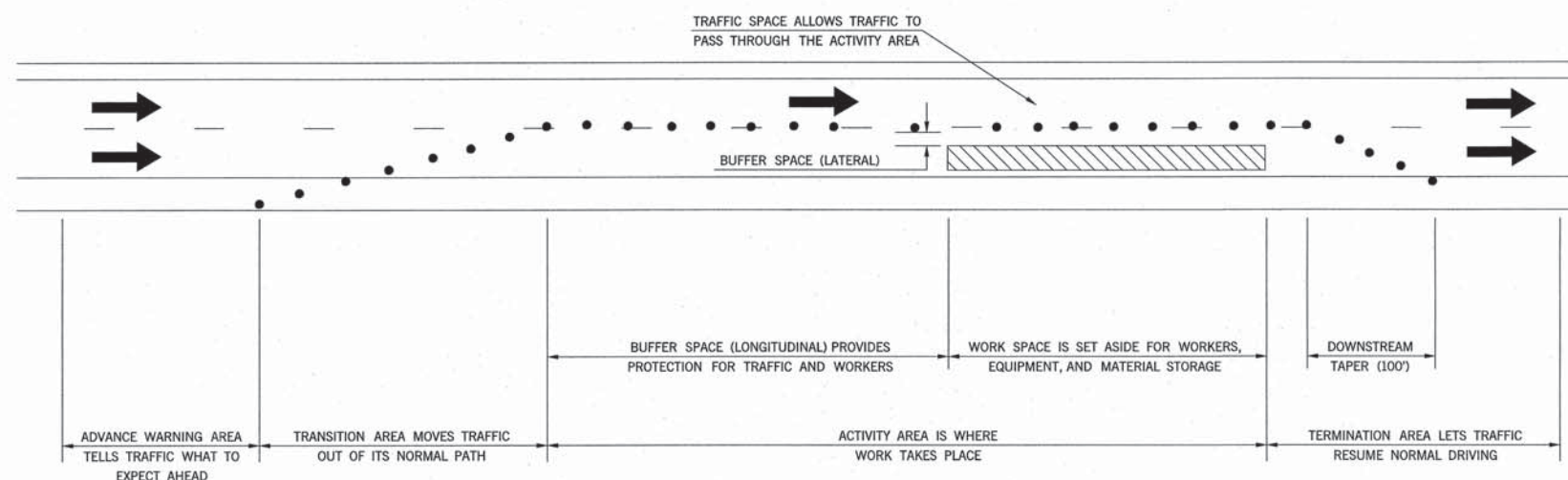
APPROVED BY  
TRAFFIC ENGINEER: *David Smith* DATE: 6/23/10

TRAFFIC STANDARD  
TRAFFIC CONTROL STANDARD  
TRAFFIC CONTROL TABLES AND CHARTS

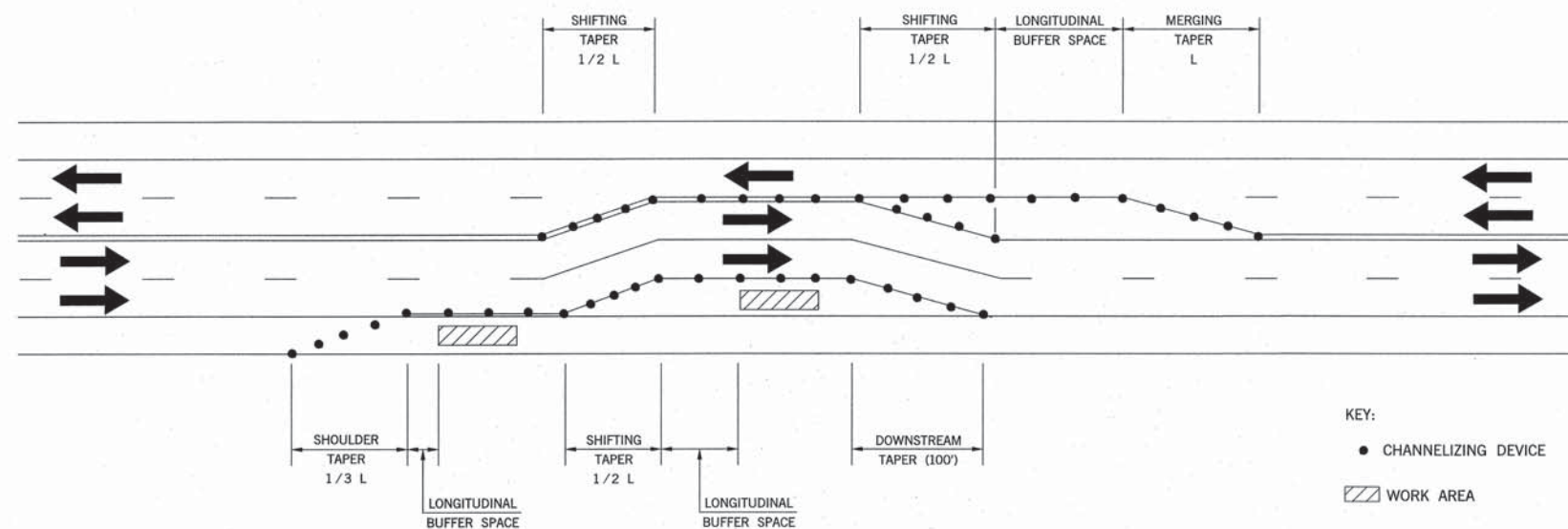
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DESCRIPTION	REVISIONS	DATE
CHANGED TRANSITION NOTATION		5/31/2011



**COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL ZONE**



**TAPERS AND BUFFER SPACE**

**TEMPORARY TRAFFIC CONTROL ELEMENTS**



APPROVED BY TRAFFIC ENGINEER: *[Signature]* DATE: 5/31/2011

TRAFFIC STANDARD  
TRAFFIC CONTROL STANDARD  
TEMPORARY TRAFFIC CONTROL ELEMENTS

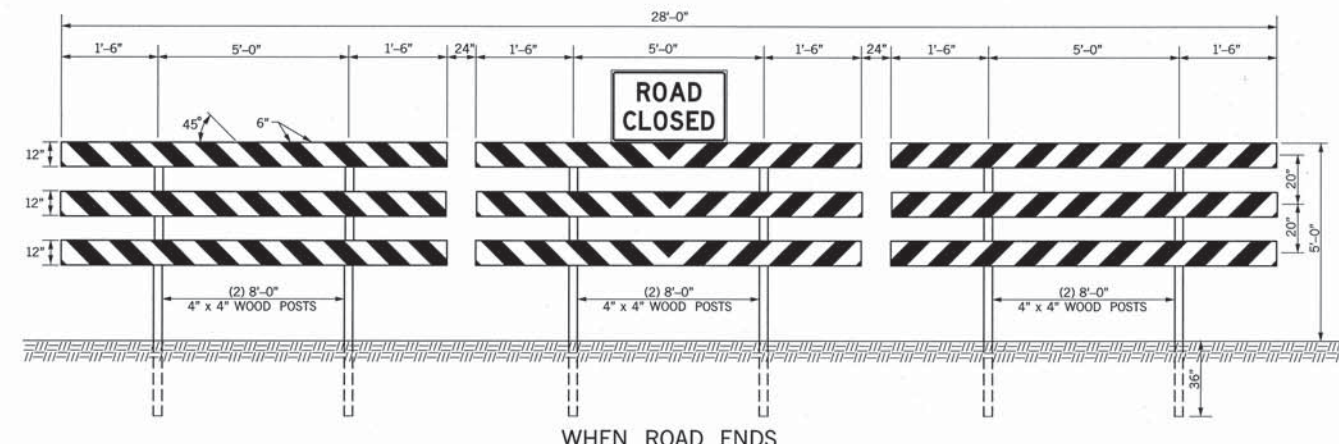
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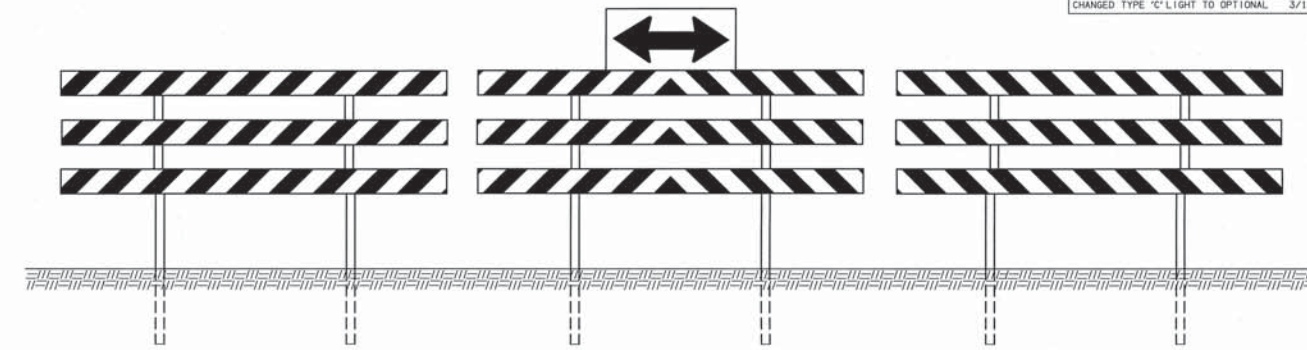
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DESCRIPTION	REVISIONS	DATE
CHANGED TYPE 'C' LIGHT TO OPTIONAL		3/16/2011



