

**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.

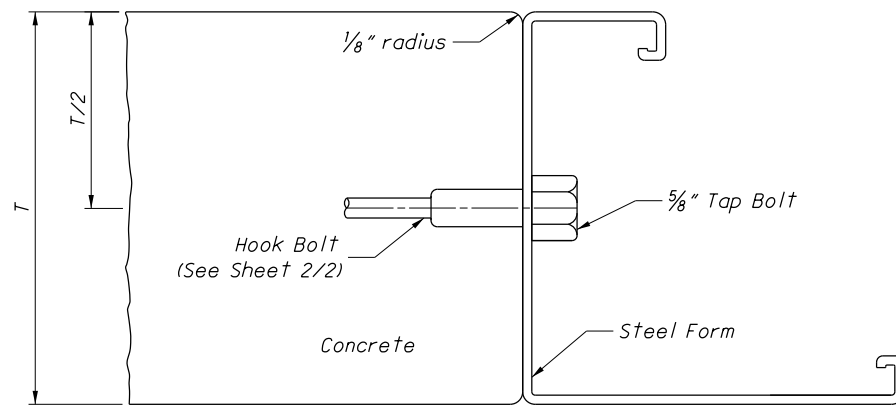
Tie bars shall be #5 deformed bars. A satisfactory device shall be used to hold the tie bars in proper positions or they may be installed by a mechanical installing device. Tie bars shall be centered on the longitudinal joint as nearly as practical.

**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.

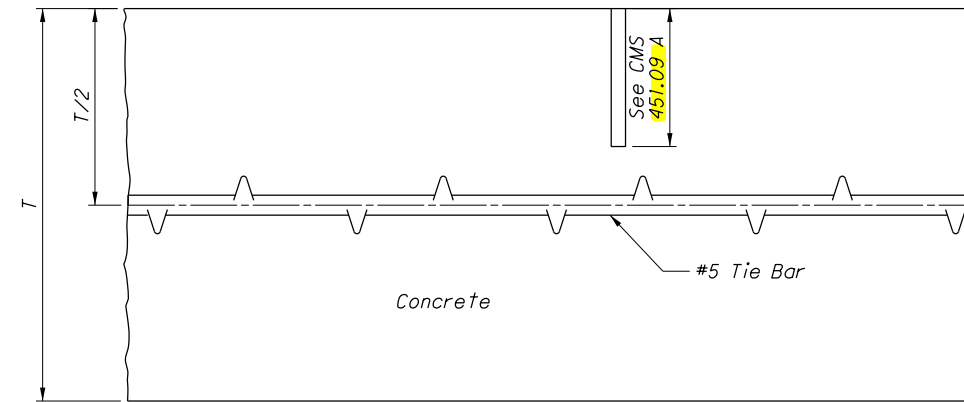
**TYPE D (DRILLED TIED LONGITUDINAL) JOINT:** Type D joints shall be constructed in accordance with CMS 255.05. The nylon or plastic retention disc shall be clear or opaque white in color. Grout shall meet the requirements of CMS 255.02. 5/8" expansion anchors, FF-S-325, Group VIII, Type 1 or Group II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

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

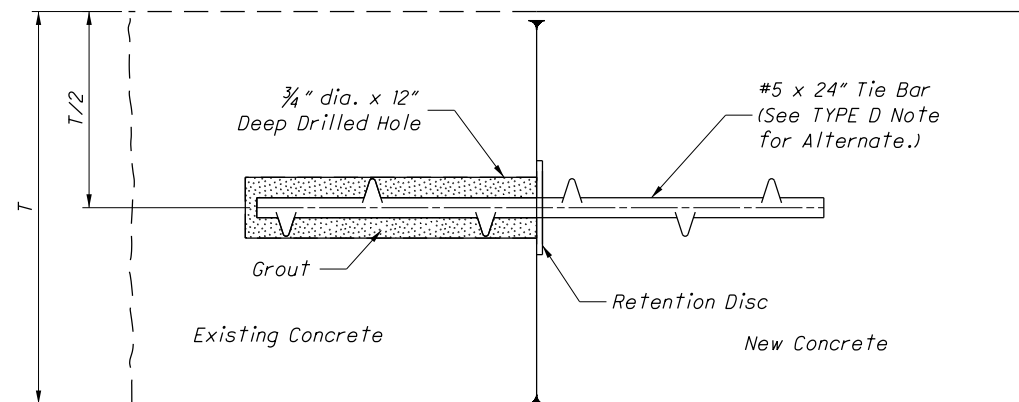
See sheet 2/2 for additional details.



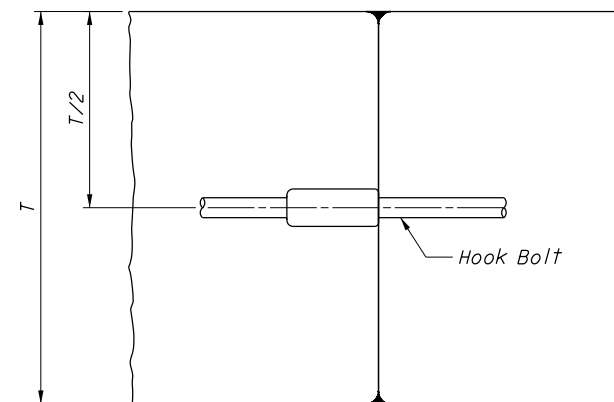
**ACCEPTABLE METHOD OF FORMING JOINT**



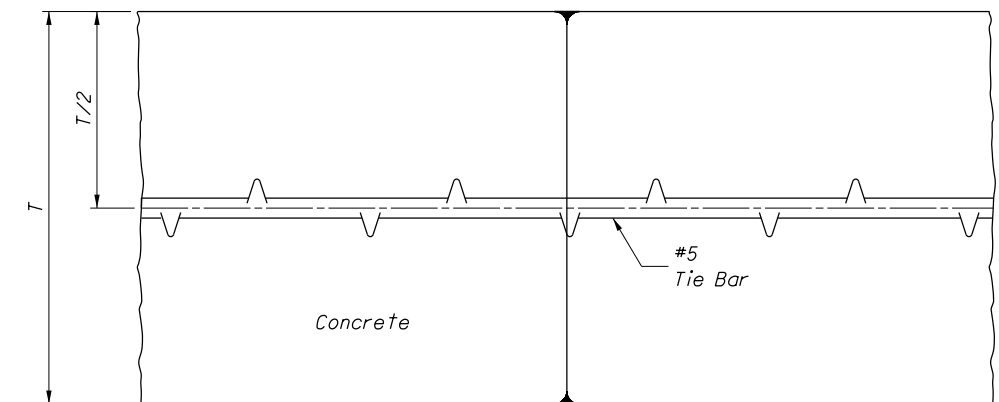
**SAWED JOINT**



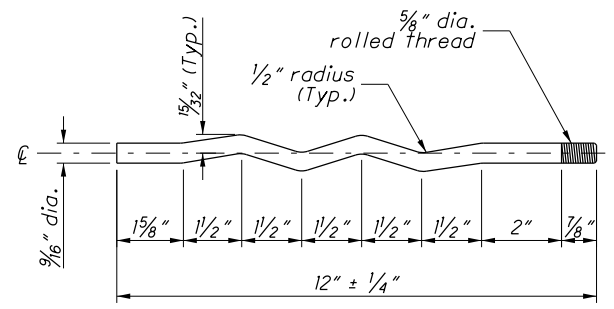
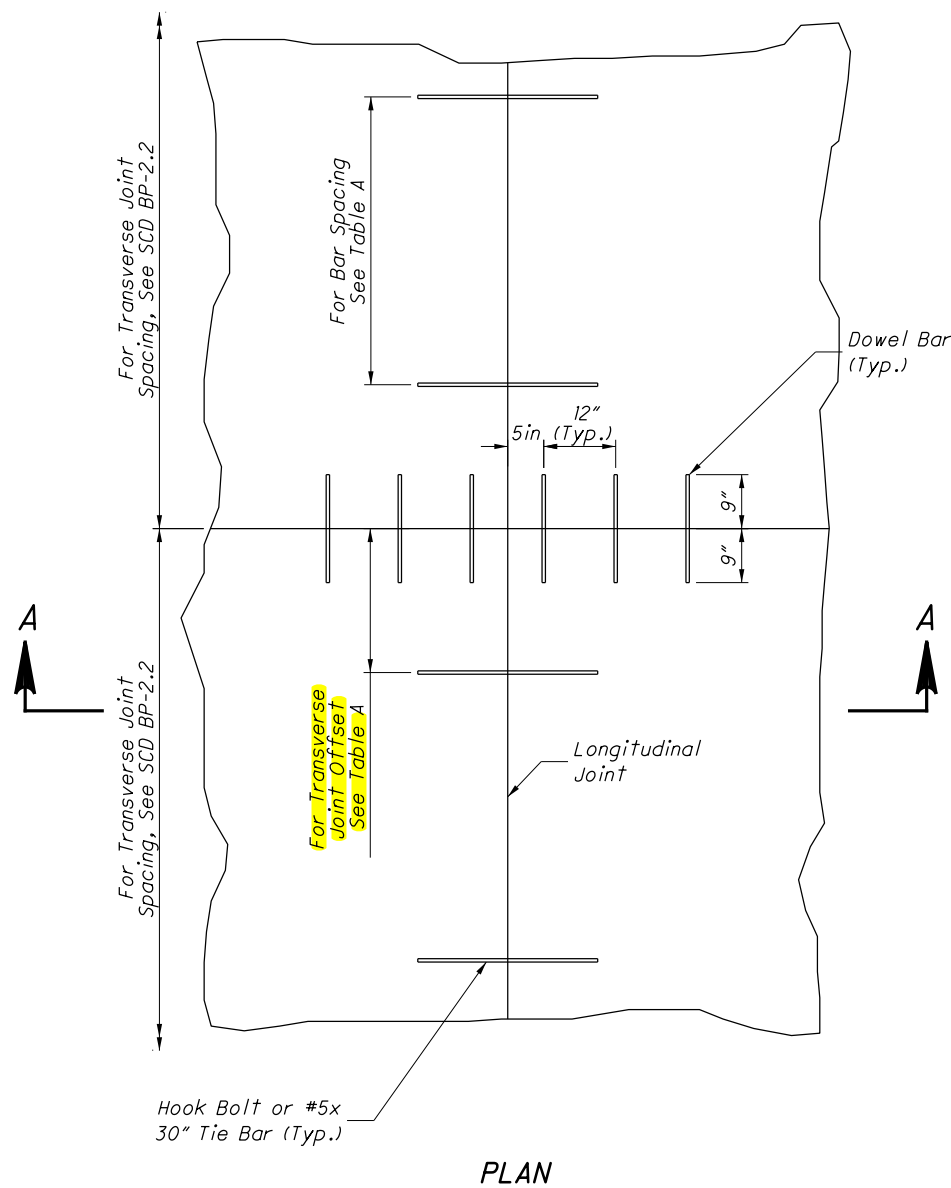
**TYPE D (DRILLED TIED LONGITUDINAL) JOINT**



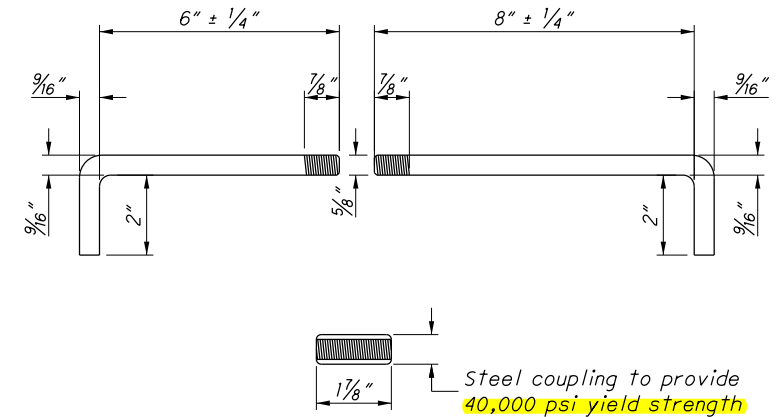
**BUTT JOINT  
w/ HOOK BOLT**



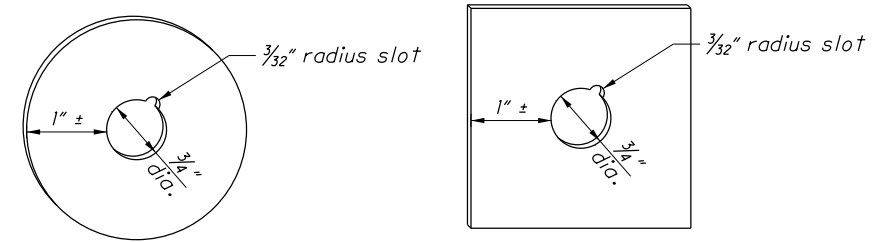
**BUTT JOINT  
w/ TIE BAR**



HOOK BOLT ALTERNATE

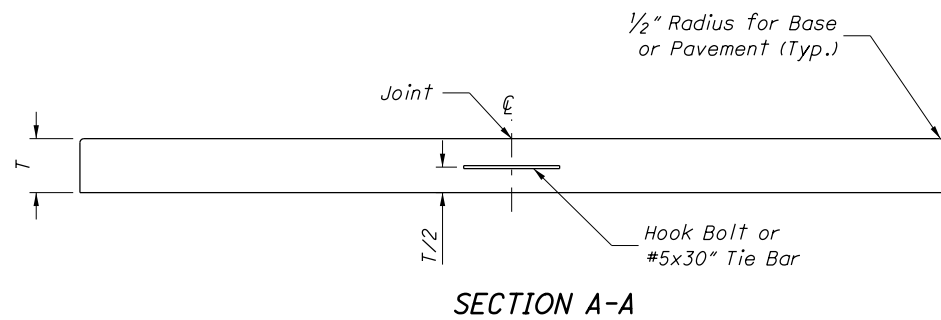


HOOK BOLT



NYLON OR PLASTIC GROUT RETENTION DISCS FOR DOWEL/TIE BARS  
(1/16" min. thick)

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'



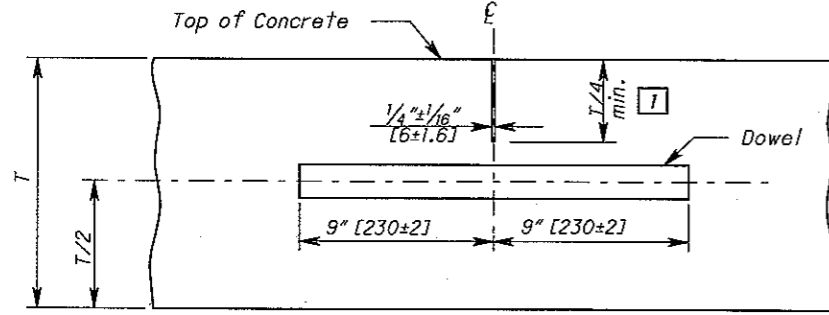
TIE BAR OR HOOK BOLT SPACING

**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.

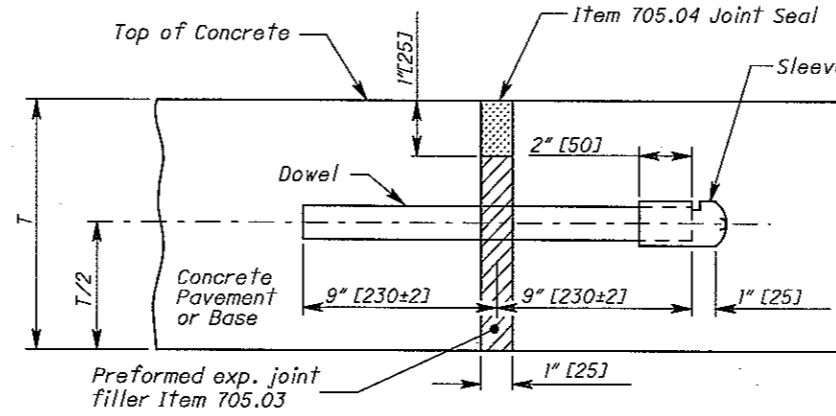
**HOOK BOLTS:** Threaded hook bolts and alternates shall be turned to a tight fit when installed in couplings. Ensure the coupling is located on the same side of the joint as the shorter (6" +/- 1/4") hook bolt.

**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.



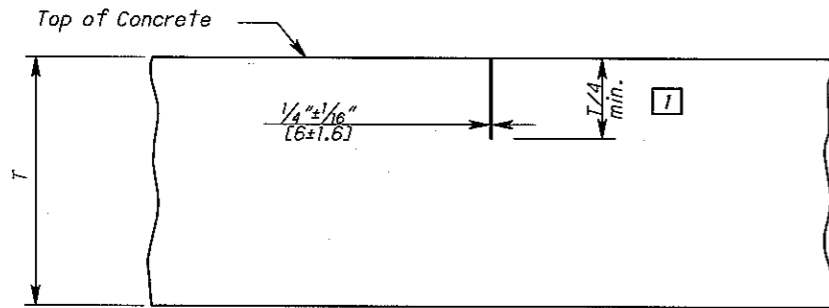
ITEM 451, 452 & 305



SECTION THROUGH EXP. JOINT

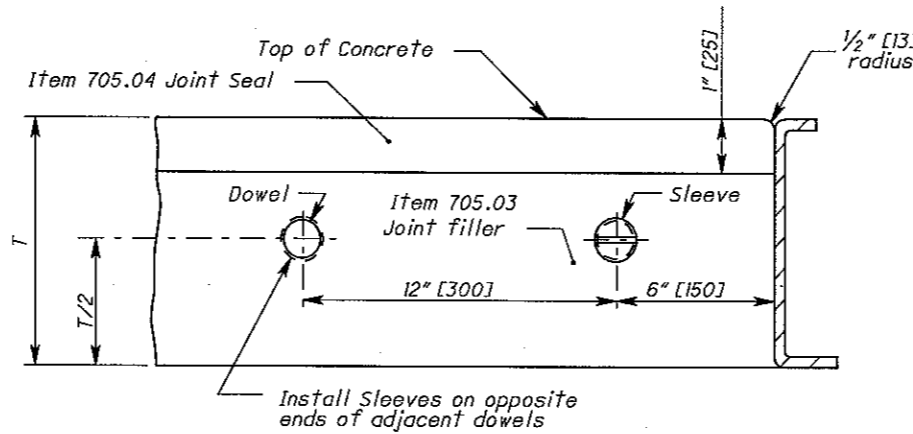
LEGEND

[1] Where  $T > 10$  [255], the sawcut depth shall be  $T/3$ .  
If using early entry saws, cut joints  $2\frac{1}{4}$  to  $2\frac{1}{2}$  [56 to 63] deep and  $\frac{1}{8}$  [3] wide.



ITEM 452 and 305  
(for shoulders, alleys, driveways, etc.)

CONTRACTION JOINTS SECTIONS



SIDE ELEVATION OF EXP. JOINT  
(through Concrete Pavement or Base)  
EXPANSION JOINTS

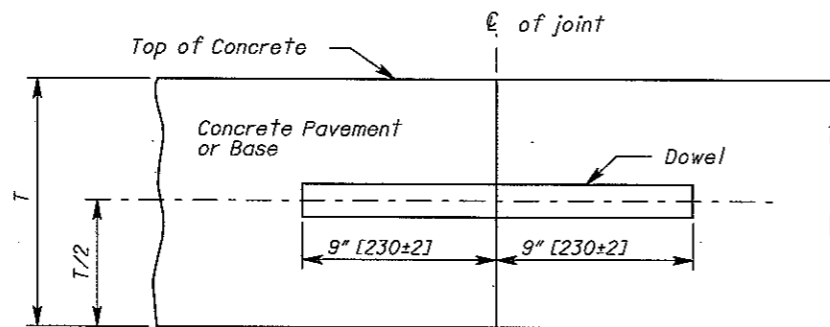
NOTES

**GENERAL:** Notes and details shown on this drawing shall be considered in conjunction with and supplemental to the pertinent specifications for portland cement concrete pavement and bases, and related incidentals.

**JOINT COMPONENTS:** This drawing is intended for use with a uniform depth pavement. When the project involves the placing of variable depth pavement, the joint components shall be held in place in accordance with the method shown in the plans or as approved by the Engineer.

**CONTRACTION JOINTS:** Contraction joints in Items 452 and 305 shall not be dowelled in alleys, private drives, or commercial drives.

Contraction joints of the type specified shall be spaced in accordance with the CONTRACTION JOINT SPACING Table.

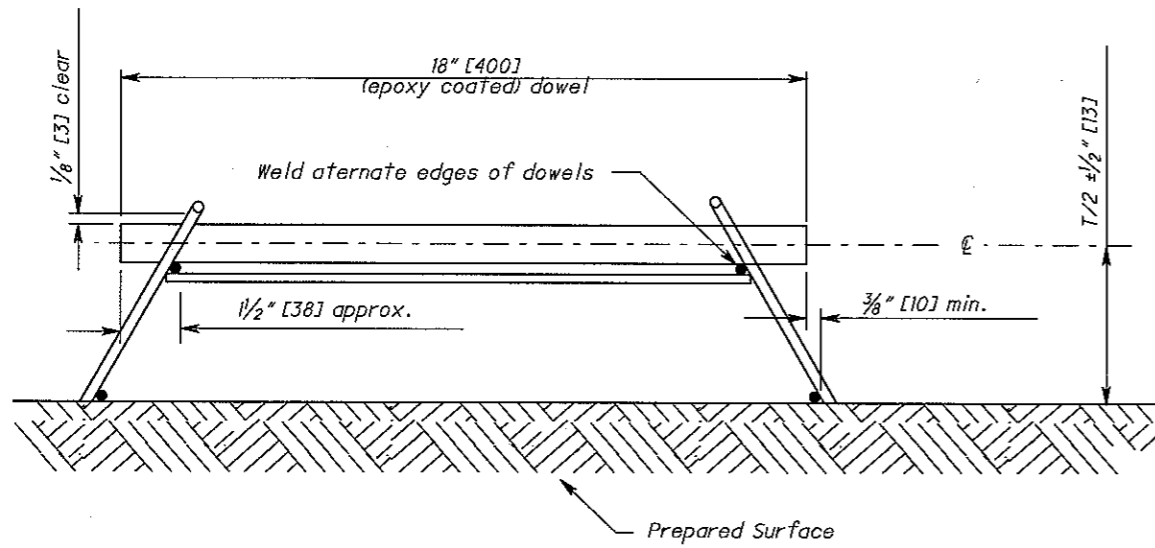


SECTION THROUGH CONSTRUCTION JOINT

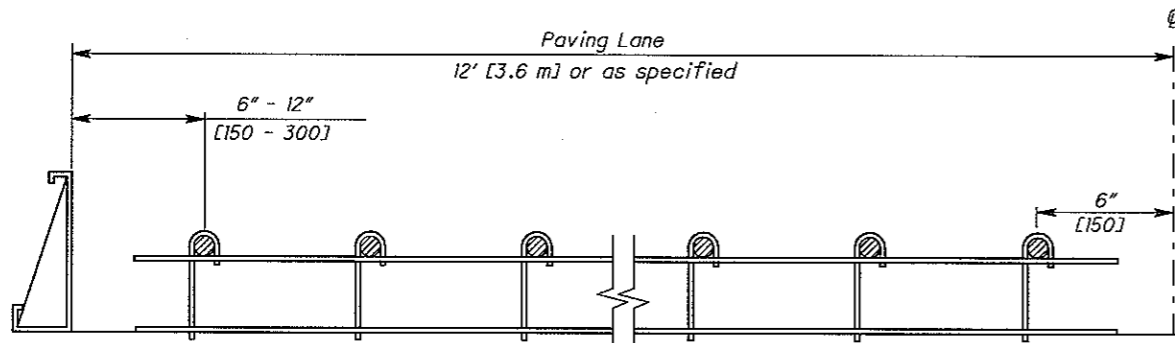
CONSTRUCTION JOINT

CONTRACTION JOINT SPACING	
Types of Pavement or Base	Maximum Spacing Between Joints
Item 451 Reinforced Concrete Pavement	21' [6.5 m]
Item 452 Non-Reinforced Concrete Pavement	15' [4.6 m]
Item 305 Concrete Base	15' [4.6 m]

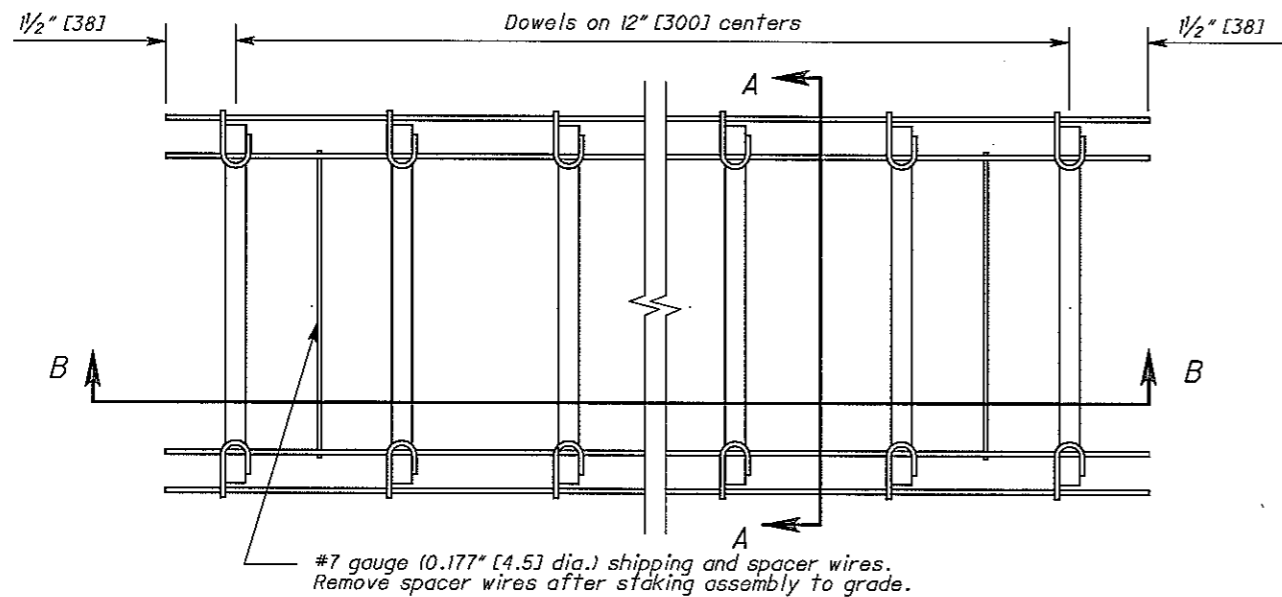
X:\Standards\Publications\Transmittals\2008-04-18\Published (black) set\SCD\bp22\_v8.dgn 14-JUL-2008 12:21PM dfocke



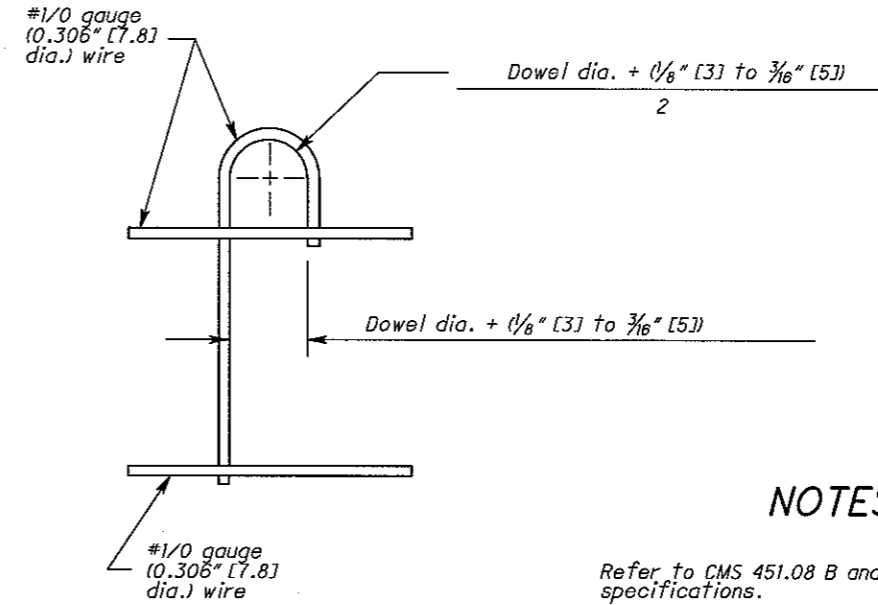
SECTION A-A



SECTION B-B



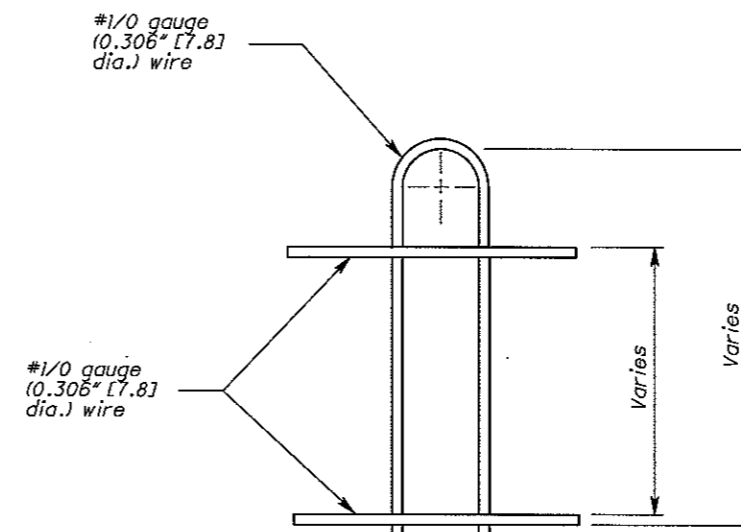
PLAN VIEW



J-LEG DETAIL  
(ALTERNATE)

NOTES

- Refer to CMS 451.08 B and 709.13 for dowel specifications.
- 1) Wire sizes shown are minimum required.
  - 2) All wire intersections are to be welded.
  - 3) Stakes typically applied at working ends of dowel.
  - 4) TOLERANCES:
    - 5) A)  $\pm 1/4$ " per foot [ $\pm 20$  mm per meter] unless otherwise specified.
    - B) Centerline of individual dowels shall be parallel to each other, the surface and the centerline of the slab.
    - C) On centers should be  $\pm 1/2$ " [ $\pm 13$ ].
    - D) Dowels should be placed at mid-depth of slab.
  - 6) J-Leg or U-Leg to be installed on inside or outside of subframe.



U-LEG DETAIL

THIS SHEET REPLACES BP-2.2 DATED 7-16-04.

SCD NUMBER  
BP-2.2

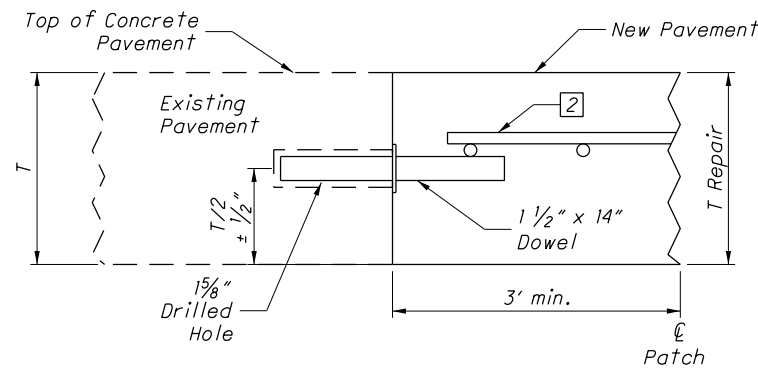
STANDARD ROADWAY CONSTRUCTION DRAWING  
TRANSVERSE PAVEMENT JOINTS

OFFICE OF  
ROADWAY  
ENGINEERING

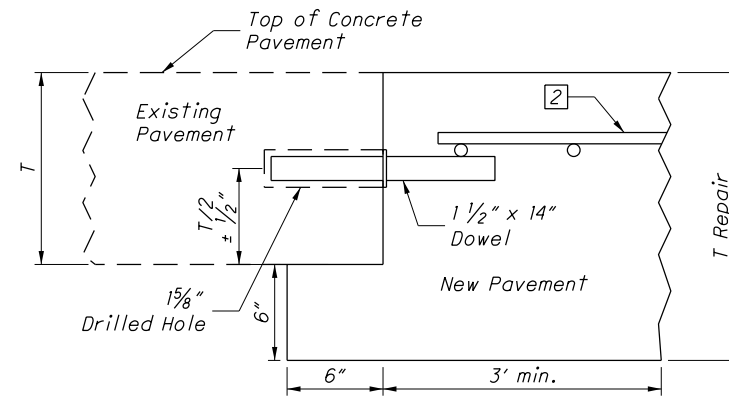
ALL METRIC DIMENSIONS  
( IN BRACKETS [ ] ) ARE  
IN MILLIMETERS UNLESS  
OTHERWISE NOTED.

