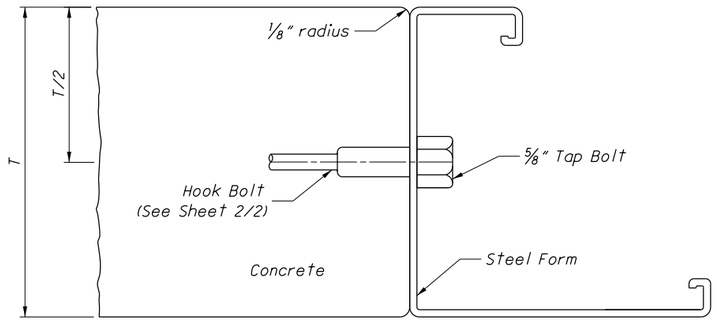
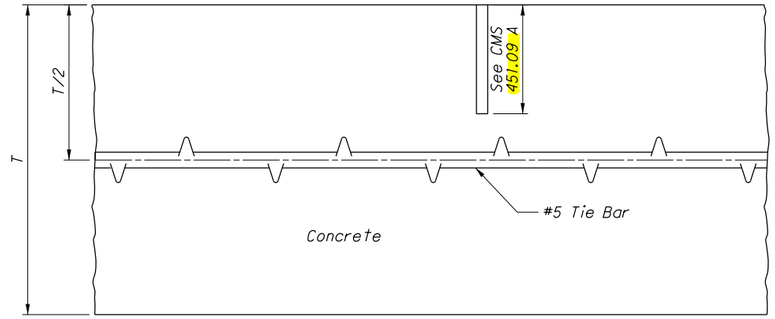


ACCEPTABLE METHOD OF FORMING JOINT



SAWED JOINT

NOTES

GENERAL: *Longitudinal joints shall be used when specified on the typical section and shall be constructed as shown on this drawing in Items 451 and 452 Pavement and Item 305 Base.*

The joint shall be on the centerline of the pavement unless otherwise shown on the plans. Where the pavement width exceeds 16', an additional longitudinal joint shall be introduced into the jointing details as directed by the Engineer.

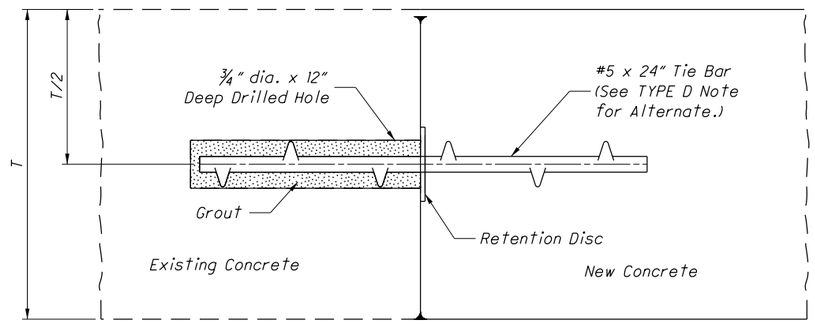
Tie bars shall be #5 deformed bars. A satisfactory device shall be used to hold the tie bars in proper positions or they may be installed by a mechanical installing device. Tie bars shall be centered on the longitudinal joint as nearly as practical.

BUTT JOINT: *The longitudinal joint between adjoining slabs poured in separate operations shall be butt joint with hook bolts or tie bars, unless otherwise shown on the plans. Bent tie bars shall not be permitted.*

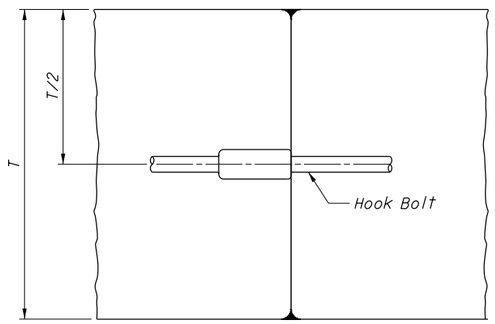
TYPE D (DRILLED TIED LONGITUDINAL) JOINT: *Type D joints shall be constructed in accordance with CMS 255.05. The nylon or plastic retention disc shall be clear or opaque white in color. Grout shall meet the requirements or CMS 255.02. 5/8" expansion anchors, FF-S-325, Group VIII, Type 1 or Group II Type 4, Class 1 may be used in lieu of the #5 x 24" deformed bar and shall be installed according to the manufacture's recommendations.*

The use of self drilling expansion shield anchors, FF-S-325, Group III, Type 1 (a) and (c) shall not be permitted.

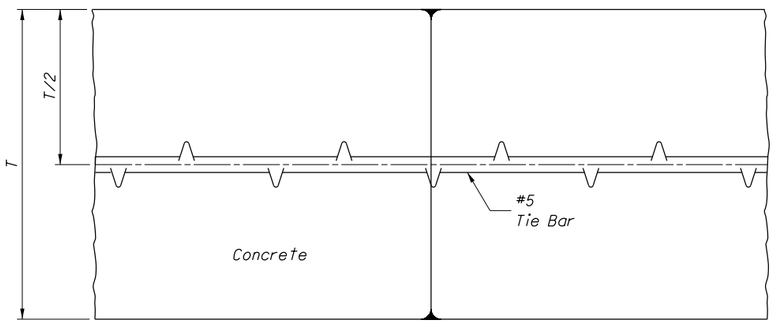
See sheet 2/2 for additional details.



TYPE D (DRILLED TIED LONGITUDINAL) JOINT



BUTT JOINT
w/ HOOK BOLT



BUTT JOINT
w/ TIE BAR

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Randall Hagy
ADMINISTRATOR
7-19-2013
DATE

STDS. ENGINEER
D. MILLER

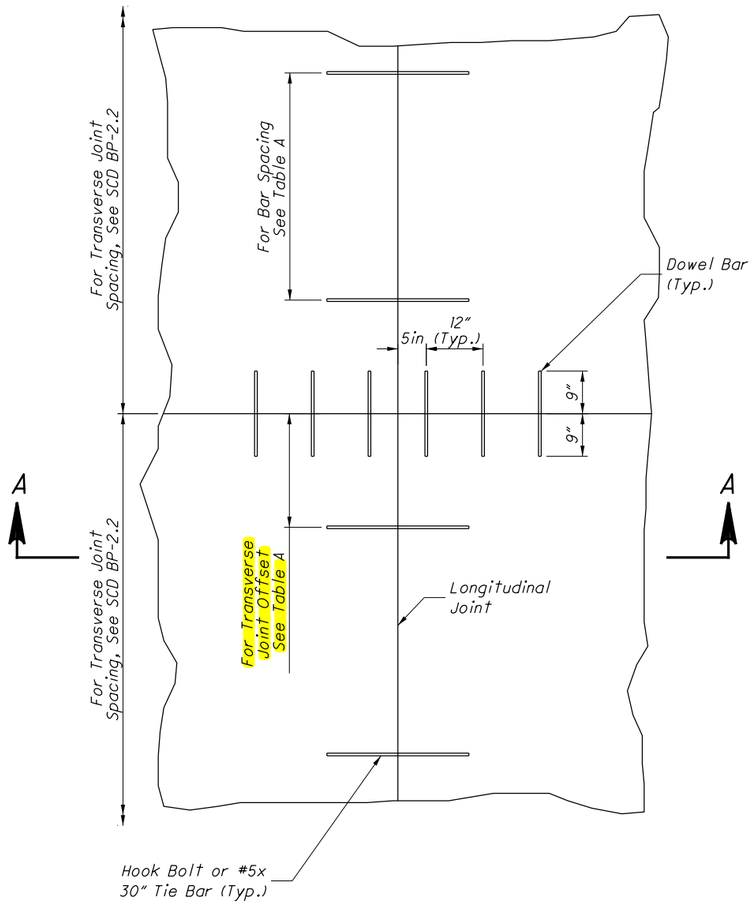
OFFICE OF PAVEMENT ENGINEERING

THIS DRAWING REPLACES BP-2.1 DATED 7-18-08.

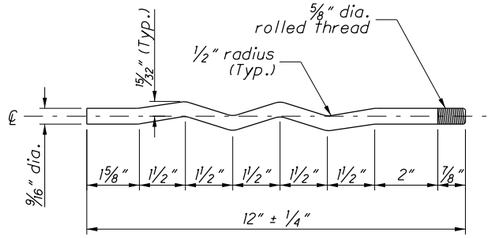
STANDARD ROADWAY CONSTRUCTION DRAWING

LONGITUDINAL PAVEMENT JOINTS

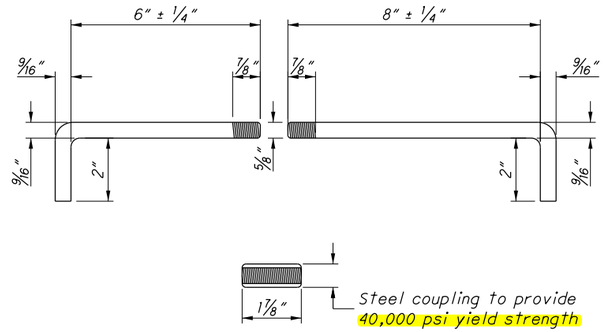
SCD NUMBER
BP-2.1



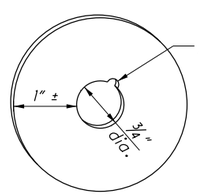
PLAN

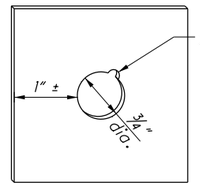


HOOK BOLT ALTERNATE



HOOK BOLT

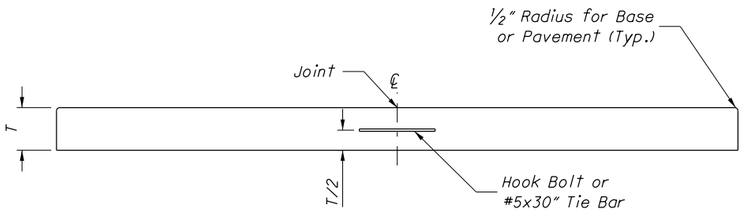




NYLON OR PLASTIC GROUT RETENTION DISCS FOR DOWEL/TIE BARS

(1/16" min. thick)

TABLE A			
Transverse Joint Spacing	Number of Tie Bars per Slab	Max. spacing between Tie Bars	Minimum Offset to Transverse Joint
15'	6	30"	15"
21'	8	30"	21"



SECTION A-A

TIE BAR OR HOOK BOLT SPACING

EDGING: Edge butt joints with a thin metal edger having a radius of 1/8". Finish the free edges of the pavement with a thin metal edger having a radius of 1/2". Any impression left in the surface of the pavement by the flat part of the edging tool shall be eliminated.

HOOK BOLTS: Threaded hook bolts and alternates shall be turned to a tight fit when installed in couplings. Ensure the coupling is located on the same side of the joint as the shorter (6" +/-1/4" hook bolt.

METAL STRENGTH: Tie bars, hook bolts assemblies, and the hook bolt alternate shall have a minimum yield strength of 40,000 psi.

SPACING: Tie bars shall not be located within 15" of any transverse joint.

THIS DRAWING REPLACES BP-2.1 DATED 7-18-08.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Jerry Wray
ADMINISTRATOR
7-19-2013
DATE

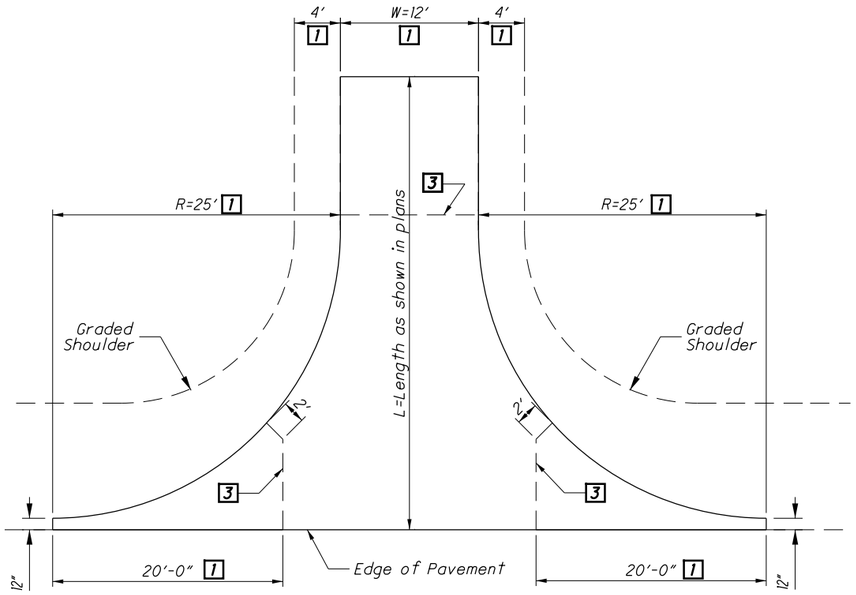
STDS. ENGINEER
D. MILLER

OFFICE OF PAVEMENT ENGINEERING

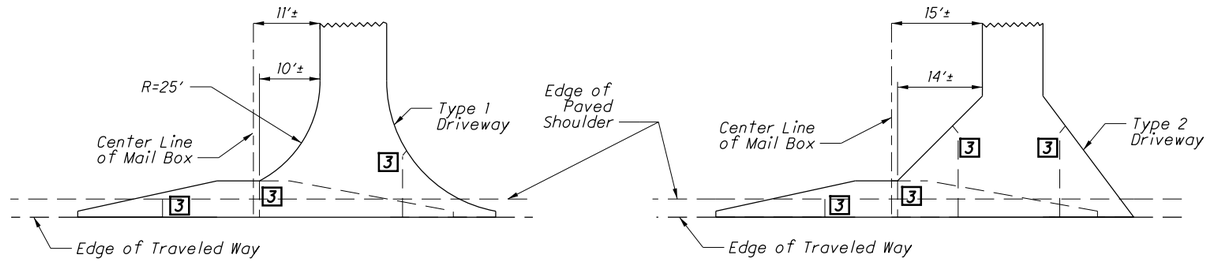
STANDARD ROADWAY CONSTRUCTION DRAWING

LONGITUDINAL PAVEMENT JOINTS

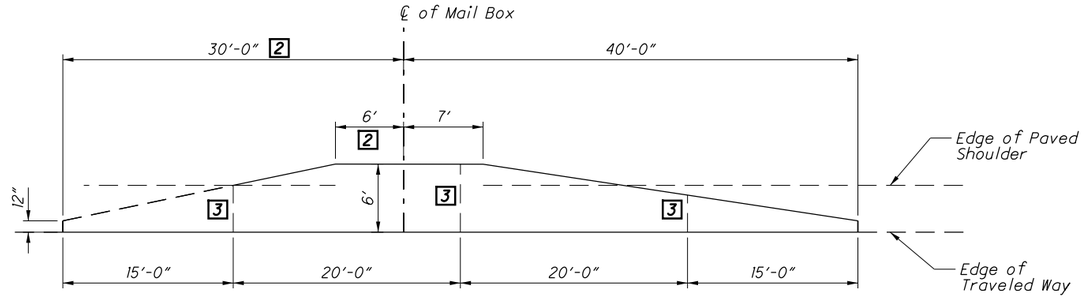
SCD NUMBER
BP-2.1



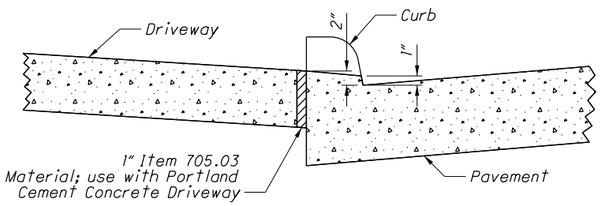
TYPE 1 DRIVEWAY



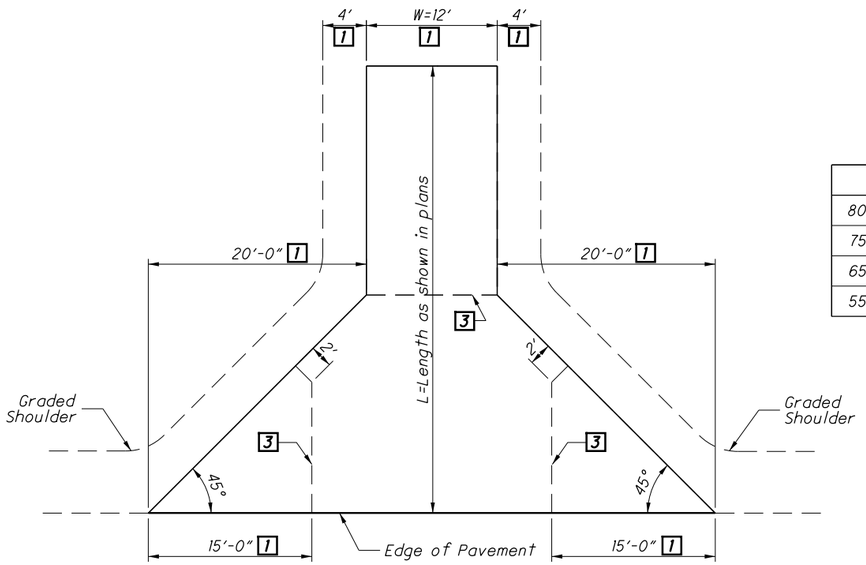
COMBINED DRIVEWAY & MAIL BOX APPROACH



TYPICAL MAIL BOX APPOACH

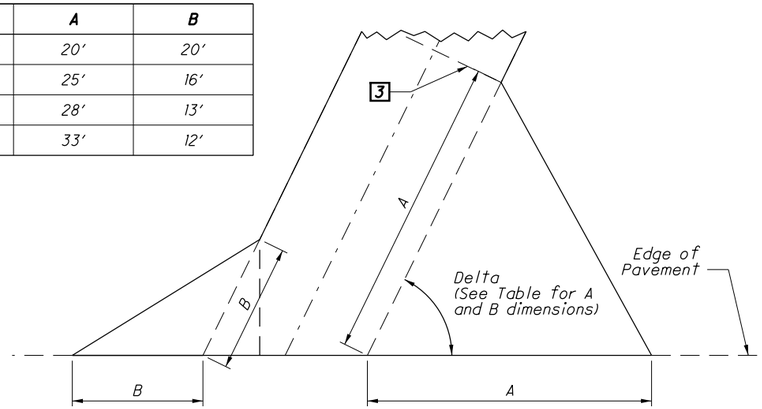


DROP CURB DETAILS AT DRIVEWAYS



TYPE 2 DRIVEWAY

Delta	A	B
80° to 90°	20'	20'
75° to 85°	25'	16'
65° to 75°	28'	13'
55° to 65°	33'	12'



TYPE 2 SKEWED DRIVEWAY

Transition from Standard Curb Section to Drop Curb Section to be made in 18" distance from Driveway

NOTES

GENERAL: *The design details shown here shall govern the construction of driveways unless otherwise shown in the project plans.*

The pavement type and thickness shall be specified in the project plans.

Driveway and mail box approaches shall be combined when feasible.

JOINTS: *Impressed joints for portland cement concrete driveways shall be 1/4" minimum width by 3"± depth and shall be sealed with Item 705.04 or ASTM D 1850.*

In addition to the joints shown here, impressed joints without tie bars shall be placed in portland cement concrete driveways at intervals not to exceed 17' in the portion of the driveway beyond the flare.

LEGEND

1 *Unless otherwise shown in the plans.*

2 *Add 3' for each additional Mail Box*

3 *Impressed Joint without Tie Bars for Portland Cement Surface*

THIS DRAWING REPLACES BP-4.1 DATED 7-16-04.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — 7-19-2013
ADMINISTRATOR — DATE

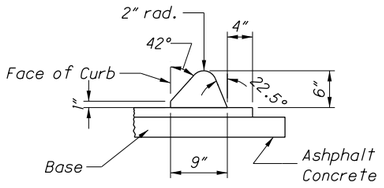
STDS. ENGINEER: M. Ruppe

OFFICE OF ROADWAY ENGINEERING

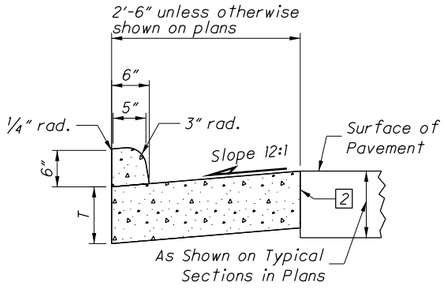
STANDARD ROADWAY CONSTRUCTION DRAWING

DRIVEWAYS

SCD NUMBER
BP-4.1



TYPE 1



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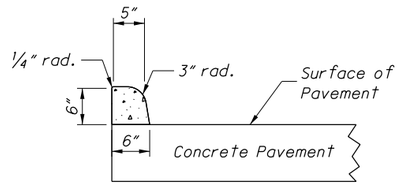
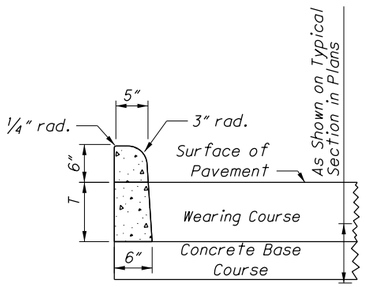
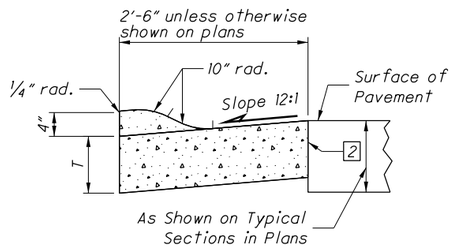


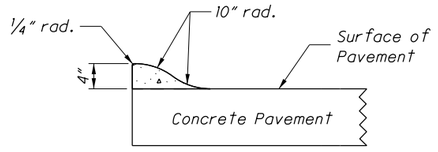
TYPE 2-A



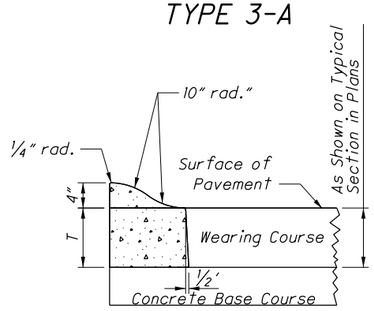
TYPE 2-B



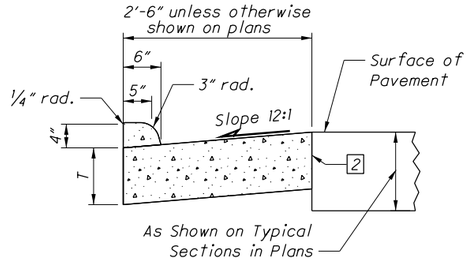
TYPE 3



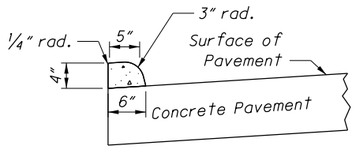
TYPE 3-A



TYPE 3-B



TYPE 4



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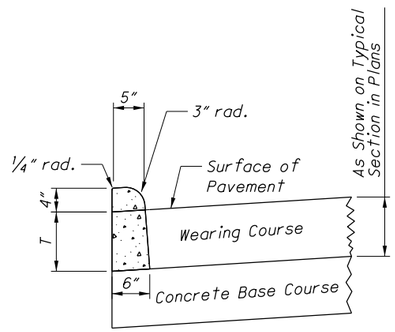

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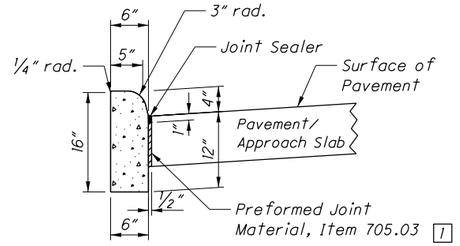
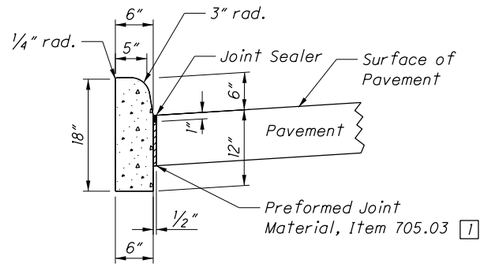


TYPE 4-C



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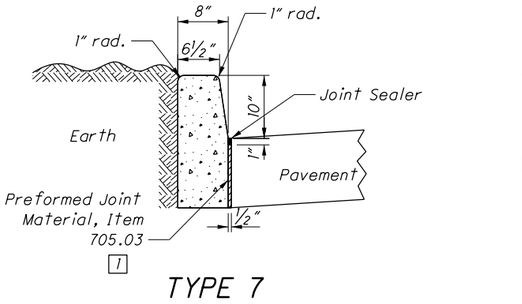
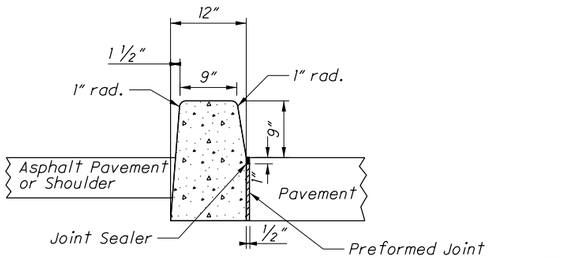


TYPE 7



TYPE 8

NOTES

GENERAL: *This drawing shows alternate types of curb that may be used on various types of pavement. The typical section of the project shows the type to be used, also the thickness of the edge of the pavement or the edge of the curb and gutter section.*

JOINTS: *1" expansion joints shall extend up to the top of the curb and shall be constructed in the curb and gutter section in such a manner that the joint seal will extend the full width of the gutter and into the curb face a sufficient distance to seal the joint to an elevation of a least 2" above the flow line of the gutter. Dowel bars shall be used in the curb and gutter section at expansion joints and to the surface of the pavement.*

Transverse expansion joint material shall meet the requirements of Item 705.03.

GUTTER PLATE THICKNESS: *Thickness of gutter plate "T" shall be 9" unless otherwise shown on the plans.*

TOLERANCES: *Dimensional tolerances are as follows:*

Curbs: -1/32" to +1/4".

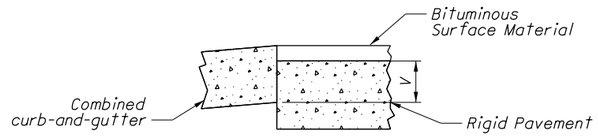
Gutters: 0 to +1/2".

LEGEND

1 *Expansion joint material and joint sealer are not required for the portion of the curb that is adjacent to a flexible pavement type. Both materials are required, as detailed, for the full height of rigid pavement and concrete bases.*

2 *Butt joints shall be provided between combined curb-and-gutter and new or existing rigid pavements, with tie bars or hook bolts provided at intervals of 5'. See SCD BP-2.1 for details of tie bars and hook bolts.*

If the combined curb-and-gutter adjoins a new rigid base or an existing rigid base or pavement that is to be surfaced with bituminous material, a butt joint shall also be provided. However, tie bars or hook bolts shall be omitted when the vertical overlap ("V" in detail below) between the curb-and-gutter and rigid pavement is less than 7".



THIS DRAWING REPLACES BP-5.1 DATED 7-28-00.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Blume — ADMINISTRATOR
7-19-2013 DATE

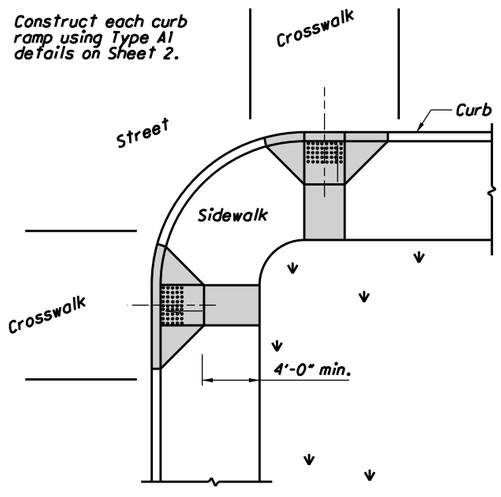
STDS. ENGINEER M. Ruppe

OFFICE OF ROADWAY ENGINEERING

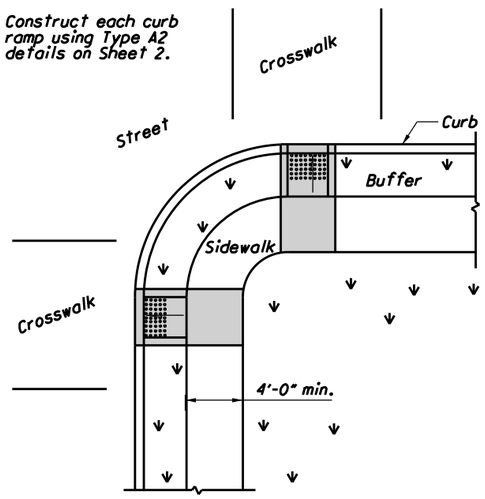
STANDARD ROADWAY CONSTRUCTION DRAWING
CONCRETE CURBS AND COMBINED CURB AND GUTTER

SCD NUMBER **BP-5.1**

1 / 1

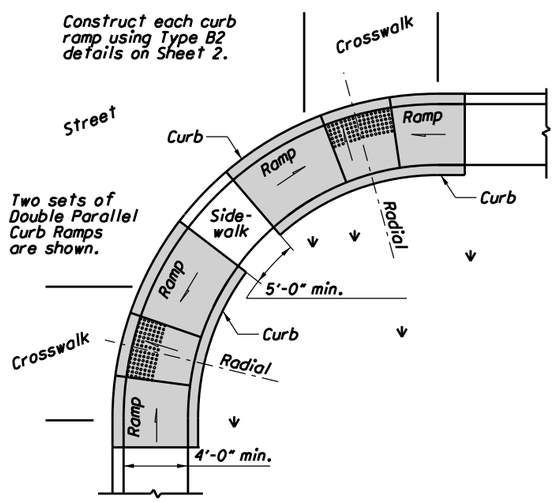


Use curb ramps with flared sides at locations with wide sidewalks.



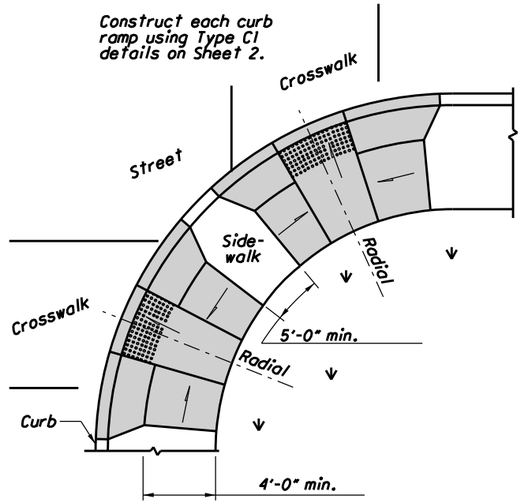
Use curb ramps with returned curbs where buffer is wide enough to accommodate ramp slope.

PERPENDICULAR CURB RAMPS



Place on streets having wide turning radius and where sidewalks are narrow.

PARALLEL CURB RAMPS



Curb ramp placement where streets have wide turning radius, and sufficient sidewalks width.

COMBINATION CURB RAMPS

PREFERRED CONSTRUCTION PLACEMENT

NOTES

GENERAL: This drawing shows curb ramp types details and placement examples for curb ramp construction, including the installation of detectable warnings.

Curb ramp types are shown on Sheet 2 and include Perpendicular, Parallel, and Combined types as specified to be constructed in the locations shown on the project plans.

Curb ramps added to an existing intersection or walk should be individually detailed on the project plans to assure that the design is appropriate for site constraints and all items can be constructed to ADA standards. The contractor may adjust the placement of curb ramps if existing field conditions warrant with the approval of the Engineer.

DETECTABLE WARNINGS: Install Detectable Warnings on each curb ramp with approved materials, as shown on Sheet 3. Install these proprietary products as per manufacturer's written instructions.

DRAINAGE: Contractor is to ensure the base of each constructed curb ramp allows for proper drainage, without exceeding allowable cross slope or ramp slopes. Vertical change in level exceeding ⅛" between the 1) pavement and gutter, and 2) gutter and ramp, are not allowed.

SURFACE TEXTURE: Texture concrete surfaces by coarse brooming transverse to the ramp slopes to be rougher than the adjacent walk.

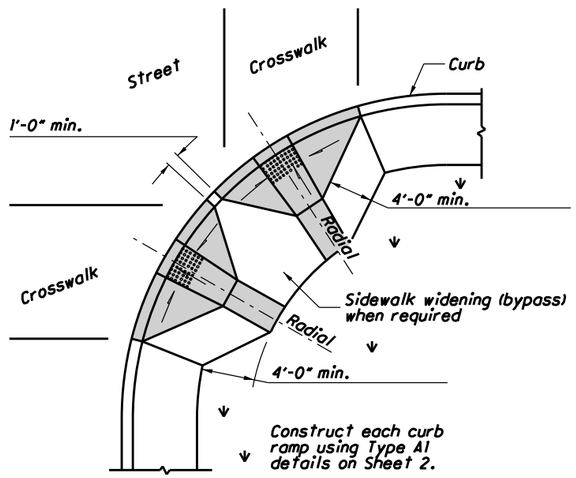
JOINTS: Provide expansion joints in the curb ramp as extensions of walk joints and consistent with Item 608.03 requirements for a new concrete walk. Provide a ½" Item 705.03 expansion joint filler around the edge of ramps built in existing concrete walks. Lines shown on this drawing indicate the ramp edges and slope changes, and do not necessarily indicate joint lines.

PAYMENT: Measure and pay for the ramp area within the shaded limits of this drawing as Item 608 Curb Ramp, Square Foot. This includes the cost of the ramp curbing, detectable warnings, landing areas and any additional materials, installation, grading, forming, and finishing required within the shaded area.

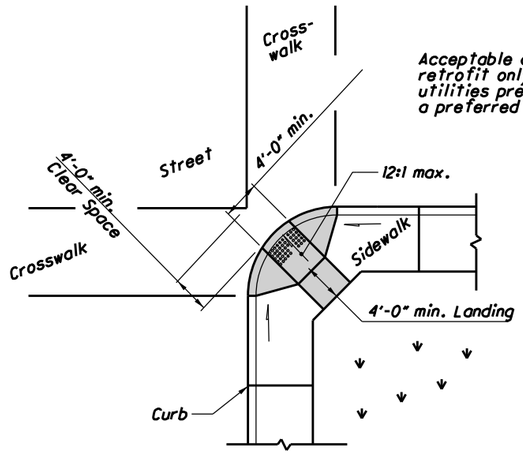
Work beyond the shaded ramp/landing area is paid for as curb (609) and walk (608). Removal of existing curb, walk (or existing curb ramps) are paid under Item 202.

For at-grade crossing locations where only detectable warnings are required in order to acheive ADA compliance, measure and pay for the strip of detectable warnings as Item 608 Detectable Warning, Square Foot. The work to cast the tiles in place will also require removal of existing pavement (Item 202) to the nearest joint, or if no joint exists, a minimum of 4 feet.

Acceptable design on corners with wide turning radius where user is able to maneuver within crosswalk limits so as not to encroach into adjacent traveled lanes.



PERPENDICULAR RAMPS



Use this design only for existing walks, and when site constraints prohibit other designs. The diagonal Type D ramp may be constructed as either a Perpendicular, Parallel or Combination curb ramp type. Avoid using where curb radii are less than 20'-0".

DIAGONAL RAMP (Type D)

ACCEPTABLE CONSTRUCTION PLACEMENT

THIS DRAWING REPLACES BP-7.1 DATED 1-19-07.

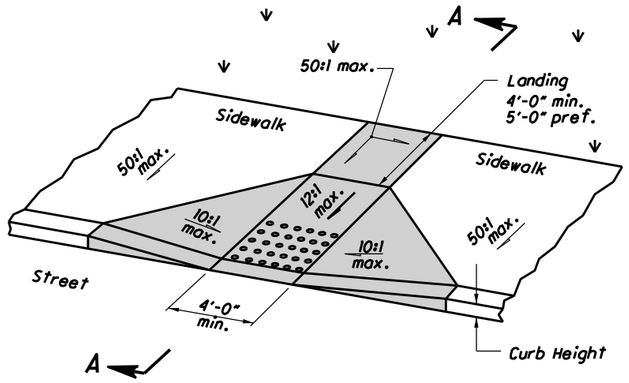
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
10-15-10 DATE
David B. Brown
ADMINISTRATOR

STDS. ENGINEER
M. Bline

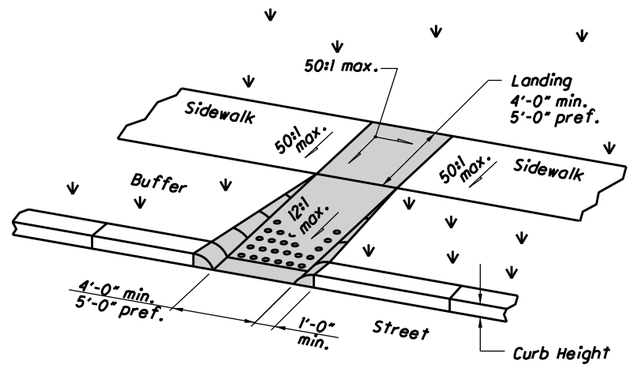
OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING
NEW CURB RAMPS
(with Detectable Warnings)

SCD NUMBER
BP-7.1



Type A1 (Perpendicular with flared sides)



Type A2 (Perpendicular with returned curb)

PERPENDICULAR CURB RAMP DETAILS

NOTES

The running slope of the ramp is preferred to be 12:1 or flatter. In existing sidewalks, where the maximum ramp slope is not feasible due to site constraints (e.g. utility poles or vaults, right-of-way limits) it may be reduced as follows:

A) 10:1 for a max. rise of 6",
B) 8:1 for a max. rise of 3",
C) 6:1 over a max. run of 2'-0" for historic areas where a flatter slope is not feasible.

To prevent chasing the grade indefinately, the transition from exisiting sidewalk to the shaded curb ramp area is not required to exceed 15 feet in length.

While ramps may be skewed to the crosswalk, the entire lower landing area must fall within the cross walk that the ramp serves and cannot be located in the traveled lane of opposing traffic.

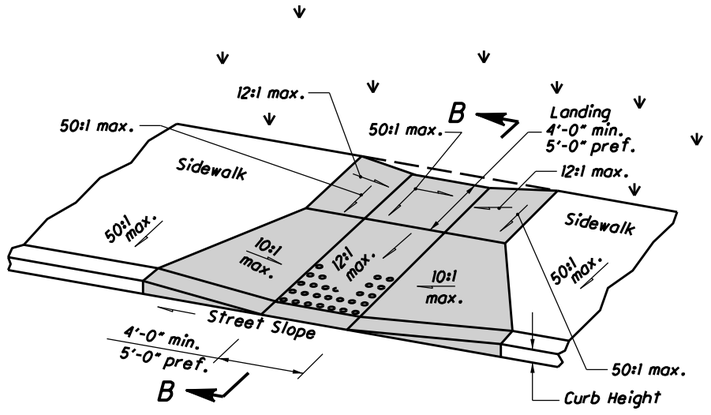
The counter slope of the gutter or street at the foot of a curb ramp, landing, or blended transitions shall be 20:1 ot flatter.

The bottom edge of the ramp shall change planes perpendicular to the landing.

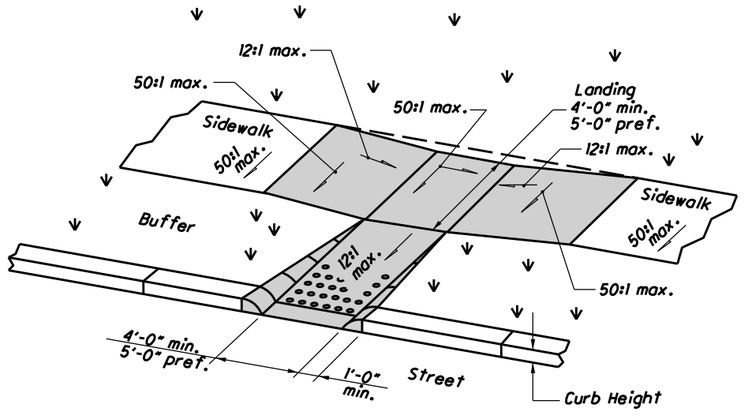
The edge of the curb shall be flush with the edge of the adjacent pavement and gutter and surface slopes that meet grade breaks shall also be flush.

Ramp landings shall be 4' min. x 4' min. with a 50:1 or flatter cross slope and running slope.

See Sheet 3 for Sections.

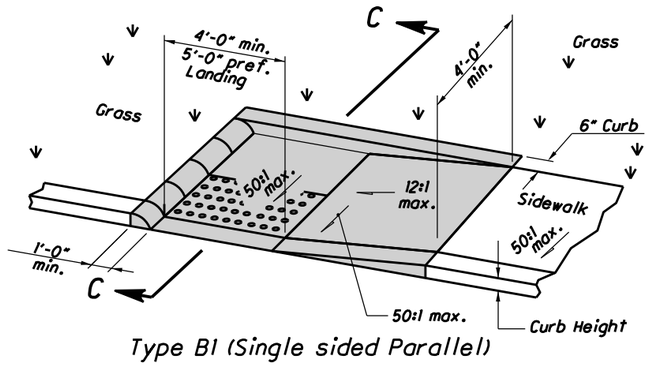


Type C1 (Combined with flared sides)

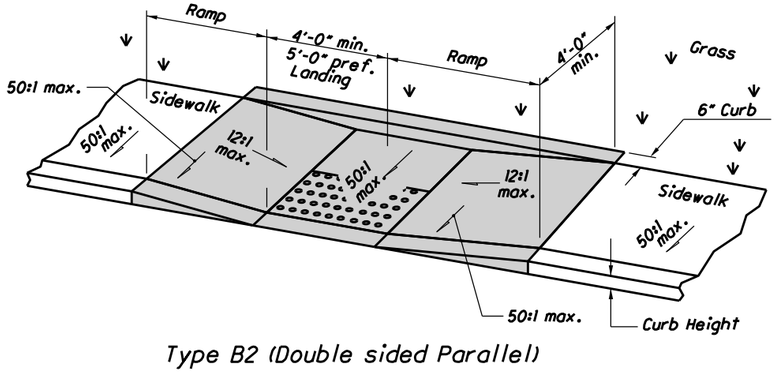


Type C2 (Combined with returned curb)

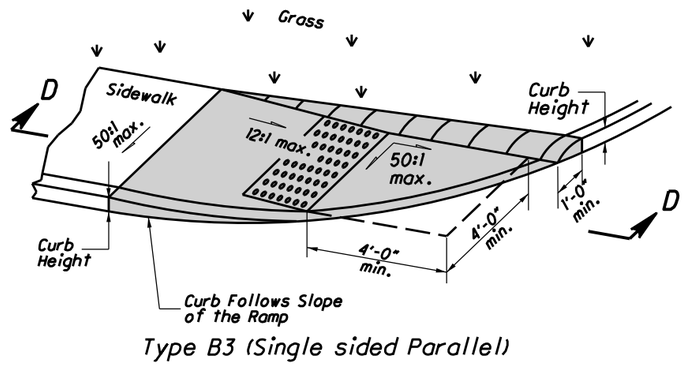
COMBINED CURB RAMP DETAILS



Type B1 (Single sided Parallel)



Type B2 (Double sided Parallel)



Type B3 (Single sided Parallel)

PARALLEL CURB RAMP DETAILS

THIS DRAWING REPLACES BP-7.1 DATED 1-19-07.

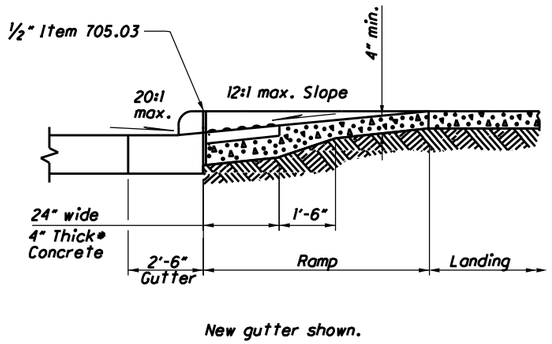
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
10-15-10 DATE
Dirk Bauer
ADMINISTRATOR

STDS. ENGINEER
M. Bline

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING
NEW CURB RAMPS (with Detectable Warnings)

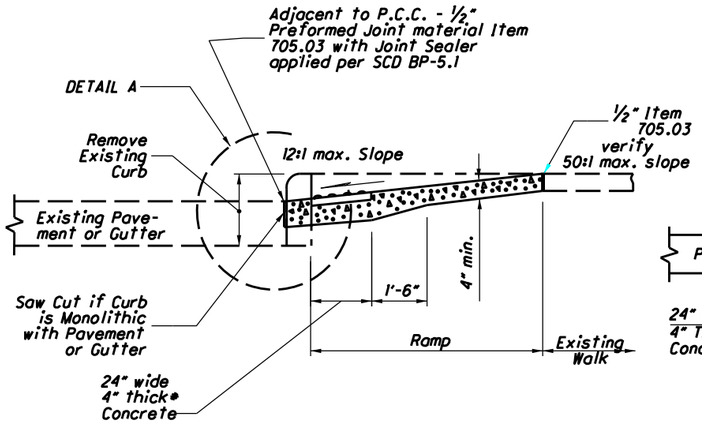
SCD NUMBER
BP-7.1



New gutter shown.

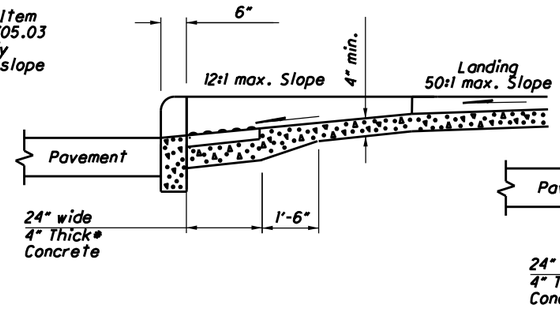
SECTION A-A NORMAL DETAIL

See Sheet 2.



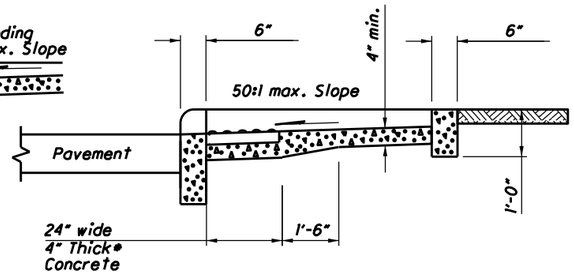
SECTION A-A EXISTING WALK DETAIL

See Sheet 2.



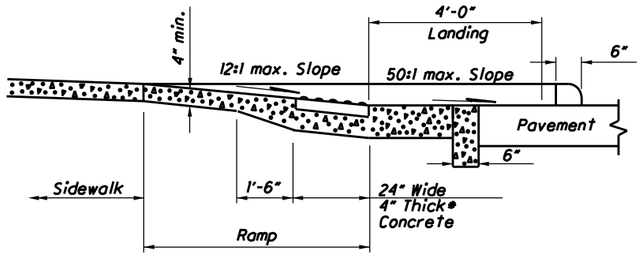
SECTION B-B

See Sheet 2.



SECTION C-C

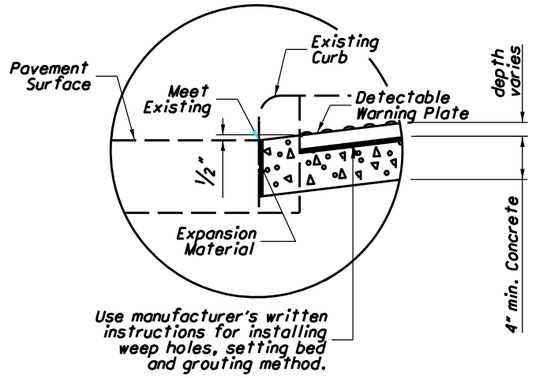
See Sheet 2.



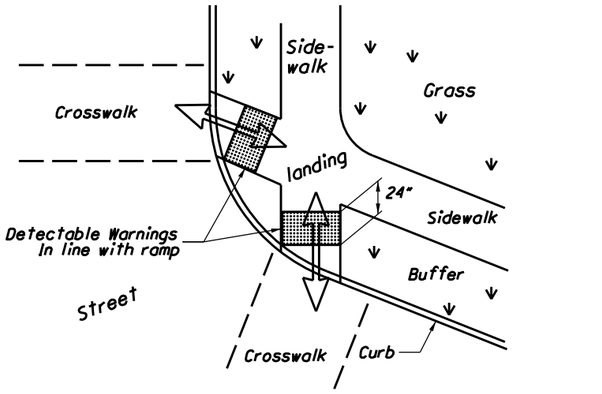
SECTION D-D

See Sheet 2.

*Where possible, pour ramp area integral with the curb, otherwise use 6" thick walk.



DETAIL A



DETECTABLE WARNING ALIGNMENT

DETECTABLE WARNINGS NOTES

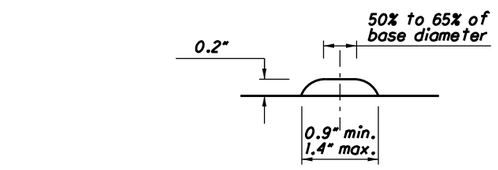
GENERAL: Detectable Warnings are a distinctive surface pattern of truncated domes which are detectable by cane or underfoot to alert people with vision impairments of their approach to streets and hazardous drop-offs.

PLACEMENT: Detectable warnings are to be installed at any location where pedestrians might cross paths with vehicular traffic lanes, such as the base of curb ramps or at blended curbs. A 24" strip of domes is to be installed for the full width of the ramp or walk. Typical street corner placement locations are shown on Sheet 1.

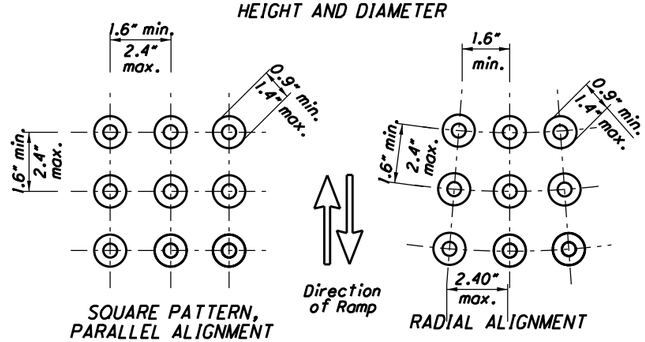
The depth of concrete underneath detectable warning products shall be a minimum of 4". See DETAIL A.

ALIGNMENT: Truncated domes should be aligned with the primary direction of the ramp as shown on the DETECTABLE WARNING ALIGNMENT Detail. Normally the detectable warnings should be flush with the back of the curb, but in skewed conditions at least one corner of the 24" strip should be adjacent to the back of curb. For non-standard layouts, detectable warning materials may have to be mitered and placed segmentally.

PRODUCTS & COLORS: Color of the detectable warnings should contrast with surrounding concrete walk and ramp. Black is not an acceptable color. Approved products and guidance on color may be found on the Office of Roadway Engineering Service's Detectable Warnings Approved List. Install products as per manufacturer's printed instructions.



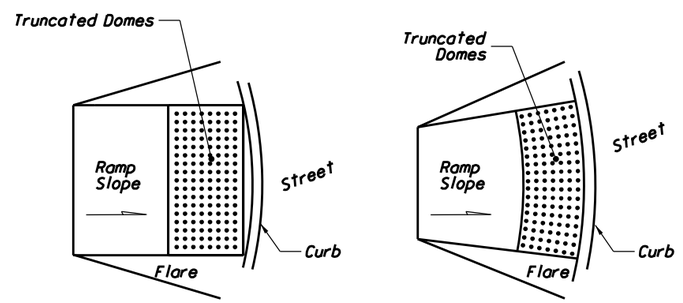
HEIGHT AND DIAMETER



SQUARE PATTERN, PARALLEL ALIGNMENT

RADIAL ALIGNMENT

TRUNCATED DOMES DETAILS



DOME ALIGNMENT ON RADIUSED CURB

THIS DRAWING REPLACES BP-7.1 DATED 1-19-07.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Dirk B. Bruns — ADMINISTRATOR
10-15-10 DATE

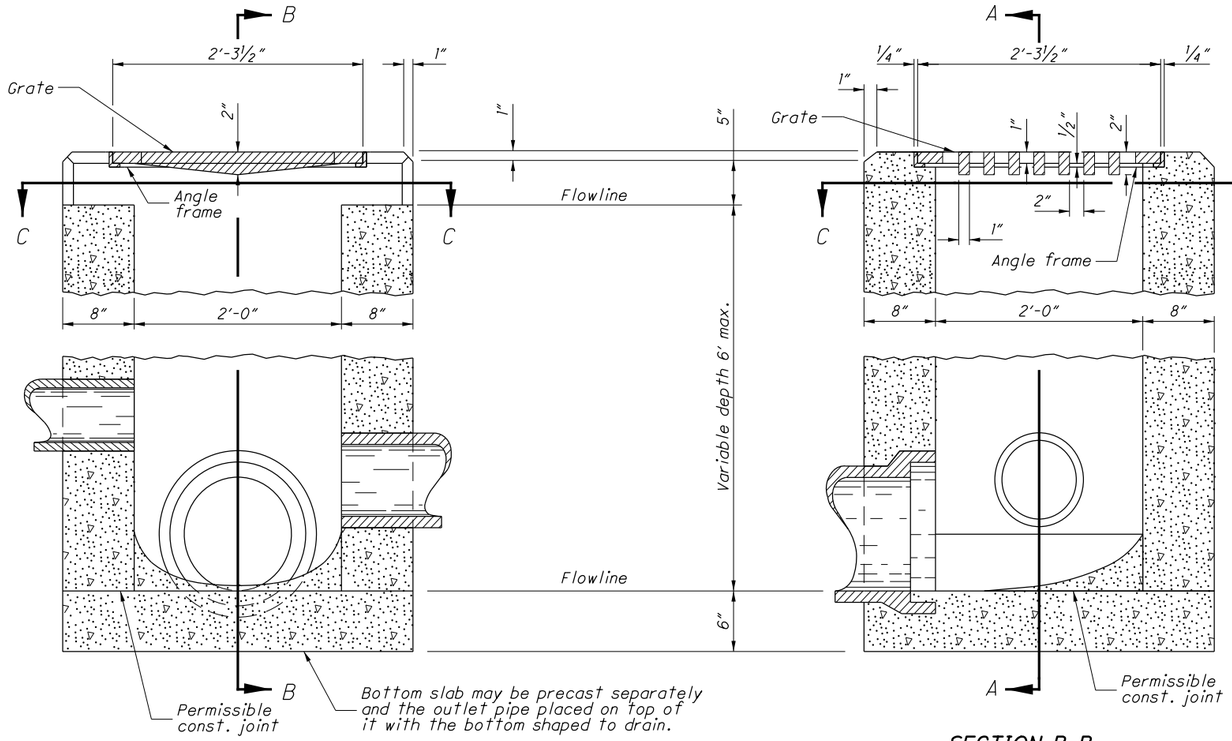
STDS. ENGINEER: M. Bline

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

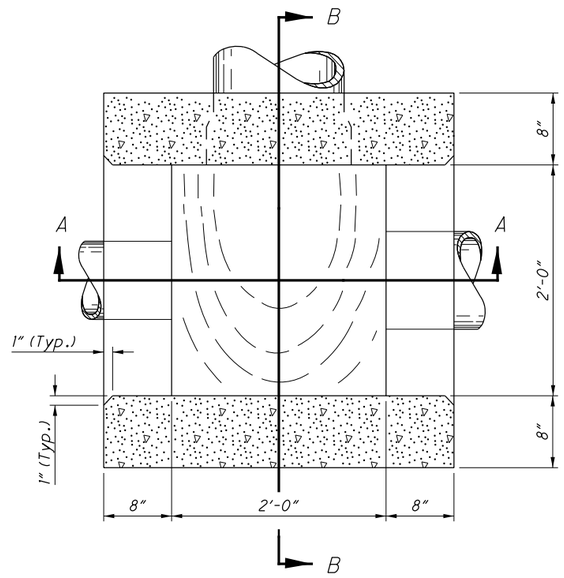
NEW CURB RAMPS (with Detectable Warnings)

SCD NUMBER BP-7.1



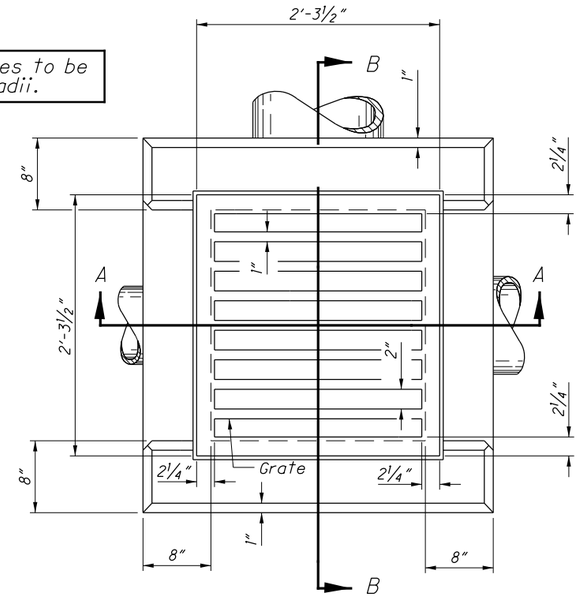
SECTION A-A

SECTION B-B



SECTION C-C

All grate edges to be rounded ¼" radii.



PLAN

NOTES

GENERAL: *Catch Basins 2-2A and 2-2B are not intended for traffic bearing applications.*

CATCH BASINS 2-2A &B: *This sheet depicts Catch Basin 2-2A. See Sheet 2 of 2 for Catch Basin 2-2B.*

GRATE AND FRAME: *Furnish a design essentially the same and equally as strong as the one shown (see Construction Information table), or meet the requirements of CMS 711.14. Provide grate openings and dimensions as shown here unless otherwise shown in the plans.*

Cast the following text into the top of the grate:

"DUMP NO WASTE" *and* ***"DRAINS TO WATERWAY"***

Print text in bold, capital letters at least ½" high. "WATERWAY" may be substituted with "STREAM", "RIVER", "LAKE", etc. Actual placement and logo may vary per manufacturer.

WALLS: *Construct brick or cast-in-place walls with a nominal 8" thickness. Provide precast walls at least 6" thick with sufficient reinforcing to permit shipping and handling without damage. Do not use brick above the flow line of the side opening for Type 2-2A.*

CONCRETE: *Use 4000 psi compressive strength for cast-in-place concrete. Meet the requirements of CMS 706.13 for all precast concrete and mark with the catch basin number.*

PRECAST BASE: *If a precast base is used, set it deep enough so that the top can be placed on the base to provide the grate elevation specified in the plans. Do not use brick layers to adjust the top elevation.*

LOCATION AND ELEVATION: *When given on the plans, location is the top center of the grate and the elevation is the flow line of the side inlet.*

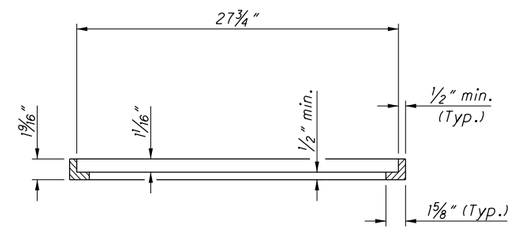
MINIMUM DEPTH: *The minimum depth of CB No. 2-2A is the outside diameter (O.D.) of the outlet pipe plus 7".*

OPENINGS: *Obtain the Engineer's approval for any pipe openings greater than 4" from the outside of the pipe to the structure. Fill any voids per CMS 611*

2-2A SIDE INLETS: *Provide inlets on both sides of the No. 2-2A catch basin in sags and on upstream side only where the ditch has a continuous down grade past the catch basin. Do not use CB 2-2A within the Clear Zone. The flow line should be 4" to 6" below normal ditch returning to normal 10' to 15' each side of the inlet.*

PAYMENT: *All materials and labor, including excavation and backfilling, are paid for under* ***Item 611 - Catch Basin, No. 2-2A.***

CONSTRUCTION INFORMATION
Minimum weight of grate, 120 lbs.
Minimum weight of frame, 40 lbs.



SECTION THRU ANGLE FRAME
FOR STANDARD No. 2-2A CATCH BASIN

CATCH BASIN No. 2-2A

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
STATE HYDRAULIC ENGINEER

REVISIONS
7-20-01
7-19-02
7-15-05
7-20-12
1-18-13

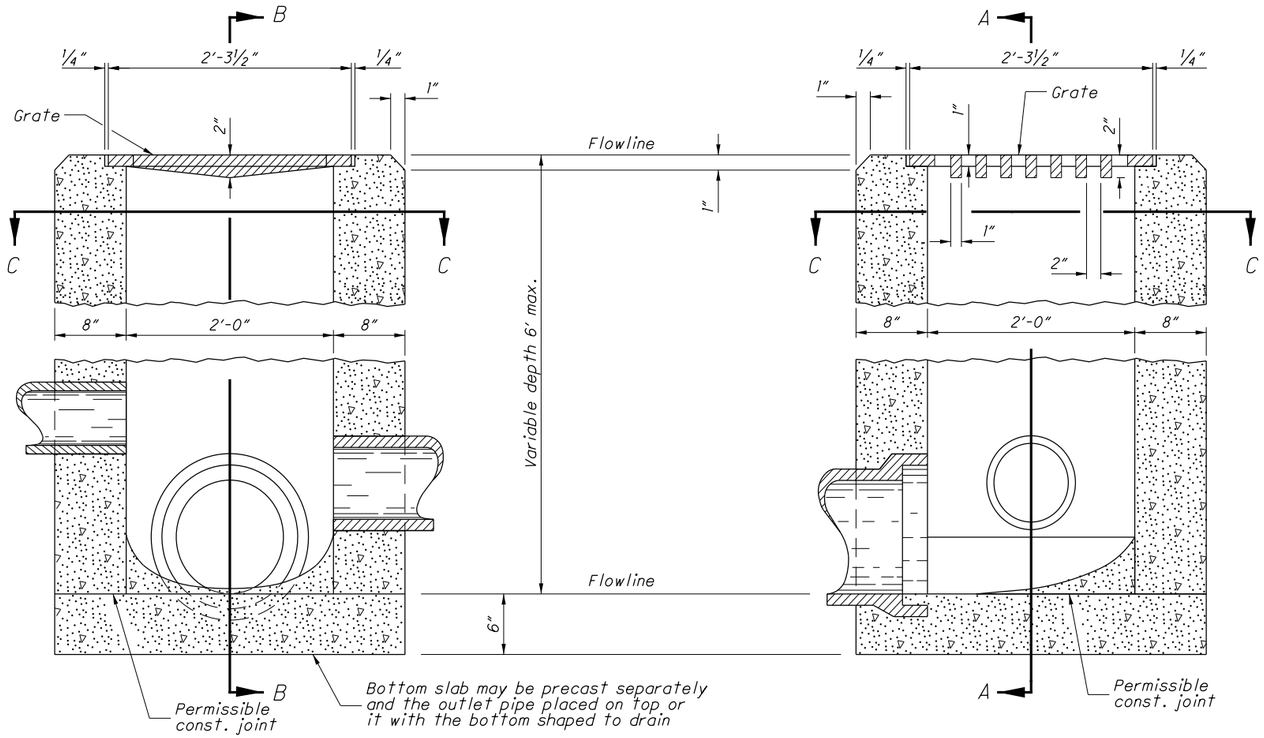
ROADWAY HYDRAULIC ENGINEER
Matt Cazzoli

OFFICE OF HYDRAULIC ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
CATCH BASINS No's 2-2A & B

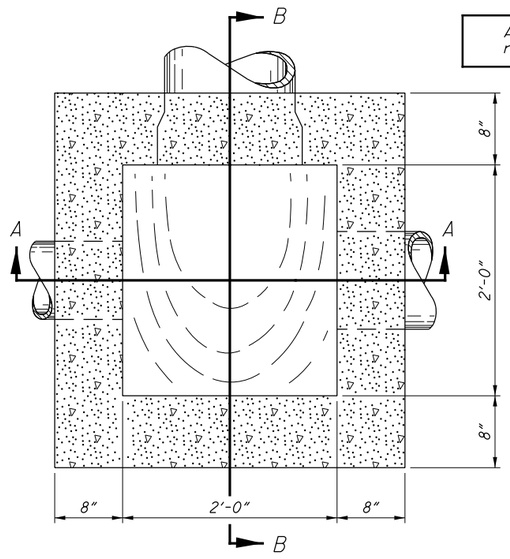
SCD NUMBER
CB-1.1

1 / 2



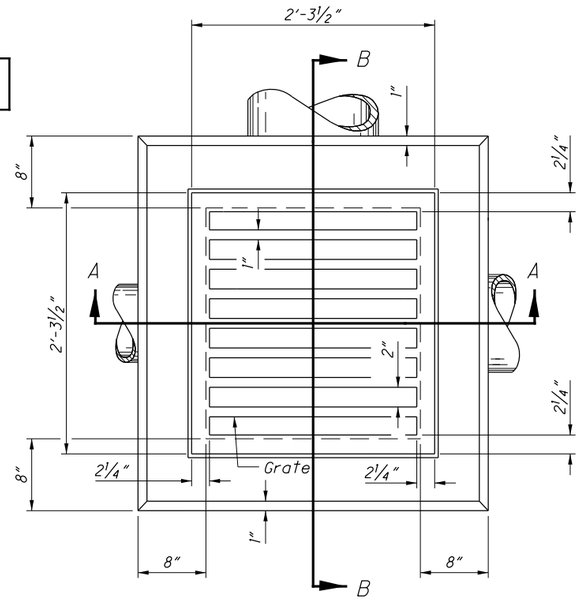
SECTION A-A

SECTION B-B



SECTION C-C

All grate edges to be rounded ¼" radii



PLAN

NOTES

CATCH BASINS 2-2A & B: *This sheet depicts Catch Basin 2-2B. See Sheet 1 of 2 for Catch Basin 2-2A.*

GRATE: *Furnish a design essentially the same and equally as strong as the one shown (see Construction Information table), or meet the requirements of CMS 711.14. Provide grate openings and dimensions as shown here unless otherwise shown in the plans.*

If necessary, bicycle safe grates will be specified in the plans. Furnish Neenah No. R-4859-C or East Jordan No. 5110 Type M3 bicycle safe grates or approved equals.

Cast the following text into the top of the grate:

"DRAINS TO WATERWAY" *and* ***"DUMP NO WASTE"***

Print text in bold, capital letters at least ½" high. "WATERWAY" may be substituted with "STREAM", "RIVER", "LAKE", etc. Actual placement and logo may vary per manufacturer.

WALLS: *Construct brick or cast-in-place walls with a nominal 8" thickness. Provide precast walls at least 6" thick with sufficient reinforcing to permit shipping and handling without damage.*

CONCRETE: *Use 4000 psi compressive strength for cast-in-place concrete. Meet the requirements of CMS 706.13 for all precast concrete and mark with the catch basin number.*

PRECAST BASE: *If a precast base is used, set it deep enough so that the top can be placed on the base to provide the grate elevation specified in the plans. Do not use brick layers to adjust the top elevation.*

LOCATION AND ELEVATION: *When given on the plans, location and elevation are at the top center of the grate. When side openings are provided, the elevation is at the flow line of the side inlet.*

MINIMUM DEPTH: *The minimum depth of CB No. 2-2B is the outside diameter (O.D.) of the outlet pipe plus 4".*

2-2B GRATE ELEVATION: *Place grate elevation 4" to 6" below normal ditch and return to normal 10' to 15' each side of inlet.*

OPENINGS: *Obtain the Engineer's approval for any pipe openings greater than 4" from the outside of the pipe to the structure. Fill all voids per CMS 611*

PAYMENT: *All materials and labor, including excavation and backfilling, are paid for under* ***Item 611 - Catch Basin, No. 2-2B.***

CONSTRUCTION INFORMATION
Minimum weight of grate, 120 lbs.