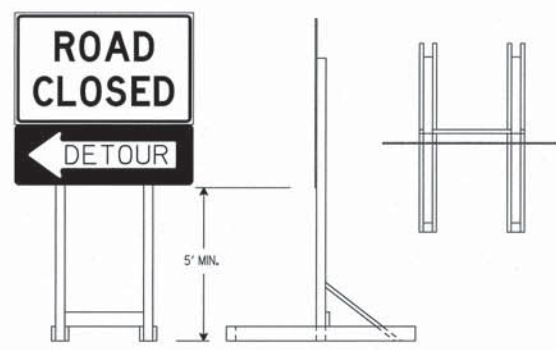
**PERMANENT TYPE III(A/B) BARRICADE**  
(DIMENSIONS ARE TYPICAL FOR BOTH BARRICADES)



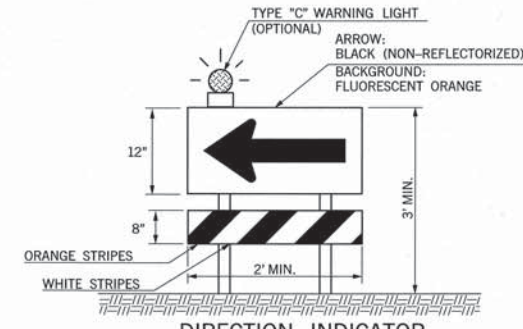
**FOR T-INTERSECTIONS**

NOTES: A PERMANENT BARRICADE TYPE III(A) SHALL CONSIST OF NINE (9) PANELS AND SIX (6) POSTS.  
TYPICAL INSTALLATION AS SHOWN IS FOR AN ABSOLUTE CLOSURE.  
BARRICADES SHOULD NOT BE PLACED PARALLEL TO TRAFFIC IF NOT OUTSIDE OF CLEAR ZONE.

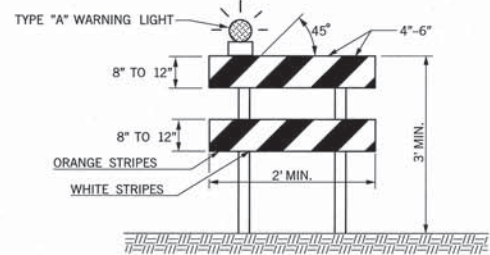
PERMANENT BARRICADE TYPE III(B) WILL BE IDENTICAL TO TYPE III(A) WITH NINE (9) ADDITIONAL REFLECTORIZED 3/4"x12" LUMBER PANELS ATTACHED TO THE BACK SIDE OF THE BARRICADE.  
COLOR: BACKGROUND - WHITE (REFLECTORIZED)  
DIAGONAL STRIPES - RED (REFLECTORIZED)



Skid-Mounted Sign Support with plywood sign  
**LONG/INTERMEDIATE TERM STATIONARY PORTABLE SIGN SUPPORTS**  
5 Foot Mounting Height (SKID MOUNTED)  
(SHALL BE PLACED BEHIND TYPE III BARRICADE)



**DIRECTION INDICATOR BARRICADE**



**TYPE II BARRICADE**

NOTES: FOR WOODEN BARRICADES NOMINAL LUMBER DIMENSIONS WILL BE SATISFACTORY.  
FOR RAILS LESS THAN 3 FEET LONG, 4 INCH WIDE STRIPES SHALL BE USED.  
TYPE III BARRICADES SHALL BE CONSTRUCTED USING A MINIMUM OF TWO (2) POSTS.  
FOR WOODEN BARRICADES, PANEL THICKNESS SHALL NOT EXCEED ONE-HALF INCH (1/2").  
BARRICADES SHOULD NOT BE PLACED PARALLEL TO TRAFFIC IF NOT OUTSIDE OF CLEAR ZONE.  
PROJECTS WITH WORK LIMITS OF 2.0 MILES OR MORE IN LENGTH WILL REQUIRE THE G20-1A SIGN. THE SIGN (G20-1A) WILL BE REQUIRED ON ONE SIDE OF A 2-LANE ROADWAY AND BOTH SIDES OF A DIVIDED HIGHWAY.  
ALL BARRICADE STRIPES SHALL BE RETROREFLECTIVE.  
COLOR: BACKGROUND - WHITE (REFLECTORIZED)  
DIAGONAL STRIPES - FLUORESCENT ORANGE (REFLECTORIZED)

IF BARRICADES ARE USED TO CHANNELIZE PEDESTRIANS, THERE SHALL BE CONTINUOUS DETECTABLE BOTTOM AND TOP RAILS WITH NO GAPS BETWEEN INDIVIDUAL BARRICADES TO BE DETECTABLE TO USERS OF LONG CANES. THE BOTTOM OF THE BOTTOM RAIL SHALL BE NO HIGHER THAN 6 INCHES ABOVE THE GROUND SURFACE. THE TOP OF THE TOP RAIL SHALL BE NO LOWER THAN 36 INCHES ABOVE THE GROUND SURFACE.

SIGNS MOUNTED ON TYPE III BARRICADES SHOULD NOT COVER MORE THAN 50 PERCENT OF THE TOP TWO RAILS OR 33 PERCENT OF THE TOTAL AREA OF THE THREE RAILS  
SIGNS MOUNTED ON BARRICADES, OR OTHER PORTABLE SUPPORTS, SHALL BE NO LESS THAN 1' ABOVE THE TRAVELED WAY.

SANDBAGS MAY BE PLACED ON LOWER PARTS OF THE FRAME OR THE STAYS OF BARRICADES TO PROVIDE THE REQUIRED BALLAST.

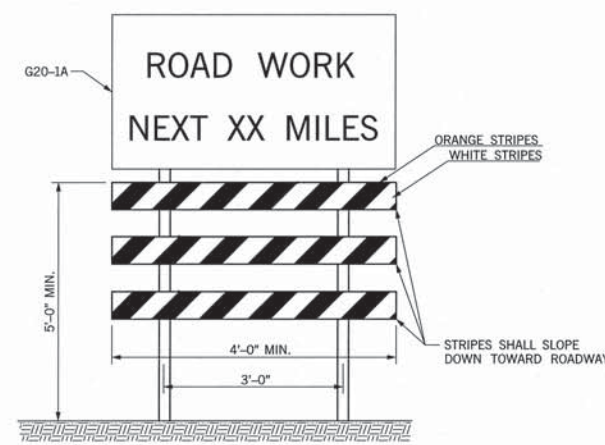
BALLAST SHALL NOT BE PLACED ON TOP OF ANY STRIPED RAIL. BARRICADES SHALL NOT BE BALLASTED BY NONDEFORMABLE OBJECTS SUCH AS ROCKS OR CHUNKS OF CONCRETE. BALLAST SHALL NOT EXTEND INTO THE ACCESSIBLE PASSAGE WIDTH OF 60".

DIRECTION INDICATOR BARRICADE SHALL CONSIST OF A ONE-DIRECTION LARGE ARROW (W1-6) SIGN MOUNTED ABOVE A DIAGONAL STRIPED, HORIZONTALLY ALIGNED, RETROREFLECTIVE RAIL.

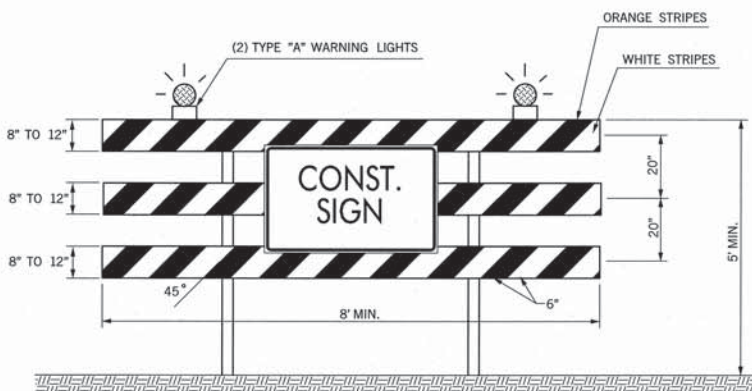
WHERE BARRICADES EXTEND ENTIRELY ACROSS A ROADWAY, THE STRIPES SHOULD SLOPE DOWNWARD IN THE DIRECTION TOWARD WHICH ROAD USERS MUST TURN.

WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED, THE BARRICADE STRIPES SHOULD SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE OR BARRICADES.

WHERE NO TURNS ARE INTENDED, THE STRIPES SHOULD BE POSITIONED TO SLOPE DOWNWARD TOWARD THE CENTER OF THE BARRICADE OR BARRICADES.

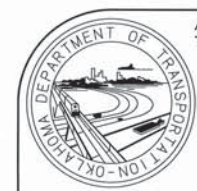


**WING BARRICADE**



**TYPE III BARRICADE**

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
880(B)	CONSTRUCTION SIGNS	SD
880(C)	CONSTRUCTION BARRICADES	SD
880(E)	WARNING LIGHTS	SD