PAVEMENT  
DESIGN ENGR  
D. Miller

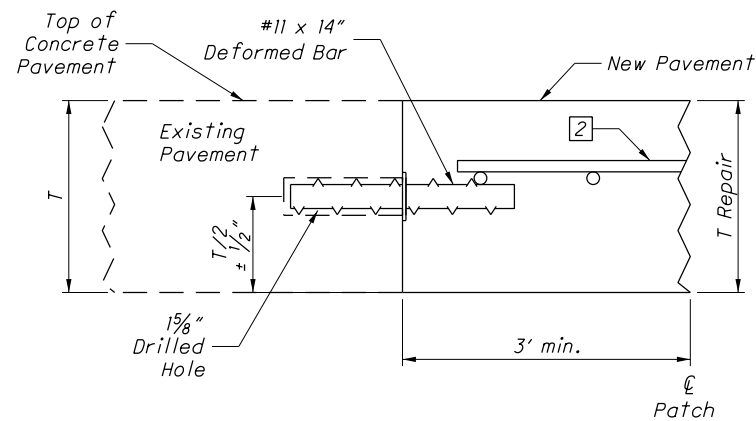
STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
PAVEMENT ENGINEERING ADMINISTRATION  
7-18-08  
DATE



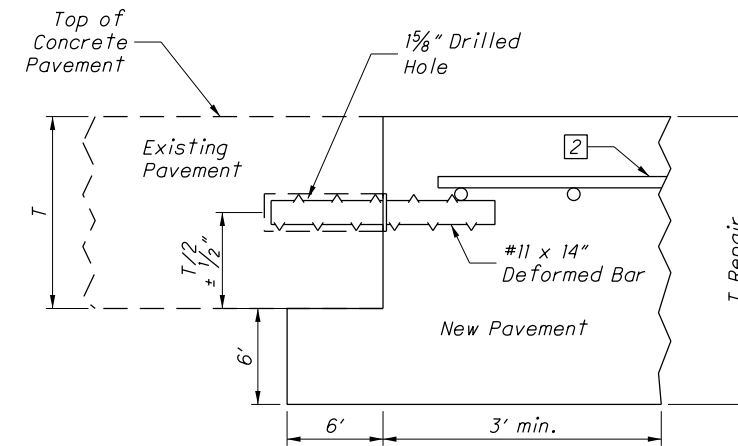
**SECTION - TYPE Y**  
(Contraction)



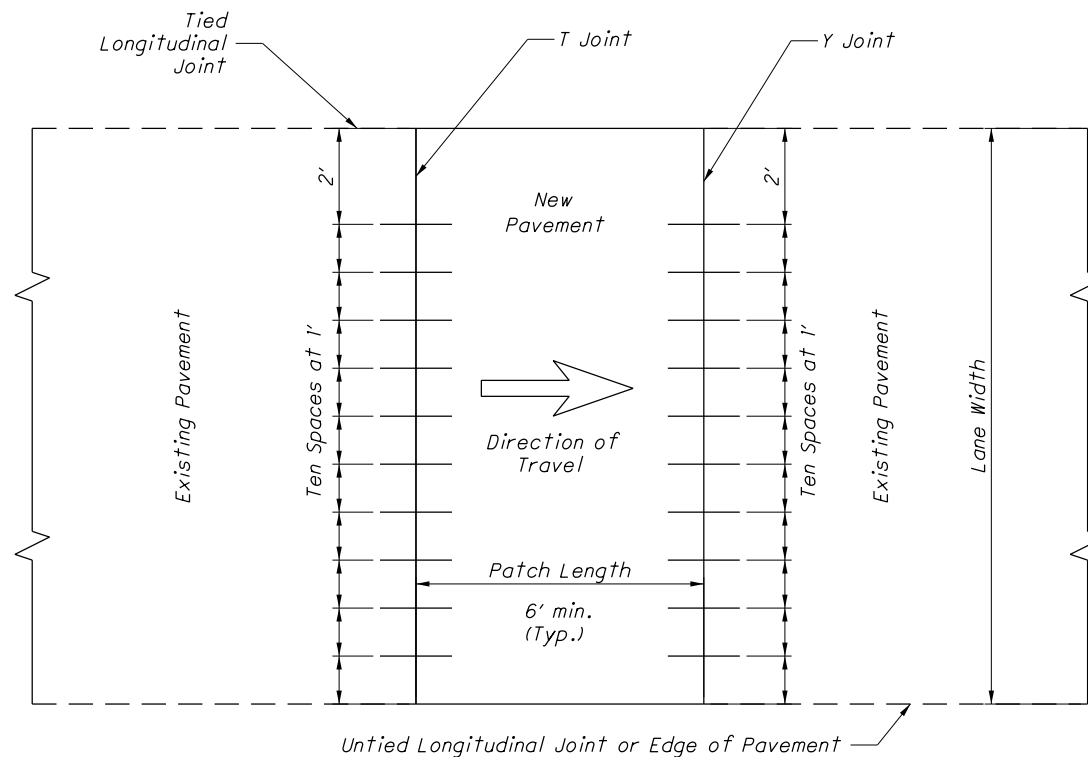
**SECTION - TYPE YU**  
(Undercut : Contraction)



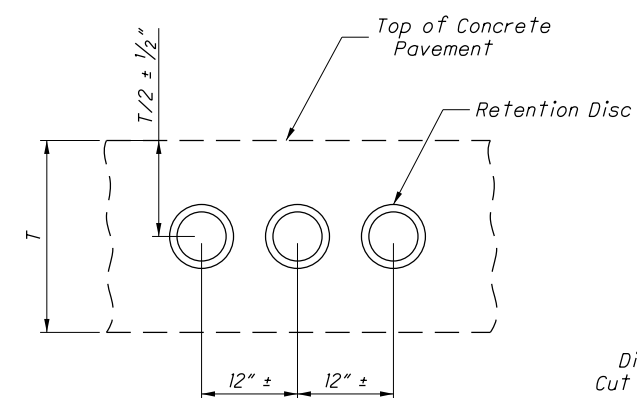
**SECTION - TYPE T**  
(Tied)



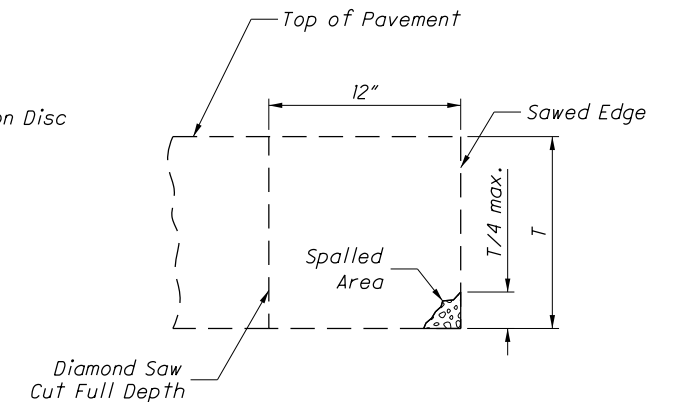
**SECTION - TYPE TU**  
(Undercut : Tied)



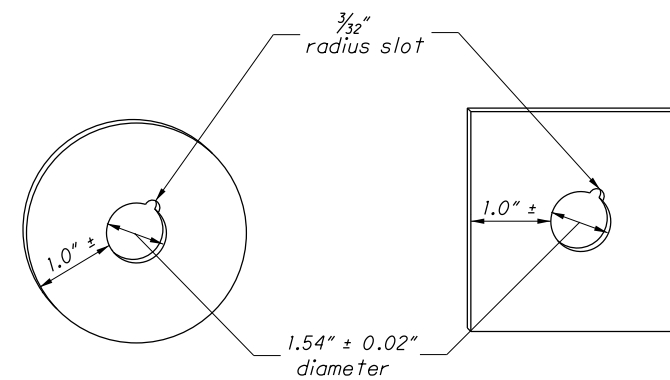
**TIE/DOWEL BAR  
PLACEMENT DETAIL**  
(See [1] for Bar Placement)



**HOLE DRILLING DETAILS**



**ADDITIONAL PAVEMENT  
REMOVALS**



**NYLON OR PLASTIC  
GROUT RETENTION DISCS  
FOR DOWEL/TIE BARS [3]**  
(1/16" min. thickness)

**NOTES**

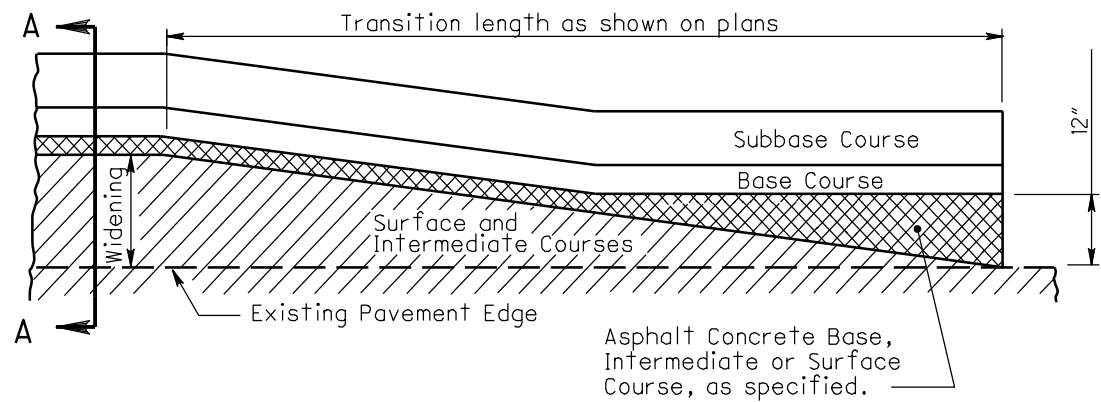
**GENERAL:** All joints shall be constructed normal to the centerline of the pavement lane unless otherwise specified in the plans.  
All dowel holes shall be drilled by a mechanical device that will allow independent adjustment of all drill shafts in the horizontal and vertical direction. The device shall be capable of drilling a minimum of three holes at a time.  
All smooth dowels shall be coated with a bond breaking material conforming to **451.09 B** after they have been installed in the existing pavement and just prior to placing the patch. All dowels shall be placed parallel to the pavement surface and the centerline of the pavement lane.  
This standard drawing is intended for use in repairing both concrete and composite pavements. For clarity, asphalt overlays are not shown.  
When Prefabricated Edge Drains are used, they shall be placed after joint repairs are completed.

**TYPE N JOINT:** Joints referred to as Type N joints on the plan shall be constructed as contraction joints per SCD BP-2.2.

**ADDITIONAL PAVEMENT REMOVAL:** If, after the sawing and removal of the pavement from the area to be repaired, the face of the remaining pavement is spalled or deteriorated for a height greater than one-fourth the thickness of the rigid pavement, an additional saw cut shall be made as shown and as directed by the Engineer. This additional work shall be measured for additional payment for full depth pavement sawing, rigid pavement removal and replacement.

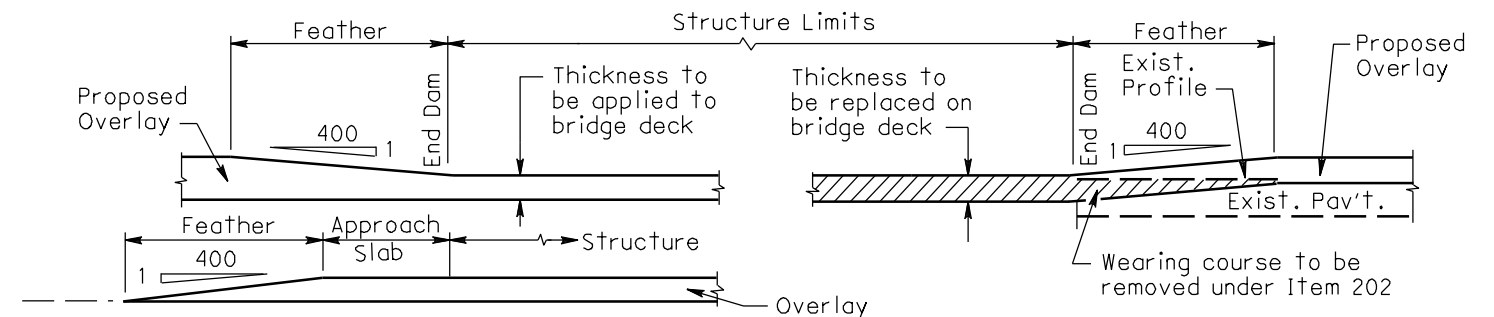
**LONGITUDINAL JOINT:** For patches 10' or greater in length, the longitudinal joint shall be constructed per SCD BP-2.1. The tie bars or hook bolts shall be spaced according to SCD BP-2.1.

- LEGEND**
- [1] Bars shall be placed 2' from all tied longitudinal joints and continue across with a 1' spacing to the edge of pavement or an untied longitudinal joint. Where lane widths are between two tied longitudinal joints, begin bars 2' from each tied longitudinal joint and continue across with a 1' spacing.
  - [2] Reinforcement will be required for all repairs greater than 10' in length or for Class FS repairs that will be opened to traffic within 24 hours of placement. The fabric shall consist of W8.5 or D8.5 longitudinal wires spaced 6" c/c and W4 or D4 transverse wires spaced 12" c/c. The clearance from the end of the wire fabric to the edge of pavement or new transverse joint shall be 4" ± 2".
  - [3] Nylon or plastic grout retention discs shall be clear or opaque white in color.



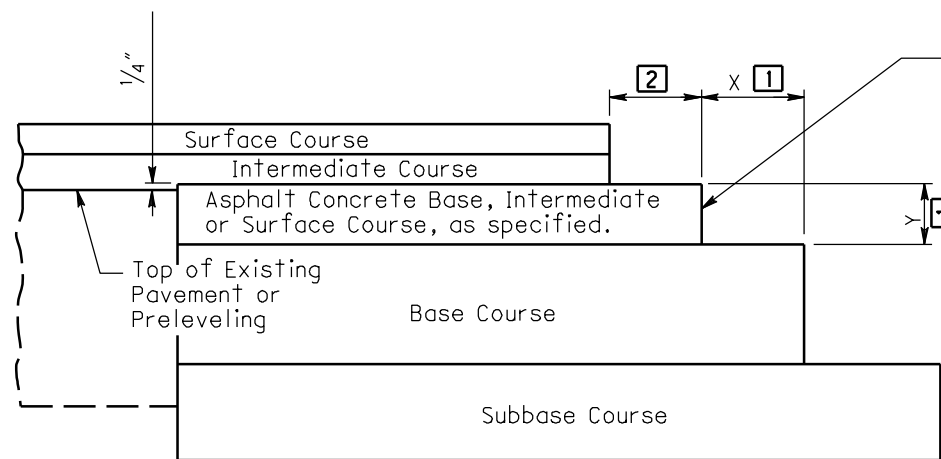
PLAN

MERGING EDGE OF PAVEMENT WIDENING WITH EDGE OF EXISTING PAVEMENT



FEATHERING AT STRUCTURES

Details assume non-settled approach slabs. Smoothing of the profile for settlement is required per plan grades or as directed by the Engineer.



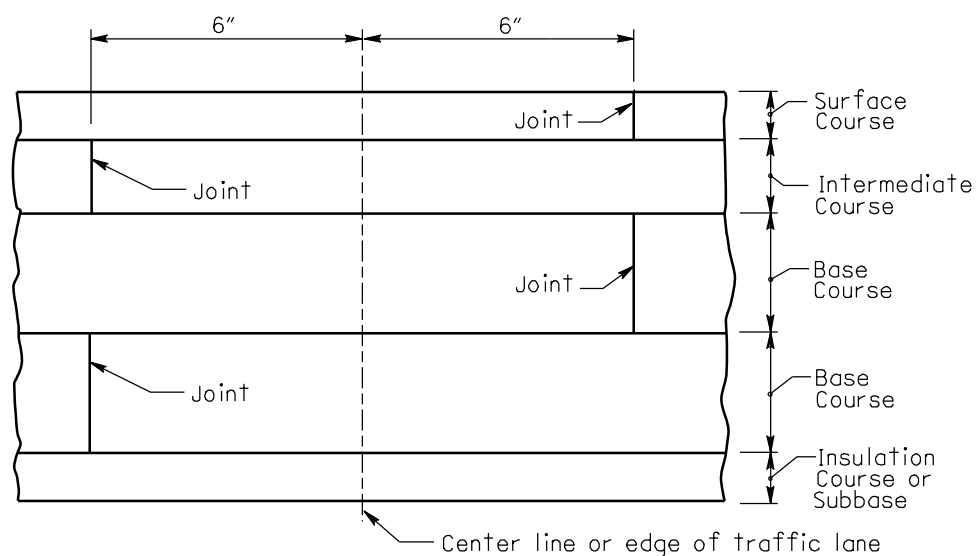
SECTION A-A

COURSE DETAIL FOR WIDENING

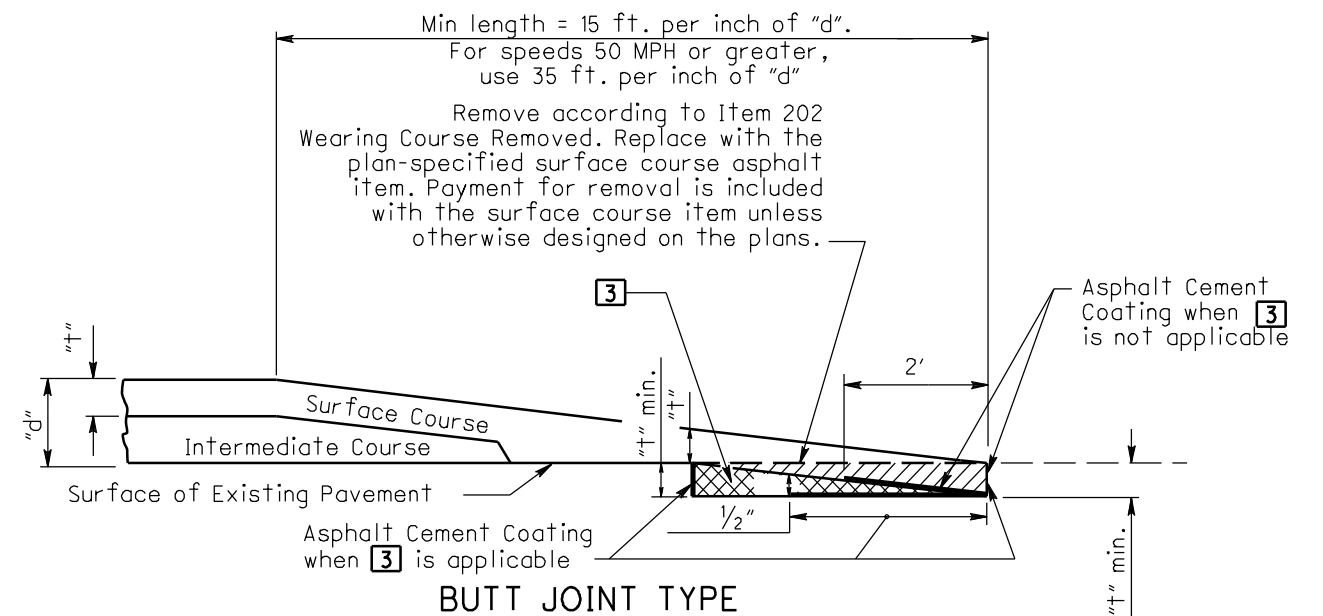
Construct the lift shown approximately 1/4" above the top of the existing pavement or preleveling. Place the preleveling prior to excavation of the widening trench.

LEGEND

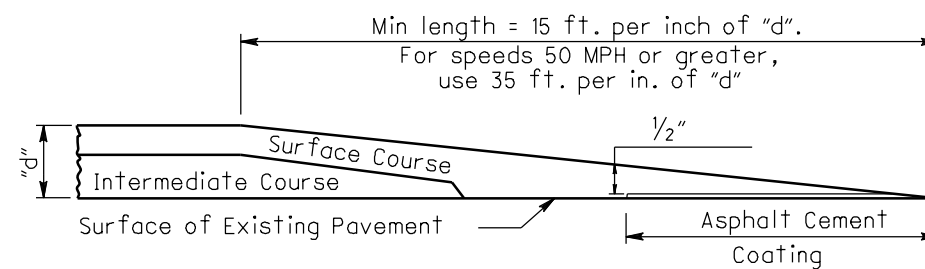
- 1 The extended width (X) of a base or subbase lift shall be equal to the depth (Y) of the overlying lift or 6", whichever is greater, or as shown on the plans.
- 2 The extended width shall be equal to the combined thickness of the surface and intermediate courses, or 4 inches, whichever is greater.
- 3 Permissible removal and replacement.



LAPPING LONGITUDINAL JOINTS



BUTT JOINT TYPE

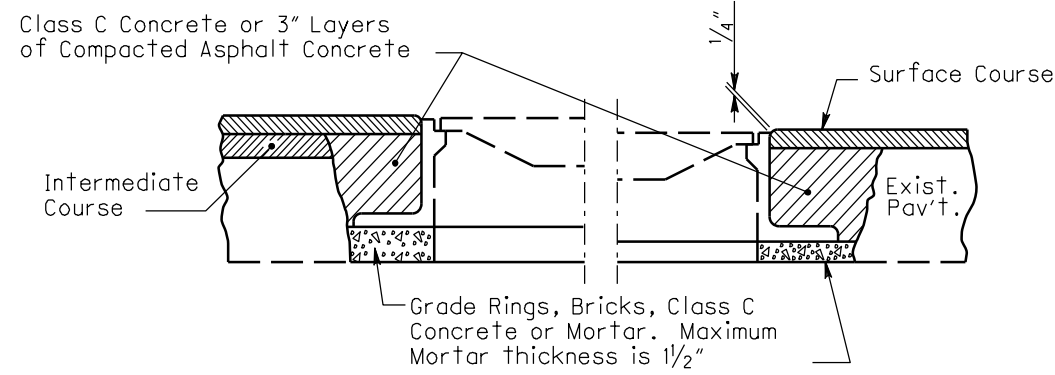


TAPER EDGE TYPE

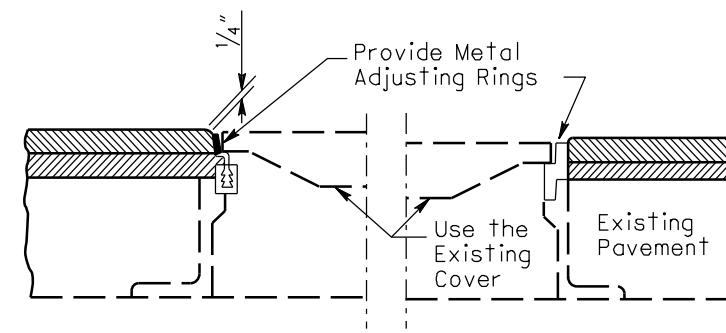
NOTE: Either butt or taper type may be used unless type is specified by the plan.

PLACING FEATHERED AREAS

Values for "t" and "d" are obtained from the plan.



USING CONCRETE OR MORTAR



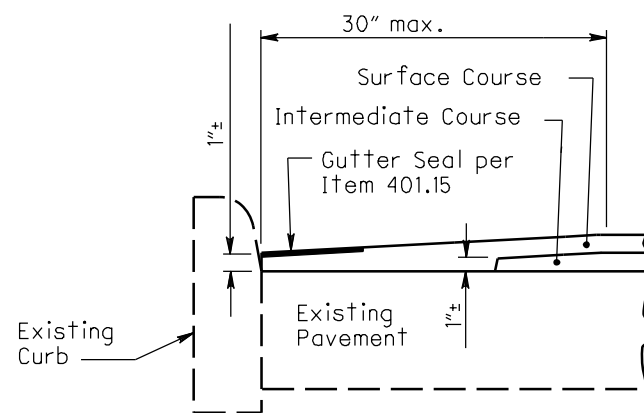
USING METAL ADJUSTING RINGS

Metal adjusting rings shall:

- (a) attach securely to the existing frame by welding or mechanical devices;
- (b) consist either of cast metal having an integral rim and seat, or be fabricated metal with a sturdy connection between the seat and rim; and
- (c) provide an even seat for the manhole cover.

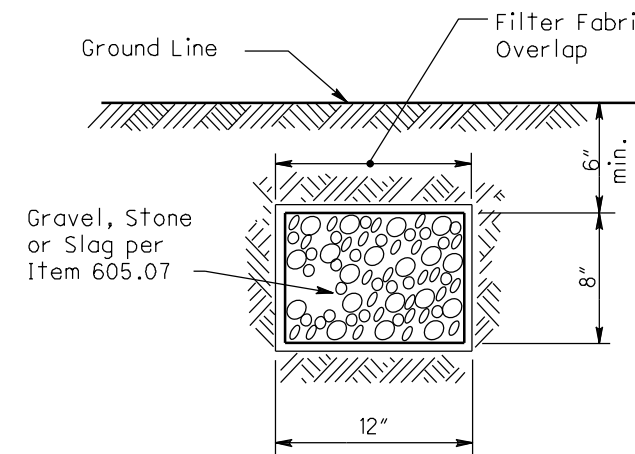
In addition, the adjusting ring type shall be a design acceptable to the local governmental agency responsible for street and sewer maintenance. Any installation unacceptable to the Engineer shall be replaced by the Contractor at his expense.

MANHOLES ADJUSTED TO GRADE



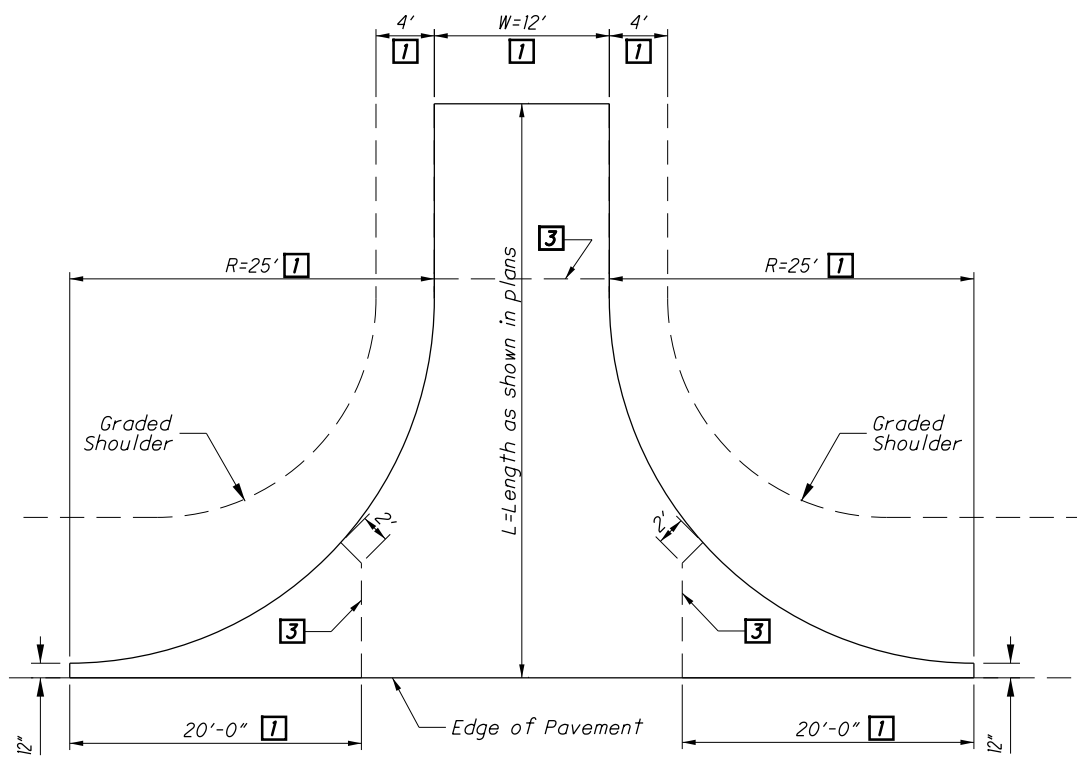
Special care shall be taken during construction to obtain maximum compaction of bituminous concrete in gutters.

GUTTER FINISH

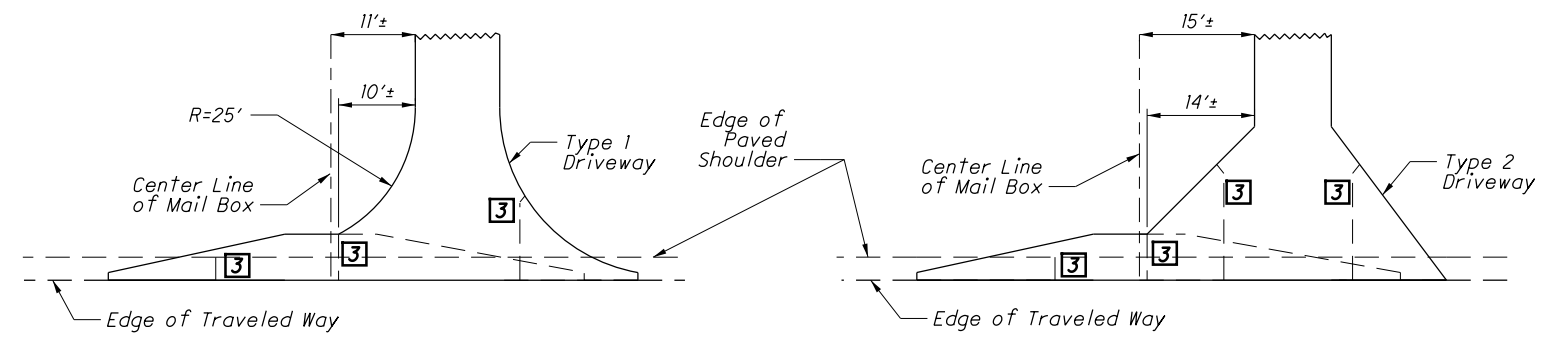


Aggregate drains to be placed where and as directed by Engineer. Provide Filter Fabric when specified as a separate pay item.

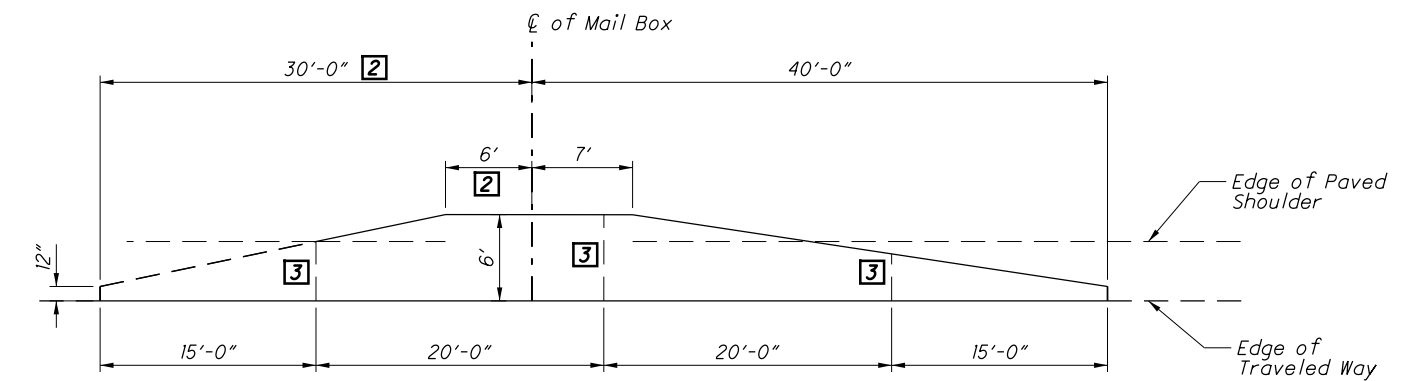
AGGREGATE DRAIN



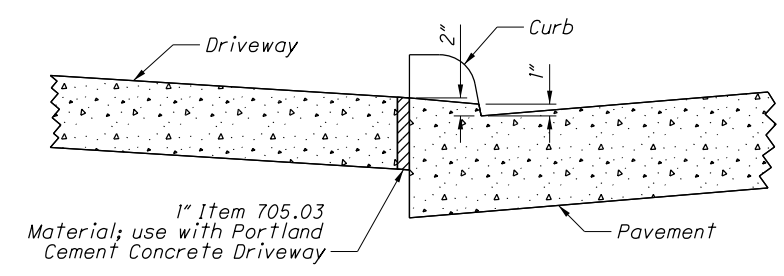
**TYPE 1 DRIVEWAY**



**COMBINED DRIVEWAY & MAIL BOX APPROACH**

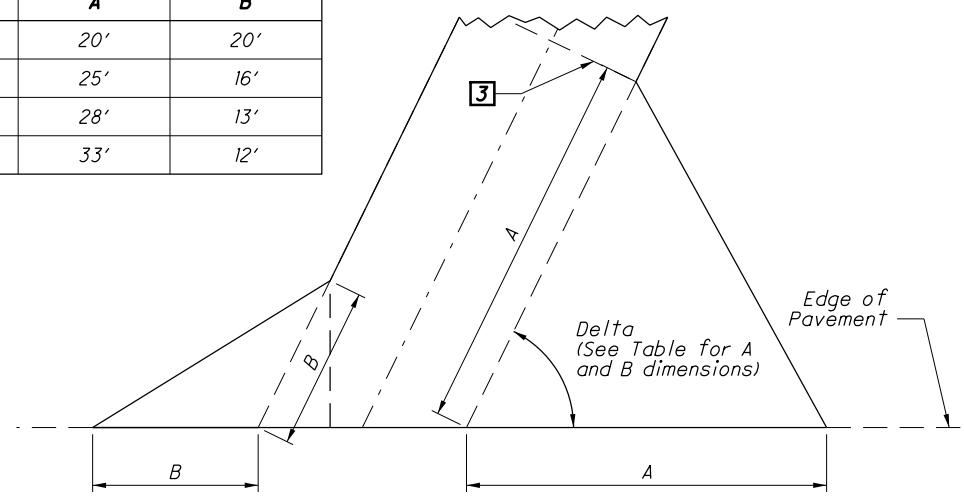


**TYPICAL MAIL BOX APPROACH**



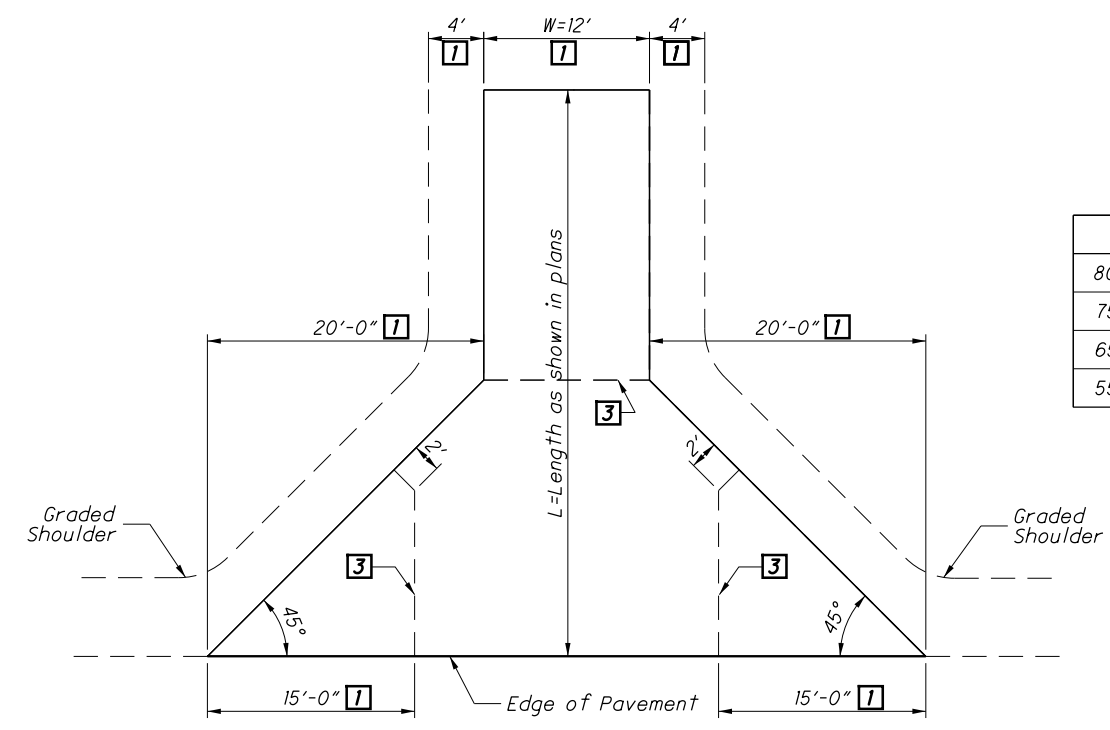
**DROP CURB DETAILS AT DRIVEWAYS**

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



**TYPE 2 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.

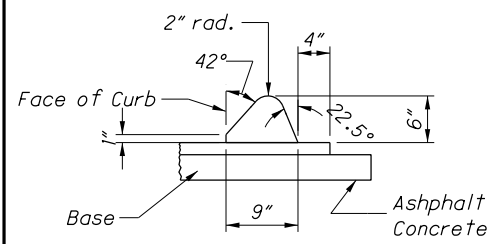
**JOINTS:** Impressed joints for portland cement concrete driveways shall be 1/4" minimum width by 3"± depth and shall be sealed with Item 705.04 or ASTM D 1850.

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.