CATCH BASIN	***OUTLET PIPE SIZE***
2-2A	*12" to 21"*
2-2B	*12" to 21"*

CATCH BASIN No. 2-2B

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
STATE HYDRAULIC ENGINEER

REVISIONS
7-20-01
7-19-02
7-15-05
7-20-12
1-18-13

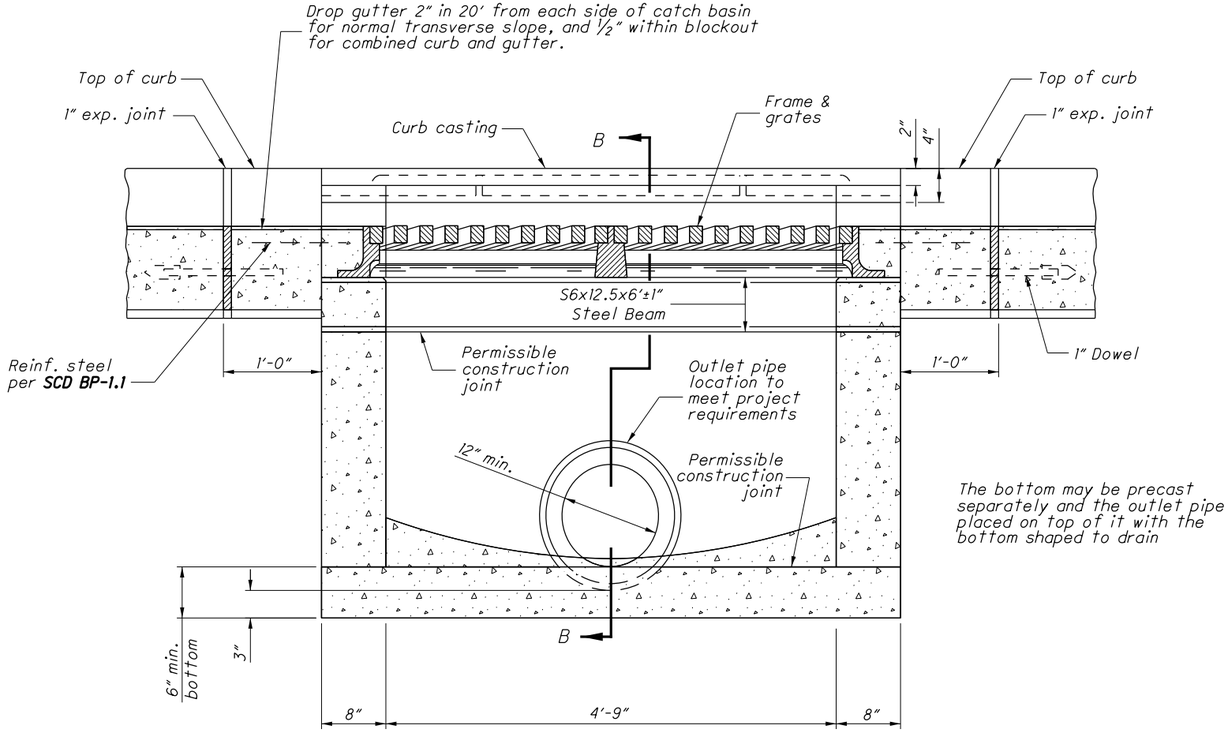
ROADWAY HYDRAULIC ENGINEER
Matt Cozzoli

OFFICE OF HYDRAULIC ENGINEERING

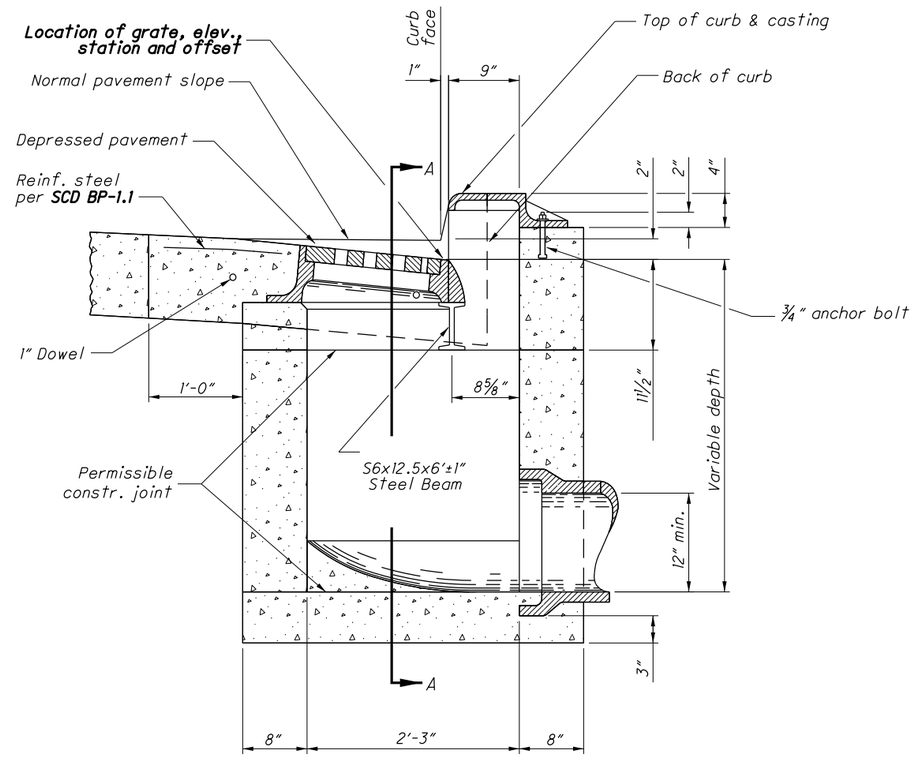
STANDARD HYDRAULIC CONSTRUCTION DRAWING

CATCH BASINS No's 2-2A & B

SCD NUMBER
CB-1.1

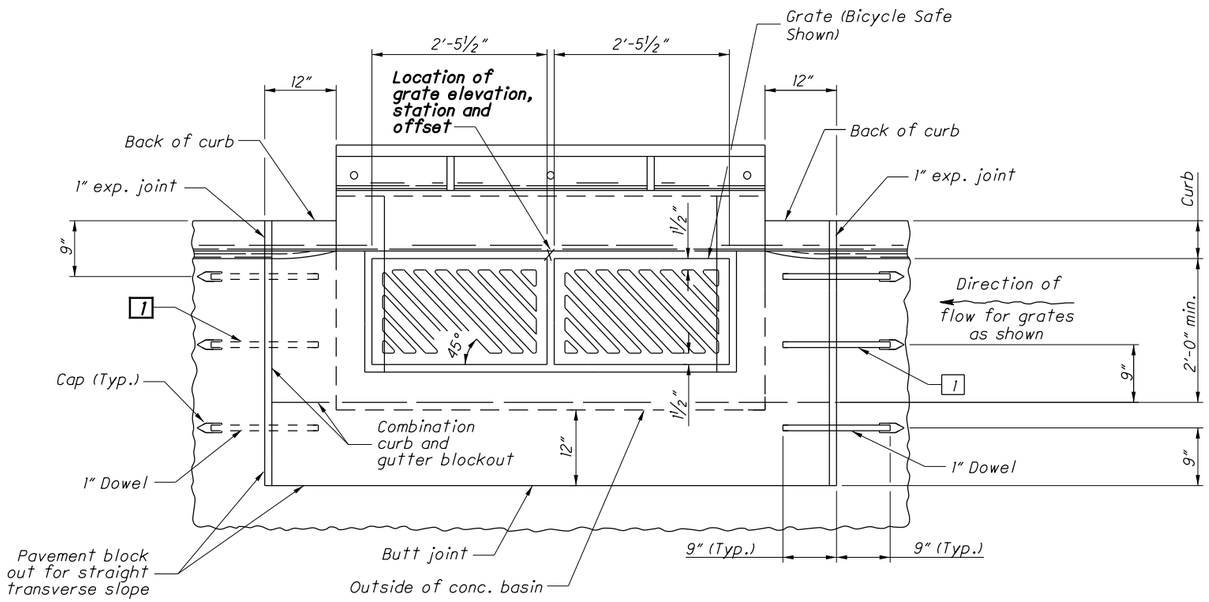


SECTION A-A

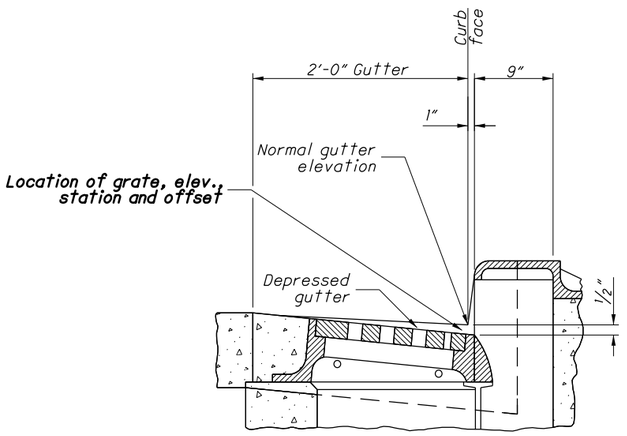


SECTION B-B
WITH CURB
(2" DEPRESSION)

[1] Dowel location for curb & gutter



PLAN OF CATCH BASIN AND PAVEMENT JOINTS



SECTION B-B
WITH CURB & GUTTER
(½" DEPRESSION)

See Sht. 2/2 for NOTES

CATCH BASIN No. 3

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
STATE HYDRAULIC ENGINEER

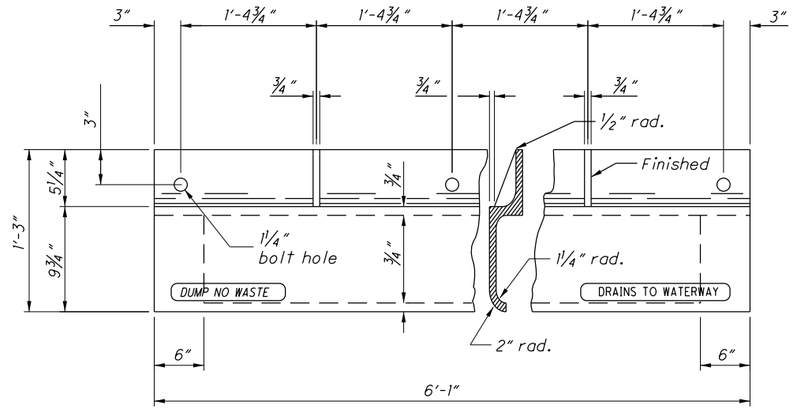
REVISIONS
7-20-01
7-19-02
7-15-05
7-20-12
1-18-13

ROADWAY HYDRAULIC ENGINEER
Matt Cozzoli

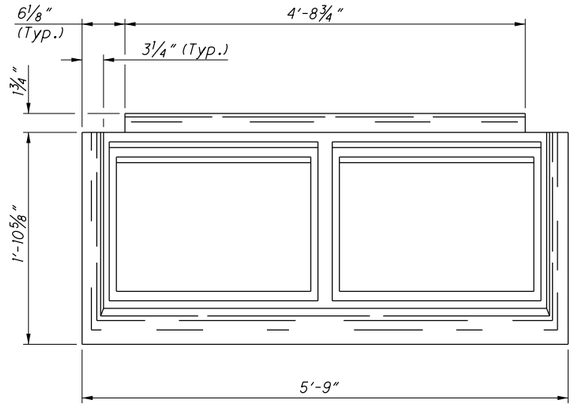
OFFICE OF HYDRAULIC ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
CATCH BASIN NO. 3

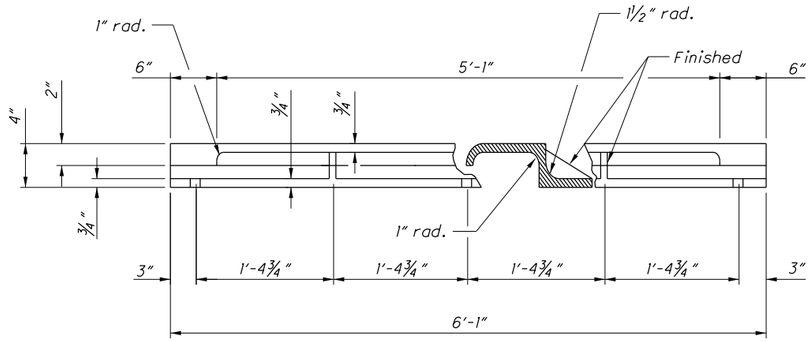
SCD NUMBER
CB-2.1



PLAN & SECTION

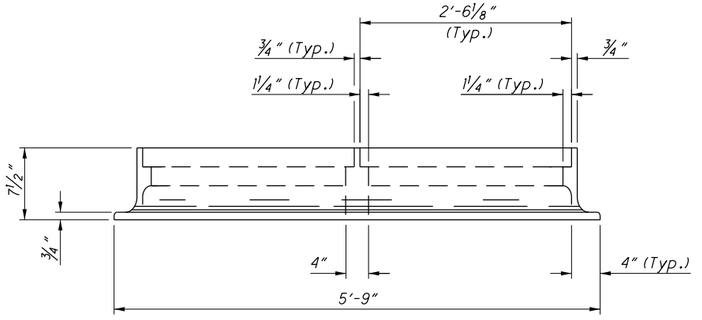


PLAN

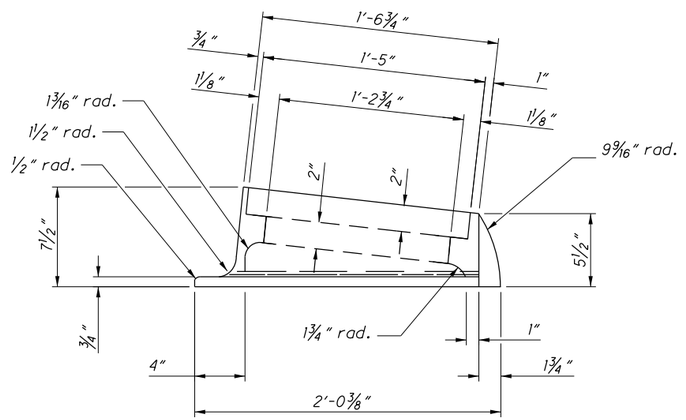


FRONT VIEW & SECTION

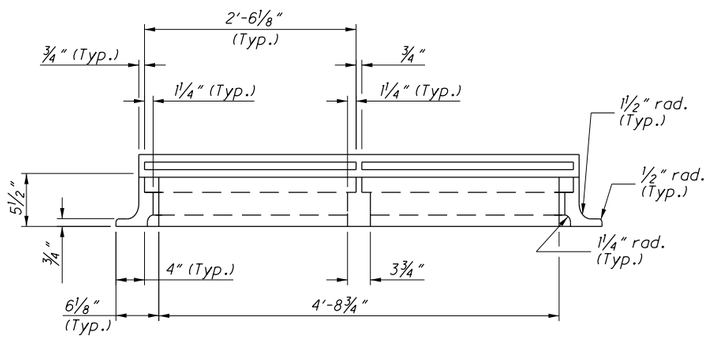
CURB CASTING



FRONT VIEW



END VIEW FRAME



BACK VIEW

FRAME

NOTES

GRATES: *Two required. For details, see* ***SCD CB-2.2.*** *Provide Grate "V" unless the plans specifically require the diagonal grate. If the diagonal grate is specified, place it so that the diagonal bars direct drainage flow toward the curb.*

CASTINGS: *Provide a design essentially the same and equally as strong as the one shown. Minimum weight:*

Curb Casting . . . . . 305 lbs.
Two Grates . . . . . 254 lbs.
Frame . . . . . 590 lbs.
Two Grate "V" . . . . 210 lbs.

Lighter weight frames and grates that meet the requirements of CMS 711.14 may also be provided. Provide grate openings and dimensions as shown here unless otherwise shown in the plans.

Cast the following text into the top of the curb casting:

"DUMP NO WASTE" *and* ***"DRAINS TO WATERWAY"***

Print text in bold, capital letters at least ¾" high. See example on Plan & Section. "WATERWAY" may be substituted with "STREAM", "RIVER", "LAKE", etc. Actual placement and logo may vary per manufacturer.

BEARING AREAS: *Fit and finish the frame and grate to provide a firm and even seat. No projections are permitted on bearing areas, and the grate must seat in its frame without rocking.*

WALLS: *When used in place of concrete, construct brick side walls with 8" nominal thickness.*

PRECAST CONSTRUCTION: *Permitted, except for the apron. Meet CMS 706.13 concrete requirements. Provide precast walls at least 6" thick with sufficient reinforcing to permit shipping and placement without damage. Reduce the wall thickness from the outside.*

MINIMUM DEPTH: *The minimum depth is per the cover requirements for that pipe type.*

OPENINGS: *Obtain the Engineer's approval for any pipe openings greater than 4" from the outside of the pipe to the structure. Fill all voids per CMS 611.*

DOWELS: *Furnish four 1"x18" dowels for concrete pavement or gutter blockout. See* ***SCD BP-2.2*** *for dowel details.*

BLOCKOUT: *Pave blockouts with 4000 psi compressive strength concrete in PCC pavement or gutter. Blockouts are paid for as part of the pavement or gutter with no deduction in pavement, curb or gutter quantities because of the castings. Cast a 4000 psi compressive strength concrete apron, the size of the 2'-0" gutter blockout, in place in asphalt pavement (no dowels required) with the cost included in the catch basin bid price. No deduction is made in curb quantities.*

PAYMENT: *All materials and labor, including excavation and backfilling, are paid for under* ***Item 611 - Catch Basin, No. 3.***

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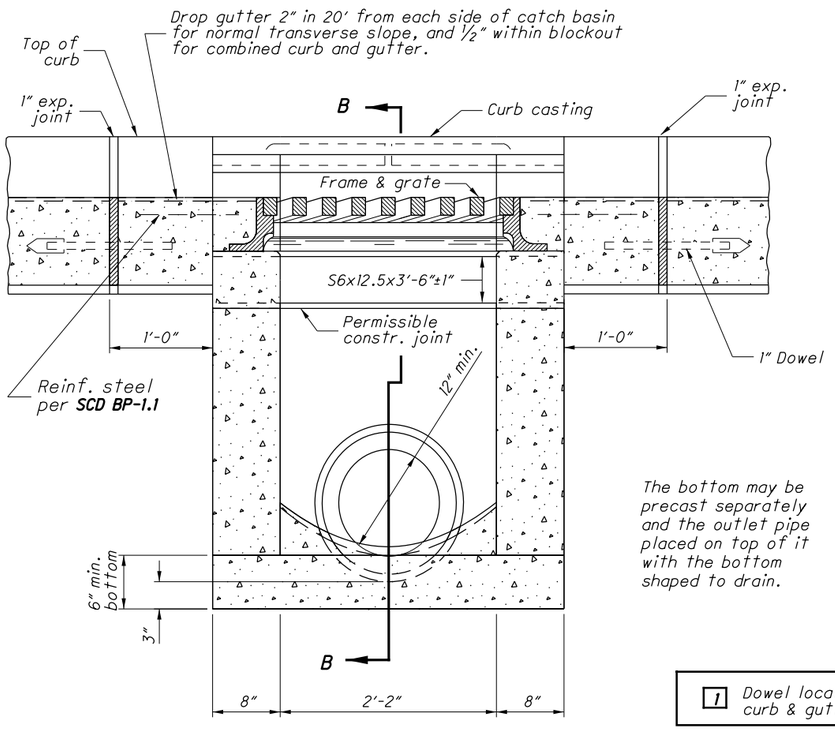
ROADWAY HYDRAULIC ENGINEER
Matt Cozzoli

OFFICE OF HYDRAULIC ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING

CATCH BASIN NO. 3

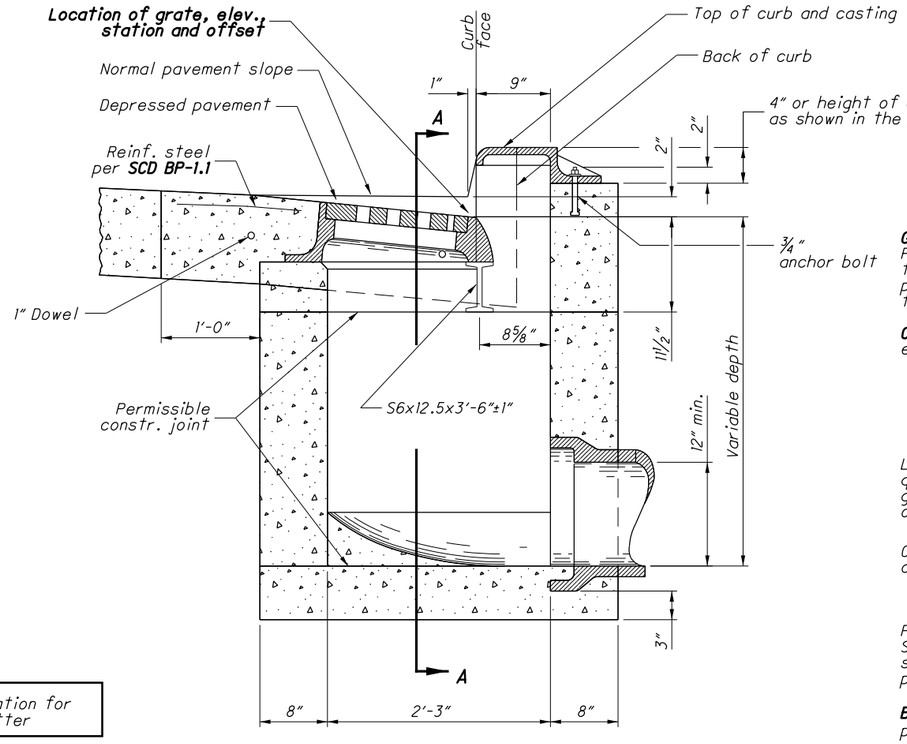
SCD NUMBER
CB-2.1



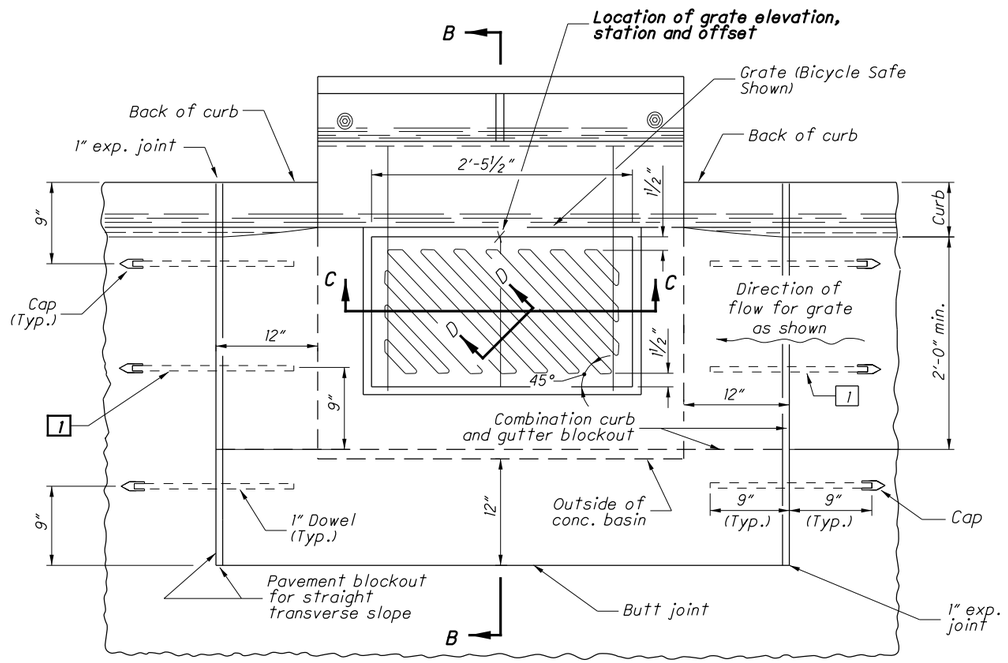
SECTION A-A

The bottom may be precast separately and the outlet pipe placed on top of it with the bottom shaped to drain.

[1] Dowel location for curb & gutter

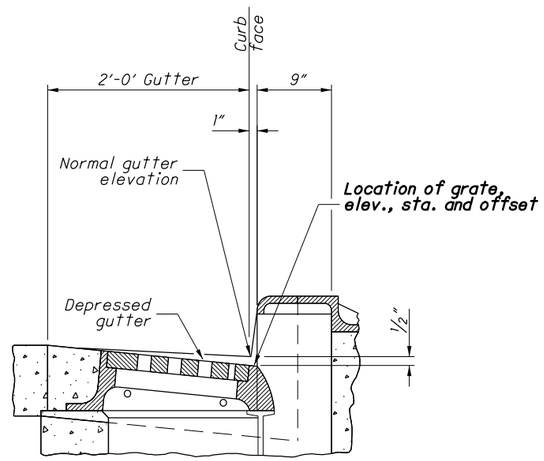


SECTION B-B WITH CURB (2" DEPRESSION)



PLAN OF CATCH BASIN AND PAVEMENT JOINTS

(For SECTIONS C-C and D-D, see Sht. 2/2)



SECTION B-B WITH CURB & GUTTER (½" DEPRESSION)

NOTES

GRATES: Two required. For details, see **SCD CB-2.2.** Provide Grate "V" unless the plans specifically require the diagonal grate. If the diagonal grate is specified, place it so that the diagonal bars direct drainage flow toward the curb.

CASTINGS: Provide a design essentially the same and equally as strong as the one shown. Minimum weight:

Curb Casting . . . . . 170 lbs.
Standard Grate . . . . 127 lbs.
Frame . . . . . 320 lbs.
Grate "V" . . . . . 105 lbs.

Lighter weight frames and grates that meet the requirements of CMS 711.14 may also be provided. Provide grate openings and dimensions as shown here unless otherwise shown in the plans.

Cast the following text into the top of the curb casting:

"DUMP NO WASTE" and **"DRAINS TO WATERWAY"**

Print text in bold, capital letters at least ¾" high. See example on Plan & Section. "WATERWAY" may be substituted with "STREAM", "RIVER", "LAKE", etc. Actual placement and logo may vary per manufacturer.

BEARING AREAS: Fit and finish the frame and grate to provide a firm and even seat. No projections are permitted on bearing areas, and the grate must seat in its frame without rocking.

WALLS: When used in place of concrete, construct brick side walls with 8" nominal thickness.

PRECAST CONSTRUCTION: Permitted, except for the apron. Meet CMS 706.13 concrete requirements. Provide precast walls at least 6" thick with sufficient reinforcing to permit shipping and placement without damage. Reduce the wall thickness from the outside.

MINIMUM DEPTH: The minimum depth is per the cover requirements for that pipe type.

OPENINGS: Obtain the Engineer's approval for any pipe openings greater than 4" from the outside of the pipe to the structure. Fill all voids per CMS 611.

DOWELS: Furnish four 1"x18" dowels for concrete pavement or gutter blockout. See **SCD BP-2.2** for dowel details.

BLOCKOUT: Pave blockouts with 4000 psi compressive strength concrete in PCC pavement or gutter. Blockouts are paid for as part of the pavement or gutter with no deduction in pavement, curb or gutter quantities because of the castings. Cast a 4000 psi compressive strength concrete apron, the size of the 2'-0" gutter blockout, in place in asphalt pavement (no dowels required) with the cost included in the catch basin bid price. No deduction is made in curb quantities.

PAYMENT: All materials and labor, including excavation and backfilling, are paid for under **Item 611 - Catch Basin, No. 3A.**

CATCH BASIN No. 3A

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ROADWAY HYDRAULIC ENGINEER
Matt Cozzoli

OFFICE OF HYDRAULIC ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
CATCH BASIN No. 3A

SCD NUMBER
CB-2.2

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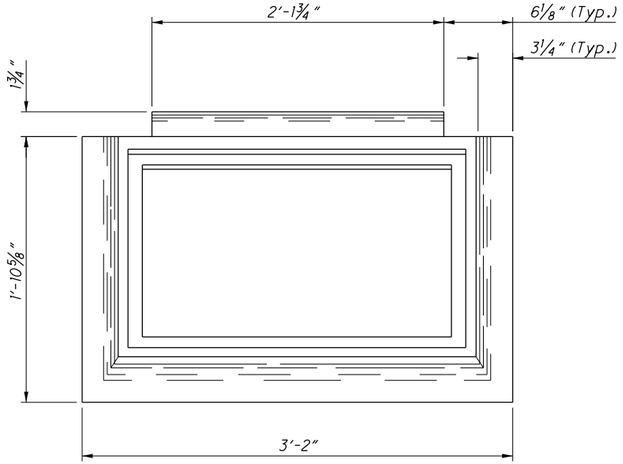
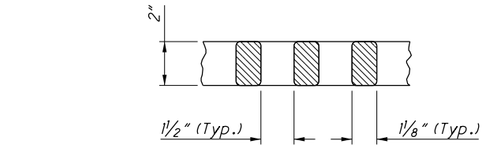
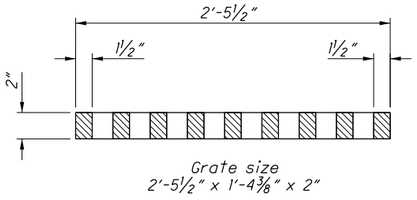


PLAN

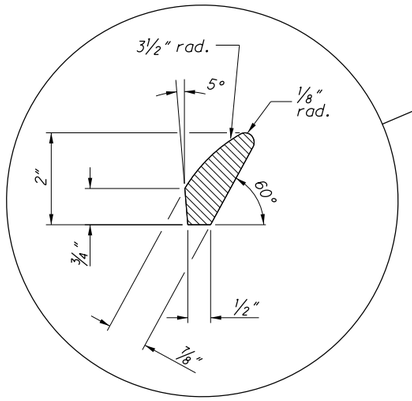


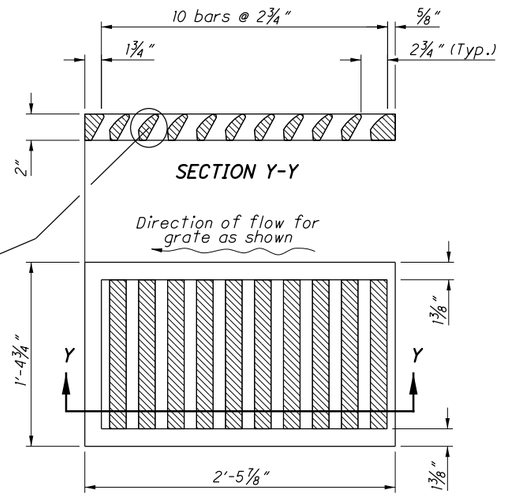
SECTION D-D
(See Sht. 1/2.)



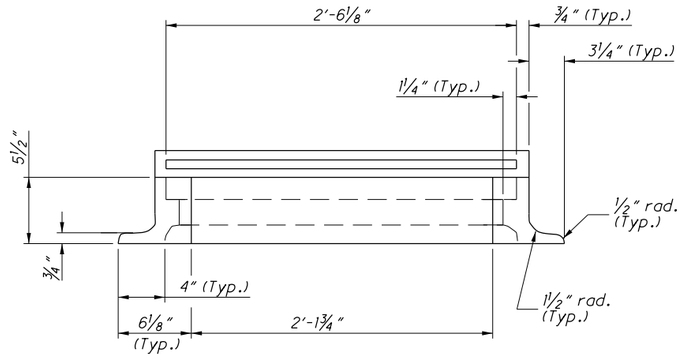
SECTION C-C
DIAGONAL GRATE
(See Sht. 1/2)

⅛" radii
all bar edges

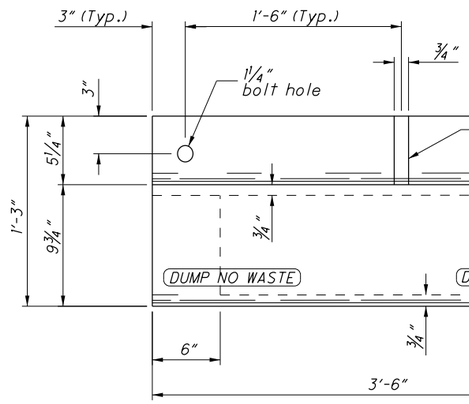




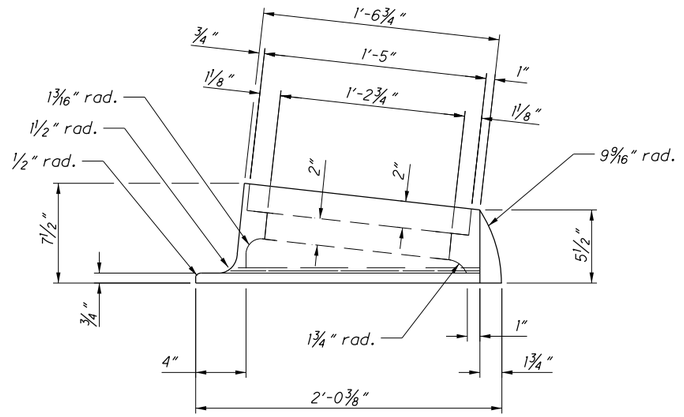
PLAN
GRATE "V"



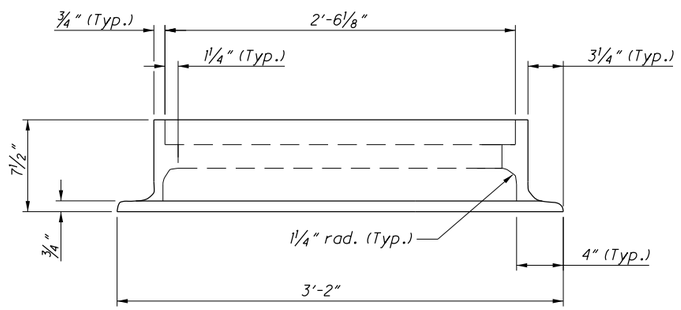
BACK VIEW



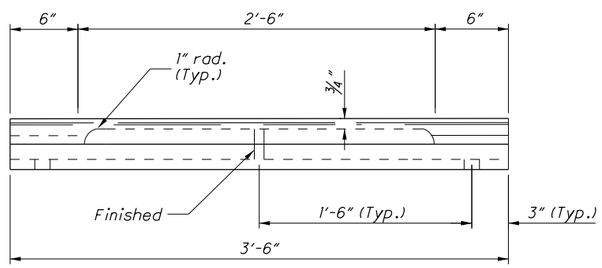
PLAN



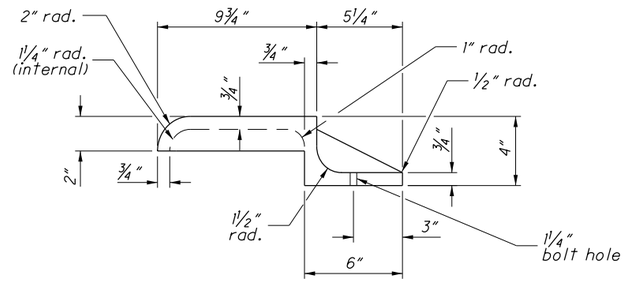
END VIEW FRAME



FRAME
FRONT VIEW



FRONT VIEW
CURB CASTING



END VIEW
CURB CASTING

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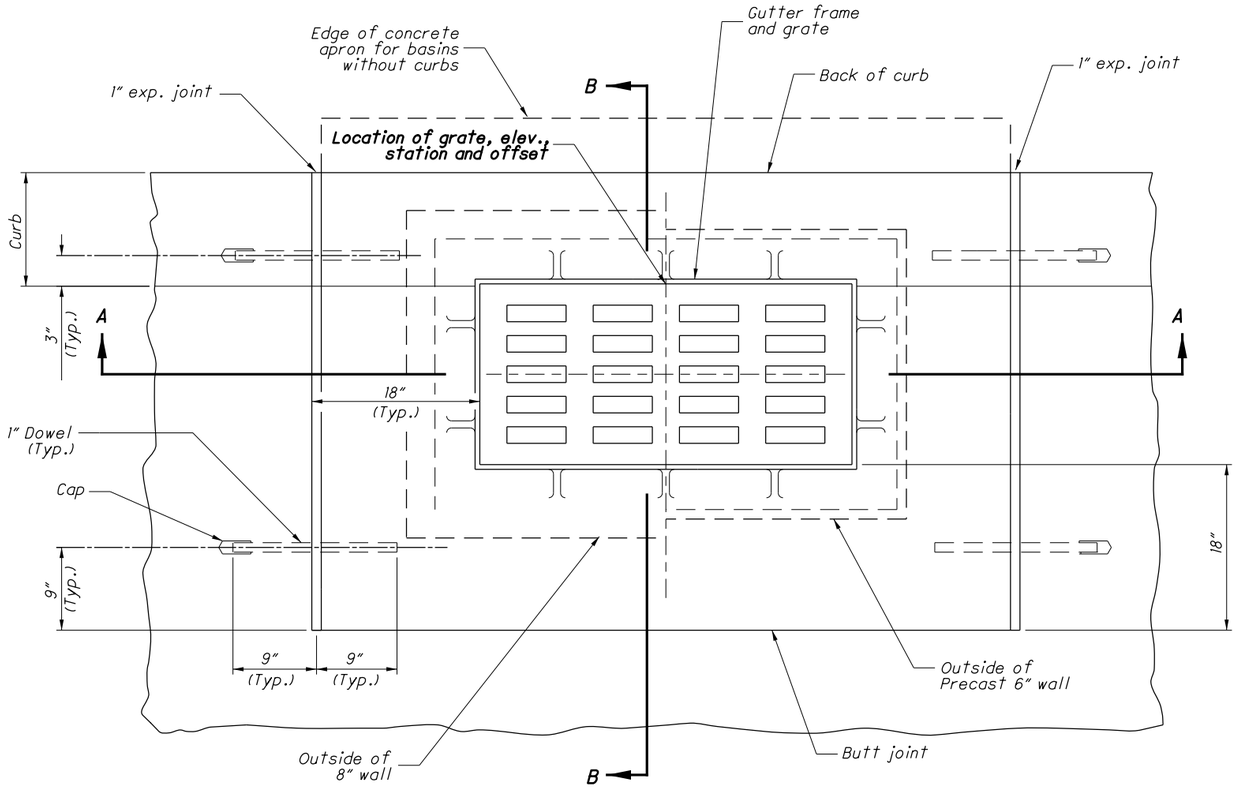
ROADWAY HYDRAULIC ENGINEER
Matt Cazzoli

OFFICE OF HYDRAULIC ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING

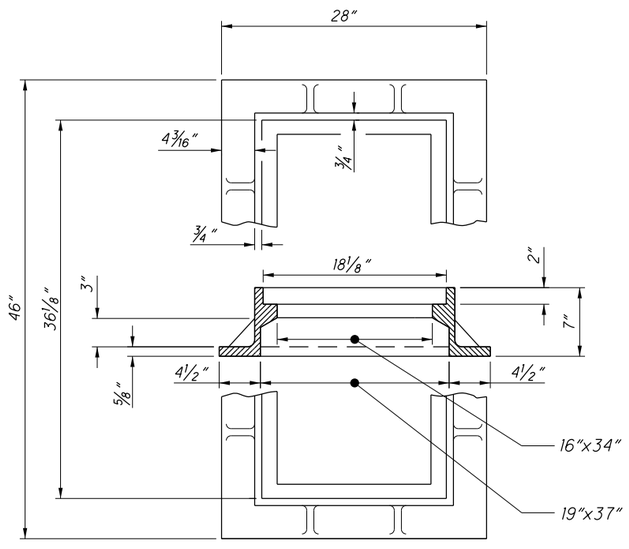
CATCH BASIN No. 3A

SCD NUMBER
CB-2.2

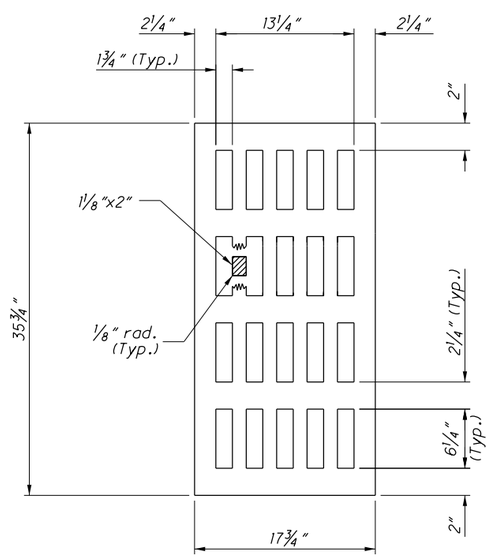


See Sht. 2/2 for Sections

PLAN OF CATCH BASINS AND PAVEMENT JOINTS



FRAME



GRATE

NOTES

GRATE AND FRAME: Provide a design essentially the same and equally as strong as the one shown (see construction information table), or meet the requirements of CMS 711.14. Provide grate openings and dimensions as shown here unless otherwise shown in the plans.

Cast the following text into the top of the grate:

"DUMP NO WASTE" and **"DRAINS TO WATERWAY"**

Print text in bold, capital letters at least ½" high. "WATERWAY" may be substituted with "STREAM", "RIVER", "LAKE", etc. Actual placement and logo may vary per manufacturer.

BEARING AREAS: Fit and finish frame and grate to provide a firm and even seat for all portions of the grate in the frame. No projections are permitted on bearing areas of either casting, and the grate must seat in its frame without rocking. Fit, match and mark frame and grate before delivery to the project.

WALLS: Construct brick or cast-in-place walls with a nominal thickness of 8". Provide precast walls at least 6" thick with sufficient reinforcing to permit shipping and handling without damage.

CONCRETE: Use 4000 psi for cast-in-place concrete. Meet the requirements of CMS 706.13 for precast concrete and mark with the catch basin number. Reduce the wall thickness from the outside.

MINIMUM DEPTH: The minimum depth is the outside diameter (O.D.) of the outlet pipe plus 15".

OPENINGS: Obtain the Engineer's approval for any pipe openings greater than 4" from the outside of the pipe to the structure. Fill all voids per CMS 611.

DOWELS: Furnish four 1"x18" dowels for pavement and curb. See **SCD BP-2.2** for dowel detail.

BLOCKOUT APRONS: Use 4000 psi compressive strength concrete. Cost of apron is not included in catch basin price when located in PCC pavement, and no deduction in normal pavement quantities is made because of blockout. When adjacent paving is asphalt, omit the dowels, and the cost of the concrete apron is included in the catch basin bid price. Cost of curb, if any, is included in CMS 609. For basins without curb, the grate elevation is 1" below the normal pavement slope measured at the center of the grate.

PAYMENT: All materials and labor, including excavation and backfilling, are paid for under **Item 611 - Catch Basin, No. 6.**

CONSTRUCTION INFORMATION
Minimum weight of grate, 210 lbs.
Minimum weight of frame, 265 lbs.

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CATCH BASIN No. 6

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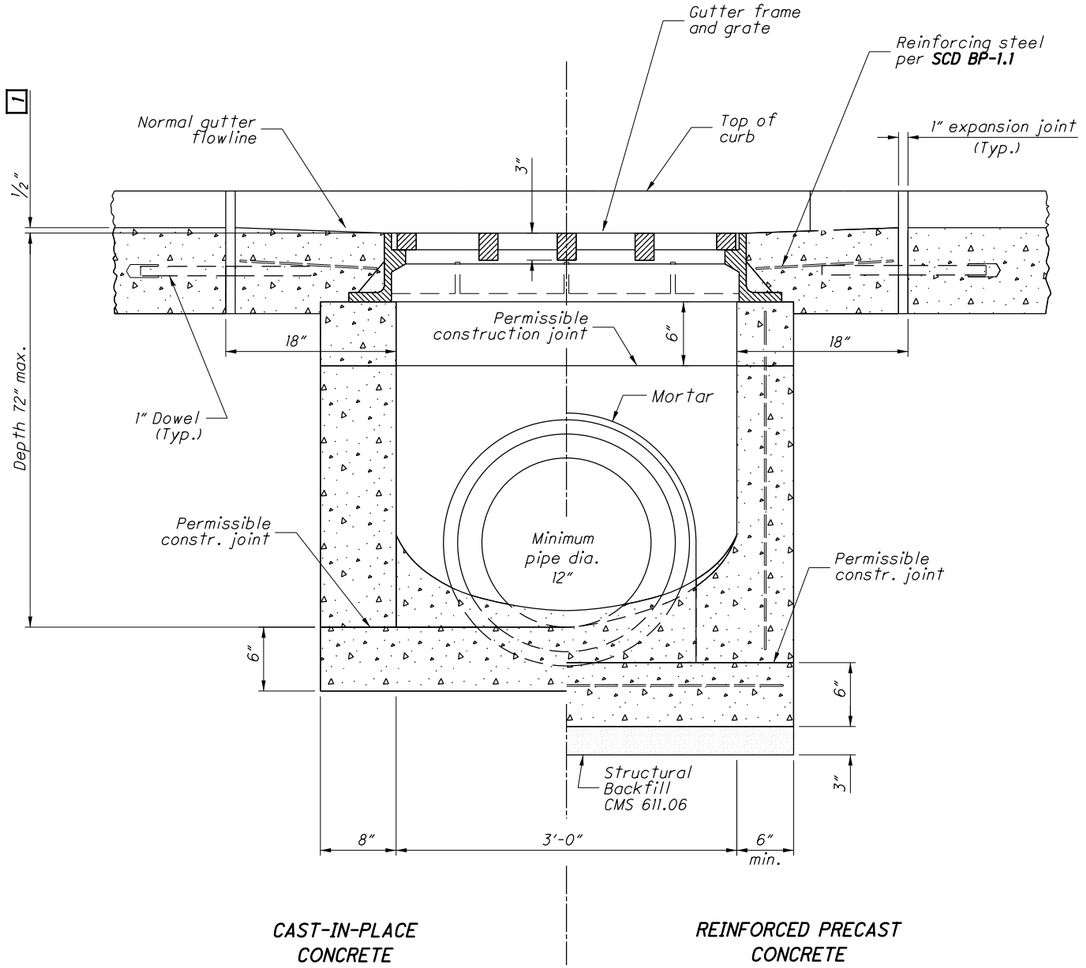
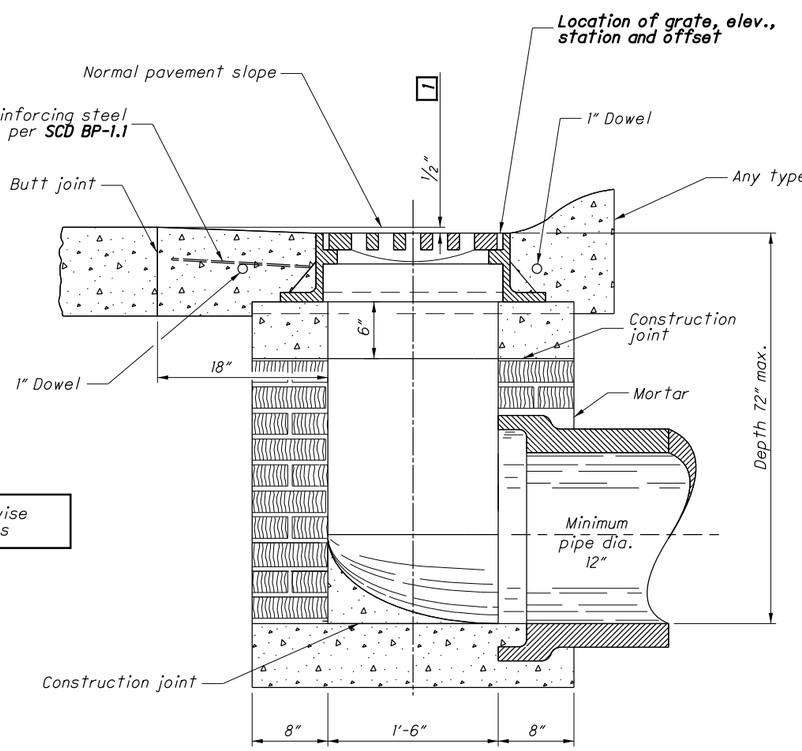


SECTION A-A

(See Sht. 1/2.)

1 Unless otherwise shown on plans



SHOWN WITH BRICK WALLS

SECTION B-B

(See Sht. 1/2.)

CATCH BASIN No. 6

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Matt Cozzoli

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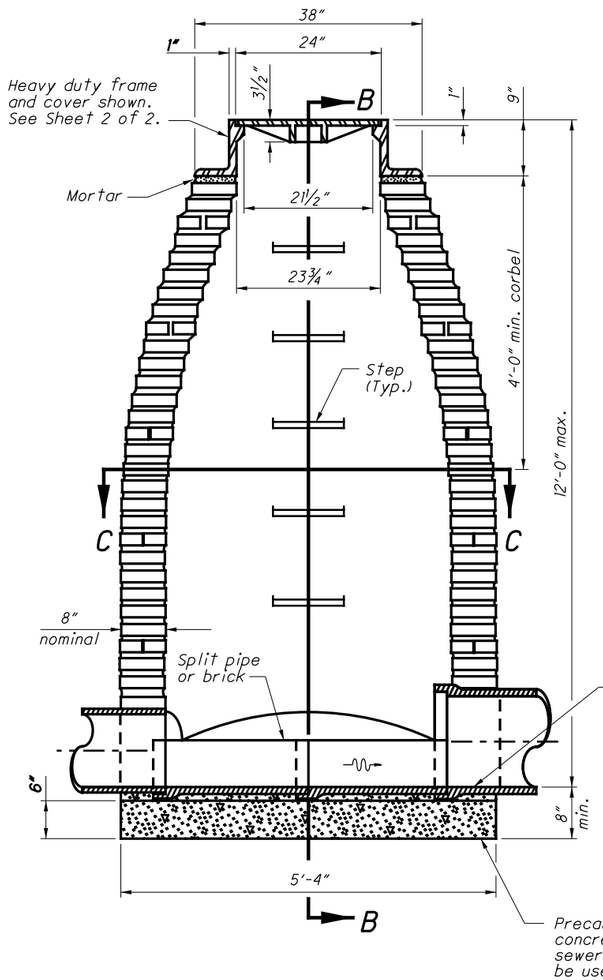
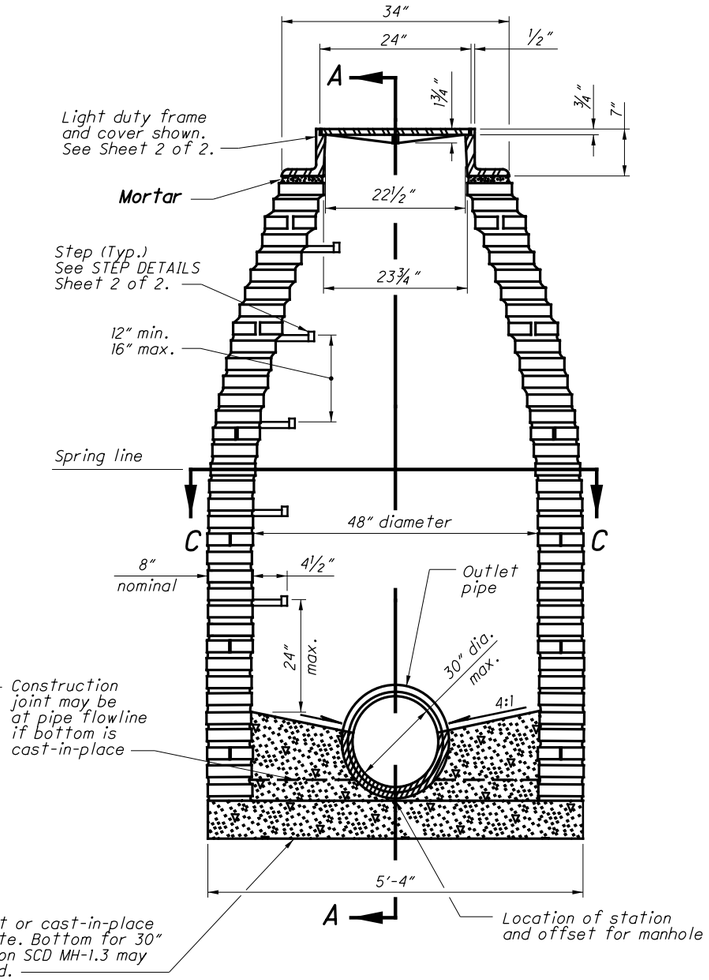
CATCH BASIN No. 6

SCD NUMBER
CB-2.3





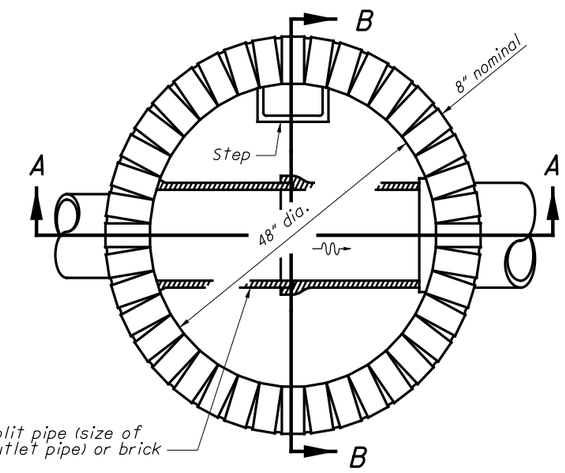
Construction joint may be at pipe flowline if bottom is cast-in-place

Precast or cast-in-place concrete. Bottom for 30″ sewer on SCD MH-1.3 may be used.

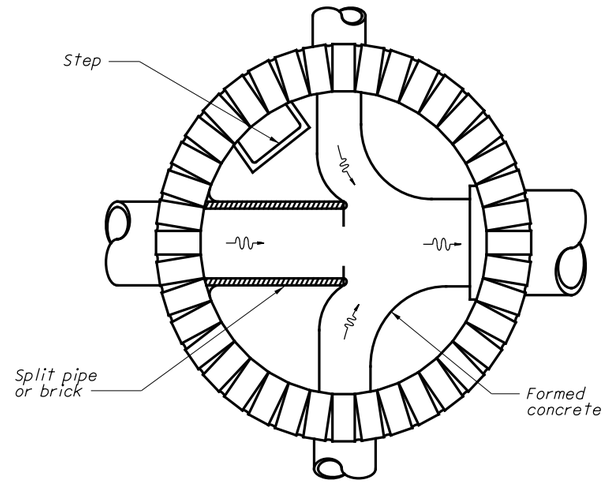
Location of station and offset for manhole

SECTION A-A

SECTION B-B



SECTION C-C



SECTION BELOW SPRING LINE SHOWING METHOD OF TURNING SIDE DRAINS

NOTES

CONSTRUCTION: *Manhole No. 1 is for sewers 30″ diameter or less. The design shown is for brick construction with every sixth course a stretcher course. The 6″ bottom may be precast or cast-in-place concrete. Build the bottom channel section with concrete and line it with split pipe or brick, except curved channels may be formed in the concrete.*

Precast solid concrete radial blocks or cast-in-place concrete reinforced with # 4 bars on 12″ centers both vertically and horizontally may be used with a wall thickness of 6″ or greater. Precast manholes detailed on ***SCD MH-1.2 or MH-1.3*** *may be used instead of the design shown unless otherwise specified in the plans.*

DROP PIPE: *When specified on the plans, construct the drop pipe as shown on* ***SCD MH-3.1.***

SANITARY SEWER: *Omit pick and vent holes shown here on cover and affix a sealing gasket to the bearing surface. Do not use bolt-down covers unless specified in the plans.*

FRAME, COVER, AND STEPS: *See Sheet 2 of 2 for these notes.*

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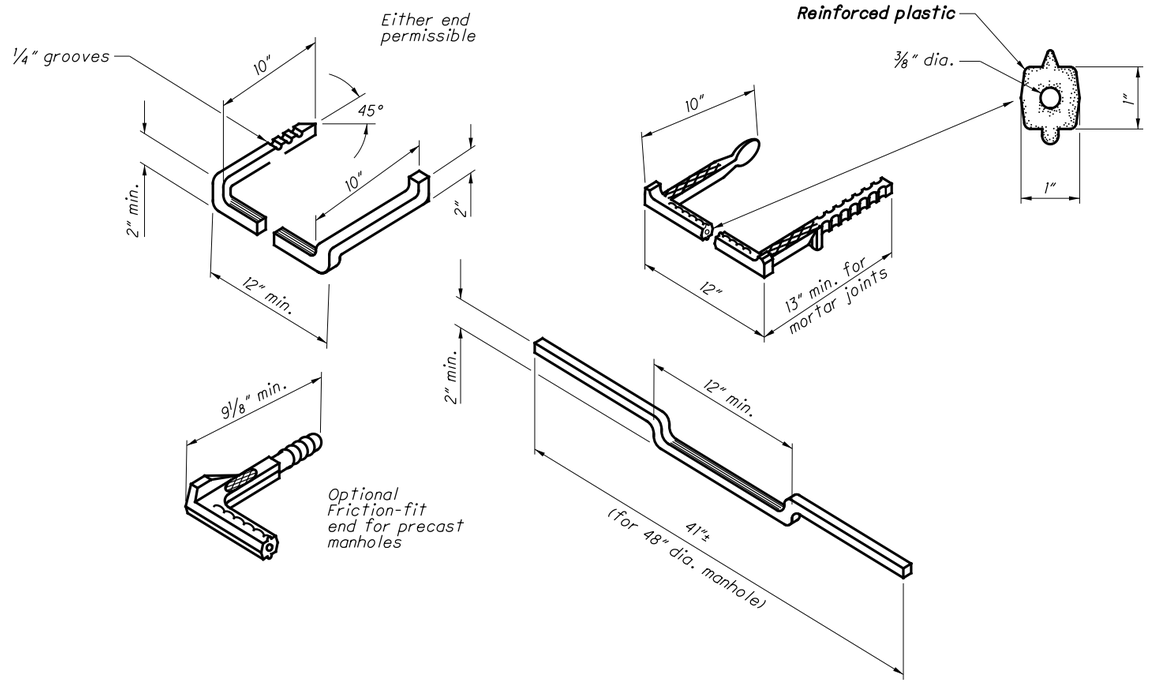
Matt Cozzoli

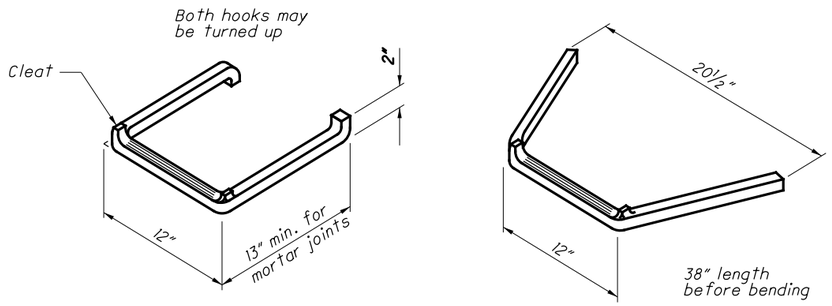
OFFICE OF HYDRAULIC ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING

MANHOLE NO. 1

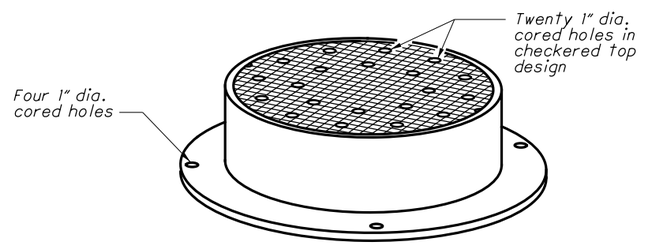
SCD NUMBER
MH-1.1





Steps have a minimum cross sectional dimension of 1" for ferrous metal ¾" for aluminum.

STEP DETAILS



FRAME & COVER

NOTES

GENERAL: See Sheet 1 of 2 for additional notes.

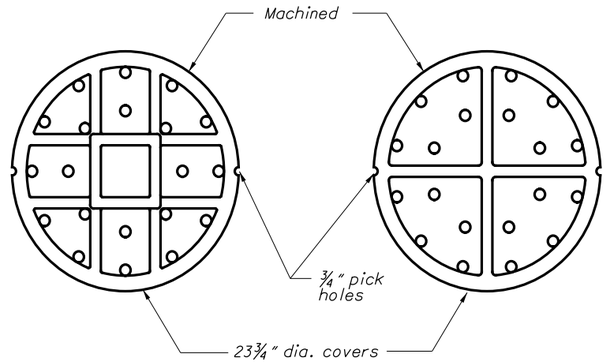
FRAME AND COVER: Provide a frame and cover that meet CMS 711.14 requirements or a heavy design (475 lbs. min. total weight) when the manhole is placed within the limits of the pavement or shoulder. Otherwise, the light design (275 lbs. min.) may be used. Finish tearing areas smooth and fit to provide a firm and even seat for all portions of the cover in the frame. Each cover must seat in its frame without rocking and be marked as a matched frame and cover before delivery to the project. Set the base of the frame in a full bed of Portland cement mortar and adjust it to conform to the finished pavement or shoulder elevation and slope. Provide castings meeting CMS 611 requirements and designed essentially the same and equally as strong as those shown.

STEPS: Provide steps that conform to the material requirements of CMS 611 and have a depressed tread or a 1/2" minimum cleat height at the ends.

Embed steps installed in fresh concrete at least 4" deep. Embed steps installed in mortar joints at least 7" deep.

Friction-fit steps meeting the requirements of CMS 711.31 with rebar may be used in precast manholes. Do not allow the receiving holes for friction-fit steps to penetrate the manhole walls.

The Engineer may require the contractor to test load a maximum of one step per manhole to a proof load of 400 lbs. in direct pull. Meet the approval of the Engineer with the equipment and method used. If the selected step fails the pull-out test, also test the remaining steps in that manhole. Remove all steps not passing the pull-out test, and install and test a new step to the satisfaction of the Engineer. Cost of testing is incidental to the unit price bid for the manhole.



HEAVY DUTY LIGHT DUTY

COVERS - BOTTOM VIEW

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Matt Cozzoli

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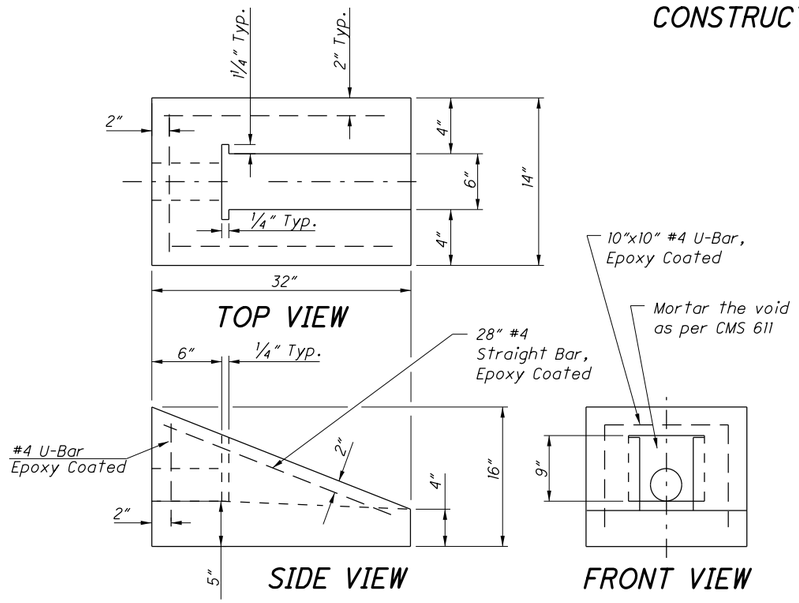
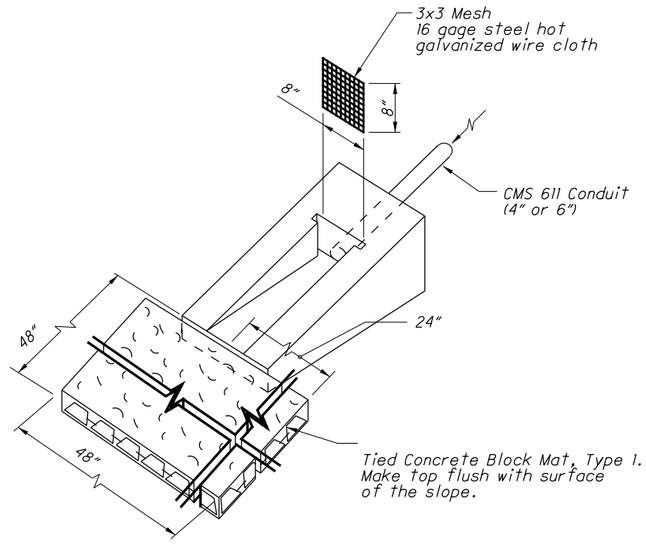
STANDARD HYDRAULIC CONSTRUCTION DRAWING

MANHOLE NO. 1

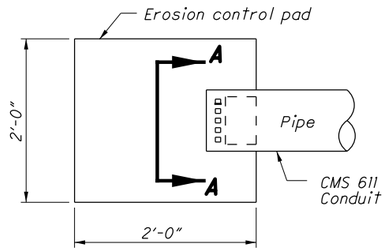
SCD NUMBER
MH-1.1

CONSTRUCTION METHODS

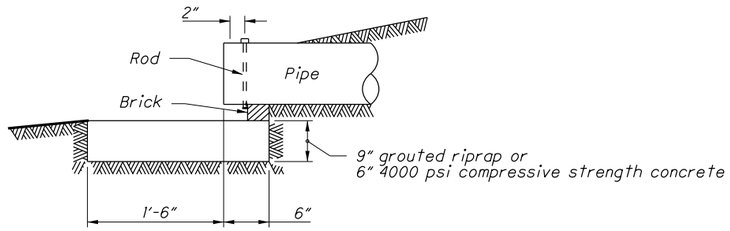




PRECAST REINFORCED CONCRETE OUTLET



PLAN



PROFILE

EROSION CONTROL PAD AND
ANIMAL GUARD FOR OUTLET PIPE

NOTES

EROSION CONTROL PAD AND ANIMAL GUARDS: *Provide these items at the outlet end of all farm drains except where they outlet into a drainage structure.*

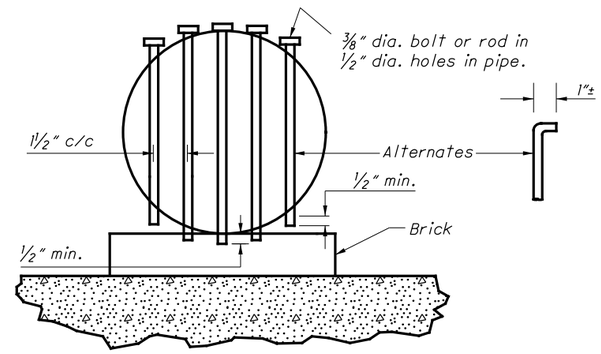
Furnish galvanized steel bolts or rods for the animal guard per CMS 711.02. Instead of drilling or punching the ½" diameter holes into the pipe, a metal collar meeting all of the above requirements may be clamped onto the pipe if approved by the Engineer.