APPROVED BY TRAFFIC ENGINEER: *[Signature]* DATE: 3/21/11

TRAFFIC STANDARD  
TRAFFIC CONTROL STANDARD  
TRAFFIC CONTROL DEVICES

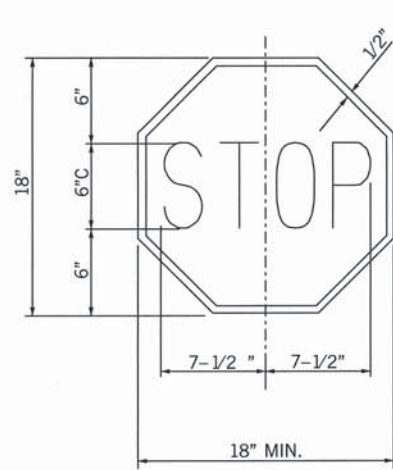
2009 SPECIFICATIONS

TCS4-1	01
	T-504

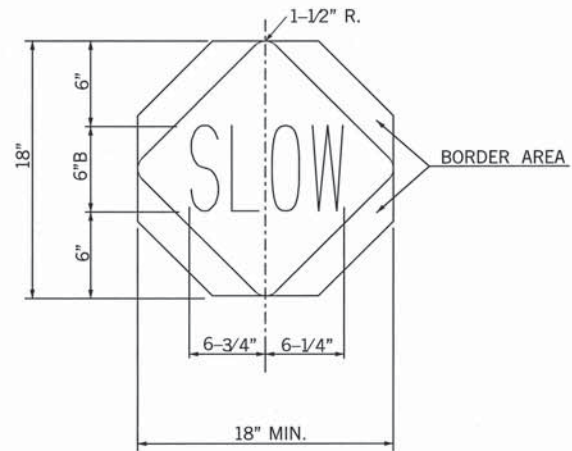
\$\$\$date\$\$\$



DESCRIPTION	REVISIONS	DATE

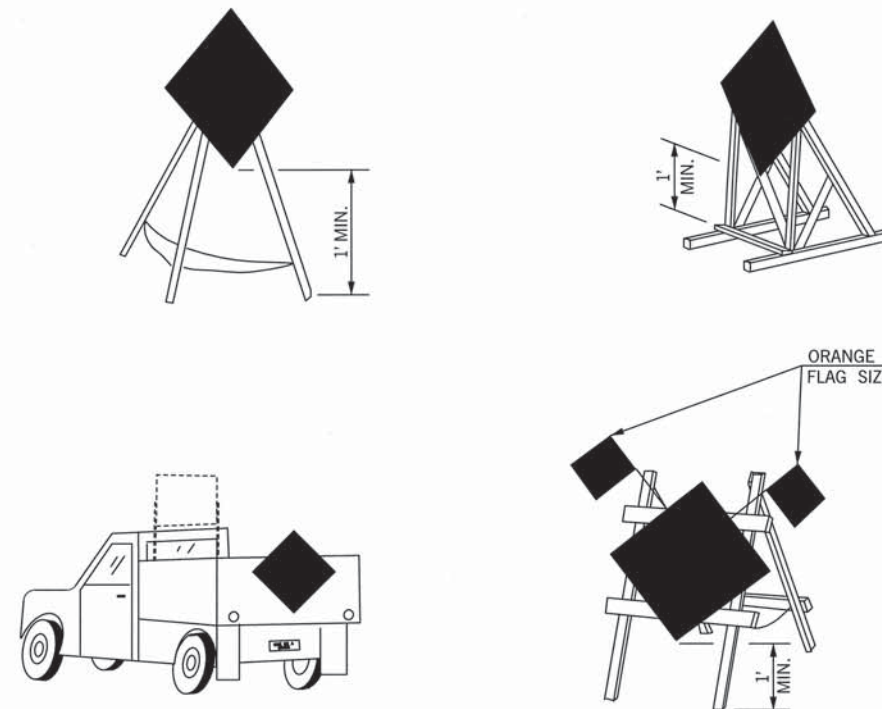


STOP:  
 LEGEND AND BORDER: WHITE (REFLECTORIZED)  
 BACKGROUND: RED (REFLECTORIZED)



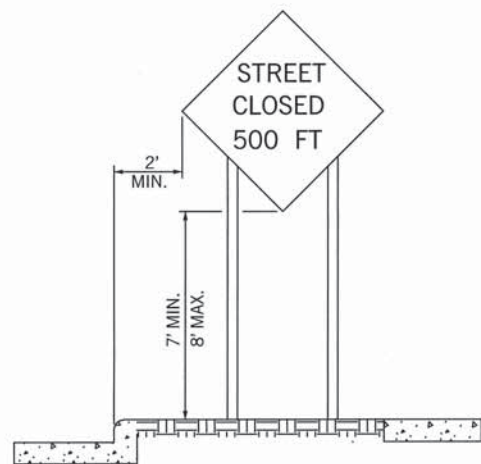
SLOW:  
 LEGEND AND BORDER AREA: BLACK (NON-REFLECTORIZED)  
 BACKGROUND: ORANGE (REFLECTORIZED)

**STOP-SLOW PADDLE**

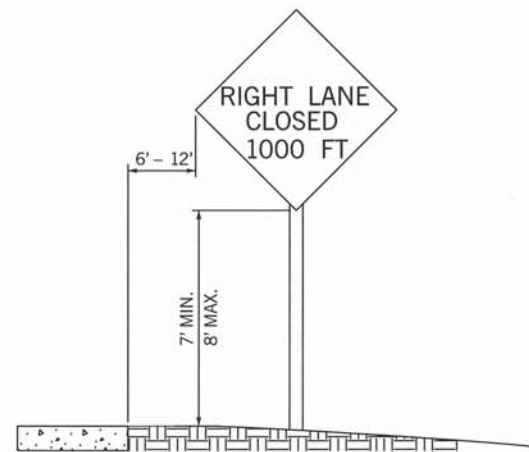


NOTE:  
 THE BOTTOM OF SIGNS MOUNTED  
 ON BARRICADES OR TEMPORARY  
 SUPPORTS SHALL NOT BE LESS THAN  
 1 FOOT ABOVE THE TRAVELED WAY.

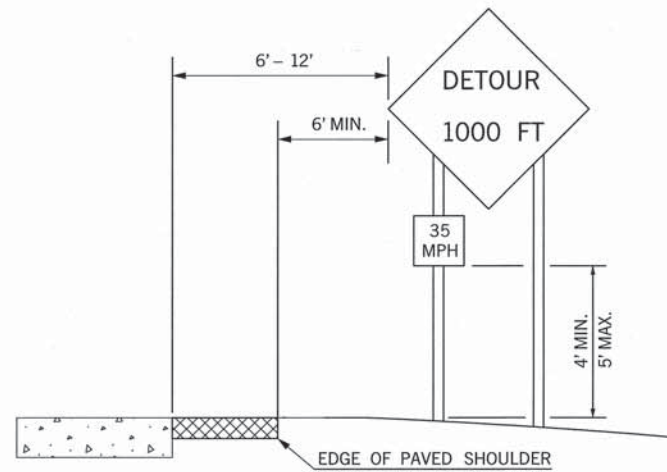
**PORTABLE AND TEMPORARY MOUNTINGS  
 METHODS OF MOUNTING SIGNS OTHER THAN ON POSTS**



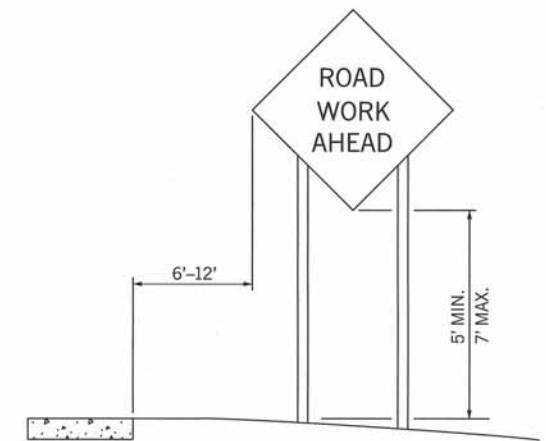
**URBAN DISTRICT  
 (WITH CURB)**



**URBAN DISTRICT  
 (WITHOUT CURB)**



**RURAL DISTRICT WITH  
 ADVISORY SPEED PLATE**



**RURAL DISTRICT**

**HEIGHT AND LATERAL LOCATIONS OF SIGNS – TYPICAL INSTALLATIONS**



APPROVED BY  
 TRAFFIC ENGINEER: *[Signature]* DATE: 6/23/10

TRAFFIC STANDARD

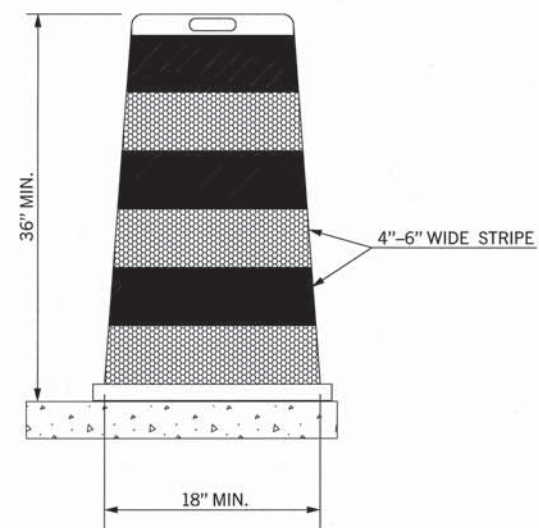
TRAFFIC CONTROL STANDARD  
 TYPICAL SIGN INSTALLATION

2009 SPECIFICATIONS

TCSS-1	00
T-505	



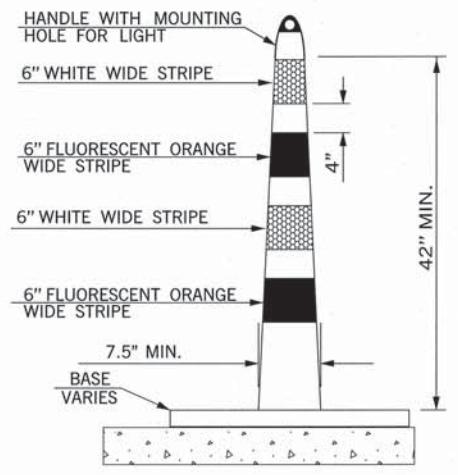
DESCRIPTION	REVISIONS	DATE
ADD NOTE TO VERTICAL PANEL		07/19/10
CHANGED TYPE "C" LIGHT TO OPTIONAL		3/15/2011



**DRUM**

**NOTES:**

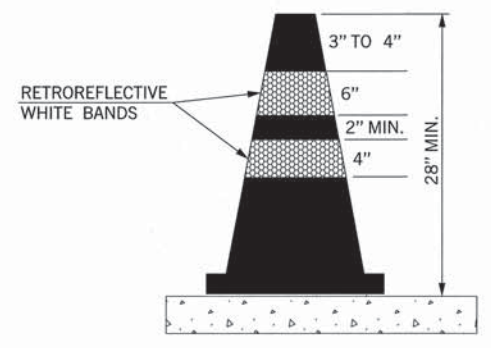
METAL DRUMS SHALL NOT BE USED.  
 EACH DRUM SHALL HAVE A MINIMUM OF TWO (2) FLUORESCENT ORANGE STRIPES ALTERNATING WITH A MINIMUM OF TWO (2) WHITE STRIPES. THESE STRIPES SHALL CONSIST OF RETROREFLECTIVE SHEETING.  
 BALLAST SHALL NOT BE PLACED ON TOP OF A DRUM.  
 DRUMS SHALL NOT BE USED TO DELINEATE AN EDGE DROP OFF IF THEY MUST BE PLACED IN THE DROP OFF AREA BELOW THE LEVEL OF THE DRIVING SURFACE.