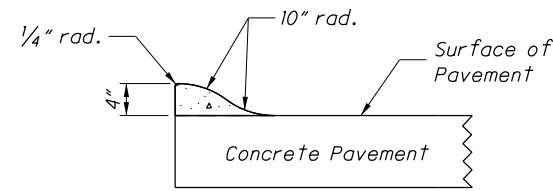
**LEGEND**

- 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

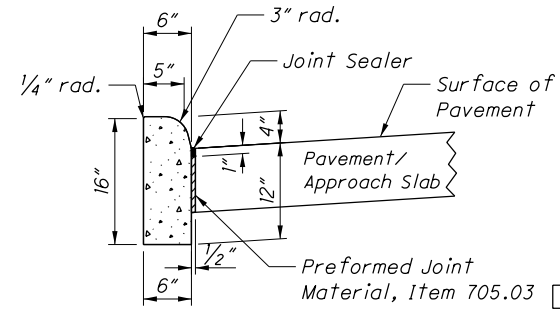




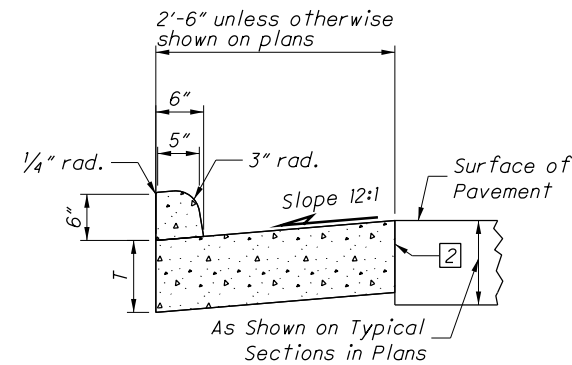
TYPE 1



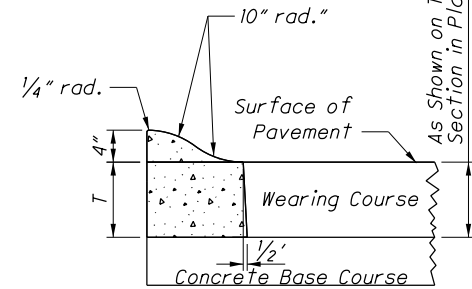
TYPE 3-A



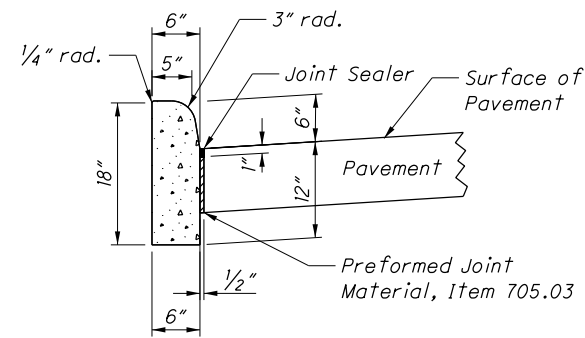
TYPE 4-C



TYPE 2



TYPE 3-B



TYPE 6

**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.

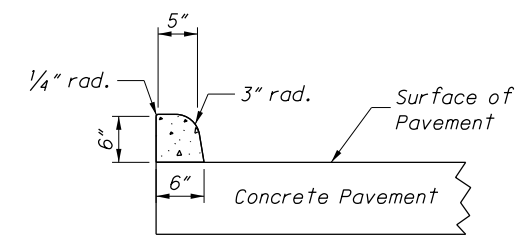
Transverse expansion joint material shall meet the requirements of Item 705.03.

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

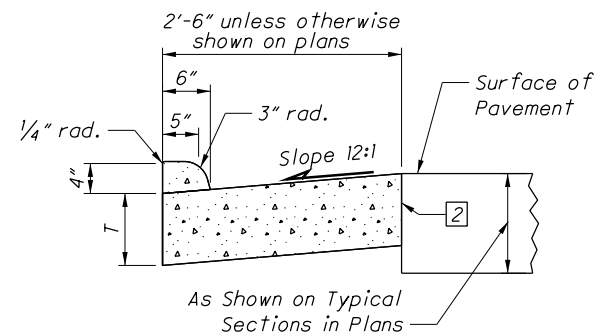
**TOLERANCES:** Dimensional tolerances are as follows:

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

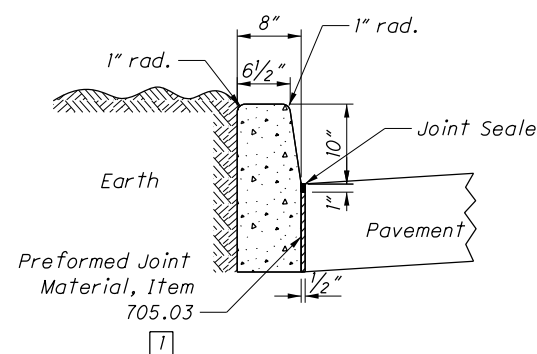
Gutters: 0 to  $+1/2"$ .



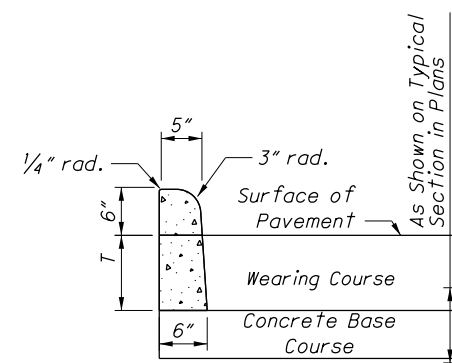
TYPE 2-A



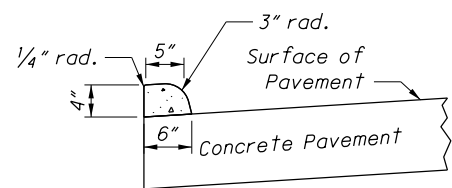
TYPE 4



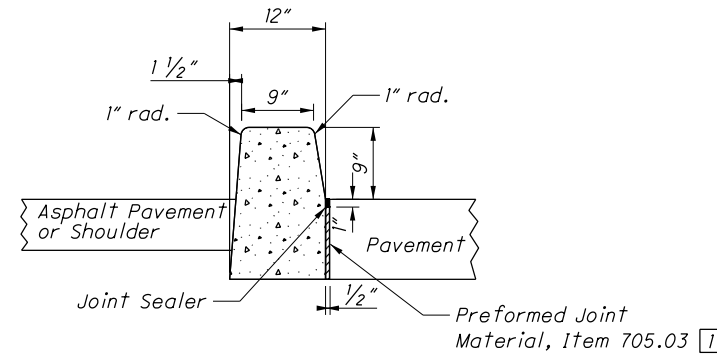
TYPE 7



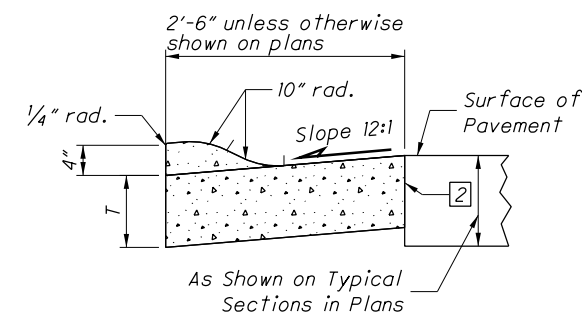
TYPE 2-B



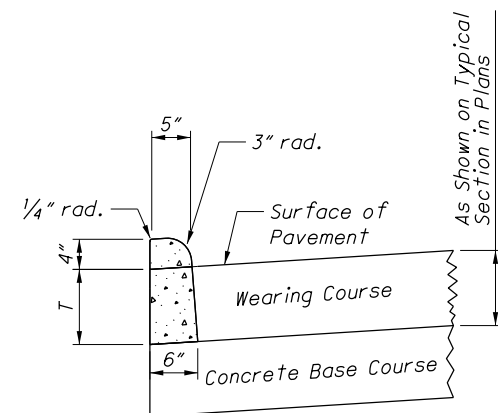
TYPE 4-A



TYPE 8



TYPE 3



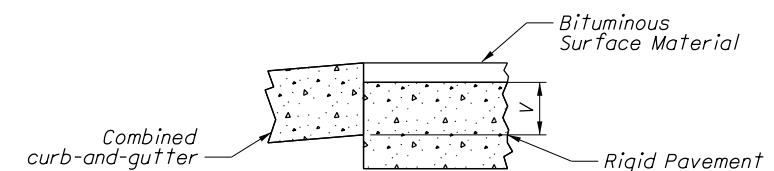
TYPE 4-B

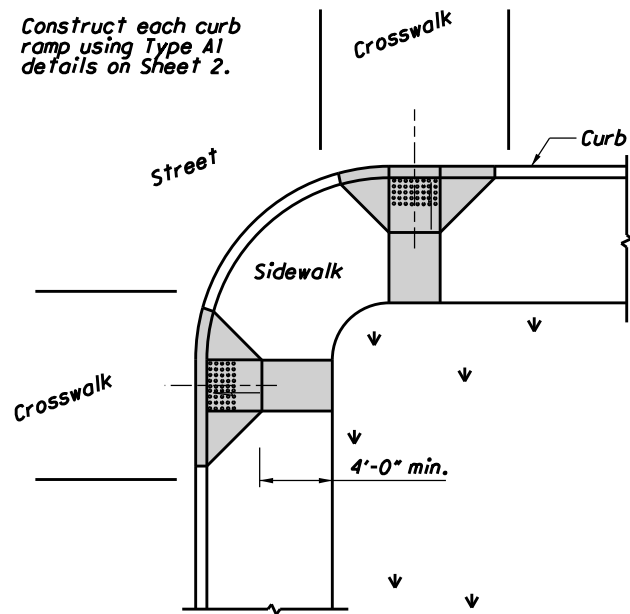
**LEGEND**

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.

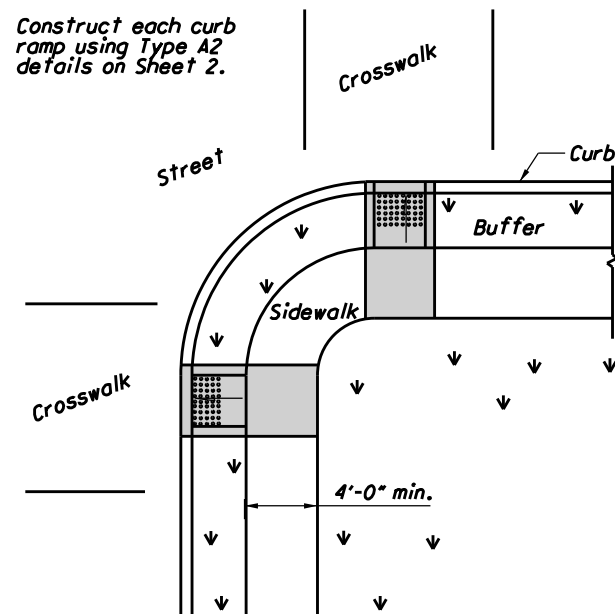
2 Butt joints shall be provided between combined curb-and-gutter and new or existing rigid pavements, with tie bars or hook bolts provided at intervals of 5'. See SCD BP-2.1 for details of tie bars and hook bolts.

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".

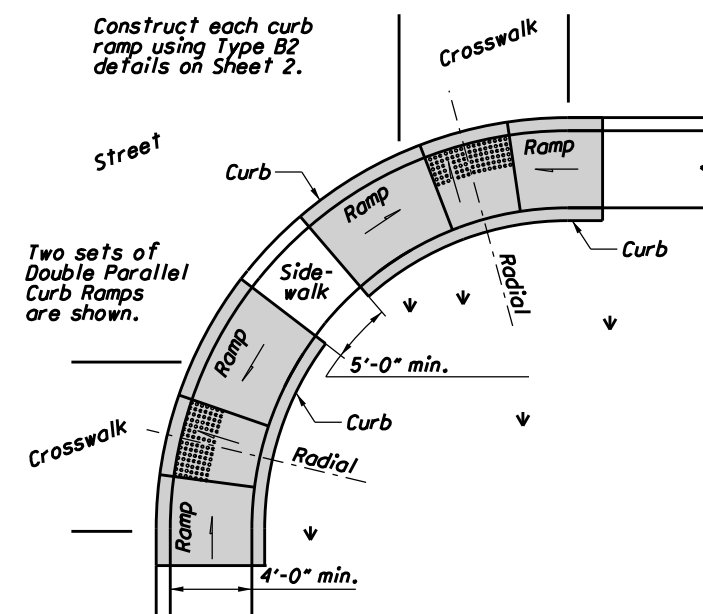




Construct each curb ramp using Type A1 details on Sheet 2.



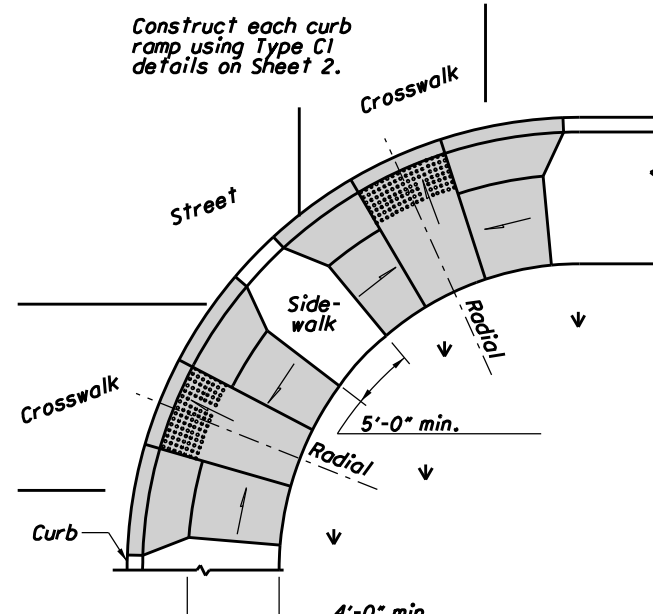
Construct each curb ramp using Type A2 details on Sheet 2.



Construct each curb ramp using Type B2 details on Sheet 2.

Two sets of Double Parallel Curb Ramps are shown.

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



Construct each curb ramp using Type C1 details on Sheet 2.

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

PERPENDICULAR CURB RAMPS

PARALLEL CURB RAMPS

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 1/8" 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.

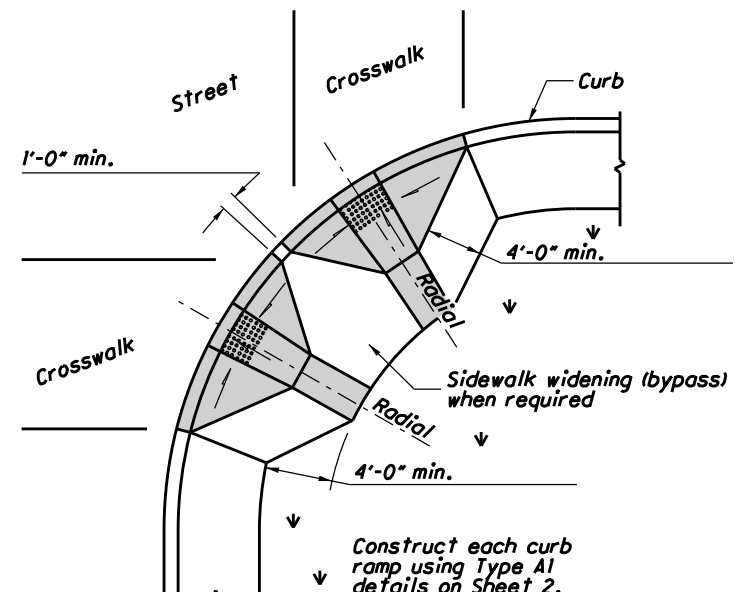
**JOINTS:** Provide expansion joints in the curb ramp as extensions of walk joints and consistent with Item 608.03 requirements for a new concrete walk. Provide a 1/2" Item 705.03 expansion joint filler around the edge of ramps built in existing concrete walks. Lines shown on this drawing indicate the 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.

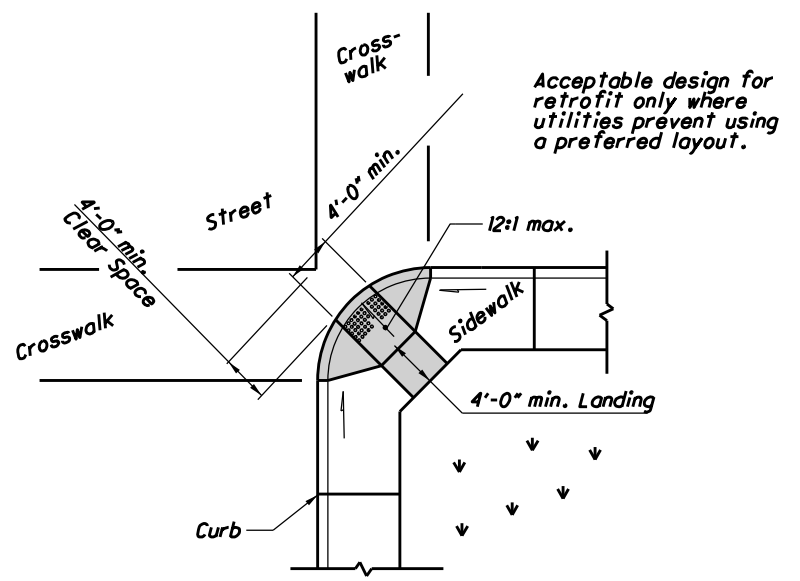
Work beyond the shaded ramp/landing area is paid for as curb (609) and walk (608). Removal of existing curb, walk (or existing curb ramps) are paid under Item 202.

For at-grade crossing locations where only detectable warnings are required in order to achieve 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

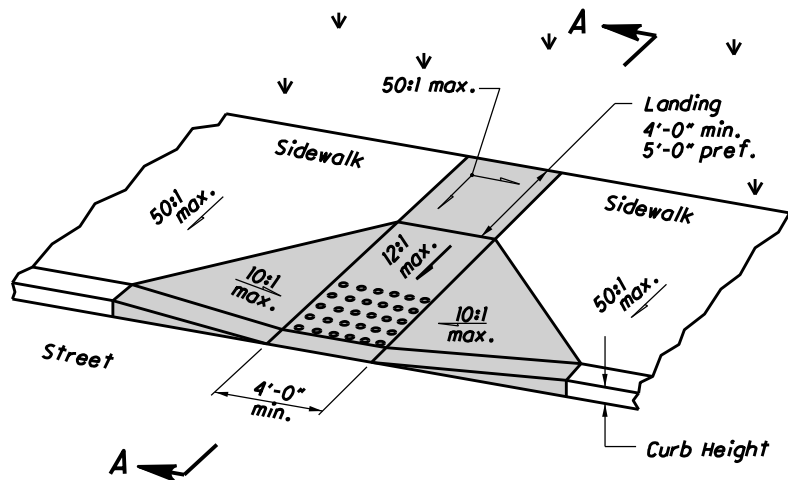


Acceptable design for retrofit only where utilities prevent using a preferred layout.

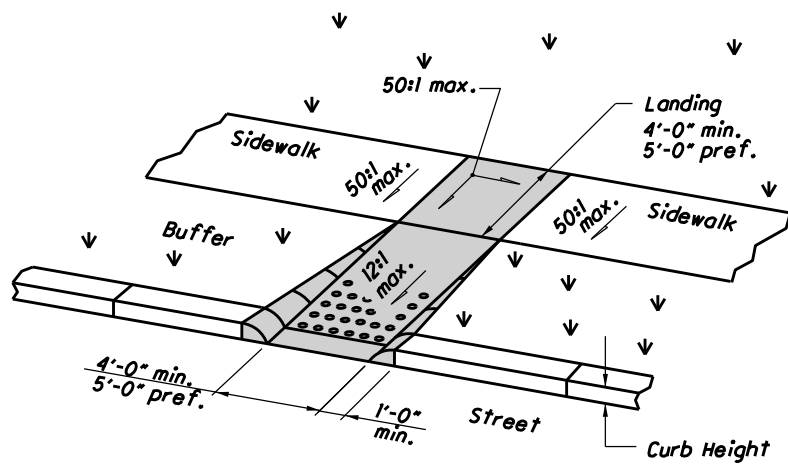
Use this design only for existing walks, and when site constraints prohibit other designs. The diagonal Type D ramp may be constructed as either a Perpendicular, Parallel or Combination curb ramp type. Avoid using where curb radii are less than 20'-0".

DIAGONAL RAMP (Type D)

ACCEPTABLE CONSTRUCTION PLACEMENT

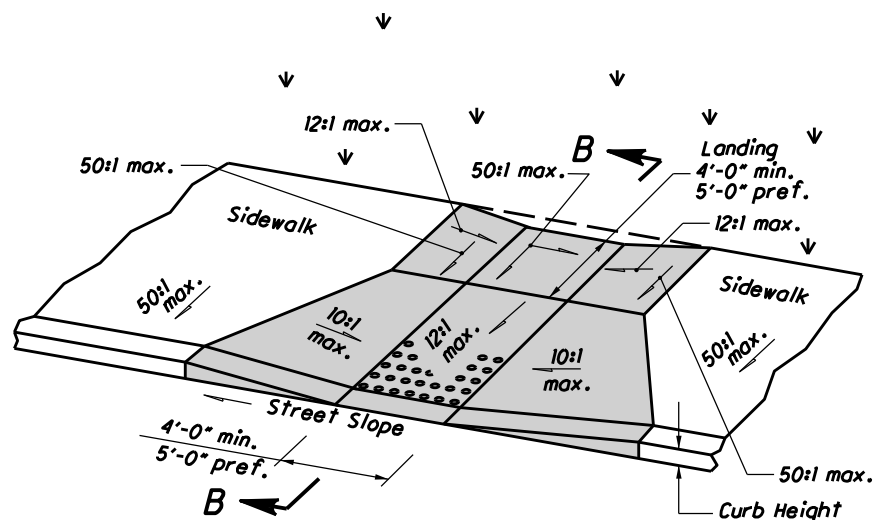


Type A1 (Perpendicular with flared sides)

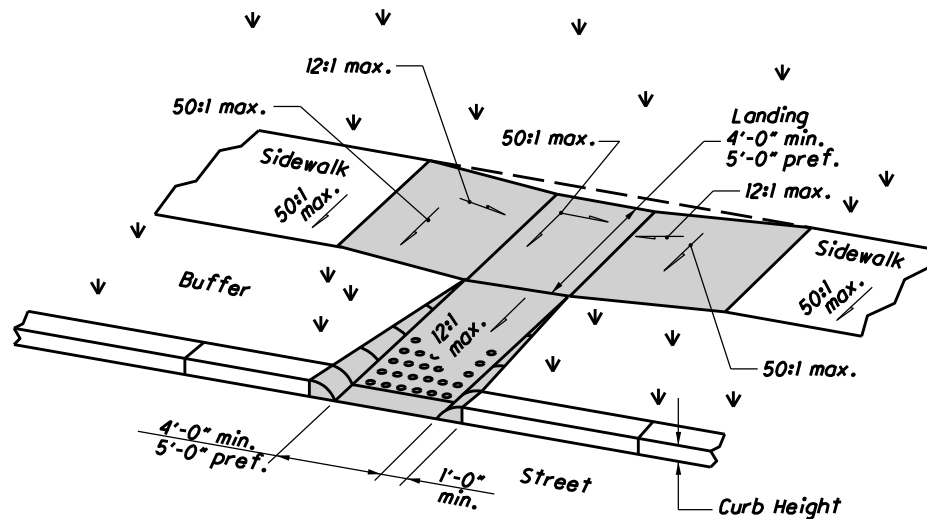


Type A2 (Perpendicular with returned curb)

**PERPENDICULAR CURB RAMP DETAILS**

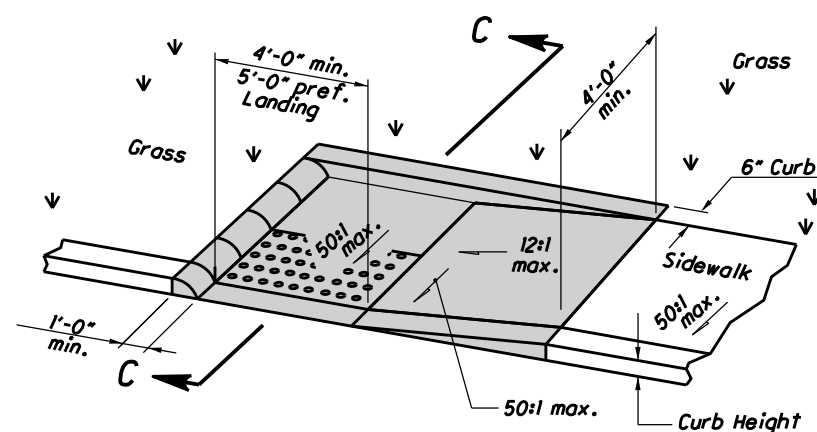


Type C1 (Combined with flared sides)

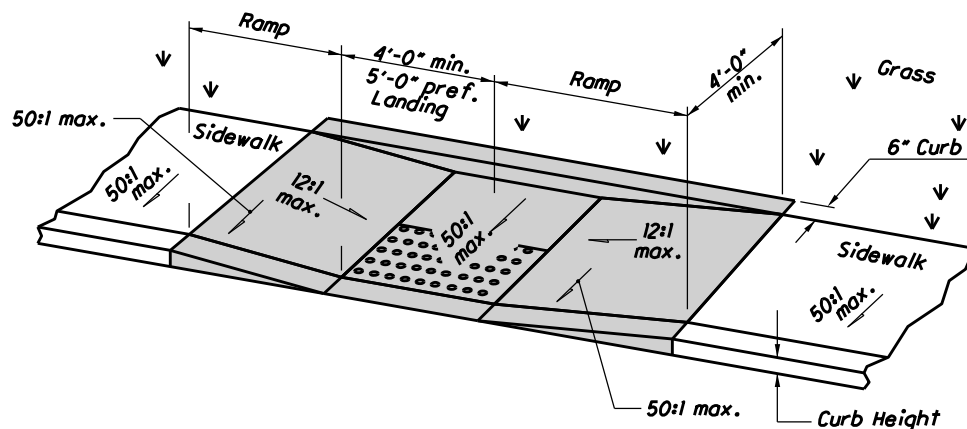


Type C2 (Combined with returned curb)

**COMBINED CURB RAMP DETAILS**

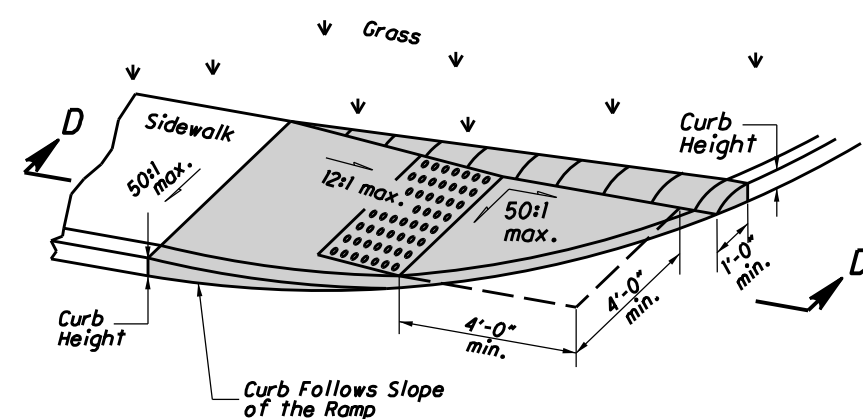


Type B1 (Single sided Parallel)



Type B2 (Double sided Parallel)

**PARALLEL CURB RAMP DETAILS**



Type B3 (Single sided Parallel)

**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 indefinitely, the transition from existing 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.

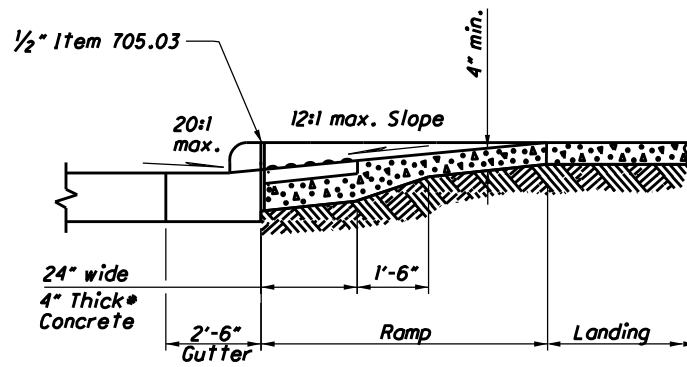
The counter slope of the gutter or street at the foot of a curb ramp, landing, or blended transitions shall be 20:1 or flatter.

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

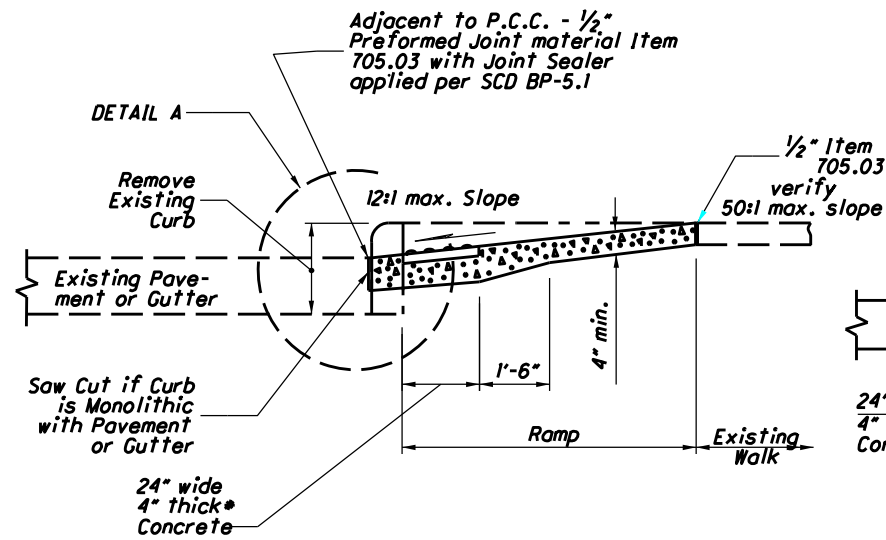
The edge of the curb shall be flush with the edge of the adjacent pavement and gutter and surface slopes that meet grade breaks shall also be flush.

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

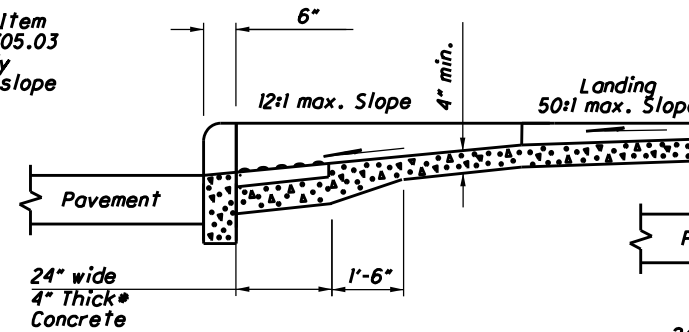
See Sheet 3 for Sections.



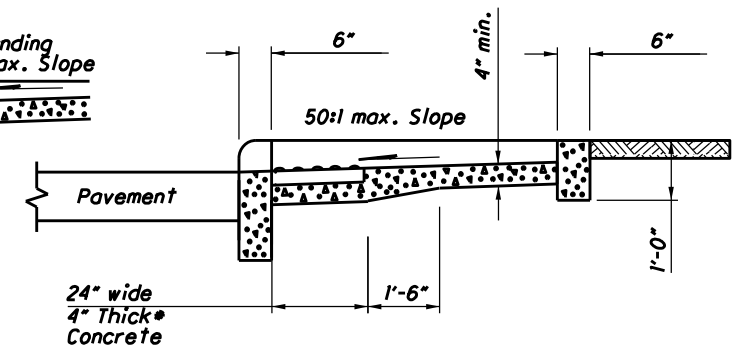
New gutter shown.  
**SECTION A-A  
NORMAL DETAIL**  
See Sheet 2.



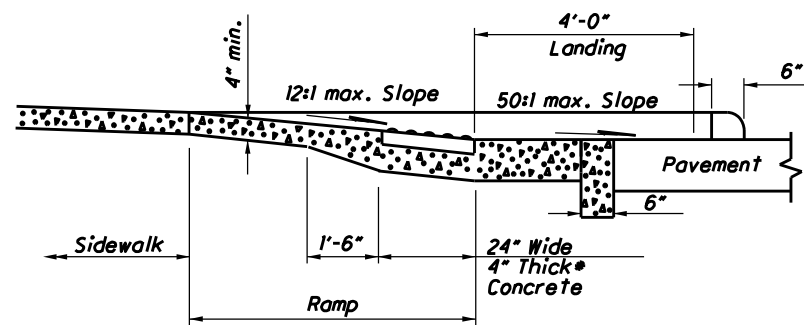
**SECTION A-A  
EXISTING WALK DETAIL**  
See Sheet 2.



**SECTION B-B**  
See Sheet 2.

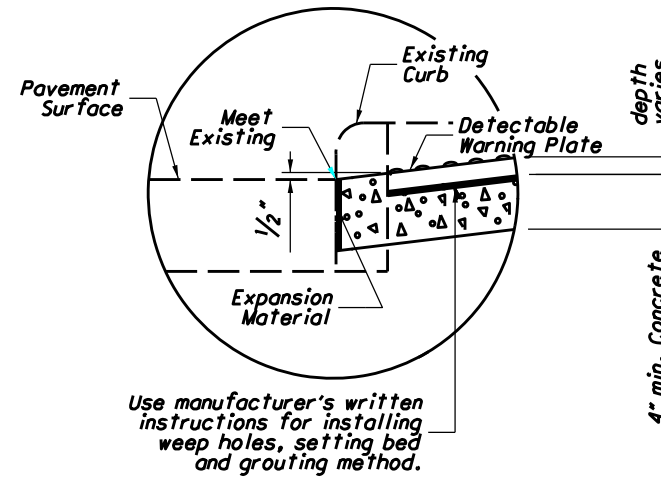


**SECTION C-C**  
See Sheet 2.

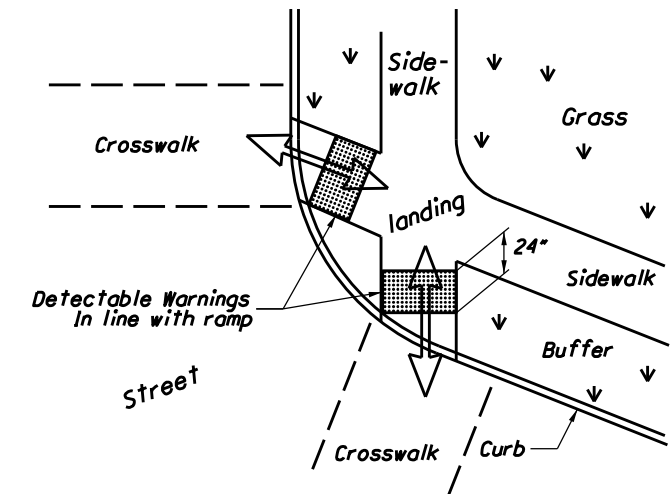


**SECTION D-D**  
See Sheet 2.

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



**DETAIL A**



**DETECTABLE WARNING ALIGNMENT**

**DETECTABLE WARNINGS NOTES**

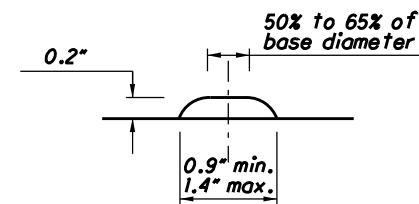
**GENERAL:** Detectable Warnings are a distinctive surface pattern of truncated domes which are detectable by cane or underfoot to alert people with vision impairments of their approach to streets and hazardous drop-offs.

**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.

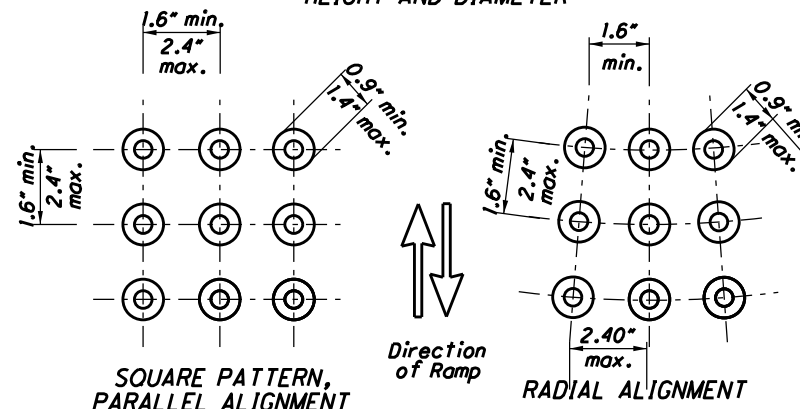
The depth of concrete underneath detectable warning products shall be a minimum of 4". See DETAIL A.