PAYMENT: *Erosion control pads and animal guards are included in the unit price bid for* ***Item 611 - __ Inch Conduit, Type __ .***

PRECAST REINFORCED CONCRETE OUTLET: *Provide a concrete outlet that meets CMS 611 requirements.*

PAYMENT: *The precast reinforced concrete outlet and wire mesh are paid at the contract unit price bid for* ***Item 611 - Precast Reinforced Concrete Outlet.***

Tied Concrete Block Mat, Type 1 is paid at the contract unit price bid for ***Item 601 - Tied Concrete Block Mat, Type 1.***



SECTION A-A

CONDUIT SIZE	4"	6"	8"	10"	12"	15"	18"
No. of Bolts	2	3	5	6	7	9	11

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OUTLETS, DRAINS AND SEWERS

SCD NUMBER
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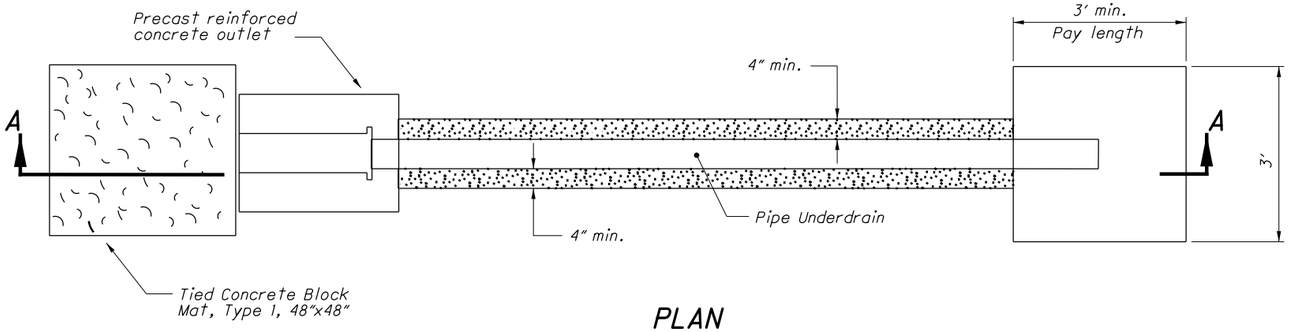
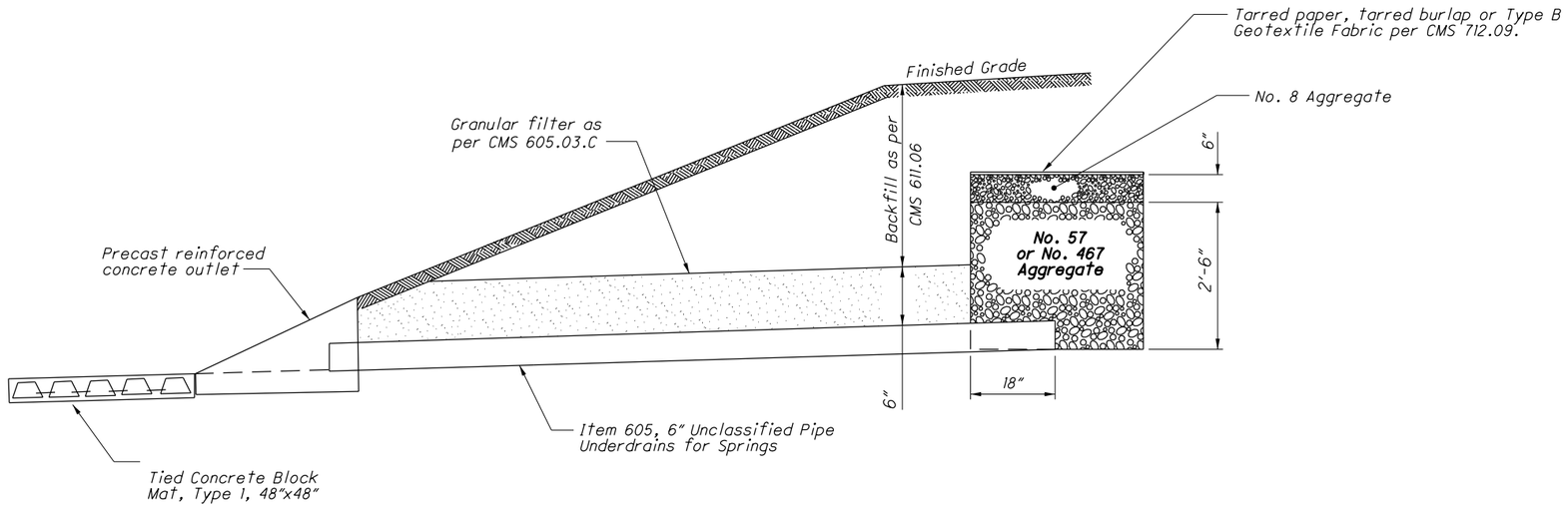


PLAN



SECTION A-A
SPRING DRAIN DETAIL

NOTES

SPRING DRAIN: *Aggregates, tarred paper, tarred burlap, or geotextile fabric backfill and necessary excavation for spring drains are included for payment in the unit price bid per Foot for* ***Item 605, Aggregate Drains for Springs.***

PAYMENT: *The pipe is included in the unit price bid per Foot for* ***Item 605 - 6" Unclassified Pipe Underdrains for Springs.***

PRECAST REINFORCED CONCRETE OUTLET: *Provide a concrete outlet that meets CMS 611 requirements.*

PAYMENT: *The precast reinforced concrete outlet and wire mesh is paid at the contract unit price bid for* ***Item 611 - Precast Reinforced Concrete Outlet.***

Tied Concrete Block Mat, Type 1 is paid at the contract unit price bid for ***Item 601 - Tied Concrete Block Mat, Type 1.***

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OUTLETS, DRAINS AND SEWERS

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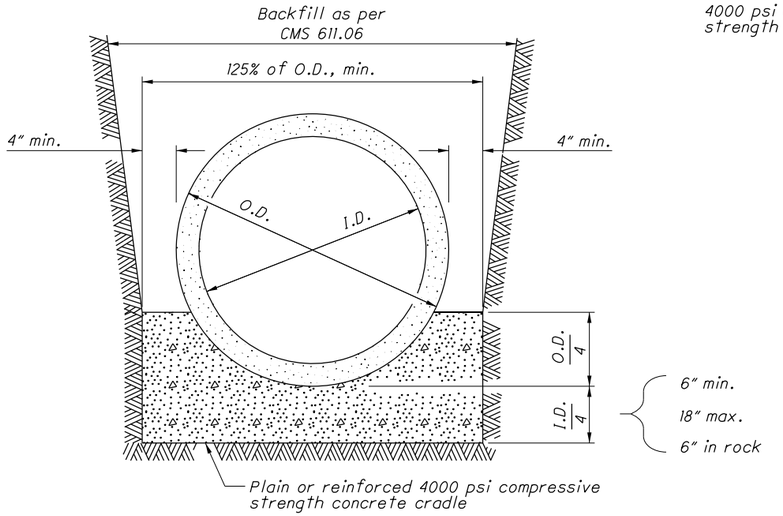
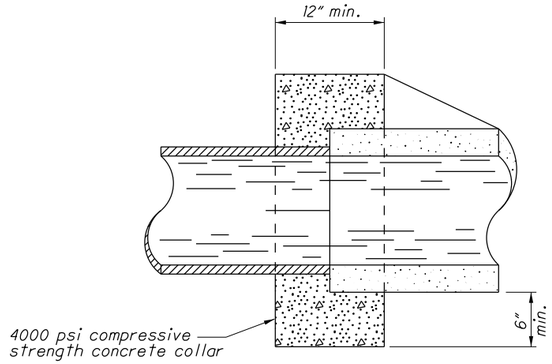


CONCRETE CRADLE

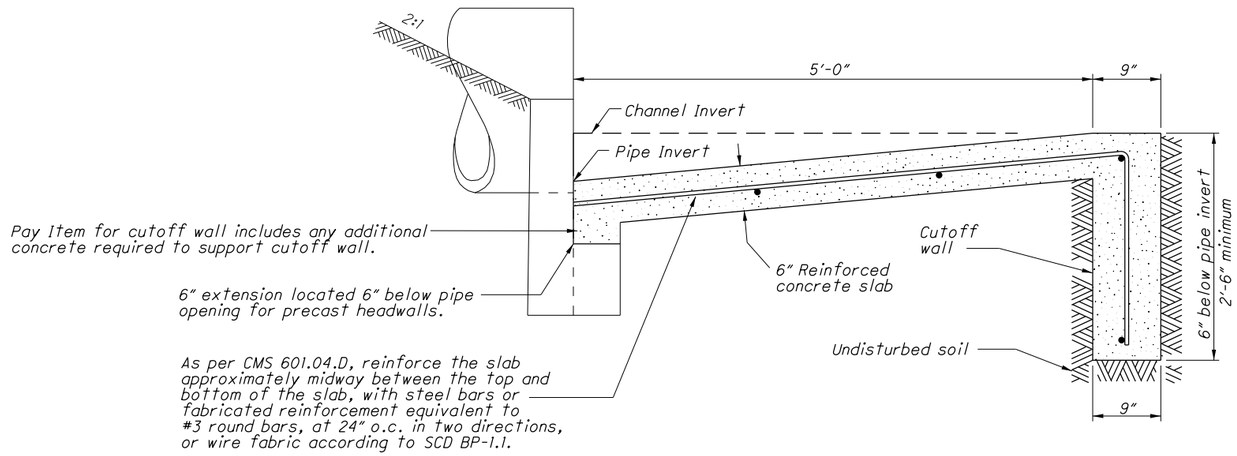


MASONRY COLLAR

NOTES

MASONRY COLLARS: *Provide a masonry collar where plans require that a pipe extension be joined to the end of an existing pipe with a butt joint. The cost is included in the unit price bid for the new conduit.*

RIPRAP CUTOFF WALL:
The cost of the cutoff wall is included in the unit price bid for Item 601 Riprap Using 6" Reinforced Concrete Slab.



RIPRAP CUTOFF WALL

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OUTLETS, DRAINS AND SEWERS

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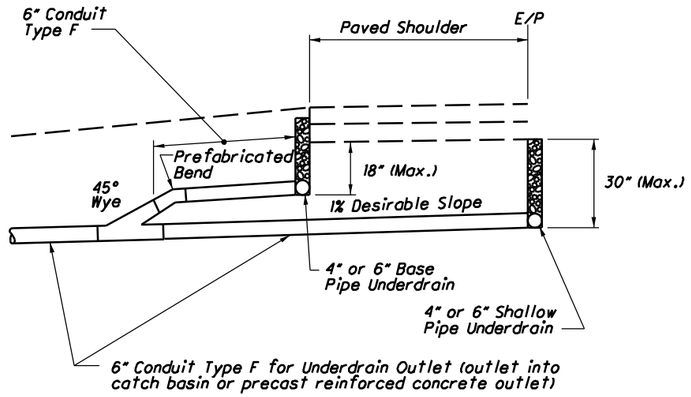
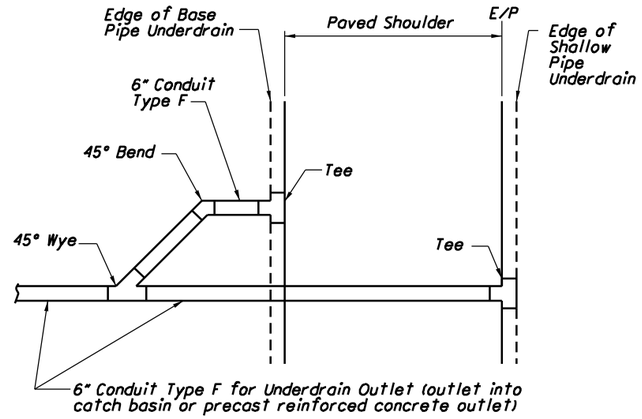


RIGID OR FLEXIBLE PAVEMENT
PROFILE



RIGID OR FLEXIBLE PAVEMENT
PLAN

NOTES

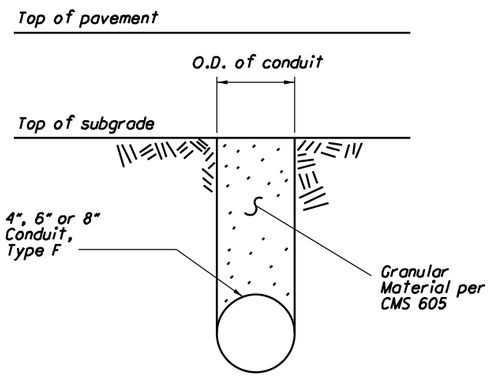
DESCRIPTION: *This item consists of furnishing and installing either a pipe underdrain system or a prefabricated edge underdrain system according to the specifications and with the details on the plans or as directed by the Engineer.*

MATERIALS: *Provide either a pipe underdrain system or a prefabricated edge underdrain system that meets the requirements of CMS 605.*

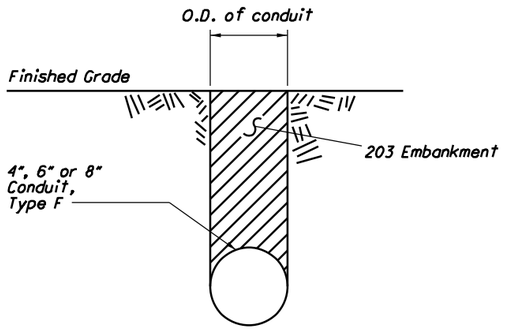
BASIS OF PAYMENT FOR PIPE UNDERDRAIN SYSTEM: *Work completed, accepted and measured under this item is paid for at the contract unit price bid for* ***Item 605 - ...." Base Pipe Underdrain, Item 605 - ...." Shallow Pipe Underdrain, or Item 605 ...." Deep Pipe Underdrain.*** *The price is full compensation for excavation and backfill; for furnishing materials, including materials for outlet fittings; and for all labor, tools, equipment and incidentals necessary to complete the work.*

BASIS OF PAYMENT FOR PREFABRICATED EDGE DRAIN SYSTEM: *Work completed, accepted and measured under this item is paid for at the contract unit price bid for* ***Item 605 - ...." Prefabricated Edge Underdrains.*** *The price is full compensation for excavation and backfill; for removing and disposing of all surplus excavation according to CMS 105.16 and 105.17; for furnishing materials, including materials for splices, outlet fittings, and Item 301; and for all labor, tools, equipment and incidentals necessary to complete the work associated with the installation of prefabricated edge underdrains.*

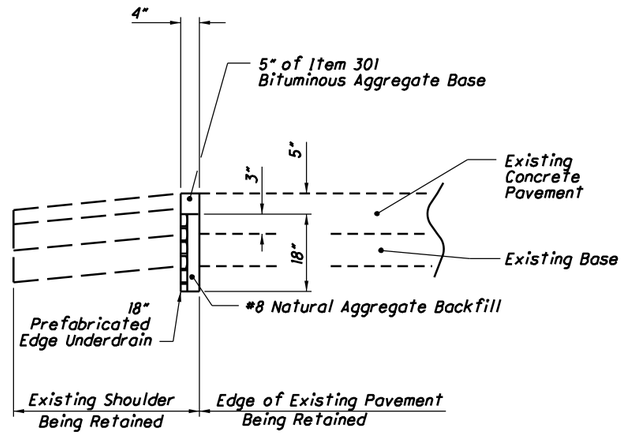
The cost of the 4" Conduit, Type F, and pipe bends and branches needed to connect the existing and proposed underdrains is included with the cost of the 6" Conduit, Type F, for Underdrain Outlets.



611 4", 6", or 8" Conduit, Type F Under Pavement or Base



611 4", 6", or 8" Conduit, Type F Outside Pavement or Base



PREFABRICATED EDGE DRAIN SYSTEM

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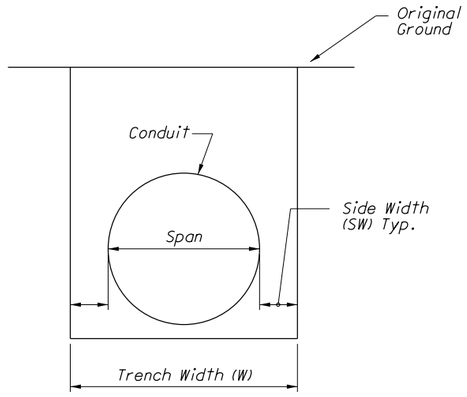
PIPE UNDERDRAINS

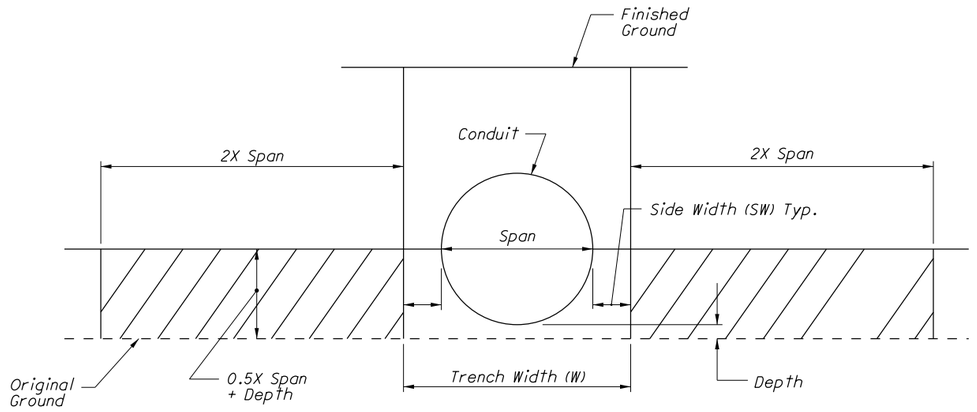
SCD NUMBER
DM-1.2

1 / 1

EXCAVATION METHODS



METHOD A-CUT



METHOD B-FILL

Minimum Constructed Embankment

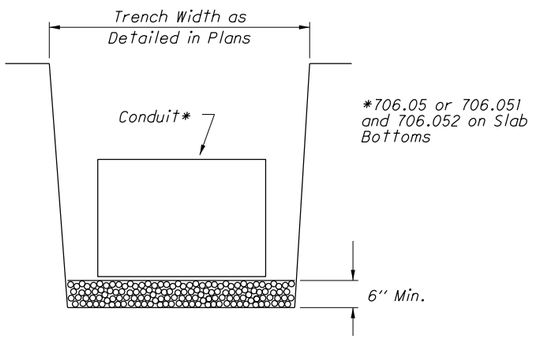
TRENCH DIMENSIONS

MATERIAL	SW	WIDTH (W)
Long Span	2'	Span+2(2)
Concrete	0.165 X Span	1.33 X Span
Metal & Plastic	0.5 + 0.125 X Span	1.25 X Span + 1

NOTES

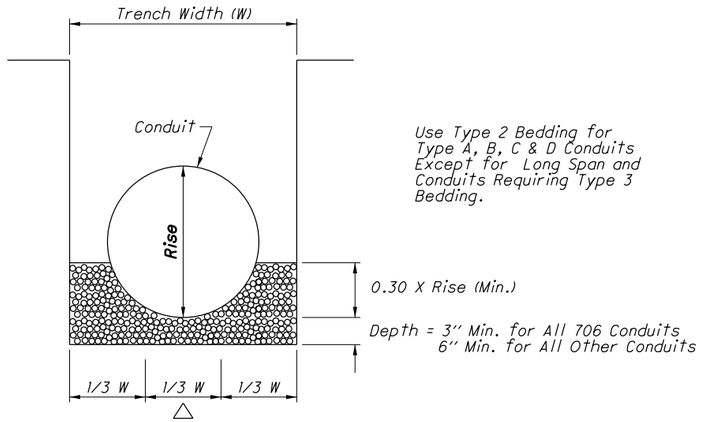
- This drawing is intended for use in conjuction with SS 811 only.
- Use Structural Backfill Type 1, 2, or 3 per CMS 811.
- Use Embankment per SS 811.
- Conduit Span is the horizontal distance from outside wall to outside wall or outside corrugation measured at the widest point of the conduit.
- Conduit Rise is the vertical distance from outside wall to outside wall or outside corrugation measured at the middle of the conduit.
- All dimensions are in feet unless specified.

BEDDING TYPES



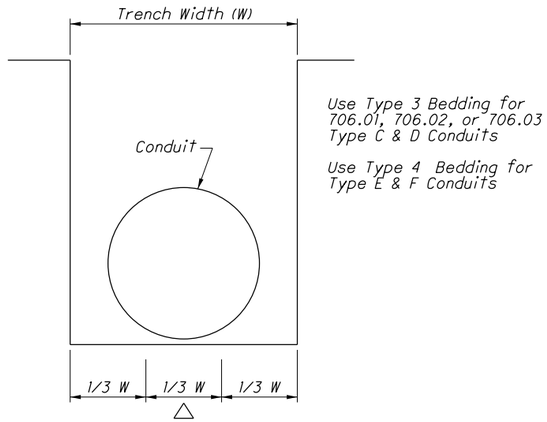
TYPE 1 BEDDING

Structural Backfill



TYPE 2 BEDDING

△ The Middle 1/3 W Under the Conduit Shall Be Uncompacted



TYPE 3 & 4 BEDDING

△ Scarify and Loosen the Middle 1/3 W Under the Conduit for Type 3 Bedding

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ALL METRIC DIMENSIONS ( ) ARE IN BRACKETS [ ] IN MILLIMETERS UNLESS OTHERWISE NOTED.

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CONDUIT INSTALLATION

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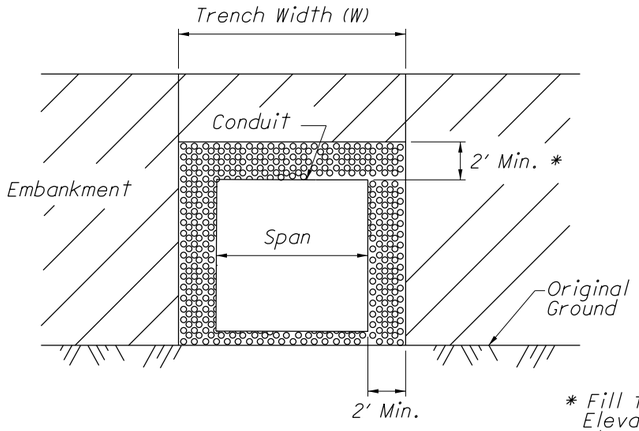
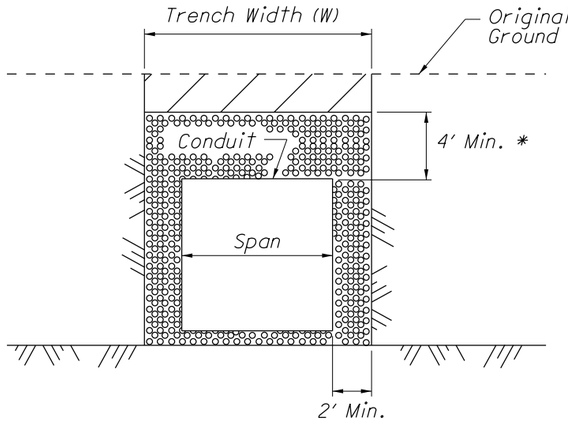
BACKFILL CONDITIONS

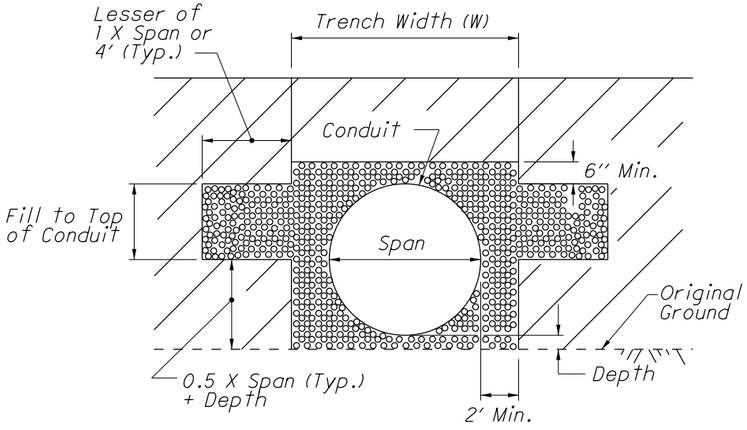


* Fill to Subgrade Elevation if Less Than Min.

LONG SPAN-FILL

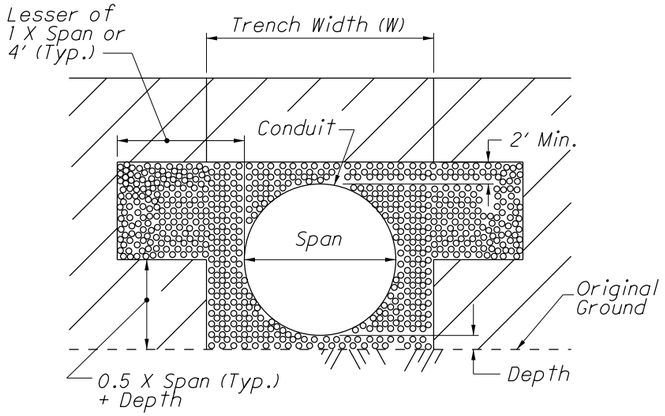


LONG SPAN-CUT

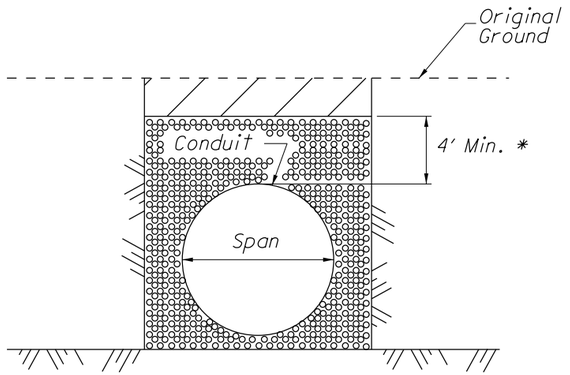


** PLASTIC CONDUIT, TYPE C & D -FILL

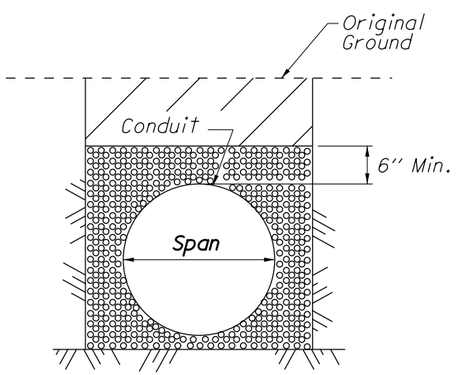
** For All Other Type C & D Conduits Place & Compact Backfill on Top of Bedding.



CONDUIT, TYPE A & B-FILL



CONDUIT TYPE A & B-CUT



** PLASTIC CONDUIT, TYPE C-CUT

- Construction Embankment

- Structural Backfill

NOTES

Backfill Conduits per SS 811.

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CONDUIT INSTALLATION

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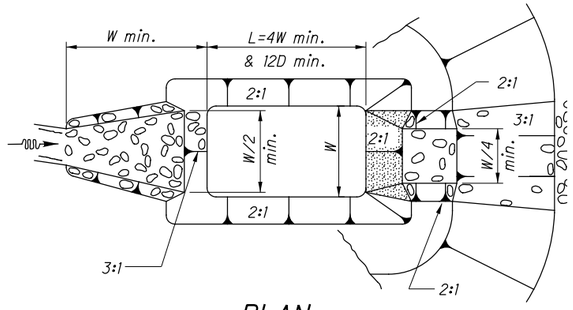
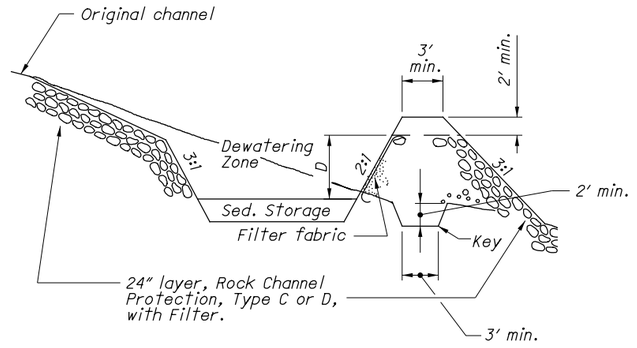


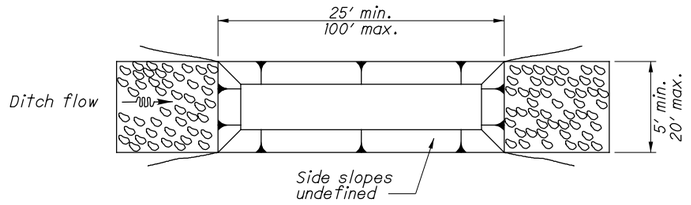
PLAN



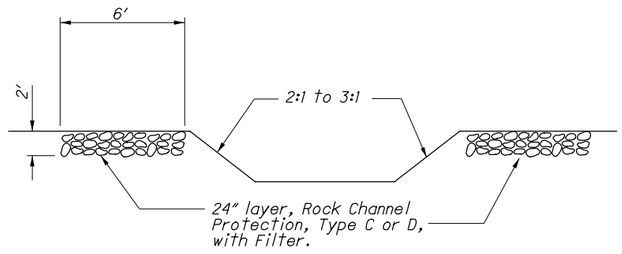
PROFILE

SEDIMENT DAM

(Drainage Area of Less than 5 Acres)



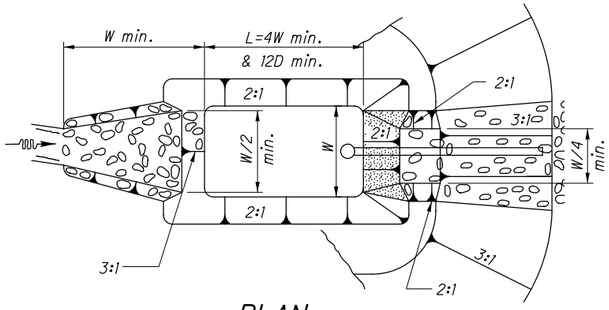
PLAN



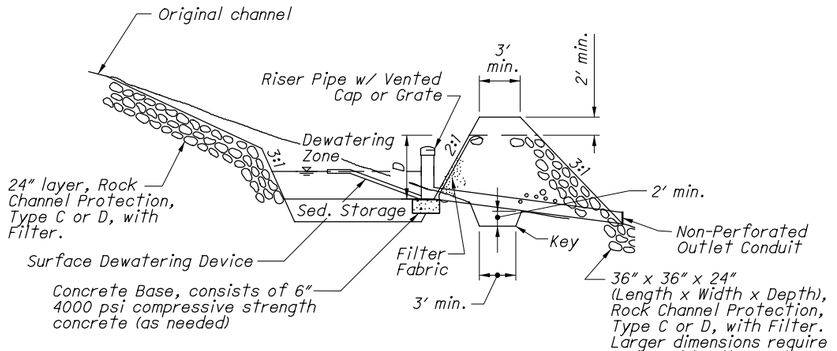
PROFILE

SEDIMENT BASIN

(Drainage Area of Less than 5 Acres)



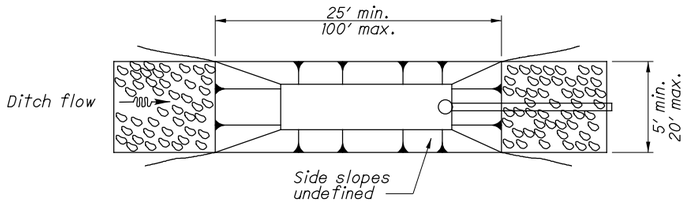
PLAN



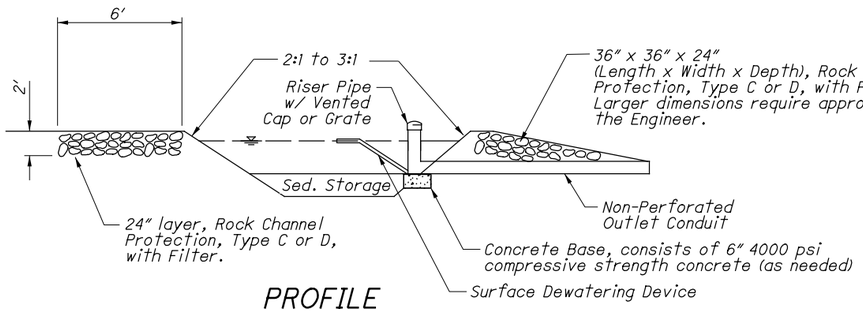
PROFILE

SEDIMENT DAM

(Drainage Area of 5 Acres or More)



PLAN



PROFILE

SEDIMENT BASIN

(Drainage Area of 5 Acres or More)

NOTES

MATERIAL:

Furnish materials conforming to Item 203, Embankment, and Item 601, Rock Channel Protection, Type C or D with filter. Furnish construction fence consisting of 4'-0" high plastic fence with 6' long metal fence posts.

CONSTRUCTION:

Construct the Basin and Dams as detailed. Construct the construction fence in urban areas or in high pedestrian traffic areas. Construct the fence to completely surround the sediment basin or dam. Place the fence post on 8' centers, 2' deep. Securely attach the plastic construction fence to the fence post.

PAYMENT:

The Department will pay for accepted quantities at the prices shown in Appendix F of Supplemental Specification 832 (SS832) for the following items:

- Sediment Basins and Dams
- Rock Channel Protection, Type C or D, with Filter

All items shown on this Standard Construction Drawing that are required for construction that are not specifically identified in SS832 Appendix F are considered incidental.

RISER PIPE:

Use schedule 40 Polyvinyl Chloride Conduit.

SURFACE DEWATERING DEVICE:

Furnish surface dewatering device as required by the ODNR Rainwater and Land Development Manual.

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SEDIMENT AND EROSION CONTROLS

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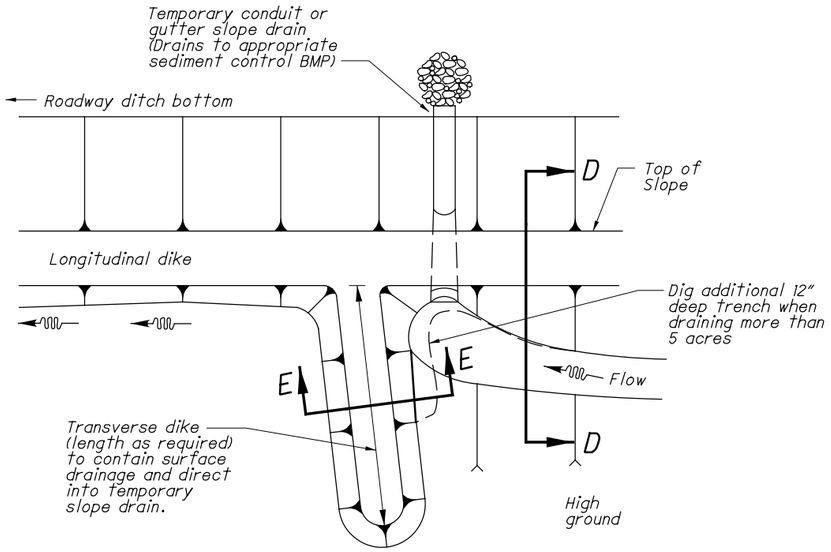
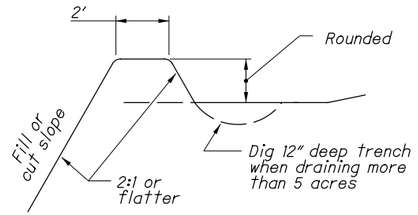
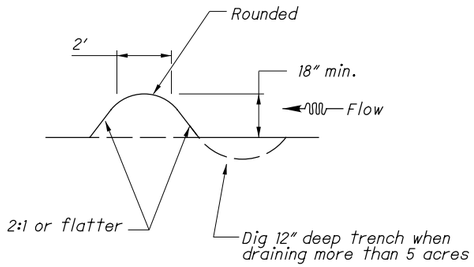
DIKES AND SLOPE DRAINS



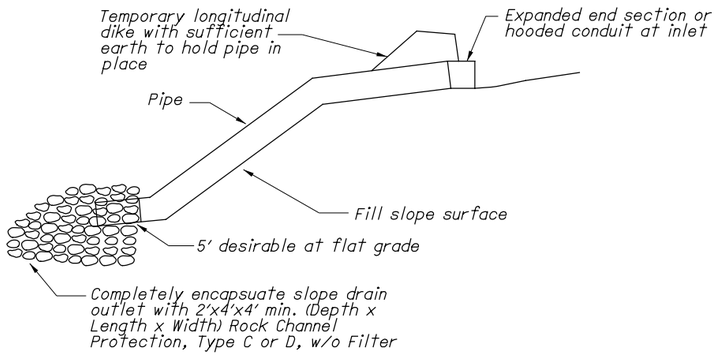
PLAN VIEW



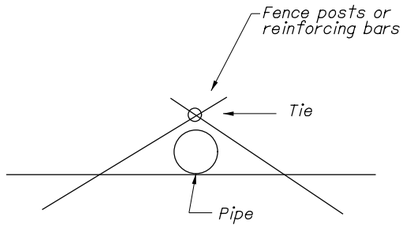
SECTION D-D



SECTION E-E



CONDUIT SLOPE DRAIN



TIE-DOWN SLOPE DRAIN

NOTES

MATERIAL:

Furnish materials conforming to Item 203, Embankment, and Item 601, Rock Channel Protection, Type C or D, without filter.

Furnish the following for the slope drains: corrugated steel pipe, corrugated or smooth plastic pipe, reinforcing bars or fence posts.

CONSTRUCTION:

Construct as detailed. Compact the dike to 85% of Standard Proctor.

Use reinforcing bars or fence posts to tie down the slope drains and to keep the pipe from moving.

Ensure that the water entering the slope drain inlet does not erode or degrade the dike section containing the temporary conduit.

PAYMENT:

The Department will pay for accepted quantities at the prices shown in Appendix F of Supplemental Specification 832 (SS832) for the following items:

- *Slope Drains*
- *Dikes*
- *Rock Channel Protection, Type C or D, Without Filter*

All items shown on this Standard Construction Drawing that are required for construction that are not specifically identified in SS832 Appendix F are considered incidental.

TEMPORARY SLOPE DRAINS RECOMMENDED SIZES		
AREA in acres	PIPE SIZES	
	Smooth	Corrugated
0-4	6"	6"
4-8	8"	12"
8-12	10"	15"

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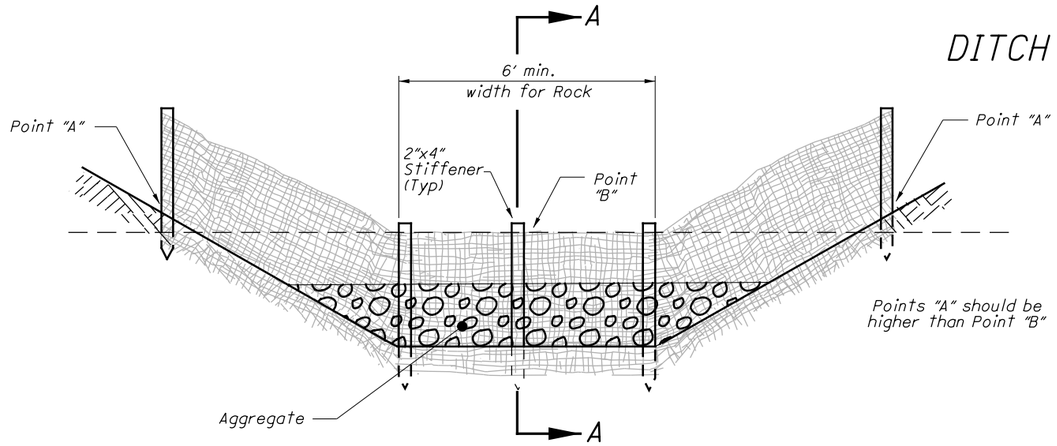
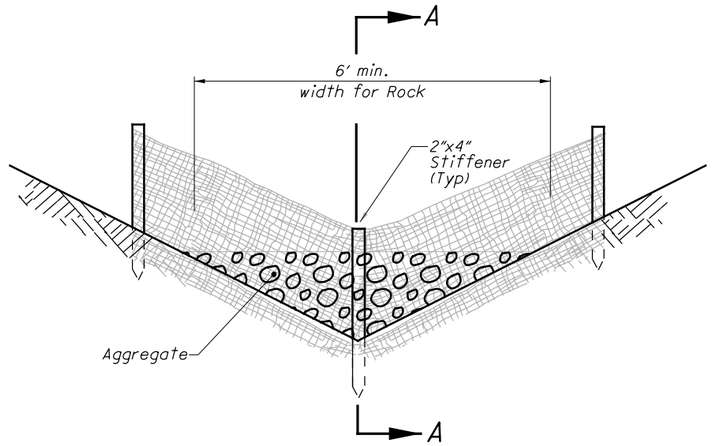
DM-4.3

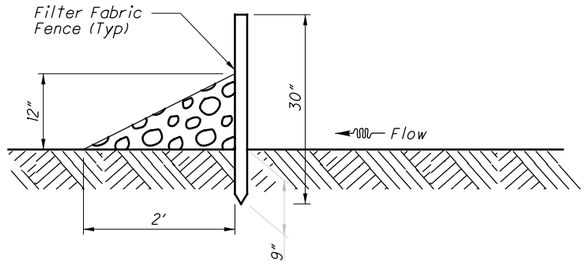
DITCH CHECKS



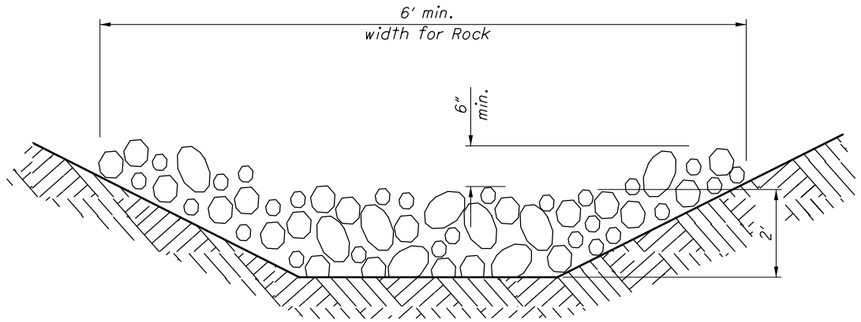
CROSS-SECTIONAL VIEW OF FLAT BOTTOM DITCH



CROSS-SECTIONAL VIEW OF "V" DITCH



PROFILE VIEW OF FLAT BOTTOM AND V DITCH
SECTION A-A



Minimum dimensions: 2' high x 6' wide x 3' long

CROSS-SECTIONAL VIEW
ROCK CHECK

NOTES

FILTER FABRIC DITCH CHECKS:

MATERIALS:
Furnish filter fabric ditch checks consisting of the following materials:

1. 30" wide filter fabric with sound wood supports with maximum on-center spacing of 10'. Use filter fabric conforming to 712.09, Type C.
2. A vertically driven 2"x4" stiffener stake in the center of the ditch.
3. Aggregate conforming to one of the following gradations: No. 1 through No. 4 on Table 703.01-1.

When using straw bales, furnish 30" long 2"x2" wooden stakes, reinforcing bars or fence posts to stake straw bales in place.

CONSTRUCTION:
Trench the filter fabric fence as detailed for PERIMETER FILTER FABRIC FENCE (see Sheet 2). Place a vertical 2"x4" stiffener stake in the center of the ditch with the top level to the top of the fence and at least 6" below the bottom of the ditch. Excavate for aggregate and place the aggregate on the downstream side of the ditch check.

If the Engineer determines that rock should not be used for the filter fabric ditch checks, replace aggregate with straw bales configured with minimal gaps between bales. Tightly place each bale adjacent to one another. Entrench 2" to 3" into the ground prior to staking. Firmly stake each bale with at least two stakes.

PAYMENT:
The Department will pay for accepted quantities at the prices shown in Appendix F of Supplemental Specification 832 (SS832) for the following items:

- Filter Fabric Ditch Check

All items shown on this Standard Construction Drawing that are required for construction that are not specifically identified in SS832 Appendix F are considered incidental.

ROCK CHECKS:

MATERIALS:
Furnish material conforming to Item 601 - Rock Channel Protection, Type C or D, Without Filter.

CONSTRUCTION:
If the Engineer determines that rock should not be used for the rock checks, replace rock channel protection with straw bales configured with minimal gaps between bales. Tightly place each bale adjacent to one another. Entrench 2" to 3" into the ground prior to staking. Firmly stake each bale with at least two stakes.

PAYMENT:
The Department will pay for accepted quantities at the prices shown in Appendix F of Supplemental Specification 832 (SS832) for the following items:

- Rock Channel Protection, Type C or D, Without Filter

All items shown on this Standard Construction Drawing that are required for construction that are not specifically identified in SS832 Appendix F are considered incidental.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
STATE HYDRAULIC ENGINEER

REVISIONS
12-01-08
4-17-09
7-20-12

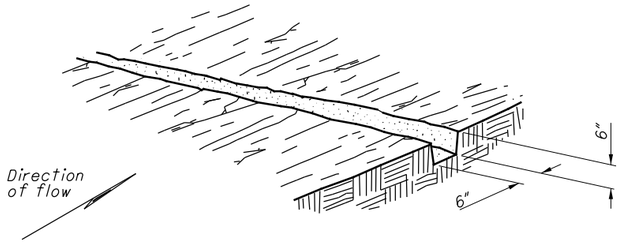
ROADWAY HYDRAULIC ENGINEER
Matt Cozzoli

OFFICE OF HYDRAULIC ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING
CONSTRUCTION EROSION CONTROL

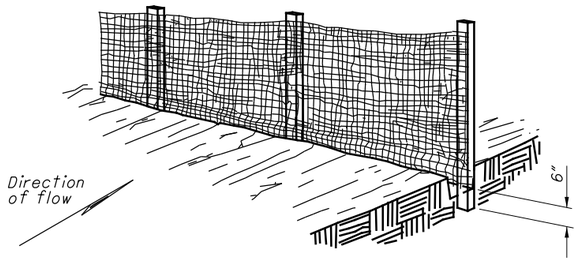
SCD NUMBER
DM-4.4

PERIMETER FILTER FABRIC FENCE



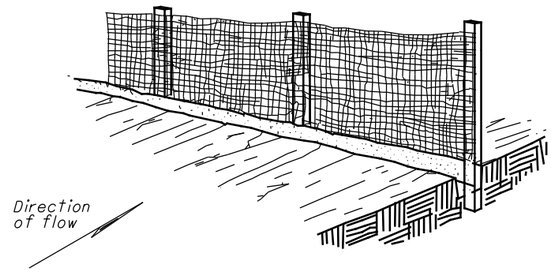
Excavate a 6"x6" trench along the proposed fence line.

STEP 1



Place fabric and support stakes and extend fabric into the trench.

STEP 2



Backfill and compact the excavated soil.

STEP 3

NOTES

MATERIALS:

Furnish 30" wide filter fabric with sound wood supports with maximum on-center spacing of 10'. Use filter fabric conforming to 712.09, Type C.

CONSTRUCTION:

Trench the filter fabric fence as detailed. The contractor may elect to trench the fence detailed on steps 1 through 3 in one plowing operation.

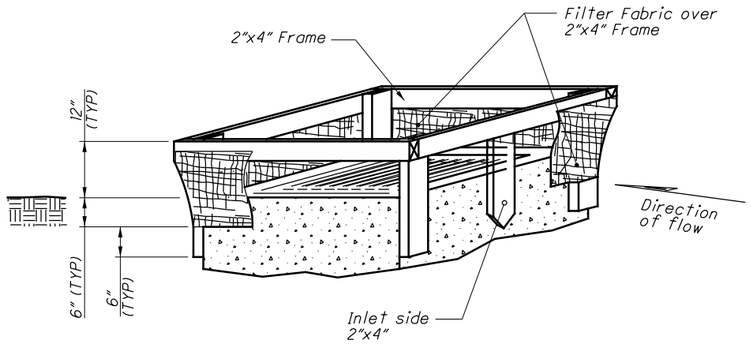
PAYMENT:

The Department will pay for accepted quantities at the prices shown in Appendix F of Supplemental Specification 832 (SS832) for the following items:

- Perimeter Filter Fabric Fence

All items shown on this Standard Construction Drawing that are required for construction that are not specifically identified in SS832 Appendix F are considered incidental.

INLET PROTECTION



INLET PROTECTION

NOTES

MATERIALS:

Furnish inlet protection consisting of 18" wide filter fabric fence with a securely nailed 2"x4" wood frame with a vertically driven 2"x4" on the inlet, or flow, side of the structure. Use filter fabric conforming to 712.09, Type C.

CONSTRUCTION:

Construct an 18" wide filter fabric fence supported around a storm drain inlet or catch basin with a securely nailed 2"x4" wood frame. Excavate a 6" trench around the inlet, and drive support posts 6" below the excavated trench bottom. Stretch the fabric around the frame. Secure it tightly, ensuring that 6" of fabric is in the trench. Overlap the fabric on one side of the inlet so that the fabric ends are not attached to the same post. Backfill and compact the excavated soil tightly onto the fabric. Place a vertical 2"x4" in the center of the inlet so that the top is at the top of the fence and the bottom is at least 6" below the bottom of the ditch.

PAYMENT:

The Department will pay for accepted quantities at the prices shown in Appendix F of Supplemental Specification 832 (SS832) for the following items:

- Inlet Protection

All items shown on this Standard Construction Drawing that are required for construction that are not specifically identified in SS832 Appendix F are considered incidental.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
STATE HYDRAULIC ENGINEER

REVISIONS
4-29-02
7-19-02
12-01-08
4-17-09
7-20-12

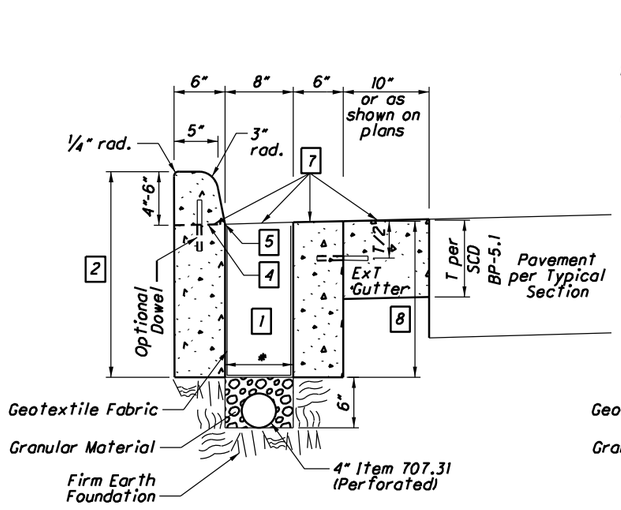
ROADWAY HYDRAULIC ENGINEER
Matt Cozzoli

OFFICE OF HYDRAULIC ENGINEERING

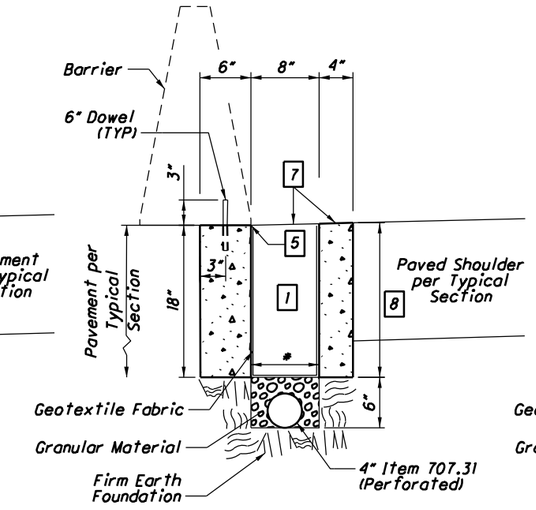
STANDARD HYDRAULIC CONSTRUCTION DRAWING

CONSTRUCTION EROSION CONTROL

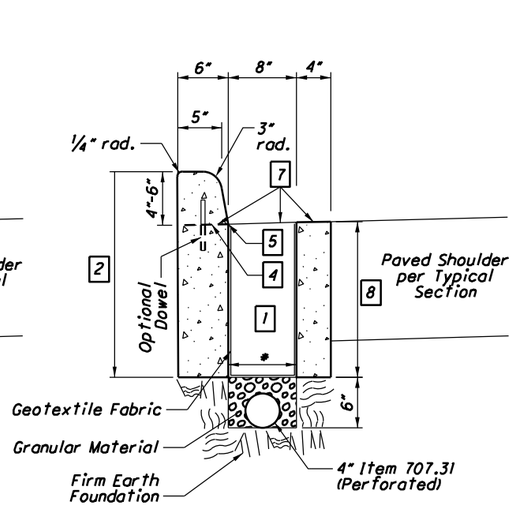
SCD NUMBER
DM-4.4



EXFILTRATION TRENCH
TYPE A - Section A-A
Curb and Gutter Application
(NTS)

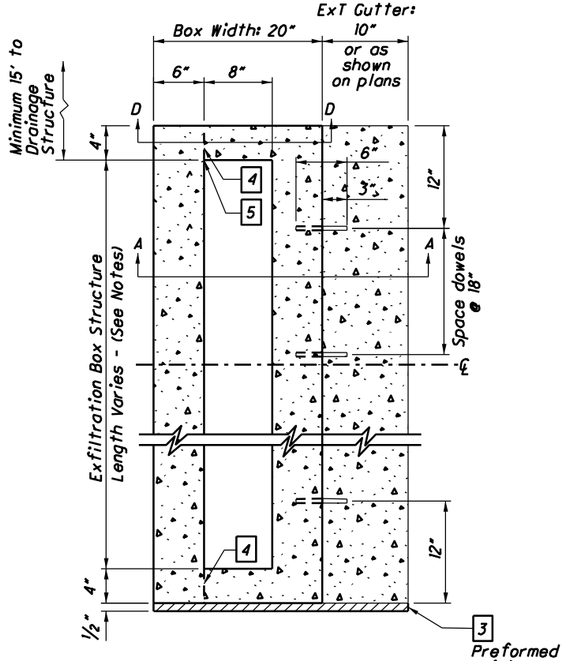


EXFILTRATION TRENCH
TYPE B - Section B-B
Barrier Application
(NTS)

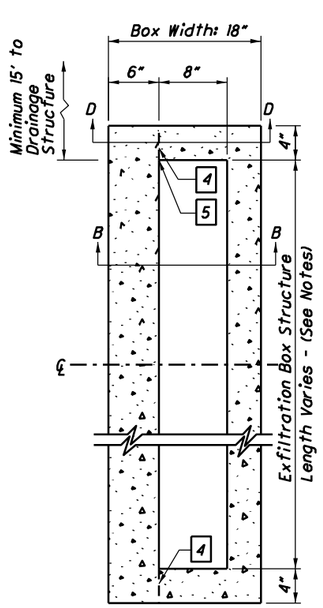


EXFILTRATION TRENCH
TYPE C Section C-C
Various Curb Application
(NTS)

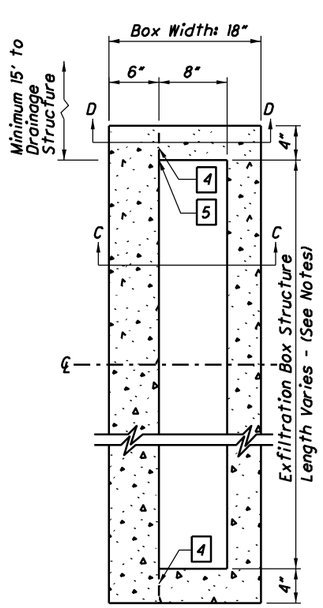
* Bottom dimension may be reduced by up to ½" to assist in form removal during construction



EXFILTRATION TRENCH
TYPE A
Plan View
(NTS)



EXFILTRATION TRENCH
TYPE B
Plan View
(NTS)



EXFILTRATION TRENCH
TYPE C
Plan View
(NTS)

NOTES

EXFILTRATION TRENCH (ExT): *Locate the exfiltration box structure as shown on the plans.*

The exfiltration box structure may be precast, cast in the field or a combination of precast and cast in the field. The minimum length of a precast exfiltration box structure is 4'. More than 1 precast section may be provided to meet the required length shown in the plans.

Provide concrete conforming to CMS 511 for exfiltration trench base.

If the exfiltration box structure is precast, furnish reinforcing steel conforming to CMS 509.02 and CMS 709.00 for the precast structure in a sufficient amount to permit shipping and placement without damage. Locate all lifting devices on the exterior side walls of the precast structure.

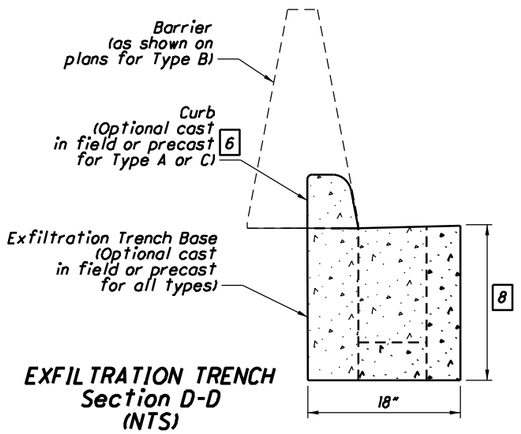
Maintain the cross slope of the pavement as shown on the Standard Construction Drawing or as shown on the plans. Additional variations in dimensions from the Standard Construction Drawing for precast exfiltration box structures may occur. Variances for precast structure dimensions must be approved by the Office of Hydraulics.

Furnish 6" epoxy coated #4 reinforcing bars, conforming to CMS 509.02 and 709.00, to be used as dowels to connect proposed barrier or field cast curb to the top of the precast exfiltration box structure and to connect ExT gutter and exfiltration box structure. Space dowels for curb every 12" on center for the length of the exfiltration box structure. Space dowels for ExT gutter 12" from the ends of the ExT base and every 18" on center for the length of the exfiltration box structure. When dowels are required, drill in place or precast the dowel opening. If dowel openings are drilled, fill with epoxy when placing the dowel. Furnish galvanized inserts for dowels.

Provide concrete conforming to CMS 609 for 12" exfiltration trench gutter for Exfiltration Trench Type A. Cost for the concrete is included in the price of Item 835 - Exfiltration Trench, Type A. Costs for the 4" perforated conduit (Item 707.31), filter media, and exfiltration trench box structure are included in the price of Item 835 - Exfiltration Trench, Type ___. Cost for the curb for ExT, Types A and C is included in the price of Item 835 - Exfiltration Trench, Type ___. Cost for Barrier for ExT, Type B is included with the Barrier.

All materials and labor, including excavation and backfill are paid for at the contract price for ***ITEM 835 - EXFILTRATION TRENCH, TYPE ___.***

1. *Exfiltration Trench Filter Media (See SS835) - Maintain free from debris and sediment laden runoff throughout construction of the project.*
2. *22" for 4" Curb and Gutter and 24" for 6" Curb and Gutter.*
3. *Furnish preformed expansion joint material according to 705.03 when abutting concrete.*
4. *Optional Construction Joint w/ dowels.*
5. *Location for Station and Offset. Elevation according to Typical Section.*
6. *If curb portion is to be cast in field, furnish dowels for the curb as shown for Type A and C. For 4" and 6" curb height, extend the dowels 2" and 3", respectively, above the exfiltration trench base.*
7. *Match the cross slope of the top of the ExT walls, the top of the filter media, and the ExT gutter (if applicable) with the the proposed cross slope of the adjacent pavement or gutter cross slope.*
8. *Determine the front wall dimension of the ExT by using the dimensions at the outside edge of the back wall and the cross slope from* 7.



EXFILTRATION TRENCH
Section D-D
(NTS)

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
STATE HYDRAULIC ENGINEER

REVISIONS
1/20/06
4/21/06
10/17/08
7/20/12

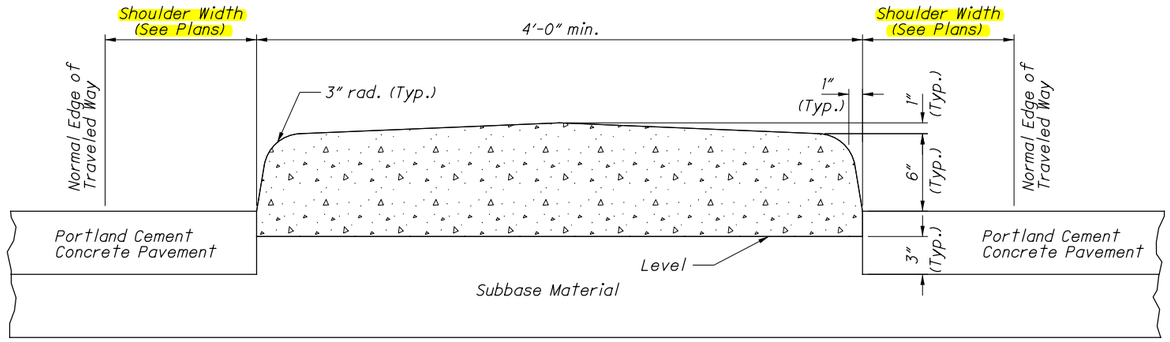
ENVIRONMENTAL HYDRAULIC ENGINEER
R. Humphreys

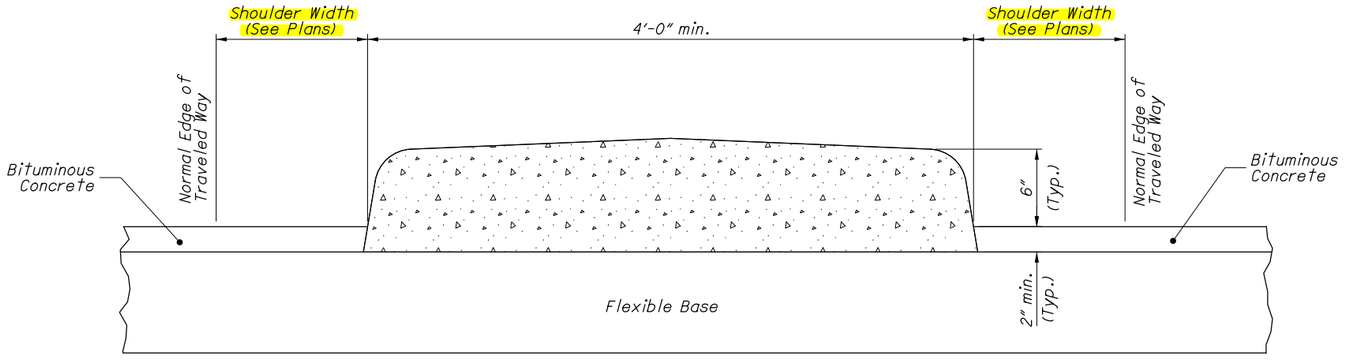
OFFICE OF HYDRAULIC ENGINEERING

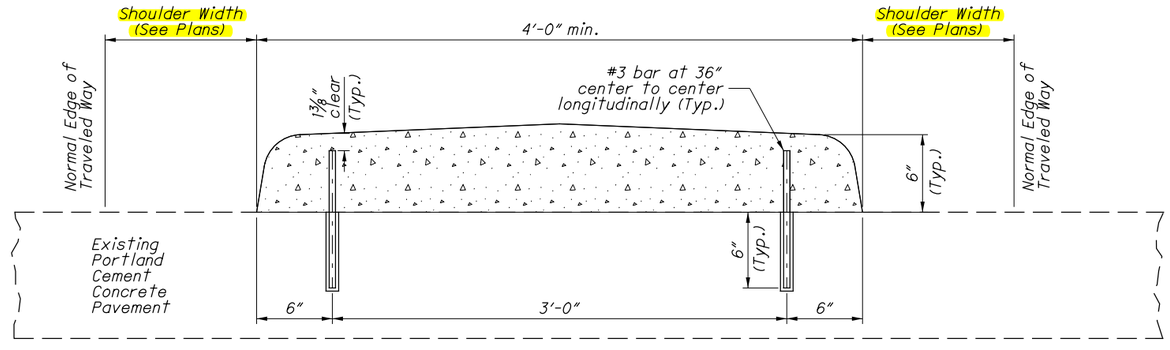
STANDARD HYDRAULIC CONSTRUCTION DRAWING
WATER QUALITY - EXFILTRATION TRENCH

SCD NUMBER
WQ-1.3

1 / 1







CONCRETE MEDIANS

NOTES

CONCRETE MEDIANS & TRAFFIC ISLANDS: Construct as specified in CMS 609.

ANCHORS AND GROUT: For median widths of 18" or less, use one line of #3 rebars at 3'-0" on center spacing.

SHOULDER WIDTH: See Location and Design Manual Volume 1, for shoulder width if not specified in the plans.

THIS DRAWING REPLACES RM-3.1 DATED 10-15-10.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — 7-19-2013
ADMINISTRATOR — DATE

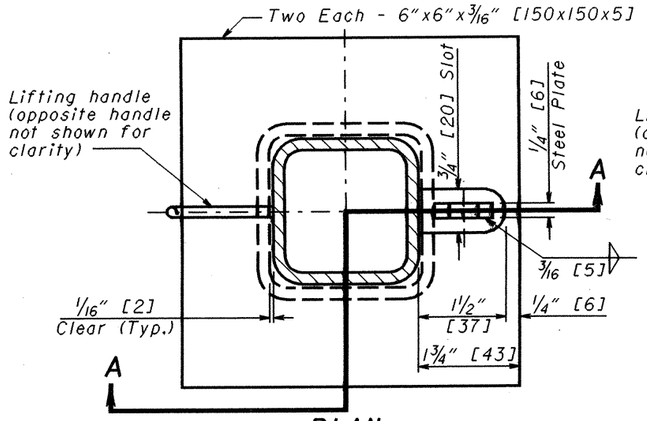
STDS. ENGINEER: M. Ruppe

OFFICE OF ROADWAY ENGINEERING

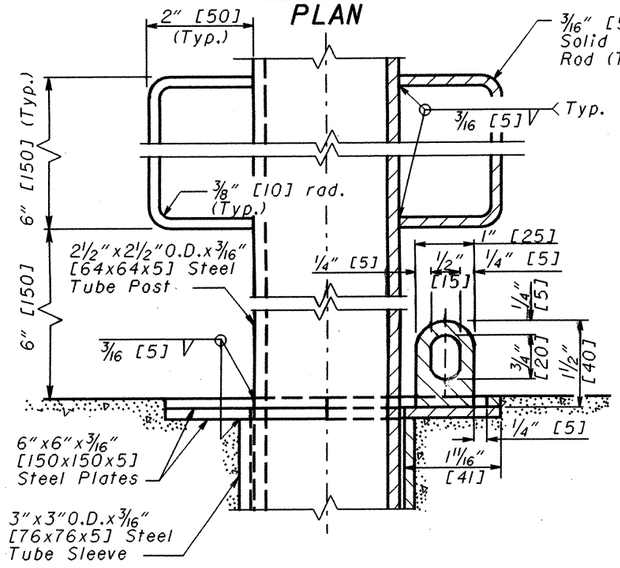
STANDARD ROADWAY CONSTRUCTION DRAWING

TRAFFIC DIVIDERS

SCD NUMBER RM-3.1

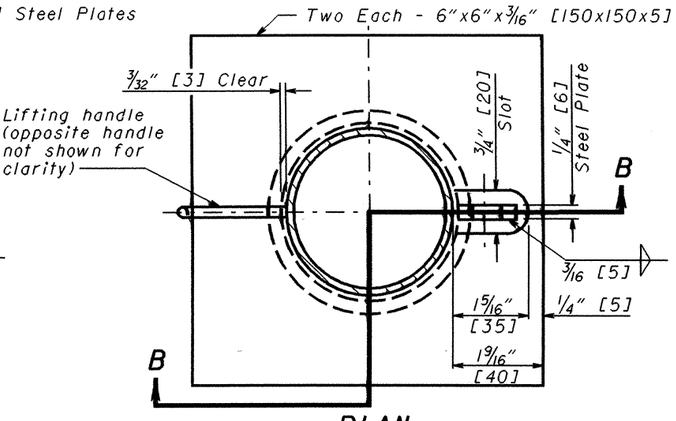


PLAN

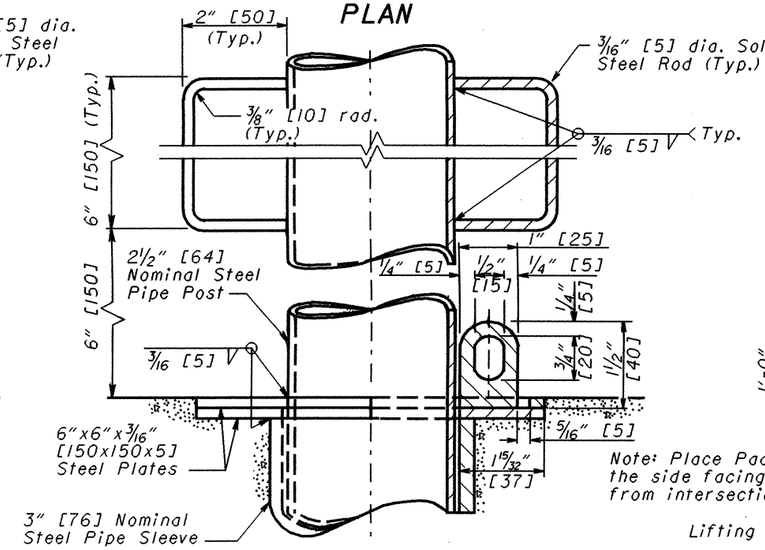


SECTION A-A

REMOVABLE SQUARE BOLLARD

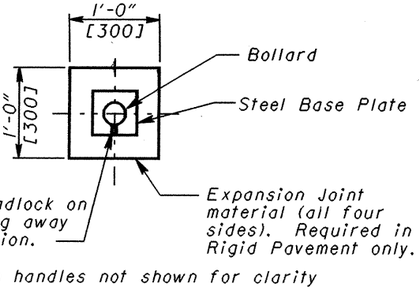


PLAN



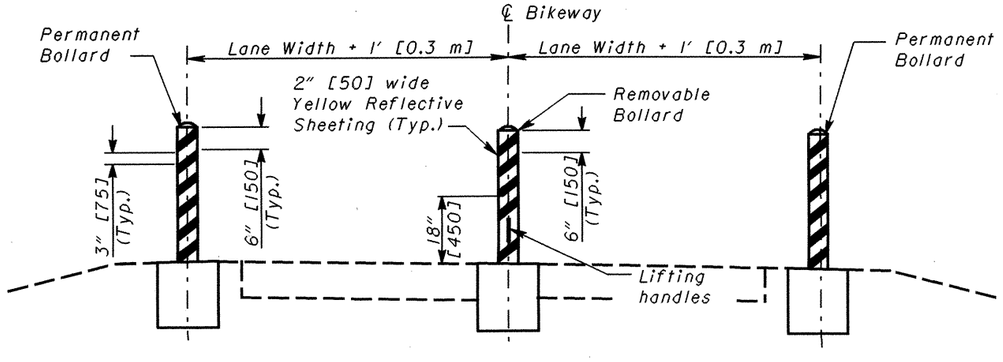
SECTION B-B

REMOVABLE ROUND BOLLARD

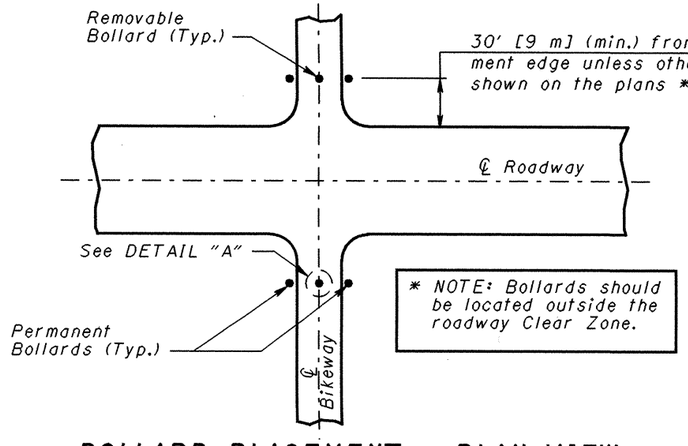


Lifting handles not shown for clarity

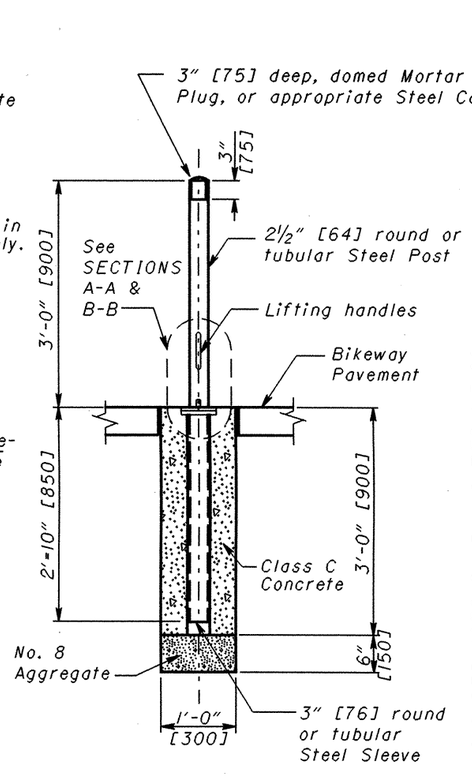
DETAIL "A"
PLAN VIEW



BOLLARD PLACEMENT - ELEVATION VIEW



BOLLARD PLACEMENT - PLAN VIEW



DETAIL "A"
ELEVATION VIEW
REMOVABLE BOLLARD

NOTES

GENERAL: Mount all bollard sleeves flush with the bikeway pavement.