**CHANNELIZER CONE**

**NOTES:**

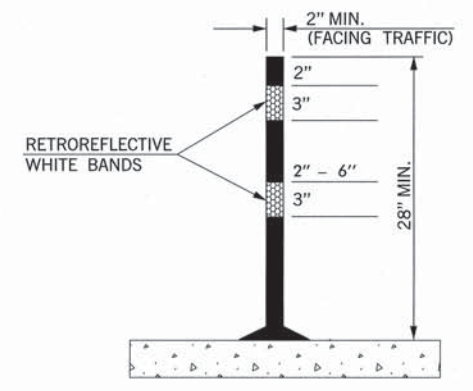
CHANNELIZER CONES USED ON HIGH SPEED ROADWAYS, ON ALL HIGHWAYS DURING NIGHTTIME, OR WHENEVER MORE CONSPICUOUS GUIDANCE IS NEEDED SHALL BE A MINIMUM OF 42 INCHES HIGH.  
 EACH CHANNELIZER CONES SHALL HAVE A MINIMUM OF TWO (2) FLUORESCENT ORANGE STRIPES ALTERNATING WITH A MINIMUM OF TWO (2) WHITE STRIPES. THESE STRIPES SHALL CONSIST OF RETROREFLECTIVE SHEETING.  
 BASE SHALL WEIGH 30 LBS. OR MORE.



**CONE**

**NOTES:**

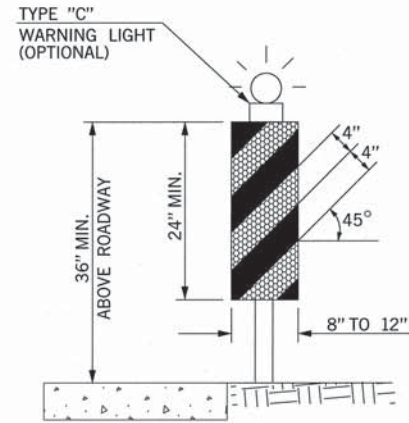
CONES USED ON HIGH SPEED ROADWAYS, ON ALL HIGHWAYS DURING NIGHTTIME, OR WHENEVER MORE CONSPICUOUS GUIDANCE IS NEEDED SHALL BE A MINIMUM OF 28 INCHES HIGH.  
 CONES SHALL BE PREDOMINANTLY ORANGE, WITH WHITE RETROREFLECTIVE SHEETING.



**TUBE CHANNELIZER**

**NOTES:**

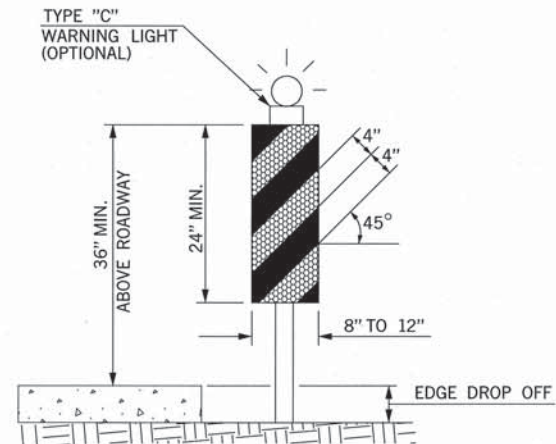
TUBE CHANNELIZERS USED ON HIGH SPEED ROADWAYS, ON ALL HIGHWAYS DURING NIGHTTIME, OR WHENEVER MORE CONSPICUOUS GUIDANCE IS NEEDED SHALL BE A MINIMUM OF 28 INCHES HIGH.  
 TUBE CHANNELIZERS SHALL BE PREDOMINANTLY ORANGE, WITH WHITE RETROREFLECTIVE SHEETING.



**VERTICAL PANEL  
W/O DROP OFF**

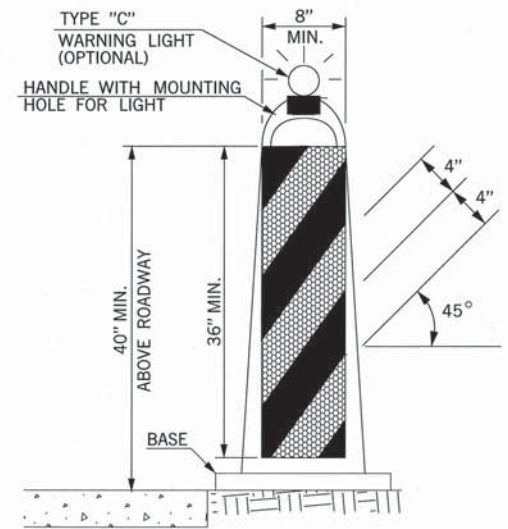
**NOTES:**

PANEL STRIPE WIDTHS SHALL BE 6 INCHES EXCEPT WHERE PANEL LENGTHS ARE LESS THAN 36 INCHES, THEN 4 INCH WIDE STRIPES MAY BE USED.  
 MARKINGS FOR VERTICAL PANELS SHALL BE ALTERNATING FLUORESCENT ORANGE AND WHITE RETROREFLECTORIZED STRIPES (SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION TRAFFIC IS TO PASS).  
 SHALL HAVE A MINIMUM OF TWO (2) FULL FLUORESCENT ORANGE STRIPES.



**VERTICAL PANEL  
W/DROP OFF**

ON UNDIVIDED HIGHWAYS, VERTICAL PANELS SHALL HAVE A MINIMUM OF 192 SQUARE INCHES OF RETROREFLECTIVE SHEETING ON EACH PANEL (FRONT AND BACK). WHEN USED ON HIGH SPEED ROADWAYS, VERTICAL PANELS SHALL HAVE MINIMUM OF 270 SQUARE INCHES OF RETROREFLECTIVE SHEETING ON EACH PANEL (FRONT AND BACK). THIS SHALL CONSTITUTE ONE (1) COMPLETE VERTICAL PANEL.  
 ON DIVIDED HIGHWAYS A VERTICAL PANEL MAY HAVE SHEETING ON ONLY ONE SIDE.



**STACKABLE VERTICAL PANEL**

**NOTES:**

(1) VERTICAL PANEL SIGNS SHALL BE MOUNTED BACK TO BACK WHEN USED FOR TWO-WAY TRAFFIC.  
 (2) BASE SHALL BE NO LARGER THAN 28" LONG BY 20" WIDE, AND 2" THICK.  
 (3) BASE SHALL WEIGHT 30 LBS. OR MORE.  
 (4) THESE DEVICES SHALL BE CONSTRUCTED OF A MATERIAL THAT CAN BE STRUCK WITHOUT DAMAGING VEHICLES ON IMPACT.

**KEY:**

	FLUORESCENT ORANGE (REFLECTORIZED)
	WHITE (REFLECTORIZED)

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
880(D)	VERTICAL PANEL	SD
880(E)	WARNING LIGHTS	SD
880(F)	DRUMS	SD
880(G)	TUBE CHANNELIZERS	SD
880(H)	CONES	SD
880(I)	CHANNELIZER CONES	SD