**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.

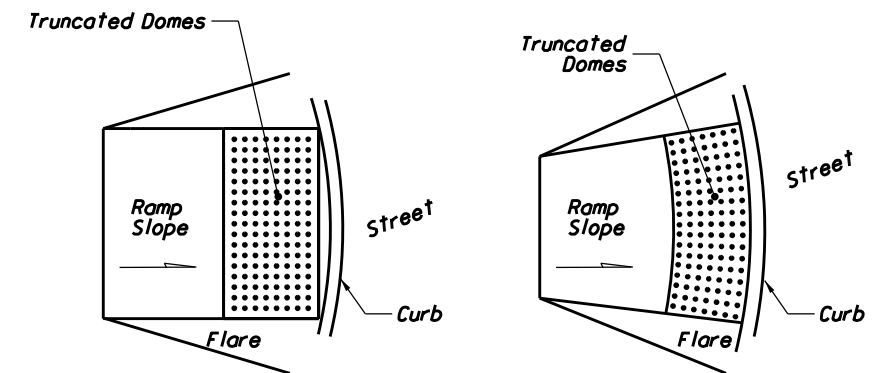
**PRODUCTS & COLORS:** Color of the detectable warnings should contrast with surrounding concrete walk and ramp. Black is not an acceptable color. Approved products and guidance on color may be found on the Office of Roadway Engineering Service's Detectable Warnings Approved List. Install products as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



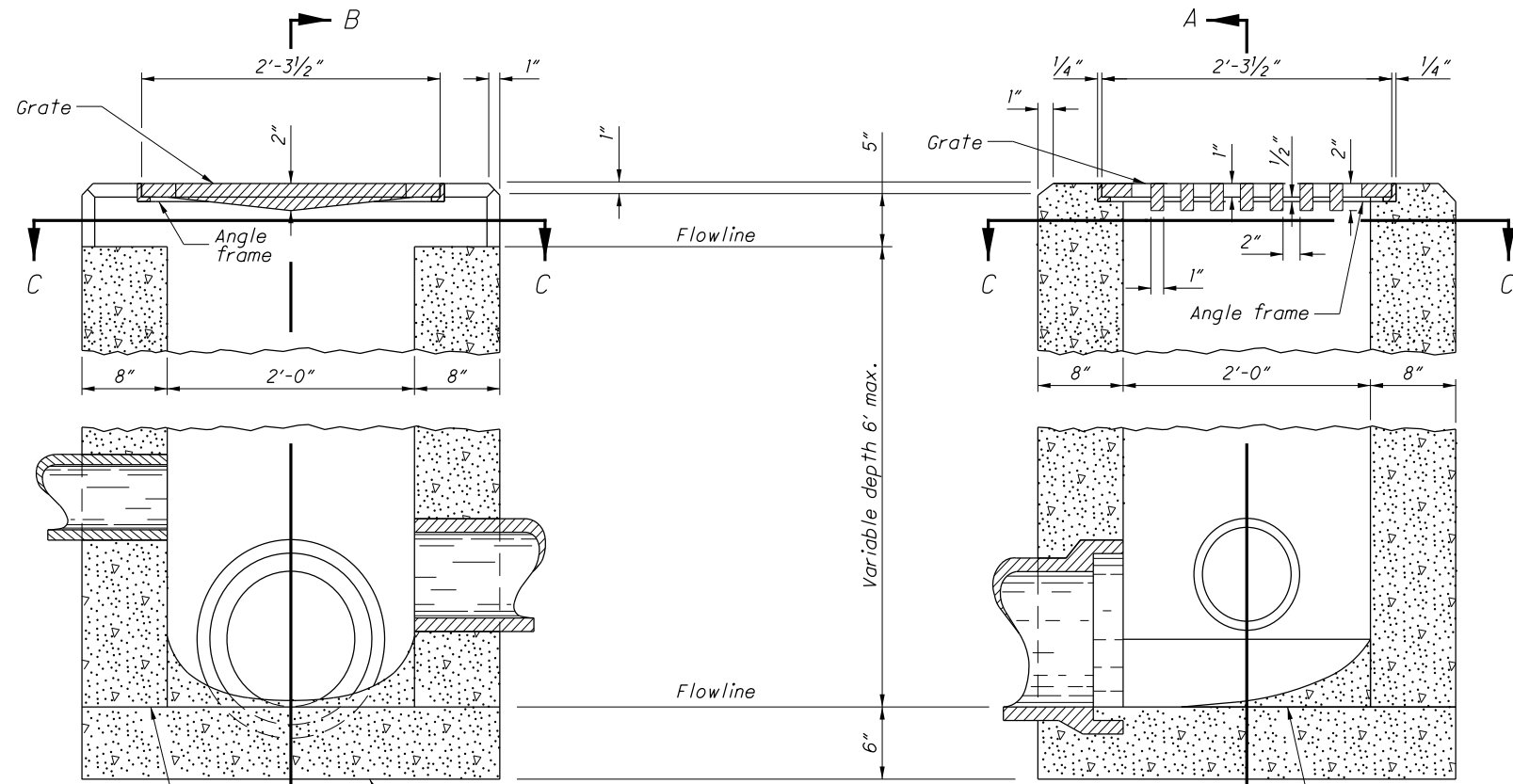
**HEIGHT AND DIAMETER**



**TRUNCATED DOMES DETAILS**



**DOME ALIGNMENT ON RADIUS CURB**



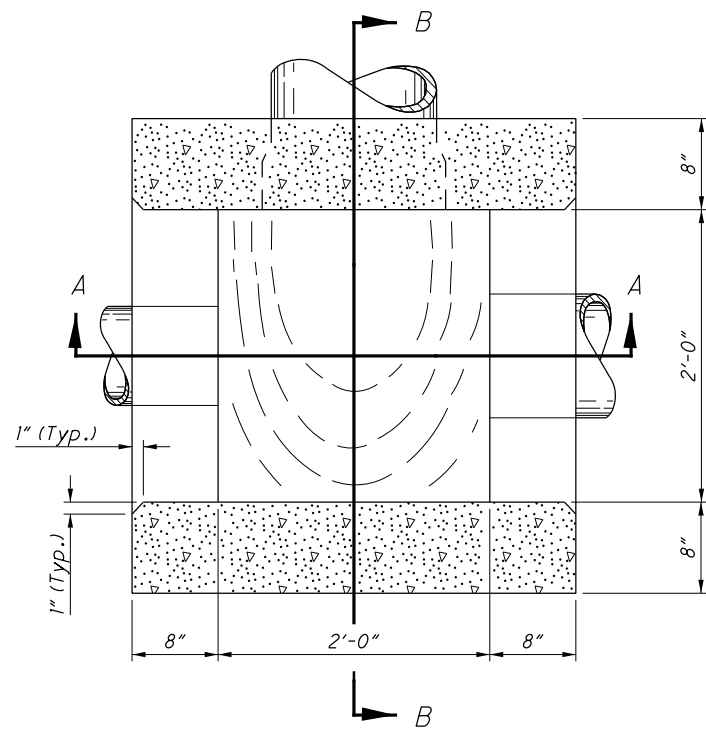
SECTION A-A

SECTION B-B

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

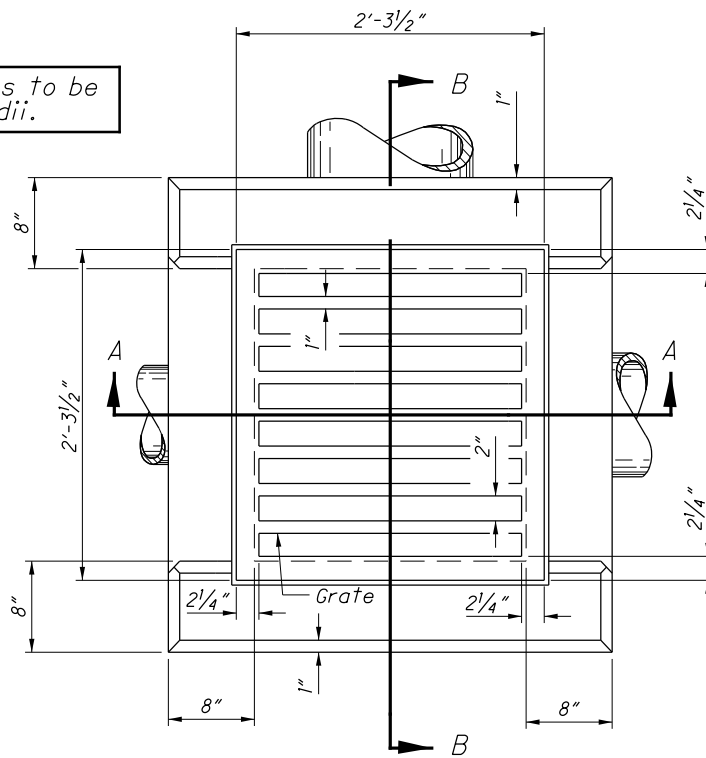
Permissible const. joint

Permissible const. joint



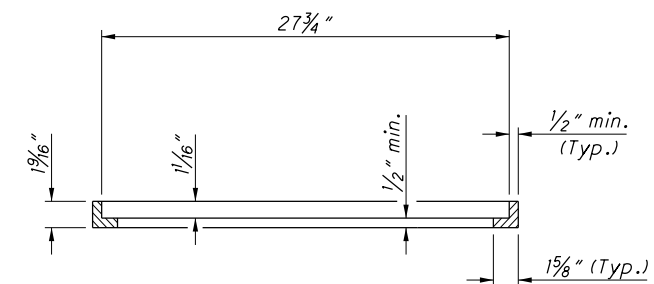
SECTION C-C

All grate edges to be rounded 1/4\"/>



PLAN

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

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 1/2" 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.

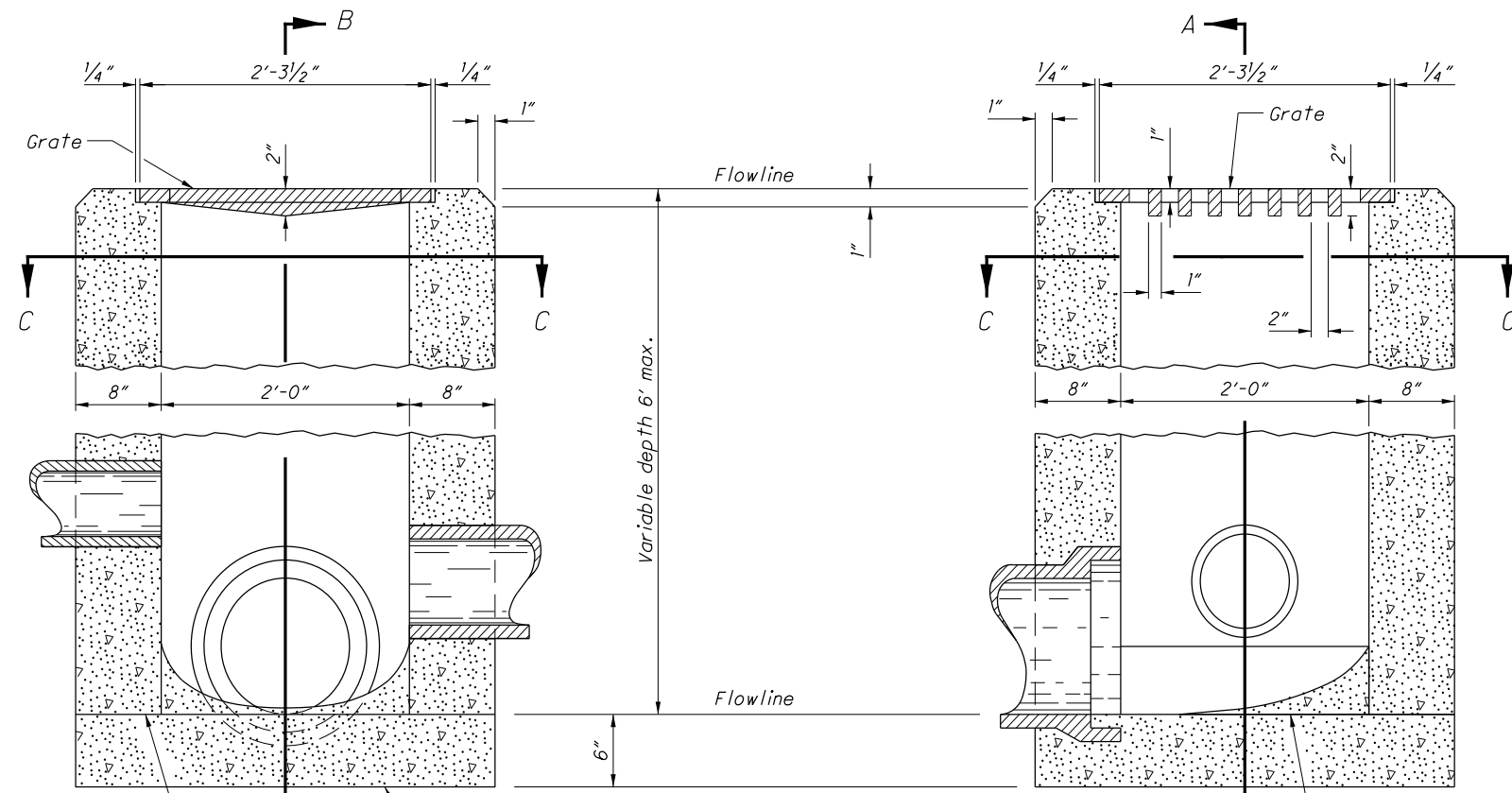
**MINIMUM DEPTH:** The minimum depth of CB No. 2-2A is the outside diameter (O.D.) of the outlet pipe plus 7".

**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.

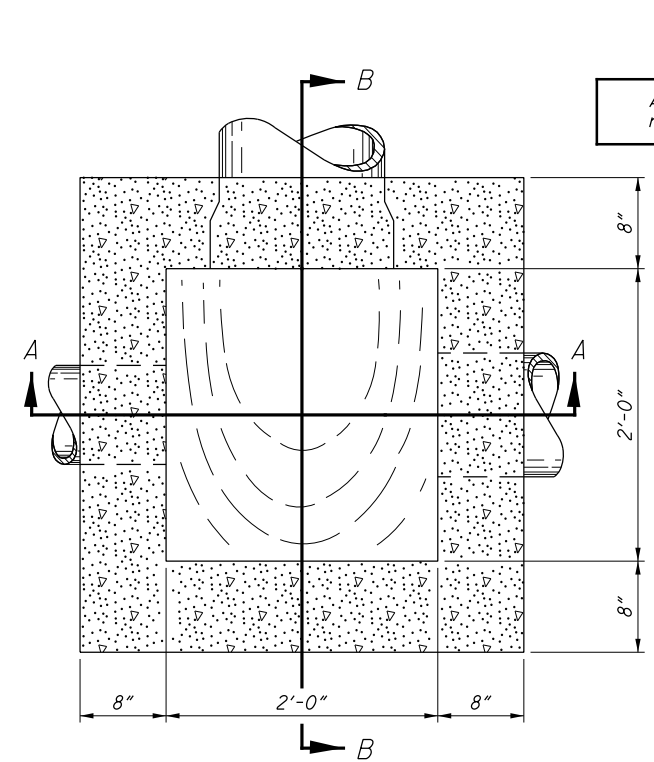
**PAYMENT:** All materials and labor, including excavation and backfilling, are paid for under **Item 611 - Catch Basin, No. 2-2A.**

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  
1/2

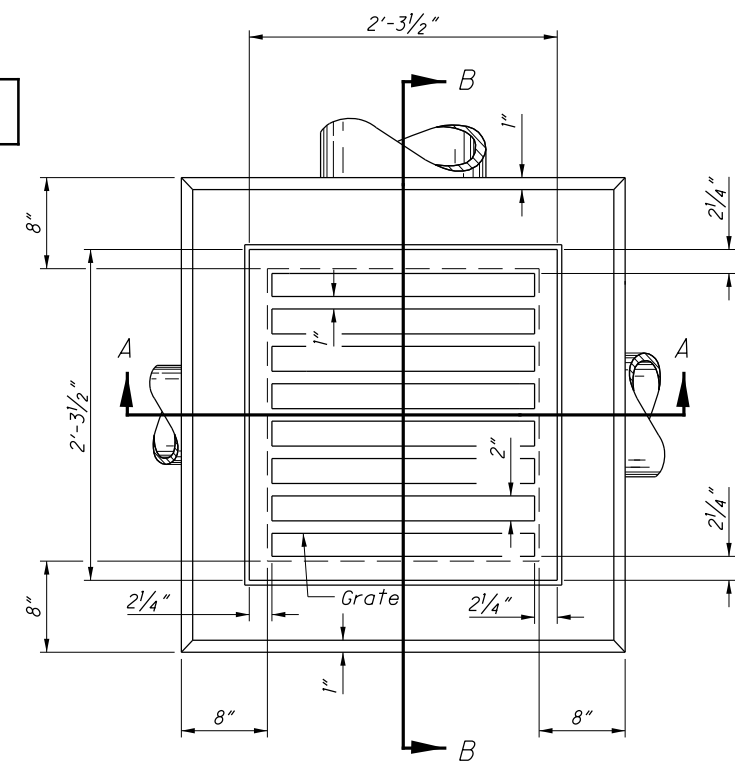


SECTION A-A  
 Bottom slab may be precast separately and the outlet pipe placed on top or it with the bottom shaped to drain  
 Permissible const. joint

SECTION B-B  
 Permissible const. joint



SECTION C-C



PLAN

CATCH BASIN No. 2-2B

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 1/2" 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".

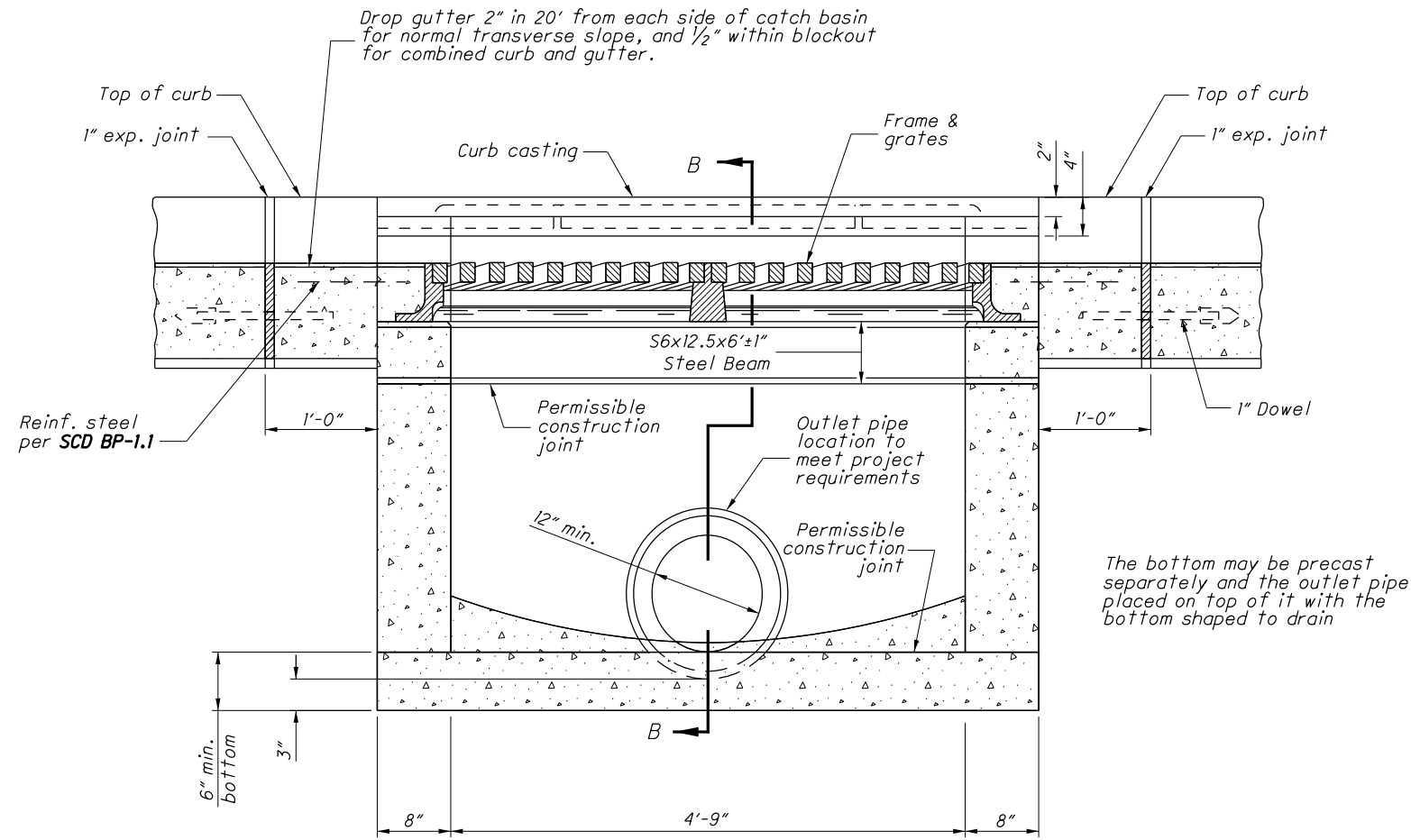
**2-2B GRATE ELEVATION:** Place grate elevation 4" to 6" below normal ditch and return to normal 10' to 15' each side of inlet.

**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.**

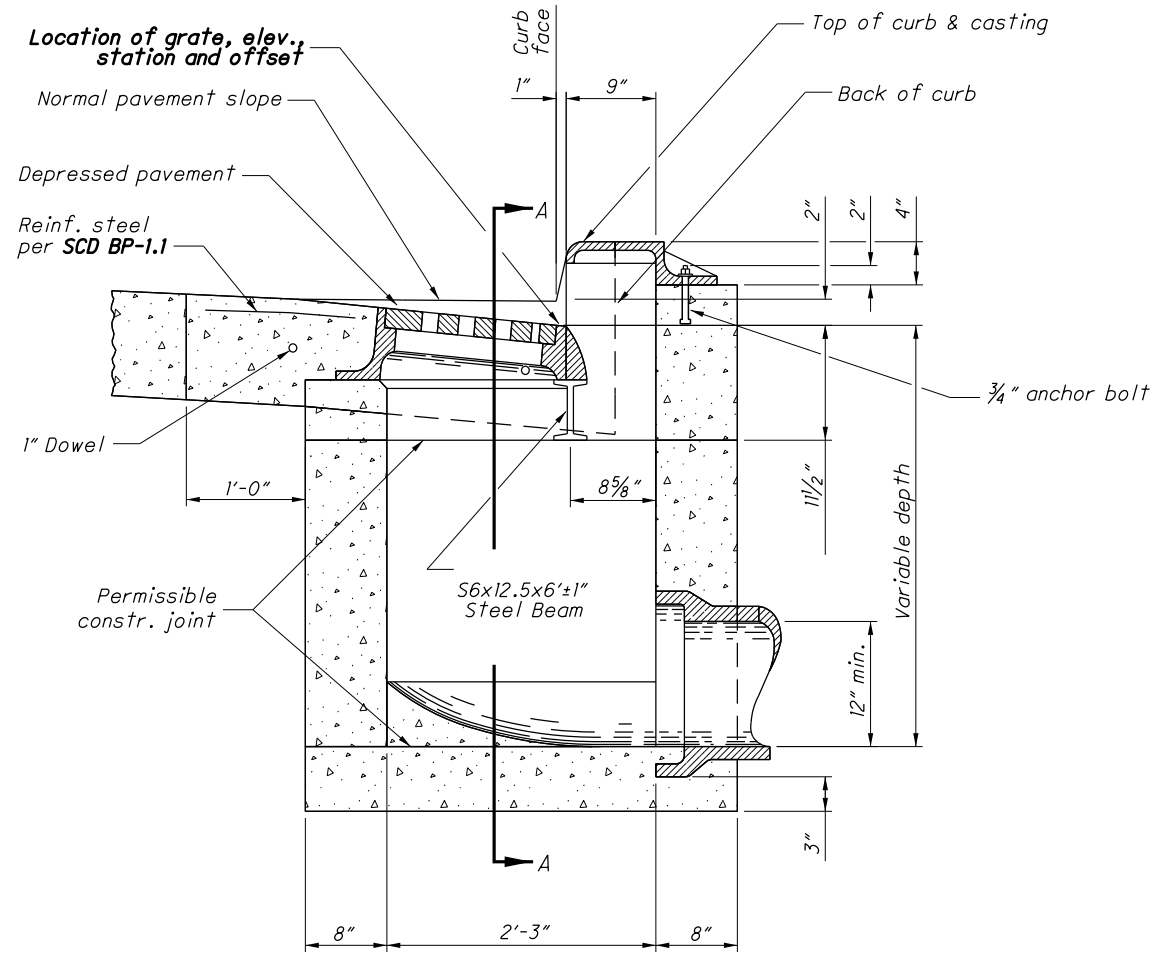
CONSTRUCTION INFORMATION	
Minimum weight of grate, 120 lbs.	

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

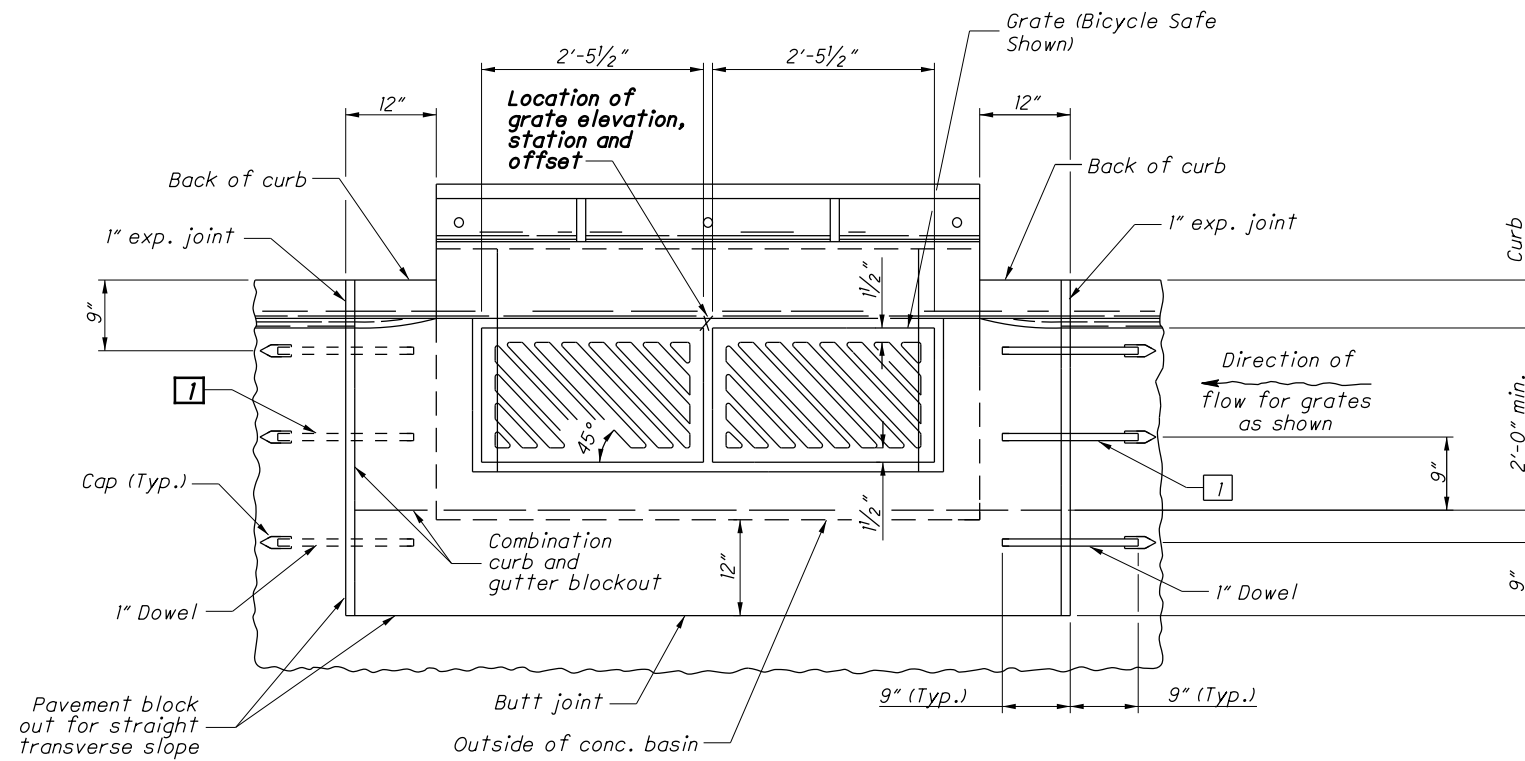


SECTION A-A

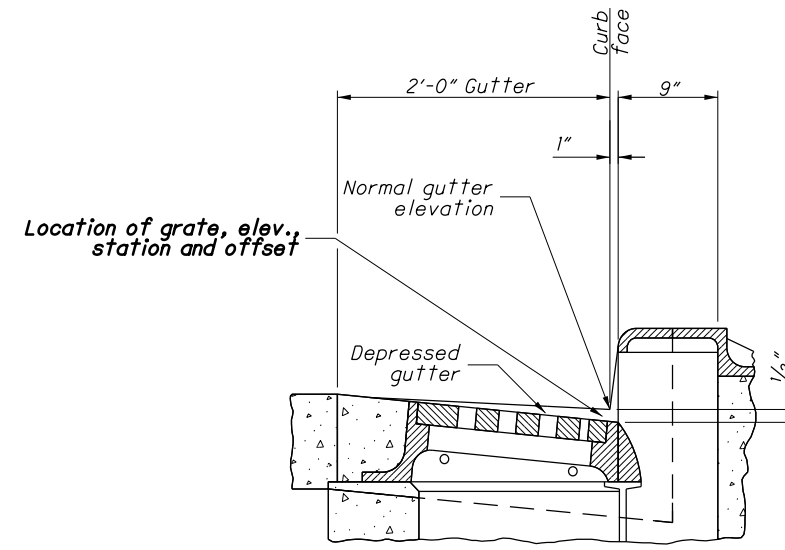
1 Dowel location for curb & gutter



SECTION B-B WITH CURB (2" DEPRESSION)

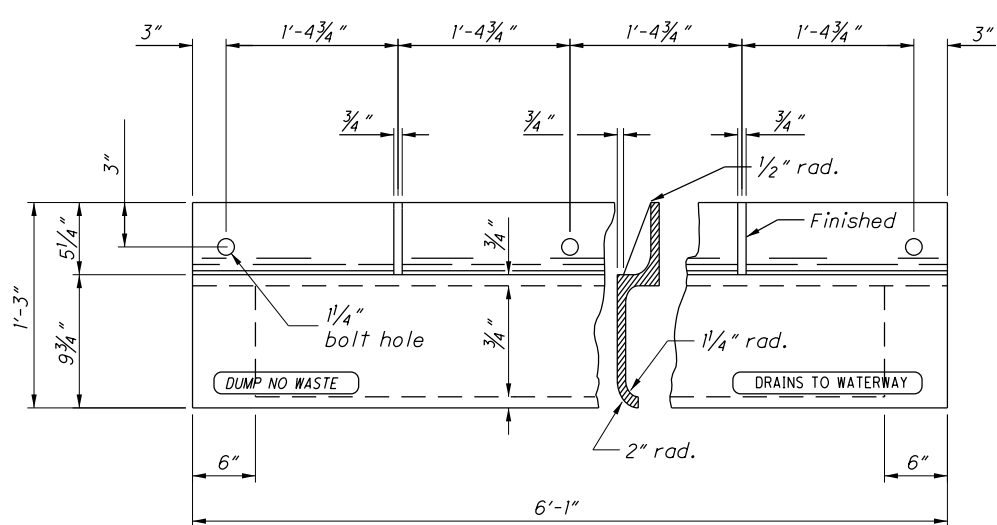


PLAN OF CATCH BASIN AND PAVEMENT JOINTS

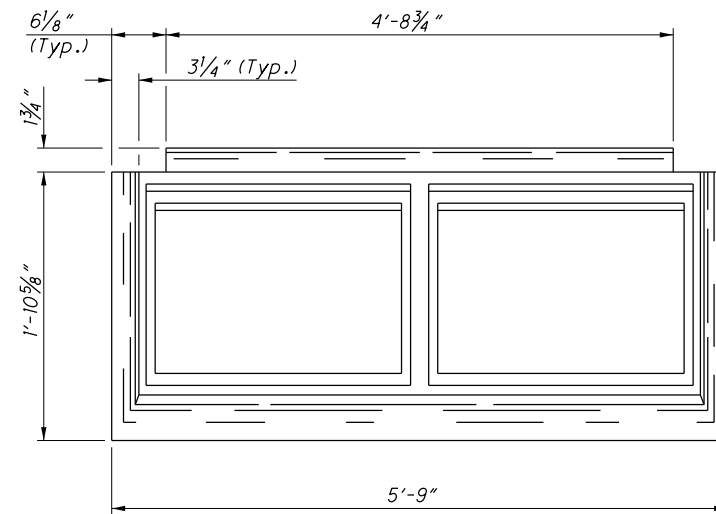


SECTION B-B WITH CURB & GUTTER (1/2" DEPRESSION)

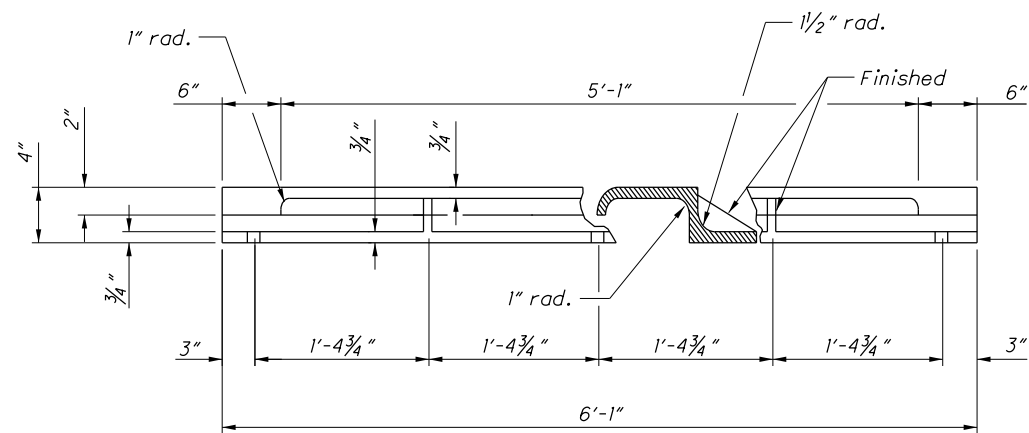
See Sht. 2/2 for NOTES



PLAN & SECTION

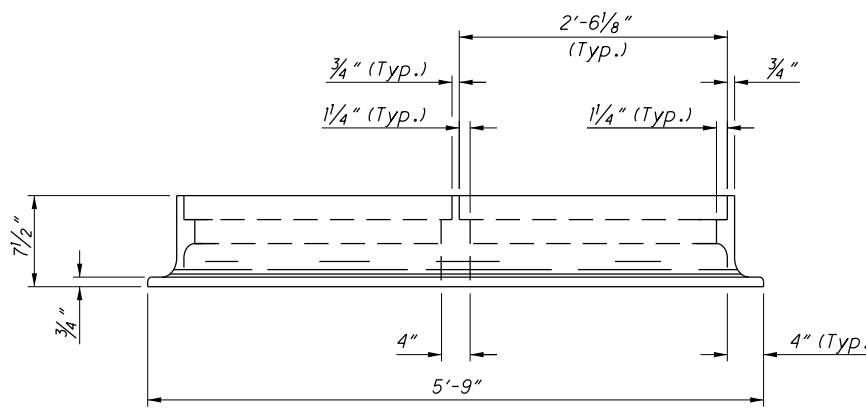


PLAN

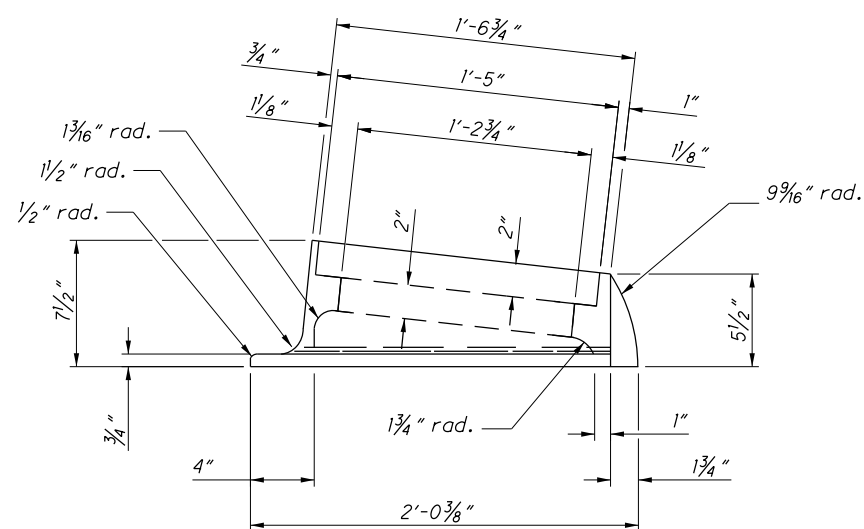


FRONT VIEW & SECTION

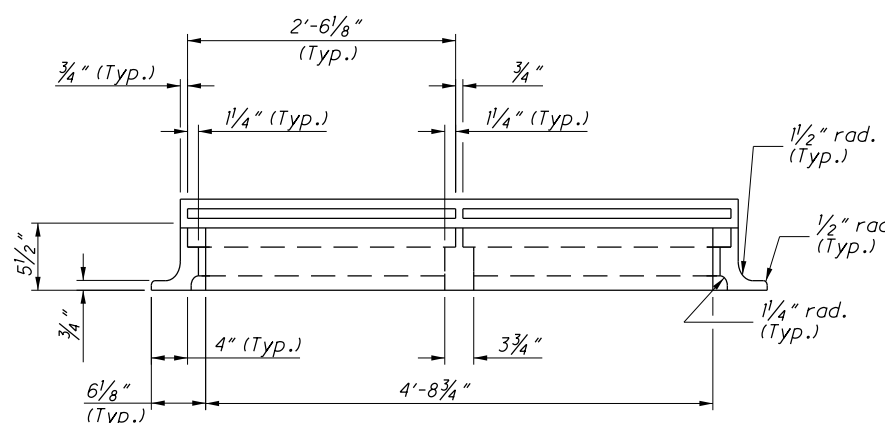
CURB CASTING



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 3/4" 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.