CONCRETE ENCASEMENT: Sleeve encasement shall be square as shown, in concrete pavement, but may be square or round in flexible pavement. Round encasement should be 1'-0" [300] diameter.

PREFORMED EXPANSION JOINT FILLER: Shall meet the provisions of CMS 705.11, and is required when bollards are set in concrete pavement.

STEEL PIPE: ASTM A 53 Schedule 40.,

CONCRETE: Use Class C concrete as specified in CMS 499 and CMS 511.

REFLECTIVE SHEETING: Shall meet the provisions of CMS 730.19.

GALVANIZING: After fabricating, hot-dip galvanize all steel parts, including steel pipe, as specified in ASTM A 123.

ALUMINUM: All steel components may be replaced by aluminum components meeting the following ASTM Specifications: B 209 (plate), B 210 or B 241 (drawn seamless tubes & plates), B 211 (rods), and F 901 (bolts).

PERMANENT BOLLARDS: Permanent Bollards shall be the same as Removable Bollards, except that the steel plates, sleeves and lifting handles shall be omitted. Encase posts directly in concrete.

THIS DRAWING REPLACES RM-5.1M DATED 1-3-96.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
Randy I. Kinkland
4-18-03
DATE

STDS. ENGR.
D. Focke

All metric dimensions [in brackets] are in millimeters unless otherwise noted.

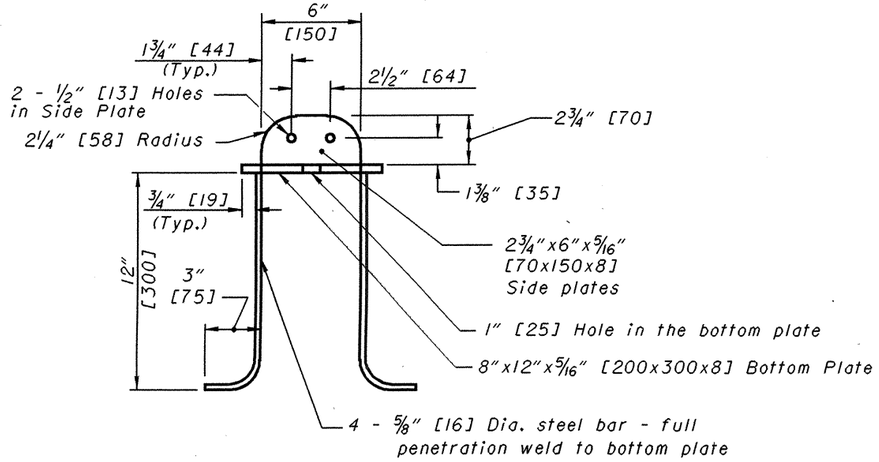
ROADWAY ENGINEERING SERVICES

STANDARD ROADWAY CONSTRUCTION DRAWING

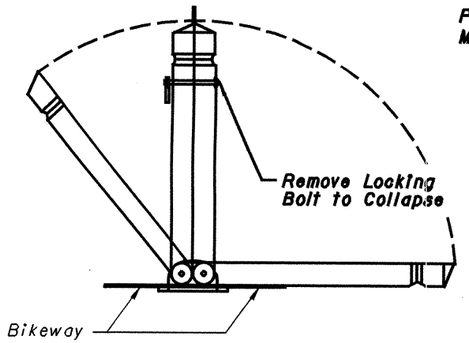
STEEL BOLLARDS

NUMBER
RM-5.1

1 / 2



SECTION



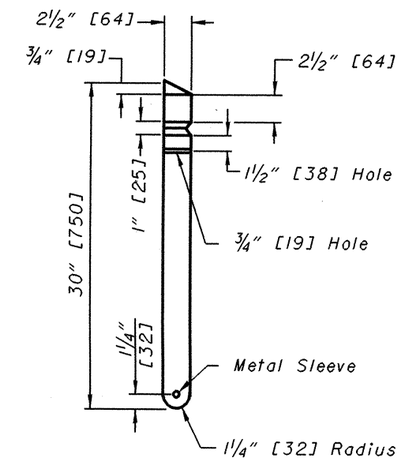
Orientate bollard to open
parallel to centerline of path.

BOLLARD DETAIL

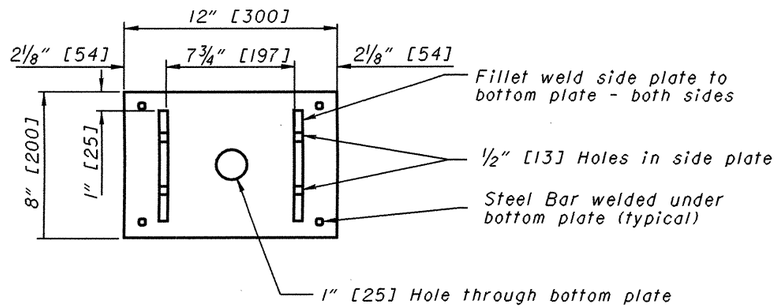
NOTES

MATERIALS: *In order to ensure that the bollard stays plumb and in place, make the fittings as tight as possible. If made of wood, construct the bollard using CCA pressure treated Southern Yellow Pine. Pressure treat as specified in CMS 712.06. Hot-dip galvanize any hardware and steel used for the bollard.*

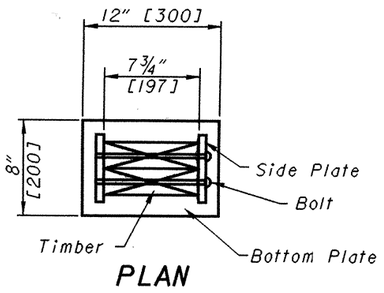
PAYMENT *Payment for the bollard shall be* ***Item Special - Bollard, Misc., Hinged***



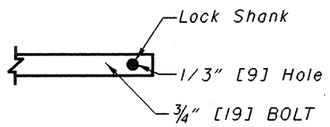
DETAIL OF TIMBER



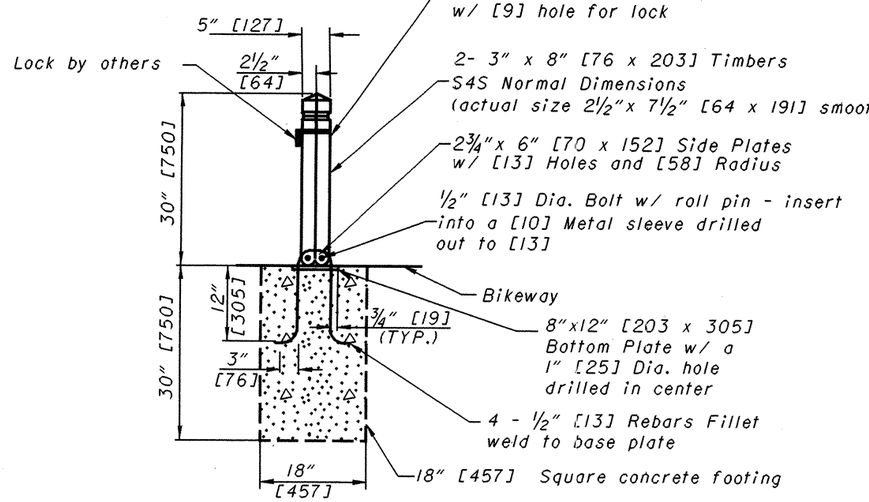
PLAN



PLAN



DETAIL OF HOLE FOR LOCK



SECTION

THIS DRAWING REPLACES RM-5.1M DATED 1-3-96.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
4-18-03
DATE

STDS. ENGR.
D. Focke

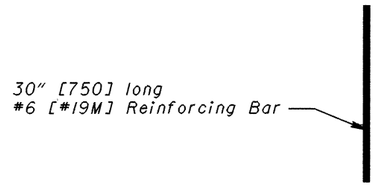
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

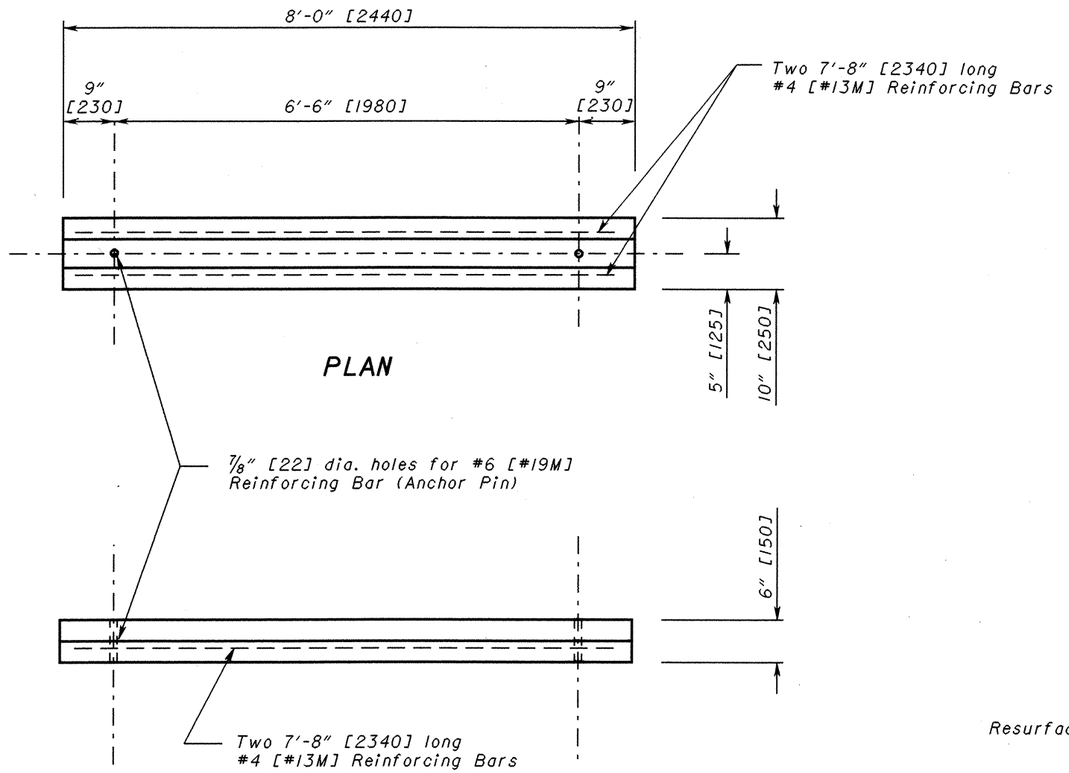
STANDARD ROADWAY CONSTRUCTION DRAWING

STEEL BOLLARDS

NUMBER
RM-5.1



ANCHOR PIN



PLAN

ELEVATION

NOTES

1) All materials used to manufacture the concrete parking block shall be in accordance with CMS 604.

2) The material requirements for the anchor pin shall be in accordance with CMS 509.02.

3) All #4 [#13M] reinforcing bars shall be epoxy coated as per CMS 509.

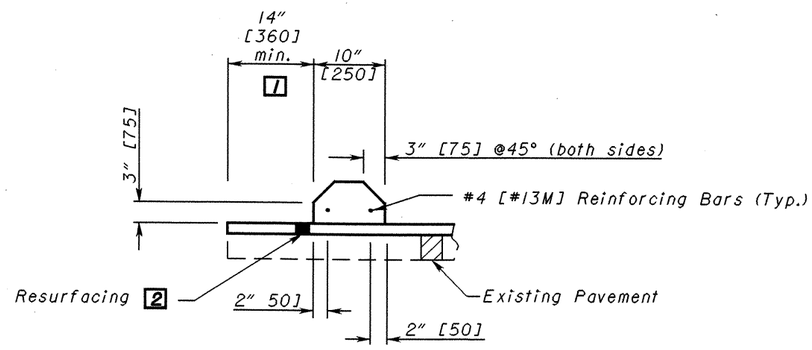
4) Reinforcing steel shall be placed 2″ [50] clear (minimum) from the surface of the concrete.

5) Payment will be made as **Item Special, Concrete Parking Block, Each** and includes reinforcing steel and anchor pins.

LEGEND

[1] 14″ [360] is the normal setback distance from a pavement edge.

[2] In a remove and reset operation, the block would go on new or resurfaced pavement. However, it may be necessary on some projects to place new blocks on existing pavement.



SECTION

NEW DRAWING

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
10-17-03
DATE

STDS. ENGR.
D. Focke

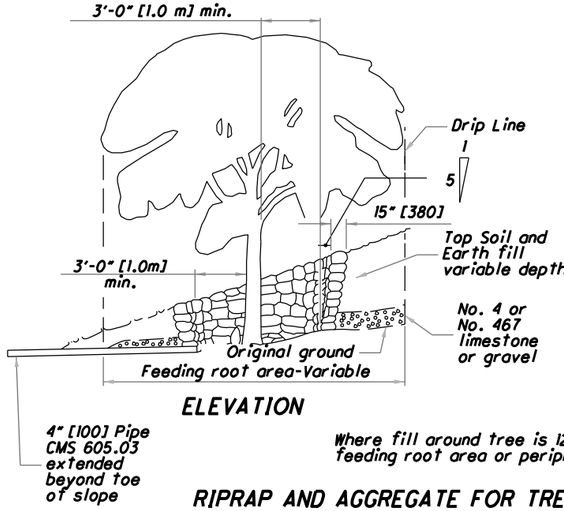
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

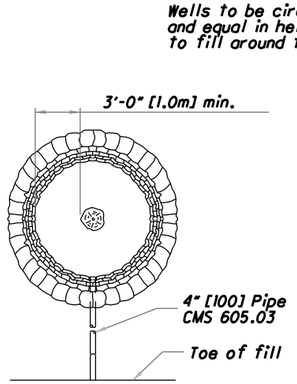
STANDARD ROADWAY CONSTRUCTION DRAWING
CONCRETE PARKING BLOCK DETAIL

NUMBER
RM-6.1

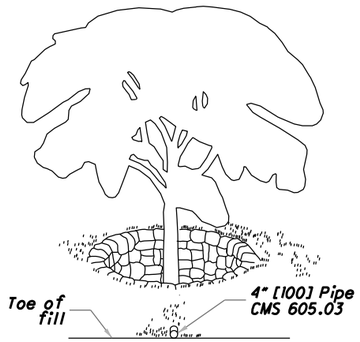
1 / 1



ELEVATION



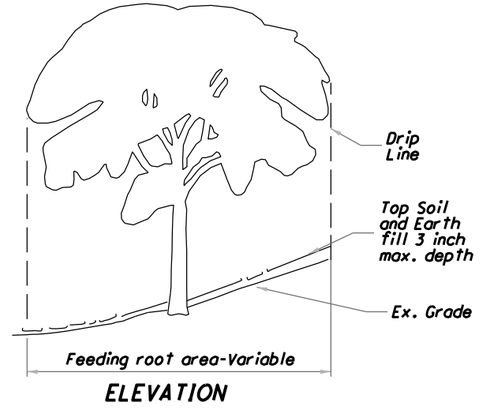
PLAN



FRONT VIEW

Where fill around tree is 12" [300] or more in depth over any part of the feeding root area or periphery of the tree, a well is to be constructed as shown.

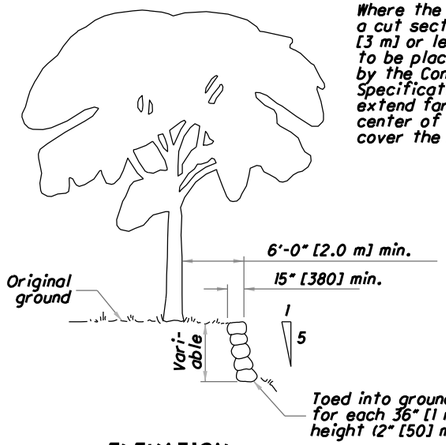
RIPRAP AND AGGREGATE FOR TREE PROTECTION AND AERATION IN FILL



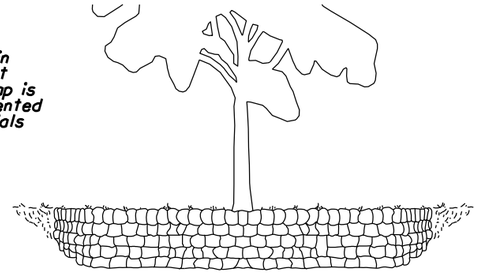
ELEVATION

TREE ROOT PROTECTION IN FILL

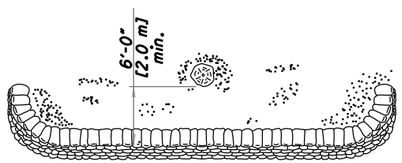
Where the top of the slope in a cut section is within 9 feet [3 m] or less of a tree, riprap is to be placed as shown, augmented by the Construction & Materials Specifications. Walls are to extend far enough from the center of the tree to amply cover the roots.



ELEVATION

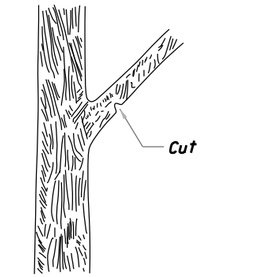


FRONT VIEW



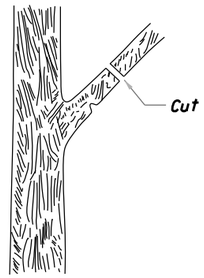
PLAN

RIPRAP FOR TREE PROTECTION IN CUT



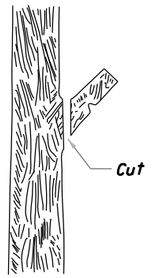
1

Undercut 1/3 of way through to prevent bark from stripping.



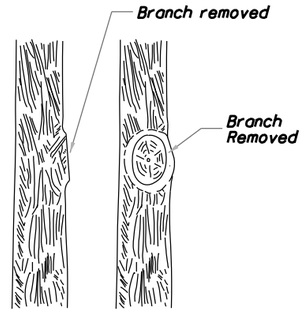
2

Remove the limb by making one downward cut leaving a stub.



3A

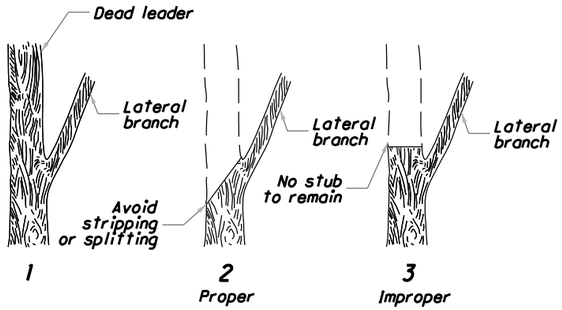
Remove the stub by cutting outside the branch collar.



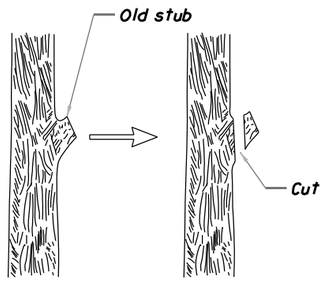
3B

Final cut should not be flush with the trunk, but outside the branch collar.

PROPER REMOVAL OF BRANCHES



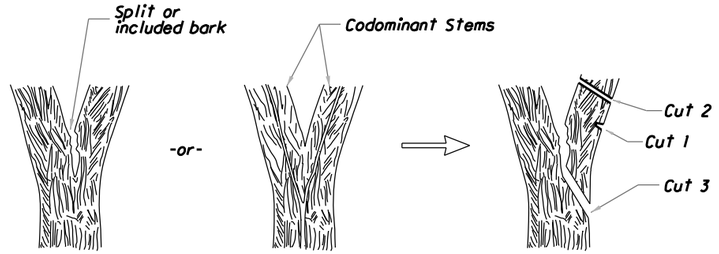
PART OF LEADER OR BRANCH TO BE REMOVED



Remove wire, nails, etc.

Remove the stub by cutting outside the branch collar.

REMOVING STUBS



Remove one stem to create central leader

PROPER CROTCH TREATMENT

PRUNING

THIS DRAWING REPLACES LA-1.1 DATED 7-28-2000.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Gail B. Bruce — ADMINISTRATOR — 10-15-10 DATE

STDS. ENGINEER: M. Bline

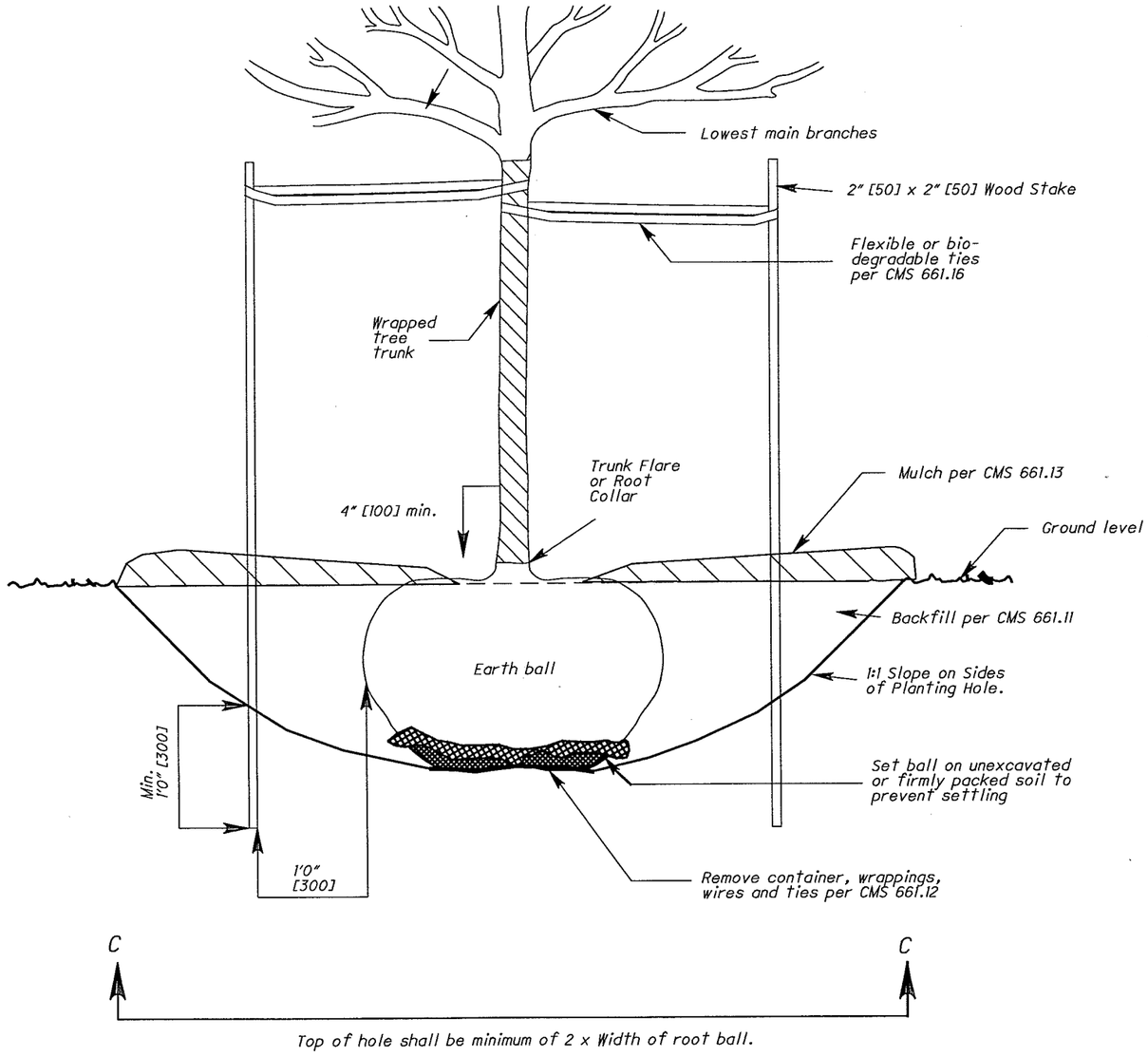
ALL METRIC DIMENSIONS ( ) ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

TREE WELLS AND PRUNING

SCD NUMBER: LA-1.1



TREE PLANTING & BRACING PER CMS 661.16

PLANTING ON LEVEL GROUND

NOTES

PLANTING DETAILS: The types and quantities of fertilizer, water, mulch and backfill vary with different soil and weather conditions. The costs for these items shall be included in the unit price bid for the planting items per CMS.

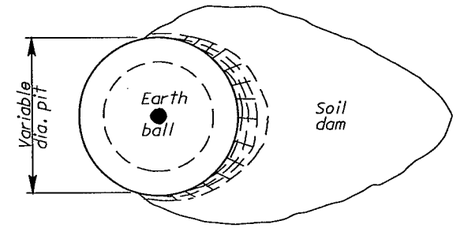
Pit diameter and depth shall vary with the type and size of the plant, the soil type and other site conditions.

Backfill unless otherwise specified, shall be in accordance with CMS 661.11. Circling roots of container plants shall be cut or removed prior to planting and backfilling.

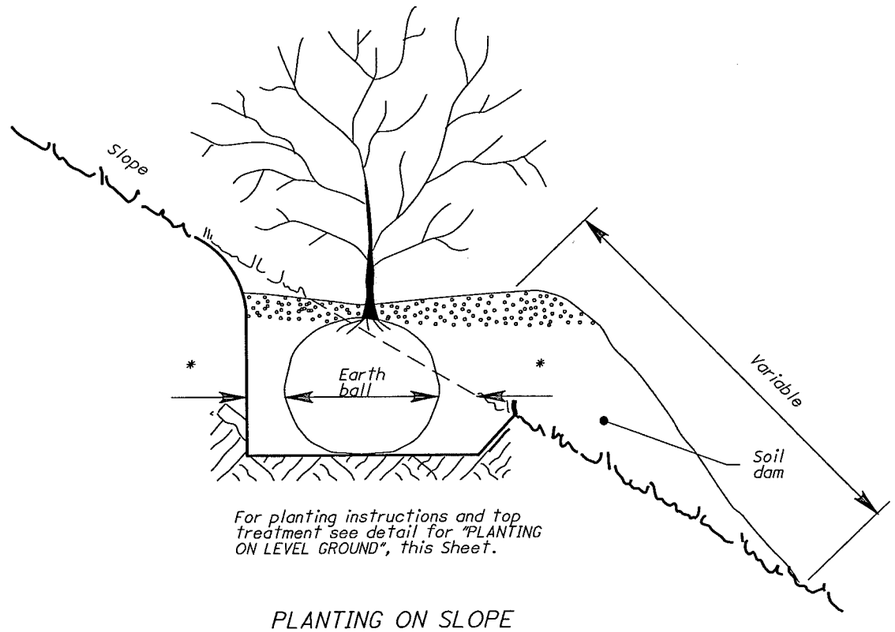
Walls of planting holes dug with a tree spade shall be roughened before planting.

Only flexible or biodegradable ties shall be used when staking trees. The ties shall be lose fitting, (not girdle the truck) attached to the lower half of the tree, and allow trunk movement and growth. All wrap and staking shall be removed at the end of the establishment period, as per CMS 661.17.

Provide a minimum 4" [100] space between the tree trunk and the mulch bed.



PLAN VIEW



For planting instructions and top treatment see detail for "PLANTING ON LEVEL GROUND", this Sheet.

PLANTING ON SLOPE

THIS DRAWING REPLACES LA-1.2 DATED 7-28-00.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Jerry Wray ADMINISTRATOR 1-16-09 DATE

STDS. ENGINEER D. Focke

ALL METRIC DIMENSIONS (IN BRACKETS [ ]) ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

OFFICE OF ROADWAY ENGINEERING

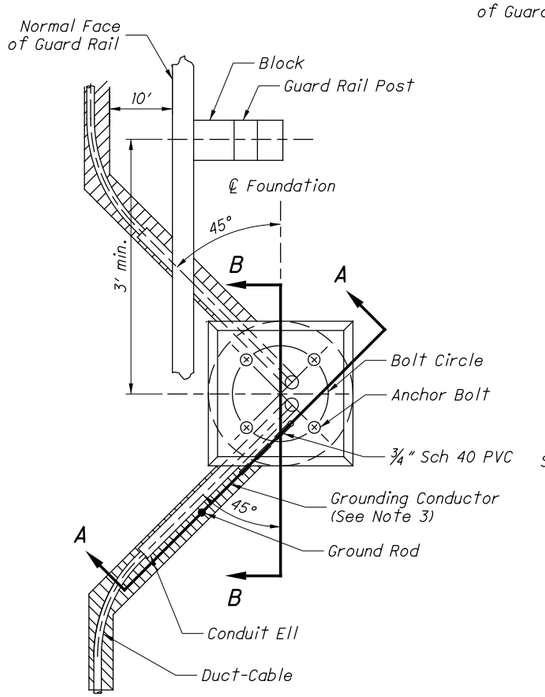
STANDARD ROADWAY CONSTRUCTION DRAWING

PLANTING AND BRACING

SCD NUMBER LA-1.2

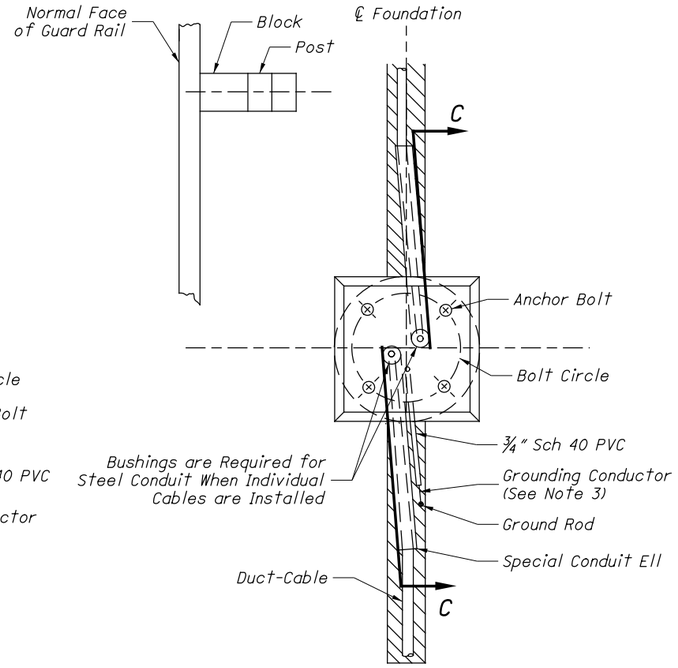
1 / 1

X:\Standards\Publications\SCD\Distributions\scd 2009-01-16\la12_jul08_v8.dgn 15-JAN-2009 9:26AM mbline

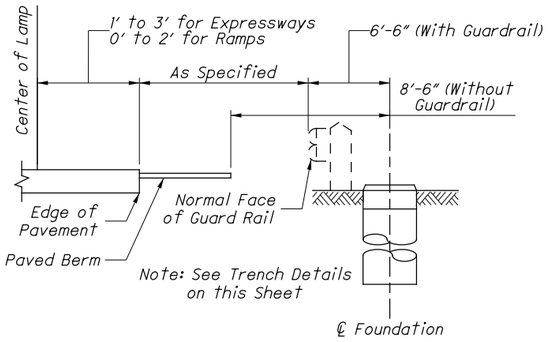


ALTERNATE TRENCH ALIGNMENT

(Use as Directed by the Engineer)



NORMAL TRENCH ALIGNMENT



NORMAL LOCATION OF LIGHT POLE FOUNDATION

NOTES:

1. Upslope side of foundation for pole with breakaway feature shall be flush with grade if pole is exposed to traffic.

2. Minimum depth to be as follows:
   6' for poles having a support height of less than 40'.
   8' for poles having a support height 40' thru 44'.
   9' for poles having a support height 45' thru 49'.
   10' for poles having a support height of 50' thru 55'.

   1/2' diameter tie bars required as follows:
   4 No. 4 diameter tie bars for 6' depth
   5 No. 4 tie bars for 8' depth
   6 No. 4 tie bars for 10' depth
   Rotate bars to clear conduits.

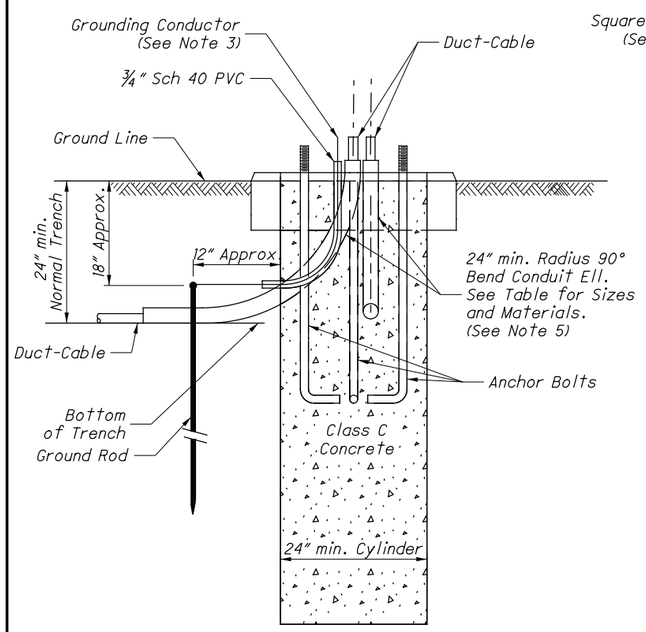
3. Grounding conductor shall be 4 AWG, insulated copper. Exothermically weld cable to ground rod, run free and through ¾" Sch 40 PVC and connect as shown on Standard Construction Drawing (SCD) HL-60.11. Use two coats of insulating varnish over exothermic weld and exposed conductor.

4. For anchor bolt data see SCD HL-10.13, Pole Base Details.

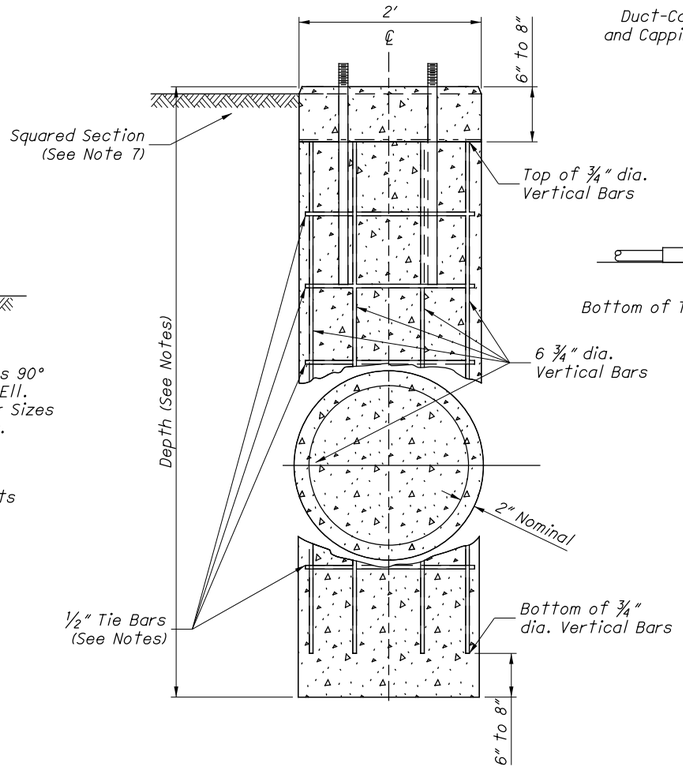
5. Where 2" or 3" diameter conduit terminates in a foundation, the conduit elbows in the foundation shall be the same as the conduit. The ends of the conduit elbows containing distribution cable shall closed be as described in CMS 625.12. When the terminating conduit is steel, the conduit elbows in the pole foundations shall also be steel. At the last light pole on a circuit, the vacant conduit elbow in the light pole foundation shall be stubbed out and capped.

6. Reinforcing steel may be assembled in cages by approved welding of bars. Subject to approval of the Engineer, cages may be assembled in a spiral conformation.

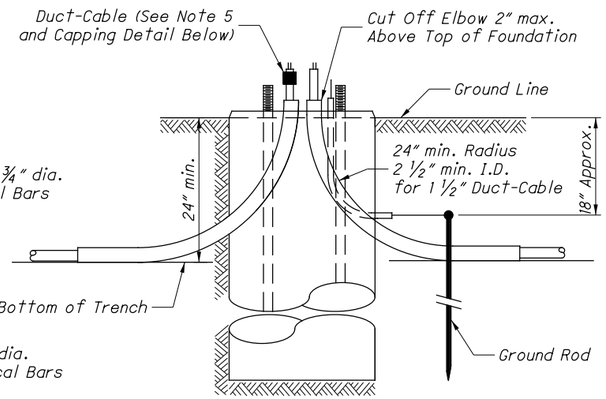
7. Squared section in top 6" of foundation is required only when foundation is in tree lawn or continguous to or in paved surround.



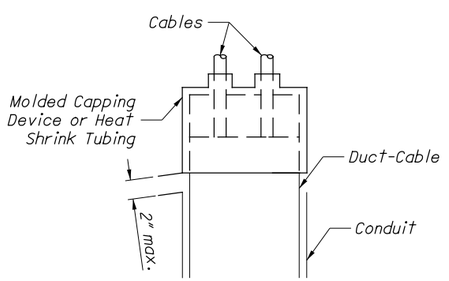
SECTION A-A



SECTION B-B REINFORCING STEEL



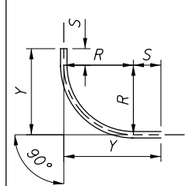
SECTION C-C (EXPANDED)



CAPPING DETAIL

SPECIAL CONDUIT ELLS 90° BEND IN INCHES

R = Bending Radius
S = Straight Section
Y = R+S



2", 2 ½" & 3"		
R	S	Y
24	11	35
30	11	41
36	11	47
42	12	54
48	12	60

THIS DRAWING REPLACES HL-20.11 DATED 01-19-2007.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Stanger 01-17-2014
ADMINISTRATOR DATE

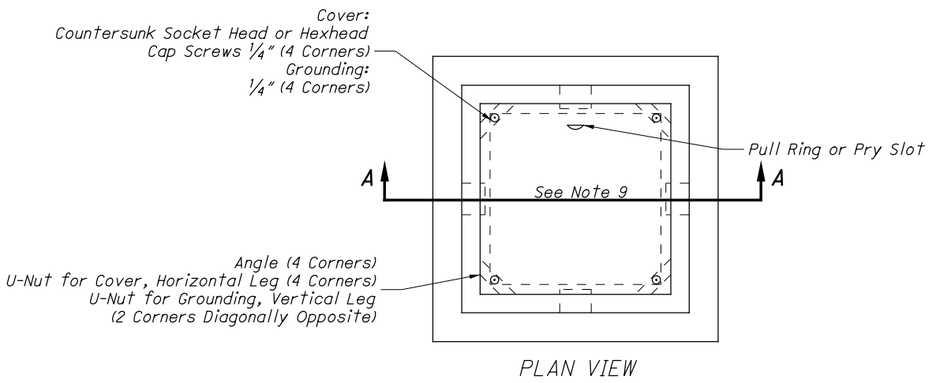
STDS. ENGINEER Duemmel

OFFICE OF ROADWAY ENGINEERING

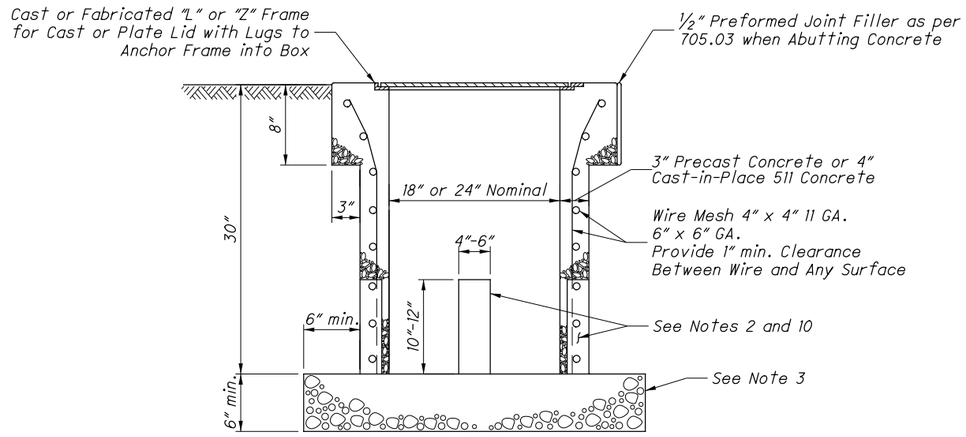
STANDARD ROADWAY CONSTRUCTION DRAWING

FOUNDATION AND TRENCH DETAILS

SCD NUMBER HL-20.11

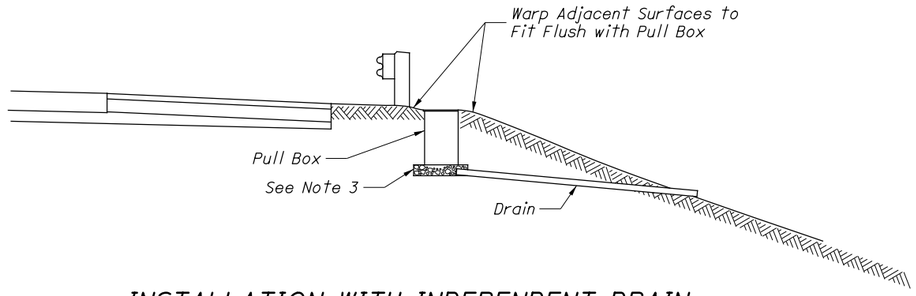


PLAN VIEW

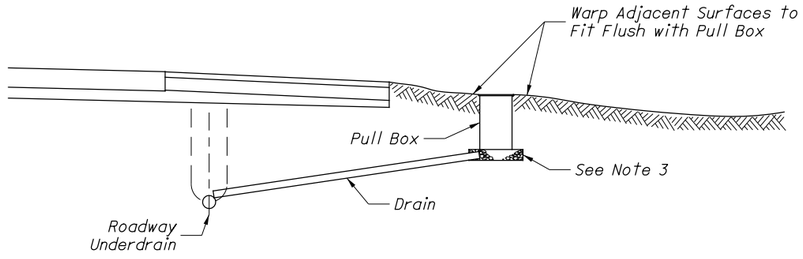


SECTION A-A

PORTLAND CEMENT CONCRETE PULLBOX



INSTALLATION WITH INDEPENDENT DRAIN



INSTALLATION WITH CONNECTION TO ROADWAY UNDERDRAIN

NOTES:

1. Pull boxes shall conform with CMS 625.11 and 725.07 or 725.08 or 725.06.
2. Conduit openings shall be sealed after conduit installation.
3. Aggregate used for pull boxes shall be No. 7 or 8, at least 6" deep. Cost for aggregate shall be included with the unit price bid for each pull box.
4. Pull box drains in accordance with CMS 611 shall be installed as directed by the Engineer.
5. A durable label reminding of the need to lubricate the threads of the cover hold down screws with grease or anti-seize compound shall be on the inside of the frame or upper wall.
6. See specifications for cover marking requirements.
7. Portland cement concrete pull box covers shall be cast iron with reinforcing ribs and matching frames by Neenah, Josam or Zurn foundries, or approved equal, or covers may be 1/2" minimum galvanized plate steel.
8. Tapered thickness portland cement concrete pull box walls may be used; however, minimum wall thickness shall be as indicated.
9. Lifting rings or wire pulling rings may be incorporated into precast portland cement concrete pull box walls.
10. Conduit entries for cast-in-place portland cement concrete pull boxes shall be cast as required. Precast portland cement concrete pull boxes may have field core drilled or sawed openings, or may have precast openings or knockouts. Knockouts shall be arranged to avoid compromising the structural integrity of the box.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Marquez 01-17-2014
ADMINISTRATOR DATE

STDS. ENGINEER Duemmel

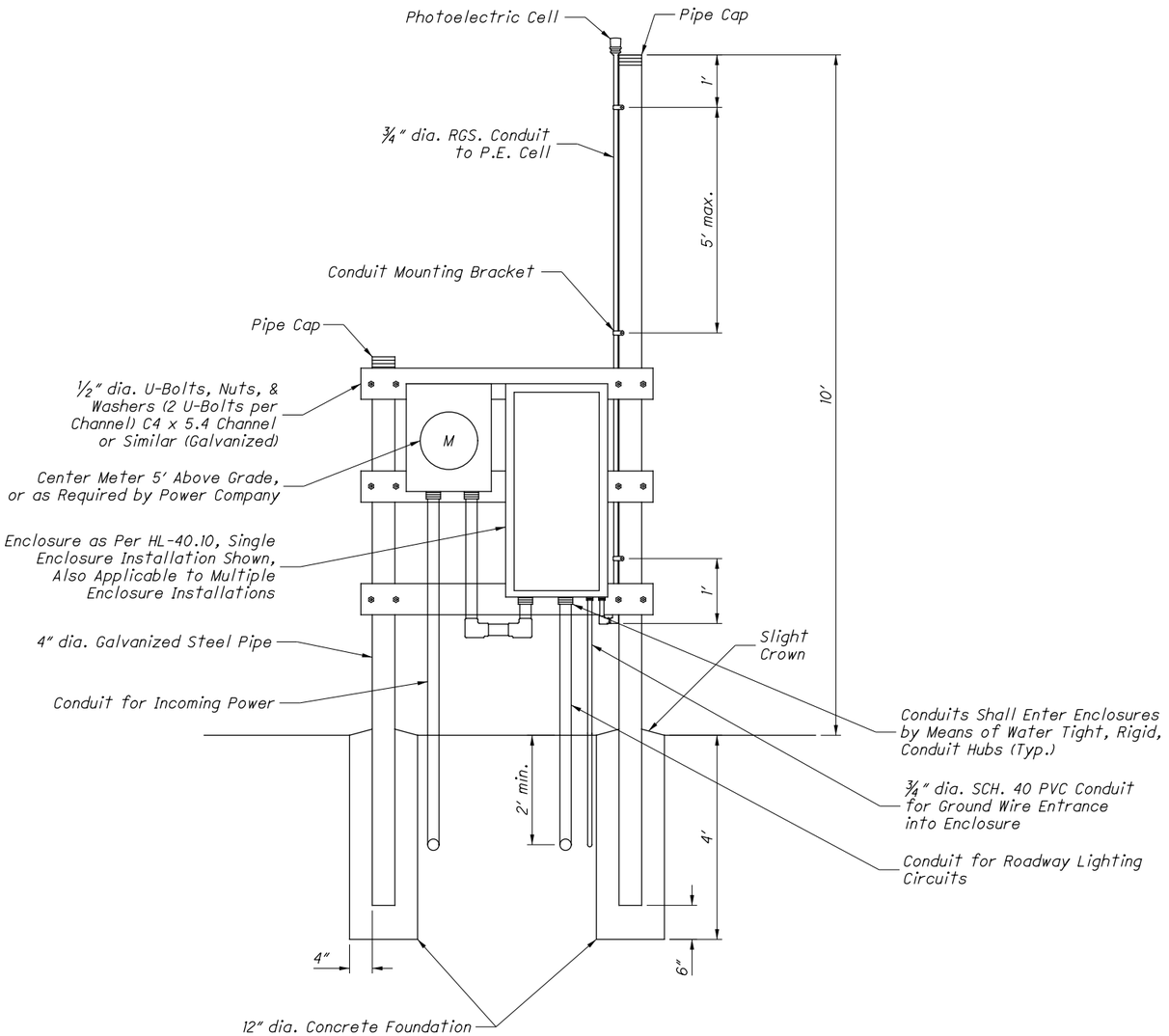
OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES HL-30.11 DATED 01-18-2013.

STANDARD ROADWAY CONSTRUCTION DRAWING

PULL BOX DETAILS I

SCD NUMBER HL-30.11



FRONT VIEW

THIS DRAWING REPLACES HL-40.20 DATED 01-19-2007.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Atanguer ADMINISTRATOR 01-17-2014 DATE

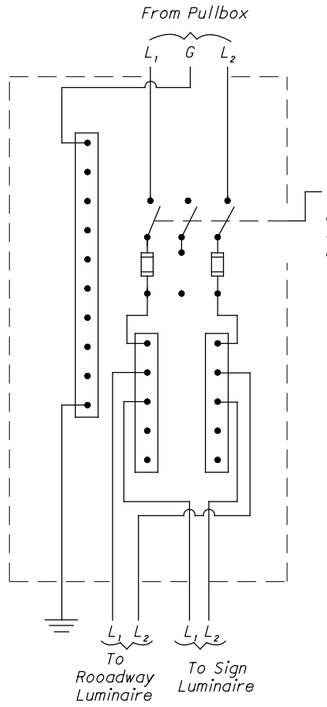
STDS. ENGINEER Duemmel

OFFICE OF ROADWAY ENGINEERING

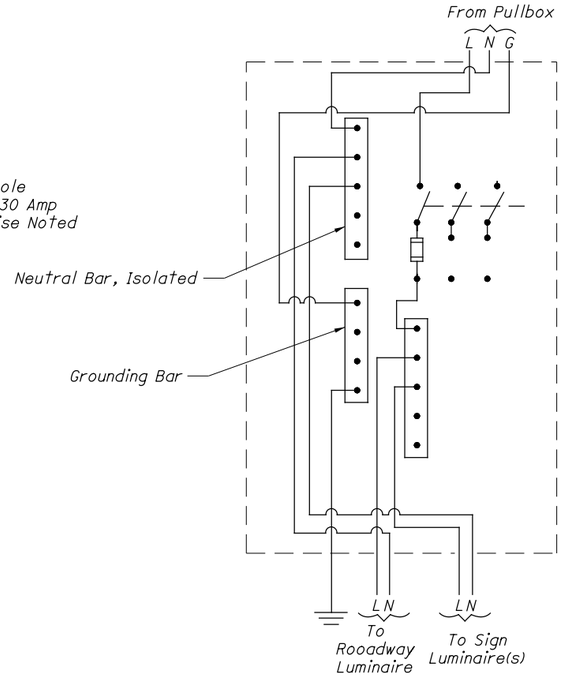
STANDARD ROADWAY CONSTRUCTION DRAWING

POWER SERVICE GROUND MOUNTED

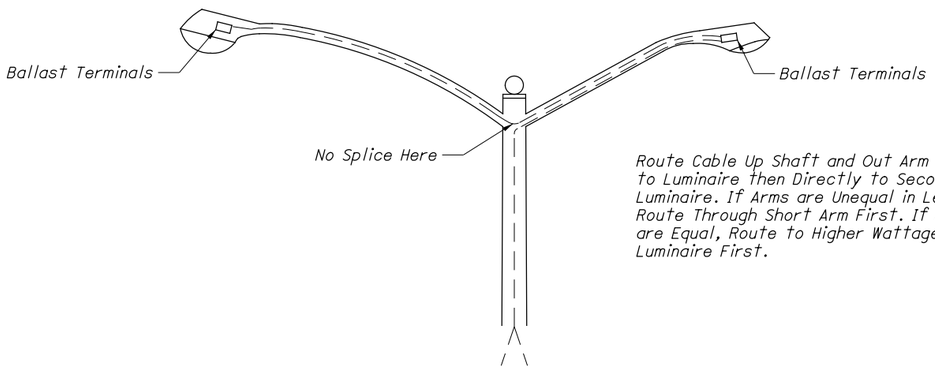
SCD NUMBER HL-40.20



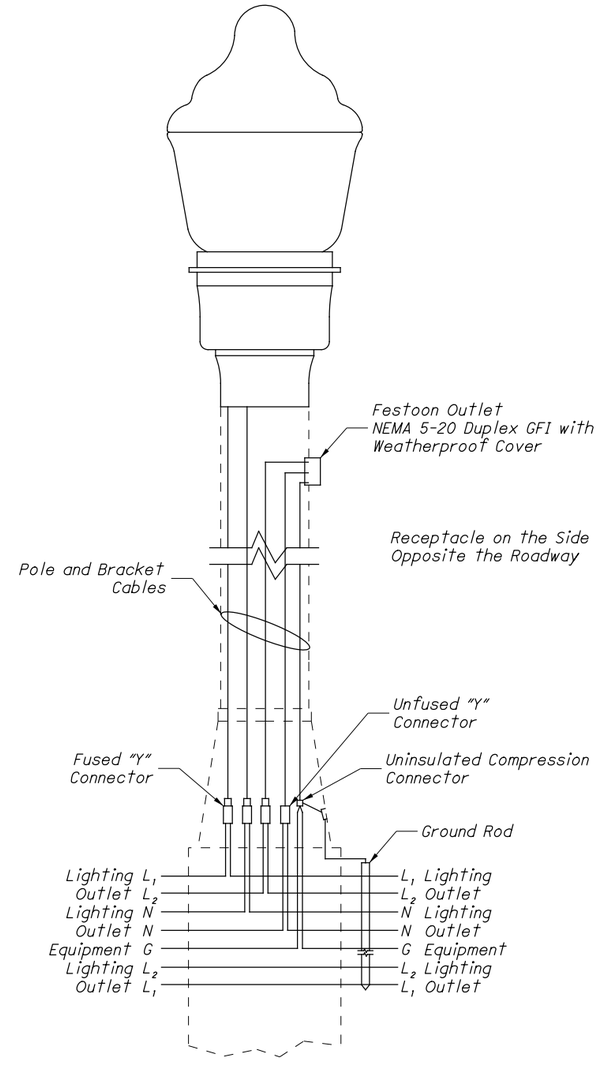
120/240 VOLT CONNECTIONS
240/480 VOLT CONNECTIONS
277/480 VOLT CONNECTIONS



120 VOLT CONNECTIONS
277 VOLT CONNECTIONS



WIRING FOR TWIN-LUMINAIRE POLES



POLE WIRING - LIGHT POLE WITH FESTOON OUTLET

Odd Numbered Pole Shown. For Even Numbered Poles, Reverse L1 and L2 on Both the Lighting Circuit and the Outlet Circuit

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Stanger 01-17-2014
ADMINISTRATOR DATE

STDS. ENGINEER Duemmel

OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES HL-60.12 DATED 10-21-2011.

STANDARD ROADWAY CONSTRUCTION DRAWING

POLE WIRING II

SCD NUMBER HL-60.12

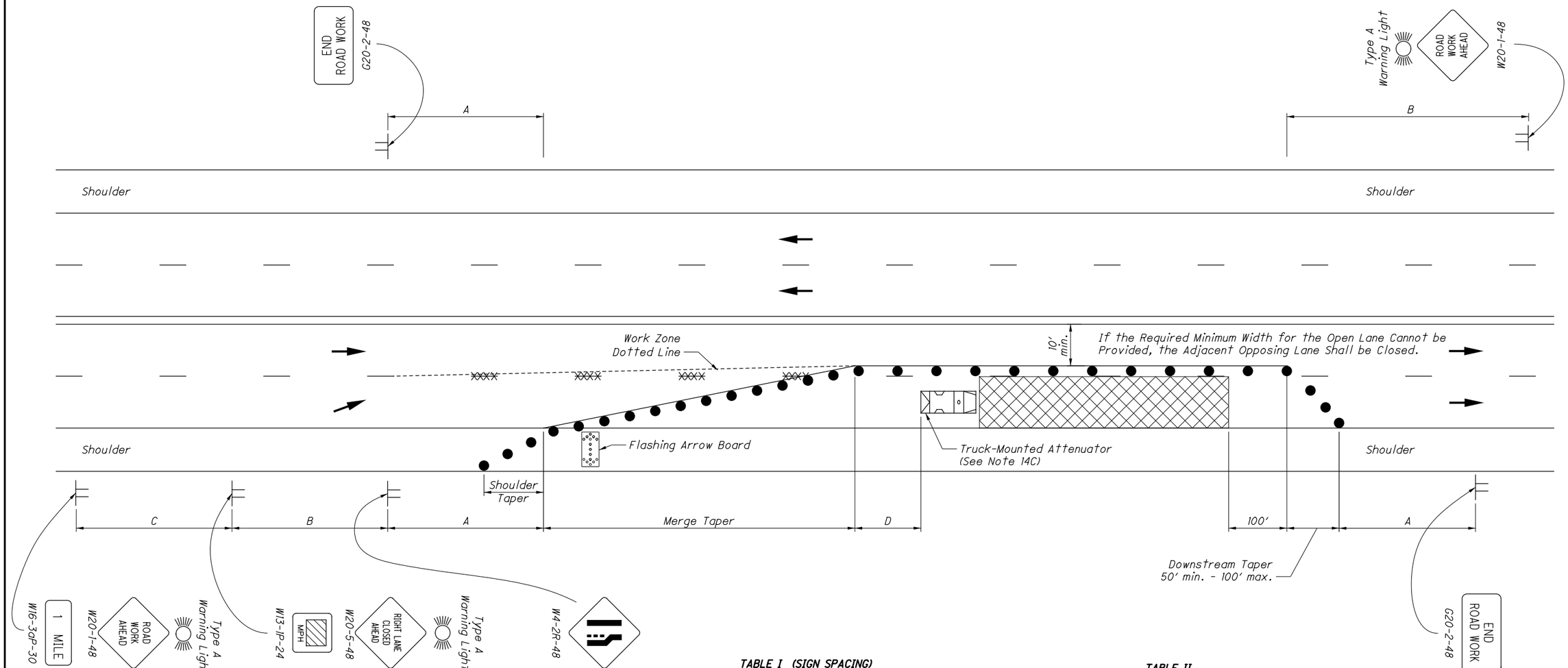


TABLE I (SIGN SPACING)

ROAD TYPE	DISTANCE BETWEEN SIGNS (FT)		
	A	B	C
MAJOR CONVENTIONAL	500	500	500
FREEWAY & EXPRESSWAY	1000	1500	2640

TABLE II

SPEED LIMIT (MPH)	MERGING TAPER RATE MINIMUM	SHOULDER TAPER RATE MINIMUM	MAXIMUM DRUM SPACING (FT)		BUFFER (D) (FT) MINIMUM
			TAPER SEC.	TANGENT SEC.	
25	11:1	4:1	25	40	155
30	15:1	5:1	30	40	200
35	21:1	7:1	35	40	250
40	27:1	9:1	40	80	305
45	45:1	15:1	45	80	360
50	50:1	17:1	50	80	425
55	55:1	19:1	55	80	495

LEGEND

- WORK AREA
- DRUMS/CONES
- REMOVE EXISITING MARKINGS
- DIRECTION OF TRAVEL
- SHADOW VEHICLE

THIS DRAWING REPLACES MT-95.31 DATED 7-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

CLOSING RIGHT LANE OF A MULTI-LANE UNDIVIDED HIGHWAY WITH DRUMS

SCD NUMBER: MT-95.31

NOTES:

DESIGN SPEED

1. The design speed used for taper rates should typically be the permanent legal speed. However, on construction projects for which the speed limit is reduced, the reduced speed may be used in determining the taper rate when the taper is not the first active construction area within the project.

TAPERS

2A. The minimum acceptable length for the merge taper shall be determined by multiplying the width of offset by the merge taper rate. The merge taper rate is provided in Table II.

2B. The minimum acceptable length for the shoulder taper shall be determined by multiplying the width of the shoulder by the shoulder taper rate. The shoulder taper rate is provided in Table II.

SIGN SPACING

3A. The work zone sign spacings shown in Table I are minimums. Maximum spacing should not be greater than 1.5 times the distances shown in Table I.

3B. Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200′ for speeds of 45 mph or less and a minimum of 400′ for speeds 50 mph or greater.

ADJUSTMENTS FOR SIGHT DISTANCE

4. The location of the merging taper and the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

BASIC SIGNING

5A. ROAD WORK AHEAD (W20-1) signs shall be provided on entrance ramps or roadways entering the work limits.

5B. END ROAD WORK (G20-2) signs are only required for lane closures of more than 1 day. It is intended that these signs be placed on the mainline, on all exit ramps, and on roadways exiting the work limits.

5C. Overlapping of signing for adjacent projects should be avoided where the messages could be confusing. Any W20-1 or G20-2 signs which falls within the limits of another traffic control zone shall be omitted or covered during the period when both projects are active.

SIGNING DETAILS

6A. The Advisory Speed (W13-1P) plaque shall be used when specified in the plan.

6B. When the approach speed limit is 40 mph or less, 36″ warning signs may be used.

6C. The distance plaque W16-3aP (or W16-2aP if the distance shown is in feet) shall indicate the distance to the beginning of the merging taper. Distances less than 1 mile may be expressed in feet. The plaque may be omitted if Extra Advance Sign Groups are not used.

6D. Provide signing on the inactive side of the highway, as shown, when specified in the plans.

EXTRA ADVANCE WARNING SIGNING

7. Extra Advance Warning Sign Groups consisting of ROAD WORK AHEAD (W20-1), LANE CLOSED AHEAD (W20-5) and WATCH FOR STOPPED TRAFFIC (W3-H4b) signs plus Distance plaques may be specified in the plans or may be required to be erected, as determined by the Engineer (See Standard Construction Drawing (SCD) MT-95.50).

PAVEMENT MARKINGS / RPMs

8A. If the construction operation requires a lane closure for more than 1 day, the existing conflicting reflectors shall be removed from the raised pavement markers (RPMs).

8B. Additionally, if a lane closure of greater than 3 days is required, the following shall be performed:

a) The appropriate color work zone edge lines shall be applied along the taper.
b) The existing conflicting pavement markings shall be removed or covered per CMS 614.11G.
c) Work zone dotted lines, 3′ in length separated by 9′ gaps, shall be provided to identify the merge.

8C. Work zone edge lines shall be provided along the tangent section when specified in the plans.

8D. Work zone pavement markings which would conflict with final traffic lanes shall be removable tape (CMS 740.06, Type I) unless the area will be resurfaced prior to project completion.

8E. After completion of the work, pavement markings other than CMS 740.06, Type I shall be removed in accordance with CMS 614.11 I. The original markings and raised pavement marker reflectors shall be restored at no additional cost unless separately itemized in the plans.

EQUIPMENT / MATERIALS STORAGE

9A. No equipment or material shall be located within the taper or buffer zone.

9B. When no work is being performed, all material and equipment shall be stored per CMS 614.03.

FLASHING ARROW BOARD

10. The flashing arrow board shall be chosen from the ODOT approved list and follow the guidelines in Supplemental Specification 821.

FLASHING WARNING LIGHTS

11. Type A flashing warning lights shown on the ROAD WORK AHEAD (W20-1) signs and on the LANE CLOSED AHEAD (W20-5) signs are required whenever a night lane closure is necessary.

INTERSECTION / DRIVEWAY ACCESS

12. Within the length of the closure, provision shall be made to control traffic entering from intersecting streets and major drives as necessary to prevent wrong-way movements and to keep vehicles off of new pavement not ready for traffic. The Contractor shall:

a) Place across the closed lane, either 3 drums (cones) or barricades, and/or
b) Provide an additional flagger at every public street intersection and major driveway.

Drums (cones) placed across the closed lane shall be located 25′ beyond the projected pavement edges of the driveway or cross highway, as shown in SCD MT-97.11. For barricades, see SCD MT-101.60.

Existing STOP signs shall be relocated as necessary to assure proper location for the traffic conditions.

The method of control shall be subject to the approval of the Engineer.

DRUMS / CONES

13A. The maximum drum spacing along tapers and along tangent sections shall be as shown in Table II. A minimum of 5 drums shall be used to close the upstream shoulder. The downstream taper drum spacing shall be approximately 20′.

13B. Cones may be substituted for drums as follows:

a) Use of cones is permissible for either daytime operation or for nighttime operation, but shall not be used continuously, day and night. Upon completion of work within the work period, the cones shall be removed. They may again be placed on the highway in order to resume work in the following such work period.
b) Cones used for daytime traffic control shall have a minimum height of 28″.
c) Cones used for nighttime traffic control shall have a minimum height of 42″.
d) Use of cones at night shall be prohibited along tapers.
e) Cone spacing at night shall be at a maximum of 40′.
f) Where cones are substituted for drums along tangents, intermixing of channelizing devices within the same run will not be permitted. Either cones shall be used for the entire length of the tangent section, or drums shall be used for the entire length.

13C. Provisions shall be made to stabilize the cones and drums to prevent them from blowing over.

SHADOW VEHICLE

14A. The shadow vehicle shall be in place and unoccupied whenever workers are in the work area. This vehicle shall be removed from the pavement whenever workers are not in the work area.

14B. The shadow vehicle shall be equipped with a high-intensity yellow rotating, flashing, oscillating, or strobe light(s).

14C. The vehicle shall be equipped with a truck-mounted attenuator when specified in the plans.

THIS DRAWING REPLACES MT-95.31 DATED 7-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Blune — 7-19-2013
ADMINISTRATOR — DATE

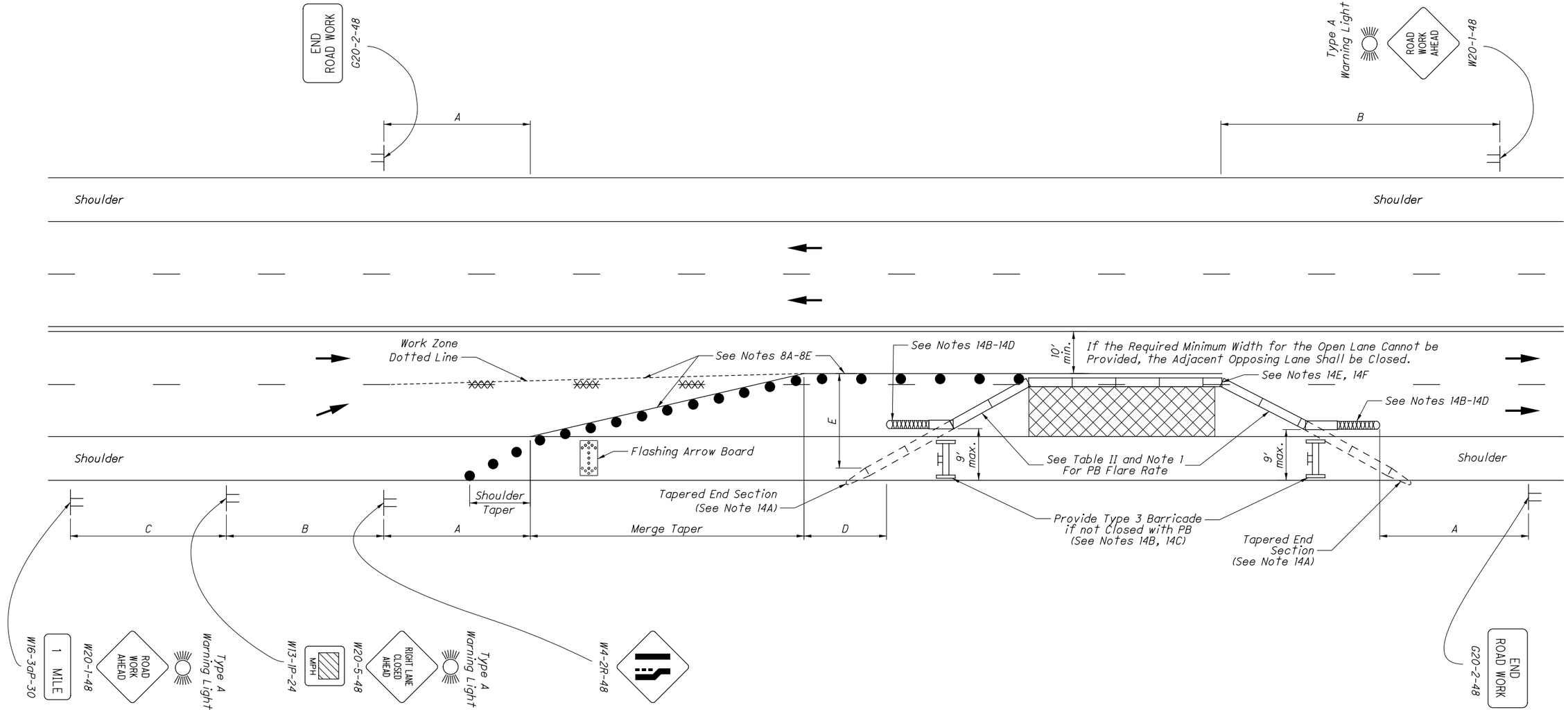
STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

CLOSING RIGHT LANE OF A MULTI-LANE UNDIVIDED HIGHWAY WITH DRUMS

SCD NUMBER MT-95.31



LEGEND

- WORK AREA
- DRUMS
- PORTABLE BARRIER (PB)
- REMOVE EXISTING MARKINGS
- ATTENUATOR
- OPTIONAL TREATMENT
- DIRECTION OF TRAVEL

TABLE I (SIGN SPACING)

ROAD TYPE	DISTANCE BETWEEN SIGNS (FT)		
	A	B	C
MAJOR CONVENTIONAL	500	500	500
FREEWAY & EXPRESSWAY	1000	1500	2640

TABLE II

SPEED LIMIT (MPH)	MERGING TAPER RATE MINIMUM	SHOULDER TAPER RATE MINIMUM	PB FLARE RATE MINIMUM	MAXIMUM DRUM SPACING (FT)		BUFFER (D) (FT) MINIMUM	CLEAR ZONE WIDTH (E) (FT)
				TAPER SEC.	TANGENT SEC.		
25	11:1	4:1	8:1	25	40	155	15
30	15:1	5:1	8:1	30	40	200	15
35	21:1	7:1	9:1	35	40	250	15
40	27:1	9:1	10:1	40	80	305	15
45	45:1	15:1	12:1	45	80	360	19
50	50:1	17:1	14:1	50	80	425	19
55	55:1	19:1	16:1	55	80	495	23

THIS DRAWING REPLACES MT-95.41 DATED 1-18-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — 7-19-2013
ADMINISTRATOR — DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

CLOSING RIGHT LANE OF A MULTI-LANE UNDIVIDED HIGHWAY WITH PORTABLE BARRIER

SCD NUMBER: MT-95.41

NOTES:

DESIGN SPEED

1. The design speed used for taper rates should typically be the permanent legal speed. However, on construction projects for which the speed limit is reduced, the reduced speed may be used in determining the taper rate when the taper is not the first active construction area within the project.