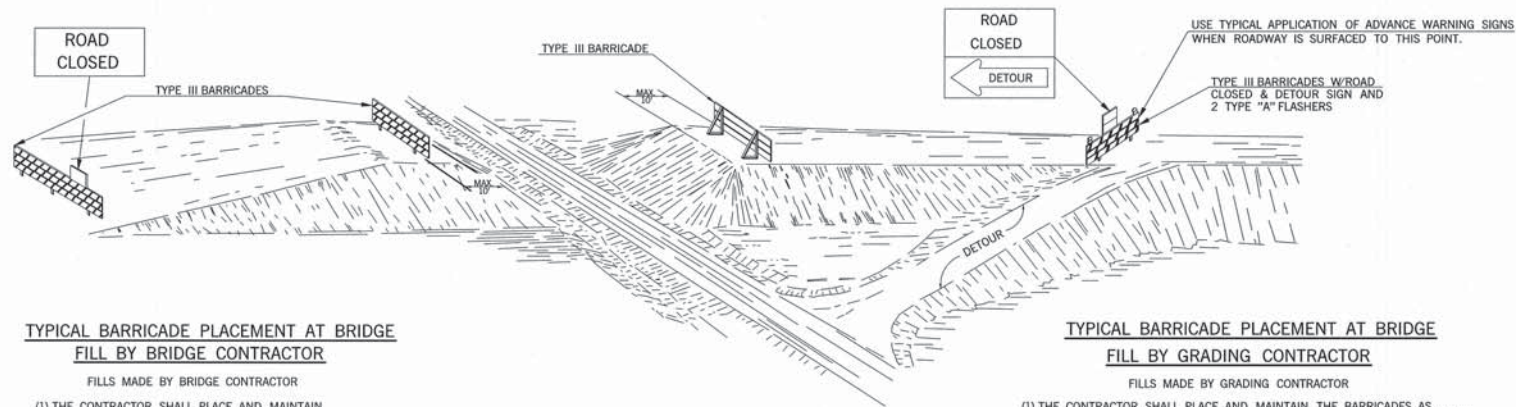


APPROVED BY  
 TRAFFIC ENGINEER: *Dwight Smith* DATE: 3/15/11

TRAFFIC STANDARD  
 CONTROL STANDARD  
 CHANNELIZING DEVICES

\$\$\$date\$\$\$



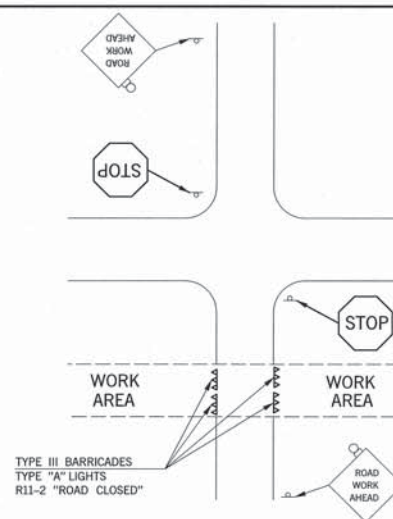


**TYPICAL BARRICADE PLACEMENT AT BRIDGE FILL BY BRIDGE CONTRACTOR**

- FILLS MADE BY BRIDGE CONTRACTOR
- (1) THE CONTRACTOR SHALL PLACE AND MAINTAIN THE BARRICADES AS SHOWN UNTIL THEY ARE NO LONGER NEEDED.
  - (2) THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO REMOVAL OF THE BARRICADES.
  - (3) THE ENGINEER SHALL NOTIFY THE GRADING CONTRACTOR TO FURNISH AND ERECT HIS BARRICADES "IMMEDIATELY" AFTER THE BRIDGE CONTRACTOR REMOVES HIS BARRICADES. THE GRADING CONTRACTOR SHALL MAINTAIN HIS BARRICADES UNTIL FINAL INSPECTION OR UNTIL THEY ARE NO LONGER NEEDED.
  - (4) BARRICADES AT BRIDGE FILL SHALL BE IN PLACE AND MAINTAINED AT ALL TIMES UNTIL OPENED TO TRAFFIC. HOWEVER, BARRICADES MAY BE REMOVED OR ADJUSTED, AS NEEDED, TO ALLOW ACCESS TO THE WORK AREA.

**TYPICAL BARRICADE PLACEMENT AT BRIDGE FILL BY GRADING CONTRACTOR**

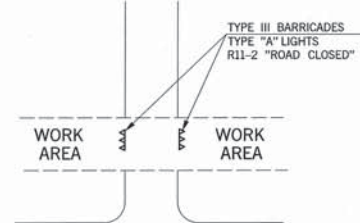
- FILLS MADE BY GRADING CONTRACTOR
- (1) THE CONTRACTOR SHALL PLACE AND MAINTAIN THE BARRICADES AS SHOWN UNTIL FINAL INSPECTION OR UNTIL THEY ARE NO LONGER NEEDED.
  - (2) THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO REMOVAL OF THE BARRICADES.
  - (3) IF THE BRIDGE WORK ORDER IS ISSUED PRIOR TO COMPLETION OF THE GRADING CONTRACT, THE BRIDGE CONTRACTOR SHALL MAKE ARRANGEMENTS WITH THE GRADING CONTRACTOR TO ASSUME RESPONSIBILITY FOR PROTECTION OF THE BRIDGE WORK AREA. THIS WILL INCLUDE FURNISHING, INSTALLING, AND MAINTAINING ALL BARRICADES AND SIGNS NECESSARY TO PROVIDE THAT PROTECTION UNTIL THE BRIDGE IS COMPLETED AND THE FINAL INSPECTION IS COMPLETED.
  - (4) IF THE BRIDGE WORK ORDER HAS NOT BEEN ISSUED PRIOR TO THE FINAL INSPECTION OF THE GRADING, THEN THE GRADING CONTRACTOR SHALL MAKE ARRANGEMENTS WITH THE OKLAHOMA DEPARTMENT OF TRANSPORTATION FOR STATE FORCES TO SUPPLY, INSTALL AND MAINTAIN ANY NECESSARY TRAFFIC CONTROL DEVICES NEEDED TO PROTECT THE WORK AREA. THESE STATE OWNED DEVICES SHALL REMAIN IN PLACE UNTIL SUCH TIME THAT THE BRIDGE WORK ORDER IS ISSUED. AT THAT TIME THE BRIDGE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR TRAFFIC CONTROL AND REPLACE THE STATE OWNED DEVICES WITH HIS OWN.
  - (5) SUFFICIENT NUMBER OF TYPE II BARRICADES WITH SIGNS SHALL BE USED TO COMPLETELY CLOSE THE WORK AREA TO THROUGH TRAFFIC.
  - (6) BARRICADES AT BRIDGE FILL SHALL BE IN PLACE AND MAINTAINED AT ALL TIMES UNTIL OPENED TO TRAFFIC. HOWEVER, BARRICADES MAY BE REMOVED OR ADJUSTED, AS NEEDED, TO ALLOW ACCESS TO THE WORK AREA.



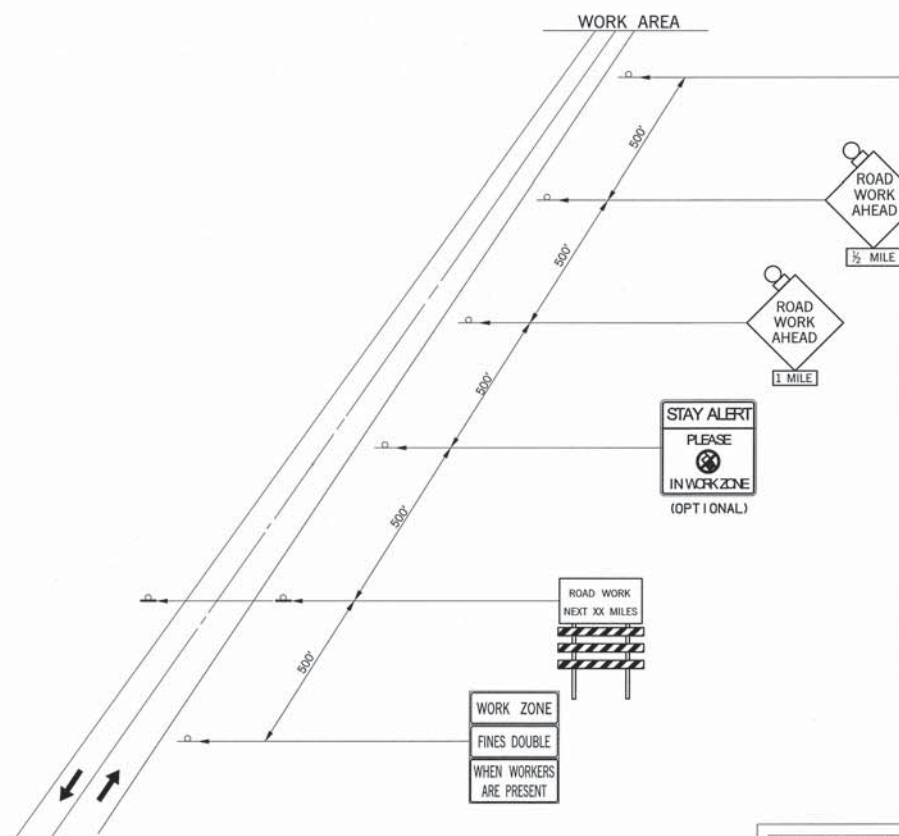
**TYPICAL SIGN PLACEMENT FOR INTERSECTING ROADS AND STREETS**

DESCRIPTION	REVISIONS	DATE
MODIFIED NOTE		3/15/2011
ADD "NO CELL PHONE" USAGE IN WORK ZONE DISTANCE SIGN TO WARNING SIGNS		4/2/2013

- NOTES:
- (1) SIGNS SHOWN FOR ONE DIRECTION OF TRAVEL ONLY.
  - (2) FLASHING WARNING LIGHTS SHALL BE USED TO CALL ATTENTION TO THE EARLY WARNING SIGNS.
  - (3) WARNING LIGHTS SHOULD BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED.
  - (4) PLACEMENT OF TYPE III BARRICADES SHALL BE APPROVED BY THE ENGINEER.
  - (5) TYPE II BARRICADES, DRUMS AND/OR VERTICAL PANELS MAY BE SUBSTITUTED FOR TYPE III BARRICADES TO AVOID OBSTRUCTING THE MOTORISTS VIEW.
  - (6) IF TWO OR MORE DRIVEWAYS ARE IN CLOSE PROXIMITY, THE BARRICADES BETWEEN THE DRIVEWAYS MAY BE OMITTED AT THE DISCRETION OF THE ENGINEER.
  - (7) THE "ROAD WORK AHEAD" SIGN, WHICH SERVES AS A GENERAL WARNING OF OBSTRUCTIONS OR RESTRICTIONS, SHALL BE LOCATED ON ALL INTERSECTING ROADS AND STREETS.



**TYPICAL SIGN PLACEMENT FOR PRIVATE DRIVE OR RESIDENCE**



**TYPICAL APPLICATION ADVANCE WARNING SIGNS ON 2-LANE HIGHWAY**

TYPICAL CONSTRUCTION WARNING SIGNS WITH MESSAGES OTHER THAN DETAILED ON STANDARD DRAWINGS SHALL BE CONSTRUCTED USING THE LARGEST POSSIBLE LETTER SIZE. SIGN SIZE AND COLOR SHALL BE THE SAME AS OTHER CONSTRUCTION WARNING SIGNS USED FOR SIMILAR CONDITIONS.