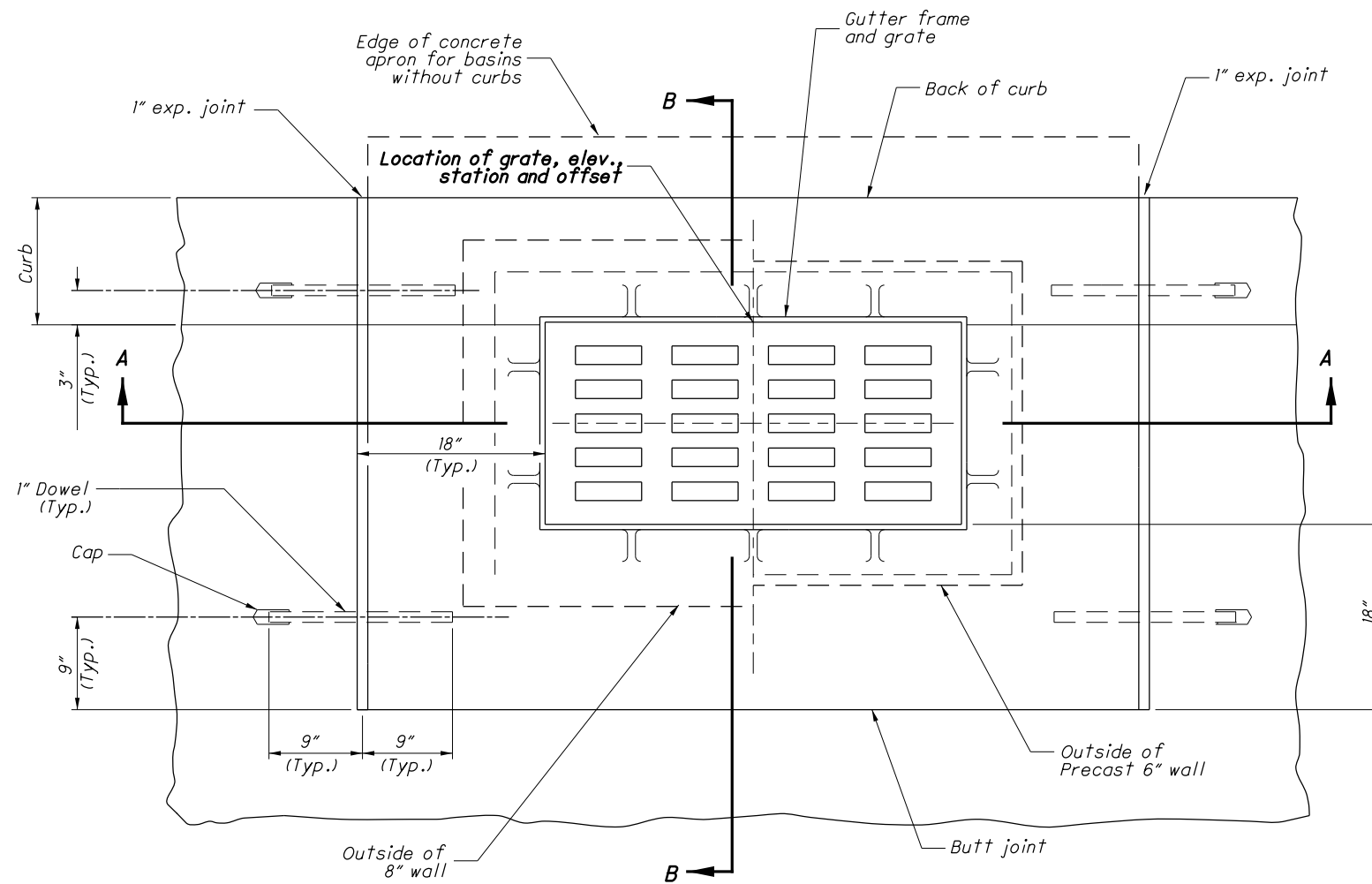
**OPENINGS:** Obtain the Engineer's approval for any pipe openings greater than 4" from the outside of the pipe to the structure. Fill all voids per CMS 611.

**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.

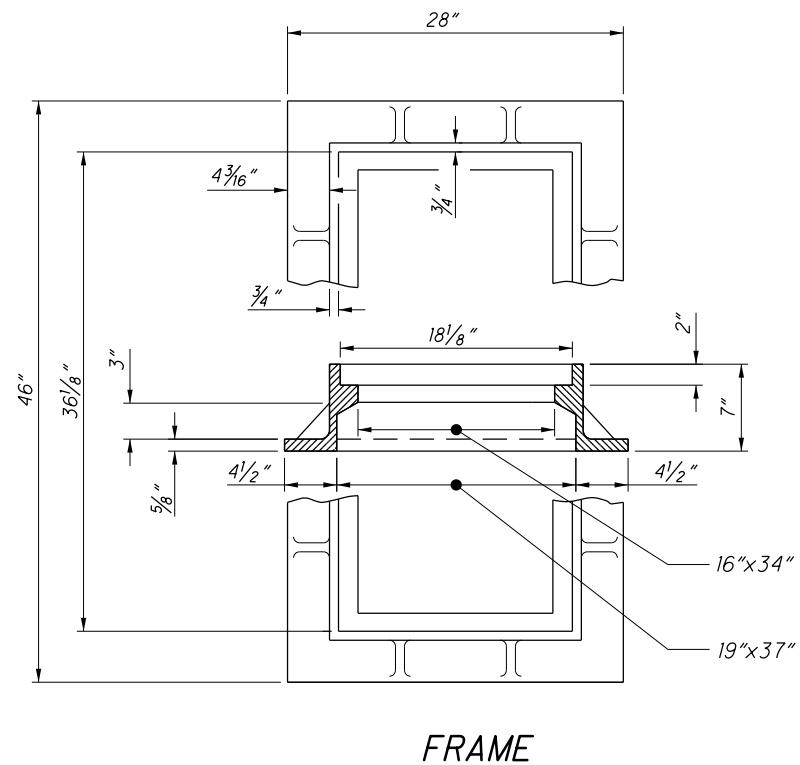
**PAYMENT:** All materials and labor, including excavation and backfilling, are paid for under **Item 611 - Catch Basin, No. 3**.



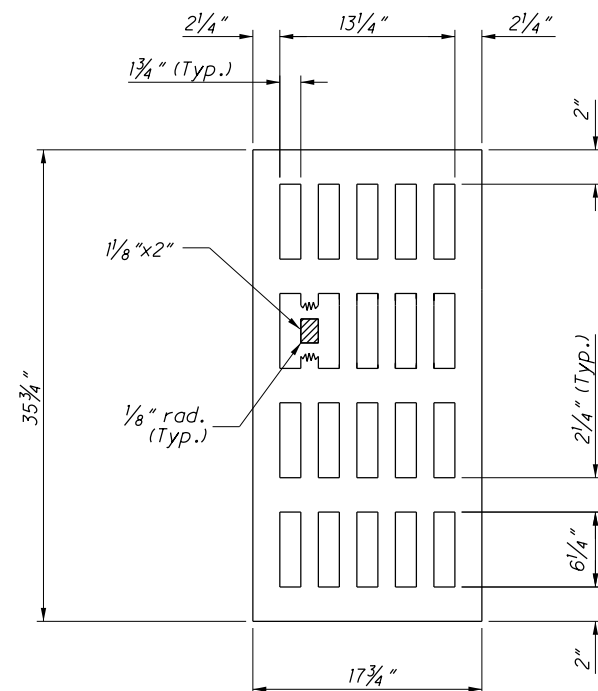


See Sht. 2/2  
for Sections

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 1/2" 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.

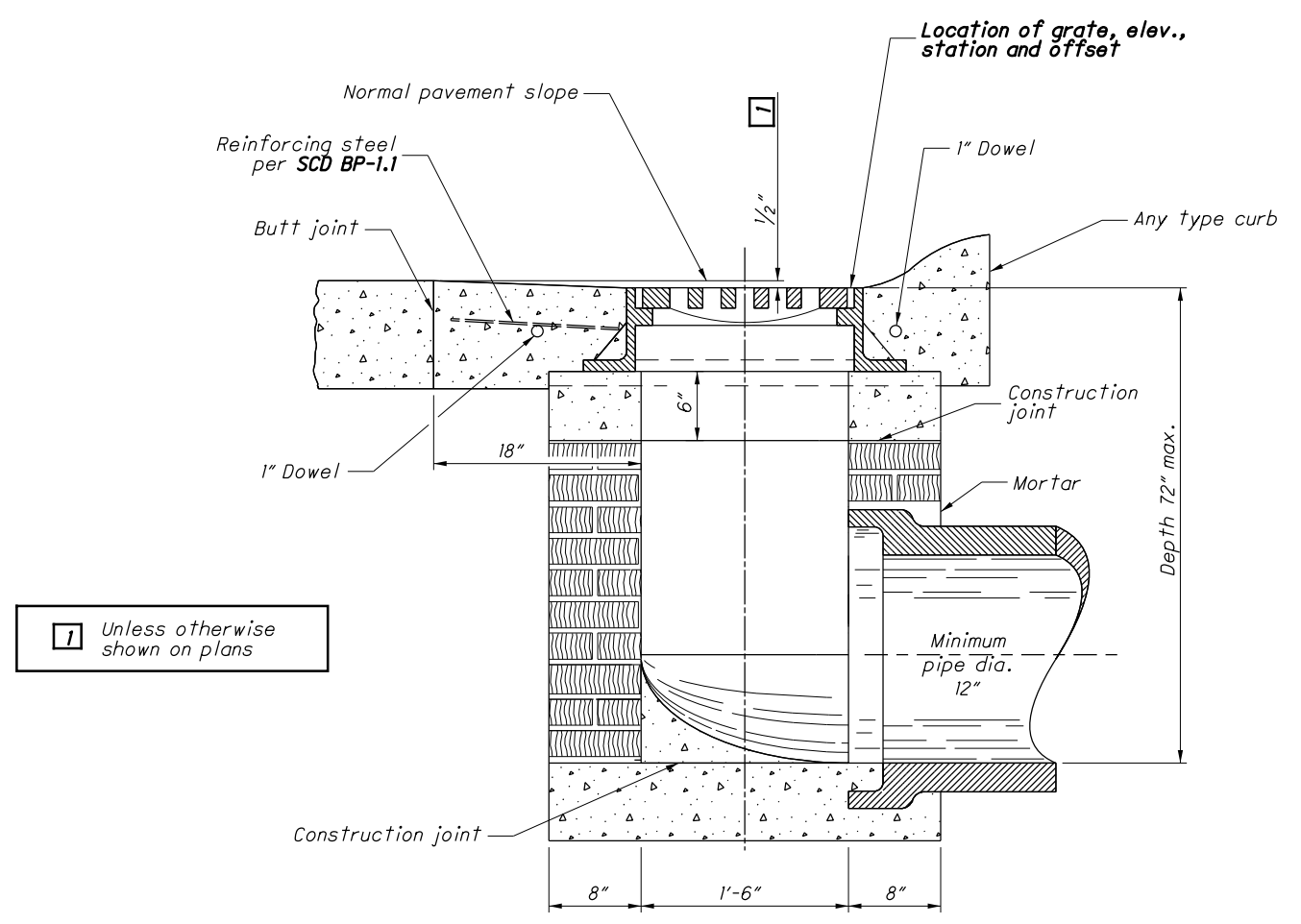
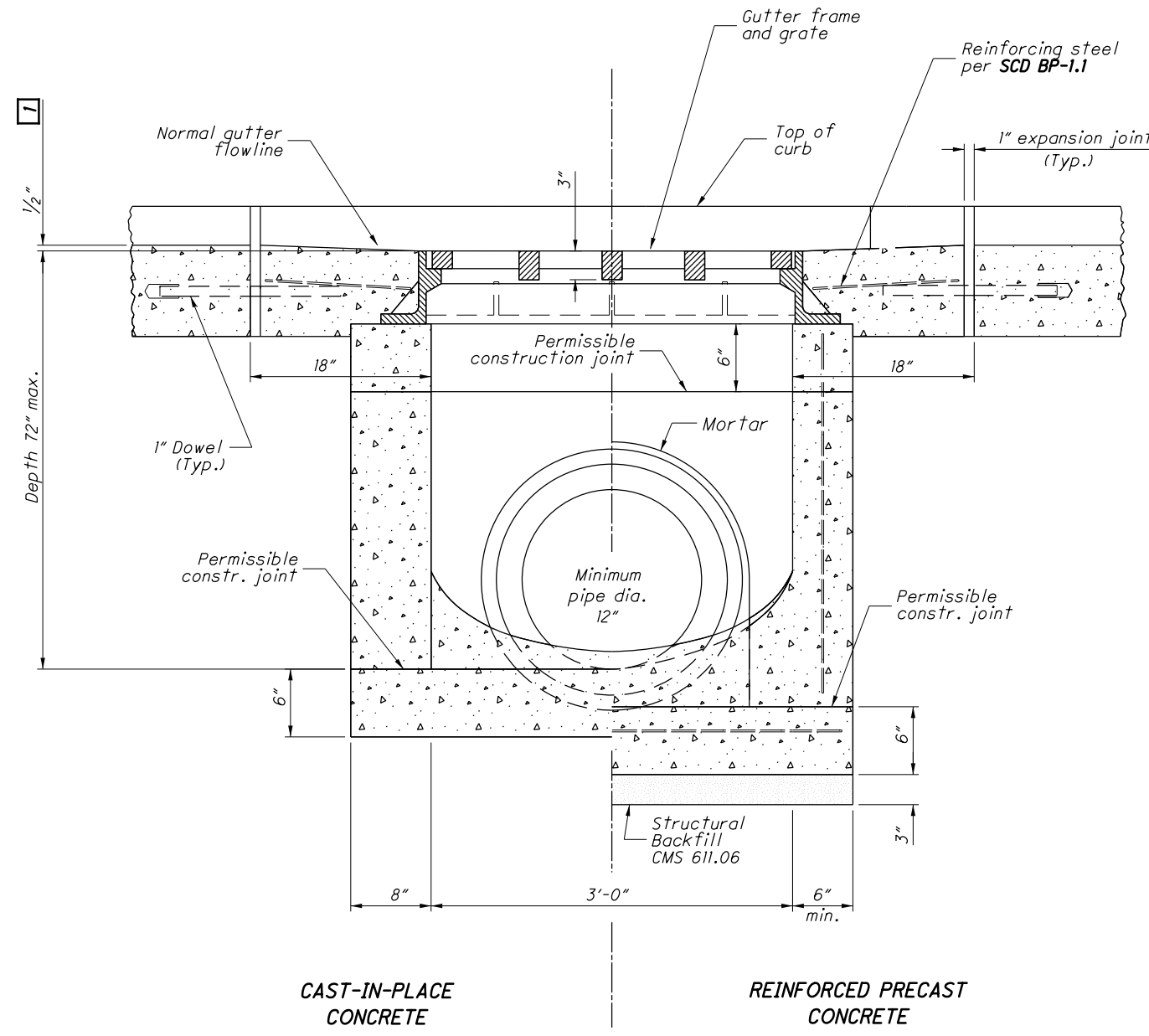
**DOWELS:** Furnish four 1"x18" dowels for pavement and curb. See **SCD BP-2.2** for dowel detail.

**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.



1 Unless otherwise shown on plans

CATCH BASIN No. 6

NOTES

CONSTRUCTION METHODS

**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.

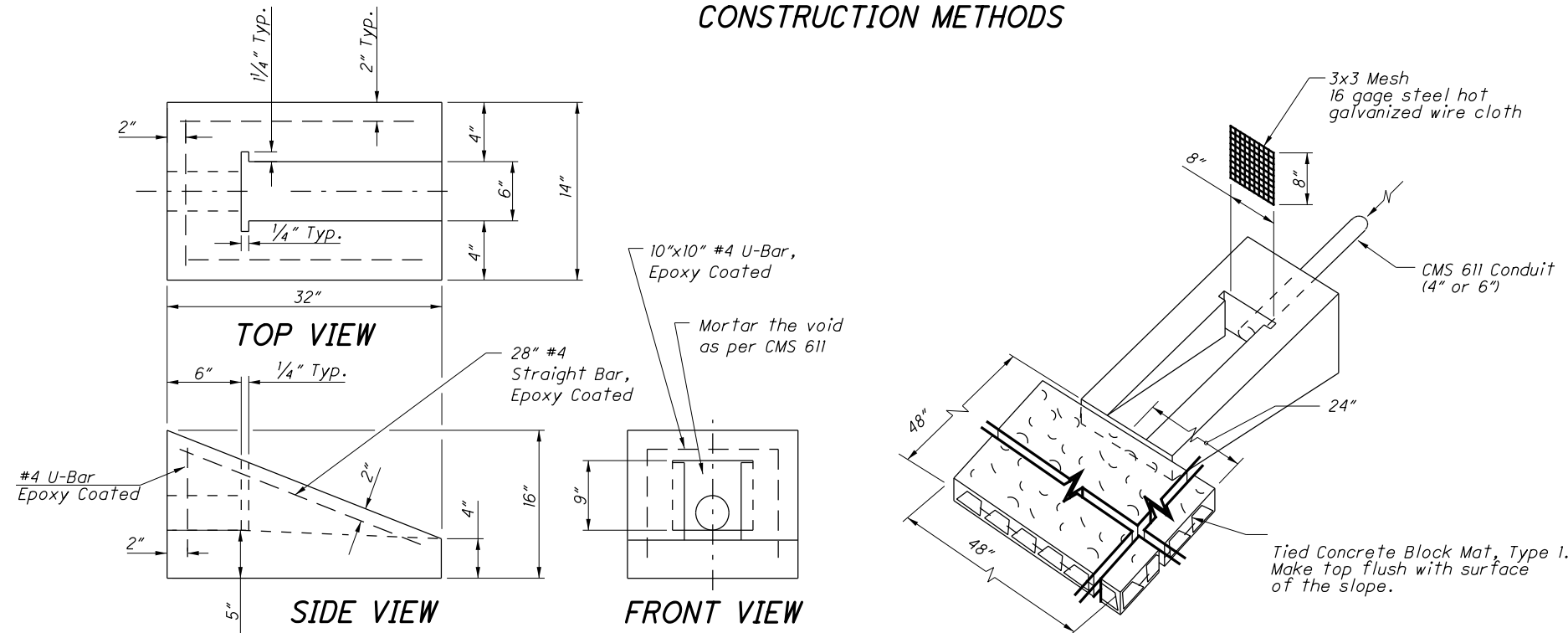
Furnish galvanized steel bolts or rods for the animal guard per CMS 711.02. Instead of drilling or punching the 1/2" diameter holes into the pipe, a metal collar meeting all of the above requirements may be clamped onto the pipe if approved by the Engineer.

**PAYMENT:** Erosion control pads and animal guards are included in the unit price bid for **Item 611 - 4" to 18" Conduit, Type 1**.

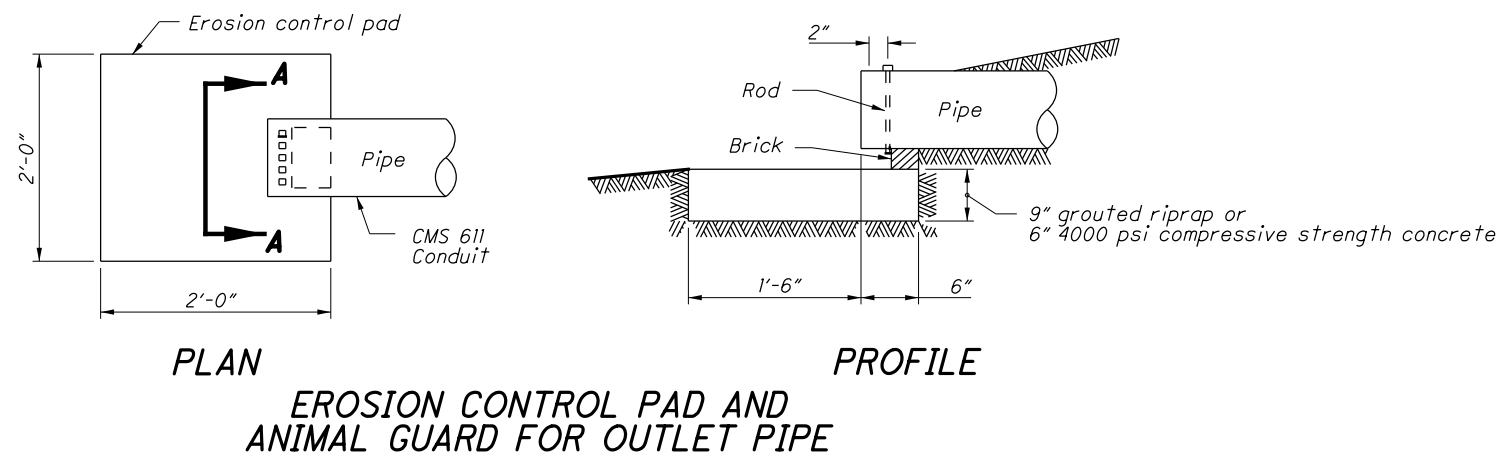
**PRECAST REINFORCED CONCRETE OUTLET:** Provide a concrete outlet that meets CMS 611 requirements.

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

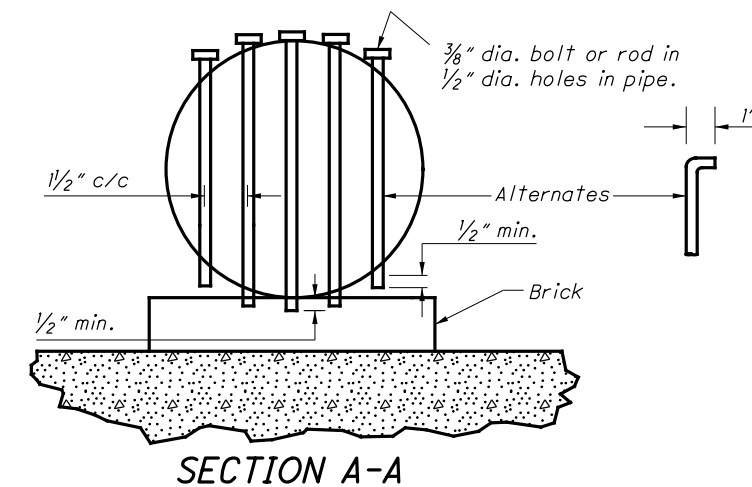
Tied Concrete Block Mat, Type 1 is paid at the contract unit price bid for **Item 601 - Tied Concrete Block Mat, Type 1**.



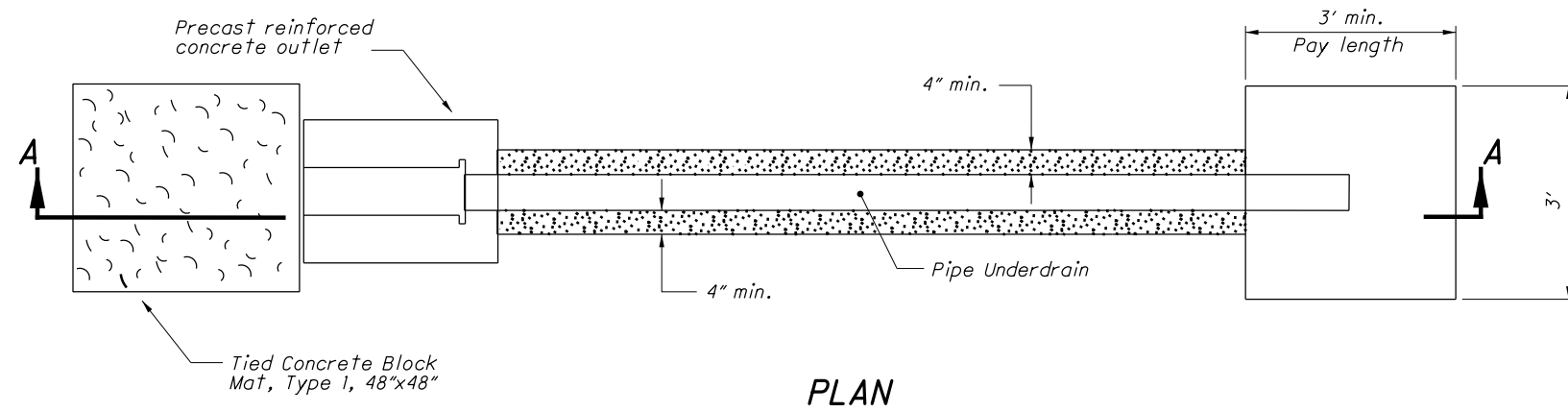
PRECAST REINFORCED CONCRETE OUTLET



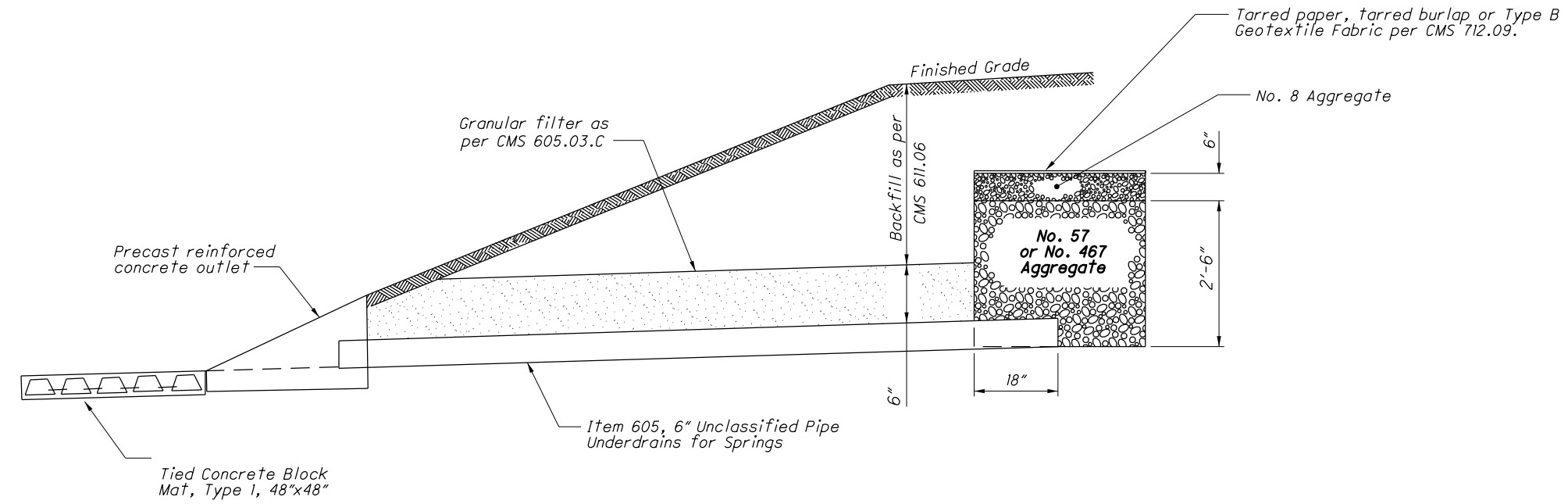
EROSION CONTROL PAD AND ANIMAL GUARD FOR OUTLET PIPE



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



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.**

REVISIONS
7-19-02
7-18-03
1-21-05
10-21-05
4-21-06
1-21-11
7-20-12
1-18-13

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HYDRAULIC  
ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING  
OUTLETS, DRAINS AND SEWERS

SCD NUMBER  
DM-1.1

REVISIONS
7-19-02
7-18-03
1-21-05
10-21-05
4-21-06
1-21-11
7-20-12
1-18-13

ROADWAY  
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ENGINEER  
Mott  
Cozzoli

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HYDRAULIC  
ENGINEERING

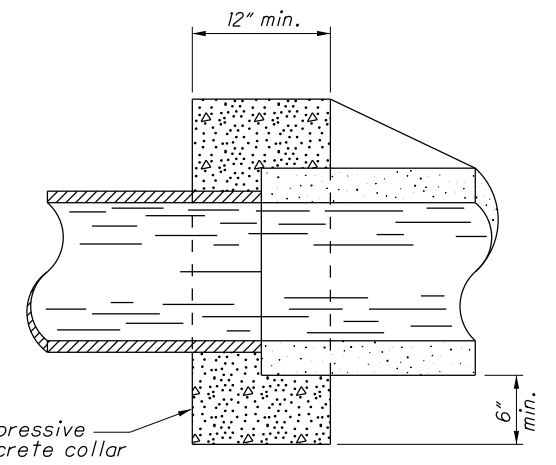
STANDARD HYDRAULIC CONSTRUCTION DRAWING

SCD NUMBER  
DM-1.1

**NOTES**

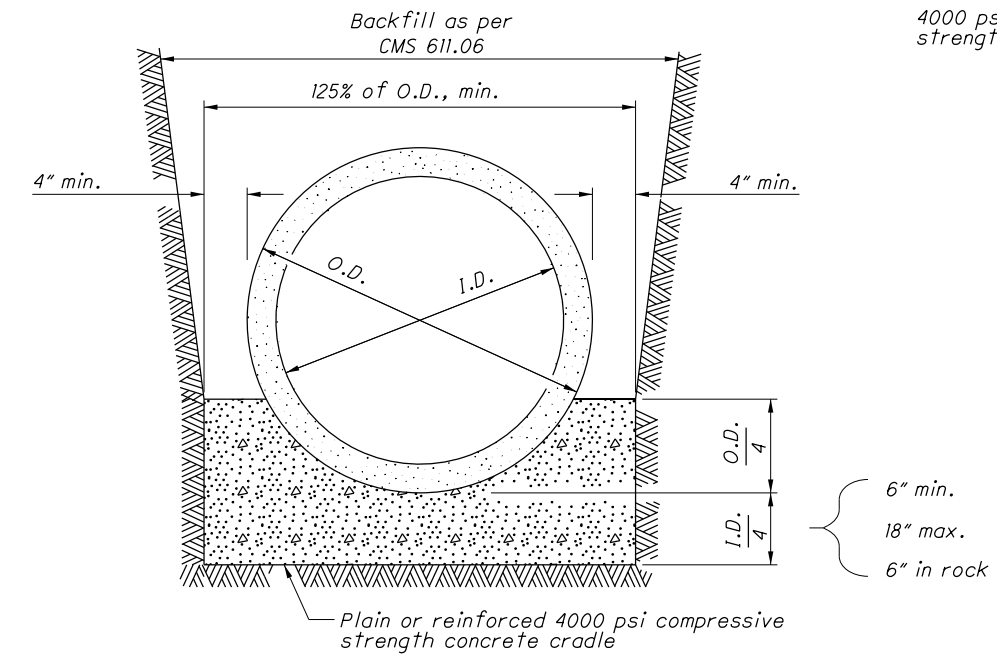
**MASONRY COLLARS:** Provide a masonry collar where plans require that a pipe extension be joined to the end of an existing pipe with a butt joint. The cost is included in the unit price bid for the new conduit.