TAPERS

2A. The minimum acceptable length for the merge taper shall be determined by multiplying the width of offset by the merge taper rate. The merge taper rate is provided in Table II.

2B. The minimum acceptable length for the shoulder taper shall be determined by multiplying the width of the shoulder by the shoulder taper rate. The shoulder taper rate is provided in Table II.

SIGN SPACING

3A. The work zone sign spacings shown in Table I are minimums. Maximum spacing should not be greater than 1.5 times the distances shown in Table I.

3B. Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200′ for speeds of 45 mph or less and a minimum of 400′ for speeds 50 mph or greater.

ADJUSTMENTS FOR SIGHT DISTANCE

4. The location of the merging taper and the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

BASIC SIGNING

5A. ROAD WORK AHEAD (W20-1) signs shall be provided on entrance ramps or roadways entering the work limits.

5B. END ROAD WORK (G20-2) signs are only required for lane closures of more than 1 day. It is intended that these signs be placed on the mainline, on all exit ramps, and on roadways exiting the work limits.

5C. Overlapping of signing for adjacent projects should be avoided where the messages could be confusing. Any W20-1 or G20-2 signs which falls within the limits of another traffic control zone shall be omitted or covered during the period when both projects are active.

SIGNING DETAILS

6A. The Advisory Speed (W13-1P) plaque shall be used when specified in the plan.

6B. When the approach speed limit is 40 mph or less, 36″ warning signs may be used.

6C. The distance plaque W16-3aP (or W16-2aP if the distance shown is in feet) shall indicate the distance to the beginning of the merging taper. Distances less than 1 mile may be expressed in feet. The plaque may be omitted if Extra Advance Sign Groups are not used.

6D. Provide signing on the inactive side of the highway, as shown, when specified in the plans.

6E. Provide the appropriate word or symbol legend necessary on Lane Reduction (W4-2, W20-5) signs to correctly identify which lane is to be closed.

EXTRA ADVANCE WARNING SIGNING

7. Extra Advance Warning Sign Groups consisting of ROAD WORK AHEAD (W20-1), LANE CLOSED AHEAD (W20-5) and WATCH FOR STOPPED TRAFFIC (W3-H4b) signs plus Distance plaques may be specified in the plans or may be required to be erected, as determined by the Engineer (see Standard Construction Drawing (SCD) MT-95.50).

PAVEMENT MARKINGS / RPMs

8A. If the construction operation requires a lane closure for more than 1 day, the existing conflicting reflectors shall be removed from the raised pavement markers (RPMs).

8B. Additionally, if a lane closure of greater than 3 days is required, the following shall be performed:

a) The appropriate color work zone edge lines shall be applied along the taper.
b) The existing conflicting pavement markings shall be removed or covered per CMS 614.11G.
c) Work zone dotted lines, 3′ in length separated by 9′ gaps, shall be provided to identify the merge.

8C. Work zone edge lines shall be provided along the tangent section when specified in the plans.

8D. Work zone pavement markings which would conflict with final traffic lanes shall be removable tape (CMS 740.06, Type I) unless the area will be resurfaced prior to project completion.

8E. After completion of the work, pavement markings other than CMS 740.06, Type I shall be removed in accordance with CMS 614.11 I. The original markings and raised pavement marker reflectors shall be restored at no additional cost unless separately itemized in the plans.

EQUIPMENT / MATERIALS STORAGE

9A. No equipment or material shall be located within the taper or buffer zone.

9B. When no work is being performed, all material and equipment shall be stored per CMS 614.03.

FLASHING ARROW BOARD

10. The flashing arrow board shall be chosen from the ODOT approved list and follow the guidelines in Supplemental Specification 821.

FLASHING WARNING LIGHTS

11. Type A flashing warning lights shown on the ROAD WORK AHEAD (W20-1) signs and on the LANE CLOSED AHEAD (W20-5) signs are required whenever a night lane closure is necessary.

INTERSECTION / DRIVEWAY ACCESS

12. Within the length of the closure, provision shall be made to control traffic entering from intersecting streets and major drives as necessary to prevent wrong-way movements and to keep vehicles off of new pavement not ready for traffic. The Contractor shall:

a) Place across the closed lane, either 3 drums (cones) or barricades, and/or
b) Provide an additional flagger at every public street intersection and major driveway.

Drums (cones) placed across the closed lane shall be located 25′ beyond the projected pavement edges of the driveway or cross highway, as shown in SCD MT-97.11. For barricades, see SCD MT-101.60.

Existing STOP signs shall be relocated as necessary to assure proper location for the traffic conditions.

The method of control shall be subject to the approval of the Engineer.

DRUMS

13 . The maximum drum spacing along tapers and along tangent sections shall be as shown in Table II. A minimum of 5 drums shall be used to close the upstream shoulder.

PORTABLE BARRIER (PB)

14A. A tapered end section may be used in place of the impact attenuator at locations where the last full section of PB can be extended outside of the clear zone for approaching traffic. See Table II for clear zone widths.

14B. If it is necessary to provide the Contractor with access to the work area behind the PB flare, the PB end treatment shall include an impact attenuator. The maximum width of the opening shall be 9′ between the impact attenuator and the outside edge of the paved shoulder.

14C. If Contractor access is provided per Note 14B, the length of PB shall be adequate to shield the work area from the motorist. This length of need of PB shall be determined from the calculations provided in the L&D Manual, Volume 1, Figure 602-1E, and shall require the approval of the Engineer.

14D. When used, impact attenuators shall be installed parallel to traffic. Also, the last full section of PB, adjacent to the impact attenuator, shall be located parallel to traffic.

14E. Where narrow medians are provided, see Table II to determine whether or not the downstream end of the PB is located within the clear zone of opposing traffic. If the PB is located within the clear zone of opposing traffic, the downstream end shall be flared away from opposing traffic to shield the work area from potential errant vehicles crossing the median.

14F. If the PB is located beyond the clear zone of opposing traffic, the downstream end of the PB may be provided with a tapered end, located 10′ beyond the work area.

14G. Where PB is located beyond the edge of the paved shoulder, the cross slope within the clear zone, including the surface on which the PB is placed, shall be graded at 10:1, or flatter. If the cross slope is steeper than 10:1, the PB shall be terminated on the paved shoulder. The PB shall be extended along the paved shoulder as necessary to satisfy the length of need, and then terminated using an impact attenuator.

14H. The work area shall be adequately protected from traffic approaching from intersections and driveway approaches using PB and impact attenuators as called for by the Engineer.

14I. For installation procedures, refer to the manufacturer's installation instructions.

14J. For details on delineation of PB, see Standard Construction Drawing MT-101.70.

THIS DRAWING REPLACES MT-95.41 DATED 1-18-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Blune — 7-19-2013
ADMINISTRATOR — DATE

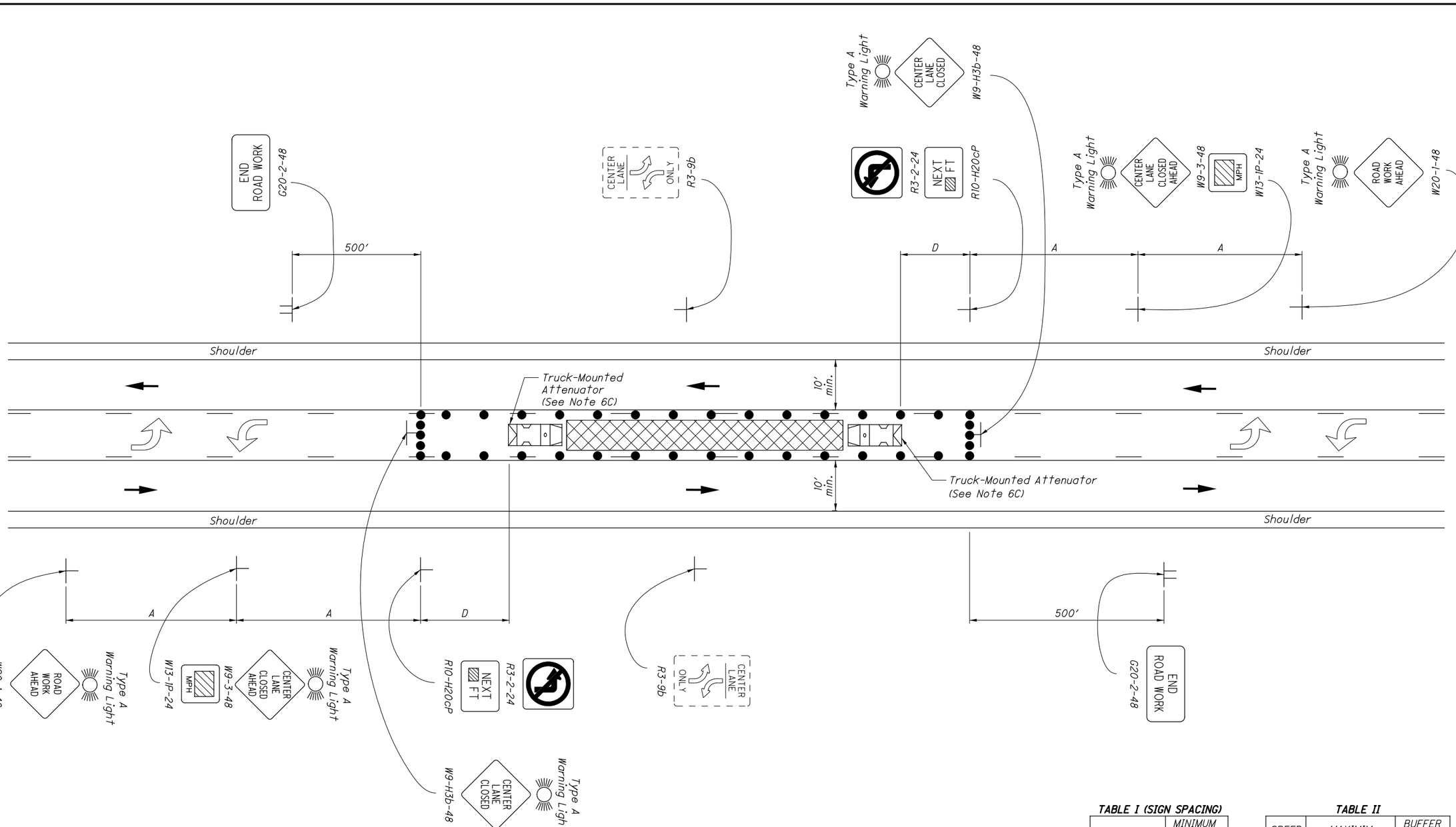
STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

CLOSING RIGHT LANE OF A MULTI-LANE UNDIVIDED HIGHWAY WITH PORTABLE BARRIER

SCD NUMBER MT-95.41



LEGEND

- WORK AREA
- DRUMS/CONES
- 2-WAY LEFT-TURN MARKING
- DIRECTION OF TRAVEL
- SHADOW VEHICLE

TABLE I (SIGN SPACING)

ROAD TYPE	MINIMUM DISTANCE (FT)
	A
URBAN (≤ 40 MPH)	100
URBAN (45-50 MPH)	350
RURAL (55 MPH)	500

TABLE II

SPEED LIMIT (MPH)	MAXIMIM DRUM SPACING (FT)	BUFFER (D) (FT) MINIMUM
25	25	155
30	30	200
35	35	250
40	40	305
45	40	360
50	40	425
55	40	495

THIS DRAWING REPLACES MT-95.60 DATED 7-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — 7-19-2013
ADMINISTRATOR — DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

CLOSURE OF TWO-WAY LEFT TURN LANE

SCD NUMBER: MT-95.60

NOTES:

SIGNING

1A. The location of the Advance Warning Signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment. The distances shown are minimums.

1B. Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200'.

1C. The Advisory Speed (W13-1P) plaque shall be used when specified in the plan.

1D. If the lane closure will exist for more than one day, existing Two-Way Left Turn Only (R3-9b) signs in the work area shall be removed or covered.

1E. END ROAD WORK (G20-2) signs are only required for lane closures of more than one day.

1F. 36" warning signs may be used when the approach speed limit is 40 mph or less.

FLASHING WARNING LIGHTS

2. Type A flashing warning lights shown on the ROAD WORK AHEAD (W20-1) signs and on the CENTER LANE CLOSED AHEAD (W9-3) and the CENTER LANE CLOSED (W9-H3b) signs are required whenever a night lane closure is necessary.

DRUMS / CONES

3A. Drum spacing shall be as follows:

a) Spacing along the closure shall be as specified in Table II.
b) A minimum of five drums shall be placed laterally at each end of the closed lane as shown in the drawing.

3B. Cones may be substituted for drums as follows:

a) Cones used for daytime traffic control shall have a minimum height of 28".
b) Cones used for nighttime traffic control shall have a minimum height of 42".

3C. Provisions shall be made to stabilize the cones and drums to prevent them from blowing over.

3D. Intermixing of channelizing devices within the same run will not be permitted. Either drums shall be used for the entire run of channelizeation, or cones shall be for the entire run.

PAVEMENT MARKING / RAISED PAVEMENT MARKERS (RPMs)

4. If the construction operation requires the lane closure for more than one day then the following shall be performed:

a) The existing conflicting reflectors from the RPMs shall be removed.
b) The appropriate color work zone edge lines shall be applied. Existing conflicting pavement markings shall be removed or covered as per Construction and Material Specifications (CMS) 614.11G.
c) Work zone pavement markings for transition areas (lane shifts) shall be as called for in the plans.
d) Work zone pavement markings which would conflict with the final traffic lanes shall be removable (CMS 740.06, Type I) tape unless the area will be resurfaced prior to project completion.
e) After completion of the work, pavement markings other than CMS 740.06, Type I shall be removed in accordance with CMS 641.10. The original markings and raised pavement marker reflectors shall be restored at no additional cost unless separately itemized in the plans.
f) Existing markings which will be covered by portable barrier do not need to be removed.

EQUIPMENT / MATERIALS STORAGE

5. All material and equipment shall be removed from the closure and the work area when no work is being done.

SHADOW VEHICLE

6A. The shadow vehicle shall be in place and unoccupied whenever workers are in the work area.

6B. The shadow vehicle shall be equipped with a high-intensity yellow rotating, flashing, oscillating, or strobe light(s).

6C. The vehicle shall be equipped with a truck-mounted attenuator when called for in the plans.

6D. The vehicle shall be removed from the pavement whenever workers are not in the work area.

6E. Other protective devices may be used in lieu of the shadow vehicle shown when approved by the Engineer.

THIS DRAWING REPLACES MT-95.60 DATED 7-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR — 7-19-2013 DATE

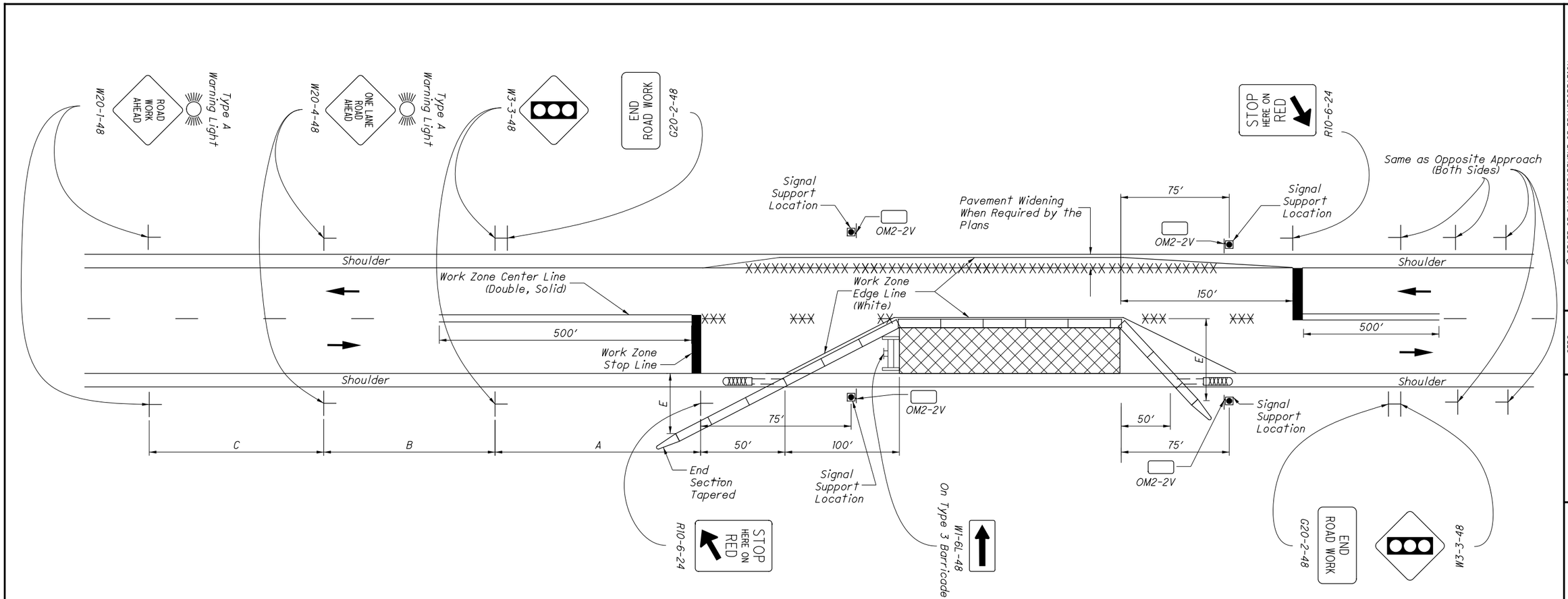
STDS. ENGINEER: Stargell

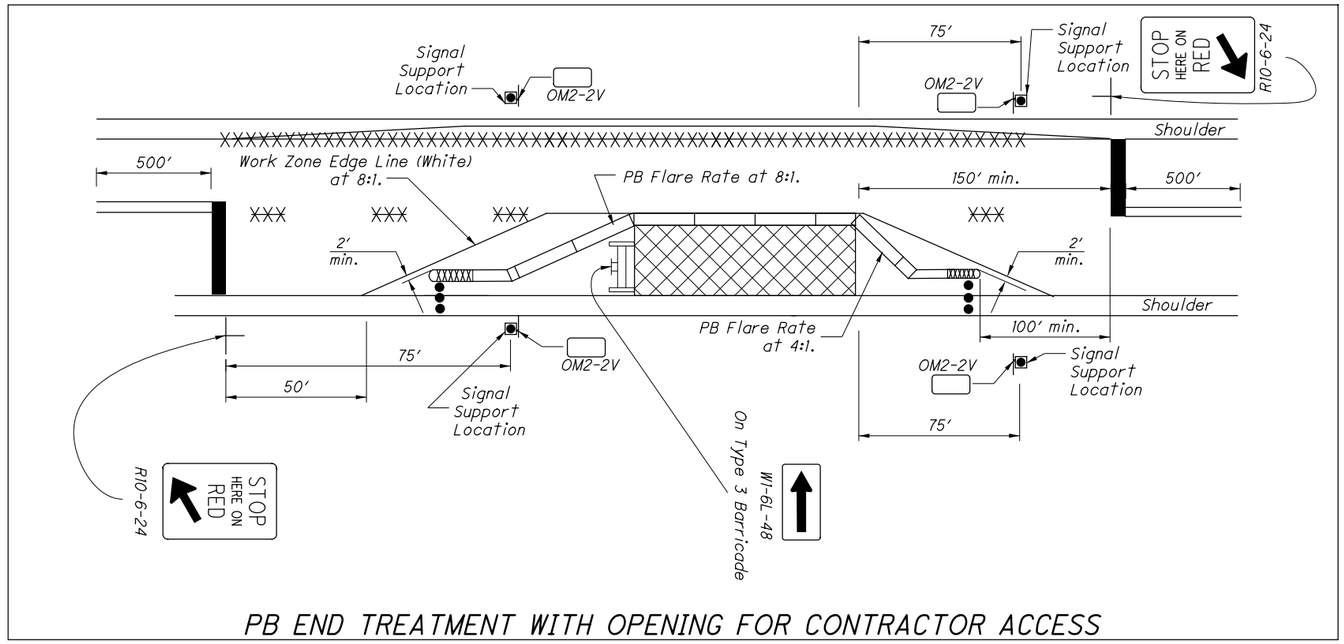
OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

CLOSURE OF TWO-WAY LEFT TURN LANE

SCD NUMBER: MT-95.60





PB END TREATMENT WITH OPENING FOR CONTRACTOR ACCESS

TABLE I (SIGN SPACING)

DISTANCE (FT)	A	B	C
URBAN (≤ 40 MPH)	100	100	100
URBAN (≥ 45 MPH)	350	350	350
RURAL	500	500	500

TABLE II

SPEED LIMIT (MPH)	CLEAR ZONE WIDTH (E) (FT)
25	15
30	15
35	15
40	15
45	19
50	19
55	23
60	30

LEGEND

- WORK AREA
- DRUMS/CONES
- PORTABLE BARRIER (PB)
- REMOVE EXISTING MARKINGS
- ATTENUATOR
- TAPERED END TREATMENT
- TYPE III BARRICADE
- DIRECTION OF TRAVEL

THIS DRAWING REPLACES MT-96.11 DATED 07-19-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Stargell 01-17-2014
ADMINISTRATOR DATE

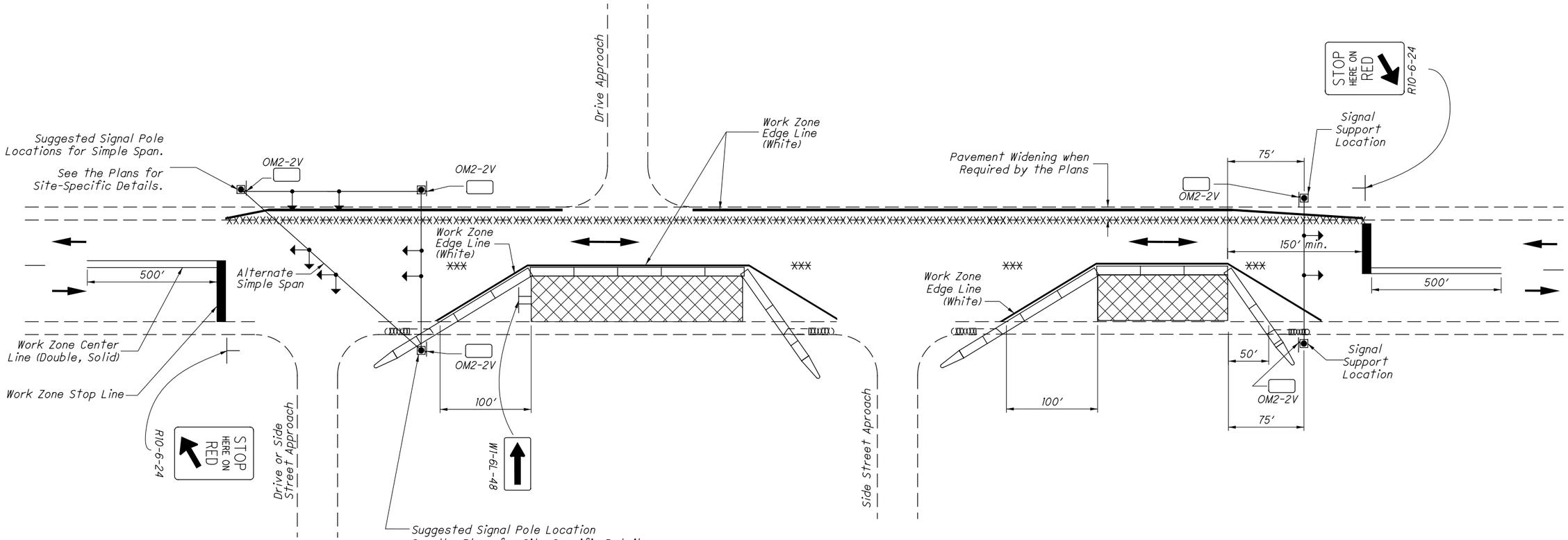
STDS. ENGINEER Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

SIGNALIZED CLOSING ONE LANE OF A 2-LANE HIGHWAY

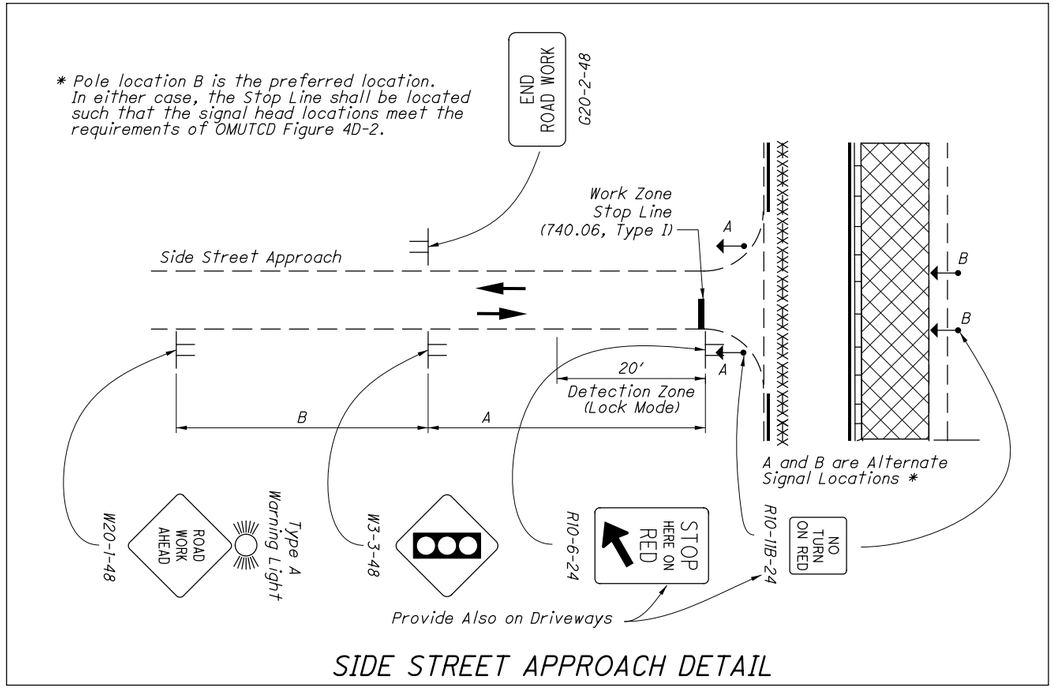
SCD NUMBER MT-96.11



For Placement of PB see Sheet 1.

LEGEND

- WORK AREA
- DRUMS/CONES
- PORTABLE BARRIER (PB)
- REMOVE EXISTING MARKINGS
- ATTENUATOR
- TAPERED END TREATMENT
- DIRECTION OF TRAVEL
- SIGNAL HEAD



SIDE STREET APPROACH DETAIL

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Otanguer 01-17-2014
ADMINISTRATOR DATE

STDS. ENGINEER Stargell

OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES MT-96.11 DATED 07-19-2013.

STANDARD ROADWAY CONSTRUCTION DRAWING

SIGNALIZED CLOSING ONE LANE OF A 2-LANE HIGHWAY

SCD NUMBER MT-96.11

NOTES:

SIGNAL EQUIPMENT

1A. All traffic signal equipment used in this installation, such as signal cable, signal heads, or signal controller shall be in conformance with specifications CMS 632, 633, 732 and 733.

1B. The performance test of CMS 632.28G, the working drawing requirements of 632.04 and 633.04, the wiring diagram and service manual requirement of 633.05 and the testing and prequalification requirement of 633.06 are waived.

1C. Used equipment is acceptable.

1D. Conflict monitors or Malfunction Management Units (MMUs) typical of traditional traffic control signal operation shall be used.

1E. At least one and preferably both of the signal faces for the mainline through movement shall be located per Ohio Manual of Uniform Traffic Control Devices (OMUTCD) Figure 4D-2.

1F. If side-mounted, signal heads shall be located across the highway from each other.

1G. For conventional signal mounting, see Standard Construction Drawing (SCD) MT-96.20.

1H. For portable signals, see Supplemental Specification 961 and Supplement 1050. Any portable traffic signals provided shall be chosen from the prequalified list maintained by the Office of Traffic Engineering, and available on the Office of Materials Management website.

1I. Portable traffic signals shall be located off of the pavement or behind drums or portable barrier or guardrail.

SIGNAL OPERATION

2A. Signals shall be installed and operated in accordance with the requirements of Part 4 of the OMUTCD.

2B. Signal timing settings shall be as shown in the plans or provided to the Contractor by the Engineer prior to implementation of the signal control.

2C. If the signal fails or is changed to flashing operation, red shall be flashed to all approaches on all signal heads.

SIGNING

3A. The spacing between work zone signs, as shown in Table I, are minimums. Maximum spacing should not be greater than 1.5 times the distances shown in Table I.

3B. Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200′ for speeds of 45 mph or less and a minimum of 400′ for speeds of 50 mph or greater.

3C. The location of the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

3D. Overlapping of signing for adjacent projects should be avoided where the messages could be confusing. Any ROAD WORK AHEAD (W20-1) sign or END ROAD WORK (G20-2) sign which falls within the limits of another work zone shall be omitted or covered during the period when both projects are active.

3E. 36″ warning signs may be used when the approach speed limit is 40 mph or less.

3F. Provide a NO TURN ON RED (R10-11b-24) sign on each side road and driveway approach located between the mainline stop bars, as shown on Sheet 2 of this drawing. Mounting shall be as follows:

a) If the signal heads are side-mounted, the sign should be placed below the right-most signal head.
b) If the signal heads are overhead mounted, the sign should be placed to the right of the right-most signal head.

3G. END ROAD WORK (G20-2) signs are only required for lane closures of more than one day.

3H. All existing signs (STOP, STOP AHEAD, etc.) which conflict with the work zone traffic signals or other traffic control shall be covered or removed.

3I. The STOP HERE ON RED (R10-6a) sign may be used in place of the R10-6 shown.

TREE AND BRUSH TRIMMING

4. Tree or brush trimming to provide adequate sight distance to sign and signals shall be provided as determined by the Engineer. Payment for this work shall be included in the lump sum bid for CMS 614 - Maintaining Traffic.

PAVEMENT MARKING AND RAISED PAVEMENT MARKERS (RPMs)

5A. If a lane closure of greater than 3 days is required, then the following shall be performed:

a) Existing conflicting pavement markings shall be removed or covered as per CMS 614.11G.
b) Existing conflicting RPMs shall be removed.
c) 12″ work zone stop lines shall be provided.
d) Work Zone Center Lines, Double, Solid shall be provided when existing Center Line, Solid, Double is not in place.
e) Work Zone Edge Lines shall be provided.

5B. Work zone edge lines which would conflict with final traffic lanes shall be removable (CMS 740.06, Type I) tape unless the area will be resurfaced prior to completion of the project.

5C. After completion of the work, pavement markings other than CMS 740.06, Type I shall be removed in accordance with CMS 614.11I. The original marking shall be restored at no additional cost.

5D. All work zone edge lines shall be white.

PORTABLE BARRIER (PB)

6A. A tapered end section may be used at locations where the last full section of PB can be extended outside of the clear zone for approaching traffic. See Table II for clear zone widths.

6B. Where PB is located beyond the edge of the paved shoulder, the cross slope within the clear zone, including the surface on which the PB is placed, shall be graded to 10:1 or flatter. If the cross slope is steeper than 10:1, the PB shall be terminated on the paved shoulder. The PB shall be extended along the paved shoulder as necessary to satisfy the length of need, and then terminated using an impact attenuator.

6C. An impact attenuator shall be used where the last full section of PB will be located within the clear zone.

6D. When used, impact attenuators shall be installed parallel to traffic. Also, the last full section of PB, adjacent to the impact attenuator, shall be located parallel to traffic.

6E. For impact attenuator installation procedures, refer to manufacturer's installation instructions.

6F. If it is necessary to provide the Contractor with access to the work area behind the PB, an opening shall be provided behind the impact attenuator, with maximum width of 9′ between the impact attenuator and the outside edge of the paved shoulder.

6G. The opening for the Contractor shall be kept closed by placing 3 drums side-by-side across the opening near the impact attenuator. The drums shall be out of position only during ingress and egress of work vehicles and supply vehicles.

BARRIER DELINEATION

7A. PB shall be delineated as per SCD MT-101.70.

7B. Existing barrier between work zone stop lines shall be delineated with CMS 614 - Object Markers.

DRUMS / CONES

8A. Drums may be used in lieu of PB only if called for in the plans.

8B. Drum spacing shall be as follows:

a) Spacing along the two-way traffic taper shall be 10′ center-to-center.
b) Spacing along the closure shall be 40′ center-to-center within the work area.

8C. Cones may be substituted for drums as follows:

a) Cones used for daytime traffic control shall have a minimum height of 28″.
b) Cones used for nighttime traffic control shall have a minimum height of 42″.
c) Use of cones at night shall be prohibited along tapers.
d) Where cones are substituted for drums in tangent sections, intermixing of channelizing devices within the same run will not be permitted. Either cones shall be used for the entire length of the tangent section, or drums shall be used for the entire run.

8D. Provisions shall be made to stabilize the cones and drums to prevent them from blowing over.

8E. A minimum of 2 drums shall be used to close the paved shoulder.

FLASHING WARNING LIGHTS

9. Type A flashing warning lights shown on the ROAD WORK AHEAD (W20-1) signs and on the ONE LANE ROAD AHEAD (W20-4) signs are required whenever a night lane closure is necessary.

LIGHTING

10A. Lighting shall be provided when called for in the plans.

10B. If conventional type work zone lighting is provided, wattage shall be as called for in the plans.

EQUIPMENT / MATERIALS STORAGE

11. The following requirements shall apply if not located behind PB:

a) No equipment or material shall be located within the taper or buffer zone.
b) When work is being performed, all material and equipment shall be stored as per CMS 614.03.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Rangel
ADMINISTRATOR
01-17-2014
DATE

STDS. ENGINEER
Stargell

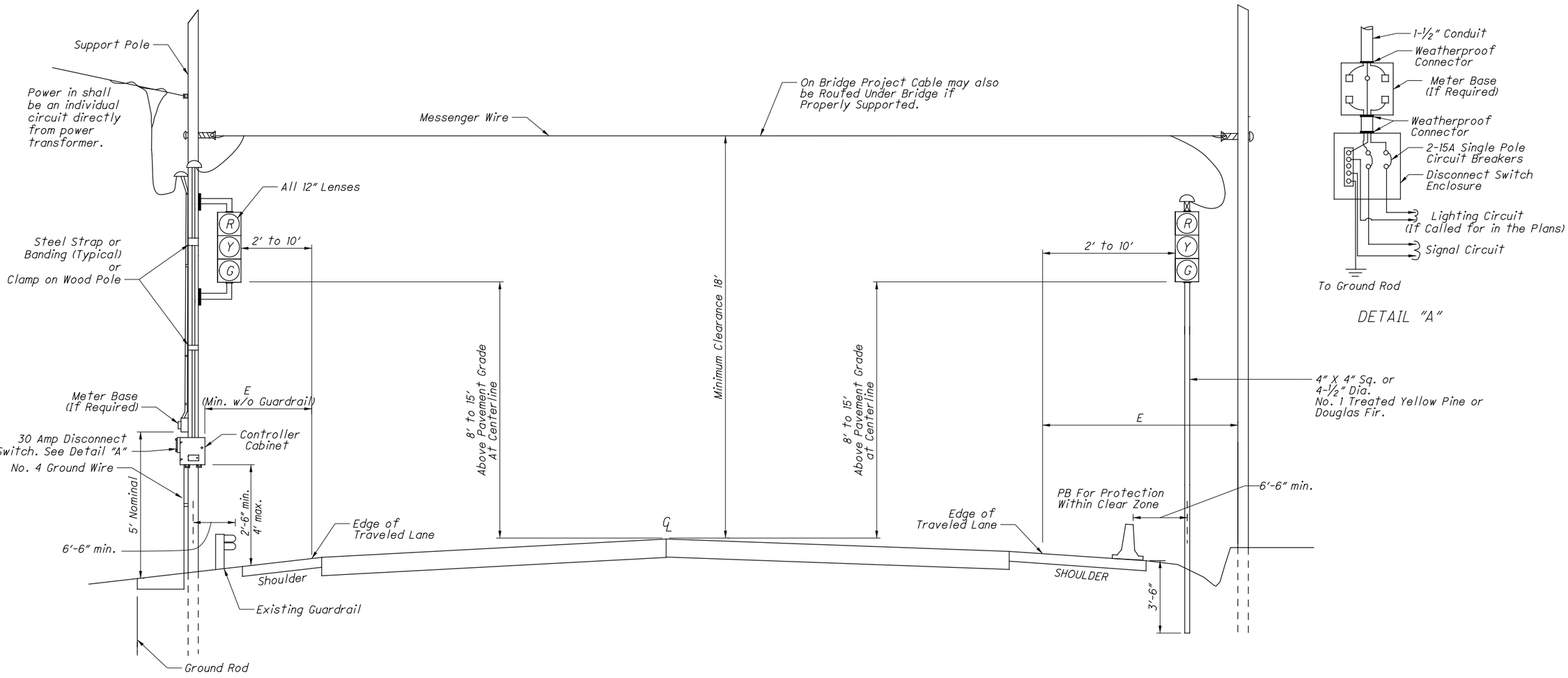
OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES MT-96.11 DATED 07-19-2013.

STANDARD ROADWAY CONSTRUCTION DRAWING

SIGNALIZED CLOSING ONE LANE OF A 2-LANE HIGHWAY

SCD NUMBER
MT-96.11

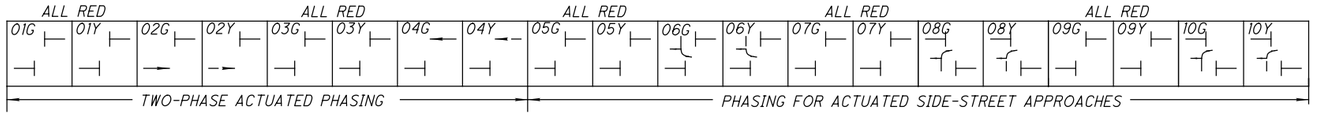


DETAIL "A"

NOTES:

1. Signal supports for work zone traffic signals shall be located outside the clear zone if not located behind guardrail or barrier, and shall also be located behind the drainage ditch where possible. See Standard Construction Drawing MT-96.11, Table II, for clear zone distance "E".
2. On bridge projects, cable may be routed under bridge as follows:

   a) Cable within reach of pedestrians shall be placed in conduit.
   b) Cable runs without conduit shall be supported at 10' intervals.
3. Imbedded loop detectors shall not be used for concrete or asphalt unless the surface is to be resurfaced as part of this work.
4. For requirements of portable traffic signals, see Supplemental Specification 961 and Supplement 1050. Portable traffic signals shall only be used when approved by the Engineer.
5. Where portable barrier (PB) is located beyond the edge of the paved shoulder, the cross slope within the clear zone, including the surface on which the PB is placed, shall be graded at 10:1 or flatter. If the cross slope is steeper than 10:1, the PB shall be terminated on the paved shoulder. The PB shall be extended along the paved shoulder as necessary to satisfy the length of need, and then terminated using an impact attenuator.



When called for in the plans, even-numbered phases shall be the green phases and shall be actuated by detectors at approach to the work zone. Odd-numbered phases shall be dummy phases to time all red interval. Timing initializes on phase one.

DETAIL "B"
TYPICAL SIGNAL PHASING

SIDE-MOUNTED SIGNAL HEADS

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

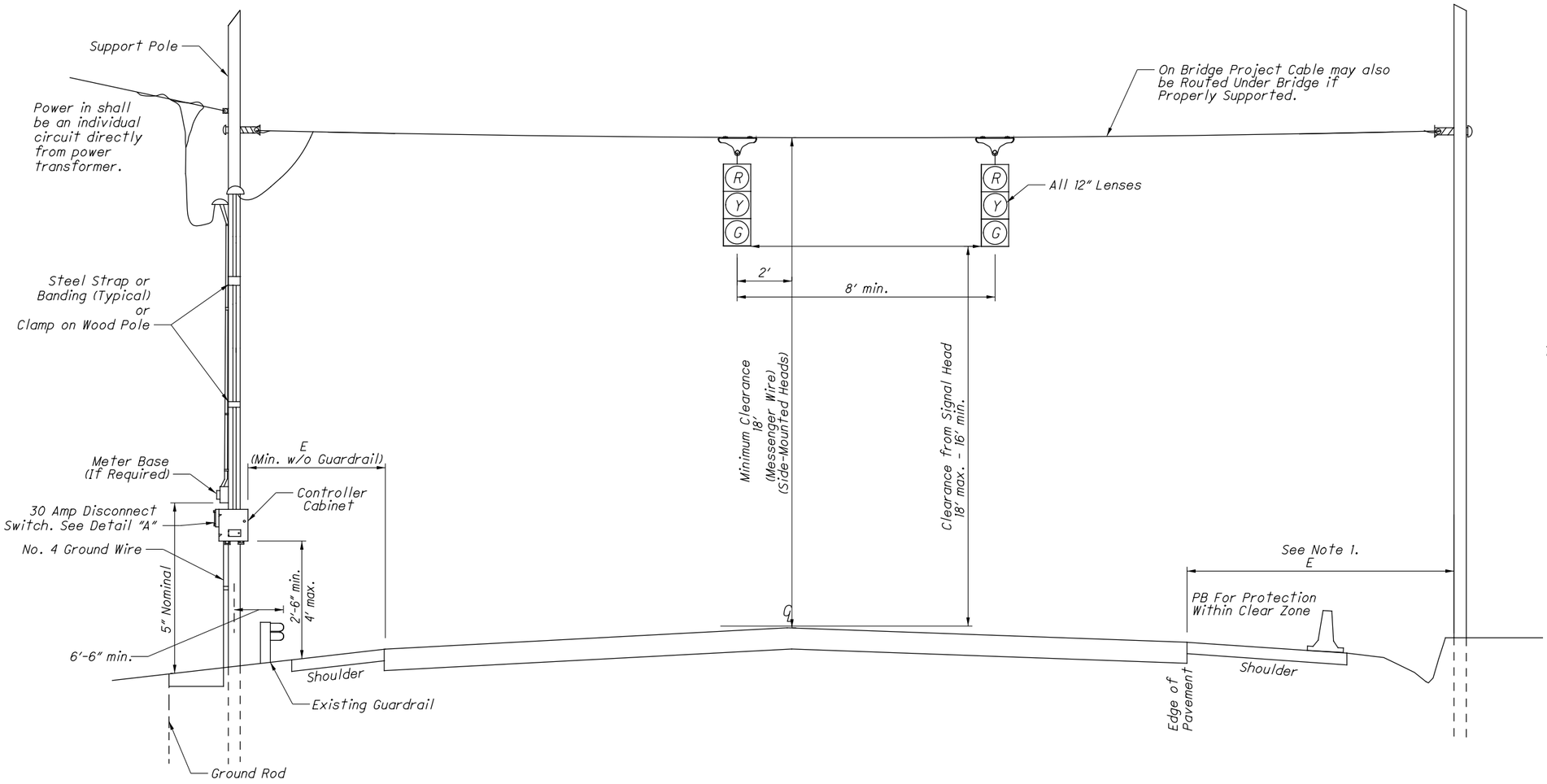
OFFICE OF ROADWAY ENGINEERING

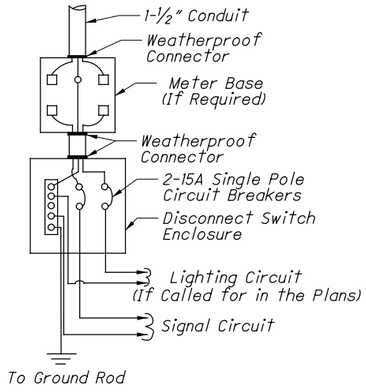
THIS DRAWING REPLACES MT-96.20 DATED 7-20-2012.

STANDARD ROADWAY CONSTRUCTION DRAWING

DETAILS FOR SIGNALIZED CLOSING ONE LANE OF A 2-LANE HIGHWAY

SCD NUMBER: MT-96.20





DETAIL "A"

NOTES:

1. Signal supports for work zone traffic signals shall be located outside the clear zone if not located behind guardrail or barrier, and shall also be located behind the drainage ditch where possible. See Standard Construction Drawing MT-96.11, Table II, for clear zone distance "E".

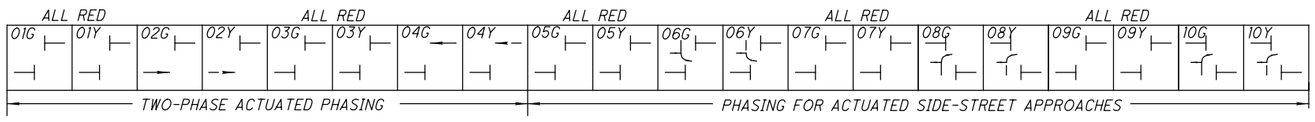
2. On bridge projects, cable may be routed under bridge as follows:

   a) Cable within reach of pedestrians shall be placed in conduit.
   b) Cable runs without conduit shall be supported at 10' intervals.

3. Imbedded loop detectors shall not be used for concrete or asphalt unless the surface is to be resurfaced as part of this work.

4. For requirements of portable traffic signals, see Supplemental Specification 961 and Supplement 1050. Portable traffic signals shall only be used when approved by the Engineer.

5. Where portable barrier (PB) is located beyond the edge of the paved shoulder, the cross slope within the clear zone, including the surface on which the PB is placed, shall be graded at 10:1 or flatter. If the cross slope is steeper than 10:1, the PB shall be terminated on the paved shoulder. The PB shall be extended along the paved shoulder as necessary to satisfy the length of need, and then terminated using an impact attenuator.



When called for in the plans, even-numbered phases shall be the green phases and shall be actuated by detectors at approach to the work zone. Odd-numbered phases shall be dummy phases to the all red interval. Timing initializes to phase one.

DETAIL "B"
TYPICAL SIGNAL PHASING

OVERHEAD-MOUNTED SIGNAL HEADS

THIS DRAWING REPLACES MT-96.20 DATED 7-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

DETAILS FOR SIGNALIZED CLOSING ONE LANE OF A 2-LANE HIGHWAY

SCD NUMBER MT-96.20

NOTES:

1. Detection may be loop, magnetometer, sonic, video or infra-red but shall be chosen, installed and operated to provide dependable accurate detection on each approach without false calls resulting from other traffic. Cabling shown is for loop detectors. However, suitable cable types, as recommended by the manufacturers, shall be used for other detectors.

2. Surge protection, as required in CMS 733.03, shall be provided for solid state electronic controllers and detectors, and as applicable to portable signals.

3. Signal cable shall be 5/c No. 14 AWG as specified in 732.19. All electrical connections to be made at terminal blocks using lock fork terminals. Splices in signal cable should be avoided but, if necessary, splice kits shall be used. All connections at splice points shall be soldered.

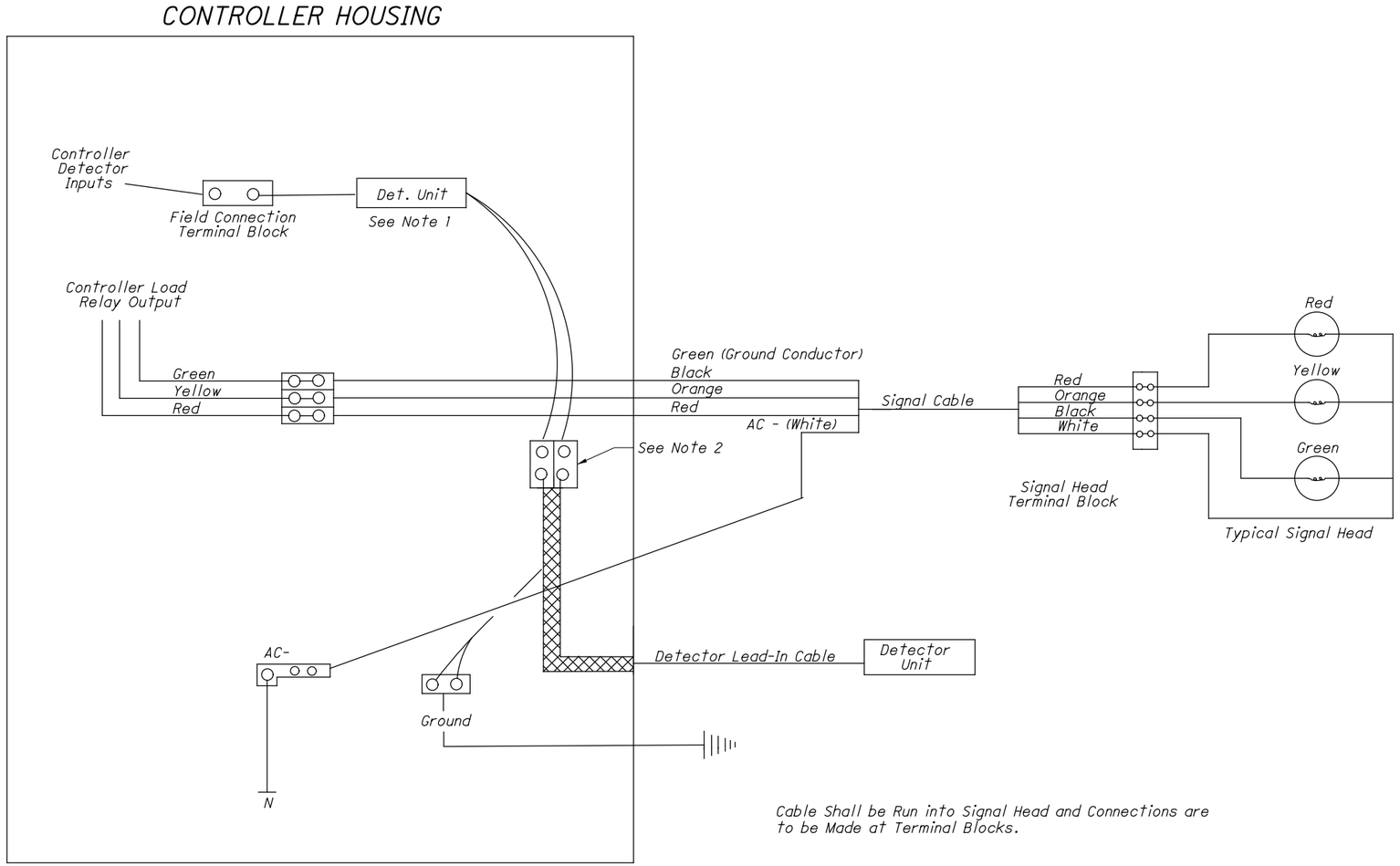
4. Typical use of conductors is as shown below. The green conductor in signal cables (conductor No. 4) shall not be used to supply power to a signal indication. It will be connected to the signal body as an equipment ground in aluminum heads and it will be unused in plastic heads. Unused conductors shall be grounded in the cabinet.

Conductor No.	Color	Vehicle Signal
1	Black	Green ball
2	White	AC neutral
3	Red	Red ball
4	Green	Equip. ground
5	Orange	Yellow ball

5. Signal timing settings shall be as shown in the plans or provided to the Contractor by the Engineer prior to implementation of signal control. The Contractor shall periodically monitor the signal operation to determine failure or inefficient operation.

6. All equipment failures including timing mechanisms and detectors shall be reported to the Engineer and fully repaired by the Contractor as soon as possible, but in no case longer than four hours following notification of the Contractor by the Engineer. All failures resulting in unsafe operations of the signal (i.e., signal or lamp failure, short-timing of yellow or all red intervals, mis-aimed signals, conflicting displays) shall result in the Contractor using 2-way radios to control traffic through the work area until the signal is fully repaired. Failures shall include situations caused by crashes, acts of nature or any other cause whether under the control of the Contractor or not.

7. If the Engineer determines that the signal operation, although in accordance with the plans and previous orders, is not providing acceptable safe and efficient movement of traffic, the Engineer shall order that appropriate changes such as timing alterations, signal or detector relocations, etc. be made to remedy the situation, at no additional cost to the State. Timing changes and signal relocations shall be implemented within four hours, detector relocations and changes within 24 hours. Failure to make required changes within these limits shall result in the non-payment for Item 614 Maintaining Traffic for each day in which such non-compliance exists at any time during such day.



Cable Shall be Run into Signal Head and Connections are to be Made at Terminal Blocks.

TYPICAL SIGNAL HEAD HOOK-UP EACH PHASE

THIS DRAWING REPLACES MT-96.26 DATED 1-16-2009.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Blune — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

TYPICAL WIRING DIAGRAM FOR ONE SIGNAL HEAD AND ONE DETECTOR

SCD NUMBER: MT-96.26

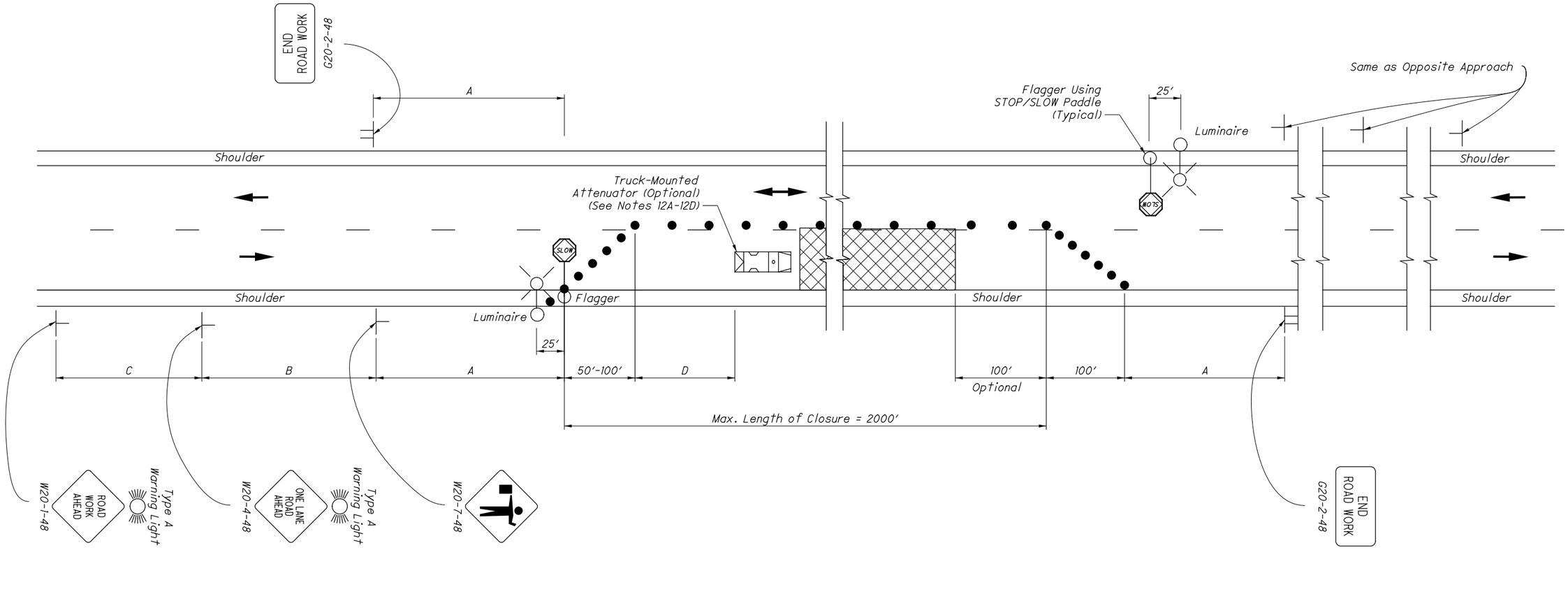


TABLE I (SIGN SPACING)

ROAD TYPE	DISTANCE BETWEEN SIGNS (FT)		
	A	B	C
Two-Lane (≤ 40 MPH)	100	100	100
Two-Lane (45-50 MPH)	350	350	350
Two-Lane (55-60 MPH)	500	500	500

TABLE II

SPEED LIMIT (MPH)	BUFFER (D) (FT) MIN.
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570

LEGEND

WORK AREA

DRUMS/CONES

DIRECTION OF TRAVEL

SHADOW VEHICLE

THIS DRAWING REPLACES MT-97.10 DATED 7-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline 7-19-2013
ADMINISTRATOR DATE

STDS. ENGINEER Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

FLAGGER CLOSING 1 LANE OF A 2-LANE HIGHWAY - STATIONARY OPERATION

SCD NUMBER MT-97.10

NOTES:

FLAGGERS

1. Flaggers, one for each direction, shall be used to control traffic continuously for as long as a one lane operation is in effect. The flaggers shall be able to communicate with each other at all times.

LENGTH OF CLOSURE

2. Several small work areas close together should be combined into one work zone. However, the closure shall not be more than 2000' long unless approved by the Engineer. The minimum length between closures shall be 2000'. Only one side of the road shall be closed in any one work zone.

SIGN LOCATION AND SPACING

3A. The minimum spacing between work zone signs is shown in Table I. Maximum spacing should not be greater than 1.5 times the distances shown in Table I.

3B. Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200' for speeds of 45 mph or less and a minimum of 400' for speeds of 50 mph or greater.

3C. The location of the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

ADJUSTMENTS FOR SIGHT DISTANCE

4. The location of the flagger station and the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

BASIC SIGNING

5A. ROAD WORK AHEAD (W20-1) signs shall be provided on entrance ramps or roadways entering the work limits.

5B. END ROAD WORK (G20-2) signs are only required for lane closures of more than 1 day. It is intended that these signs be placed on the mainline, on all exit ramps, and on roadways exiting the work limits.

5C. Overlapping of signing for adjacent projects should be avoided where the messages could be confusing. Any ROAD WORK AHEAD (W20-1) or END ROAD WORK (G20-2) sign which falls within the limits of another traffic control zone shall be omitted or covered during the period when both projects are active.

SIGNING DETAILS

6A. The Advisory Speed (W13-1P) plaque shall be used when specified in the plan.

6B. 36" warning signs may be used when the approach speed limit is 40 mph or less.

FLASHING WARNING LIGHTS

7. Type A flashing warning lights shown on the ROAD WORK AHEAD (W20-1) signs and on the LANE CLOSED AHEAD (W20-5) signs are required whenever a night lane closure is necessary.

DRUMS / CONES

8A. Drum spacing shall be as follows:

a) Spacing along the closure shall be 40' center-to-center.
b) Spacing along the approach taper shall be 10' center-to-center.

8B. Cones may be substituted for drums as follows:

a) Cones used for daytime traffic control shall have a minimum height of 28".
b) Cones used for nighttime traffic control shall have a minimum height of 42".
c) Use of cones at night shall be prohibited along tapers.

8C. Provisions shall be made to stabilize the cones and drums to prevent them from blowing over.

8D. A minimum of two drums shall be used to close the paved shoulder.

EQUIPMENT / MATERIALS STORAGE

9A. No equipment or material shall be located within the taper or buffer zone.

9B. When no work is being performed, all material and equipment shall be stored as per CMS 614.03.

AREA ILLUMINATION

10A. Adequate area illumination of each flagger station shall be provided at night. Use of portable flood lighting is acceptable. Luminaires shall be located adjacent to each flagger station.

10B. To ensure the adequacy of floodlight placement and the elimination of glare, the Contractor and the Engineer shall drive through the worksite each night when the lighting is in place. Light placement and shielding shall be adjusted to the satisfaction of the Engineer.

INTERSECTION / DRIVEWAY ACCESS

11. Within the length of closure, provision shall be made to control traffic entering from intersecting streets and major drives as necessary to prevent wrong-way movements and to keep vehicles off of new pavement not ready for traffic. The Contractor shall:

a) Place across the closed lane, either three drums (cones) or barricades, and/or
b) Provide an additional flagger at every public street intersection and major driveway.

Drums (cones) placed across the closed lane shall be located 25' beyond the projected pavement edges of the driveway or cross highway, as shown in Standard Construction Drawings (SCDs MT-97.11 or MT-97.12. For barricades, see SCD MT-101.60.

Existing STOP signs shall be relocated as necessary to assure proper location for the traffic conditions.

The method of control shall be subject to the approval of the Engineer.

SHADOW VEHICLE

12A. The shadow vehicle shall be in place and unoccupied whenever workers are in the work area. This vehicle shall be removed from the pavement whenver workers are not in the work area.

12B. The shadow vehicle shall be equipped with a high-intensity yellow rotating, flashing, oscillating, or strobe light(s).

12C. The vehicle shall be equipped with a truck-mounted attenuator when called for in the plans.

12D. Other protective devices may be used in lieu of the shadow vehicle shown when approved by the Engineer.

CHIP SEAL OPERATIONS

13. For chip seal operations, additional signing shall be incorporated in the advanced warning area.

a) The LOOSE GRAVEL (W8-7) and FRESH TAR (W21-2) signs shall both be used in advance of the chip seal operation.
b) Repeat the LOOSE GRAVEL sign with a 35 mph Advisory Speed (W13-1) plaque every half mile per CMS 422.09.
c) The FRESH TAR and the LOOSE GRAVEL signs shall both be used for signing of side roads intersecting the work area.

THIS DRAWING REPLACES MT-97.10 DATED 7-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — 7-19-2013
ADMINISTRATOR — DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

FLAGGER CLOSING 1 LANE OF A 2-LANE HIGHWAY - STATIONARY OPERATION

SCD NUMBER
MT-97.10

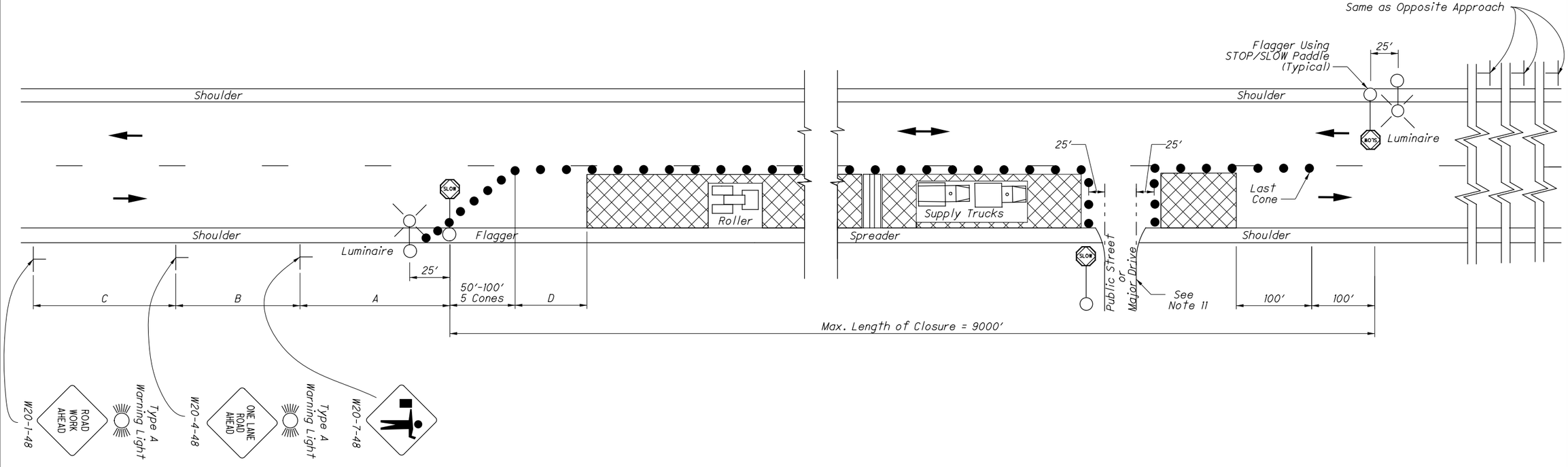


TABLE I (SIGN SPACING)

ROAD TYPE	DISTANCE BETWEEN SIGNS (FT)		
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Two-Lane (≤ 40 MPH)	100	100	100
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TABLE II

SPEED LIMIT (MPH)	BUFFER (D) (FT) MIN.
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570

LEGEND

WORK AREA

CONES

DIRECTION OF TRAVEL

THIS DRAWING REPLACES MT-97.12 DATED 7-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — 7-19-2013
ADMINISTRATOR — DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

FLAGGER CLOSING 1 LANE OF A 2-LANE HIGHWAY FOR PAVING OPERATIONS (FED)

SCD NUMBER: MT-97.12

NOTES:

FLAGGERS

1. Flaggers, one for each direction, shall be used to control traffic continuously for as long as a one lane operation is in effect. The flaggers shall be able to communicate with each other at all times.

LENGTH OF CLOSURE

2. It is required that the length of closure be kept to a minimum at all times, as directed by the Engineer, with a maximum allowable length of 9000'.

   When the ambient temperature exceeds 80 degrees Fahrenheit the Engineer may increase the maximum allowable length of closure to allow for sufficient cooling of new pavement.

   The Engineer may shorten the maximum allowable length of closure to relieve excessive traffic backups or to improve traffic operation.

SIGN LOCATION AND SPACING

3A. The minimum spacing between work zone signs is shown in Table I. Maximum spacing should not be greater than 1.5 times the distances shown in Table I.

3B. Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200' for speeds of 45 mph or less and a minimum of 400' for speeds of 50 mph or greater.

3C. The location of the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

ADJUSTMENTS FOR SIGHT DISTANCE

4. The location of the flagger station and the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

BASIC SIGNING

5A. ROAD WORK AHEAD (W20-1) signs shall be provided on entrance ramps or roadways entering the work limits.

5B. END ROAD WORK (G20-2) signs are only required for lane closures of more than 1 day. It is intended that these signs be placed on the mainline, on all exit ramps, and on roadways exiting the work limits.

5C. Overlapping of signing for adjacent projects should be avoided where the messages could be confusing. Any ROAD WORK AHEAD or END ROAD WORK sign which falls within the limits of another traffic control zone shall be omitted or covered during the period when both projects are active.

SIGNING DETAILS

6A. The Advisory Speed (W13-1P) plaque shall be used when specified in the plan.

6B. 36" warning signs may be used when the approach speed limit is 40 mph or less.

FLASHING WARNING LIGHTS

7. Type A flashing warning lights shown on the ROAD WORK AHEAD (W20-1) signs and on the LANE CLOSED AHEAD (W20-5) signs are required whenever a night lane closure is necessary.

CONES

8A. Cone spacing shall be as follows:

   a) Spacing along the buffer and along the work space (entire closed length beyond the buffer) shall be 40' center-to-center.
   b) Spacing along the approach taper shall be 10' center-to-center.

8B. Cone sizes shall be as follows:

   a) Cones used for daytime traffic control shall have a minimum height of 28".
   b) Cones used for nighttime traffic control shall have a minimum height of 42".