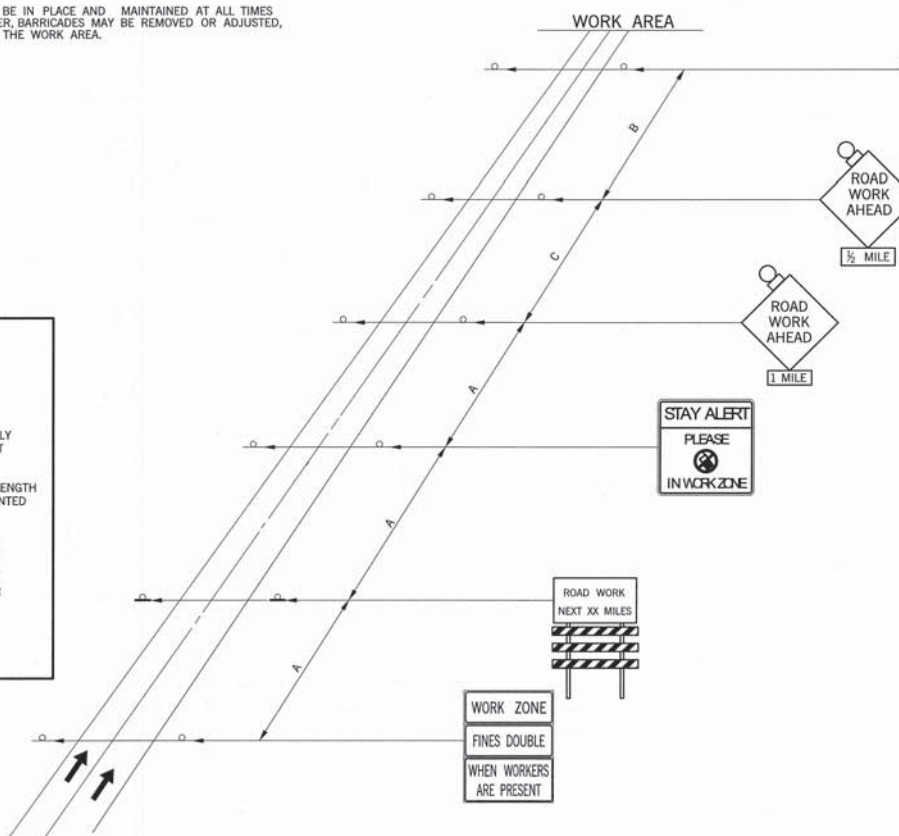
FINES DOUBLE IN WORK ZONE SIGNS ARE TO BE USED ONLY ON STATE OR FEDERAL HIGHWAYS WHERE THE SPEED LIMIT IS REDUCED OR AS DIRECTED BY THE ENGINEER.

PROJECTS WITH WORK LIMITS OF 1.0 MILES OR MORE IN LENGTH WILL REQUIRE THE Q20-1A SIGN. THE SIGN SHALL BE MOUNTED AS SHOWN ON TCS4-1 (LATEST REVISION).

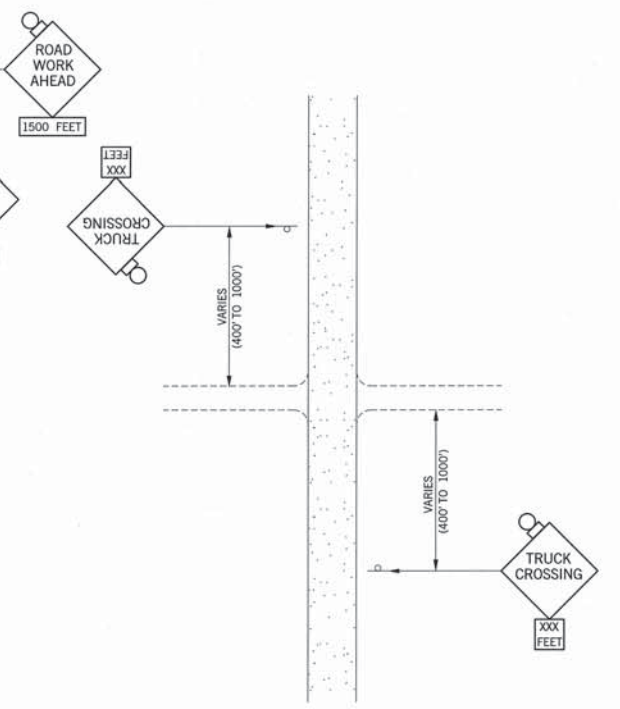
WARNING SIGNS SHOWN ARE "ADVANCE" WARNING SIGNS AND ARE REQUIRED ON ALL STATE HIGHWAYS. ADDITIONAL WARNING SIGNS MAY BE REQUIRED WITHIN THE PROJECT LIMITS TO WARN DRIVERS OF SPECIFIC HAZARDS. ADVANCE "WARNING SIGNS" MAY CHANGE AS CONDITIONS CHANGE OR AS DIRECTED BY THE ENGINEER.

PROJECT WORK OF 1.0 MILE OR MORE IN LENGTH WILL REQUIRE SIGNS CS-14 AND R2-1 TO BE PLACED EVERY 1/2 MILE THROUGH WORK ZONE.

ROAD TYPE	DISTANCE BETWEEN SIGNS SHALL BE A (MIN.)		
	A (FT)	B (FT)	C (FT)
URBAN (LOW SPEED)	100	100	100
URBAN (HIGH SPEED)	350	350	350
RURAL	500	500	500
EXPRESSWAY /FREEWAY	1,000	1,500	2,640



**TYPICAL APPLICATION ADVANCE WARNING SIGNS ON A DIVIDED HIGHWAY**



**TYPICAL APPLICATION ADVANCE SIGNING WHERE TRUCKS ARE CROSSING**



APPROVED BY TRAFFIC ENGINEER: *David S. ...* DATE: 4/18/2013

**TRAFFIC STANDARD TRAFFIC CONTROL STANDARD PLACEMENT OF ADVANCE WARNING SIGNS**

2009 SPECIFICATIONS

TCS7-1	02
	T-507

\$\$\$date\$\$\$





ROAD CLOSED

R11-2 48 x 30 10.00 SF

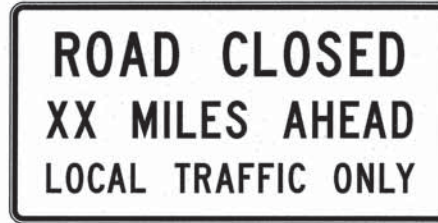
COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
WHITE (REFLECTORIZED)



LANE CLOSED

R11-2(LANE) 48 x 30 10.00 SF

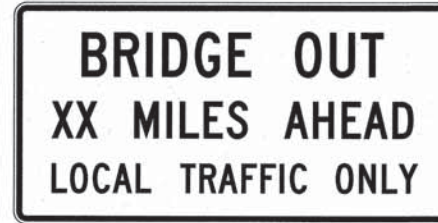
COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
WHITE (REFLECTORIZED)



ROAD CLOSED XX MILES AHEAD

R11-3a 60 x 30 12.50 SF

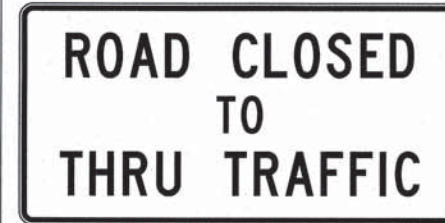
COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
WHITE (REFLECTORIZED)



BRIDGE OUT XX MILES AHEAD

R11-3b 60 x 30 12.50 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
WHITE (REFLECTORIZED)



ROAD CLOSED TO THRU TRAFFIC

R11-4 60 x 30 12.50 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
WHITE (REFLECTORIZED)



DETOUR SIGN

M4-8 24 x 12 2.00 SF  
M4-8E 30 x 15 3.13 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)



DETOUR SIGN

M4-9(R) 30 x 24 5.00 SF  
M4-9(R)E 48 x 36 12.00 SF  
M4-9(R)F 60 x 48 20.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)



DETOUR SIGN

M4-9(L) 30 x 24 5.00 SF  
M4-9(L)E 48 x 36 12.00 SF  
M4-9(L)F 60 x 48 20.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)



DETOUR SIGN

M4-9(V) 30 x 24 5.00 SF  
M4-9(V)E 48 x 36 12.00 SF  
M4-9(V)F 60 x 48 20.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)



DETOUR SIGN

M4-10(R) 48 x 18 6.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)



DETOUR SIGN

M4-10(L) 48 x 18 6.00 SF

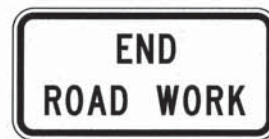
COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)



ROAD WORK NEXT XX MILES SIGN

G20-1A 36 x 18 4.50 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)



END ROAD WORK SIGN

G20-2A 36 x 18 4.50 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)



PILOT CAR FOLLOW ME SIGN

G20-4 36 x 18 4.50 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)

NOTES:  
WORD SIGNS MAY BE USED IF SYMBOL SIGNS ARE NOT AVAILABLE EITHER IN "STANDARD HIGHWAY SIGNS MANUAL" OR IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) (CURRENT EDITION).

ALL DIAMOND SHAPE CONSTRUCTION WARNING SIGNS SHALL BE 48 INCHES X 48 INCHES UNLESS OTHERWISE NOTED IN THE PLANS.