**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.

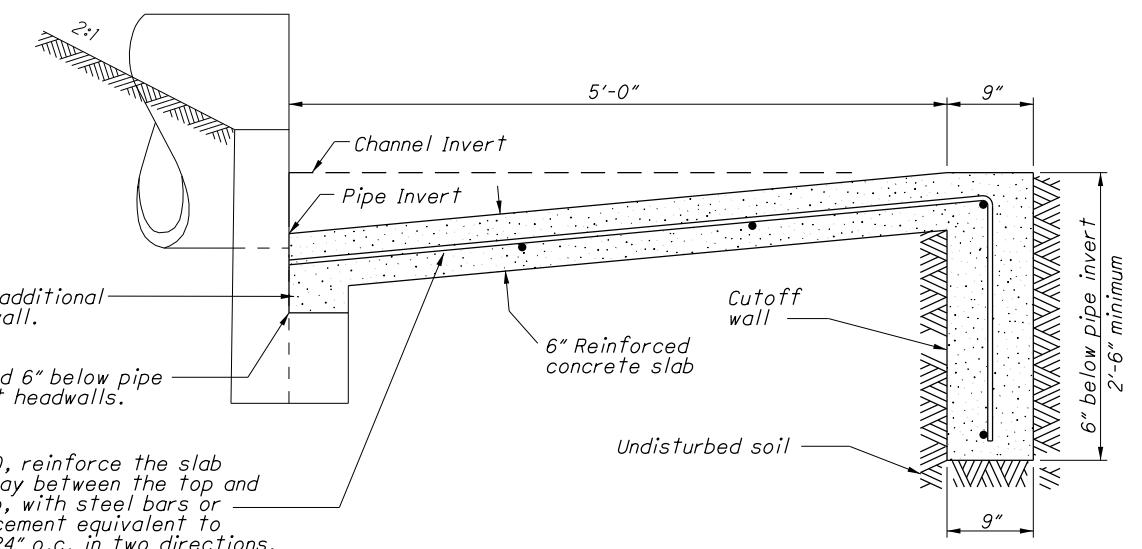


4000 psi compressive strength concrete collar

**MASONRY COLLAR**



**CONCRETE CRADLE**



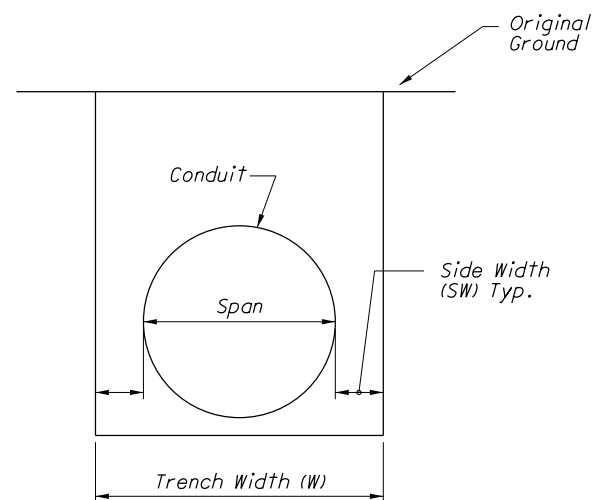
Pay Item for cutoff wall includes any additional concrete required to support cutoff wall.

6" extension located 6" below pipe opening for precast headwalls.

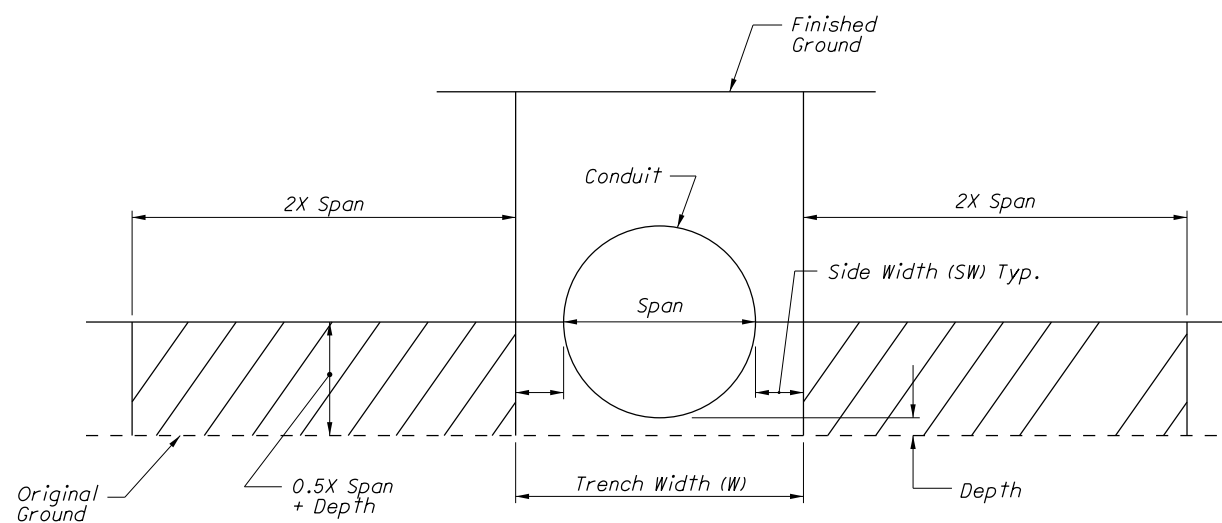
As per CMS 601.04.D, reinforce the slab approximately midway between the top and bottom of the slab, with steel bars or fabricated reinforcement equivalent to #3 round bars, at 24" o.c. in two directions, or wire fabric according to SCD BP-1.1.

**RIPRAP CUTOFF WALL**

## EXCAVATION METHODS



**METHOD A-CUT**



**METHOD B-FILL**

Minimum Constructed Embankment

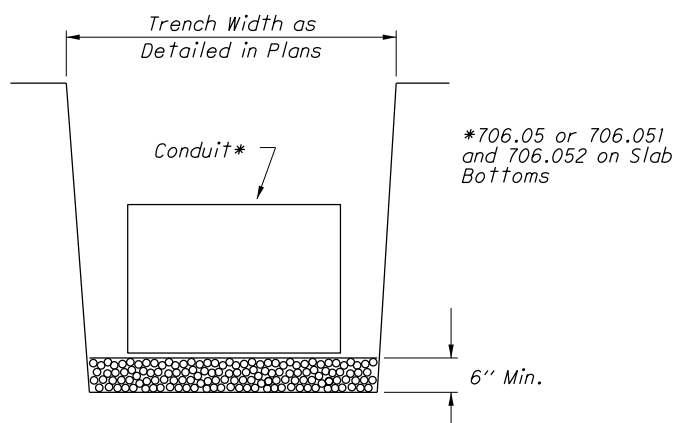
## TRENCH DIMENSIONS

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

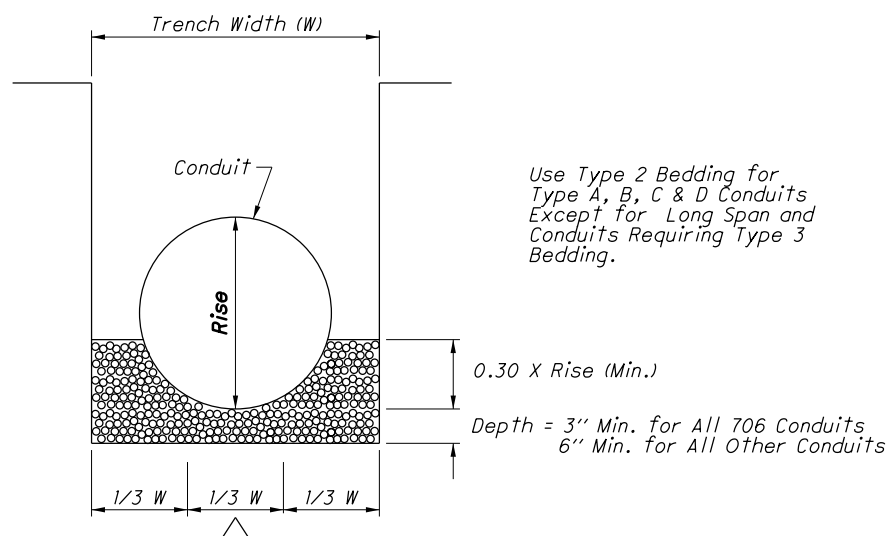
- This drawing is intended for use in conjunction with SS 811 only.
- Use Structural Backfill Type 1, 2, or 3 per CMS 811.
- Use Embankment per SS 811.
- Conduit Span is the horizontal distance from outside wall to outside wall or outside corrugation measured at the widest point of the conduit.
- Conduit 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



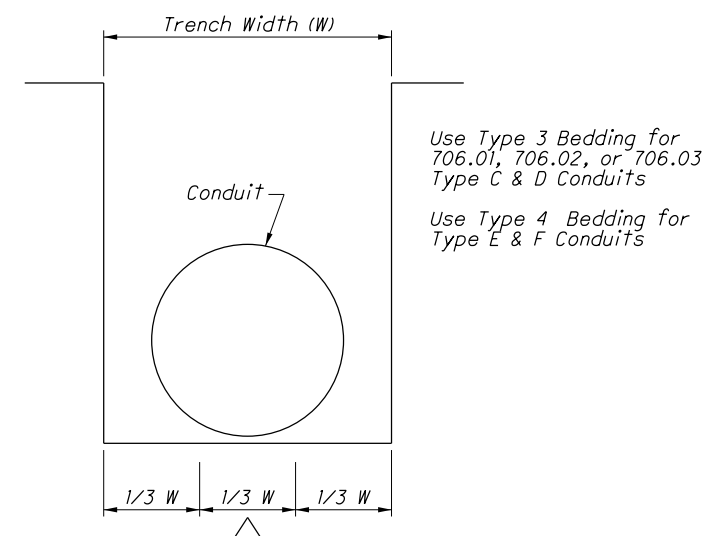
**TYPE 1 BEDDING**

Structural Backfill



**TYPE 2 BEDDING**

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

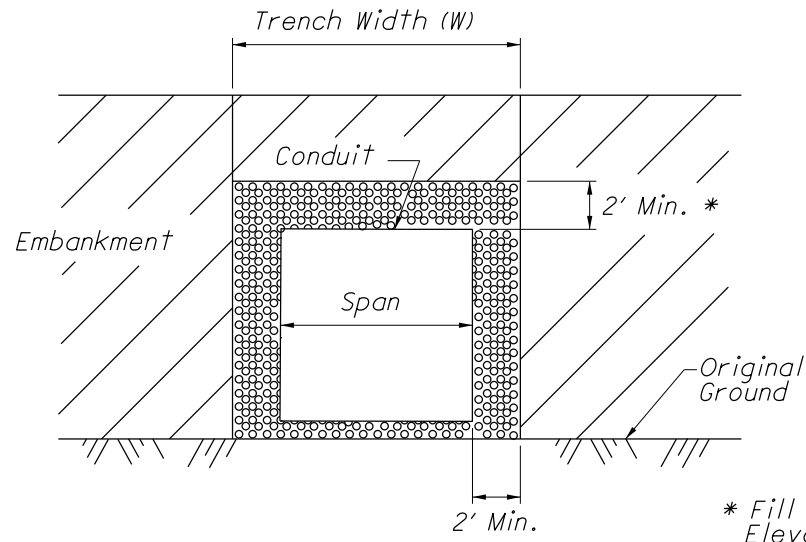


**TYPE 3 & 4 BEDDING**

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

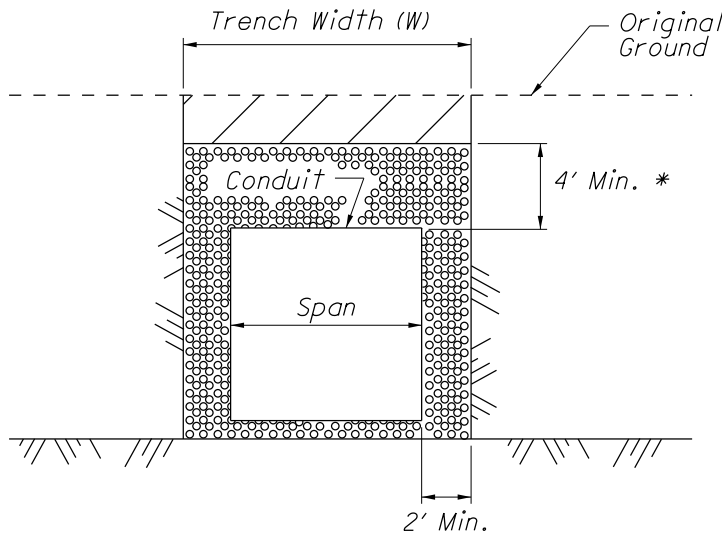
STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 ROADWAY HYDRAULIC ENGINEER  
 ALL METRIC DIMENSIONS ( IN BRACKETS ) ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.  
 OFFICE OF HYDRAULIC ENGINEERING  
 STANDARD HYDRAULIC CONSTRUCTION DRAWING  
 CONDUIT INSTALLATION  
 SCD NUMBER  
 DM-1.4  
 1 / 2

BACKFILL CONDITIONS

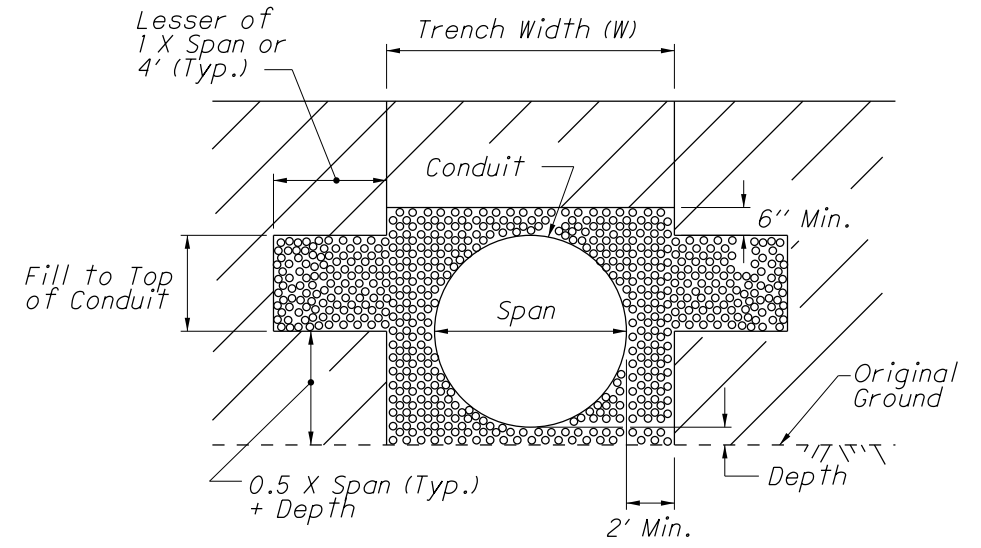


LONG SPAN-FILL

\* Fill to Subgrade Elevation if Less Than Min.

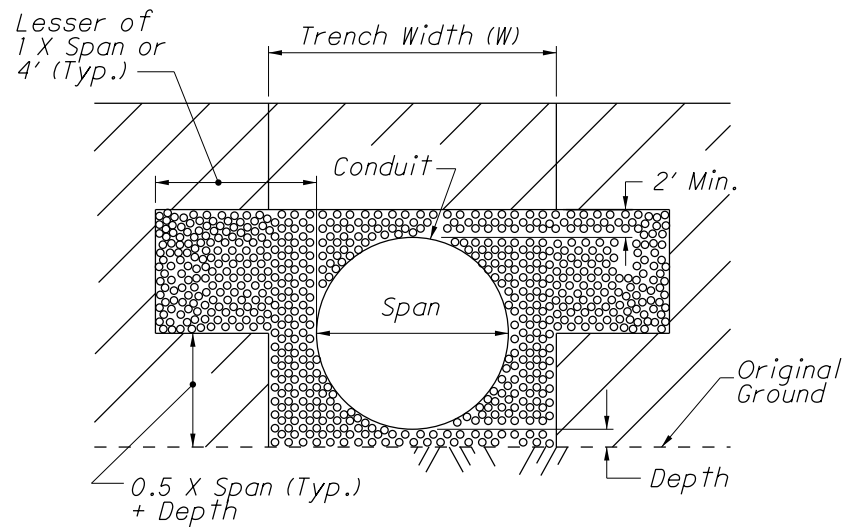


LONG SPAN-CUT

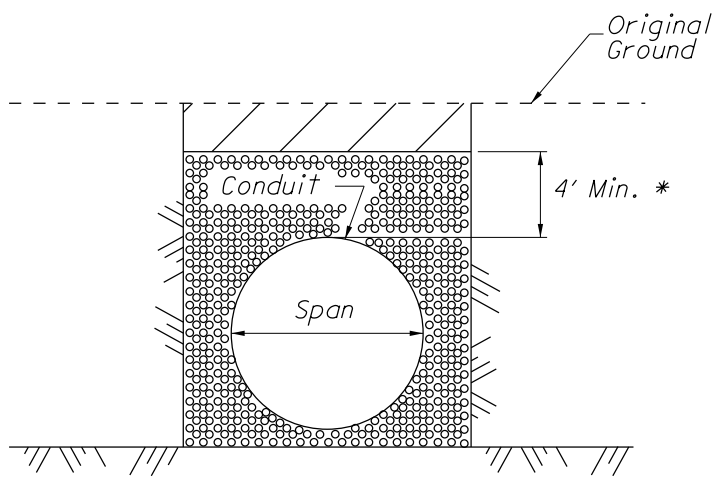


\*\* PLASTIC CONDUIT, TYPE C & D -FILL

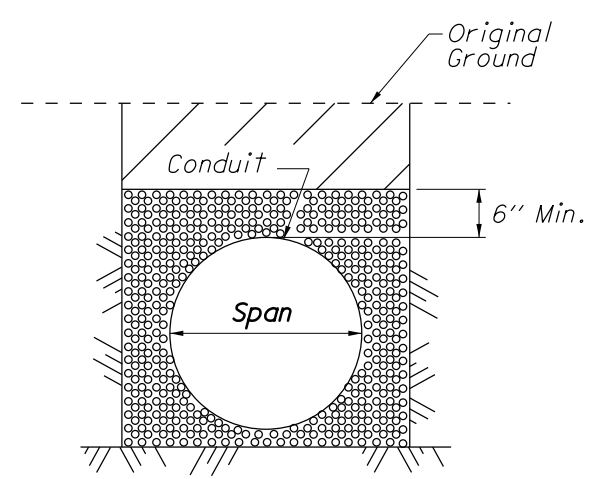
\*\* For All Other Type C & D Conduits Place & Compact Backfill on Top of Bedding.





CONDUIT, TYPE A & B-FILL



CONDUIT TYPE A & B-CUT

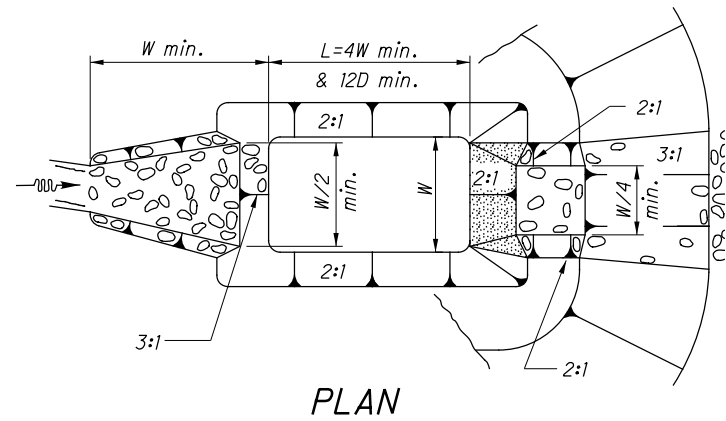


\*\* PLASTIC CONDUIT, TYPE C-CUT

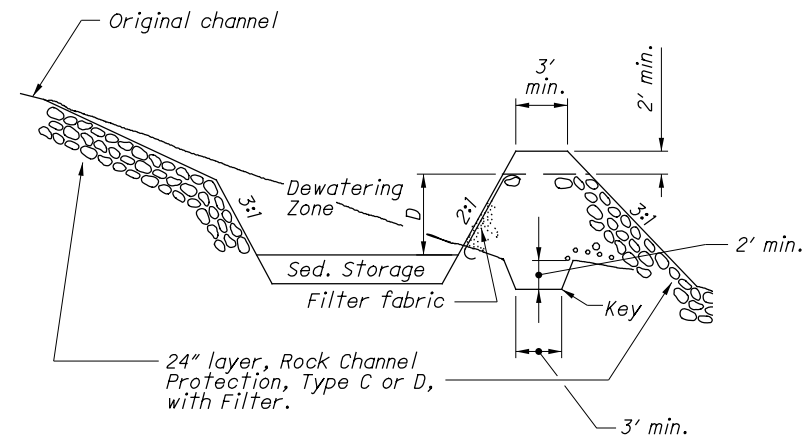
-  - Construction Embankment
-  - Structural Backfill

**NOTES**

Backfill Conduits per SS 811.



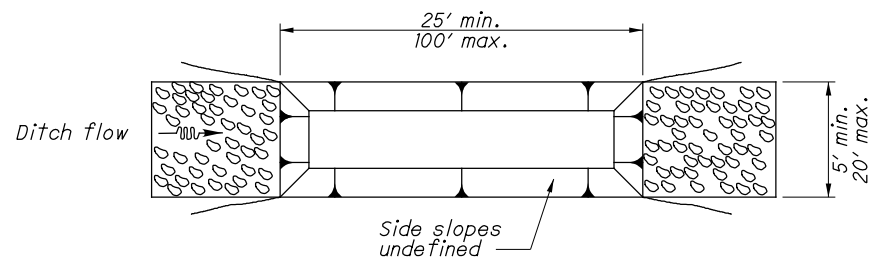
PLAN



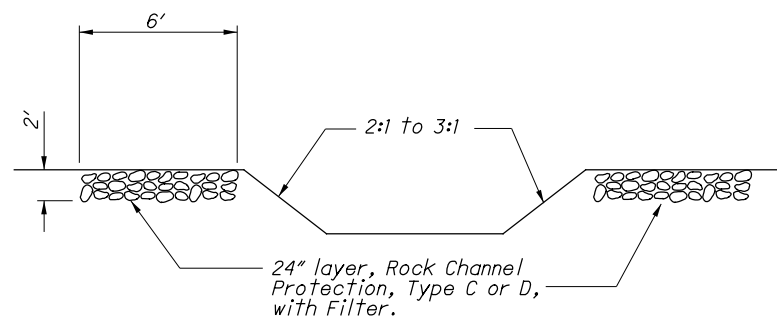
PROFILE

**SEDIMENT DAM**

(Drainage Area of Less than 5 Acres)



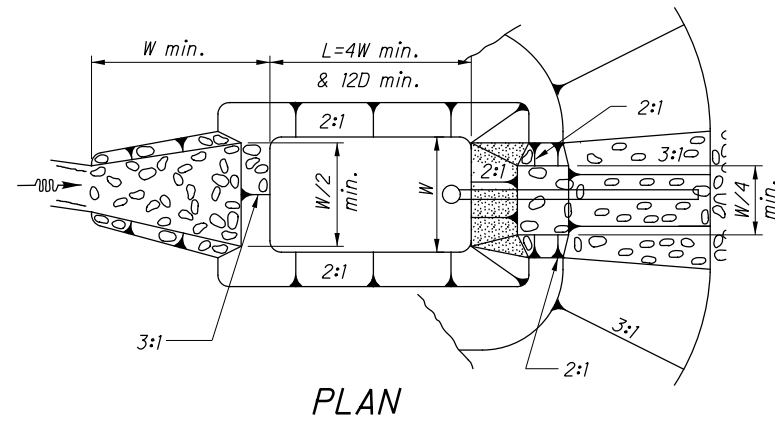
PLAN



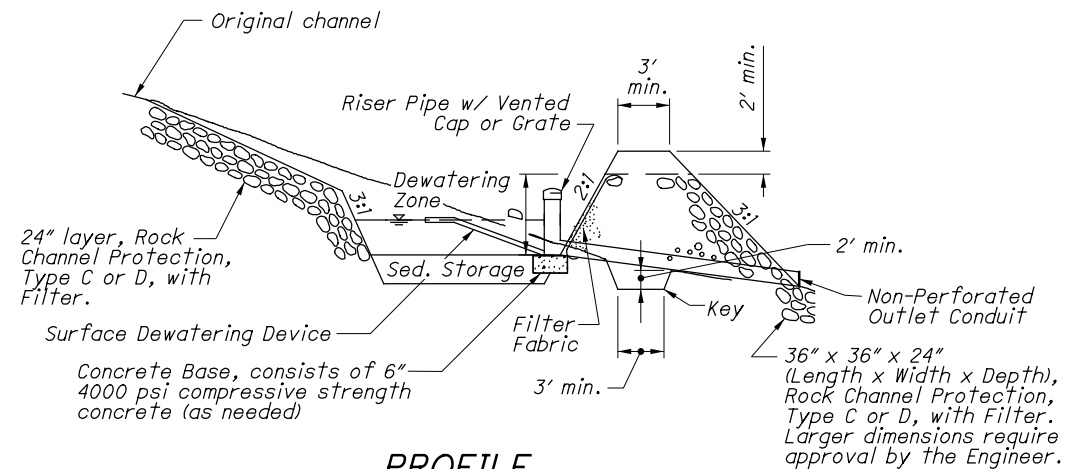
PROFILE

**SEDIMENT BASIN**

(Drainage Area of Less than 5 Acres)



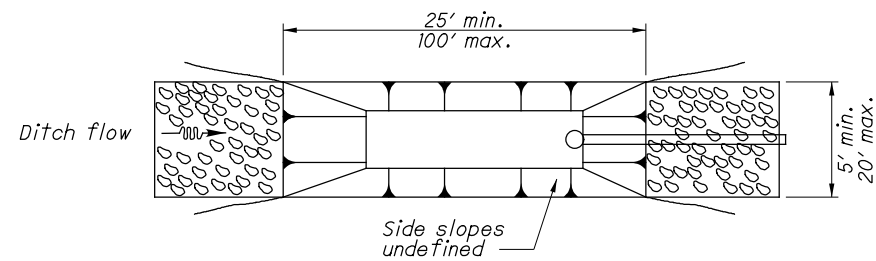
PLAN



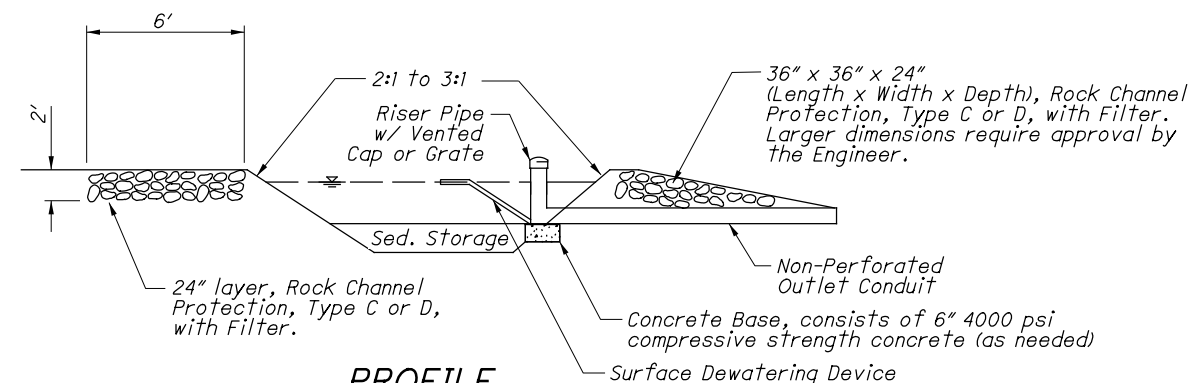
PROFILE

**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.

I:\hy\Proposed File Structure\Standard Drawings\Proposed\DM\dm4.3\_071913.dgn 4/17/2013 1:13:51 PM hyaryanh

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF HYDRAULIC ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING

SCD NUMBER

DM-4.3

SEDIMENT AND EROSION CONTROLS

STATE HYDRAULIC ENGINEER

McTt

Cozzoli

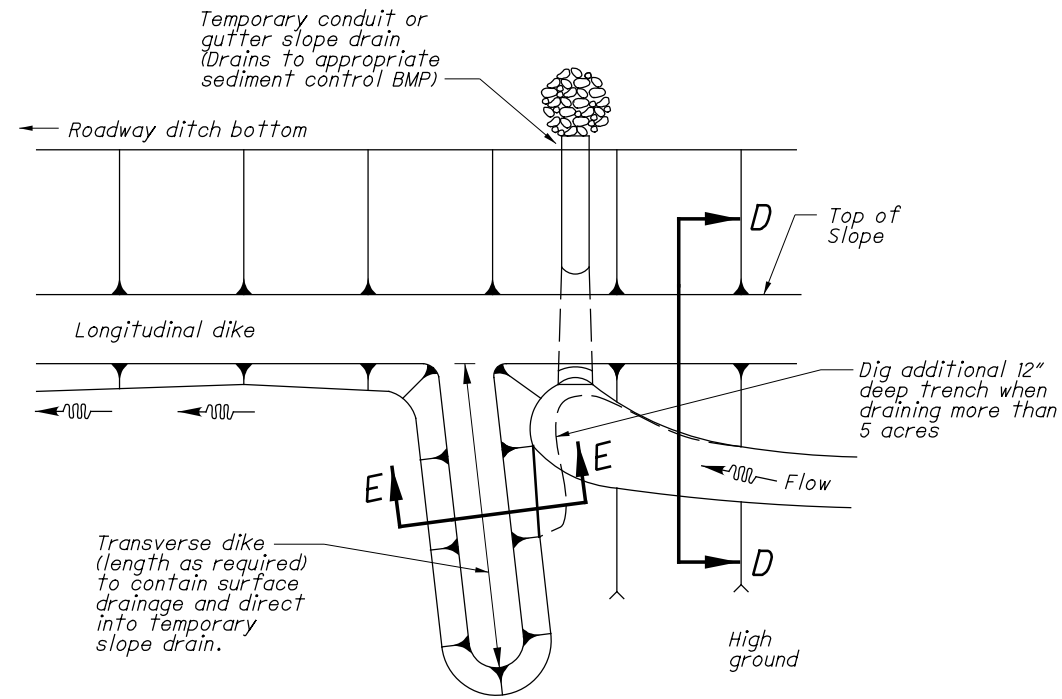
REVISIONS

4-29-99
7-19-02
11-26-08
4-17-09
7-20-12
1-18-13
7-19-13

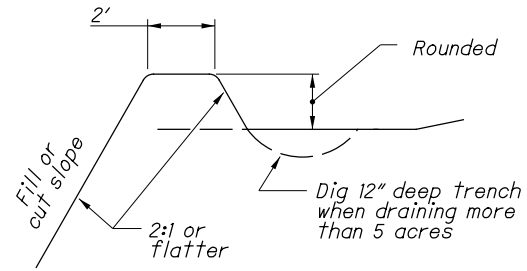
1 / 2



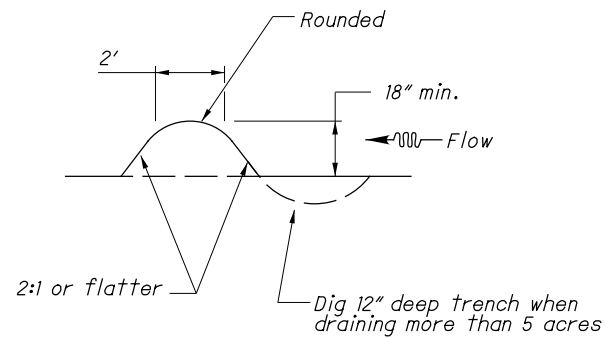
# DIKES AND SLOPE DRAINS



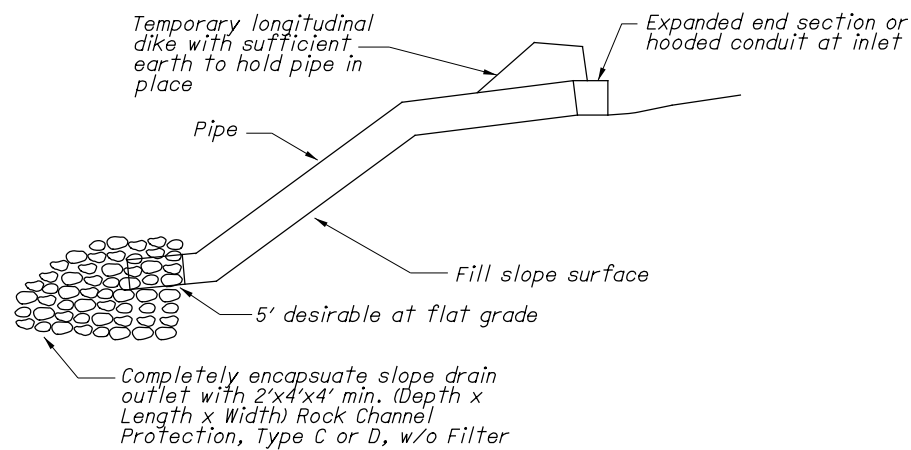
PLAN VIEW



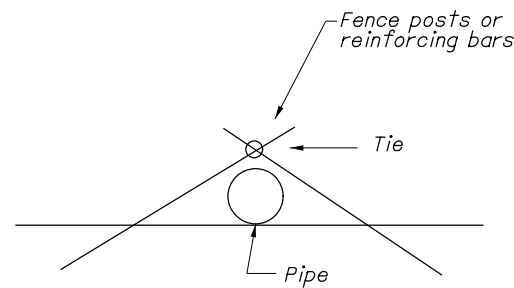
SECTION D-D



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:

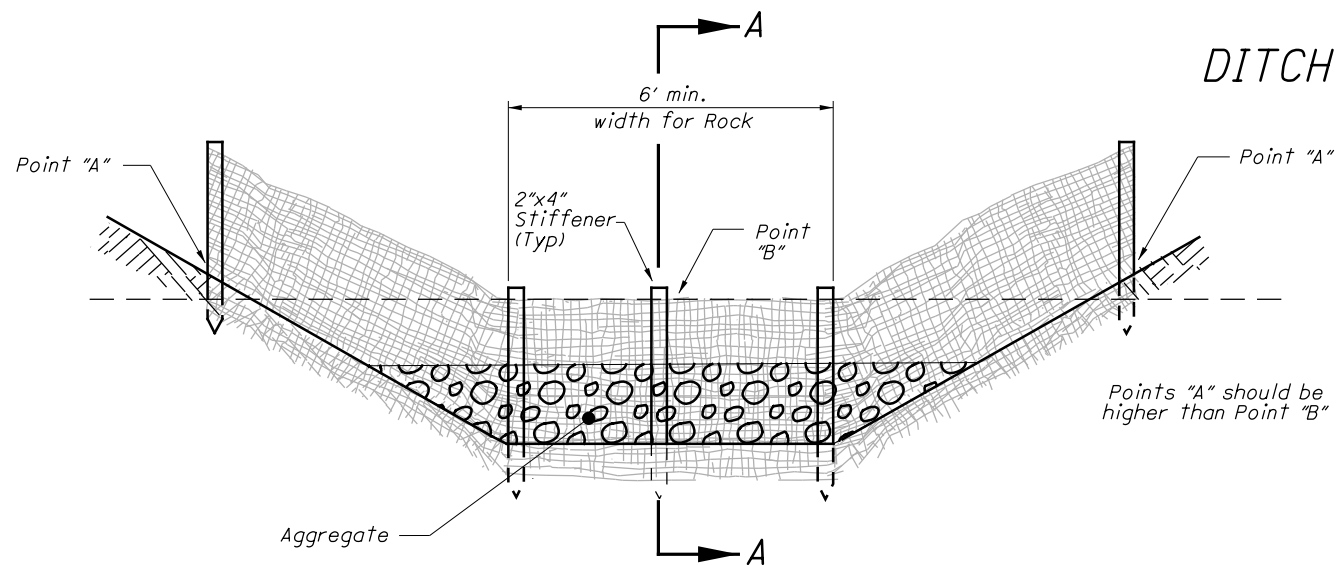
- Slope Drains
- Dikes
- Rock Channel Protection, Type C or D, Without Filter

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.