8C. Provisions shall be made to stabilize the cones to prevent them from blowing over.

8D. A minimum of two cones shall be used to close the paved shoulder.

EQUIPMENT / MATERIALS STORAGE

9A. No equipment or material shall be located within the taper or buffer zone.

9B. When no work is being performed, all material and equipment shall be stored as per CMS 614.03.

AREA ILLUMINATION

10A. Adequate area illumination of each flagger station shall be provided at night. Use of portable flood lighting is acceptable.

10B. To ensure the adequacy of floodlight placement and the elimination of glare, the Contractor and the Engineer shall drive through the worksite each night when the lighting is in place. Light placement and shielding shall be adjusted to the satisfaction of the Engineer.

INTERSECTION / DRIVEWAY ACCESS

11. Within the length of closure, provision shall be made to control traffic entering from intersecting streets and major drives as necessary to prevent wrong-way movements and to keep vehicles off of new pavement not ready for traffic. The Contractor shall:

   a) Place across the closed lane, either three cones or barricades, and/or
   b) Provide an additional flagger at every public street intersection and major driveway.

   Cones placed across the closed lane shall be located 25' beyond the projected pavement edges of the driveway or cross highway. For barricades, see Standard Construction Drawing MT-101.60.

   Existing STOP signs shall be relocated as necessary to assure proper location for the traffic conditions.

   The method of control shall be subject to the approval of the Engineer.

CHIP SEAL OPERATIONS

12. For chip seal operations, additional signing shall be incorporated in the advance warning area.

   a) The LOOSE GRAVEL (W8-7) and FRESH TAR (W21-2) signs shall both be used in advance of the chip seal operation.
   b) Repeat the LOOSE GRAVEL sign with a 35 mph Advisory Speed (W13-1) plaque every half mile per CMS 422.09.
   c) The LOOSE GRAVEL and FRESH TAR signs shall both be used for signing of side roads intersecting the work area.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — 7-19-2013
ADMINISTRATOR — DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES MT-97.12 DATED 7-20-2012.

STANDARD ROADWAY CONSTRUCTION DRAWING

FLAGGER CLOSING 1 LANE OF A 2-LANE HIGHWAY FOR PAVING OPERATIONS (FED)

SCD NUMBER: MT-97.12

PAVEMENT MARKING OPERATION PROCEDURES

NOTES:

GENERAL

1A. In addition to CMS 614, traffic shall be maintained in accordance with the following requirements.

1B. The purpose of the following requirements for traffic control for pavement marking operations is to provide safety for highway users, workers and equipment and to protect the markings from damage during application.

1C. These requirements are the required minimums. If at any time during the application of markings it is found by the Engineer that these minimum traffic control requirements are not achieving the necessary safety and marking protection, additional traffic control shall be implemented at no additional cost.

1D. The Engineer may suspend work in order to relieve traffic congestion at any time.

1E. No work shall be done during peak hours or during any other times which could result in excessive queuing, as determined by the Engineer.

1F. Vehicles transporting flammable pavement marking materials (material supply vehicles) shall not be utilized for lead or trail vehicles or for power broom equipment.

1G. All pavement marking application, protection and support equipment following the line marking machine shall have the traffic control equipment of a shadow vehicle.

1H. Line marking machines shall not be used for sign and cone placement.

CONES AND WET PAINT - KEEP OFF SIGNS

2A. Cones and WET PAINT - KEEP OFF (R11-H6-24) signs shall be placed to protect the line whenever the track-free time exceeds 2 minutes.

2B. These devices shall not be removed until the line has dried to a track-free condition.

2C. Retrieval equipment shall have the traffic control equipment of a shadow vehicle.

2D. Cones shall have a minimum height of 28".

2E. Cones shall be spaced at a maximum distance of 200' to protect the wet line. In areas of traffic congestion, on curves, and at other locations where tracking of the wet line is expected, closer spacings may be required.

2F. The WET PAINT - KEEP OFF (R11-H6-24) signs shall be placed facing traffic as follows:

a) The beginning and end of line application,
b) All side and cross roads, and
c) Maximum intervals of one mile.

2G. When line markings require greater than a two minute drying time or when the actual field conditions exceed two minute drying time, the lane from which the line marking machine applies line markings shall be closed until the line has dried to a totally track-free condition.

IMMOBILE OPERATIONS

3A. When loading material, cleaning or performing other operations in the field, every effort shall be made to have all equipment completely off of the traveled way.

3B. When it becomes necessary to enter upon private property, permission shall be obtained in advance.

3C. When the Contractor cannot remove his equipment from the traveled way, all traffic control devices on the vehicles shall be in operation and flaggers and vehicles shall be stationed to protect the work site and the traveling public.

3D. Two-way traffic shall be maintained.

3E. Flaggers shall be equipped in accordance with CMS 614.08.

AUXILIARY MARKINGS

4. Pavement preparation and placing of auxiliary markings are considered to be stationary operations and traffic control shall be in accordance with plan details, standard construction drawings and the Ohio Manual of Uniform Traffic Control Devices (OMUTCD).

NIGHTTIME OPERATION

5A. Nighttime operation is defined to include the time from sunset to sunrise, and at any other time when there are unfavorable atmospheric conditions or when there is not sufficient natural light to render discernable persons, vehicles, and substantial objects on the highway at a distance of 1000'.

5B. During nighttime conditions the following traffic control shall be provided:

a) Cones shall be reflectorized or equipped with lighting devices for maximum visibility (see OMUTCD 6F.64), and
b) The guide and side-mounted carriages shall be illuminated.

5C. The presence of highway lighting does not waive these requirements.

FLASHING ARROW BOARD

6A. A Type B flashing arrow board shall be from the ODOT approved list. For more information, refer to Supplemental Specification 921 "Arrow Boards."

6B. Arrow boards, when used on two-lane, two-way roadways shall be displayed only in the caution mode.

6C. When not in use, arrow boards shall be tilted horizontally or covered.

TRUCK-MOUNTED ATTENUATOR (TMA)

7A. When called for in the plans the shadow vehicle(s) shall be equipped with a TMA. The TMA must bring a vehicle weighing about 1800 to 4500 pounds and traveling at 60 mph to a safe, controlled stop, per NCHRP criteria.

7B. A shadow vehicle with TMA should be used in accordance with manufacturer's specifications and must meet NCHRP 350 with acceptable written manufacturer certification submitted to the Engineer before the devices are used on the project.

THIS DRAWING REPLACES MT-99.20 DATED 07-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING
TRAFFIC CONTROL FOR LONG LINE PAVEMENT MARKING OPERATIONS

SCD NUMBER MT-99.20

PAVEMENT MARKING VEHICLES AND EQUIPMENT

LEAD VEHICLE

8A. A lead vehicle shall be used to warn opposing traffic of the approach of center line and other marking equipment when this equipment extends into the adjacent opposing traffic lane.

8B. The lead vehicle shall precede the "left-of-center" marking equipment a distance that will provide advance safe warning to approaching traffic.

8C. The operator of this unit shall drive ahead of the crest of a vertical curve or around a horizontal curve and wait until the "left-of-center" marking equipment nears and then proceed, maintaining an advance location of 400′ to 600′.

8D. A lead vehicle shall be equipped with the following traffic control devices:

a) A high-intensity yellow rotating, flashing, oscillating, or strobe light(s), clearly visible a minimum of one quarter mile.
b) Lighted headlights and taillights, and
c) A KEEP RIGHT (W24-H4-48) sign and WET PAINT (W24-H3-48) sign mounted a minimum of 5′ above the road surface measured to the bottom of the sign, and visible to opposing traffic.

POWER BROOM EQUIPMENT

9. Power broom equipment shall be equipped and operated during pavement preparations with the following traffic traffic control devices:

a) A high-intensity yellow rotating, flashing, oscillating, or strobe light(s), clearly visible a minimum of one quarter mile.
b) Lighted headlights and taillights, and
c) A Type B flashing arrow board, displayed to the rear, mounted a minimum of 7′ above the road surface, measured to the bottom of of the board.

VEHICLE FOR LAYOUT AND PREMARKING

10. The vehicle used in layout and premarking shall be equipped and operated with the following equipment:

a) A high-intensity yellow rotating, flashing, oscillating, or strobe light(s), clearly visible a minimum of one quarter mile.
b) Lighted headlights and taillights, and
c) A KEEP RIGHT (W24-H4-48) sign mounted a minimum of 5′ above the road surface measured to the bottom of the sign, and visible to opposing traffic.

LINE MARKING MACHINE

11A. All traffic line marking machines shall be equipped and operated with the following traffic control equipment:

a) Three high-intensity yellow rotating, flashing, oscillating, or strobe lights, clearly visible a minimum of one quarter mile, one forward, one on the right rear and one on the left rear of the vehicle.

b) Any one of the following two:

1) A Type B flashing arrow board displayed to the rear, mounted a minimum of 7′ above the road surface, measured to the bottom of the board.

or

2) A DO NOT PASS (R11-H7-48) sign visible to the rear during center line marking on two-lane, two-way roadways and mounted a minimum of 7′ above the road surface, measured to the bottom of the sign. This sign may be used to cover the arrow board when used on two-lane, two-way roadways.

11B. A WET PAINT with Arrow (W24-H2a-24 or W24-H2-48) sign shall face the rear as follows:

a) The sign shall be positioned with the arrow pointing to the wet line.
b) When used, a W24-H2a-24 sign shall be mounted on the side of the vehicle nearest the wet marking material.
c) W24-H2a-24 and W24-H2-48 signs shall be mounted a minimum of 1′ above the road surface, measured to the bottom of the signs.

11C. A KEEP RIGHT (W24-H4-48) sign and WET PAINT (W24-H3-48) sign mounted a minimum of 5′ above the road surface, measured to the bottom of the sign facing opposing traffic when this unit extends into the adjacent opposing traffic lane.

11D. The guide and side-mounted marking carriages shall each be equipped with a clean red flag not less than 24″ square and fastened to a staff of sufficient length so as to permit the flag to move freely of any obstruction.

SHADOW VEHICLE

12A. When required, a shadow vehicle shall be positioned at the track-free end of the wet line.

12B. Shadow vehicles shall be equipped and operated with the following traffic control equipment (Also see Figure 6H-17 & 6H-35 in the OMUTCD):

a) A high-intensity yellowrotating, flashing, oscillating, or strobe light(s), clearly visible a minimum of one quarter mile.

b) Any one of the following two:

1) A Type B flashing arrow board, displayed to the rear, mounted a minimum of 7′ above the road surface, measured to the bottom of the board.

or

2) A DO NOT PASS (R11-H7-48) sign visible to the rear during center line marking on two-lane, two-way roadways and mounted a minimum of 7′ above the road surface, measured to the bottom of the sign. This sign may be used to cover the arrow panel when used on two-lane, two-way roadways.

12C. A WET PAINT with Arrow (W24-H2a-24 or W24-H2-48) sign shall face the rear as follows:

a) The sign shall be positioned with the arrow pointing to the wet line.
b) When used, W24-H2a-24 shall be mounted on the side of the vehicle nearest the wet marking material.
c) W24-H2a-24 signs shall be mounted a minimum of 1′ above the road surface and W24-H2-48 shall be mounted a minimum of 5′ above the road surface, both measured to the bottom of the sign.

MINIMUM PAVEMENT MARKING TRAFFIC CONTROL EQUIPMENT REQUIREMENTS

This table indicates the traffic control equipment which shall be furnished for each type of long line pavement marking operation. In addition, the type of traffic control equipment which shall be furnished when directed by the Engineer is indicated.

EQUIPMENT	PAVEMENT MARKING LINE TYPE (1)					
	CENTER LINE		EDGE LINE		LANE LINE (2) CHANNELIZING LINE (3)	
	LONGER THAN 2 MIN. DRY	2 MIN. OR LESS DRY	LONGER THAN 2 MIN. DRY	2 MIN. OR LESS DRY	LONGER THAN 2 MIN. DRY	2 MIN. OR LESS DRY
LEAD VEHICLE	A	A	C	C	C	C
POWER BROOM EQUIPMENT	B	B	A	A	B	B
LINE MARKING MACHINE	A	A	A	A	A	A
SHADOW VEHICLE	D	A	D	A	LANE CLOSURE REQUIRED (28" CONES REQUIRED)	A
SHADOW VEHICLE (ADDITIONAL)	C	B	C	B		A
SHADOW VEHICLE (SIGN AND CONE RETRIEVAL)	A	C	A	C		C
SHADOW VEHICLE (SHADOW FOR RETRIEVAL)	A	C	A	C		C

(1) For equipment requirements for auxiliary marking operations see the plans and OMUTCD Part 6.

(2) Includes both dashed and solid lane lines.

(3) Channelizing line segments of 200′ or less shall be considered auxiliary markings, except when applied as components of gore markings sprayed in moving operations separate from the application of transverse lines.

A	Required equipment
B	Equipment required when directed by the engineer
C	Not required
D	Required equipment for sign and cone placement

THIS DRAWING REPLACES MT-99.20 DATED 07-20-2012.

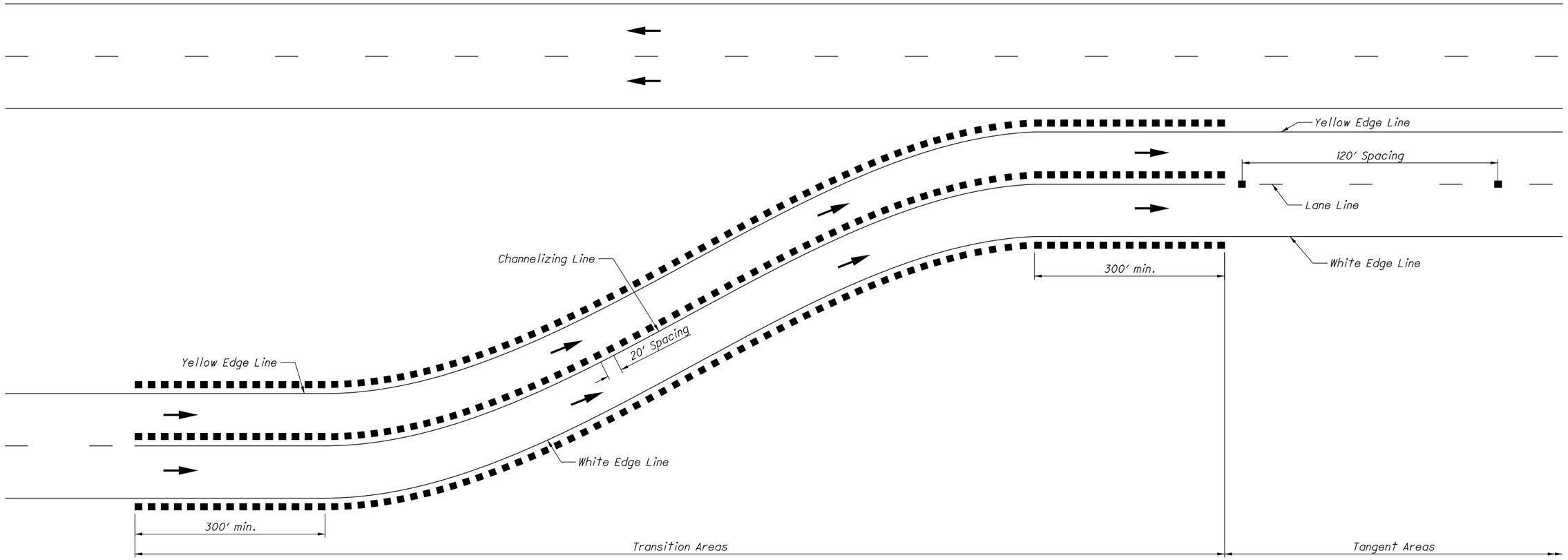
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline 7-19-2013
DATE
ADMINISTRATOR

STDS. ENGINEER Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING
TRAFFIC CONTROL FOR LONG LINE PAVEMENT MARKING OPERATIONS

SCD NUMBER MT-99.20



WORK ZONE DELINEATION FOR CROSSOVERS OR LANE SHIFTS

NOTES:

GENERAL

1. This drawing presents delineation procedures for freeways and expressways. Procedures are provided for transition areas and for tangent areas. The procedures for transitional areas apply to crossovers and to lane shifts of 4′ or greater. Delineation of transition areas for shifts of less than 4′ shall be as per the tangent area delineation.

2. All materials furnished shall be listed on the Department's Prequalified Lists.

3. The geometrics of the crossover or lane shift shall be as shown in the plans. Additional details are provided in Standard Construction Drawing (SCD) MT-95.70.

4. See SCDs MT-102.10 and MT-102.20 for more details concerning lane shifts.

5. The snow-plowing season shall be from October 15 through March 31 or as otherwise specified in the plans.

PAVEMENT MARKING

6. Raised Pavement Markers (RPMs) shall meet the following seasonal specifications:

   a) RPMs on concrete surfaces shall be 614 Work Zone Raised Pavement Markers (WZRPMs).
   b) The WZRPMs on concrete surfaces are intended for use only during the non-snow-plowing season. WZRPMs shall not be provided during the snow-plowing season. Where a temporary alignment will remain in use through the winter, the WZRPMs shall be removed prior to the beginning of snow-plowing season and replaced approximately April 1, or as otherwise determined by the Engineer.
   c) RPMs on asphalt surfaces during the normal construction season may be either 621 Raised Pavement Markers or 614 Work Zone Raised Pavement Markers (WZRPMs). The normal construction season with regard to use of WZRPMs shall be the period from April 1 through October 15.
   d) On asphalt surfaces where it is intended that RPMs will winter over, 621 Raised Pavement Markers shall be provided. Replacement of 614 Raised Pavement Markers shall be at the Contractor's expense.
   e) On asphalt surfaces where it is intended that work will continue beyond October 15 but will be completed prior to the beginning of snow-plowing season, 614 Work Zone Raised Pavement Markers may remain in place until such time. If project delays, not the fault of ODOT, cause work to extend into the snow-plowing season, the Contractor shall be responsible for replacing WZRPMs with 621 Raised Pavement Markers, as determined by the Engineer, at the Contractor's expense.

7. Spacing of RPMs shall be:

   a) 20′ center-to-center for all long-line marking within transition areas.
   b) Within tangent areas RPMs shall be provided only along the lane lines, spaced at 120′ center-to-center.

8. The RPMs shall be 1-way, facing oncoming traffic, and shall be white or yellow to match the color of the associated line marking.

9. Along the edge lines, the RPMs shall be offset a maximum of 4″ to the outside of the lines. Along the channelizing lines, the RPMs shall be offset to the left of the lines by no more than 1″. Along the lane lines the RPMs shall be centered between dashes.

10. The RPMs shall be removed when they are no longer appropriate.

11. Holes resulting from removal of 621 Raised Pavement Markers shall be filled as per 621.08. If removal of the 621 Raised Pavement Markers does not take place immediately after the temporary alignment becomes invalid, the reflectors within the 621 Raised Pavement Markers shall be removed.

12. Following removal of 621 Raised Pavement Markers, resurfacing of the transition shall be performed. The resurfacing shall be performed at the time the surface course is being applied. In preparation for resurfacing, the existing pavement shall be removed to a depth necessary to reach the level of the intermediate course of the proposed pavement.

LEGEND

■ RPM

→ Direction of Travel

THIS DRAWING REPLACES MT-99.30 DATED 04-15-2011.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — 7-19-2013
ADMINISTRATOR — DATE

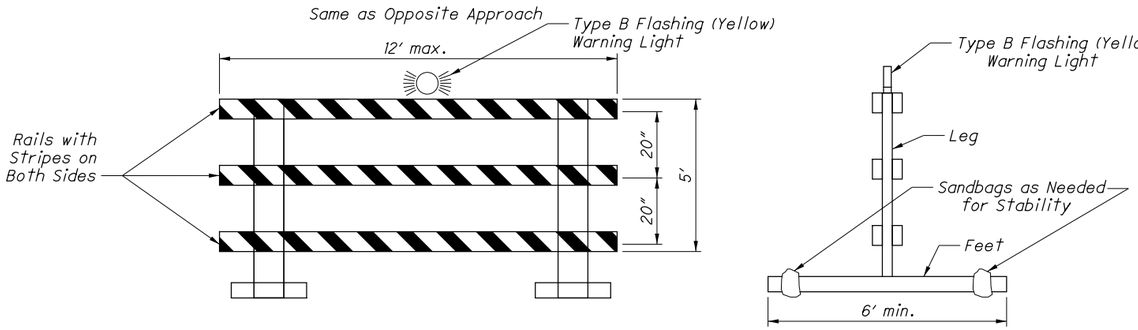
STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

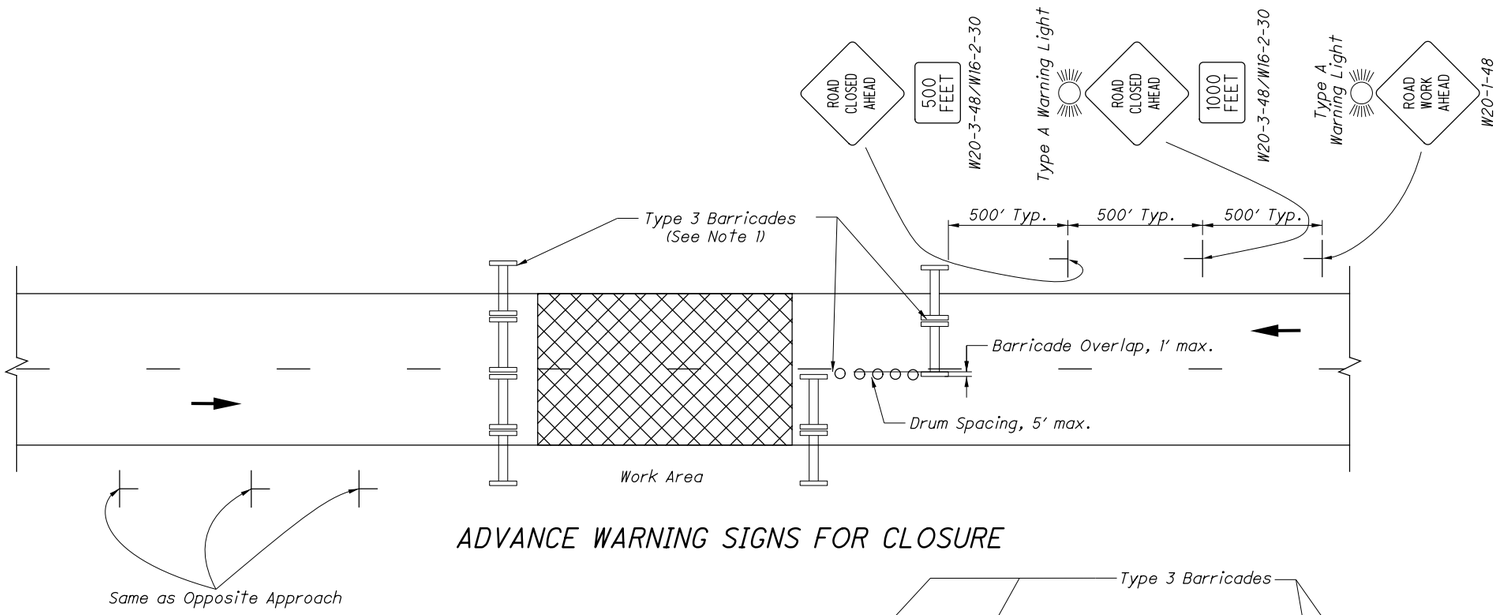
STANDARD ROADWAY CONSTRUCTION DRAWING

WORK ZONE DELINEATION

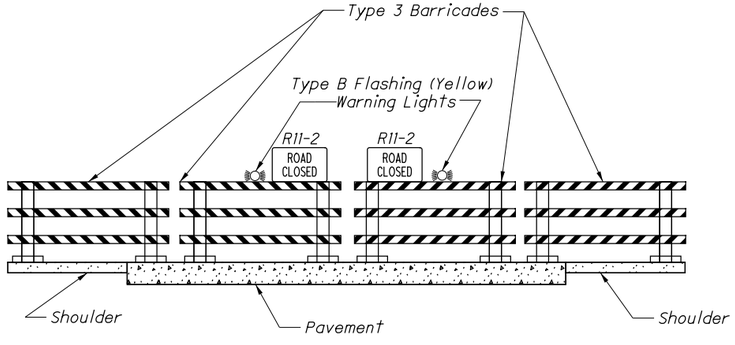
SCD NUMBER MT-99.30



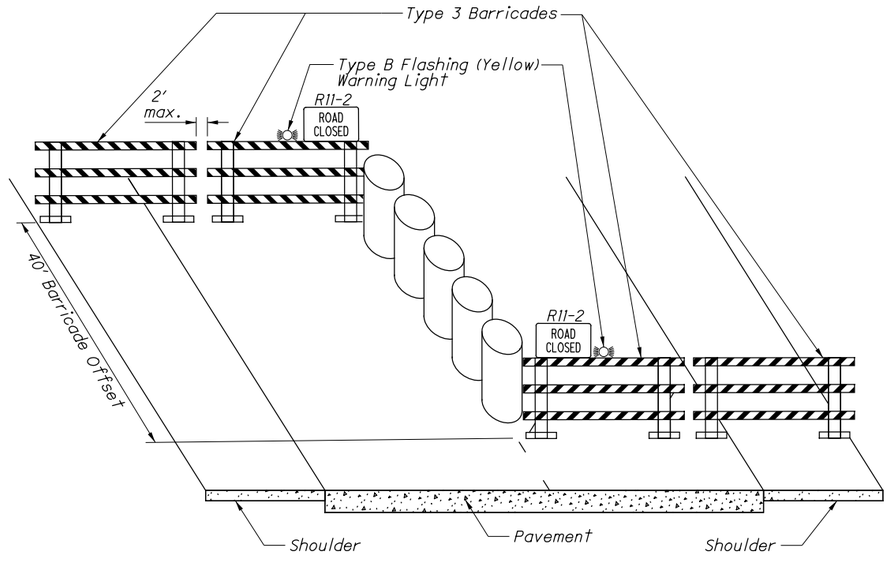
TYPE 3 BARRICADE DETAIL



ADVANCE WARNING SIGNS FOR CLOSURE



BARRICADE CLOSURE PROFILE



BARRICADE CLOSURE OFFSET OPTION

NOTES:

BARRICADE USE

1A. Barricades shall be NCHRP 350 compliant and shall be erected according to details shown. When the road is closed to traffic, barricades shall be used to effectively close the entire roadway, including the paved or aggregate shoulder.

1B. Barricades along adjacent lanes may be offset from each other as shown, with drums used to close the resulting gap. Maximum drum spacing shall be 5′.

BARRICADE REFLECTORIZATION AND COLOR

2A. In construction or maintenance areas, all rails of the barricades shall be reflectorized with orange and white reflectorized Type G sheeting in 6″ wide alternate stripes which slope downward toward the center line of the road at an angle of 45 degrees. All three rails of the barricade shall be striped on both sides. Legs and feet shall be either all white or may display the natural color of the material used.

2B. Barricades used in permanent or semi-permanent application shall differ only in that they shall use red and white stripes.

SIGNS

3A. Where the road is closed to traffic by the erection of barricades, ROAD CLOSED (R11-2) signs shall be mounted laterally as shown.

3B. The advance warning signs shown on this drawing are intended for use when the traveled way is brought to an end with no direction given to traffic. Where traffic has been directed from the permanent roadway at or just in advance of the barricades, advance signing should be provided as shown in Standard Construction Drawing MT-95.70 or Ohio Manual of Uniform Traffic Control Devices Figure 6H-7 as appropriate.

3C. Advance warning signs approaching a lane closure, as shown on these plans, shall consist of two ROAD CLOSED AHEAD (W20-3) signs with distance plaques placed about 500′ and 1000′ from the closure, and a ROAD WORK AHEAD (W20-1) sign placed about 1500′ from the closure. The signs shall be placed on both sides of the roadway for multi-lane divided highways or when required by the plans.

FLASHING WARNING LIGHTS

4A. Type A flashing warning lights are required on the ROAD WORK AHEAD (W20-1) sign and on the first ROAD CLOSED AHEAD (W20-3) sign.

4B. Type B flashing warning lights shall be provided on Type 3 Barricades, one light per each closed lane. Each light shall be conspicuously visible at all distances up to 1000′ under normal atmospheric conditions. The light shall be in operation at all times during the period the highway is closed.

OPERATION ON 2-LANE, 2-WAY ROADWAYS

5A. Where the barricade runs across the entire roadway without longitudinally offsetting sections, the Contractor will normally open only the left side of the barricade as necessary to allow the construction vehicle to enter, and then shall immediately close it. The entire barricade will not normally be opened at the same time. The Contractor shall assign an employee to assure that the barricade is closed at the end of each workday.

5B. Where the sections of the barricade are offset from each other with drums provided to close the gap (see note 1B), the Contractor may move the drums as necessary to allow the construction vehicle to enter, and then shall immediately replace the drums. The Contractor shall assign an employee to assure that the drums are in place at the end of each workday.

THIS DRAWING REPLACES MT-101.60 DATED 07-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Blume — 7-19-2013
ADMINISTRATOR — DATE

STDS. ENGINEER: Stargell

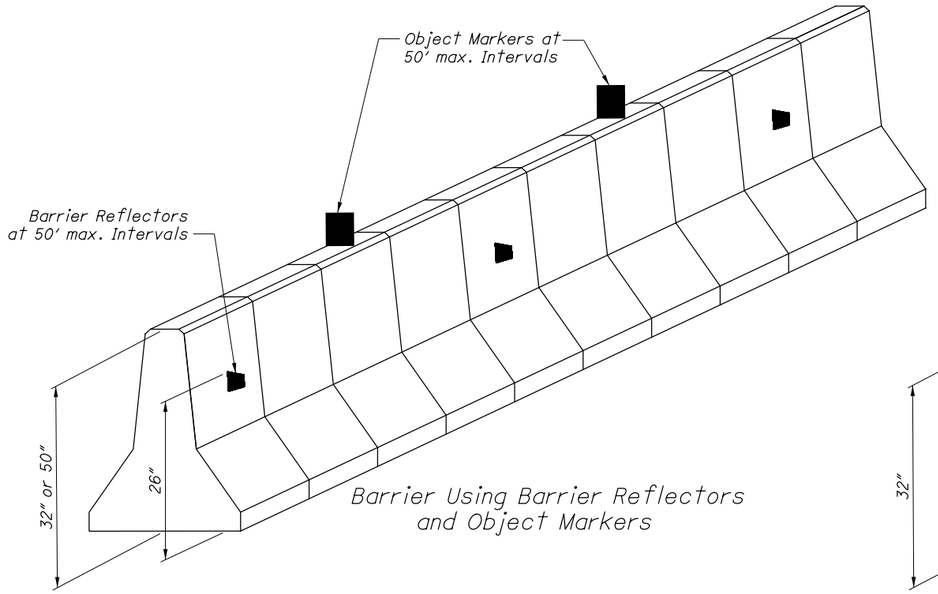
OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

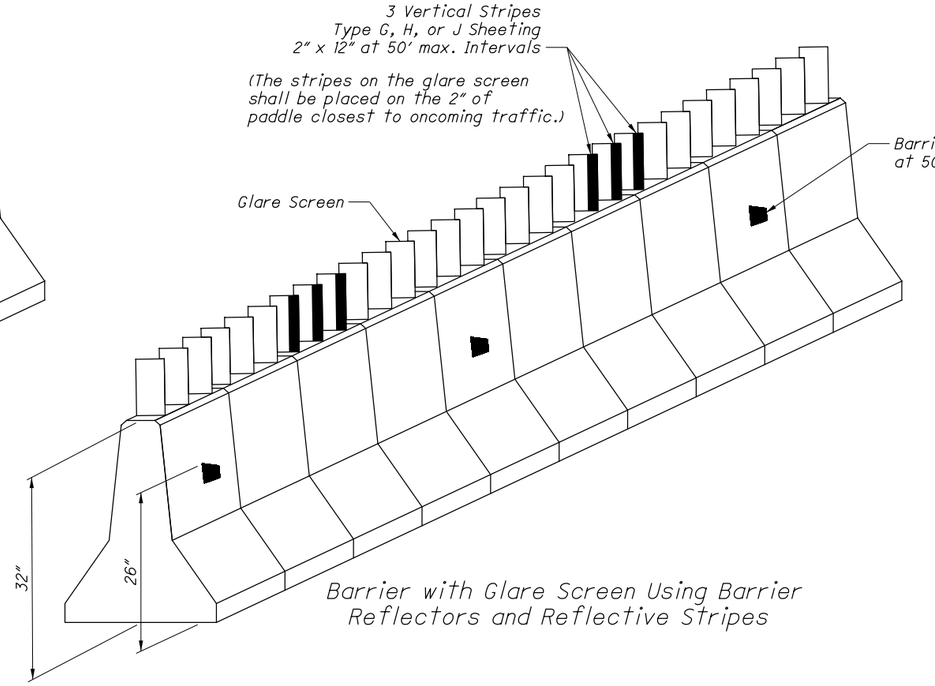
ROAD CLOSURE USING TYPE 3 BARRICADES

SCD NUMBER: MT-101.60

1 / 1

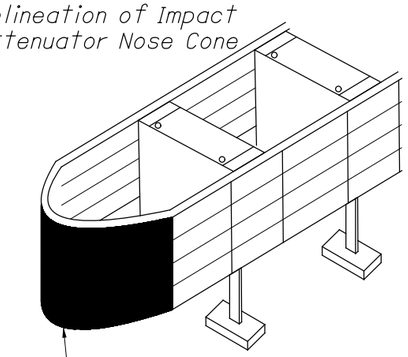


Barrier Using Barrier Reflectors
and Object Markers



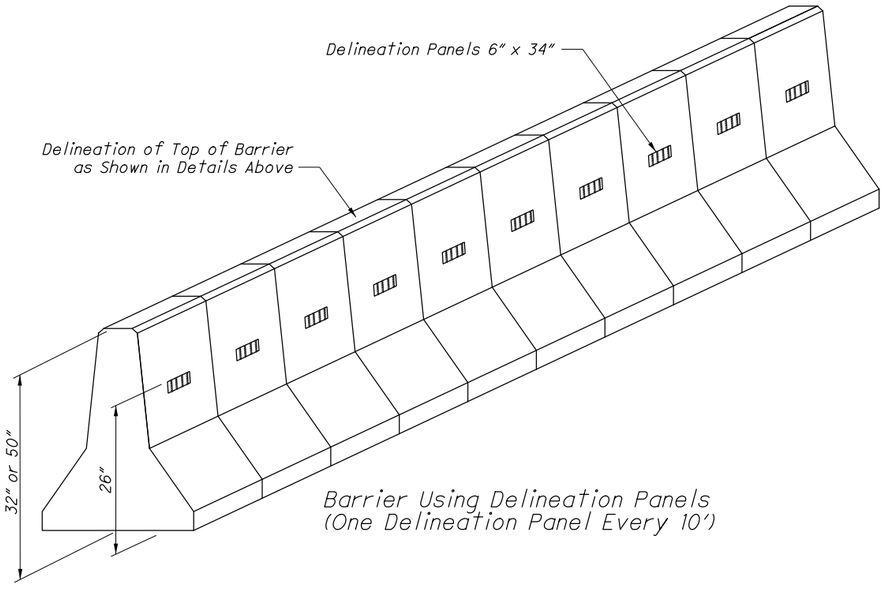
Barrier with Glare Screen Using Barrier
Reflectors and Reflective Stripes

Delineation of Impact
Attenuator Nose Cone

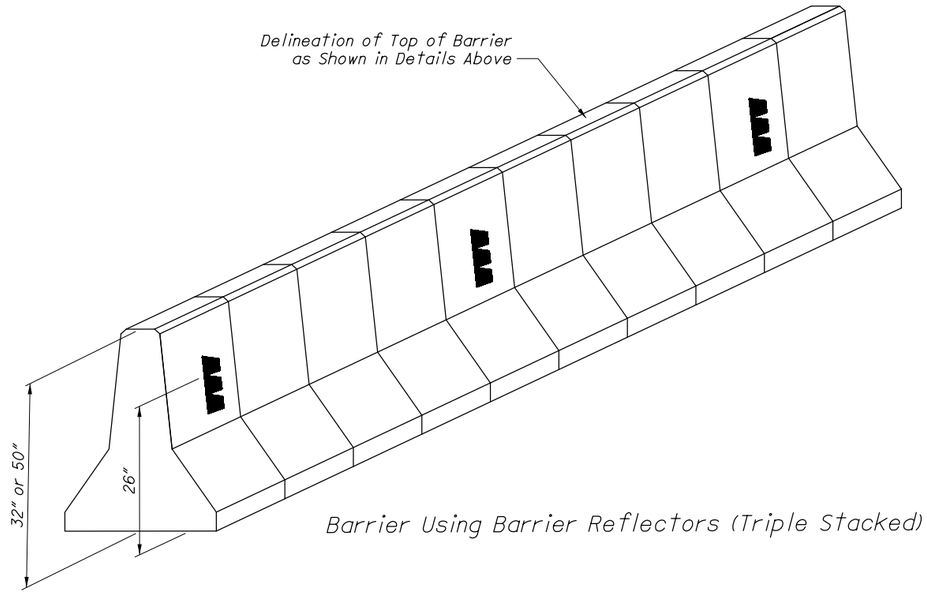


Retroreflective Surface,
Solid Fluorescent Yellow,
Without Stripes (Type G - CMS 730.19)

STANDARD BARRIER DELINEATION METHODS



Barrier Using Delineation Panels
(One Delineation Panel Every 10')



Barrier Using Barrier Reflectors (Triple Stacked)

INCREASED BARRIER DELINEATION METHODS WHEN CALLED FOR IN THE PLANS

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Atanguer 01-17-2014
ADMINISTRATOR DATE

STDS. ENGINEER Willis

OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES MT-101.70 DATED 07-19-2013.

STANDARD ROADWAY CONSTRUCTION DRAWING

BARRIER AND IMPACT ATTENUATOR DELINEATION

SCD NUMBER MT-101.70

NOTES:

1. Portable barrier (concrete or steel) shall be delineated as follows unless indicated otherwise in the plans. Permanent concrete barrier located within 5′ of the edge of the adjacent traveled lane shall also be delineated as follows unless indicated otherwise in the plans.

BARRIER TYPE	STANDARD BARRIER DELINEATION
32″ or 50″ high without glare screen	Barrier reflectors at 50′ max. center-to-center (C-C). Top mounted object markers 6″ x 12″ at 50′ max. C-C. Barrier reflectors and object markers to be alternated at 25′ spacing.
32″ high with glare screen	Barrier reflectors at 50′ max. C-C. Glare Screen delineation using sets of 3 vertical retroreflective stripes on consecutive paddles 2″ x 12″ at 50′ max. C-C of stripe sets. Barrier reflectors and glare screen delineation to be alternated at 25′ spacing C-C.

2. Either one of the following increased barrier delineation methods shall be provided when specified in the plans:

BARRIER TYPE	INCREASED BARRIER DELINEATION
	In lieu of barrier reflectors, place one section of delineation panel, crimped, 6″ x 34″ every 10′, spaced evenly along the length of the run. The top of the barrier shall be provided with object markers or with reflective stripes on glare glare screens as specified in Note 1 above.
32″ high with or without glare screen, or 50″ high without glare screen	or, Barrier reflectors are to be provided at 50′ C-C, and stacked in sets of 3 barrier reflectors per set. The locations of the barrier reflectors shall be offset from the locations of object markers or glare screen retroreflective stripes by 25′.

BARRIER REFLECTORS - VERTICAL PLACEMENT

3. The tops of the single barrier reflector shall be mounted at 26″ from the base.

4. Where sets of three barrier reflectors are stacked vertically on the barrier, there shall be no open space between the adjacent barrier reflectors in the stack. The middle reflector shall be mounted such that the top of the reflector is located at 26″ from the base. Longitudinal spacing and the alternating of barrier reflectors and object markers shall be as called for in Note 1 above.

IMPACT ATTENUATORS

5. The surface of the nose cone of the impact attenuator shall be of Type G retroreflective sheeting, as per CMS 730.19. The color of the sheeting shall be solid fluorescent yellow, without stripes. If the surface provided by the manufacturer does not meet this criteria, the nose cone shall be covered with Type G retroreflective sheeting, as per 730.19.

GLARE SCREEN PANELS

6. Delineation of the glare screen panels shall be provided by placement of vertical stripes on the glare screen. Vertical stripes, Type G, H, or J sheeting, 2″ x 12″, shall be placed in groups of three, on adjacent paddles, at intervals of 50′ C-C. Each stripe shall be placed on the 2″ of the paddle closest to and facing oncoming traffic.

7. Glare screens shall be designed using a 20 degree cut-off angle of the paddle based on tangent alignment. This cut-off angle shall be used throughout the barrier length without regard to barrier curvature.

8. Glare screen panels shall be a uniform height.

THIS DRAWING REPLACES MT-101.70 DATED 07-19-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Vazquez 01-17-2014
ADMINISTRATOR DATE

STDS. ENGINEER Willis

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

BARRIER AND IMPACT ATTENUATOR DELINEATION

SCD NUMBER MT-101.70

CONDITION I

DROP-OFFS BETWEEN ADJACENT TRAVELED LANE(S) / PAVED SHOULDER
(Freeways, Expressways, other Roadways ≥ 45 mph)

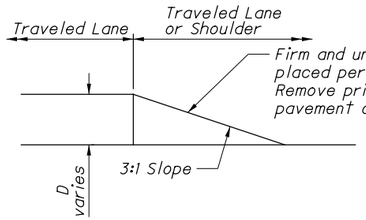
These treatments are to be used for resurfacing or pavement planing, etc. where a drop-off is located between or within traveled lanes and/or shoulder.

D	Treatment
≤ 1-½"	Erect W8-11 or W8-9 sign as appropriate.
1-½" - 3"	1) Optional Wedge Treatment; or, 2) Close a lane and/or shoulder per Condition II.
> 3"	Close a lane and/or shoulder per Condition II.

OPTIONAL WEDGE TREATMENT

(MILLING OR RESURFACING)

1. W8-9/W8-11 sign shall be used as appropriate.
2. This treatment shall not be used where a hot longitudinal joint per CMS 446 is required.



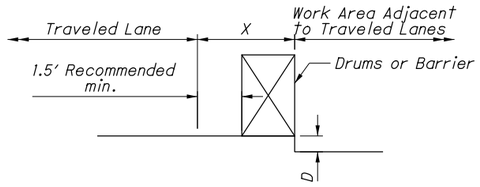
All labor, equipment, materials, and incidentals to provide and subsequently remove the pavement wedge shall be included and paid for under the lump sum bid for CMS 614 - Maintaining Traffic.

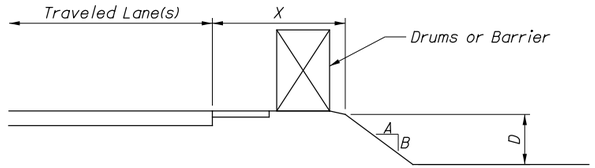
CONDITION II

DROP-OFFS BEYOND EDGE OF TRAVELED LANES / PAVED SHOULDER
(Freeways, Expressways, other Roadways ≥ 45 mph and minimal driveways)

1. The treatments indicated below are for use in conjunction with resurfacing, planing, or excavations located beyond the edge line of the traveled lanes.
2. The treatments indicated below are applicable for pavement/shoulder drop-offs and for locations where foreslopes "A/B" are steeper than 3:1.
3. Where the drop-off is located outside the clear zone, no treatment is necessary (see Table II and SCDs MT-95.30, 95.40, or 102.10).
4. Where foreslopes "A/B" are flatter than 3:1, no treatment is necessary.

D	Method of Drop-off Protection to be used to separate the traffic from the drop-off					
	Drop-off location "X" from traveled lane <4'	Drop-off location "X" from traveled lane 4' - 12'		Drop-off location "X" from traveled lane 12' - 20'		Drop-off location "X" from traveled lane 20' -30'	
		Daytime Only	Night	Daytime Only	Night	Daytime Only	Night
≤ 3"	DRUMS or OPTIONAL WEDGE TREATMENT	NONE	NONE	NONE	NONE	NONE	NONE
> 3" - 5"	DRUMS or OPTIONAL WEDGE TREATMENT	DRUMS	DRUMS	NONE	NONE	NONE	NONE
> 5" - 12"	PB	DRUMS	DRUMS	NONE	NONE	NONE	NONE
> 12" - 24"	PB	DRUMS	PB	DRUMS	DRUMS	NONE	NONE
> 24"	PB	DRUMS	PB	DRUMS	PB	DRUMS	PB



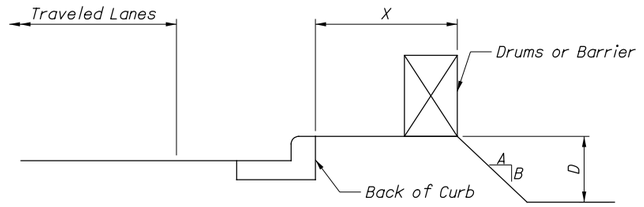


NOTES:

1. It is intended that this drawing be used for treatment of drop-offs that develop during construction operations and that are not otherwise provided for in the construction plans. Where the plans do not provide specific items for labor, equipment, or materials to implement the drop-off treatments specified herein, they shall be included for payment in the lump sum bid for CMS 614 - Maintaining Traffic.
2. Minimum lane widths shall be 10' unless otherwise specified in the plans.
3. While the need for certain advisory signing is noted herein, it is not intended that this be indicative of all signing that may be required to advise or warn motorists, and all requirements of the Ohio Manual of Uniform Traffic Control Devices (OMUTCD) must be fulfilled.
4. In urban or otherwise heavily developed areas where intersections, driveways, pedestrians and/or bicyclists may be present in significant numbers, additional signing and protective measures other than those shown herein may be required.
5. The drop-off treatment selected for use at any given location shall be as appropriate for the prevailing conditions at the site.
6. Where portable barrier is specified, it shall be in accordance with SCD RM-4.1 or 4.2 and with CMS 622.
7. For locations such as at ramps, lane shifts, lane closures, etc., where traffic is required to negotiate a difference in elevation between pavements, the Optional Wedge Treatment shall be provided.
8. Pavement Repairs (or similar work):
   a) Lengths greater than 60' - utilize appropriate treatment from Condition I.
   b) Lengths of 60' or less - repairs shall be effected in accordance with CMS 255.08. Drums may be used as a separator adjacent to the traveled lane.
9. When drums are specified for a drop-off condition, a minimum number of 4 drums shall be used. Spacing shall be as indicated in the plans or as specified in the OMUTCD. Provisions shall be made to stabilize the drums (cones) to prevent them from blowing over.
10. When UNEVEN LANES (W8-11) signs or LOW SHOULDER (W8-9) signs are required, they shall be placed 750' in advance of the condition on all intersecting entrance ramps within the limits of the condition. When the drop-off condition extends more than 0.5 miles, additional signs should be erected at intervals of 1.0 mile or less.
11. Cones may be substituted for drums as follows:
    a) Cones used for daytime traffic control shall have a minimum height of 28".
    b) Cones used for nighttime traffic control shall have a minimum height of 42".
    c) Cones used at night shall be reflectorized.
    d) Use of cones at night shall be prohibited along tapers.
    e) Intermixing of drums and cones within the same run of barrier protection shall not be permitted.
12. Where drums are used and their presence would reduce traveled lane widths to less than 10', drums may be placed on the opposite level from that of traffic, provided the drop-off depth does not exceed 5" and approval is granted by the Project Engineer.
13. Portable barrier shall be placed on the same level as the traffic surface and shall not encroach on width(s) designated as the minimum required for traffic use.

CONDITION III

DROP-OFFS BEHIND CURB WHERE CURB IS 6" OR GREATER IN HEIGHT AND THE LEGAL SPEED IS 40 MPH OR LESS



X	D	A/B	Treatment Required	
			Day	Night
0' - 10'	< 12"	Any	None	Drums
0' - 10'	> 12"	Any	Drums	Drums
>10'	Any	Any	None	None

THIS DRAWING REPLACES MT-101.90 DATED 10-19-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

DROP-OFFS IN WORK ZONES

SCD NUMBER: MT-101.90

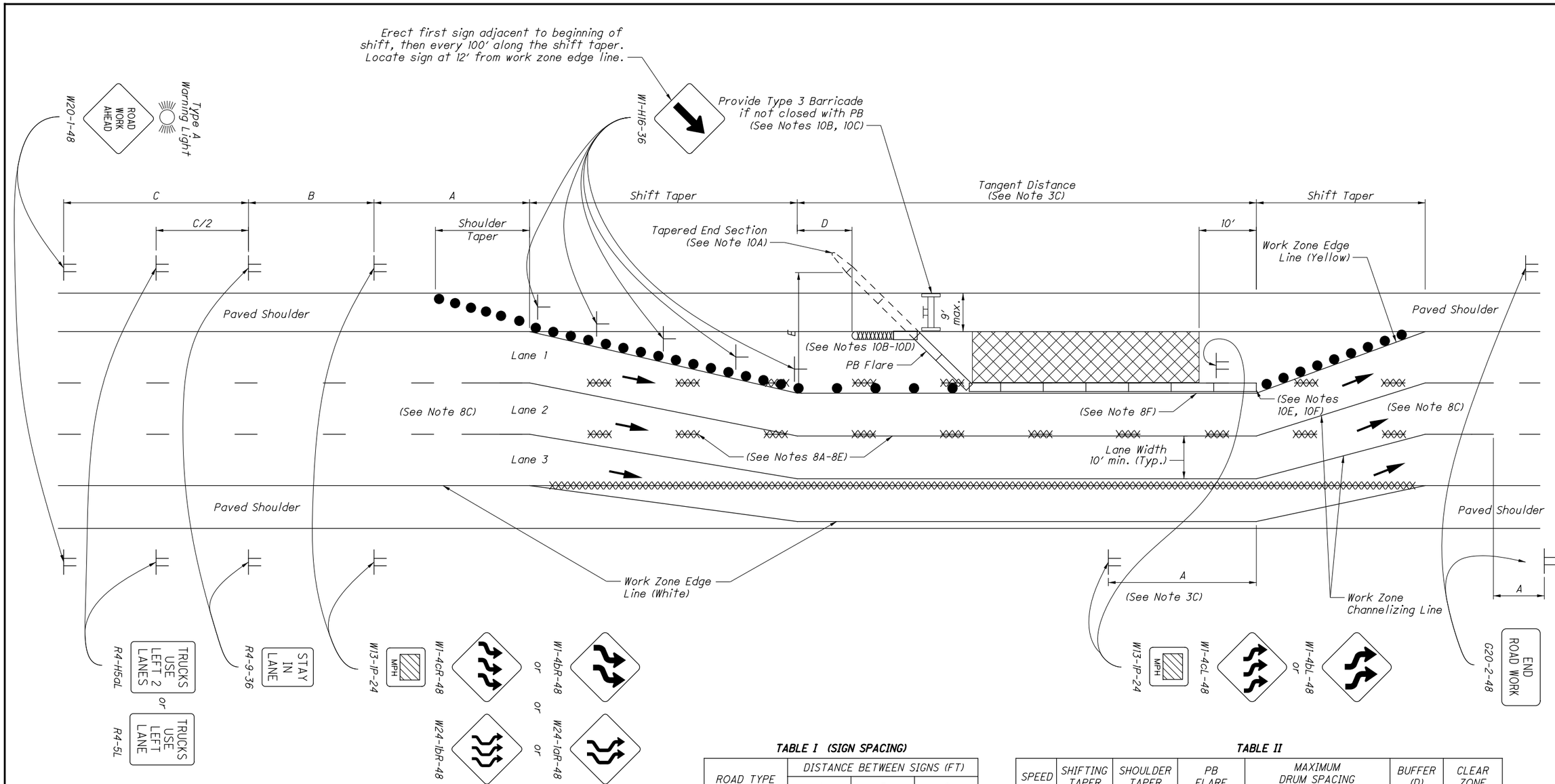


TABLE I (SIGN SPACING)

ROAD TYPE	DISTANCE BETWEEN SIGNS (FT)		
	A	B	C
MAJOR CONVENTIONAL	500	500	500
FREEWAY & EXPRESSWAY	1000	1500	2640

TABLE II

SPEED LIMIT (MPH)	SHIFTING TAPER RATE MINIMUM	SHOULDER TAPER RATE MINIMUM	PB FLARE RATE MINIMUM	MAXIMUM DRUM SPACING (FT)		BUFFER (D) (FT) MINIMUM	CLEAR ZONE WIDTH (E) (FT)
				TAPER SEC.	TANGENT SEC.		
25	11:1	4:1	8:1	25	40	155	15
30	15:1	5:1	8:1	30	40	200	15
35	21:1	7:1	9:1	35	40	250	15
40	27:1	9:1	10:1	40	80	305	15
45	45:1	15:1	12:1	45	80	360	19
50	50:1	17:1	14:1	50	80	425	19
55	55:1	19:1	16:1	55	80	495	23
60	60:1	20:1	18:1	60	120	570	30
65	65:1	22:1	19:1	65	120	645	30
70	70:1	24:1	20:1	70	120	730	30

LEGEND

- WORK AREA
- DRUMS
- PORTABLE BARRIER (PB)
- REMOVE EXISTING MARKINGS
- ATTENUATOR
- OPTIONAL TREATMENT
- DIRECTION OF TRAVEL

THIS DRAWING REPLACES MT-102.10 DATED 01-18-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Blume — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

LANE SHIFT ON A MULTI-LANE HIGHWAY USING PORTABLE BARRIER

STANDARD ROADWAY CONSTRUCTION DRAWING

SCD NUMBER: MT-102.10

NOTES:

DESIGN SPEED

1. The design speed used for taper rates should typically be the permanent legal speed. However, on construction projects for which the speed limit is reduced, the reduced speed may be used in determining the taper rate when the taper is not the first active construction area within the project.

TAPERS

2A. The minimum acceptable length for the shift taper shall be determined by multiplying the width of offset by the shift taper rate. The shift taper rate is provided in Table II.

2B. The minimum acceptable length for the shoulder taper shall be determined by multiplying the width of the shoulder by the shoulder taper rate. The shoulder taper rate is provided in Table II.

SIGN SPACING

3A. The minimum spacing between work zone signs is shown in Table I. Maximum spacing should not be greater than 1.5 times the distances shown in Table I.

3B. Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200′ for speeds of 45 mph or less and a minimum of 400′ for speeds of 50 mph or greater.

3C. If the tangent distance along the temporary diversion is less than 1000′, place the second Reverse Curve (W1-4) sign at the midpoint of the tangent (also see Notes 6C and 6F).

ADJUSTMENTS FOR SIGHT DISTANCE

4. The location of the shift taper and the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

BASIC SIGNING

5A. ROAD WORK AHEAD (W20-1) signs shall be provided on entrance ramps or roadways entering the work limits.

5B. END ROAD WORK (G20-2) signs are only required for lane closures of more than one day. It is intended that these signs be placed on the mainline, on all exit ramps, and on roadways exiting the work limits.

5C. Overlapping of signing for adjacent projects should be avoided where the messages could be confusing. Any ROAD WORK AHEAD or END ROAD WORK sign which falls within the limits of another traffic control zone shall be omitted or covered during the period when both projects are active.

SIGNING DETAILS

6A. The Advisory Speed (W13-1P) plaque shall be used when specified in the plan.

6B. 36″ warning signs may be used when the approach speed limit is 40 mph or less.

6C. Where the shifted section is longer than 600′, a Reverse Curve (W1-4) sign shall be used to show the initial shift and a second W1-4 shall be used to show the return to the normal alignment. Where the tangent distance along the shifted section is less than 600′, the Double Reverse Curve (W24-1) sign should be used in place of the first W1-4 sign. The second W1-4 sign should be omitted.

SIGNING DETAILS (cont.)

6D. Provide signing on the inactive side of the highway, as shown in Standard Construction Drawing (SCD) MT-95.30, when called for in the plans.

6E. Provide truck-use signs R4-H5a or R4-5 to keep trucks off the shoulder, unless specified otherwise in the plans or as determined otherwise by the Engineer. Where used, provide the appropriate legend (right/left) to direct truck use to the intended lane(s).

6F. For information on other related signing such as Speed Limit or Increased Penalties, see SCD MT-102.30.

DRUMS

7. The maximum drum spacing along tapers and along tangent sections shall be as shown in Table II. A minimum of 5 drums shall be used to close the upstream shoulder.

PAVEMENT MARKING / RAISED PAVEMENT MARKERS (RPMs)

8A. The existing conflicting reflectors from the RPMs shall be removed.

8B. The appropriate color work zone edge lines shall be applied. Existing conflicting pavement markings shall be removed or covered as per CMS 614.11G.

8C. Work zone pavement markings for lane shifts shall be as called for in the plans.

8D. Work zone pavement markings which would conflict with the final traffic lanes shall be removable (CMS 740.06, Type I) tape unless the area will be resurfaced prior to project completion.

8E. After completion of the work, pavement markings other than CMS 740.06, Type I shall be removed in accordance with CMS 614.11I. The original markings and raised pavement marker reflectors shall be restored at no additional cost unless separately itemized in the plans.

8F. Existing markings which will be covered by portable barrier do not need to be removed.

8G. Lane line markings between lane shifts shall be as called for in the plans.

EQUIPMENT / MATERIALS STORAGE

9A. No equipment or material shall be located within the taper or buffer zone.

9B. When no work is being performed, all material and equipment shall be stored as per CMS 614.03.

PORTABLE BARRIER (PB)

10A. A tapered end section may be used in place of the impact attenuator at locations where the last full section of PB can be extended outside of the clear zone for approaching traffic. See Table II for clear zone widths.

10B. If it is necessary to provide the Contractor with access to the work area behind the PB flare, the PB end treatment shall include an impact attenuator. The maximum width of opening shall be 9′ between the impact attenuator and the outside edge of the paved shoulder.

PORTABLE BARRIER (cont.)

10C. If Contractor access is provided as per Note 10B, the length of PB shall be adequate to shield the work area from the motorist. This length of need of PB shall be determined from the calculations provided in the L&D Manual, Volume 1, Figure 602-1E, and shall require the approval of the Engineer.

10D. When used, impact attenuators shall be installed parallel to traffic. Also, the last full section of PB, adjacent to the impact attenuator, shall be located parallel to traffic.

10E. If the PB is located within the clear zone of opposing traffic, the downstream end shall be flared away from opposing traffic (ONLY if work is on the right side of the directional roadway) to shield the work area from the potential errant vehicles crossing the median.

10F. If the PB is located beyond the clear zone of opposing traffic, the downstream end of the PB may be provided with a tapered end, located 10′ beyond the work area.

10G. Where PB is located beyond the edge of the paved shoulder, the cross section (from the edge of paved shoulder, up to and including the location of the PB) shall be graded at 10:1 or flatter.

10H. The work area shall be adequately protected from traffic approaching from intersections and driveway approaches using PB and impact attenuators as called for by the Engineer.

10I. For installation procedures, refer to manufacturer's installation instructions.

10J. For details on delineation of PB, see SCD MT-101.70.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES MT-102.10 DATED 01-18-2013.

STANDARD ROADWAY CONSTRUCTION DRAWING

LANE SHIFT ON A MULT-LANE HIGHWAY USING PORTABLE BARRIER

SCD NUMBER MT-102.10

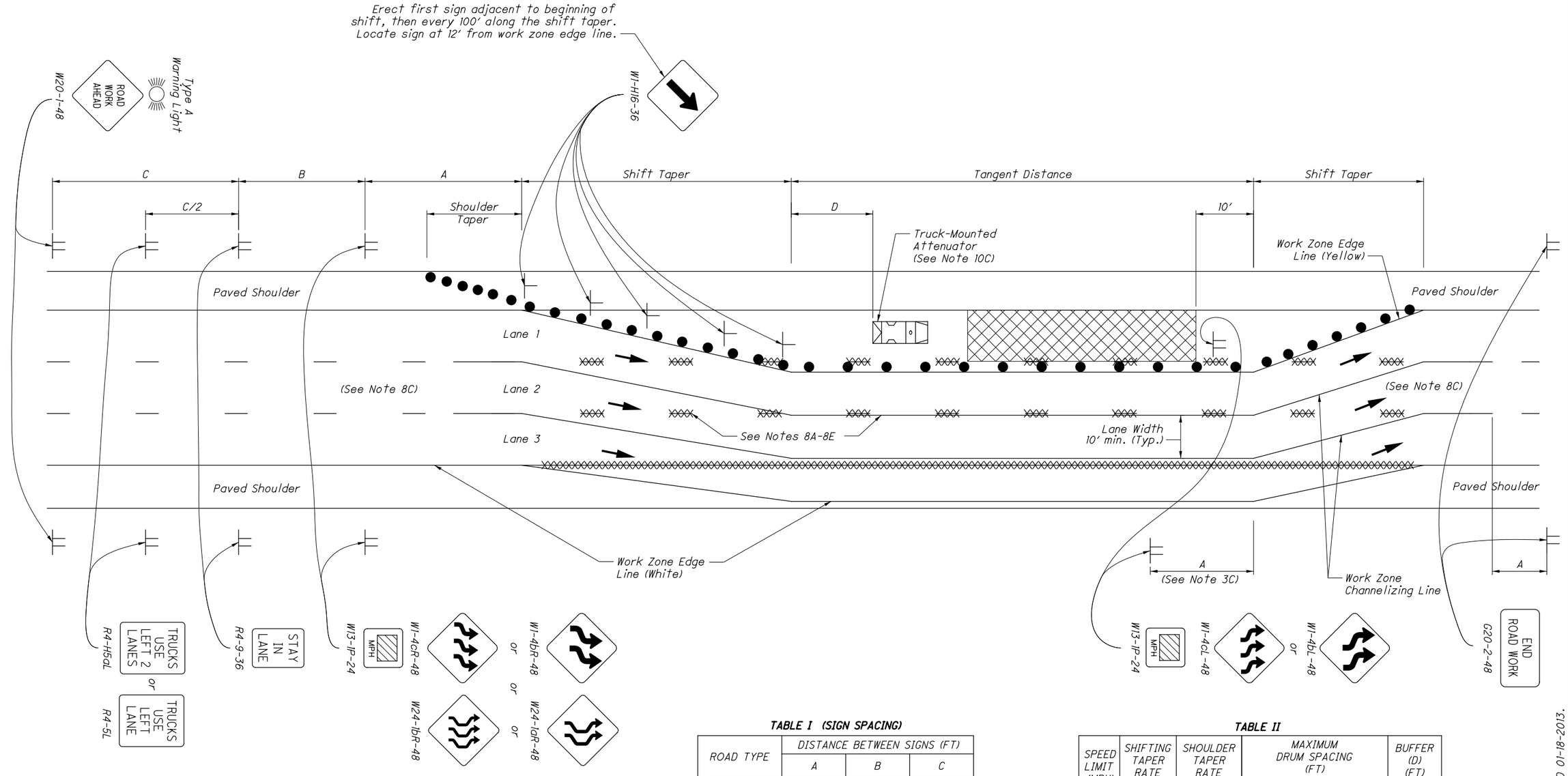


TABLE I (SIGN SPACING)

ROAD TYPE	DISTANCE BETWEEN SIGNS (FT)		
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			TAPER SEC.	TANGENT SEC.	
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30	15:1	5:1	30	40	200
35	21:1	7:1	35	40	250
40	27:1	9:1	40	80	305
45	45:1	15:1	45	80	360
50	50:1	17:1	50	80	425
55	55:1	19:1	55	80	495
60	60:1	20:1	60	120	570
65	65:1	22:1	65	120	645
70	70:1	24:1	70	120	730

LEGEND

- WORK AREA
- DRUMS
- REMOVE EXISTING MARKINGS
- DIRECTION OF TRAVEL
- SHADOW VEHICLE

THIS DRAWING REPLACES MT-102.20 DATED 01-18-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — 7-19-2013
ADMINISTRATOR — DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

LANE SHIFT ON A MULTI-LANE HIGHWAY USING DRUMS

SCD NUMBER: MT-102.20

STANDARD ROADWAY CONSTRUCTION DRAWING

NOTES:

DESIGN SPEED

1. The design speed used for taper rates should typically be the permanent legal speed. However, on construction projects for which the speed limit is reduced, the reduced speed may be used in determining the taper rate when the taper is not the first active construction area within the project.

TAPERS

2A. The minimum acceptable length for the shift taper shall be determined by multiplying the width of offset by the shift taper rate. The shift taper rate is provided in Table II.

2B. The minimum acceptable length for the shoulder taper shall be determined by multiplying the width of the shoulder by the shoulder taper rate. The shoulder taper rate is provided in Table II.

SIGN SPACING

3A. The minimum spacing between work zone signs is shown in Table I. Maximum spacing should not be greater than 1.5 times the distances shown in Table I.

3B. Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200′ for speeds of 45 mph or less and a minimum of 400′ for speeds of 50 mph or greater.

3C. If the tangent distance along the temporary diversion is less than 1000′, place the second Reverse Curve (W1-4) sign at the midpoint of the tangent (also see Notes 6C and 6F).

ADJUSTMENTS FOR SIGHT DISTANCE

4. The location of the shift taper and the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.

BASIC SIGNING

5A. ROAD WORK AHEAD (W20-1) signs shall be provided on entrance ramps or roadways entering the work limits.

5B. END ROAD WORK (G20-2) signs are only required for lane closures of more than one day. It is intended that these signs be placed on the mainline, on all exit ramps, and on roadways exiting the work limits.

5C. Overlapping of signing for adjacent projects should be avoided where the messages could be confusing. Any ROAD WORK AHEAD or END ROAD WORK sign which falls within the limits of another traffic control zone shall be omitted or covered during the period when both projects are active.

SIGNING DETAILS

6A. The Advisory Speed (W13-1P) plaque shall be used when specified in the plan.

6B. 36″ warning signs may be used when the approach speed limit is 40 mph or less.

6C. Where the shifted section is longer than 600′, a Reverse Curve (W1-4) sign shall be used to show the initial shift and a second W1-4 shall be used to show the return to the normal alignment. Where the tangent distance along the shifted section is less than 600′, the Double Reverse Curve (W24-1) sign should be used in place of the first W1-4 sign. The second W1-4 sign should be omitted.

SIGNING DETAILS (cont.)

6D. Provide signing on the inactive side of the highway, as shown in Standard Construction Drawing (SCD) MT-95.30, when called for in the plans.

6E. Provide truck-use signs R4-H5a or R4-5 to keep trucks off the shoulder, unless specified otherwise in the plans or as determined otherwise by the Engineer. Where used, provide the appropriate legend (right/left) to direct truck use to the intended lane(s).

6F. For information on other related signing such as Speed Limit or Increased Penalties, see SCD MT-102.30.

DRUMS

7. The maximum drum spacing along tapers and along tangent sections shall be as shown in Table II. A minimum of 5 drums shall be used to close the upstream shoulder.

PAVEMENT MARKING / RAISED PAVEMENT MARKERS (RPMs)

8A. The existing conflicting reflectors from the RPMs shall be removed.

8B. The appropriate color work zone edge lines shall be applied. Existing conflicting pavement markings shall be removed or covered as per CMS 614.11G.

8C. Work zone pavement markings for lane shifts shall be as called for in the plans.

8D. Work zone pavement markings which would conflict with the final traffic lanes shall be removable (CMS 740.06, Type I) tape unless the area will be resurfaced prior to project completion.

8E. After completion of the work, pavement markings other than CMS 740.06, Type I shall be removed in accordance with CMS 614.11I. The original markings and raised pavement marker reflectors shall be restored at no additional cost unless separately itemized in the plans.

8F. Existing markings which will be covered by portable barrier do not need to be removed.

8G. Lane line markings between lane shifts shall be as called for in the plans.

EQUIPMENT / MATERIALS STORAGE

9A. No equipment or material shall be located within the taper or buffer zone.

9B. When no work is being performed, all material and equipment shall be stored as per CMS 614.03.

SHADOW VEHICLE

10A. The shadow vehicle shall be in a place and unoccupied whenever workers are in the work area. This vehicle shall be removed from the pavement whenever workers are not in the work area.

10B. The shadow vehicle shall be equipped with a high-intensity yellow rotating, flashing, oscillating, or strobe light(s).

10C. The vehicle shall be equipped with a truck-mounted attenuator when called for in the plans.