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
880(B)	CONSTRUCTION SIGNS	SD



APPROVED BY  
TRAFFIC ENGINEER: *David Gandy* DATE: 3/21/11

TRAFFIC STANDARD  
TRAFFIC CONTROL STANDARD  
CONSTRUCTION SIGNS

2009 SPECIFICATIONS

TCS9-1 01  
T-509



DESCRIPTION	REVISIONS	DATE
CHANGE DESIGN NUMBER		07/19/10



CHEVRON

W1-8 18 x 24 3.00 SF  
W1-8E 30 x 36 7.50 SF  
W1-8F 36 x 48 12.00 SF

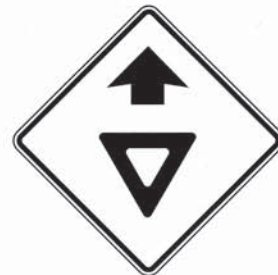
COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE  
(REFLECTORIZED)



STOP AHEAD

W3-1 48 x 48 16.00 SF

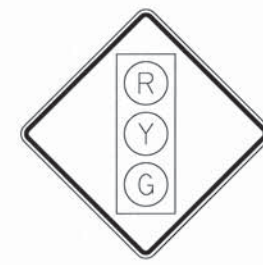
COLOR:  
BORDER AND ARROW:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)  
SYMBOL:  
WHITE BORDER ON RED BACKGROUND  
(REFLECTORIZED)



YIELD AHEAD

W3-2 48 x 48 16.00 SF

COLOR:  
BORDER AND ARROW:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)  
SYMBOL:  
WHITE BORDER ON RED BACKGROUND  
(REFLECTORIZED)



SIGNAL AHEAD

W3-3 48 x 48 16.00 SF

COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)  
R = RED (REFLECTORIZED)  
Y = YELLOW (REFLECTORIZED)  
G = GREEN (REFLECTORIZED)



BE PREPARED TO STOP SIGN

W3-4 48 x 48 16.00 SF  
COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



SPEED REDUCTION

W3-5 48 x 48 16.00 SF

COLOR:  
BORDER AND ARROW:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)  
SYMBOL:  
BLACK BORDER AND TEXT ON  
WHITE BACKGROUND (REFLECTORIZED)



LEFT LANE ENDS

W4-2(L) 48 x 48 16.00 SF

COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



RIGHT LANE ENDS

W4-2(R) 48 x 48 16.00 SF

COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



ROAD NARROWS

W5-1 48 x 48 16.00 SF

COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



NARROW BRIDGE

W5-2 48 x 48 16.00 SF

COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)

NOTES:  
WORD SIGNS MAY BE USED IF SYMBOL SIGNS  
ARE NOT AVAILABLE EITHER IN "STANDARD  
HIGHWAY SIGNS MANUAL" OR IN THE "MANUAL  
ON UNIFORM TRAFFIC CONTROL DEVICES"  
(MUTCD) (CURRENT EDITION).

ALL DIAMOND SHAPE CONSTRUCTION  
WARNING SIGNS SHALL BE 48 INCHES X  
48 INCHES UNLESS OTHERWISE NOTED IN THE  
PLANS.

\* SUPPLEMENTAL SIGNS SHALL ONLY BE USED  
IN CONJUNCTION WITH DIAMOND SHAPE  
CONSTRUCTION WARNING SIGNS. THE SIZE OF  
SUPPLEMENTAL SIGNS SHALL BE APPROPRIATE  
FOR USE WITH A 48 INCH X 48 INCH WARNING  
SIGN UNLESS OTHERWISE NOTED IN THE PLANS.



ONE LANE BRIDGE

W5-3 48 x 48 16.00 SF

COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



DIVIDED HIGHWAY

W6-1 48 x 48 16.00 SF

COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



DIVIDED HIGHWAY

W6-2 48 x 48 16.00 SF

COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



TWO WAY TRAFFIC SIGN

W6-3 48 x 48 16.00 SF

COLOR:  
SYMBOL AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)

BASIS OF PAYMENT

ITEM NO.	ITEM	UNIT
880(B)	CONSTRUCTION SIGNS	SD



APPROVED BY  
TRAFFIC ENGINEER: *[Signature]* DATE: 8/6/2010

TRAFFIC STANDARD  
TRAFFIC CONTROL STANDARD  
CONSTRUCTION SIGNS

2009 SPECIFICATIONS

TCS11-1 01  
T-511

TRFC36 U:\Traffic\TRAFFIC STD\_CURRENT\2009 DRAWINGS\TCS11-1-01 1511.dgn 3:13:15 PM 7/26/2010 R:\TRAF PLOT\lroy.psn R:\TRAF PLOT\bw.ctb



DESCRIPTION	REVISIONS	DATE



ROAD WORK SIGN

W20-1 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



DETOUR SIGN

W20-2 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



ROAD CLOSED SIGN

W20-3 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



STREET CLOSED SIGN

W20-3A 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



ONE LANE ROAD SIGN

W20-4 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



LEFT LANE CLOSED SIGN

W20-5(L) 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



RIGHT LANE CLOSED SIGN

W20-5(R) 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



FLAGGER SIGN

W20-7 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



FLAGGER SIGN

W20-7a 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



WORKERS SIGN

W21-1 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



FRESH OIL SIGN

W21-2 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)



ROAD MACHINERY AHEAD SIGN

W21-3 48 x 48 16.00 SF  
 COLOR:  
 LEGEND AND BORDER:  
 BLACK (NON-REFLECTORIZED)  
 BACKGROUND:  
 FLUORESCENT ORANGE (REFLECTORIZED)

NOTES:  
 WORD SIGNS MAY BE USED IF SYMBOL SIGNS ARE NOT AVAILABLE EITHER IN "STANDARD HIGHWAY SIGNS MANUAL" OR IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) (CURRENT EDITION).

ALL DIAMOND SHAPE CONSTRUCTION WARNING SIGNS SHALL BE 48 INCHES X 48 INCHES UNLESS OTHERWISE NOTED IN THE PLANS.

\* SUPPLEMENTAL SIGNS SHALL ONLY BE USED IN CONJUNCTION WITH DIAMOND SHAPE CONSTRUCTION WARNING SIGNS. THE SIZE OF SUPPLEMENTAL SIGNS SHALL BE APPROPRIATE FOR USE WITH A 48 INCH X 48 INCH WARNING SIGN UNLESS OTHERWISE NOTED IN THE PLANS.

TRFPC36 MA\2009\_Standard\TC\1514.dgn 8:37:49 AM 6/23/2010 R:\TRAF\_PLOT\Veroy\pen\_R\TRAF\_PLOT\dw.ctb

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
880(B)	CONSTRUCTION SIGNS	SD



APPROVED BY TRAFFIC ENGINEER: *David Smith* DATE: 6/23/10

TRAFFIC STANDARD  
 TRAFFIC CONTROL STANDARD  
 CONSTRUCTION SIGNS

2009 SPECIFICATIONS

TCS14-1	00
T-514	



DESCRIPTION	REVISIONS	DATE
ADDED NO CELL PHONE USE IN WORK ZONE		4/2/2013



SHOULDER WORK SIGN

W21-5 48 x 48 16.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



SURVEY CREW SIGN

W21-6 48 x 48 16.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



UTILITY WORK AHEAD SIGN

W21-7 48 x 48 16.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



MOWING AHEAD SIGN

W21-8 48 x 48 16.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



BRIDGE REPAIR SIGN

W21-9 48 x 48 16.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



MATERIAL ON SHOULDER SIGN

W21-10 48 x 48 16.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



MATERIAL ON ROADWAY SIGN

W21-11 48 x 48 16.00 SF

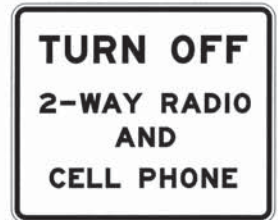
COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



BLASTING ZONE AHEAD SIGN

W22-1 48 x 48 16.00 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



CELL TELEPHONES SIGN

W22-2 36 x 30 7.50 SF  
W22-2E 42 x 36 10.50 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)



END BLASTING ZONE SIGN

W22-3 36 x 30 7.50 SF  
W22-3E 42 x 36 10.50 SF

COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)

NOTES:  
WORD SIGNS MAY BE USED IF SYMBOL SIGNS ARE NOT AVAILABLE EITHER IN "STANDARD HIGHWAY SIGNS MANUAL" OR IN THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) (CURRENT EDITION).

ALL DIAMOND SHAPE CONSTRUCTION WARNING SIGNS SHALL BE 48 INCHES X 48 INCHES UNLESS OTHERWISE NOTED IN THE PLANS.

\* SUPPLEMENTAL SIGNS SHALL ONLY BE USED IN CONJUNCTION WITH DIAMOND SHAPE CONSTRUCTION WARNING SIGNS. THE SIZE OF SUPPLEMENTAL SIGNS SHALL BE APPROPRIATE FOR USE WITH A 48 INCH X 48 INCH WARNING SIGN UNLESS OTHERWISE NOTED IN THE PLANS.