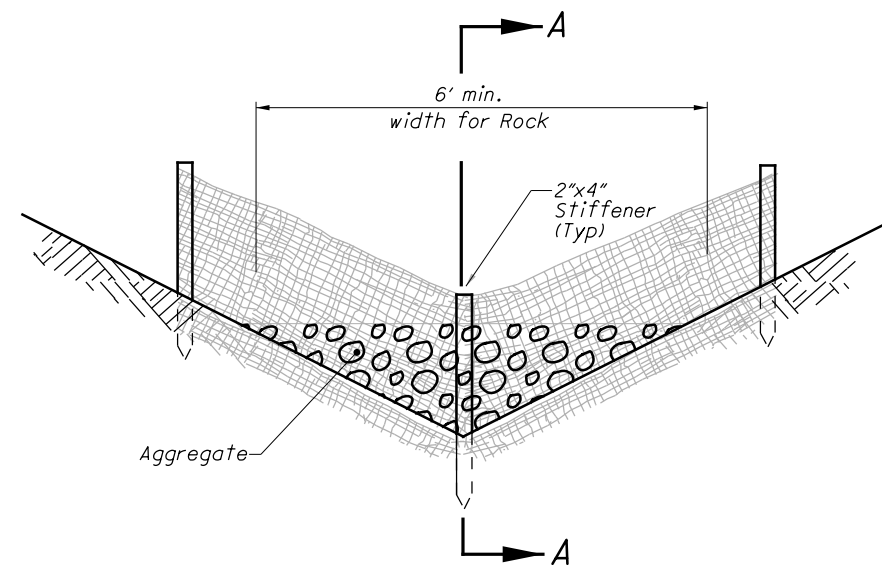
TEMPORARY SLOPE DRAINS RECOMMENDED SIZES		
AREA in acres	PIPE SIZES	
	Smooth	Corrugated
0-4	6"	6"
4-8	8"	12"
8-12	10"	15"

STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 REVISIONS  
 4-29-99  
 7-19-02  
 11-26-08  
 4-17-09  
 7-20-12  
 1-18-13  
 7-19-13  
 ROADWAY HYDRAULIC ENGINEER  
 Matt Cozzoli  
 OFFICE OF HYDRAULIC ENGINEERING  
 STANDARD HYDRAULIC CONSTRUCTION DRAWING  
 SEDIMENT AND EROSION CONTROLS  
 SCD NUMBER  
 DM-4.3  
 2 / 2

## DITCH CHECKS



CROSS-SECTIONAL VIEW OF FLAT BOTTOM DITCH



CROSS-SECTIONAL VIEW OF "V" DITCH

### 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.

### NOTES

#### ROCK CHECKS:

##### MATERIALS:

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

##### CONSTRUCTION:

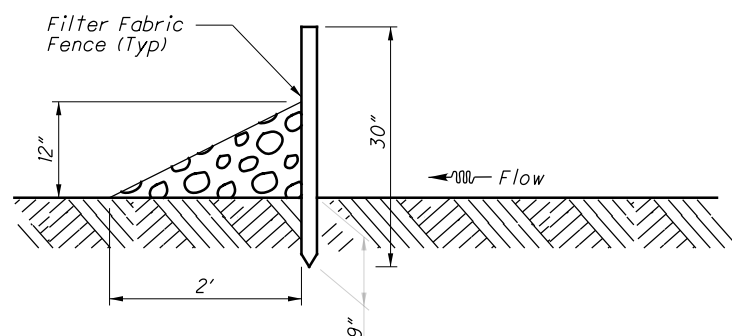
If the Engineer determines that rock should not be used for the rock checks, replace rock channel protection with straw bales configured with minimal gaps between bales. Tightly place each bale adjacent to one another. Entrench 2" to 3" into the ground prior to staking. Firmly stake each bale with at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

##### PAYMENT:

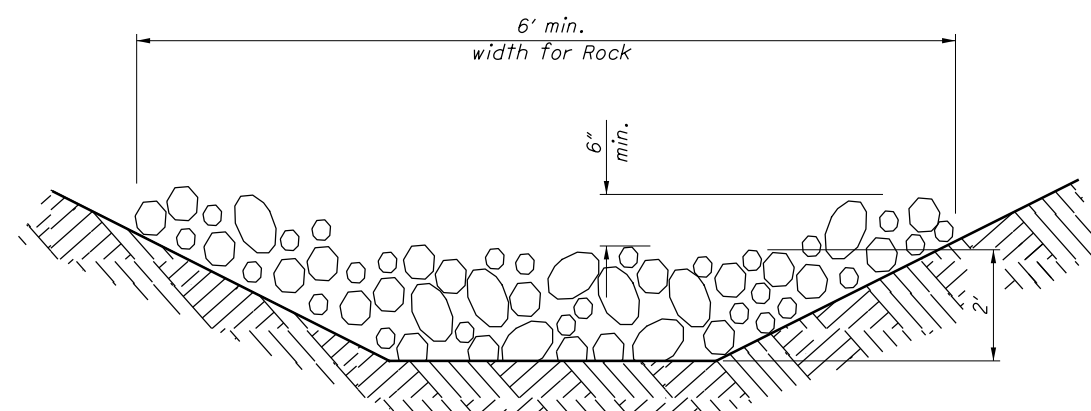
The Department will pay for accepted quantities at the prices shown in Appendix F of Supplemental Specification 832 (SS832) for the following items:

- 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.



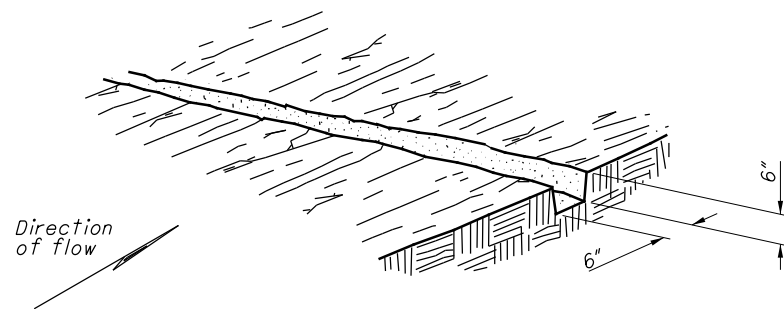
PROFILE VIEW OF FLAT BOTTOM AND V DITCH  
SECTION A-A



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

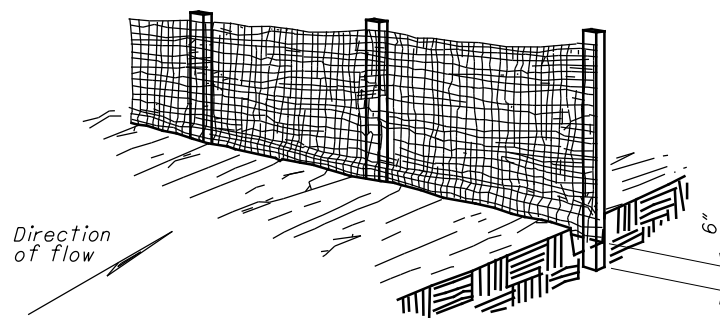
CROSS-SECTIONAL VIEW  
ROCK CHECK

# PERIMETER FILTER FABRIC FENCE



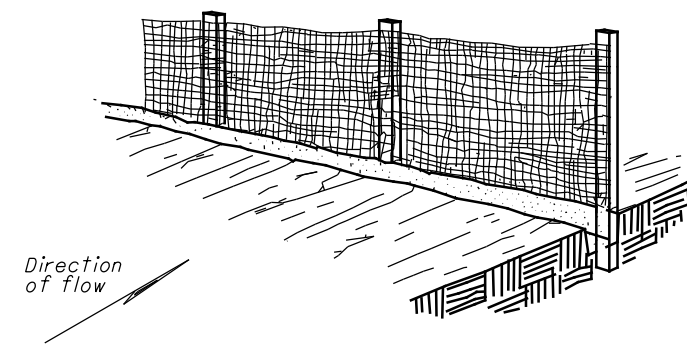
Excavate a 6"x6" trench along the proposed fence line.

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.

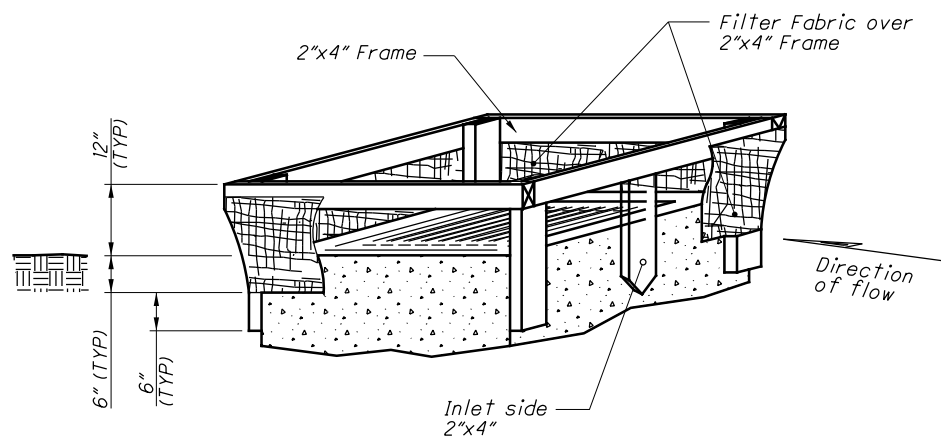
### PAYMENT:

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

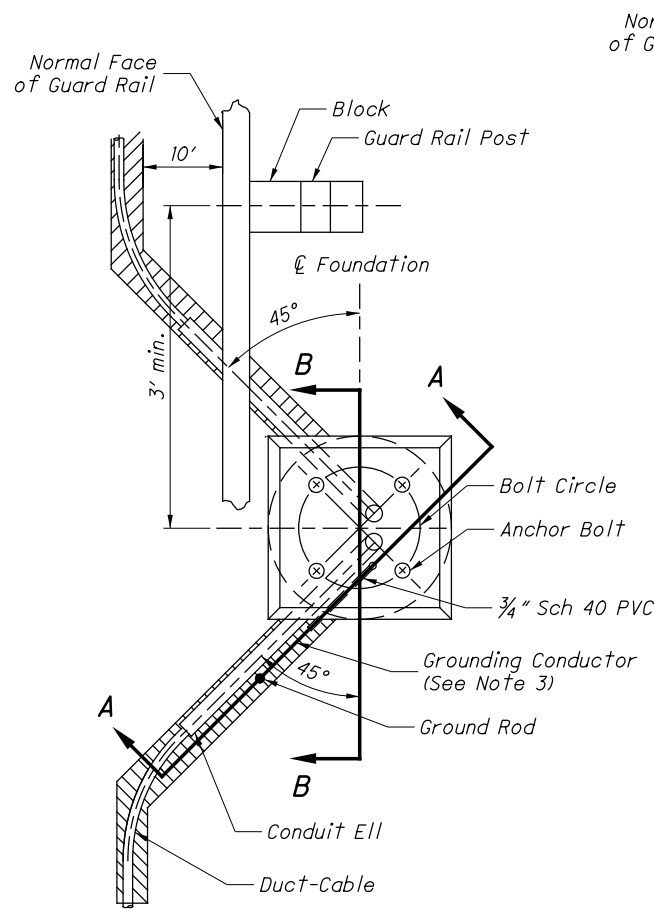
REVISIONS  
4-29-02  
7-19-02  
12-01-08  
4-17-09  
7-20-12

ROADWAY HYDRAULIC ENGINEER  
MATT COZZOLI

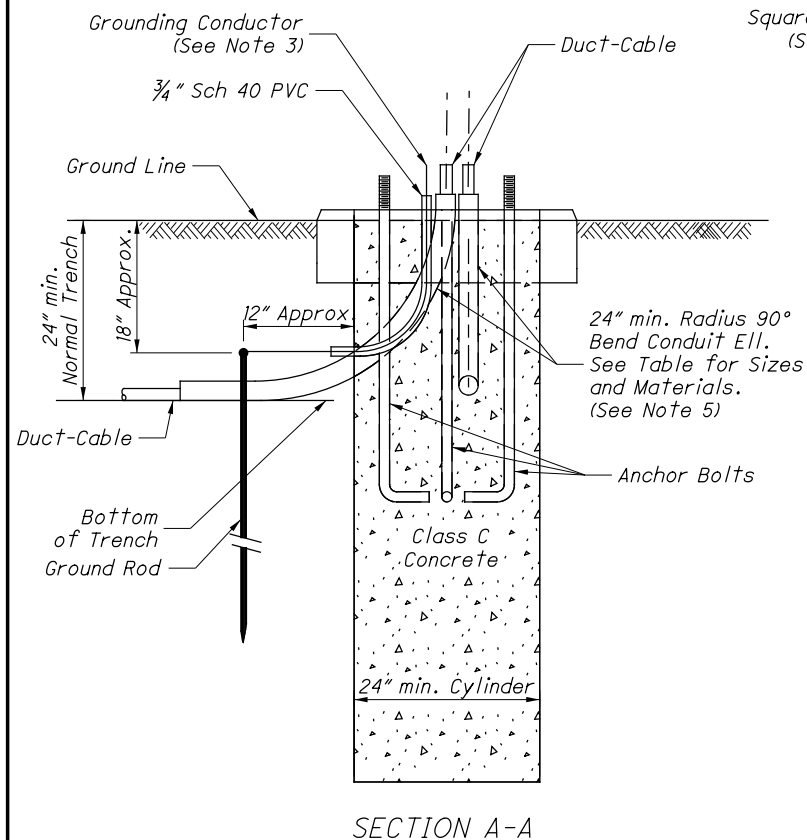
OFFICE OF HYDRAULIC ENGINEERING

STANDARD HYDRAULIC CONSTRUCTION DRAWING  
CONSTRUCTION EROSION CONTROL

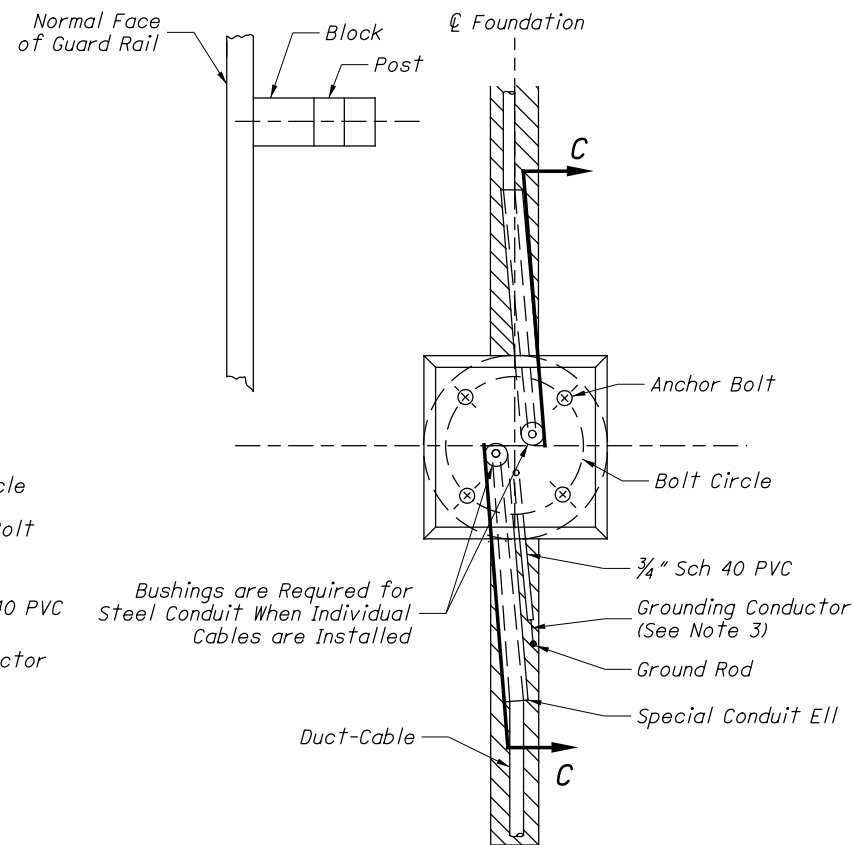
SCD NUMBER  
DM-4.4



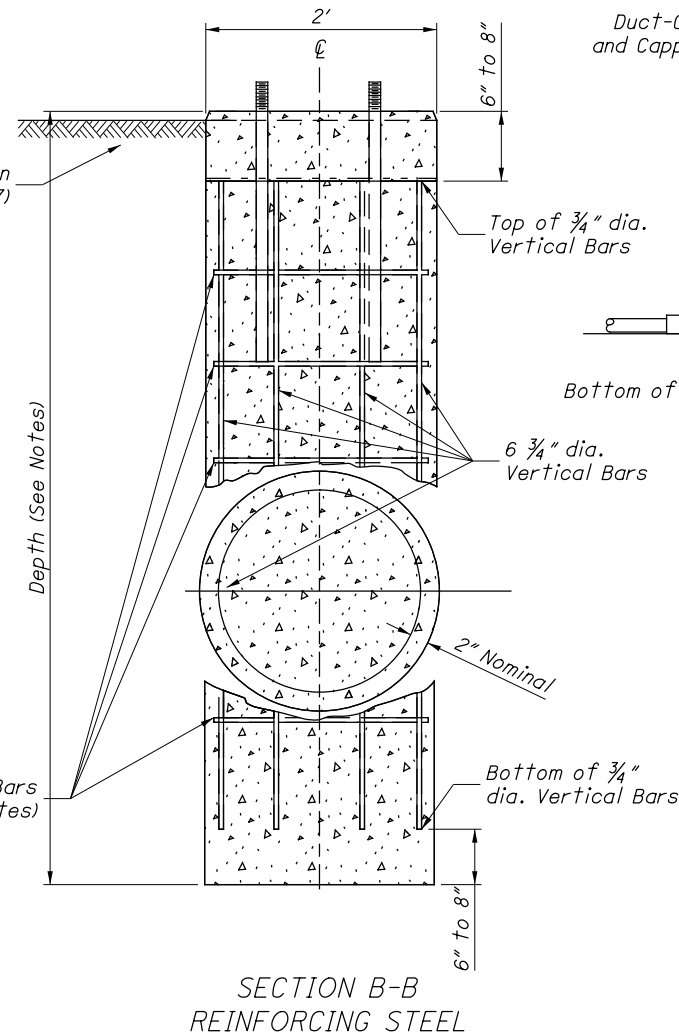
**ALTERNATE TRENCH ALIGNMENT**  
(Use as Directed by the Engineer)



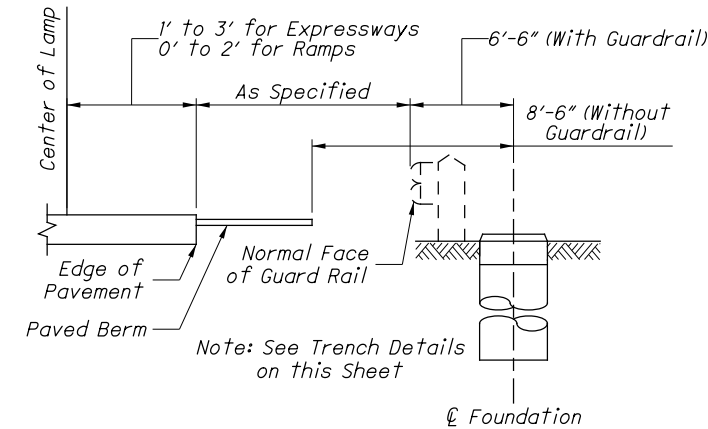
SECTION A-A



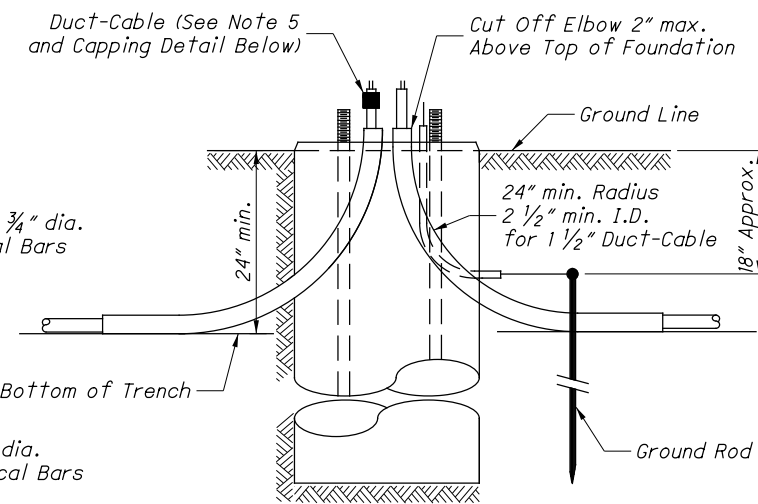
**NORMAL TRENCH ALIGNMENT**



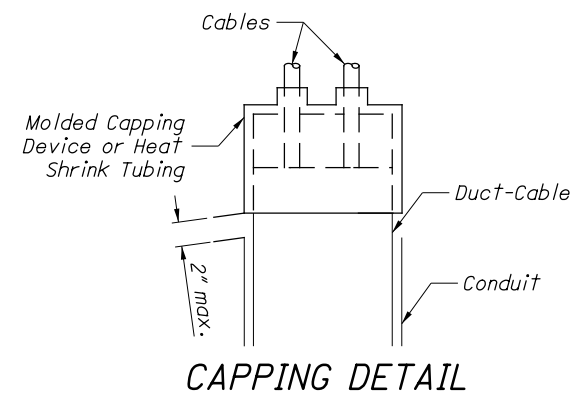
SECTION B-B  
REINFORCING STEEL



**NORMAL LOCATION OF LIGHT POLE FOUNDATION**



SECTION C-C  
(EXPANDED)



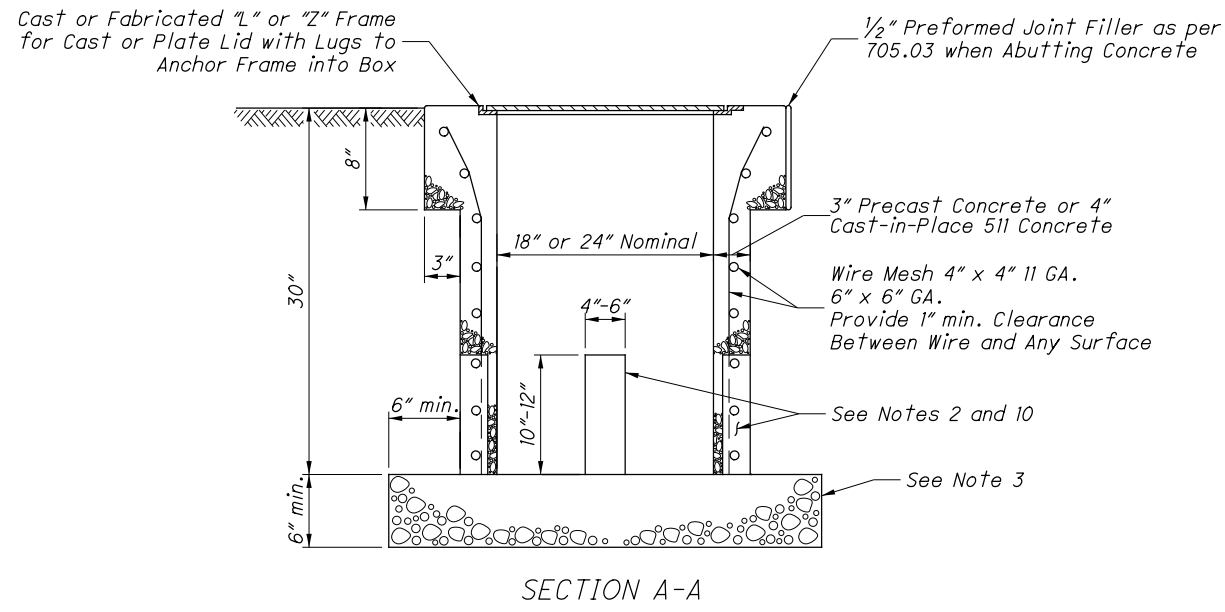
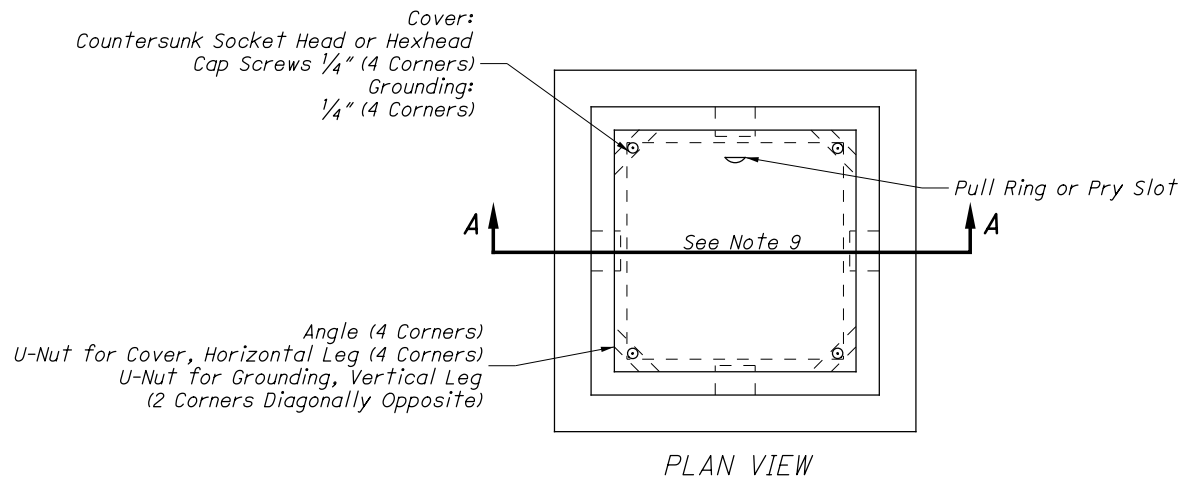
CAPPING DETAIL

**SPECIAL CONDUIT ELLS  
90° BEND IN INCHES**

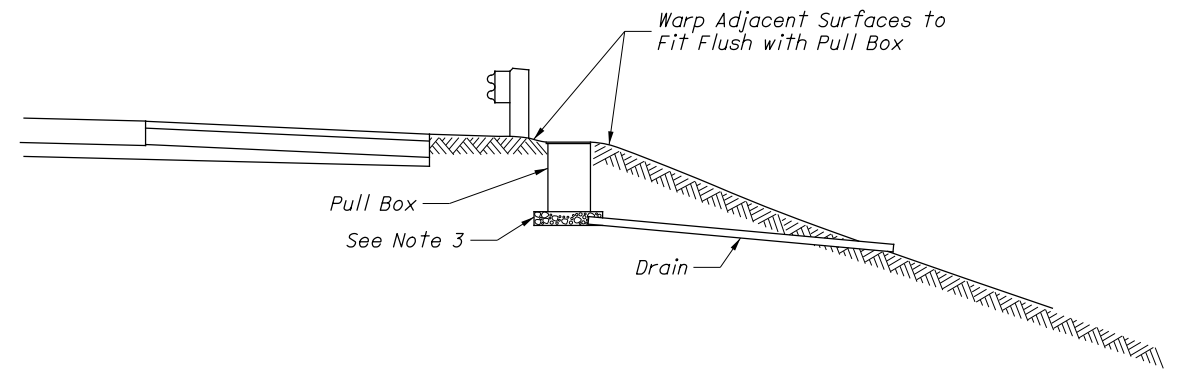
R = Bending Radius S = Straight Section Y = R+S	2", 2 1/2" & 3"		
	R	S	Y
	24	11	35
	30	11	41
	36	11	47
	42	12	54
	48	12	60

**NOTES:**

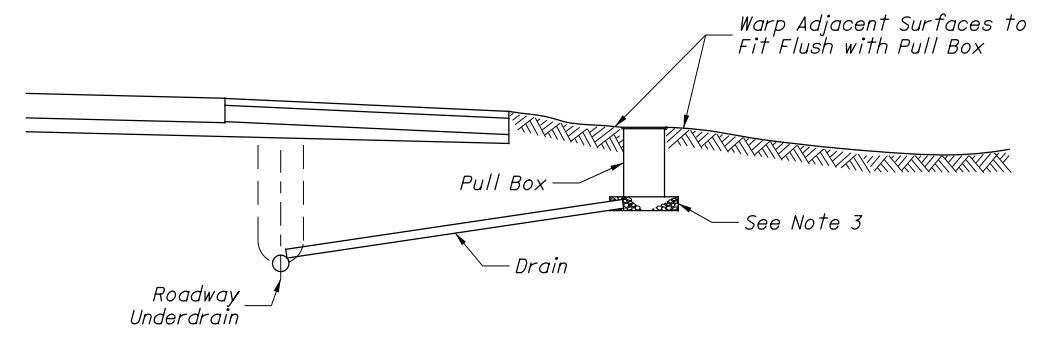
- Upslope side of foundation for pole with breakaway feature shall be flush with grade if pole is exposed to traffic.
- Minimum depth to be as follows:  
6' for poles having a support height of less than 40'.  
8' for poles having a support height 40' thru 44'.  
9' for poles having a support height 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.
- Grounding conductor shall be 4 AWG, insulated copper. Exothermically weld cable to ground rod, run free and through 3/4" 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.
- For anchor bolt data see SCD HL-10.13, Pole Base Details.
- 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.
- 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.
- Squared section in top 6" of foundation is required only when foundation is in tree lawn or contiguous to or in paved surround.



PORTLAND CEMENT CONCRETE PULLBOX



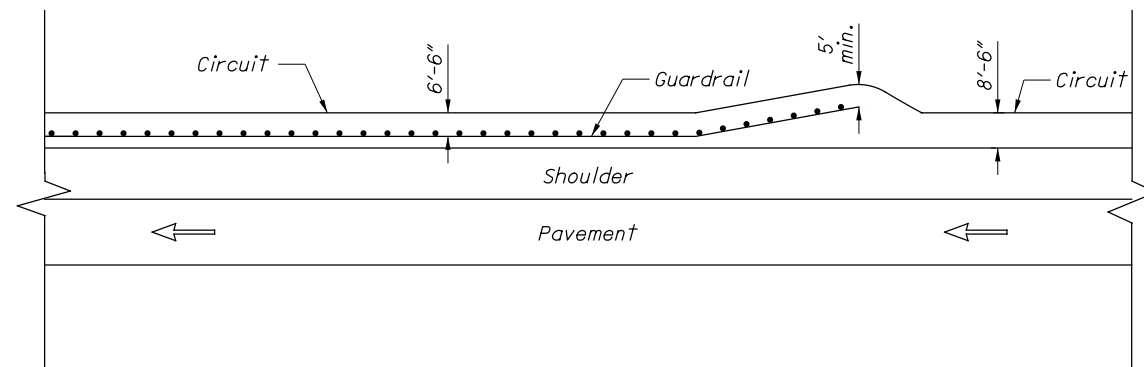
INSTALLATION WITH INDEPENDENT DRAIN



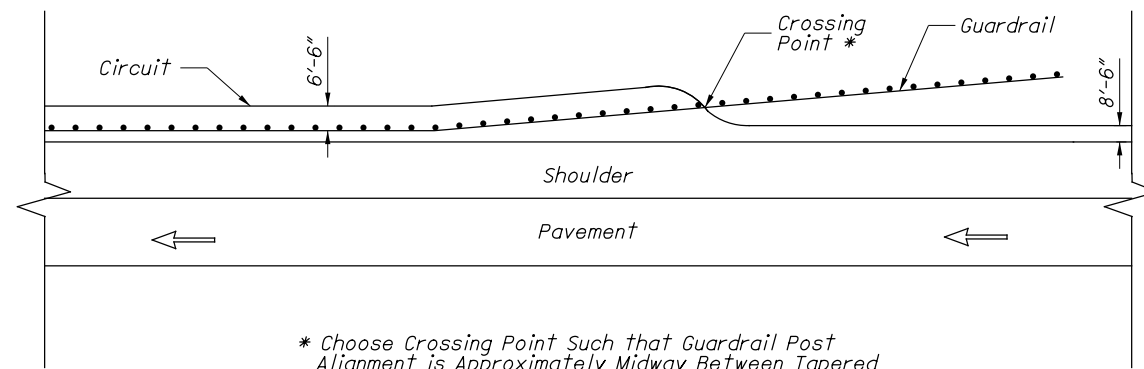
INSTALLATION WITH CONNECTION TO  
ROADWAY UNDERDRAIN

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.



CIRCUIT LOCATION WITH GUARDRAIL

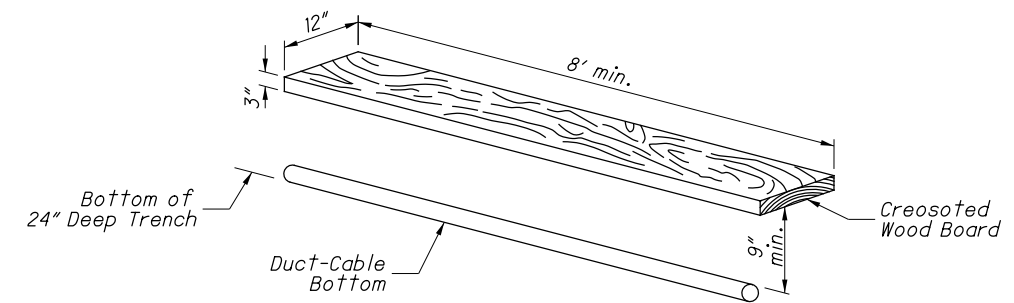


\* Choose Crossing Point Such that Guardrail Post Alignment is Approximately Midway Between Tapered Trench Alignment and Normal Trench Alignment

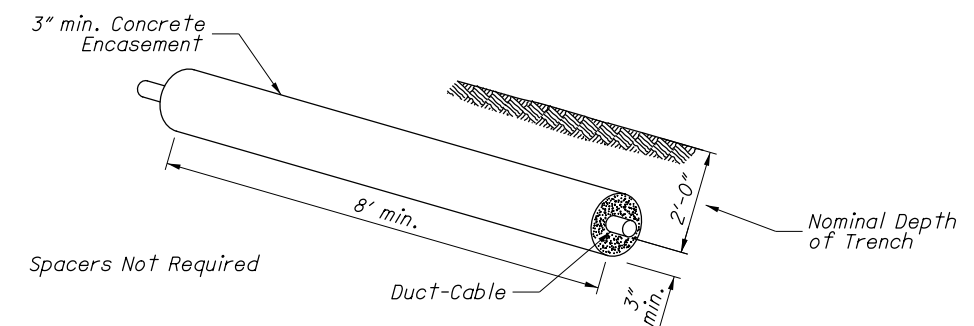
ALTERNATE CIRCUIT LOCATION WITH GUARDRAIL

NOTES:

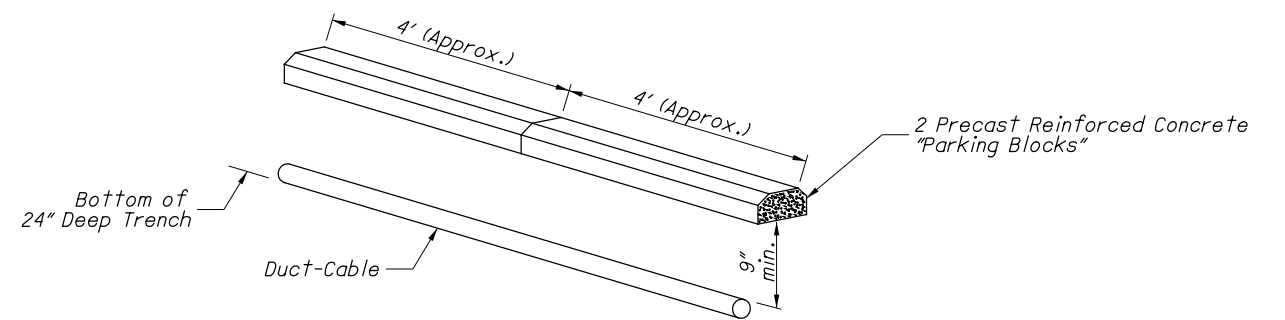
1. Payment for protection of duct-cable and distribution cable under guardrail, as determined in methods 1 thru 3, shall be included in the unit prices bid for the affected cable.