THIS DRAWING REPLACES MT-102.20 DATED 01-18-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

LANE SHIFT ON A MULT-LANE HIGHWAY USING DRUMS

SCD NUMBER MT-102.20

TEMPORARY SIGN SUPPORT REQUIREMENTS

PLACEMENT OF SIGNS

1A. Lateral placement to nearest edge of signs shall be as follows:

a) On the right side of the road for approaching traffic (except for dual-mounted signs and signs designated in the plans for left-side mounting).
b) Curbed roadway - minimum 2′ behind face of curb.
c) Uncurbed roadway - 12′ from edge of traffic lane or 6′ from edge of paved or useable shoulder, whichever is greater.
d) Behind guardrail or portable barrier - See table

SIGN OFFSET

Barrier Type / Support Class	BEHIND FACE OF GUARDRAIL	BEHIND FACE OF PORTABLE BARRIER
Class A Supports	2′ Preferred 1′ Minimum	1′ Minimum*
Class B Supports	6.5′ Minimum	1′ Minimum*

*unless barrier top mounting is required by the plans

1B. Vertical clearance of signs, as measured from near side roadway edge, shall be as follows:

a) Rural - 5′ when parked cars, construction equipment, etc. will not obscure sign visibility.
b) Rural areas with parked cars or construction equipment - 7′
c) Urban - 7′
d) Care shall be taken to assure that signs will not be obscured by construction equipment, trees, weeds or other obstacles. Brush, weeds or grass within the right-of-way shall be trimmed as necessary.
e) For signing which will remain for three days or less, minimum vertical clearance shall be 1′ from the roadway to bottom of sign.

CLASSES OF SUPPORTS

2A. The Contractor shall choose sign supports of adequate strength and with adequate foundations and anchorage to support the sign sizes erected. Sign supports which fail under typical wind load conditions shall be immediately modified or replaced with a support of adequate strength.

2B. All temporary sign supports shall be of the following types:

CLASS A:

Class A supports shall include the following:

a) All No. 2 and No. 3 posts when installed singly or in pairs (side-by-side) according to the details of Standard Construction Drawings (SCDs) TC-41.10 and TC-41.20.
b) Wood posts as shown in Solid Wood Posts detail.
c) All breakaway connection beam supports, when installed according to the proper details shown on SCD TC-41.10 with a minimum clear distance between supports of 7′ for supports larger than 6 x 9.
d) Any breakaway post or post and connection which are certified as per CMS 614.03.
e) Portable supports.

Use of Class A supports shall be required at unprotected locations on ODOT's roadway system. They may also be used on other roadway systems.

CLASS B:

Class B supports shall include the following:

a) All beam type supports without breakaway connections.
b) Supports similar to but larger than permitted for Class A.

Class B supports shall be used only at the following locations:

a) Within the clear zone where protected by guardrail or concrete barrier or where positively protected from traffic such as on retaining walls.
b) Outside the clear zone.

2C. All Class A and B supports shall be NCHRP 350 compliant.

SUPPORTS AND SIGNS

3A. Supports for signs which will remain in place more than three days should be fixed rather than portable except in situations where the sign must rest on permanent pavement or other surface which would be damaged by insertion of post type supports.

3B. Portable signing, including portable supports, ballasting of the supports, and signs shall be NCHRP 350 compliant.

3C. Ballasting of portable supports shall be in accordance with NCHRP 350 testing of the subject support.

THIS DRAWING REPLACES MT-105.10 DATED 07-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR — 7-19-2013 DATE

STDS. ENGINEER: Stargell

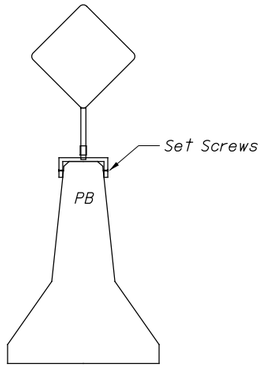
OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

TEMPORARY SIGN SUPPORT

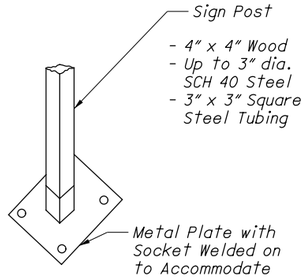
SCD NUMBER MT-105.10

CLASS A SUPPORTS FIXED



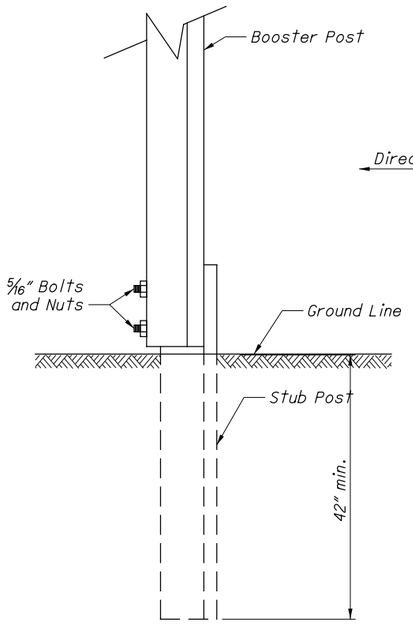
TYPE 1

Fasten to Top of PB with Expansion Bolts, etc.



TYPE 2

CLASS A SUPPORTS STUBBING STANDARD



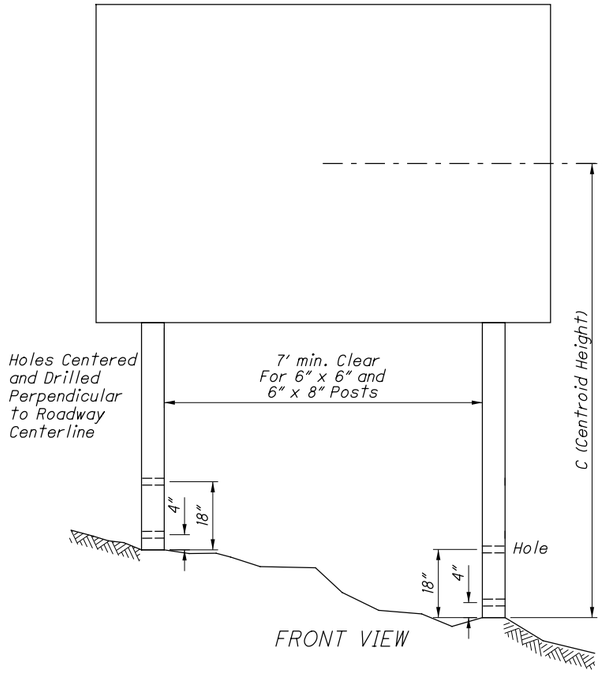
NOTES:

1. For use with No. 2 or No. 3 posts.
2. Booster post shall be the same or 1 lb/ft less than stub post.
3. When the booster post is smaller than the stub post, the booster post shall be mounted in front of the stub post.
4. When the booster post is the same size as the stub post, the booster post shall be mounted behind the stub post.
5. Bolts and nuts and other fasteners shall be steel or aluminum.
6. A minimum of two bolts and nuts or other fasteners shall be used per post assembly.
7. With steel bolts, the minimum center-to-center spacing between bolts shall be 4".
8. Stub height should be limited to 4" above the ground when using the aluminum bolts for the connection.

SOLID WOOD POSTS

TOP VIEW

When flat sheet signing is provided, bolt the flat sheet directly to the wood posts. Do not use U-Channels.

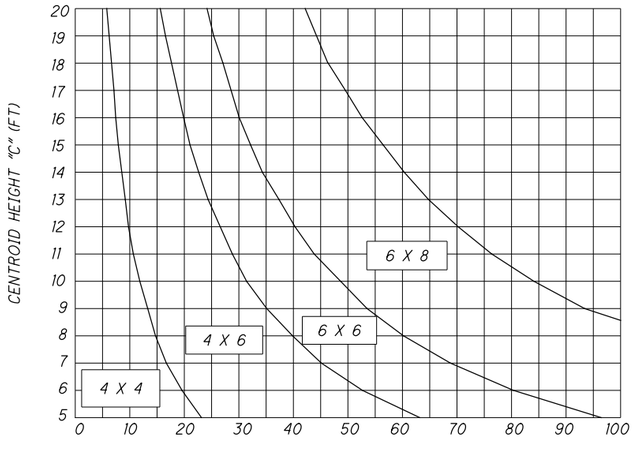


FRONT VIEW

NORMAL POST SIZE (IN)	HOLE DIAMETER (IN)	NO. OF POSTS PERMITTED IN 7' PATH IN EXPOSED LOCATIONS	MINIMUM RECOMMENDED EMBEDMENT DEPTH (FT)
4 X 4	NONE	2	3.5
4 X 6	1 ½	2	4
6 X 6	2	1	4.5
6 X 8	3	1	5

DESIGN CHART FOR WOOD POSTS TWO-POST INSTALLATIONS

(Nominal Post Size in Inches)



THIS DRAWING REPLACES MT-105.10 DATED 07-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline ADMINISTRATOR 7-19-2013 DATE

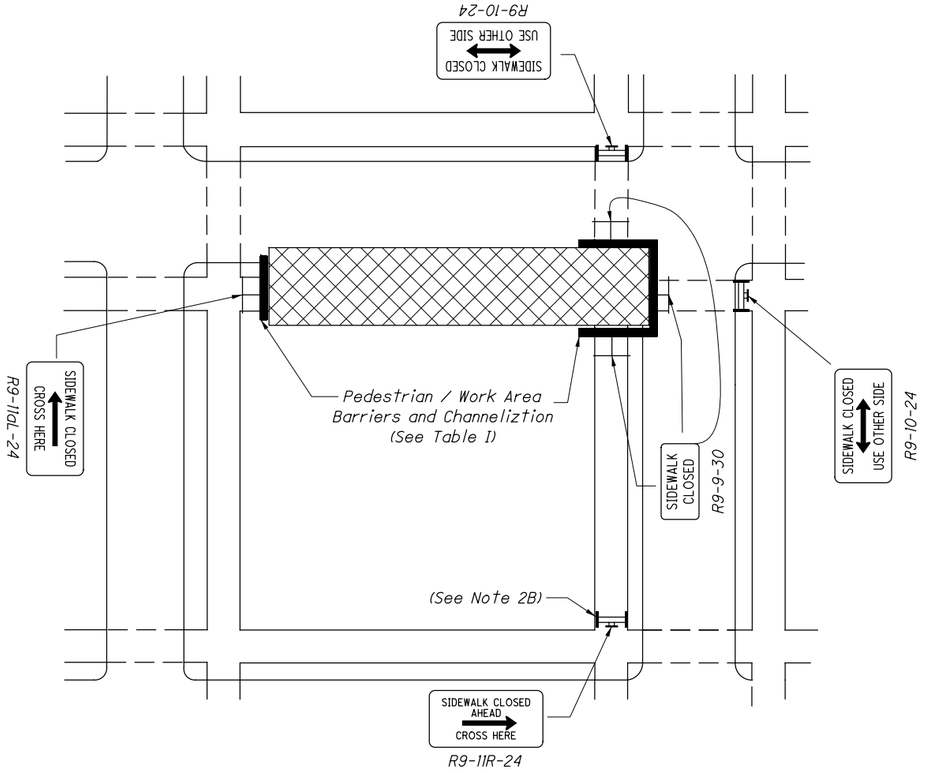
STDS. ENGINEER Stargell

OFFICE OF ROADWAY ENGINEERING

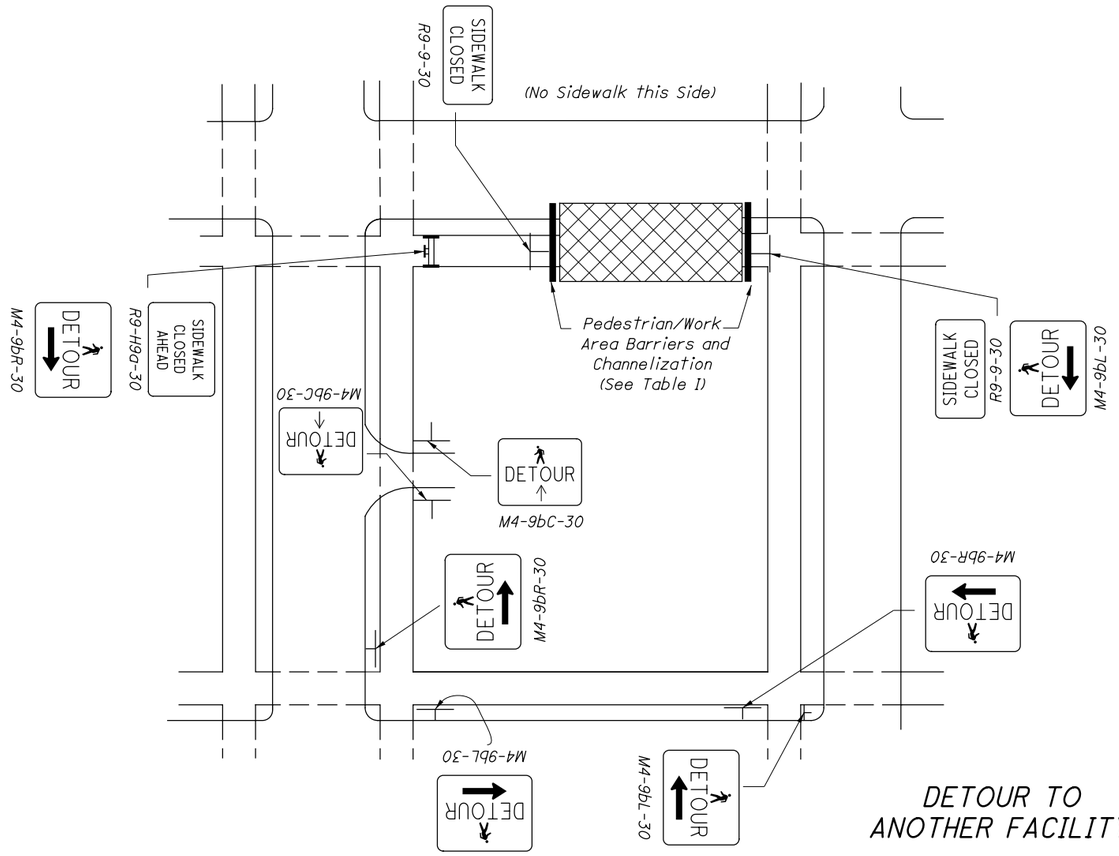
STANDARD ROADWAY CONSTRUCTION DRAWING

TEMPORARY SIGN SUPPORT

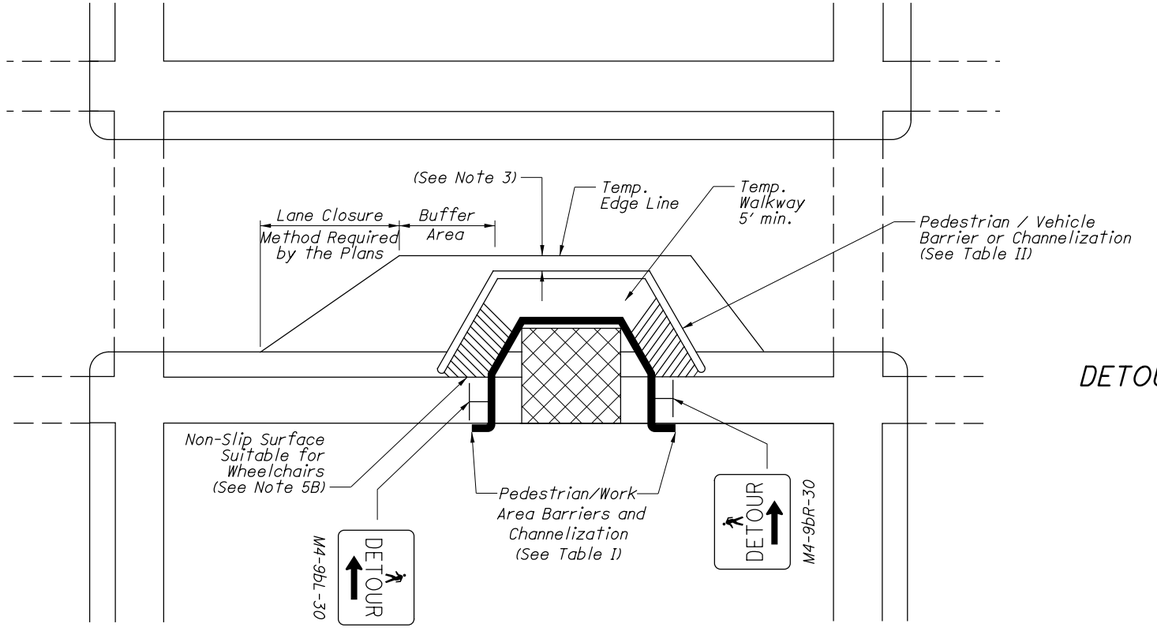
SCD NUMBER MT-105.10



DETOUR TO OTHER SIDE OF STREET



DETOUR TO ANOTHER FACILITY



DETOUR TO TEMPORARY WALKWAY ("RUNAROUND") ON ROADWAY

LEGEND

WORK AREA

TYPE I BARRICADE WITH SIGN

THIS DRAWING REPLACES MT-110.10 DATED 07-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Blume 7-19-2013
ADMINISTRATOR DATE

STDS. ENGINEER Stargell

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

PEDESTRIAN DETOUR METHODS

SCD NUMBER MT-110.10

NOTES:

GENERAL

1A. This drawing presents traffic controls only for pedestrian traffic. Vehicular traffic control shall be provided as required.

1B. The purpose of the traffic control devices provided herein is to divert and guide pedestrians whose path would otherwise enter the work area. The Contractor must take additional precautions as appropriate to protect other pedestrians or residents (including children) from exposure to hazards resulting from construction operations.

SIGNS AND BARRICADES

2A. All signs and barricades shall be placed so that they do not cause a hazard for pedestrians. All signs, not on barricades or channelizing devices, near or over active sidewalks shall have a minimum 7′ vertical clearance. Signs mounted on barricades or channelizing devices shall have a minimum 1′ clearance above the sidewalk.

2B. Advance signing for sidewalk closure shall be mounted on Type I Barricade, placed such that they will not block more than one-half the sidewalk.

PAVEMENT MARKING

3. Maintain 2′ minimum when possible, between the work zone edge line and the barrier or channelizing device separating the pedestrian path from the vehicle path.

STAGED WORK

4. For repair or reconstruction work involving sidewalks on both sides of the street, the work shall be staged so that one side is rebuilt before the other is disrupted.

TEMPORARY WALKWAYS

5A. Pedestrian walkways constructed by the Contractor shall be kept free of any obstructions or hazards including holes, debris and mud. Other walkways damaged or dirtied by the Contractor shall be immediately repaired or cleaned.

5B. For construction of temporary walkway the maximum grade shall be 5 percent unless specified otherwise in the plans. The maximum cross slope shall be 2 percent.

LIGHTING AND DELINEATION

6A. At night, in otherwise unlighted areas, pedestrian-channelizing devices and barricades and pedestrian detour signs shall be provided with lighting as follows:

a) Illumination shall provide a minimum of 1.2 foot-candles on temporary walkways.
b) Illumination shall be controlled by photocells.
c) Illumination fixtures may consist of floodlights or other protected fixtures mounted at least 10′ above ground.
d) Illumination supports may be standard highway lighting poles, 4″ x 4″ wood posts or other supports approved by the Engineer.

6B. For barricades and channelizing devices located between the pedestrian way and the vehicle travel lane in unlighted areas, the devices shall be delineated or lighted at night as follows:

a) Delineation of the portable barrier (PB) located between the vehicle lane and the pedestrian path shall be by barrier reflectors on the vehicle side of the PB and by object markers as per Standard Construction Drawing (SCD) MT-101.70.
b) Channelizing devices other than PB shall be provided with Type C steady burning lights on the vehicle side of the channelizer.

CHANNELIZATION REQUIREMENTS

7A. All channelization devices used to separate pedestrians from the work area or from the vehicular lane shall be as determined from the adjacent tables.

7B. Wood railing shall be a min. of a 2″ x 4″ rail at 32″ above ground. It shall be secured to 2″ x 4″ posts at not more than 6′ spacing with secure attachment hardware. It shall be installed and braced to be essentially rigid and able to support the following loads:

a) A horizontal transverse load of 100 pounds at each post top.
b) A vertical load of 250 pounds at midpoint between each post.

7C. Wood snow fence shall be nominally 42″ high, securely supported by wood or steel posts at 6′ maximum spacing. Plastic/nylon construction fence shall be bright orange. It shall be securely fastened to wood or metal posts at not more than 6′ spacing. It shall be nominally 42″ high and the top edge shall not sag below 30″ (12″ max. sag). Either of the fence sections with extensive broken slots or holes greater than 12″ x 12″ shall be repaired or replaced.

7D. Chain link fence, Type CLT shall conform to CMS 607 and appropriate details on Roadway Standard Construction Drawings F-1.1, F-3.1 and F-3.2, except that materials need not be new nor shall certification and tests be required.

7E. Plywood walls shall be a minimum of ⅝″ exterior plywood, supported by a 2″ x 4″ or heavier framing securely anchored and buttressed to resist wind load and/or persons. They shall be designed for a minimum wind loading of 30 pounds per square foot (or larger if local codes require). Height of the wall shall be not less than 7′ above the walkway and if within range of thrown objects, shall be of sufficient height to screen pedestrians and passing cars.

7F. When PB is provided, it shall be 32″ PB as per CMS 622. Delineation of PB shall be as per SCD MT-101.70.

7G. Barrier located along a "runaround" within the roadway pavement shall meet the following requirements:

a) Be a minimum of 36″ in height and continuous with the ground surface.
b) Extend along the entire length of the runaround.
c) Have no breaks or gaps along the full length of the barrier.
d) Have a solid, continuous bottom rail between 4″ and 12″ in height.
e) Be of high contrast color and material.
f) Provide temporary ramps and boardwalks as required to ensure a smooth and continuous surface that complies with Americans with Disabilities Act Accessibility Guidelines.

BARRIER AND CHANNELIZING DEVICE SELECTION TABLES

TABLE I - CHANNELIZATION TYPE WHEN USED BETWEEN THE PEDESTRIAN WALKWAY AND THE WORK AREA

DISTANCE FROM WORK ACTIVITY TO CHANNELIZATION	WORK CHARACTERISTICS *					
	< 2 FT DROPOFF	2 - 5 FT DROPOFF	> 5 FT DROPOFF	DIRT/MUD SPLASHED	EQUIPMENT WHICH MOVES OR HAS EXPOSED MOVING PARTS	OPERATION WHICH THROWS STONE/ETC.
< 5 ft.	A-E	B-E	C-D	D	D-E	D
5 - 10 ft.	A-E	B-E	B-E	D	B-E	D
> 10 - 30 ft.	A-E	A-E	B-E	N/A	A-E	D
> 30 ft.	N/A	A-E	B-E	N/A	A-E	D

* These requirements shall not apply to paving, grinding or other similar operations.

TABLE II - CHANNELIZATION TYPE WHEN USED BETWEEN THE PEDESTRIAN WALKWAY AND THE VEHICULAR LANE

DISTANCE FROM EDGE OF TRAFFIC LANE TO FACE OF CHANNELIZATION	SPEED LIMIT (MPH)		
	25	30 - 40	> 40
0 - 2 ft.	E	E	E
> 2-6 ft.	B-E	E	E
> 6 ft.	B-E	B-E	E

SELECTION LIST

A. Wood Railing
B. Snow Fence, Wood or Orange Plastic Construction Fence.
C. Chain Link Fence, Type CLT
D. Plywood Wall
E. Portable Barrier

THIS DRAWING REPLACES MT-110.10 DATED 07-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Michael Bline — ADMINISTRATOR
7-19-2013 DATE

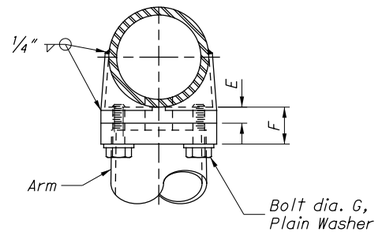
STDS. ENGINEER Stargell

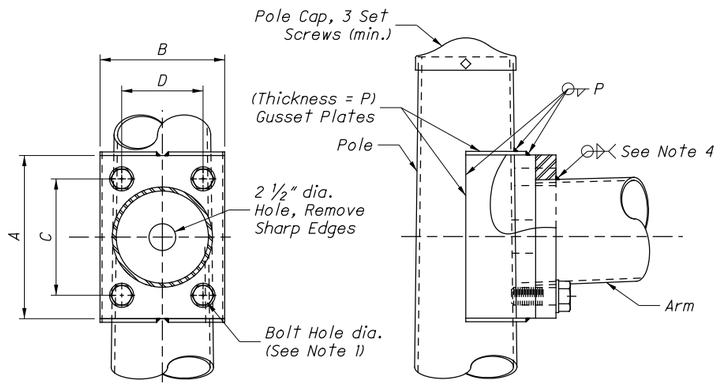
OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

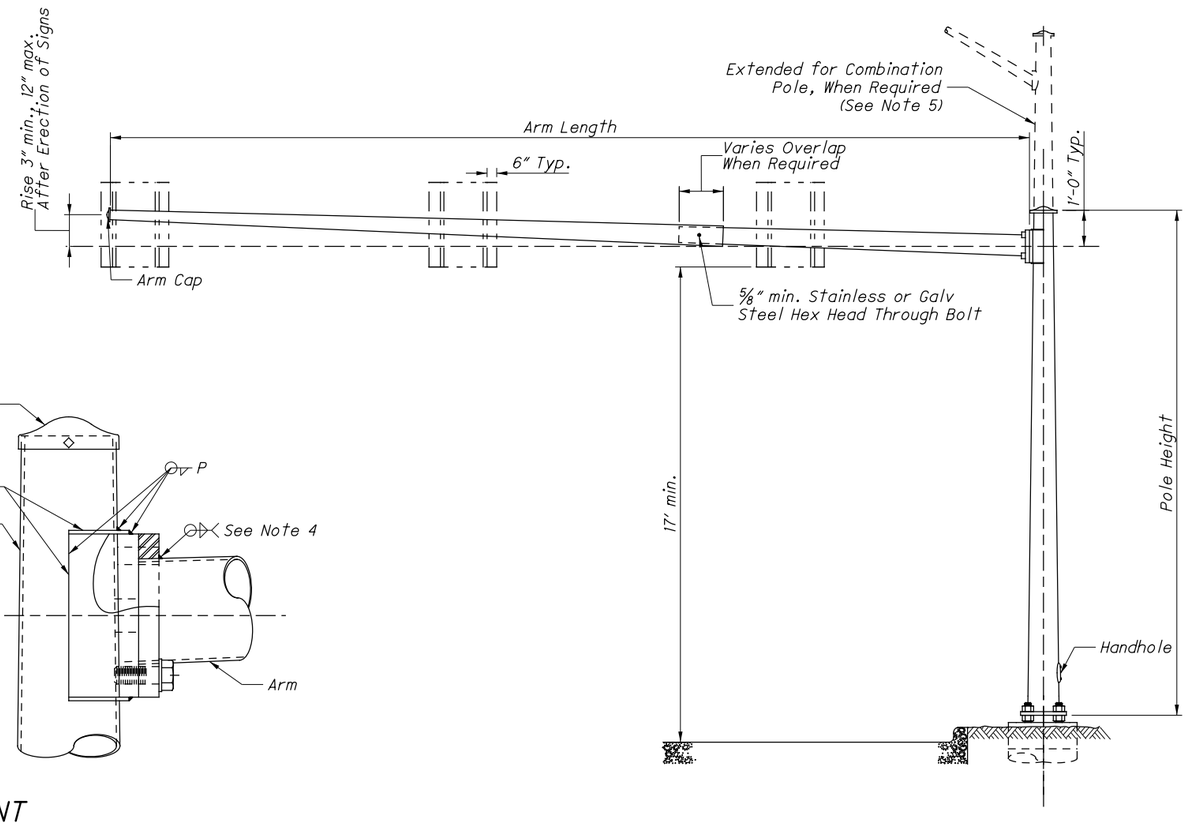
PEDESTRIAN DETOUR METHODS

SCD NUMBER MT-110.10



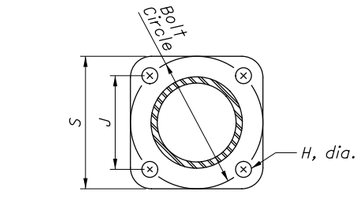


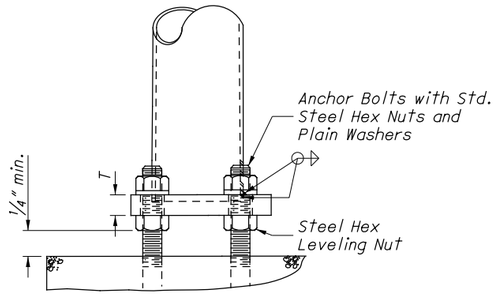
ARM ATTACHMENT



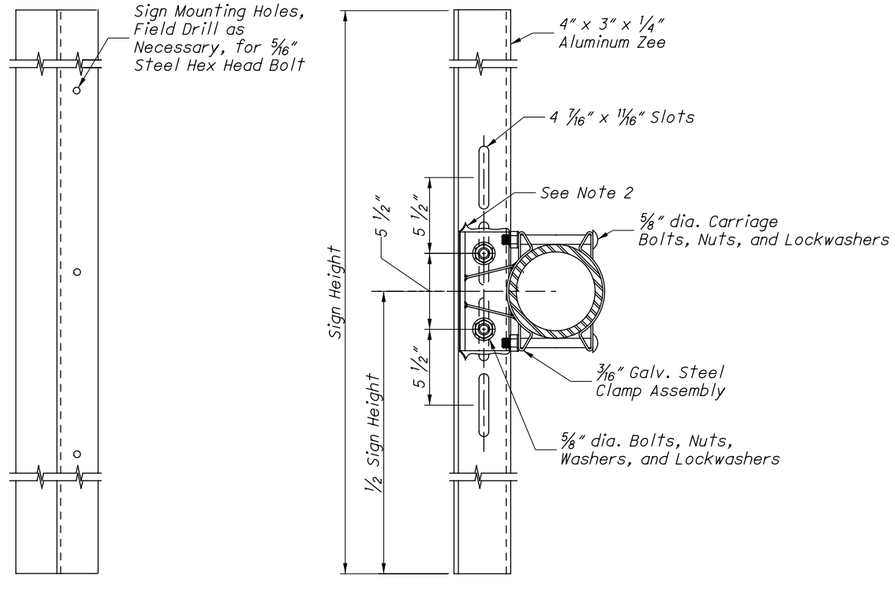
NOTES:

1. Arm plate hole diameter to be bolt diameter plus ⅛". Pole plate tapped hole to have threads with 75% min. full profile height. Threads may be retapped after galvanizing.
2. Prevent contact between aluminum and galvanized parts with a minimum 1/16" thick chloroprene gasket or approved equal.
3. For foundation details, see Standard Construction Drawing (SCD) TC-21.20.
4. The arm attachment plate shall be welded using a full penetration weld. The pole attachment to the base plate shall be welded using a full penetration weld.
5. For modification of pole to support roadway lighting, see SCD HL-10.12.
6. For location of handholes, see SCD TC-22.10.
7. The design loads were calculated as the equivalent amount of sign area that could be carried at the end of the arm.
8. The design loads were developed without applying galloping fatigue loads. Also, the stress requirements of note b. Table 11-2 in the AASHTO Code were not applied.
9. These structures should be inspected for excessive wind induced deflection in the vertical direction. If found, a damping plate should be placed on the arm.





POLE BASE DETAIL



SIGN BRACKET

THIS DRAWING REPLACES TC-16.21 DATED 04-15-2011.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ADMINISTRATOR
10-18-2013
DATE

STDS. ENGINEER: H. Suter

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

SINGLE ARM OVERHEAD SIGN SUPPORT

SCD NUMBER: TC-16.21

THESE DESIGNS USE FULL PENETRATION WELDS AT THE ARM AND BASE PLATE CONNECTIONS

ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE NOTED

DESIGN NO.	POLE ARM				TWO PIECE ARM				ARM ATTACHMENT								ANCHOR BASE					ANCHOR BOLT	
	WALL THK.	SIZE	WALL THK.	SIZE	WALL THK.	SIZE	OVERLAP	ARM LENGTH	A	B	C	D	E	F	G	P	BOLT CIRCLE	S	J	T	H	DIA.	L
5	.239	11″ x 8.06″ x 21′	.239	8″ x 4.64″ x 24′					14.5	12	10.5	8	1.25	1.50	1.25	0.25	15	15.63	10.63	2	2.13	1.75	84
6	.239	11″ x 8.06″ x 21′	.239	8″ x 4.22″ x 27′					14.5	12	10.5	8	1.25	1.50	1.25	0.25	15	15.63	10.63	2	2.13	1.75	84
7	.239	11″ x 8.06″ x 21′	.239	8″ x 3.80″ x 30′					14.5	12	10.5	8	1.25	1.50	1.25	0.25	15	15.63	10.63	2	2.13	1.75	84
8	.239	12″ x 9.06″ x 21′	.239	9″ x 4.38″ x 33′					14.5	12	10.5	8	1.25	1.50	1.25	0.25	16	17	11.31	2	2.13	1.75	84
9	.239	13″ x 10.06″ x 21′	.239	10″ x 4.96″ x 36′					16.5	14.5	12.5	9.5	1.25	2	1.25	0.25	18	18.5	12.73	2	2.13	1.75	84
10	.239	14″ x 11.06″ x 21′	.239	11″ x 5.54″ x 39′					16.5	14.5	12.5	9.5	1.25	2	1.25	0.25	20	20.5	14.13	2	2.13	1.75	84
11	.239	14″ x 11.06″ x 21′	.239	11″ x 5.12″ x 42′	.239 .179	11″ x 8.62″ x 17′ + 9.19″ x 5.52″ x 26′-3″	15	42′	16.5	14.5	12.5	9.5	1.25	2	1.25	0.25	20	20.5	14.13	2	2.13	1.75	84
12	.299	14″ x 11.06″ x 21′			.299 .179	11″ x 8.62″ x 17′ + 9.19″ x 5.10″ x 29′-3″	15	45′	16.5	14.5	12.5	9.5	1.25	2	1.375	0.25	20	20.5	14.13	2	2.38	2	90
13	.250	16″ x 13.06″ x 21′			.250 .179	13″ x 8.80″ x 30′ + 9.43″ x 5.02″ x 31′-6″	18	60′	17.5	22	13.5	18	1.50	2	1.375	0.375	22	23	15.56	2	2.38	2	90
14	.250	16″ x 13.06″ x 21′			.250 .179	13″ x 7.82″ x 37′ + 8.45″ x 3.34″ x 36′-6″	18	72′	17.5	22	13.5	18	1.50	2	1.375	0.375	22	23	15.56	2	2.38	2	90

THIS DRAWING REPLACES TC-16.21 DATED 4-15-2011.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

10-18-2013
DATE

ADMINISTRATOR

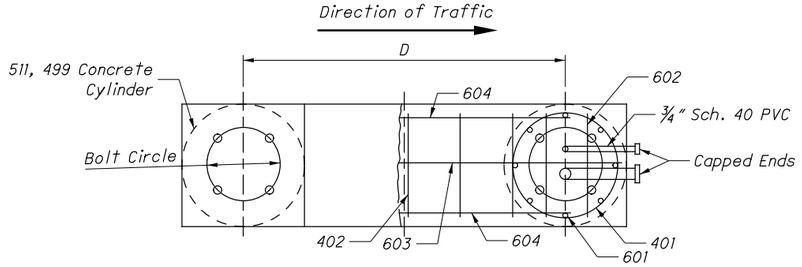
STDS. ENGINEER
H. Suter

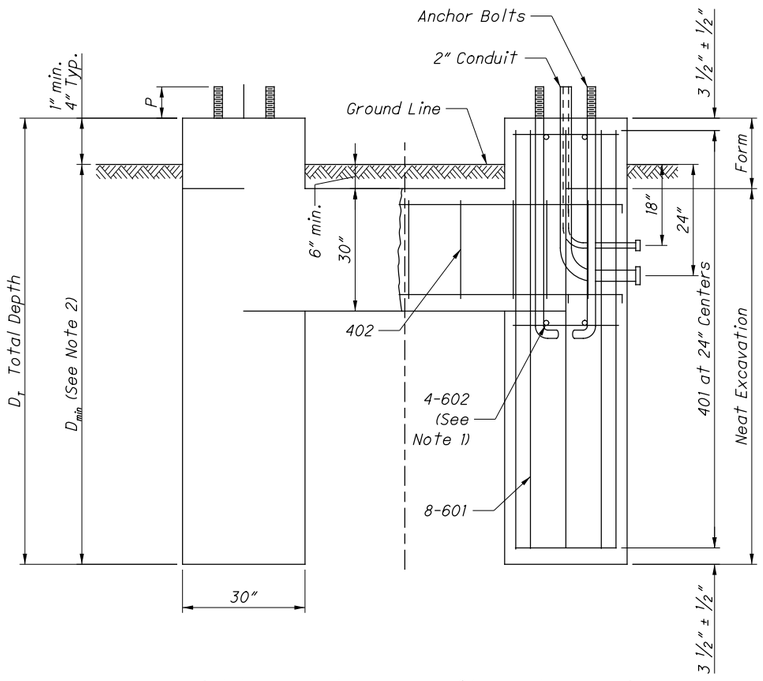
OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

SCD NUMBER
TC-16.21

SINGLE ARM
OVERHEAD SIGN SUPPORT

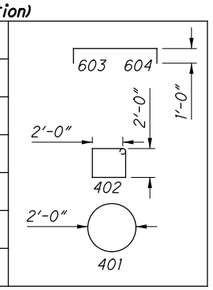




(Right Hand Shown - Left Hand Opposite)

Reinforcement Schedule
(For Each Foundation)

MARK	No.	LENGTH	TYPE
401	24" c/c	7'-6"	401
402	12" c/c	8'-6"	402
601	16	D_t - 6"	STR.
602	8	2'-0"	STR.
603	2	D + 4'-0"	603
604	4	D + 2'-0"	604

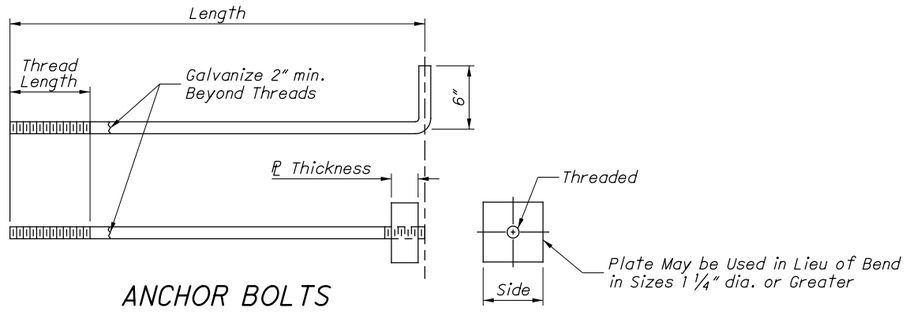


NOTES:

1. Tie anchor bolts to rebar cage near the top and bottom of the anchor bolts.
2. D_{min} may be deeper as required in the plans.
3. When required by local conditions and approved by the Engineer, alternate foundation designs are acceptable.
4. Provide all anchor bolts with standard steel hex nuts, leveling nuts, and plain washers. The nuts shall be capable of developing the full strength of the anchor bolts.
5. At locations where the existing slope is 6:1 or greater, the buried depth of foundation shall apply to the low side of the slope. Set the top of the foundation 2" above the existing surface on the high side of the slope. The addtional depth of foundation necessary to meet these requirements shall be added to the formed top.

ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE NOTED

SUPPORT TYPE	TRUSS BOX SIZE	D	D_{min}	ANCHOR BOLTS							
				CIRCLE	DIA.	LENGTH	THREAD LENGTH	P	℄ THICK	℄ SIDE	THREADS PER INCH
7.65 and 7.2-7.6 (Al. Truss)	3'-0"	4'-5"	11'-0"	11	1 ¼	42	8	5	1 ½	4	7
	4'-0"	5'-7"									
	5'-0"	6'-7"									
15.115 and 15.8 (St. Truss)	3'-4" ±	5'-3"	12'-0"	12 ½	1 ½	54	9	6	1 ½	4	6
	5'-0"	6'-7"									



ANCHOR BOLTS

THIS DRAWING REPLACES TC-21.10 DATED 01-19-2007.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ADMINISTRATOR
10-18-2013
DATE

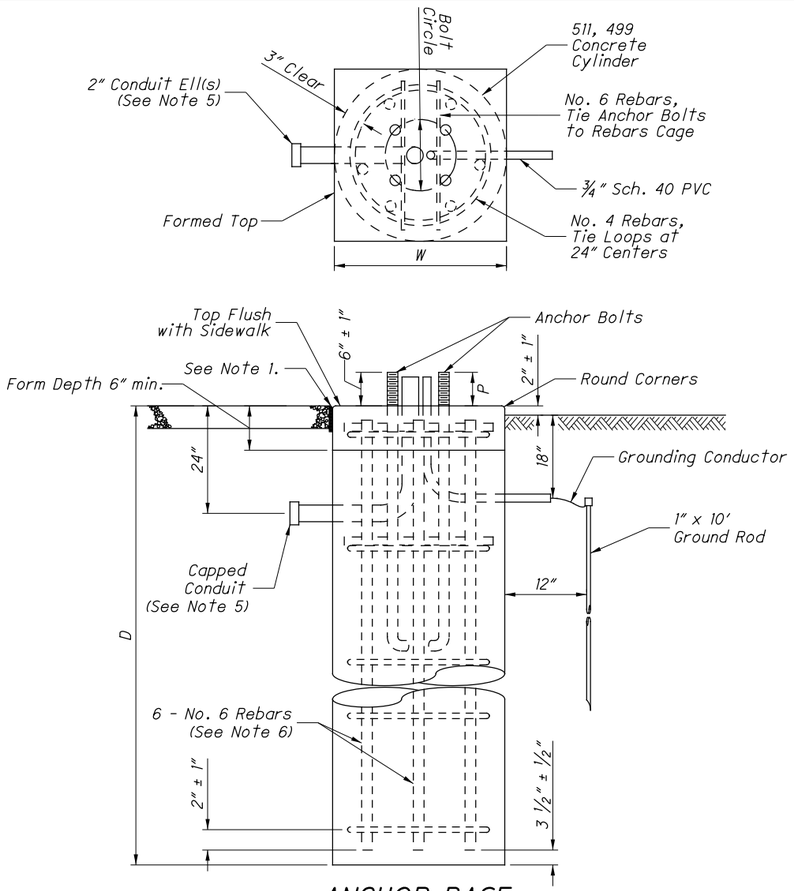
STDS. ENGINEER
H. Suter

OFFICE OF ROADWAY ENGINEERING

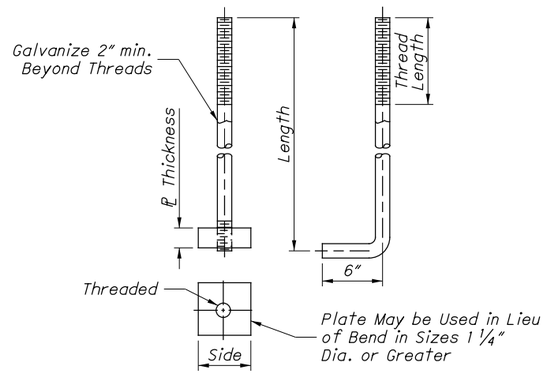
STANDARD ROADWAY CONSTRUCTION DRAWING

SIGN SUPPORT FOUNDATIONS

SCD NUMBER
TC-21.10



ANCHOR BASE



ALL DIMENSIONS IN INCHES

DIA.	LENGTH	THREAD LENGTH	℄ THICK	℄ SIDE	THREADS PER INCH
1 ¼	42	8	1 ½	4	7
1 ½	54	9	1 ½	4	6
1 ¾	84	9	2	5	5
2	90	9	2	5	4 ½
2 ¼	90	10	2 ½	6	4 ½
2 ½	114	10	2 ½	6	4
3	138	12	3	7	4

ANCHOR BOLTS

NOTES:

1. Use ½" preformed joint filler as per CMS 705.03 between foundations and adjacent paved areas.
2. A special foundation design will be required when cohesive soil with undrained shear strength of less than 2000 lb/ft² or granular soil with an angle of internal friction less than 30° and a wet density less than 120 lb/ft³ is encountered.
3. Provide all anchor bolts with standard steel hex nuts, leveling nuts, and plain washers. The nuts shall be capable of developing the full strength of the anchor bolts.
4. At locations where the existing shape is 6:1 or greater, the buried depth of foundation shall apply to the low side of the slope. Set the top of the foundation 2" above the existing surface on the high side of the slope. The additional depth of foundation necessary to meet these requirements shall be added to the formed top.
5. Provide a minimum of one capped 2" conduit ell in Standard Construction Drawings (SCDs) TC-81.10 and TC-81.21 foundations for future use. This ell is in addition to any other conduits specified in the plans.
6. SCD TC-81.10 type supports designs 13 and 14 shall use 6 No. 8 rebars.

ALL DIMENSIONS IN INCHES, UNLESS OTHERWISE NOTED

TC-9.10 TYPE SUPPORTS						TC-16.21 & TC-81.21 TYPE SUPPORTS						TC-17.10 & 81.10 TYPE SUPPORTS						TC-12.30 TYPE SUPPORTS					
DESIGN NO.	D (feet)	W	ANCHOR BOLTS			DESIGN NO.	D (feet)	W	ANCHOR BOLTS			DESIGN NO.	D (feet)	W	ANCHOR BOLTS			DESIGN NO.	D (feet)	W	ANCHOR BOLTS		
			SIZE	CIRCLE	P				SIZE	CIRCLE	P				SIZE	CIRCLE	P				SIZE	CIRCLE	P
1	8	30	1 ½ x 54	13 ½	6 ¾	1	8	30	1 ½ x 54	13 ½	6 ¾	1	7	30	1 ¼ x 42	10	5 ¾	1	9	36	1 ¾ x 84	15	7 ¾
2	8	30	1 ½ x 54	13 ½	6 ¾	2	8	30	1 ½ x 54	15	6 ¾	2	7	30	1 ½ x 54	12 ½	6 ¾	2	9	36	1 ¾ x 84	15	7 ¾
3	9	36	1 ¾ x 84	16	7 ¾	3	9	30	1 ½ x 54	16	6 ¾	3	8	30	1 ½ x 54	13 ½	6 ¾	3	11	36	2 x 90	18	8 ½
						4	10	36	1 ¾ x 84	18	7 ¾	4	8	36	1 ¾ x 84	15	7 ¾	4	11	36	2 x 90	18	8 ½
TC-9.30 TYPE SUPPORTS						5	9	36	1 ¾ x 84	15	7 ¾	5	9	36	1 ¾ x 84	16	7 ¾	5	11	36	2 x 90	22	8 ½
1	8	30	1 ½ x 54	13 ½	6 ¾	6	9	36	1 ¾ x 84	15	7 ¾	6	9	36	1 ¾ x 84	16	7 ¾	6	11	36	2 x 90	22	8 ½
2	9	36	1 ¾ x 84	15	7 ¾	7	9	36	1 ¾ x 84	15	7¾	7	10	36	2 x 90	18	8 ½	7	15	36	2 ½ x 114	23 ½	9 ¾
3	10	36	2 x 90	20	8 ½	8	9	36	1 ¾ x 84	16	7 ¾	8	10	36	2 x 90	20	8 ½	8	15	36	2 ½ x 114	23 ½	9 ¾
4	11	36	2 ¼ x 90	22	9	9	10	36	1 ¾ x 84	18	7 ¾	9	10	36	2 x 90	22	8 ½	9	15	36	2 ½ x 114	23 ½	9 ¾
5	11	36	2 ¼ x 90	22	9	10	10	36	1 ¾ x 84	20	7 ¾	10	11	36	2 ¼ x 90	22	9	10	17	36	2 ½ x 114	25 ½	9 ¾
						11	10	36	1 ¾ x 84	20	7 ¾	11	11	36	2 ¼ x 90	22	9	11	17	36	2 ½ x 114	25 ½	9 ¾
						12	11	36	2 x 90	20	8 ½	12	12	36	2 ½ x 114	23 ½	9 ¾	12	18	36	3 x 138	25 ½	11 ¼
						13	15	36	2 x 90	22	8 ½	13	16	36	3 x 138	26	11 ¾						
						14	15	36	2 x 90	22	8 ½	14	16	48	3 x 138	34	11 ¾						

THIS DRAWING REPLACES TC-21.20 DATED 01-18-2013.

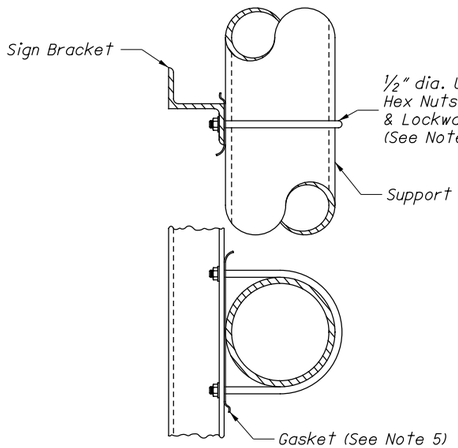
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ADMINISTRATOR
10-18-2013
DATE

STDS. ENGINEER
Suter

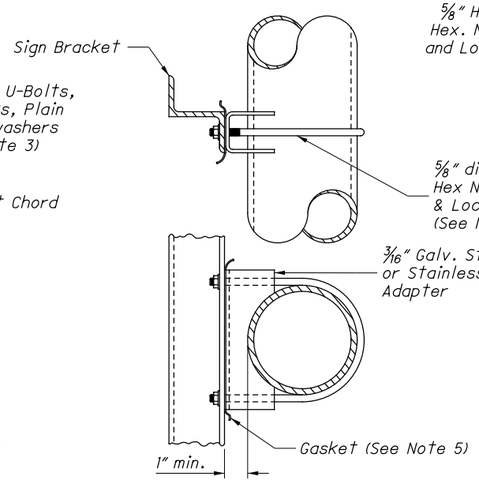
OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING
FOUNDATIONS

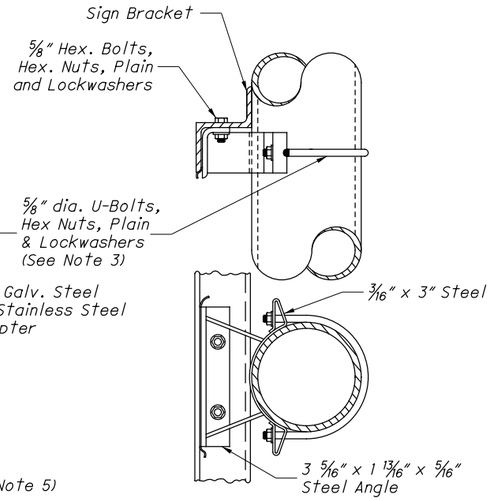
SCD NUMBER
TC-21.20



DOUBLE CHORDS



SINGLE ARM



ALTERNATE CLAMP

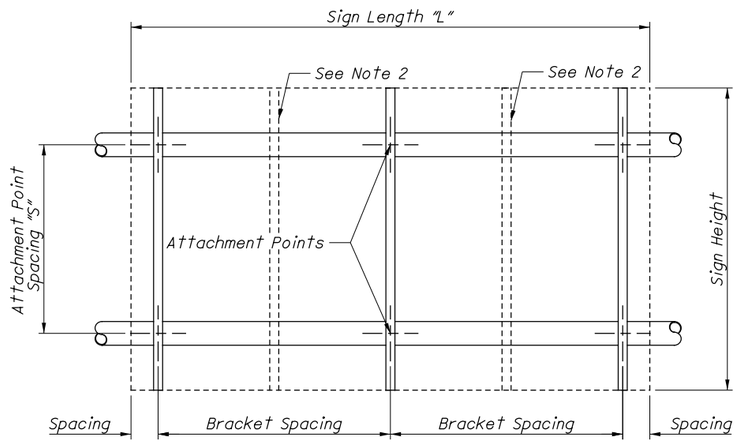
NOTES:

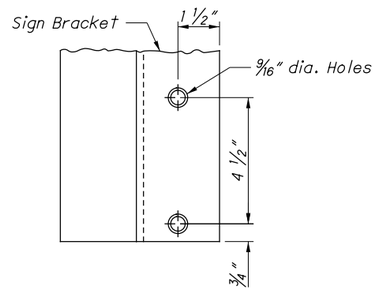
1. Sign brackets shall be a 4" x 3" x ¼" aluminum zee at 2.85 lb/ft.
2. Provide intermediate sign brackets if the sign extends more than 4' above or below an attachment point.
3. U-bolts, other bolts, nuts and washers shall be stainless steel for use with aluminum chords. When used with galvanized sign structures the U-bolts only may be galvanized steel.

   The inside diameter of U-bolts used to attach the sign attachment assembly aluminum zee brackets to the overhead sign support horizontal member shall have a tolerance of +0.5, -0.0" relative to the outside diameter of the overhead sign support horizontal member at the attachment point.
4. The outer flange of the sign attachment assembly aluminum zee brackets may be oriented in either direction. However, at least one zee bracket per each individual sign shall be oriented with the outer flange in the opposite direction of the others.
5. Prevent contact between aluminum and galvanized parts with a minimum 1/16" thick chloroprene gasket or approved equal.
6. Type A shall be for supports where the sign height is less than 1' greater than the attachment point spacing.
7. Type B shall be for back-to-back mounted signs.
8. Detail "C" - fixture support arm mounting for lighted signs complying with Plan Insert Sheet 203121.
9. Attach gusset plates by bolting or welding.

ATTACHMENT POINT SPACING

SUPPORT TYPE	DESIGN	S
7.2	1	2'-4"
	2	3'
	3	4'
7.3	1 & 2	3'
	3 & 4	4'
7.4 7.5 7.6	1	3'
	2 & 3	4'
	4	5'
7.65	6 & 6 Alt.	3'
	8 & 8 Alt.	5'
9.12	Single Arm	
9.24	1 Thru 4	4'
10.48	1 Thru 5	4'
	6 Thru 8	6'
11.08	Single Arm	
12.24	1 Thru 4	4'
	5 Thru 8	6'
12.30	1 - 4 Alt.	4'
	5 - 12 Alt.	6'
15.8	All	3'
15.115	All	5'
16.10	Single Arm	





DETAIL "C"
(See Note 8)

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Vazquez 01-17-2014
ADMINISTRATOR DATE

STDS. ENGINEER H. Suter

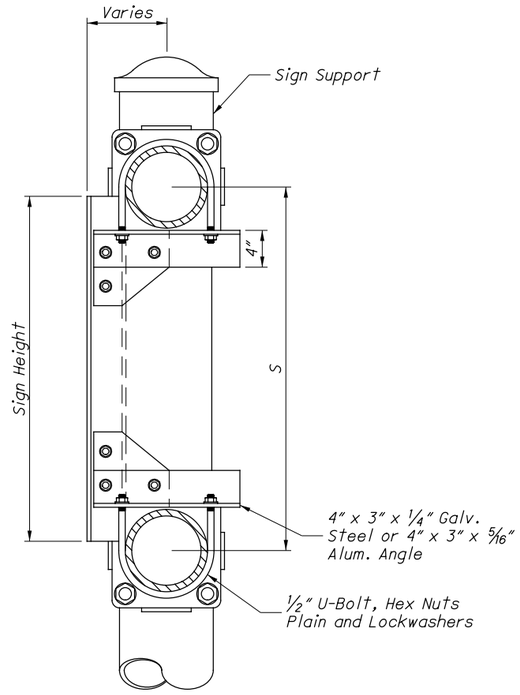
OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES TC-22.20 DATED 10-18-2013.

STANDARD ROADWAY CONSTRUCTION DRAWING

SIGN ATTACHMENT ASSEMBLIES

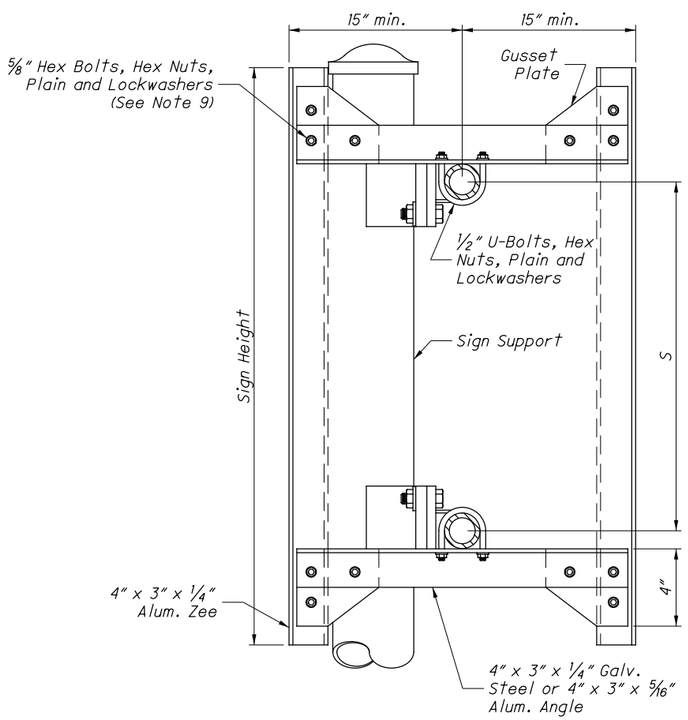
SCD NUMBER TC-22.20



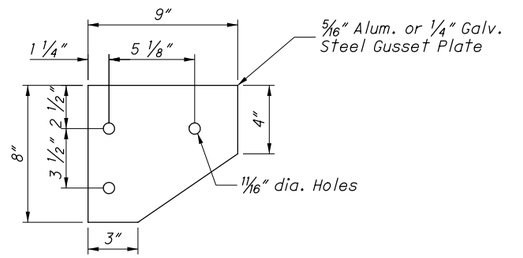
TYPE A
(See Note 6)

SIGN BRACKET

L (FEET)	NUMBER OF BRACKETS	BRACKET SPACING (INCHES)								
4	2	6	36	6						
5		6	48	6						
6		6	60	6						
7		6	72	6						
8		12	72	12						
9		12	84	12						
10		12	96	12						
11		18	96	18						
12	3	6	66	66	6					
13		6	72	72	6					
14		12	72	72	12					
15		18	72	72	18					
16		12	84	84	12					
17		18	84	84	18					
18		12	96	96	12					
19		18	96	96	18					
20	4	12	72	72	72	12				
21		18	72	72	72	18				
22		6	84	84	84	6				
23		12	84	84	84	12				
24		18	84	84	84	18				
25		6	96	96	96	6				
26		12	96	96	96	12				
27		18	96	96	96	18				
28	5	12	78	78	78	78	12			
29		6	84	84	84	84	6			
30		12	84	84	84	84	12			
31		18	84	84	84	84	18			
32		12	90	90	90	90	12			
33		18	90	90	90	90	18			
34		12	96	96	96	96	12			
35		18	96	96	96	96	18			
36	6	6	84	84	84	84	84	6		
37		12	84	84	84	84	84	12		
38		18	84	84	84	84	84	18		
39		9	90	90	90	90	90	9		
40		15	90	90	90	90	90	15		
41		6	96	96	96	96	96	6		
42		12	96	96	96	96	96	12		
43		18	96	96	96	96	96	18		
44	7	12	84	84	84	84	84	84	12	
45		18	84	84	84	84	84	84	18	
46		6	90	90	90	90	90	90	6	
47		12	90	90	90	90	90	90	12	
48		18	90	90	90	90	90	90	18	
49		6	96	96	96	96	96	96	6	
50		12	96	96	96	96	96	96	12	
51		18	96	96	96	96	96	96	18	
52	8	18	84	84	84	84	84	84	84	18
53		24	84	84	84	84	84	84	84	24
54		9	90	90	90	90	90	90	90	9
55		15	90	90	90	90	90	90	90	15
56		21	90	90	90	90	90	90	90	21
57		6	96	96	96	96	96	96	96	6
58		12	96	96	96	96	96	96	96	12
59		18	96	96	96	96	96	96	96	18



TYPE B
(See Note 7)



GUSSET PLATE

THIS DRAWING REPLACES TC-22.20 DATED 10-18-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Vazquez
ADMINISTRATOR
01-17-2014
DATE

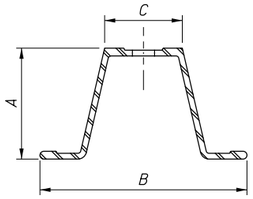
STDS. ENGINEER: H. Suter

OFFICE OF ROADWAY ENGINEERING

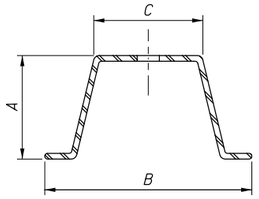
STANDARD ROADWAY CONSTRUCTION DRAWING

SIGN ATTACHMENT ASSEMBLIES

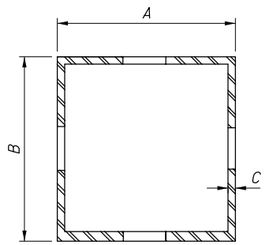
SCD NUMBER: TC-22.20



TYPE P

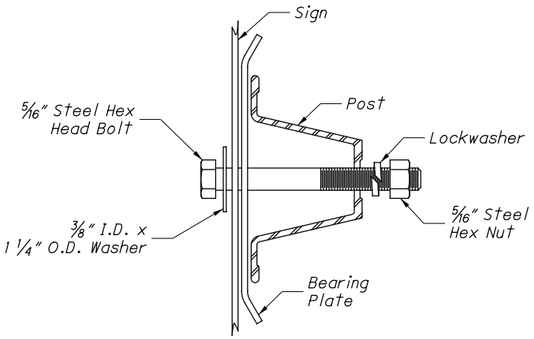


TYPE F



TYPE S

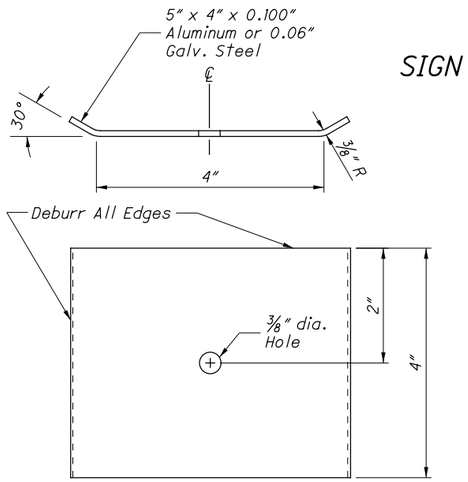
POST NO.	TYPE	LB/FT	POST DIMENSIONS (INCHES)			ANCHOR DIMENSIONS			# OF POSTS PERMITTED IN 7' PATH IN EXPOSED LOCATIONS
			A	B	C	A	B	C	
1	F	1.12	0.875	2.063	0.813				
2	P	2.00	1.469	3.063	1.281				2
	F	2.00	1.516	3.125	1.250				2
	S		1.750	1.750	0.083	2.000	2.000	0.105	2
3	P	3.00	1.875	3.500	1.313				2
	F	3.00	1.750	3.500	1.625				2
	S		2.00	2.00	0.083	2.250	2.250	0.105	2
4	P	4.00	TWO NO.2 POST						0
	F	4.00	TWO NO.2 POST						0
	S		2.500	2.500	0.105	3.000	3.000	0.188	1
6	P	6.00	TWO NO.3 POST						0
	F	6.00	TWO NO.3 POST						0



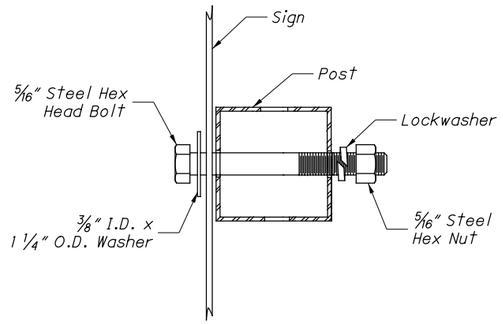
U-CHANNEL
SIGN ATTACHMENT DETAIL

NOTES:

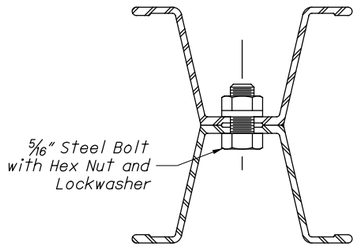
1. Install No. 4 type P and F posts, and No. 6 type P and F posts, only in protected locations (e.g., behind guardrail). Install two post installations of number 4 type S posts within 7 foot path only in protected locations.
2. Use of anchor base with No. 2 and No. 3 square post is optional. Use of anchor base with No. 4 square post is required.
3. Square post may have die-cut knockouts or open holes.



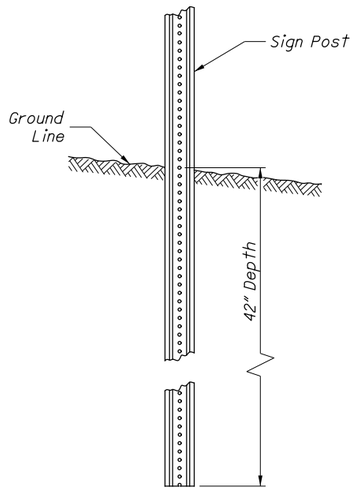
BEARING PLATE



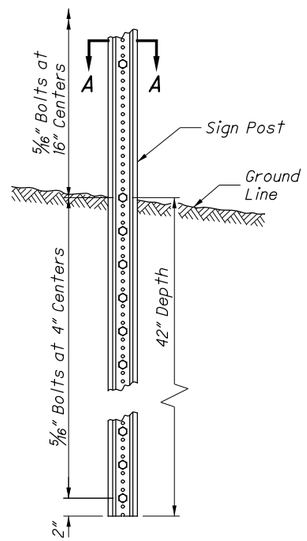
SQUARE POST
SIGN ATTACHMENT DETAIL



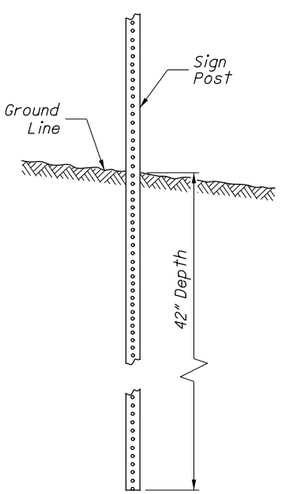
SECTION A-A



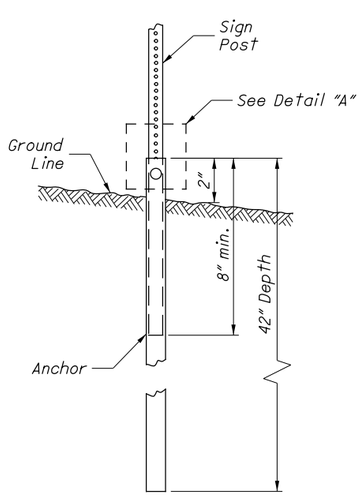
TYPICAL NO. 1, NO. 2 AND NO. 3 U-CHANNEL DRIVEN INSTALLATION



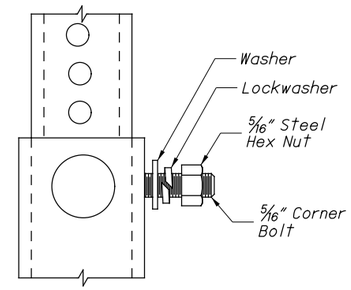
TYPICAL NO. 4 AND NO. 6 U-CHANNEL DRIVEN INSTALLATION



TYPICAL SQUARE POST DRIVEN INSTALLATION



TYPICAL SQUARE POST ANCHOR BASE INSTALLATION



DETAIL "A"

THIS DRAWING REPLACES TC-41.20 DATED 01-19-2001.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ADMINISTRATOR
10-18-2013
DATE

STDS. ENGINEER: H. Suter

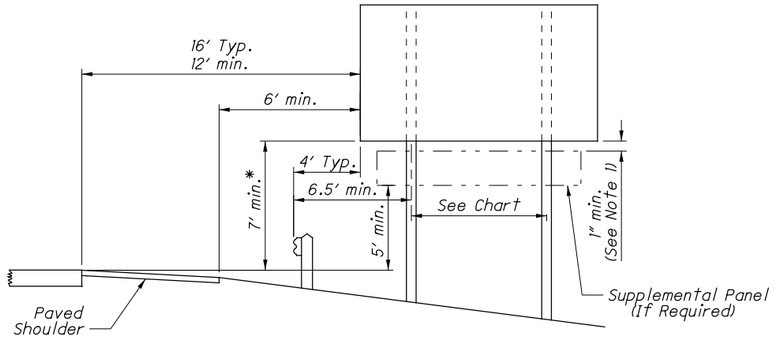
OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

YIELDING POST

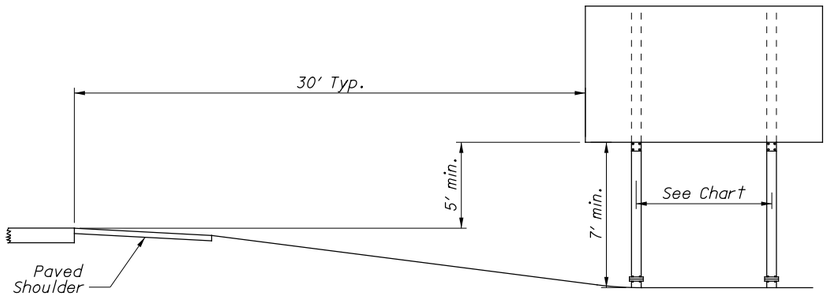
SCD NUMBER: TC-41.20

FREEWAYS AND EXPRESSWAYS

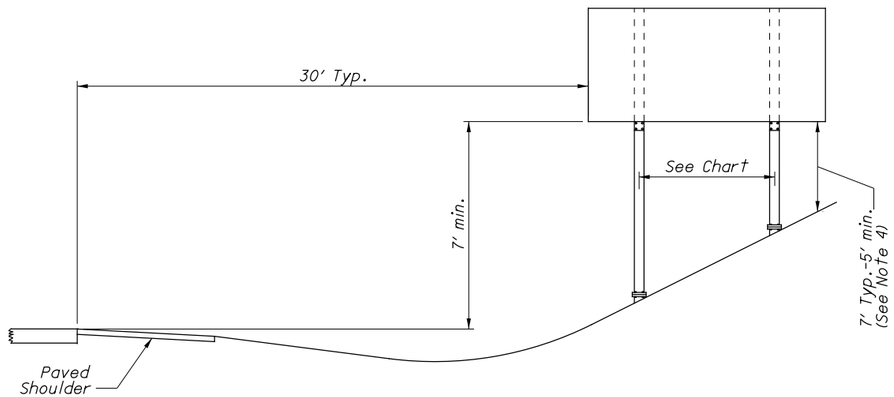


TYPICAL INSTALLATION WITH GUARDRAIL

* 8′ min. with Supplemental Panel

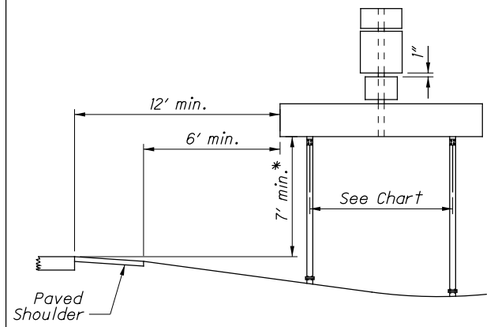


TYPICAL INSTALLATION, FILL SECTION, 30′ OFFSET

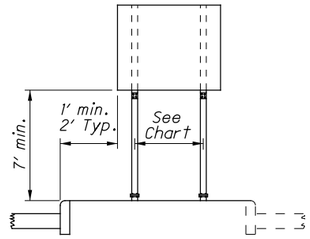


TYPICAL INSTALLATION, CUT SECTION, 30′ OFFEST

STREETS-RAMPS-HIGHWAYS



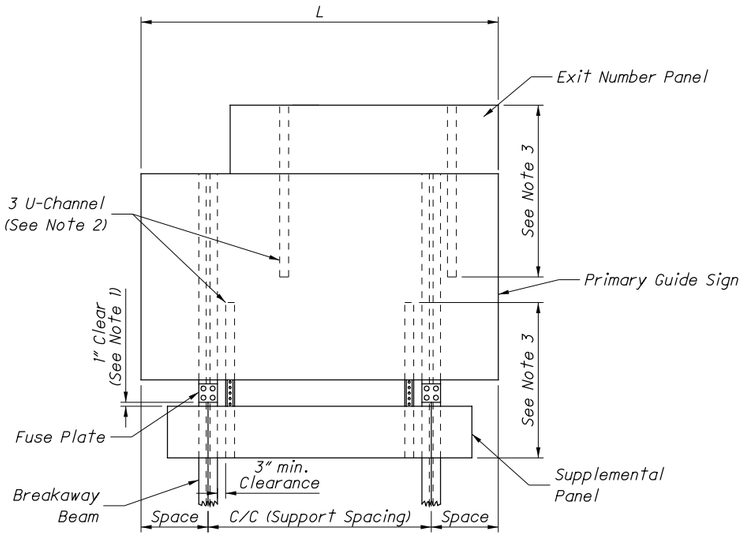
* 5′ min. on Rural Conventional Road



CURB SECTION

NOTES:

1. Mount supplemental panels 1″ below the fuse plate on breakaway beam installations and 1″ minimum below the guide sign when the sign supports are rigid beams.
2. Attach No. 3 U-channel drive post to both the guide sign and the exit number or other supplemental panels by mounting clips fastened alternately at each horizontal extrusion and both sides at the top and bottom of the post. Do not make any connections between the supplemental panel and breakaway beams.
3. Length of post shall be 2.5 times the height of the supplemental panel. The post spacing shall be as per the support spacing chart.
4. Use 5′ minimum mounting height above ground ground if back slopes are greater than 3:1.
5. Align the exit number panel with the right edge of the sign for right exits and with the left edge of the sign for left exits.