BORDER  
R=1.5"  
TH=0.75"  
IN=0.75"  
NO CELL PHONE WORK ZONE

■ COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT YELLOW (REFLECTORIZED)

○ COLOR: SYMBOL  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
WHITE (REFLECTORIZED)

▲ COLOR:  
LEGEND AND BORDER:  
BLACK (NON-REFLECTORIZED)  
BACKGROUND:  
FLUORESCENT ORANGE (REFLECTORIZED)

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
880(B)	CONSTRUCTION SIGNS	SD



APPROVED BY  
TRAFFIC ENGINEER: \_\_\_\_\_ DATE: \_\_\_\_\_

TRAFFIC STANDARD  
TRAFFIC CONTROL STANDARD  
CONSTRUCTION SIGNS

2009 SPECIFICATIONS

TCS15-1 01  
T-515





SIGN NUMBER	CS-13
WIDTH x HGHT.	2'-0" x 1'-0"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	2.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: FLO*
LEGEND/BORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

LETTER POSITIONS (X)					LENGTH	SERIESIZE
B	E	G	I	N		D 2000
4.8	8.2	11.3	14.9	16.5		14.4



SIGN NUMBER	CS-13E
WIDTH x HGHT.	3'-0" x 1'-0"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	3.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: FLO*
LEGEND/BORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

LETTER POSITIONS (X)					LENGTH	SERIESIZE
B	E	G	I	N		D 2000
7.2	12.3	16.9	22.3	24.7		21.6

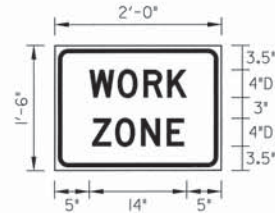


SIGN NUMBER	CS-13F
WIDTH x HGHT.	4'-0" x 1'-6"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	6.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: FLO*
LEGEND/BORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

LETTER POSITIONS (X)					LENGTH	SERIESIZE
B	E	G	I	N		E 2000
7.1	15.2	22.6	30.9	34.4		33.8

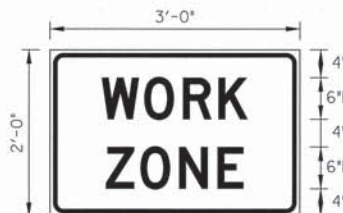
FLO\* = FLUORESCENT ORANGE



SIGN NUMBER	CS-14
WIDTH x HGHT.	2'-0" x 1'-6"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	3.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: FLO*
LEGEND/BORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

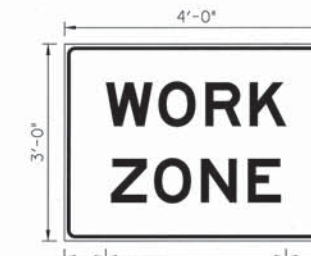
LETTER POSITIONS (X)					LENGTH	SERIESIZE
W	O	R	K			D 2000
5	9.1	12.8	16.2			14
Z	O	N	E			D 2000
5.4	8.7	12.5	16.1			13.2



SIGN NUMBER	CS-14E
WIDTH x HGHT.	3'-0" x 2'-0"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	6.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: FLO*
LEGEND/BORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

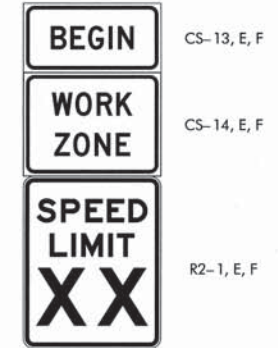
LETTER POSITIONS (X)					LENGTH	SERIESIZE
W	O	R	K			D 2000
7.5	13.6	19.2	24.3			21
Z	O	N	E			D 2000
8.1	13.1	18.7	24.2			19.8



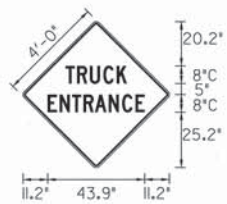
SIGN NUMBER	CS-14F
WIDTH x HGHT.	4'-0" x 3'-0"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	12.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: FLO*
LEGEND/BORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

LETTER POSITIONS (X)					LENGTH	SERIESIZE
W	O	R	K			E 2000
7.6	17.2	25.7	33.8			32.9
Z	O	N	E			E 2000
8.5	16.4	24.9	33.5			31



CONSTRUCTION  
BEGIN WORK ZONE  
SPEED LIMIT  
ASSEMBLY



SIGN NUMBER	CS-15
WIDTH x HGHT.	4'-0" x 4'-0"
BORDER WIDTH	0.75"
CORNER RADIUS	1.38"
MOUNTING	Ground
SIGN AREA	16.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: Yellow
LEGEND/BORDER	TYPE: Reflective COLOR: Black

Dimensions are in Inches.tenths

LETTER POSITIONS (X)										LENGTH	SERIESIZE
T	R	U	C	K							C 2000
19.3	24.5	30.4	36.5	42.5							27.7
E	N	T	R	A	N	C	E				C 2000
11.2	16.7	22.3	27.5	32.7	38.9	45	51.1				43.9

BASIS OF PAYMENT

ITEM NO.	ITEM	UNIT
880(B)	CONSTRUCTION SIGNS	SD

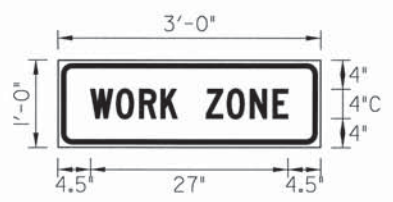


APPROVED BY  
TRAFFIC ENGINEER: *David Gandy* DATE: 3/21/11

TRAFFIC STANDARD  
TRAFFIC CONTROL STANDARD  
CONSTRUCTION SIGNS



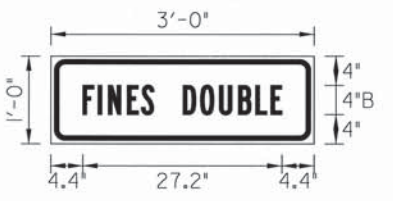
DESCRIPTION	REVISIONS	DATE
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SIGN NUMBER	CS-16
WIDTH x HGHT.	3'-0" x 1'-0"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	3.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: Orange
LEGENDBORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

LETTER POSITIONS (X)										LENGTH	SERIESIZE
W	O	R	K	Z	O	N	E			C	2000
4.5	8	11.2	14.1	16.3	20.3	23.2	26.3	29.5		27	



SIGN NUMBER	CS-17
WIDTH x HGHT.	3'-0" x 1'-0"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	3.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: White
LEGENDBORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

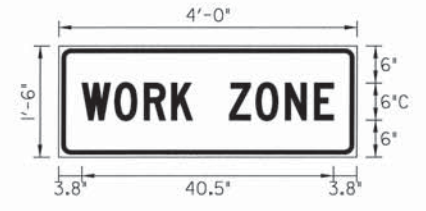
LETTER POSITIONS (X)										LENGTH	SERIESIZE	
F	I	N	E	S	D	O	U	B	L	E	B	2000
4.4	6.5	7.9	10.5	12.4	14.1	18.1	20.5	23.1	25.7	28	30.1	27.2



SIGN NUMBER	CS-18
WIDTH x HGHT.	3'-0" x 1'-6"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	4.5 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: White
LEGENDBORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

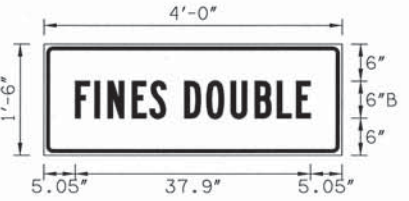
LETTER POSITIONS (X)										LENGTH	SERIESIZE		
W	H	E	N	W	O	R	K	E	R	S	B	2000	
3	6.1	8.7	10.9	12.6	16.6	19.6	22.2	24.6	27	29.1	31.3	30	
A	R	E	P	R	E	S	E	N	T			B	2000
5.3	8	10.3	11.9	15.9	18.1	20.5	22.4	24.8	26.9	29.2		25.5	



SIGN NUMBER	CS-16E
WIDTH x HGHT.	4'-0" x 1'-6"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	6.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: Orange
LEGENDBORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

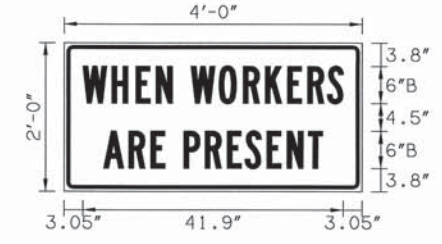
LETTER POSITIONS (X)										LENGTH	SERIESIZE
W	O	R	K	Z	O	N	E			C	2000
3.8	9	13.8	18.2	21.5	27.5	31.8	36.5	41.2		40.5	



SIGN NUMBER	CS-17E
WIDTH x HGHT.	4'-0" x 1'-6"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
MOUNTING	Ground
SIGN AREA	6.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: White
LEGENDBORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

LETTER POSITIONS (X)										LENGTH	SERIESIZE	
F	I	N	E	S	D	O	U	B	L	E	B	2000
5.1	8.2	10.3	14.2	17.1	22.7	26.2	30.1	34	37.5	40.7	37.9	



SIGN NUMBER	CS-18E
WIDTH x HGHT.	4'-0" x 2'-0"
BORDER WIDTH	0.63"
CORNER RADIUS	1.13"
MOUNTING	Ground
SIGN AREA	8.0 Sq.Ft.
BACKGROUND	TYPE: Reflective COLOR: White
LEGENDBORDER	TYPE: Non-Reflective COLOR: Black

Dimensions are in Inches.tenths

LETTER POSITIONS (X)										LENGTH	SERIESIZE		
W	H	E	N	W	O	R	K	E	R	S	B	2000	
3	7.7	11.6	14.9	20.4	24.9	28.8	32.4	36	39.2	42.4	41.9		
A	R	E	P	R	E	S	E	N	T			B	2000
6.4	10.5	14	19.3	22.7	26.3	29.1	32.7	35.9	39.3		35.2		



CS-16, E  
CS-17, E  
CS-18, E

CONSTRUCTION  
FINES DOUBLE  
ASSEMBLY

BASIS OF PAYMENT		
ITEM NO.	ITEM	UNIT
880(B)	CONSTRUCTION SIGNS	SD



APPROVED BY  
TRAFFIC ENGINEER: *David Smith* DATE: 6/23/10

TRAFFIC STANDARD  
TRAFFIC CONTROL STANDARD  
CONSTRUCTION SIGNS

TRFPC36 M:\2009\_Standards\_TC\1520.dgn 8:42:20 AM 6/23/2010 R:\TRAF\_PLOT\lroy.pen R:\TRAF\_PLOT\bw.ctb