SUPPLEMENTAL PANEL ATTACHMENT

SUPPORT SPACING CHART							
2 SUPPORTS				3 SUPPORTS			
L (Feet)	SPACING (INCHES)			L (Feet)	SPACING (INCHES)			
	SPACE	c/c	SPACE		SPACE	c/c	c/c	SPACE
4	9	30	9	20	24	96	96	24
5	12	36	12	21	30	96	96	30
6	12	48	12	22	36	96	96	36
7	12	60	12	23	30	108	108	30
8	12	72	12	24	36	108	108	36
9	12	84	12	25	42	108	108	42
10	12	96	12	26	36	120	120	36
11	18	96	18	27	42	120	120	42
12	24	96	24	28	48	120	120	48
13	30	96	30	29	42	132	132	42
14	36	96	36	30	48	132	132	48
15	36	108	36					
16	42	108	42					
17	42	120	42					
18	48	120	48					
19	48	132	48					

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ADMINISTRATOR
10-18-2013
DATE

STDS. ENGINEER: H. Suter

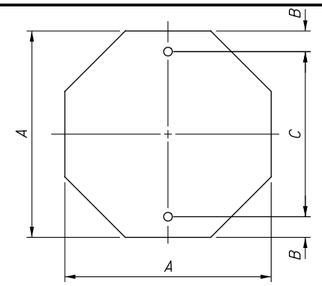
OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES TC-42.10 DATED 01-19-2007.

STANDARD ROADWAY CONSTRUCTION DRAWING

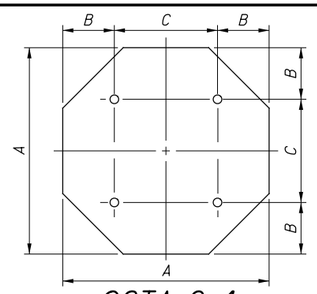
TYPICAL GUIDE SIGN PLACEMENT

SCD NUMBER TC-42.10



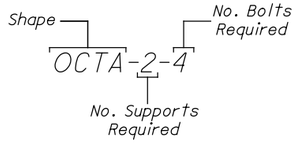
OCTA-1-2

A	B	C	THICKNESS	AREA (FT^2)
18	3	12	0.080	2.25
24	3	18	0.080	4.00
30	3	24	0.080	6.25
36	3	30	0.080	9.00



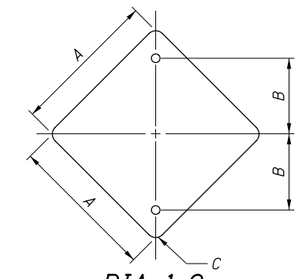
OCTA-2-4

A	B	C	THICKNESS	AREA (FT^2)
48	9	30	0.100	16.00



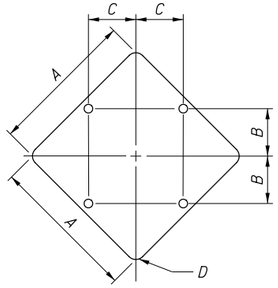
NOTES:

1. All bolt holes shall be ⅜" in diameter, and may be drilled or punched to finished size.
2. Dimensions between bolt holes shall be to tolerance of ± 1/32".
3. All route shields shall be 0.080" thick and attached to extrusheet signs with aluminum blind rivets.
4. For back-to-back mounting of STOP (R1-1) and DO NOT ENTER (R5-1) sign, follow details shown on Standard Construction Drawing TC-41.50.



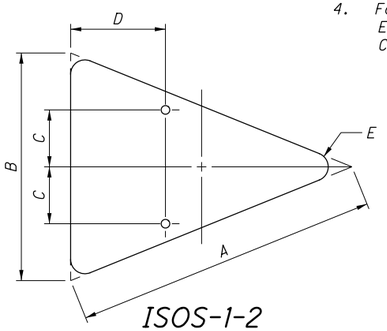
DIA-1-2

A	B	C	THICKNESS	AREA (FT^2)
18	9	1.5	0.080	2.25
24	12	1.5	0.080	4.00
30	15	1.875	0.080	6.25
36	18	2.25	0.080	9.00



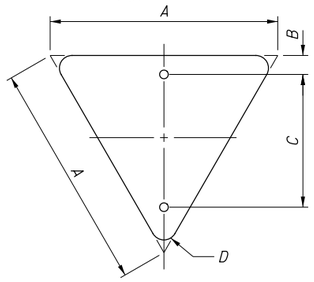
DIA-2-4

A	B	C	D	THICKNESS	AREA (FT^2)
48	15	15	3	0.100	16.00
60	18	18	3.75	0.100	25.00



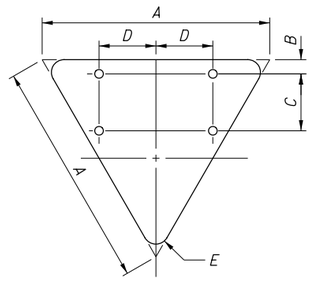
ISOS-1-2

A	B	C	D	E	THICKNESS	AREA (FT^2)
40	30	7.5	12	1.875	0.080	3.86
48	36	9	15	2.25	0.100	5.56



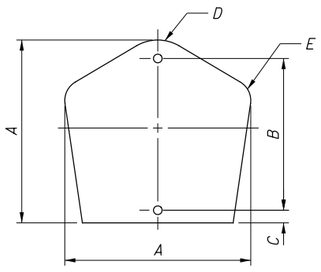
TRI-1-2

A	B	C	D	THICKNESS	AREA (FT^2)
24	2	14	1.5	0.080	1.73
30	3	18	1.5	0.080	2.71
36	3	21	2	0.080	3.90



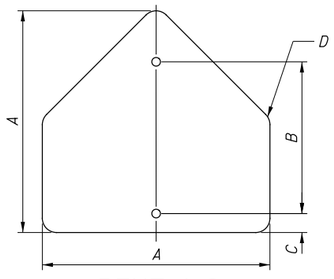
TRI-2-4

A	B	C	D	E	THICKNESS	AREA (FT^2)
48	3	12	12	3	0.100	6.93
60	3	18	15	4	0.100	10.83



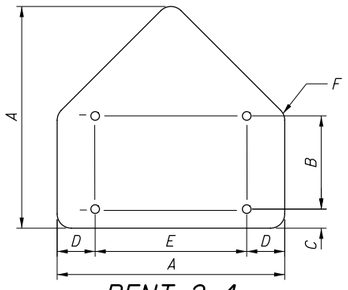
CO-1-2

A	B	C	D	E	THICKNESS	AREA (FT^2)
18	15	1	5	2	0.080	2.25
24	18	2	5.313	2.688	0.080	4.00
30	24	2	6.625	3.375	0.080	6.25



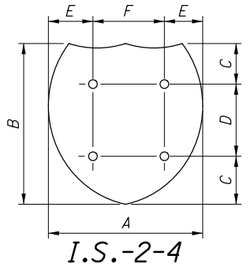
PENT-1-2

A	B	C	D	THICKNESS	AREA (FT^2)
30	21	3	1.875	0.080	6.25
36	24	3	2.25	0.080	9.00



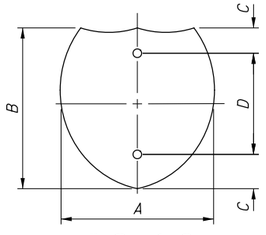
PENT-2-4

A	B	C	D	E	F	THICKNESS	AREA (FT^2)
48	18	6	9	30	3	0.100	16.00



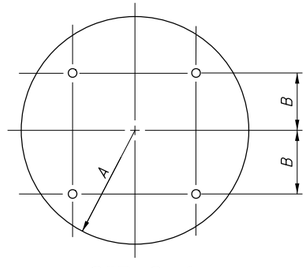
I.S.-2-4

A	B	C	D	E	F	THICKNESS	AREA (FT^2)
48	48	9	30	9	30	0.100	16.00
60	48	9	30	12	36	0.100	20.00



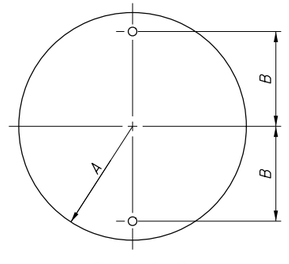
I.S.-1-2

A	B	C	D	THICKNESS	AREA (FT^2)
24	24	3	18	0.080	4.00
24	30	3	18	0.080	5.00
30	30	3	24	0.080	6.25
37.5	30	3	24	0.080	7.81
36	36	6	24	0.080	9.00
45	36	6	24	0.080	11.25



CIR-2-4

A	B	THICKNESS	AREA (FT^2)
24	15	0.100	16.00



CIR-1-2

A	B	THICKNESS	AREA (FT^2)
9	6	0.080	2.25
12	9	0.080	4.00
15	12	0.080	6.25
18	15	0.080	9.00

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ADMINISTRATOR
10-18-2013
DATE

STDS. ENGINEER
H. Suter

OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES TC-52.10 DATED 01-18-2013.

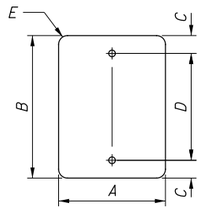
STANDARD ROADWAY CONSTRUCTION DRAWING

SIGN BLANK DETAILS I

SCD NUMBER
TC-52.10

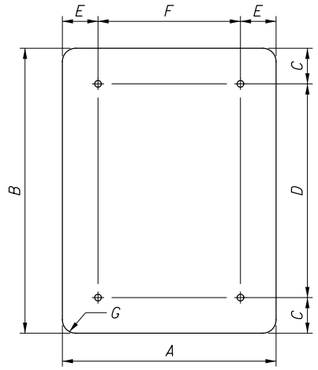
NOTES:

1. All bolt holes shall be ⅜" in diameter and may be drilled or punched to finished size.
2. Dimensions between bolt holes shall be to tolerance of ± 1/32".
3. For back-to-back mounting of STOP (R1-1) and DO NOT ENTER (R5-1) sign, follow details shown on Standard Construction Drawing TC-41.50.



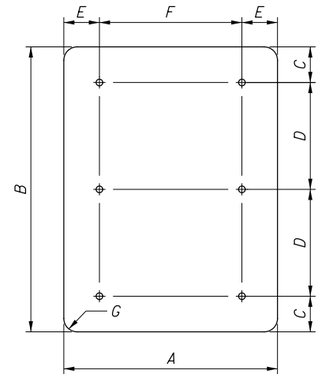
V-REC-1-2

A	B	C	D	E	THICKNESS	AREA (FT²)
6	54	9	36	1.5	0.080	2.25
9	12	1.5	9	1.5	0.080	0.75
10	12	1.5	10	1.5	0.080	0.83
12	15	1.5	12	1.5	0.080	1.25
12	16	1.5	13	1.5	0.080	1.33
12	18	1.5	15	1.5	0.080	1.50
12	24	3	18	1.5	0.080	2.00
12	30	3	24	1.5	0.080	2.50
12	36	3	30	1.5	0.080	3.00
12	48	6	36	1.5	0.080	4.00
14	48	6	36	1.5	0.080	4.67
18	24	3	18	1.5	0.080	3.00
18	60	6	48	1.5	0.100	7.50
24	30	3	24	1.5	0.080	5.00
24	36	3	30	1.5	0.080	6.00
24	38	3	32	1.5	0.080	6.33
24	42	6	30	1.5	0.080	7.00
24	48	6	36	1.5	0.100	8.00
30	36	3	30	1.875	0.080	7.50
30	42	6	30	1.875	0.080	8.75
30	48	6	36	1.875	0.100	10.00



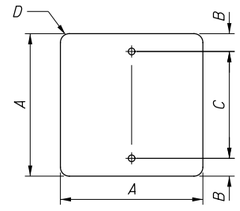
V-REC-2-4

A	B	C	D	E	F	G	THICKNESS	AREA (FT²)
36	42	6	30	6	24	2.25	0.080	10.50
36	48	6	36	6	24	2.25	0.100	12.00
36	54	6	42	6	24	2.25	0.100	13.50
36	60	6	48	6	24	2.25	0.100	15.00
36	72	12	48	6	24	2.25	0.100	18.00
36	75	13.5	48	6	24	2.25	0.100	18.75
42	60	6	48	9	24	2.25	0.100	17.50
48	60	6	48	9	30	3	0.100	20.00



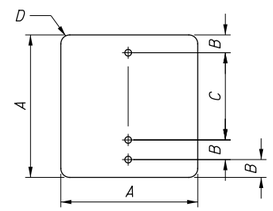
V-REC-2-6

A	B	C	D	E	F	G	THICKNESS	AREA (FT²)
48	72	6	30	9	30	3	0.100	24.00
48	76	8	30	9	30	3	0.100	25.33
48	84	12	30	9	30	3	0.100	28.00
48	96	12	36	9	30	3	0.100	32.00



SQ-1-2

A	B	C	D	THICKNESS	AREA (FT²)
6	1.0	3	1.0	0.080	0.25
9	1.0	6	1.0	0.080	0.56
12	1.5	9	1.5	0.080	1.00
15	1.5	12	1.5	0.080	1.56
16	1.5	13	1.5	0.080	1.78
18	3	12	1.5	0.080	2.25
24	3	18	1.5	0.080	4.00
30	3	24	1.875	0.080	6.25
36	3	30	2.25	0.080	9.00



SQ-1-3 (MAINTENANCE MARKER)

A	B	C	D	THICKNESS	AREA (FT²)
12	1	9	1.5	0.08	1

Shape — No. Bolts Required

V-REC-2-4

No. Supports Required

THIS DRAWING REPLACES TC-52.20 DATED 01-18-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Stanger 01-17-2014
ADMINISTRATOR DATE

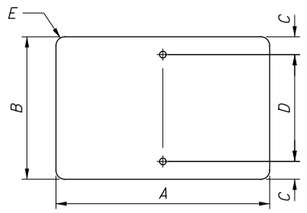
STDS. ENGINEER H. Suter

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

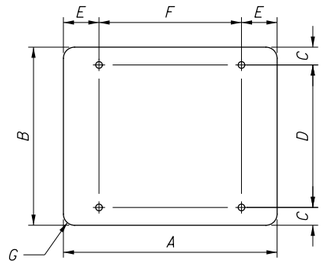
SIGN BLANK DETAILS II

SCD NUMBER TC-52.20



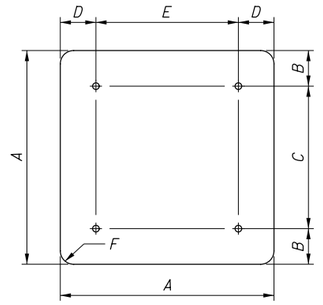
H-REC-1-2

A	B	C	D	E	THICKNESS	AREA (FT²)
12	4	1	2	1.5	0.080	0.33
12	6	1	3	1.5	0.080	0.50
12	6.5	1	3.5	1.5	0.080	0.54
12	9	1.5	6	1.5	0.080	0.75
15	8	1.5	5	1.5	0.080	0.83
15	12	1.5	9	1.5	0.080	1.25
18	6	1	3	1.5	0.080	0.75
18	9	1.5	6	1.5	0.080	1.12
18	12	1.5	9	1.5	0.080	1.50
20	15	1.5	12	1.5	0.080	2.08
20	18	3	12	1.5	0.080	2.50
21	15	1.5	12	1.5	0.080	2.19
24	6	1	3	1.5	0.080	1.00
24	8	1.5	5	1.5	0.080	1.33
24	9	1.5	6	1.5	0.080	1.50
24	10	1.5	7	1.5	0.080	1.67
24	12	1.5	9	1.5	0.080	2.00
24	18	3	12	1.5	0.080	3.00
30	8	1.5	5	1.5	0.080	1.67
30	9	1.5	6	1.5	0.080	1.88
30	12	1.5	9	1.5	0.080	2.50
30	15	1.5	12	1.5	0.080	3.12
30	16	1.5	13	1.5	0.080	3.33
30	18	3	12	1.5	0.080	3.75
30	24	3	18	1.5	0.080	5.00
36	6	1	3	1.5	0.080	1.50
36	8	1.5	5	1.5	0.080	2.00
36	9	1.5	6	1.5	0.080	2.25
36	12	1.5	9	1.5	0.080	3.00
36	14	1.5	11	1.5	0.080	3.50
36	15	1.5	12	1.5	0.080	3.75
36	18	3	12	1.5	0.080	4.50
36	20	3	14	1.5	0.080	5.00
36	24	3	18	1.5	0.080	6.00
36	30	3	24	1.875	0.080	7.50
37.5	30	3	24	1.875	0.080	7.81
48	8	1.5	5	1.5	0.125	2.67
48	10	1.5	7	1.5	0.125	3.33
48	12	1.5	9	1.5	0.125	4.00
48	14	1.5	11	1.5	0.125	4.67
48	16	1.5	13	1.5	0.125	5.33
48	18	3	12	1.5	0.125	6.00



H-REC-2-4

A	B	C	D	E	F	G	THICKNESS	AREA (FT²)
48	8	1.5	5	9	30	1.5	0.125	2.66
48	10	1.5	7	9	30	1.5	0.125	3.33
48	12	1.5	9	9	30	1.5	0.125	4.00
48	14	1.3	11	9	30	1.5	0.125	4.66
48	16	1.5	13	9	30	1.5	0.125	5.33
48	18	3	12	9	30	1.5	0.125	6.00
40	20	3	14	6	28	1.5	0.080	5.56
42	24	3	18	9	24	1.5	0.080	7.00
42	30	3	24	9	24	1.875	0.080	8.75
42	36	6	24	9	24	2.25	0.080	10.50
45	36	6	24	9	27	2.25	0.080	11.25
48	20	3	14	9	30	1.5	0.100	6.67
48	24	3	18	9	30	1.5	0.100	8.00
48	30	3	24	9	30	1.5	0.100	10.00
48	36	6	24	9	30	1.875	0.100	12.00
48	42	6	30	9	30	2.25	0.100	14.00
54	18	3	12	9	36	2.25	0.100	6.75
54	30	3	24	9	36	1.875	0.100	11.25
54	36	6	24	9	36	2.25	0.100	13.50
60	12	1.5	9	12	36	1.5	0.100	5.00
60	18	3	12	12	36	1.5	0.100	7.50
60	24	3	18	12	36	1.5	0.100	10.00
60	30	3	24	12	36	1.875	0.100	12.50
60	36	6	24	12	36	2.25	0.100	15.00
60	48	6	36	12	36	3	0.100	20.00
66	24	3	18	12	42	1.5	0.100	11.00
66	36	6	24	12	42	2.25	0.100	16.50
72	12	1.5	9	12	48	1.5	0.125	6.00
72	15	1.5	12	12	48	1.5	0.125	7.50
72	24	3	18	12	48	1.5	0.100	12.00
72	36	6	24	12	48	2.25	0.100	18.00
72	48	6	36	12	48	3	0.100	24.00
78	24	3	18	12	54	1.5	0.125	13.00



SQ-2-4

A	B	C	D	E	F	THICKNESS	AREA (FT²)
36	6	24	6	24	2.25	0.080	9.00
42	6	30	9	24	2.25	0.080	12.25
48	6	36	9	30	3	0.100	16.00

Shape — No. Bolts Required

H-REC-2-4

No. Supports Required

NOTES:

1. All bolt holes shall be ⅜" in diameter and may be drilled or punched to finished size.
2. Dimensions between bolt holes shall be to tolerance of ± 1/32".
3. For back-to-back mounting of STOP (R1-1) and DO NOT ENTER (R5-1) sign, follow details shown on Standard Construction Drawing TC-41.50.

THIS DRAWING REPLACES TC-52.20 DATED 01-18-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Vazquez 01-17-2014
ADMINISTRATOR DATE

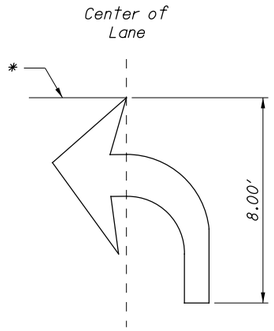
STDS. ENGINEER: H. Suter

OFFICE OF ROADWAY ENGINEERING

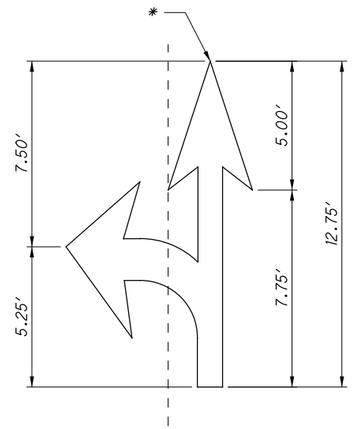
STANDARD ROADWAY CONSTRUCTION DRAWING

SIGN BLANK DETAILS II

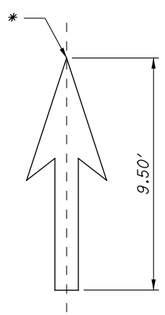
SCD NUMBER: TC-52.20



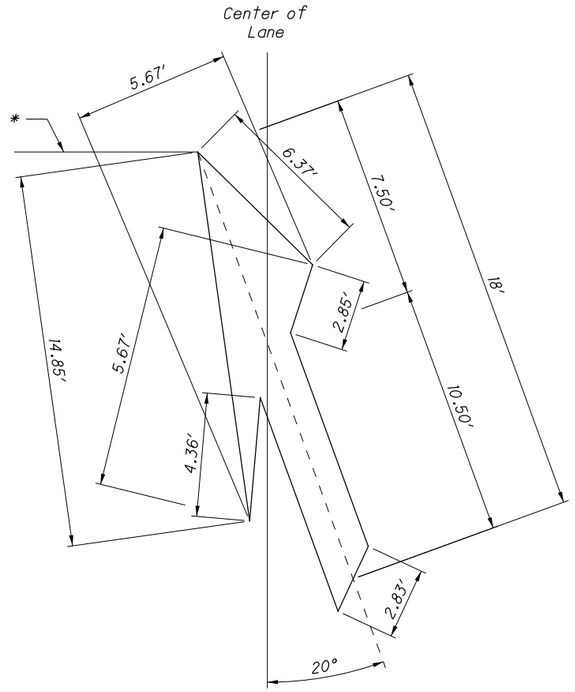
TURN ARROW
(Right Arrow Opposite)



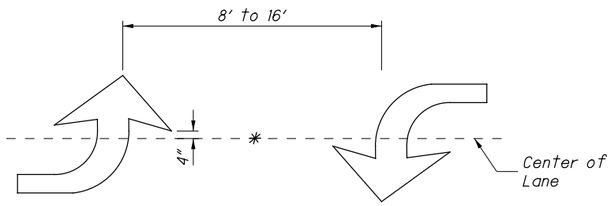
TURN AND THROUGH ARROW
(Three-Headed Directional Arrows Can be Achieved by the Combination of Turn Arrows.)



THROUGH ARROW



LANE-REDUCTION ARROW
(For Left Lane, Use Mirror Image)

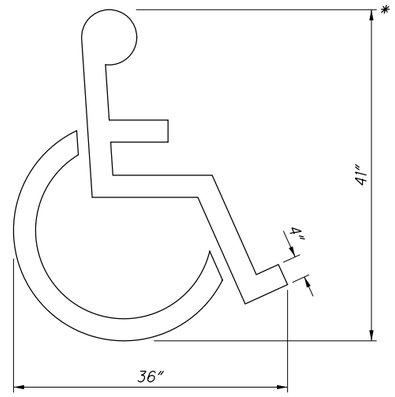


TWO-WAY LEFT-TURN ARROWS
(See Note 6)

TABLE 1 - LANE-USE ARROWS

ARROW TYPE	SIZE (FT)	AREA (SQ FT)
Turn Arrow	8.00	17
Through Arrow	9.50	13
Turn and Through Arrow	12.75	28
Lane-Reduction Arrow	18.00	46

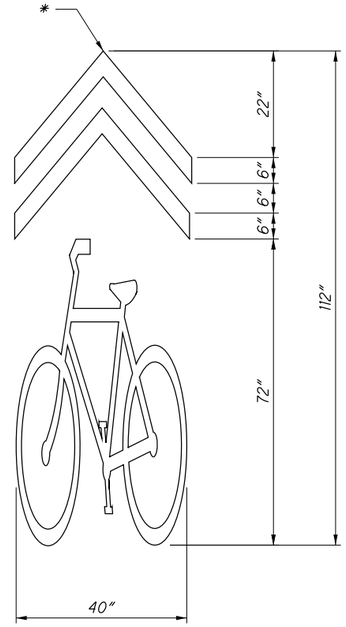
* - Indicates Station Reference Point



HANDICAP SYMBOL MARKING

TABLE 2 - HANDICAP, BIKE & CHEVRON MARKINGS

SYMBOL	HEIGHT (IN)	WIDTH (IN)	AREA (SQ FT)
HANDICAP	41	36	2.7
BIKE	72	40	16
CHEVRON	40	40	3.3 (.83 x 4)



SHARED LANE MARKING
(See Note 7)

THIS DRAWING REPLACES TC-71.10 DATED 10-19-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Atanguer 01-17-2014
ADMINISTRATOR DATE

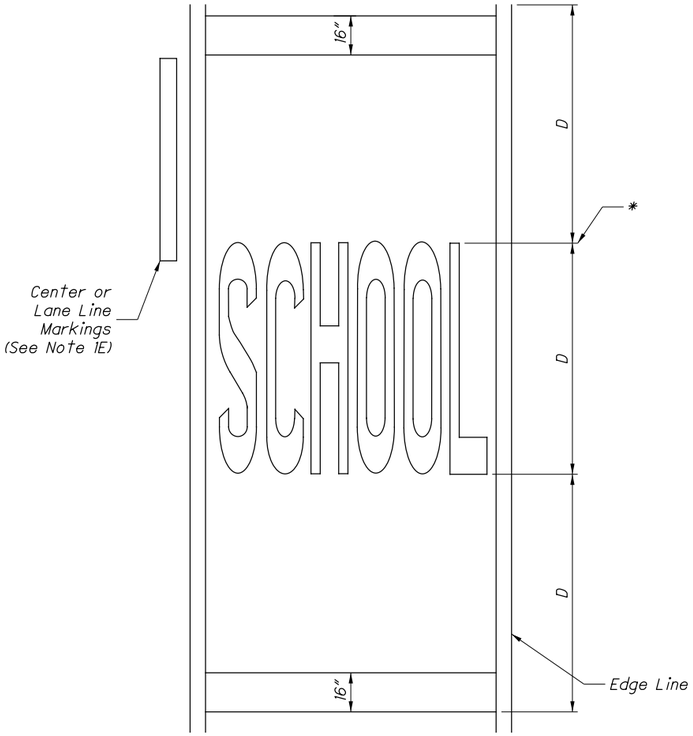
STDS. ENGINEER: P. Singh

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

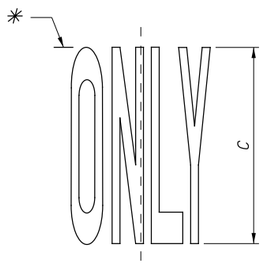
WORD AND SYMBOL PAVEMENT MARKINGS

SCD NUMBER: TC-71.10



SCHOOL WORD MARKING

(See Note 1)



ONLY WORD MARKING

(See Note 4)

TABLE 3 - WORDS (SQ FT)

WORD	HEIGHT (C, D)		
	URBAN 6′	RURAL 8′	MULTI-LANE 10′
ONLY (C)	17	23	N/A
SCHOOL (D)	27	37	90

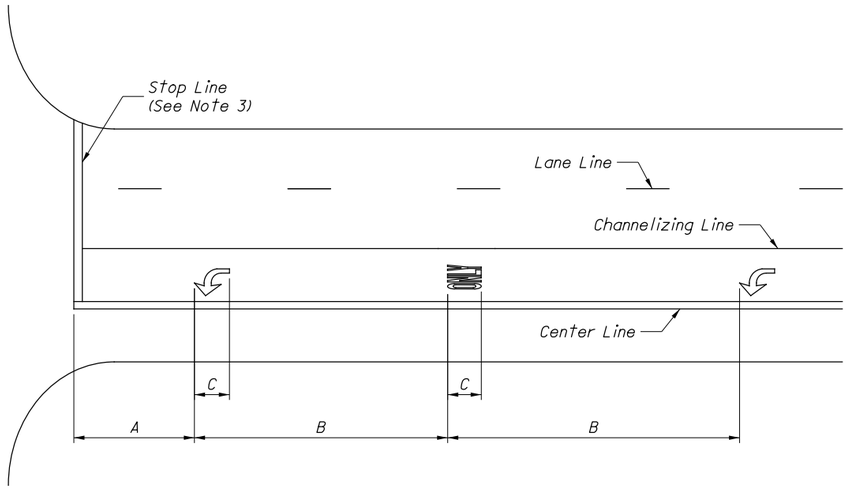
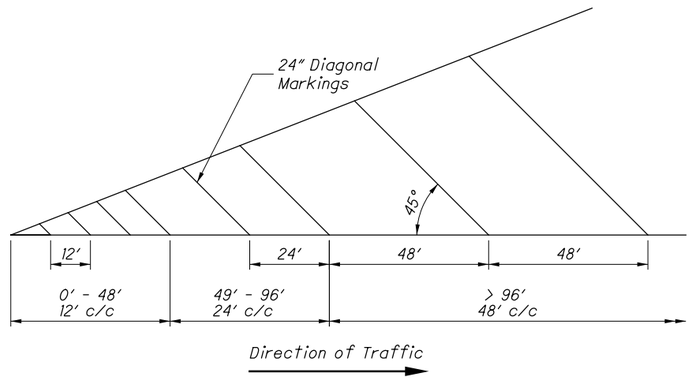


TABLE 4 - LANE USE MARKINGS

ROADWAY TYPE	DIMENSIONS (FT)		
	A (MIN.)	B	C
RURAL	30	88	8
URBAN	10	66	6

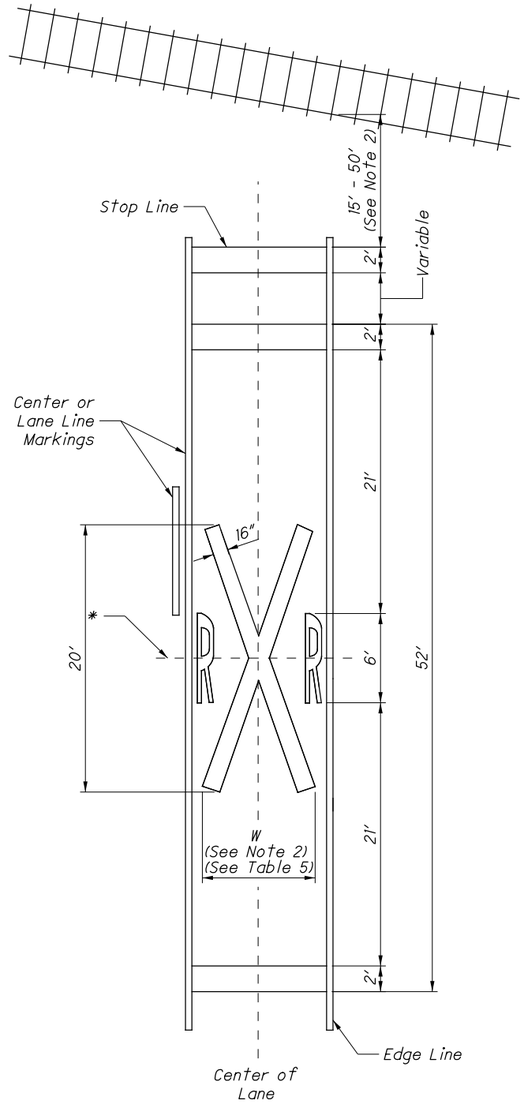
(See Note 5)



TYPICAL SPACING DETAIL FOR 24" DIAGONAL MARKINGS

(Chevron Markings, Including a Spacing Table, are Shown on SCD TC-72.20.)

* - Indicates Station Reference Point



RAILROAD SYMBOL MARKING

(See Note 2)

TABLE 5 - R X R SYMBOL

W, R X R	WIDTH (W) (FT)	8	9	10	11	12
	AREA (SQ FT)	67	68	70	71	72

THIS DRAWING REPLACES TC-71.10 DATED 10-19-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Vazquez 01-17-2014
ADMINISTRATOR DATE

STDS. ENGINEER P. Singh

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

WORD AND SYMBOL PAVEMENT MARKINGS

SCD NUMBER TC-71.10

NOTES:

SCHOOL Marking

1A. The SCHOOL markings shall be installed on all paved approaches in advance of all School Zones.

1B. The SCHOOL markings should be placed at least 100′ in advance of the School Zone. The preferred placement of the SCHOOL marking is adjacent to the School Zone Advance sign.

1C. On two-way, two-lane highways the following shall apply:

1.) When the approach lane to the School Zone is 11′ or more in width -

a.) The SCHOOL word marking and transverse lines shall be contained in, and centered in, the lane.

b.) The character height shall be 6′ for urban areas and 8′ for rural areas.

2.) When the approach lane to the School Zone is less than 11′ in width -

a.) One installation of the SCHOOL word marking and transverse lines shall extend across both lanes of traffic.
b.) The characters shall be 10′ in height.

1D. On multi-lane approaches the following shall apply -

1.) When the approach lanes to the School Zone are 11′ or more in width -

a.) The SCHOOL word marking and transverse lines shall be contained in, and centered in, each lane.
b.) The character height shall be 6′ for urban areas and 8′ for rural areas.

2.) When the approach lanes to the School Zone are less than 11′ in width -

a.) One installation of the SCHOOL word marking shall extend to the width of two approach lanes.
b.) Transverse lines shall extend across all approach lanes of traffic.
c.) The characters shall be 10′ in height.

1E. Center or lane lines shall not pass through the SCHOOL word marking.

1F. 6′ and 8′ high SCHOOL word marking shall be marked with 4″ strokes.

10′ high SCHOOL word marking shall be marked with 8″ strokes.

1G. The area of the transverse lines varies with the width of the pavement; therefore, the area must be added to the value in Table 3 (sheet 2).

Railroad Crossing Markings

2A. On multi-lane approaches, markings shall be as follows -

a.) The RXR symbol shall be placed in each approach lane.
b.) Transverse lines used with the railroad symbols shall extend across all appraoch lanes.

2B. The railroad symbol should be located so that the Railroad Advance Warning (W10-1) sign is within the two transverse boundary lines of the railroad symbol.

2C. The stop line shall be located for best sight distance between 15′ - 50′ of the near edge of the tracks.

2D. The stop line shall be approximately 8′ from a gate (if present).

2E. Width (W) of the "X" will vary according to the lane width.

2F. The height of the "R" shall be 6′.

2G. The area of the transverse lines and stop lines varies with the width of the pavement; therefore the area must be added to the value in Table 5 (sheet 2).

Stop Line Marking

3A. Except as specified in Notes 3B and 3C, the stop line should be placed as follows:

a.) The stop line should be placed where cross-corner vision is maximum.
b.) In no case shall the stop line be placed more than 30′ or less than 4′ from the nearest edge of the intersecting roadway.
c.) For normal intersections the maximum distance should be 10′.

3B. If a marked crosswalk is present the stop line should be placed 4′ in advance of, and parallel to, the nearest crosswalk line.

3C. For signalized intersections the stop line should be placed at a minimum distance of 40′ from the nearest signal head.

ONLY Word Marking

4A. The ONLY word marking is optional.

4B. Where used, the spacing between ONLY and arrow markings should be based on Table 4 (sheet 2).

4C. When lane-use arrow markings are used and the ONLY marking is not, an additional lane-use arrow should be used in its place to retain the spacing as shown in Table 4 (sheet 2).

Lane-Use Arrow Markings

5A. Lane-use arrow markings are optional except where a through traffic lane(s) approaching an intersection becomes a mandatory turn lane(s).

5B. Where used, the spacing between markings should be based on Table 4 (sheet 2). However, based on the turn lane length, the spacing between the markings may be adjusted.

Two-Way Left-Turn Only (TWLTO) Arrows

6A. Arrow sets should be longitudinally spaced at intervals of:

a.) 500′ - 1000′ for speeds less than or equal to 40 mph,
b.) 1000′ - 1500′ for speeds over 40 mph

6B. In addition, an arrow set should be placed:

a.) 100′ - 200′ from the near edge of an intersecting roadway, or
b.) Inside both ends of TWLTO lanes.

Shared Lane Marking

7A. When chevron markings are used, its area must be added to the value of the bike symbol markings (see Table 2 on sheet 1).

7B. When used, the shared lane marking should be placed immediately after an intersection and spaced at intervals not greater than 250′ thereafter.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Vazquez 01-17-2104
ADMINISTRATOR DATE

STDS. ENGINEER P. Singh

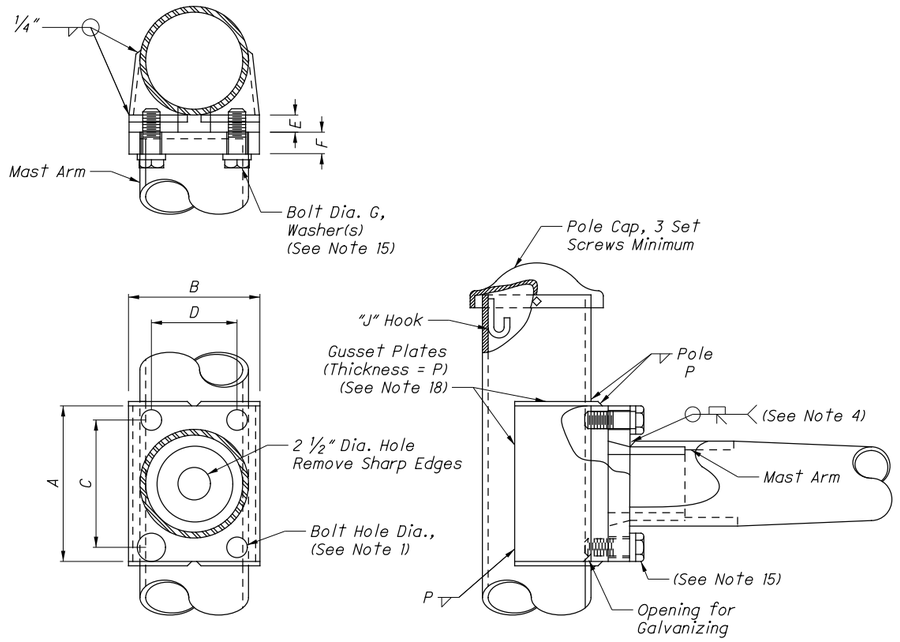
OFFICE OF ROADWAY ENGINEERING

THIS DRAWING REPLACES TC-71.10 DATED 10-19-2012.

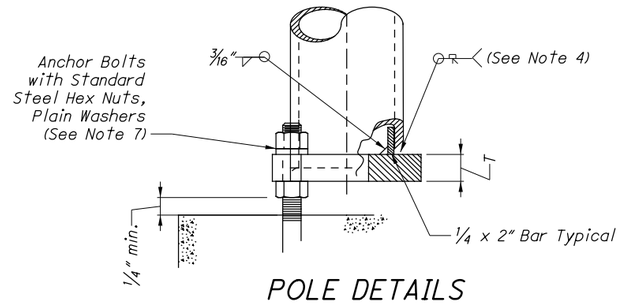
STANDARD ROADWAY CONSTRUCTION DRAWING

WORD AND SYMBOL PAVEMENT MARKINGS

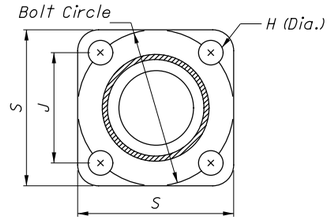
SCD NUMBER TC-71.10



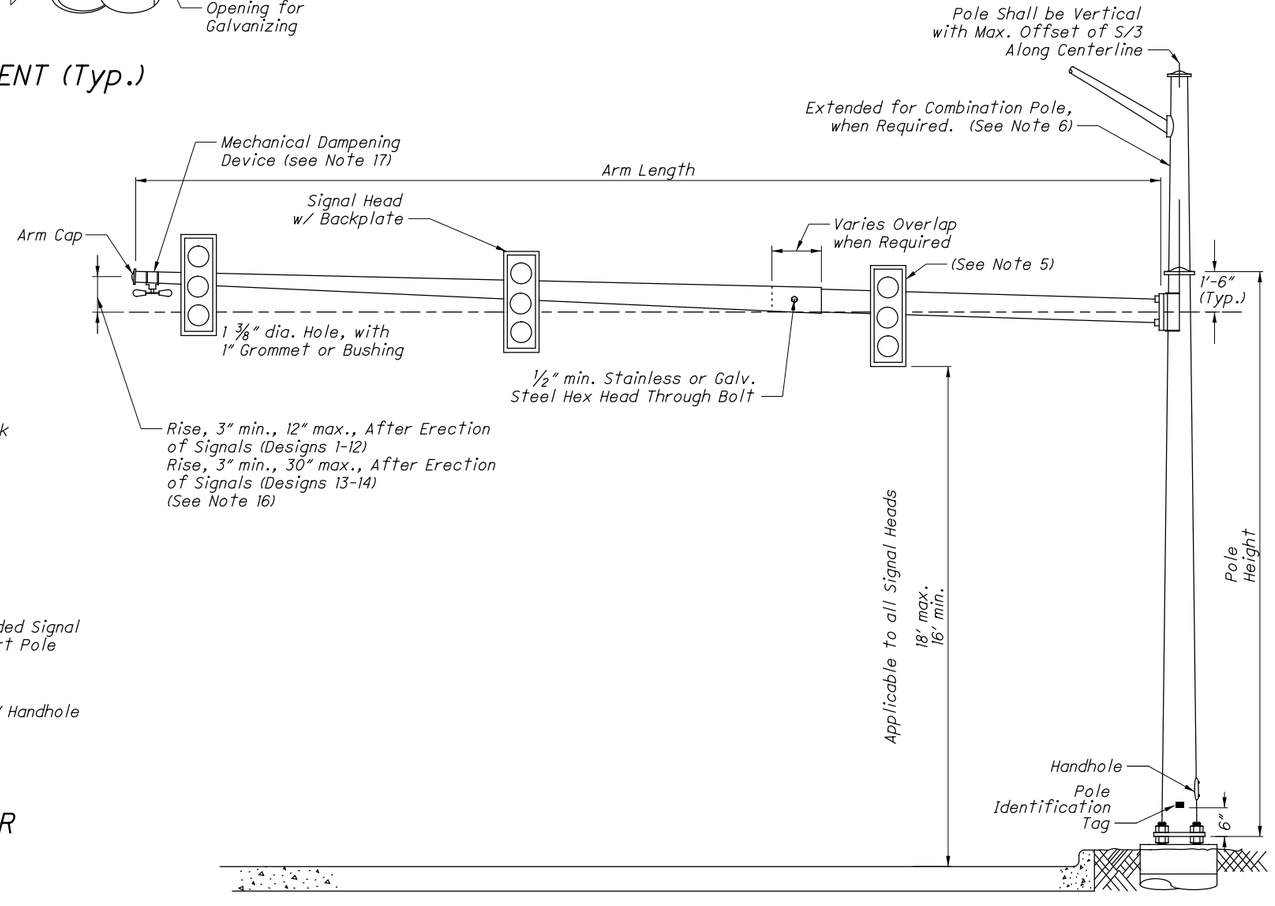
ARM ATTACHMENT (Typ.)

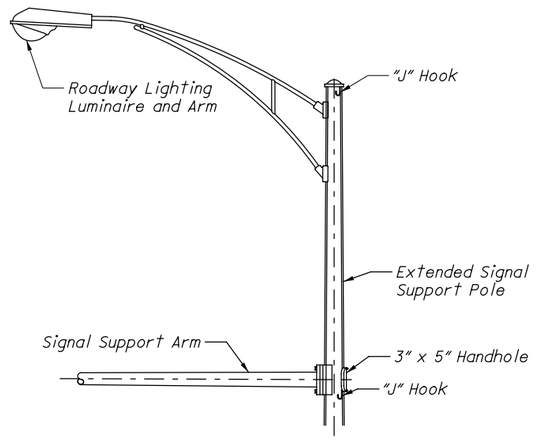


POLE DETAILS



BASE PLATE





POLE EXTENSION FOR
LIGHTING LUMINAIRE

NOTES:

1. Arm plate hole diameter shall be bolt diameter plus 1/8". Pole plate tapped hole shall have threads with 75% (min.) full profile height. Threads may be retapped after galvanizing.
2. For sign mounting details, see Standard Construction Drawings (SCDs) TC-16.21 and TC-41.41.
3. For foundation details, see SCD TC-21.20.
4. The arm attachment plate shall be welded using a full penetration weld. The pole attachment to the base plate shall be welded using a full penetration weld.
5. For signal attachment details, see SCD TC-85.20.
6. For modification of pole to support roadway lighting, see SCD HL-10.12.
7. A minimum of one bolt thread shall remain above the anchor nut.
8. All unused couplings shall be provided with a removable galvanized cast iron plug.
9. For pole and base plate dimensions, see Sheet 2.
10. The wire entrance part of the signal head may be oriented in any direction to keep the cable drip loop from rubbing on the signal head. The signal head shall hang level and plumb.
11. For construction details and location of handholes, see SCD TC-22.10.
12. The design loads were calculated as the equivalent amount of signal area that could be carried at the end of the arm.
13. The design loads were developed without applying galloping fatigue loads. Also, the stress requirements of Note b, Table 11-2 in the AASHTO code were not applied.
14. These structures should be inspected for excessive wind induced deflection in the vertical direction. If found, a damping plate should be placed on the arm.
15. Connection bolts shall be ASTM A325 for diameters 1.5" and smaller. Larger bolts shall be ASTM A449. Designs 1 through 12 shall use ASTM F436 flat washers. Design 13 shall use ASTM F959 DTI washers. Design 14 shall use ASTM F2437 Type 2 Grade 5 DTI washers. If necessary, I.D. of DTI washers shall be ground or reamed to properly fit over attachment bolts. Provide proper DTI feeler gage to Engineer. An F436 washer shall be used directly under the head of the bolt with all DTI washers. Assure that the flat washer does not spin during bolt tightening with DTI washer.
16. Negative arm end slope is acceptable to achieve rise requirement.
17. An approved mechanical damping device shall be installed as close as possible to the end of the arm. Required on arms over 59' in length. Install on arms 59' or less if directed by the plans or the Engineer. Flat plate dampers shall only be used for new construction if directed by the plans or the Engineer.
18. Ring-stiffened wrap-around horizontal plates are permitted as an alternative shown to the horizontal plates shown.

THIS DRAWING REPLACES TC-81.21 DATED 07-19-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Vazquez 01-17-2014
ADMINISTRATOR DATE

STDS. ENGINEER H. Suter

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

SINGLE ARM
OVERHEAD SIGNAL SUPPORT

SCD NUMBER TC-81.21

These designs use full penetration welds at the arm and base plate connections.

NOTES:

1. Maximum design area is based on 90 MPH design wind speed with a pressure of 25 PSF.

ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE NOTED.

DESIGN NO.	MAXIMUM DESIGN AREA SQ. FT. (NOTE 1)	DESIGN DISTANCE FROM CL (FT.)	POLE		ARM		TWO PIECE ARM		ARM ATTACHMENT								ANCHOR BASE					ANCHOR BOLT	
			WALL THICK	SIZE	WALL THICK	SIZE	WALL THICK	SIZE	A	B	C	D	E	F	G	P	BOLT CIRCLE	S	J	T	H	DIA.	L
1	26	24.5	.179	10 x 6.78 x 23′	.179	7 x 3.50 x 25′			14.50	12	10.50	8	1.25	1.25	1.25	0.25	13.50	14.13	9.56	1.50	1.75	1.50	54
2	25	31.5	.179	11 x 7.78 x 23′	.179	8 x 3.52 x 32′			14.50	12	10.50	8	1.25	1.50	1.25	0.25	15	15.63	10.63	1.50	1.75	1.50	54
3	25	37.5	.179	12 x 8.78 x 23′	.179	9 x 3.68 x 38′			14.50	12	10.50	8	1.25	1.50	1.25	0.25	16	17	11.31	1.50	1.75	1.50	54
4	42	37.5	.239	13 x 9.78 x 23′	.239	10.32 x 5.00 x 38′			16.50	14.50	12.50	9.50	1.50	2	1.25	0.25	18	18.50	12.75	2	2.13	1.75	84
11	40	44.5	.239	14 x 10.78 x 23′	Total Length = 45′		.239	11 x 8.62 x 17′ +	16.50	14.50	12.50	9.50	1.50	2	1.25	0.31	20	20.50	14.13	2	2.13	1.75	84
							.179	9.19 x 5.10 x 29′ - 3″															
12	42	47.5	.299	14 x 10.78 x 23′	Total Length = 48′		.299	11 x 8.62 x 17′ +	16.50	14.50	12.50	9.50	1.75	2	1.50	0.31	20	20.50	14.13	2	2.38	2	90
							.179	9.19 x 4.68 x 32′ - 3″															
13	40	59.5	.299	16 x 12.78 x 23′	Total Length = 60′		.299	13 x 8.80 x 30′ +	19.50	16.50	15	12	1.50	2	1.50	0.31	22	23	15.56	2	2.38	2	90
							.239	9.62 x 5.14 x 32′															
14	38	69.5	.299	17 x 13.78 x 23′	Total Length = 70′		.3125	14 x 9.1 x 35′ +	19.50	16.50	15	12	2.00	2	2.00	0.38	22	23	15.56	2	2.38	2	90
							.239	9.60 x 4.42 x 37′															

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Reynaldo Atanguen 01-17-2014
ADMINISTRATOR DATE

STDS. ENGINEER H. Suter

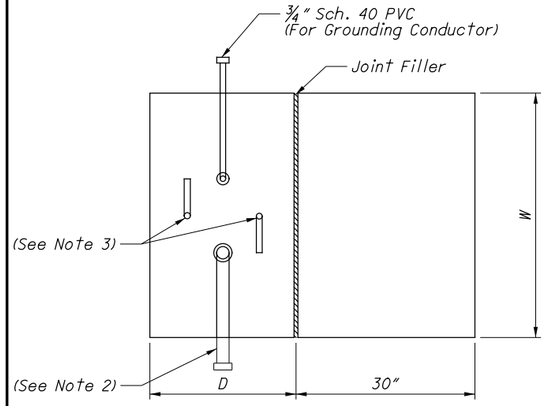
OFFICE OF ROADWAY ENGINEERING

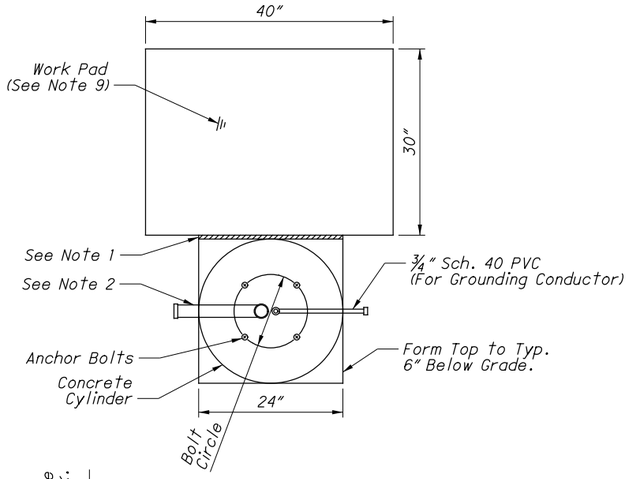
THIS DRAWING REPLACES TC-81.21 DATED 07-19-2013.

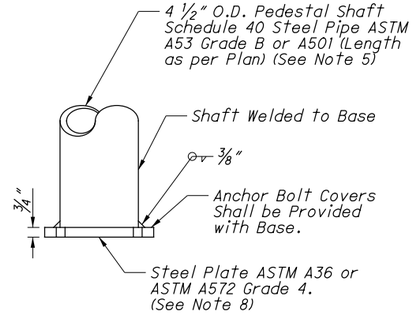
STANDARD ROADWAY CONSTRUCTION DRAWING

SINGLE ARM OVERHEAD SIGNAL SUPPORT

SCD NUMBER TC-81.21







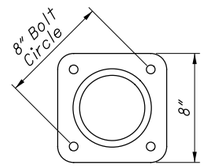
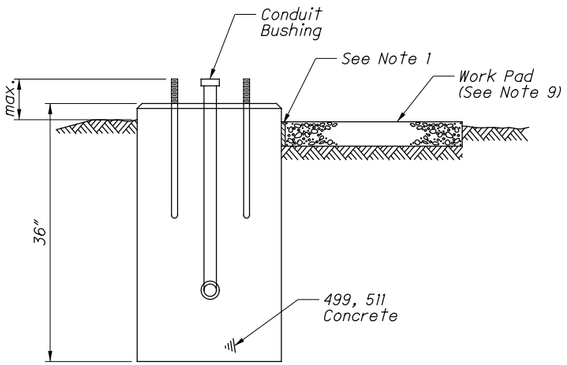


PLATE PEDESTAL BASE

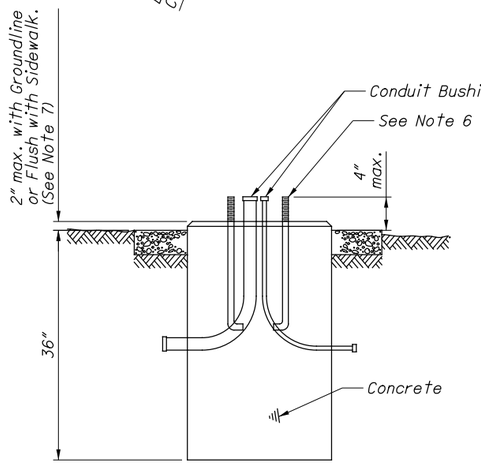
NOTES:

1. ½" preformed joint filler as per CMS 705.03 shall be used between foundations and adjacent paved areas.
2. The size, number and orientation of conduit ells shall be as shown in the plan, except that on ¾" Schedule 40 PVC shall be installed in each foundation.
3. The size, number and location of anchor bolts shall be in accordance with the manufacturer's recommendations.
4. All pedestals shall be provided with a method of securely attaching a 4 AWG insulated copper grounding conductor to the pedestal or anchor bolt. No cables or connections shall be external to the pedestal.
5. The pedestal shaft length as shown in the plans includes the pedestal base height for either base design.
6. The pedestal base shall set on the foundation top without grouting, preformed fillers or leveling nuts under the base. Steel shims may be used under the base for leveling the installation.
7. The foundation area of contact with the pedestal base shall be level. If adjacent paved areas slope, the remainder of the foundation top shall be beveled to meet the adjacent elevations.
8. A cast steel anchor base of equivalent strength may be used in lieu of the base plate.
9. A 4" thick work pad shall be provided unless in an otherwise paved area. When required, this item shall be paid for under Item 633 Controller Work Pad. In level areas the top of the pad shall be 1" above the ground line. In steeply sloped areas the pad's location shall be adjusted to provide access and drainage.
10. Ground mounted controller cabinets shall be sealed to the foundation with a flexible weatherproof clear, silicone caulking compound.
11. Threaded shaft connections into transformer-type pedestal bases shall resist rotation through the use of mechanical fasteners. If pedestal is supporting a signal device, a through-bolt shall be used with a minimum diameter of ¼" and utilizing nylock or deformed-thread nuts.



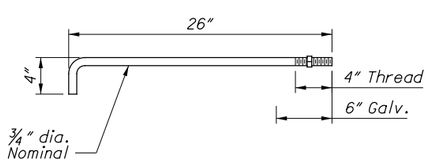
TYPE	W	D	FOUNDATION CONCRETE	WORK PAD
1	40 in	24 in	0.82 C.Y.	0.96 S.Y.
2	50 in	36 in	1.54 C.Y.	1.24 S.Y.

GROUND-MOUNTED NEMA CABINET FOUNDATION

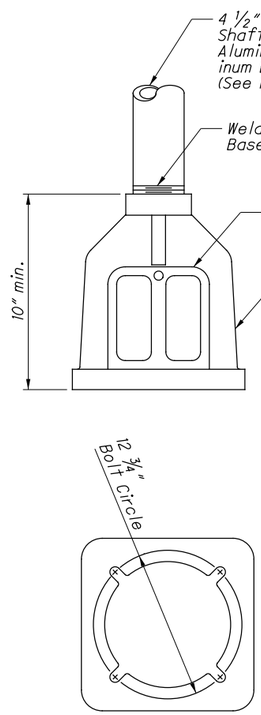


FOUNDATION CONCRETE	WORK PAD
0.42 C.Y.	0.96 S.Y.

PEDESTAL FOUNDATION



PEDESTAL ANCHOR BOLT
ASTM A307 STEEL



TRANSFORMER TYPE
PEDESTAL BASE

THIS DRAWING REPLACES TC-83.20 DATED 04-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ADMINISTRATOR
10-18-2013
DATE

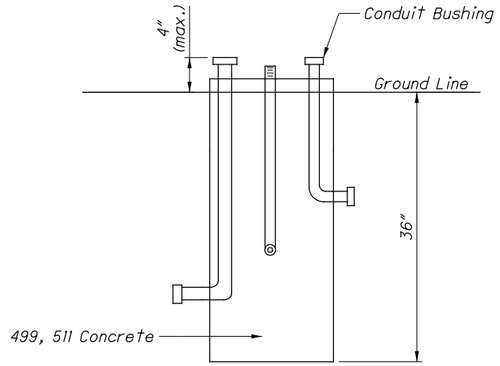
STDS. ENGINEER
Duemmel

OFFICE OF ROADWAY ENGINEERING

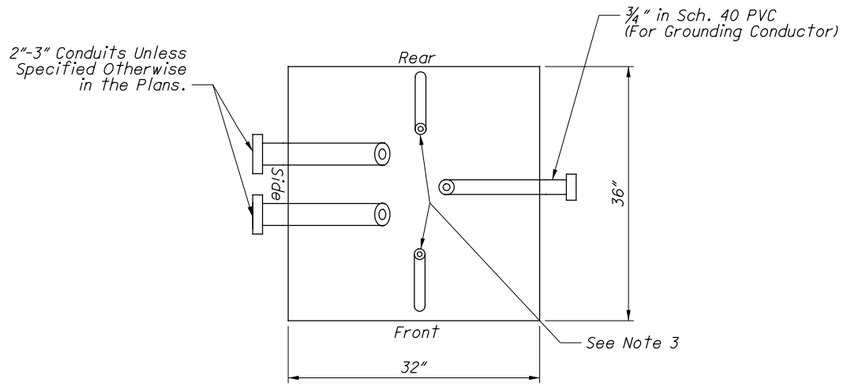
STANDARD ROADWAY CONSTRUCTION DRAWING
CABINET FOUNDATIONS AND PEDESTALS

SCD NUMBER
TC-83.20

332/336 CABINET FOUNDATION



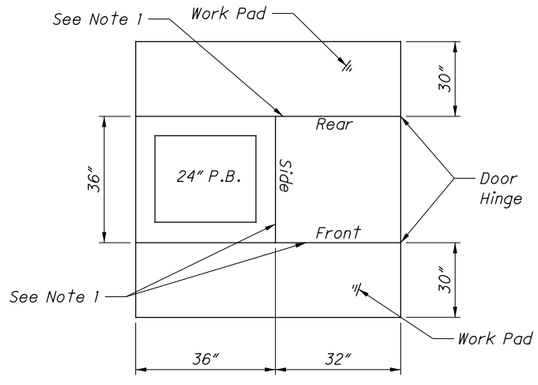
ELEVATION VIEW



PLAN VIEW

332/336 CONTROLLER WORK PAD

(See Note 9)



PLAN VIEW

NOTE: Pullbox Shall be Placed on Opposite Side of Door Hinge

THIS DRAWING REPLACES TC-83.20 DATED 04-20-2012.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

10-18-2013
DATE

ADMINISTRATOR

STDS. ENGINEER
Duemmel

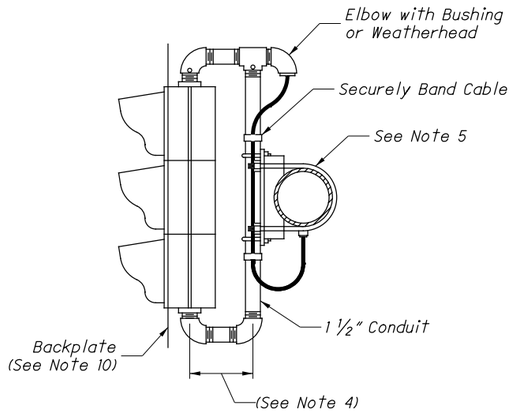
OFFICE OF ROADWAY ENGINEERING

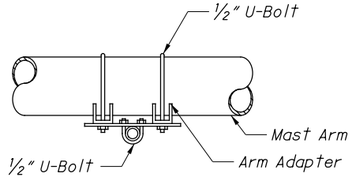
STANDARD ROADWAY CONSTRUCTION DRAWING

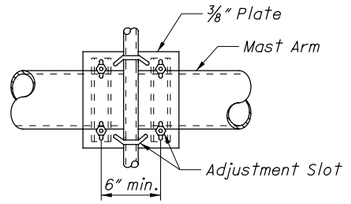
CABINET FOUNDATIONS AND PEDESTALS

SCD NUMBER
TC-83.20

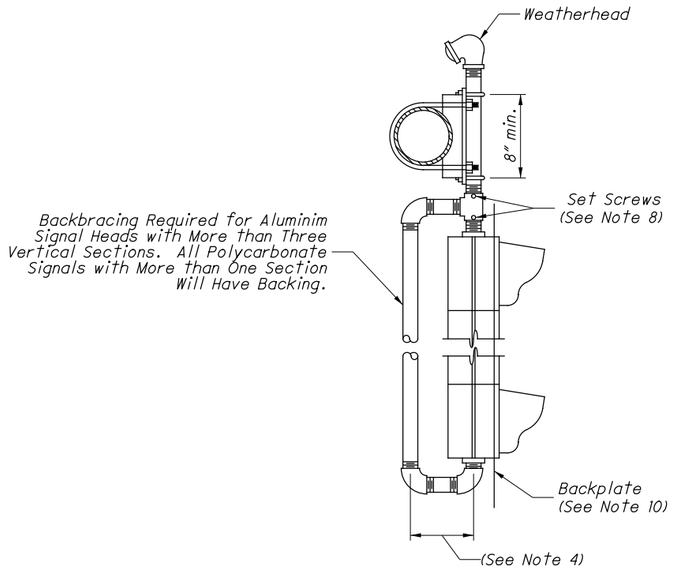
RIGID SIGNAL HEAD MOUNTING FOR MAST ARMS







SIGNAL HEAD SUSPENSION



NOTES:

1. Signal head conduit brackets and conduit fittings shall be galvanized. On span wire mounted signals, they shall be painted to match the body of the signal head. On mast arm mounted signals, they shall not be painted unless specified in the plans.
2. All signal head assemblies shall be installed in a plumb position and perpendicular to the approach lane.
3. The mast arm clamp shall have a minimum strength at yield to support a 200 pound load.
4. A minimum of 17" is required for optically programmed signal heads and a minimum of 6" for standard signal heads.
5. Alternate rigid signal head mounting devices for mast arms may be approved by the Engineer upon demonstration that they provide adequate rigidity, equal range of adjustment and can be tightened sufficiently to prevent movement and loosening under vibration.
6. All signal heads shall be installed with their lowest part (including backbracing and backplates) with a clearance above pavement elevation at the center of the roadway of 16' minimum, 18' maximum. It is intended that this clearance be obtained without the use of drop pipes, but rather by the careful selection of foundation heights, attachment heights, arm rise, and other factors during the installation. If the installation cannot be adjusted to the proper clearance the Contractor shall advise the Engineer of all signals which exceed the maximum. The Engineer will, in consultation with the maintaining agency, direct the use of drop pipes or waive the maximum clearance requirement for each head. If drop pipes are necessary, adjustable signal hangers as detailed may be used.
7. Cable entrance openings on disconnect hangers shall rigidly clamp cable to prevent movement of the cable within the enclosure.
8. Signal head rotation shall be prevented by the use of serrated rings, set screws, or other positive devices incorporated in the signal housing and at critical locations in the supporting hardware.
9. All conductors shall have adequate clearance between hangers, thimbles, bullrings, etc. in order to avoid damage from rubbing.
10. All backplates shall have a 2" fluorescent yellow reflective border.

THIS DRAWING REPLACES TC-85.20 DATED 01-18-2013.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
ADMINISTRATOR
10-18-2013
DATE

STDS. ENGINEER
Duemmel

OFFICE OF ROADWAY ENGINEERING

STANDARD ROADWAY CONSTRUCTION DRAWING

OVERHEAD SIGNAL ATTACHMENT MAST ARM

SCD NUMBER
TC-85.20