METHOD NO. 1



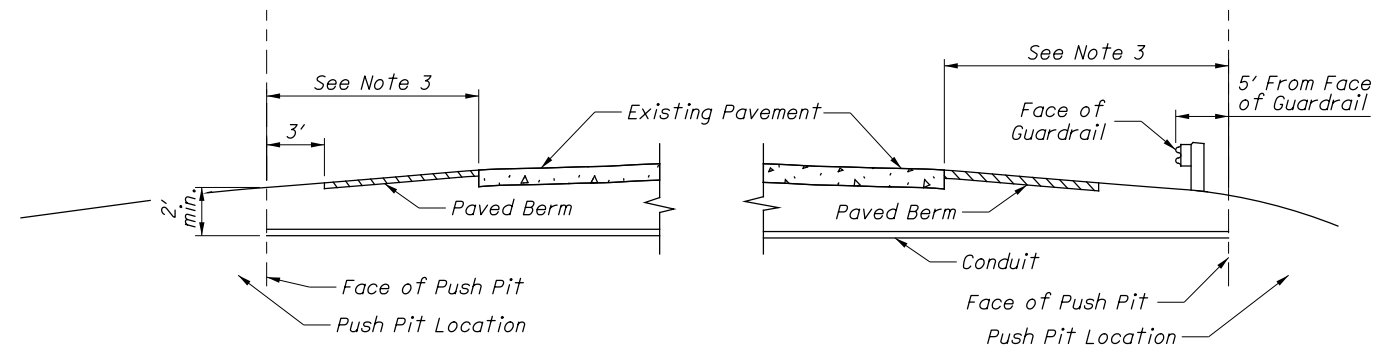
METHOD NO. 2



METHOD NO. 3

METHODS OF PROTECTING DUCT-CABLE

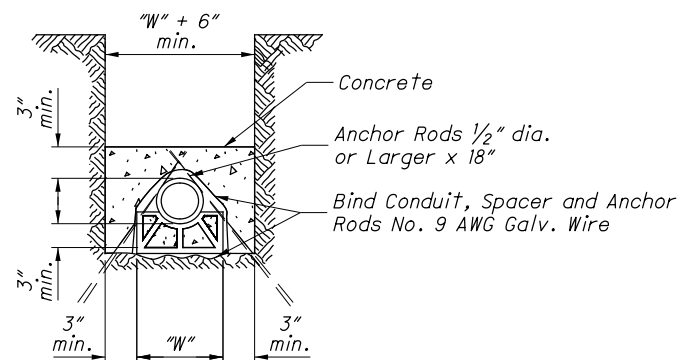
(See Note 1)



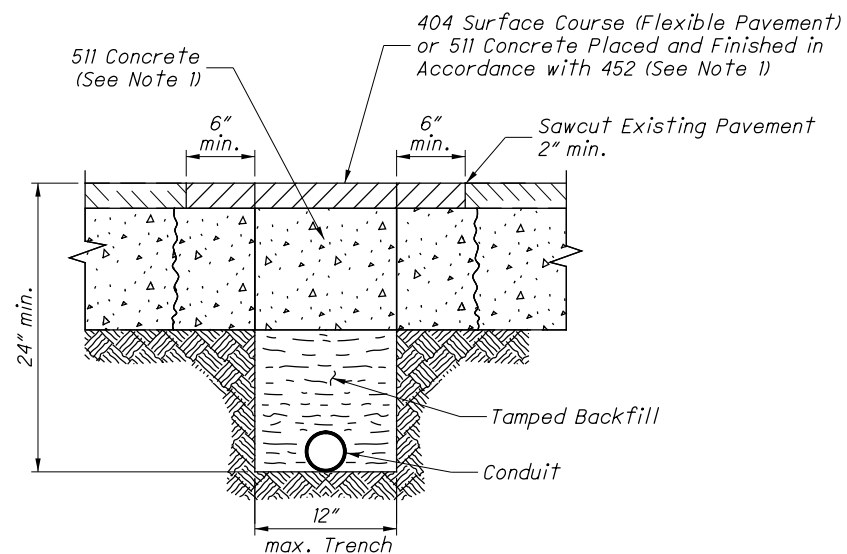
CONDUIT JACKED UNDER PAVEMENT

NOTES:

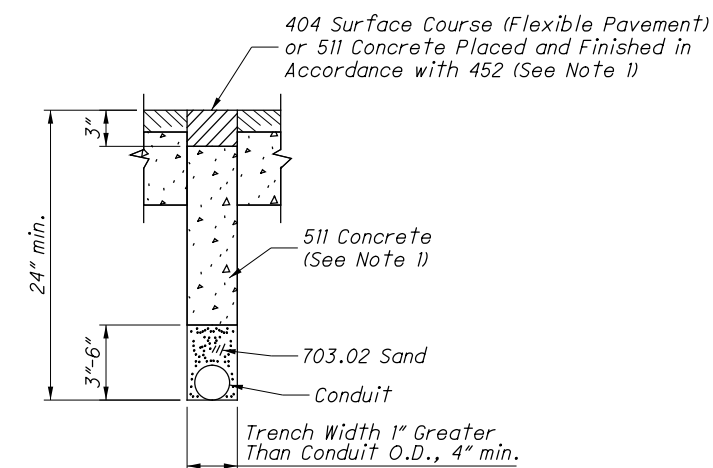
1. Replacement of disturbed flexible pavement shall consist of a CMS 511 concrete subcourse with a 404 surface course. Replacement of rigid pavement shall consist of a 511 concrete course with surface finished in accordance with 452.
2. Restore disturbed facilities and surfaces to a condition equal to that existing before the work started.
3. When undermining shoulder areas that do not have paved berms, provide  $\frac{3}{4}$ " thick steel surface plates, corrugated pipe sleeves, shoring or other approved means to prevent cave-in.
4. When conduit is jacked or drilled under divided pavements, cable may be installed in a trench through the median area when specified in the plans.



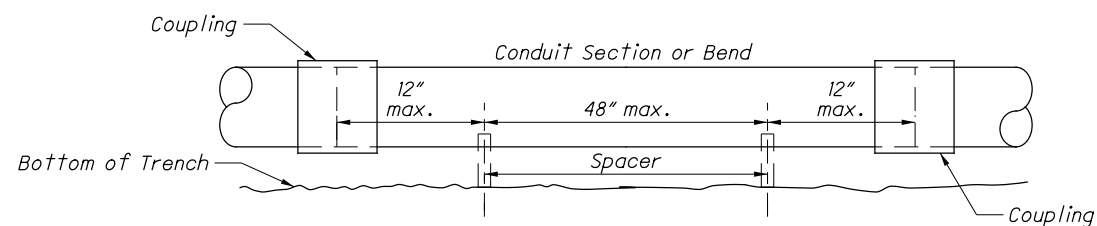
TRENCH SECTION



"T" TRENCH IN PAVED AREA

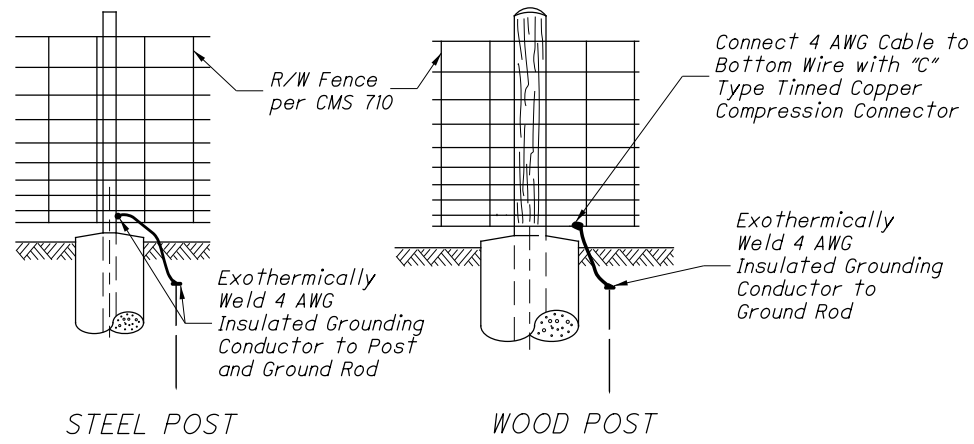


NARROW SLIT TYPE TRENCH IN PAVED AREA



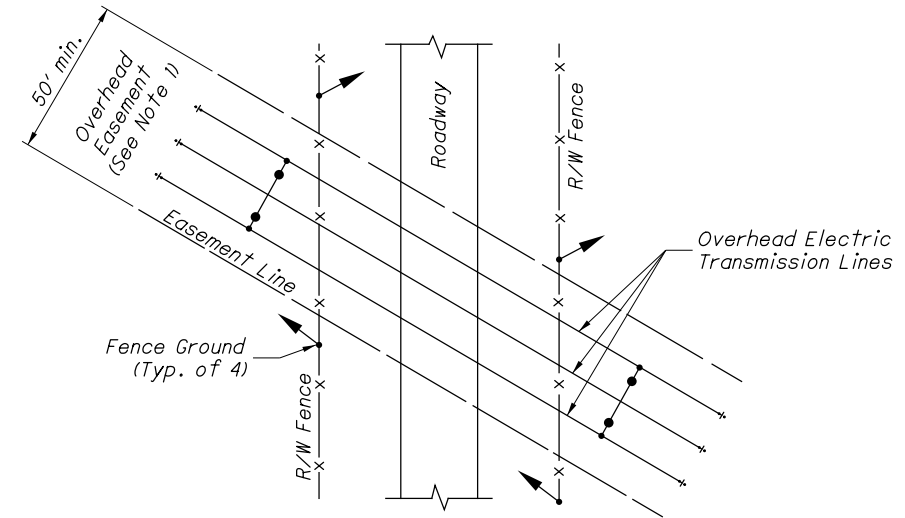
SIDE ELEVATION

CONCRETE ENCASED CONDUIT



**R/W FENCE GROUND**

When Specifically Noted on the Plans, and in Notes 1, 2, and 3, R/W Fences Shall be Grounded as Shown Above. Also see Note 4.



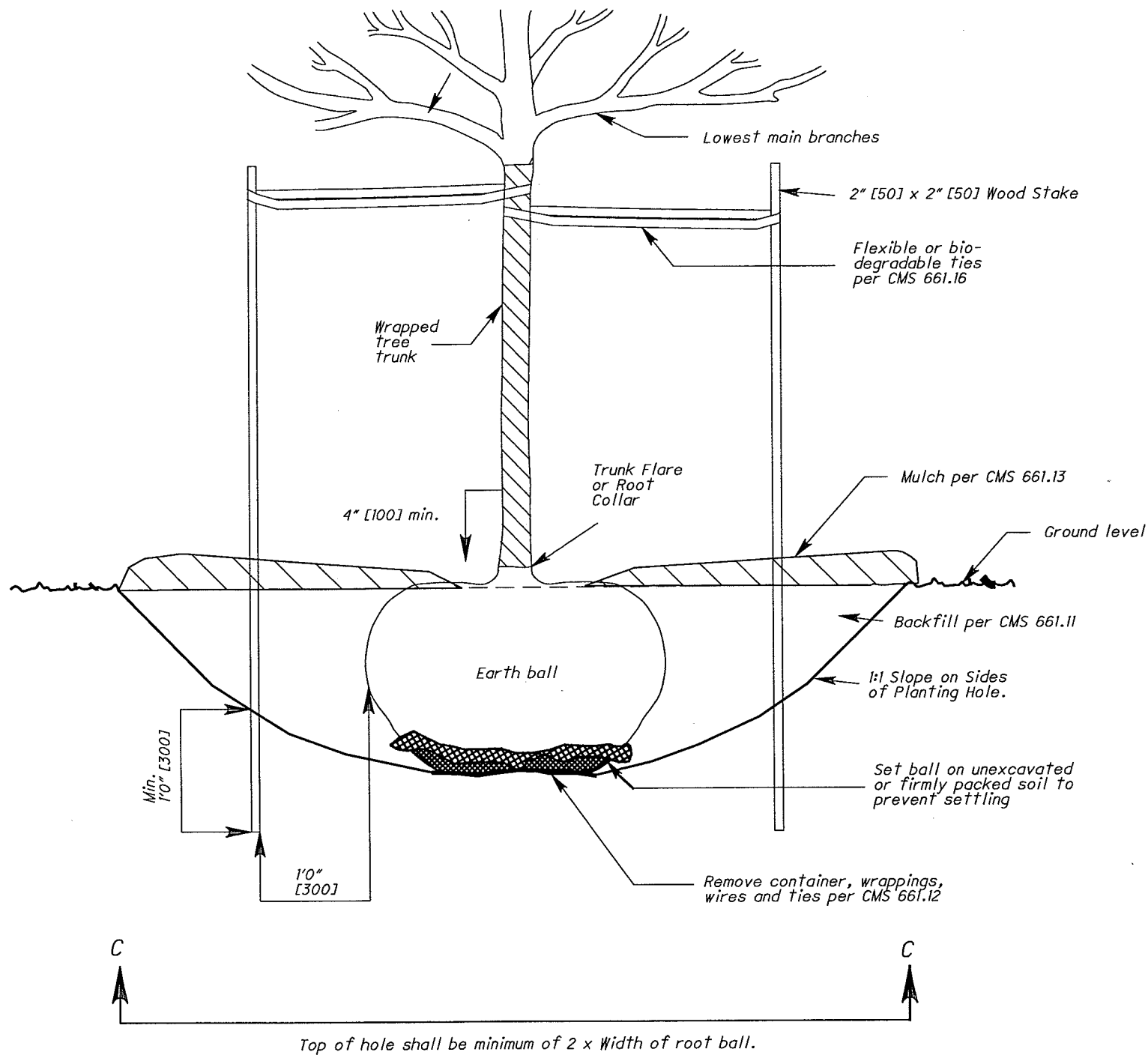
**FENCE GROUNDS AT TRANSMISSION LINES CROSSING**

**NOTES:**

1. Where overhead transmission line easements 50' or more in width cross a fenced roadway right-of-way, each fence shall be grounded as shown hereon.
2. Where overhead electric power line easements less than 50' in width cross a fenced roadway right-of-way, each fence shall be grounded directly below the centerline of the power line crossing.
3. Where overhead transmission lines rated 110 KV or higher are parallel to roadway fences and the transmission line easement is contiguous to the roadway right-of-way the roadway fences shall be grounded at least every 300'.
4. Fence grounds will be paid for at the unit price bid for CMS 625, Ground Rod.
5. Apply two coats of insulating varnish over exothermic welds and exposed cable.



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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.

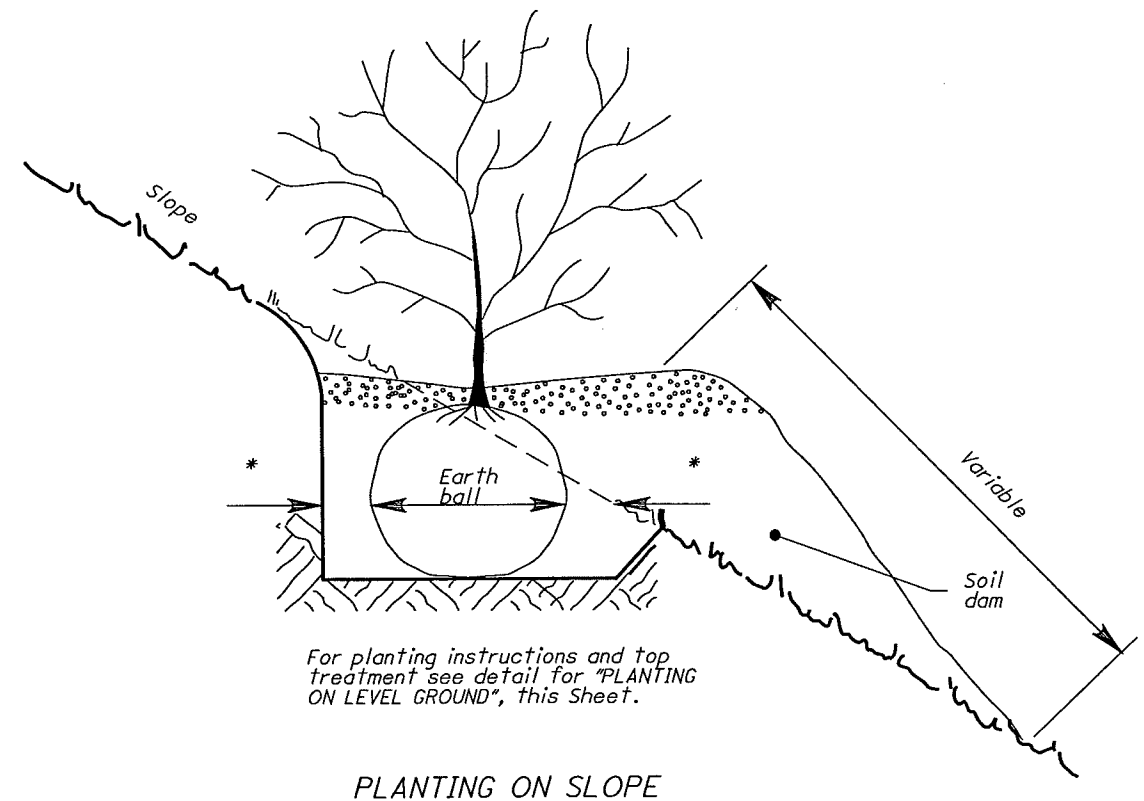
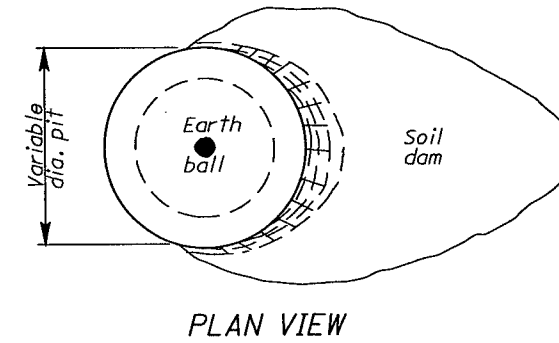
Pit diameter and depth shall vary with the type and size of the plant, the soil type and other site conditions.

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 loose fitting, (not girdle the trunk) 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.



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.

SCD NUMBER

LA-1.2

STANDARD ROADWAY CONSTRUCTION DRAWING

PLANTING AND BRACING

OFFICE OF ROADWAY ENGINEERING

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

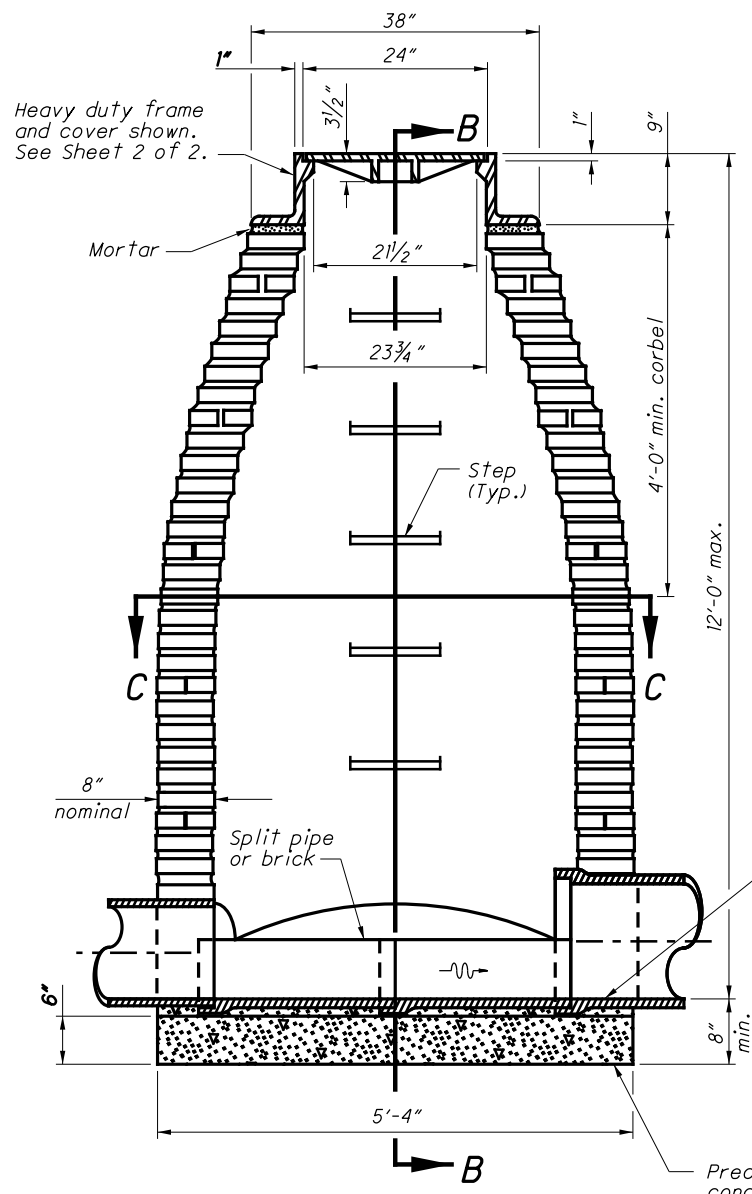
STD. ENGINEER

D. Focke

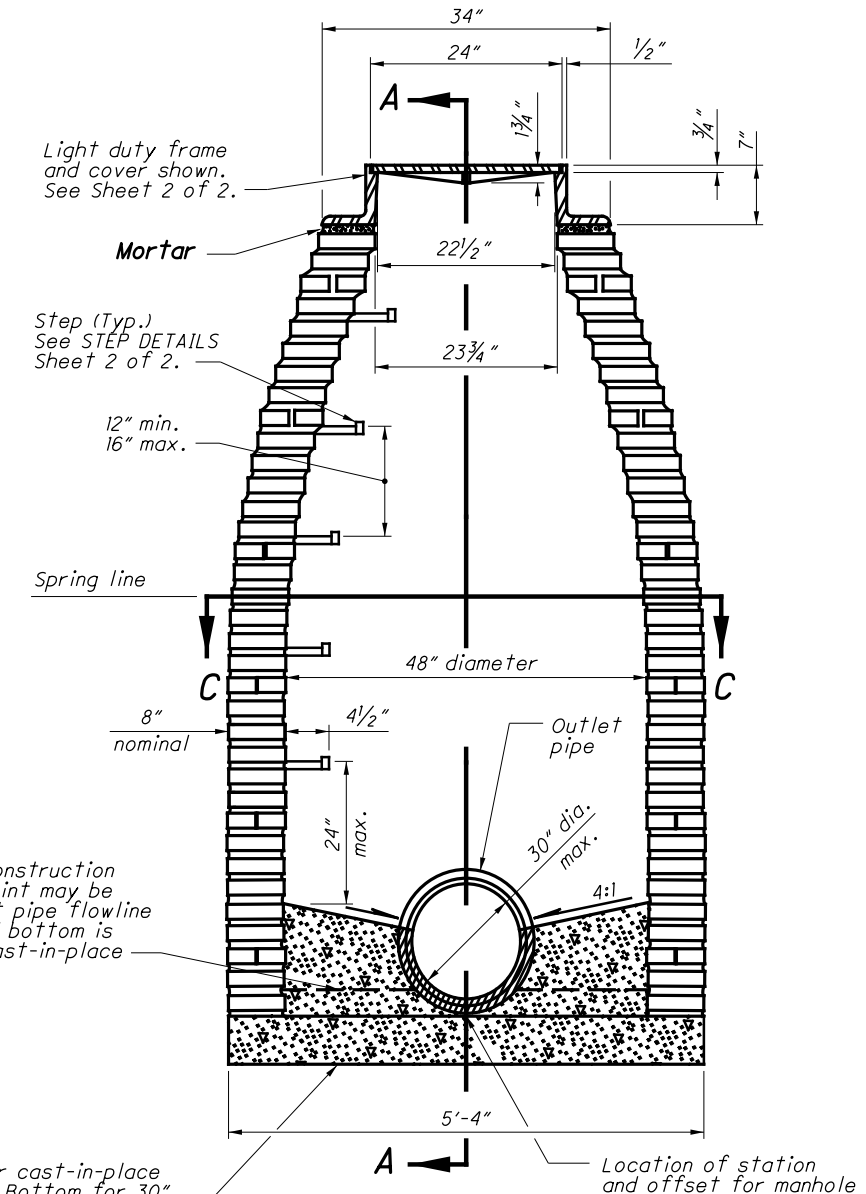
STATE OF OHIO DEPARTMENT OF TRANSPORTATION

DATE 1-16-09

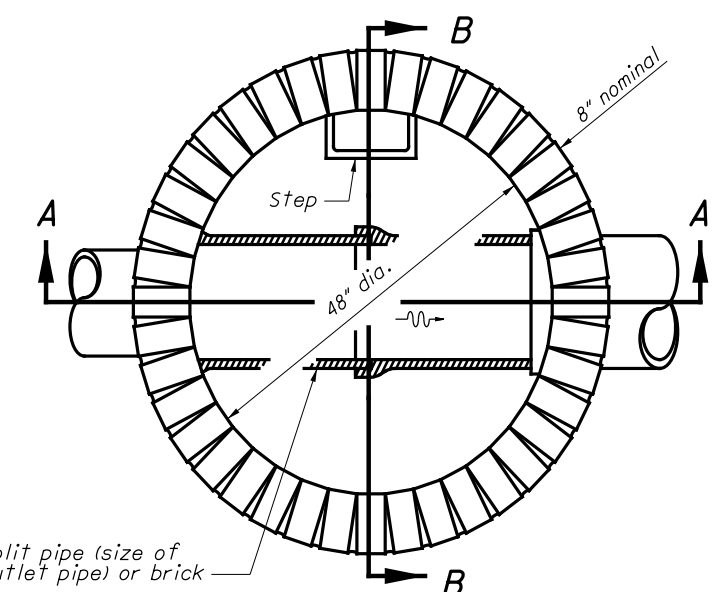
ADMINISTRATOR Dick B. Gross



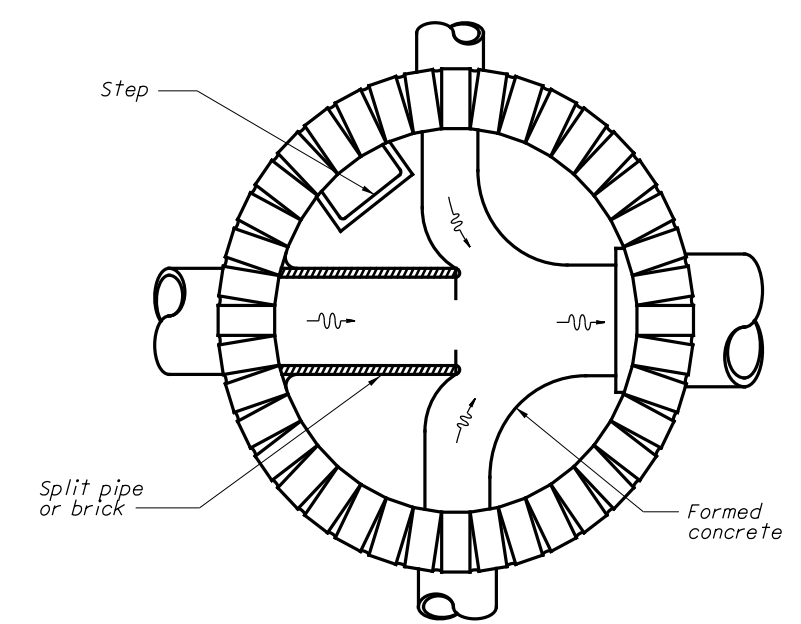
SECTION A-A



SECTION B-B



SECTION C-C



SECTION BELOW SPRING LINE SHOWING METHOD OF TURNING SIDE DRAINS

NOTES

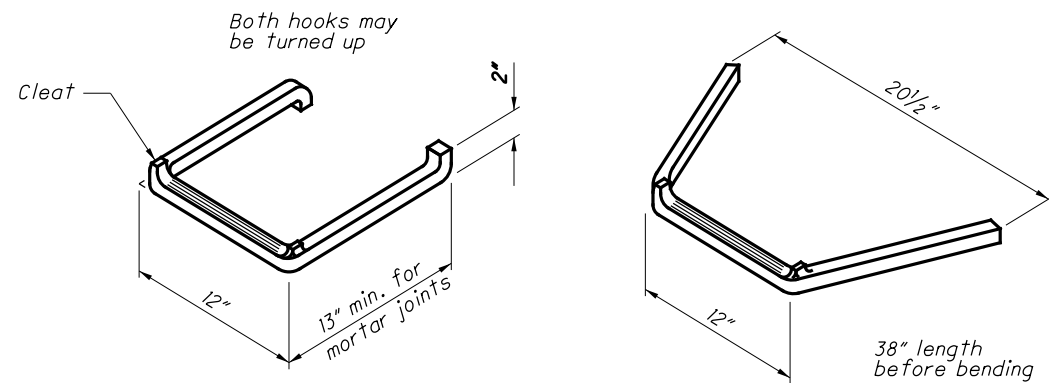
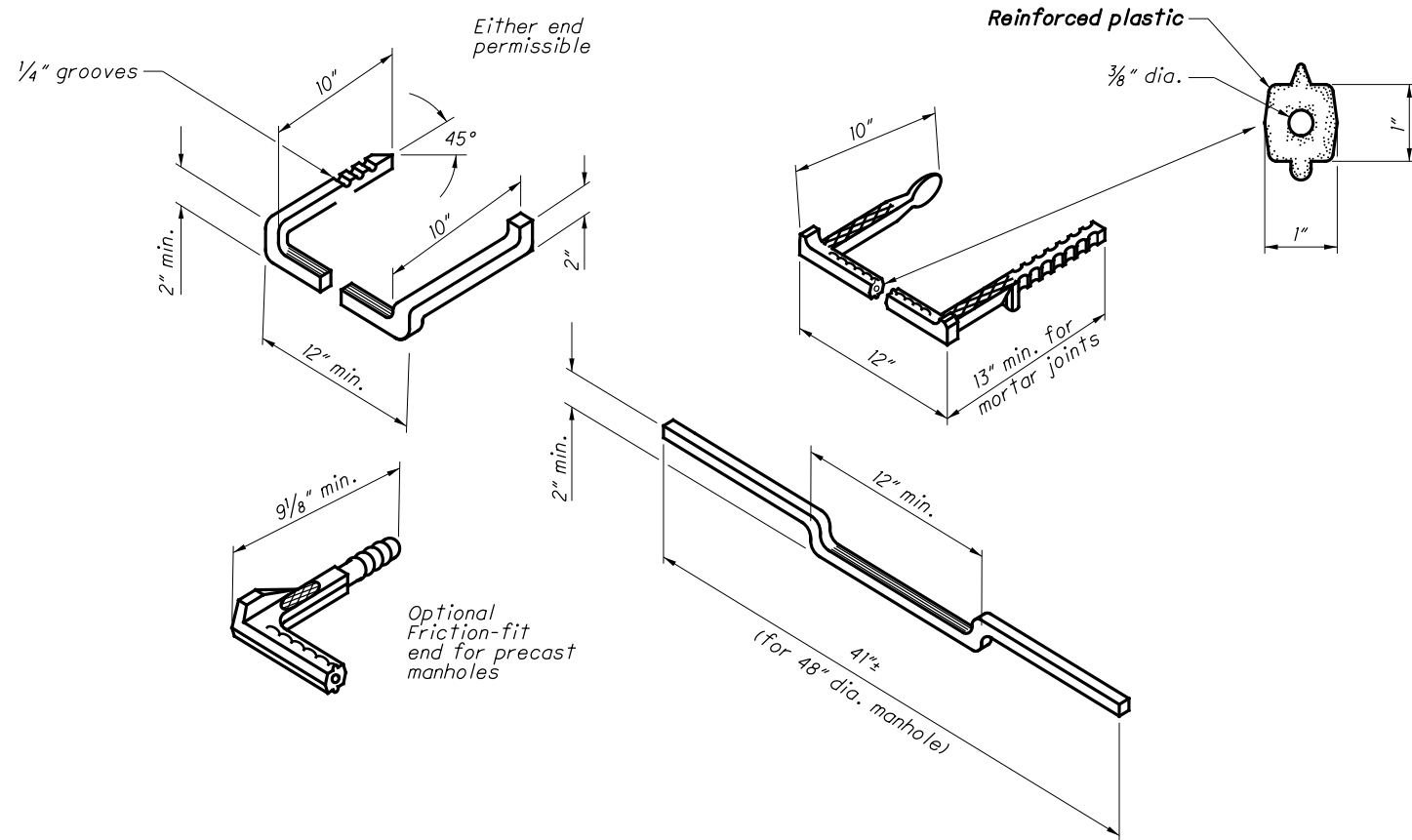
**CONSTRUCTION:** Manhole No. 1 is for sewers 30" diameter or less. The design shown is for brick construction with every sixth course a stretcher course. The 6" bottom may be precast or cast-in-place concrete. Build the bottom channel section with concrete and line it with split pipe or brick, except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

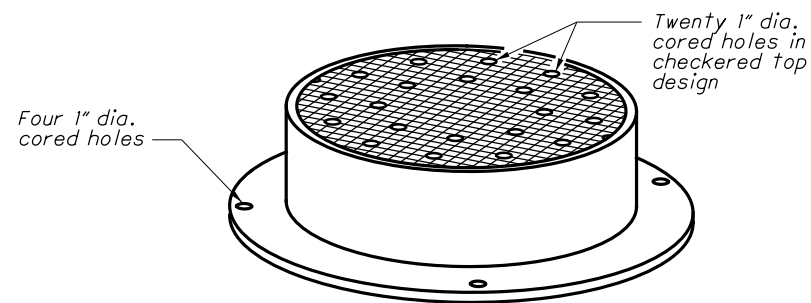
**FRAME, COVER, AND STEPS:** See Sheet 2 of 2 for these notes.

Precast or cast-in-place concrete. Bottom for 30" sewer on SCD MH-1.3 may be used.  
 Construction joint may be at pipe flowline if bottom is cast-in-place  
 Location of station and offset for manhole

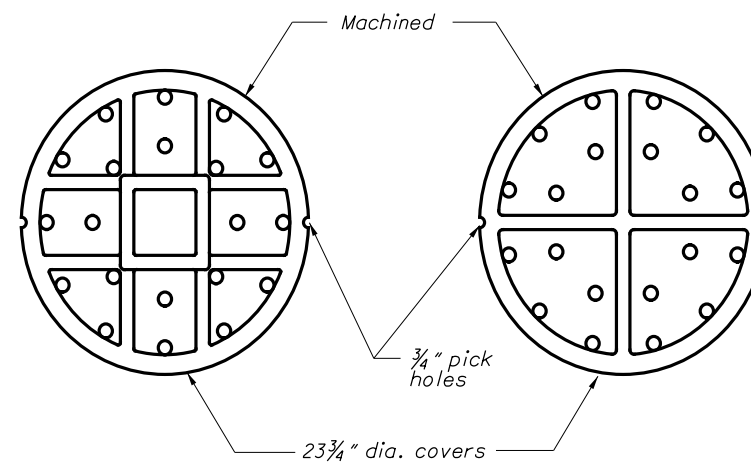


Steps have a minimum cross sectional dimension of 1" for ferrous metal 3/4" for aluminum.

**STEP DETAILS**



**FRAME & COVER**



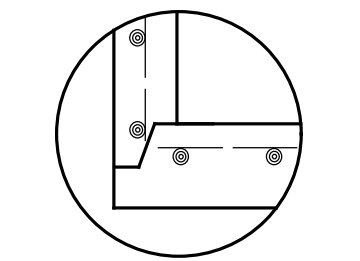
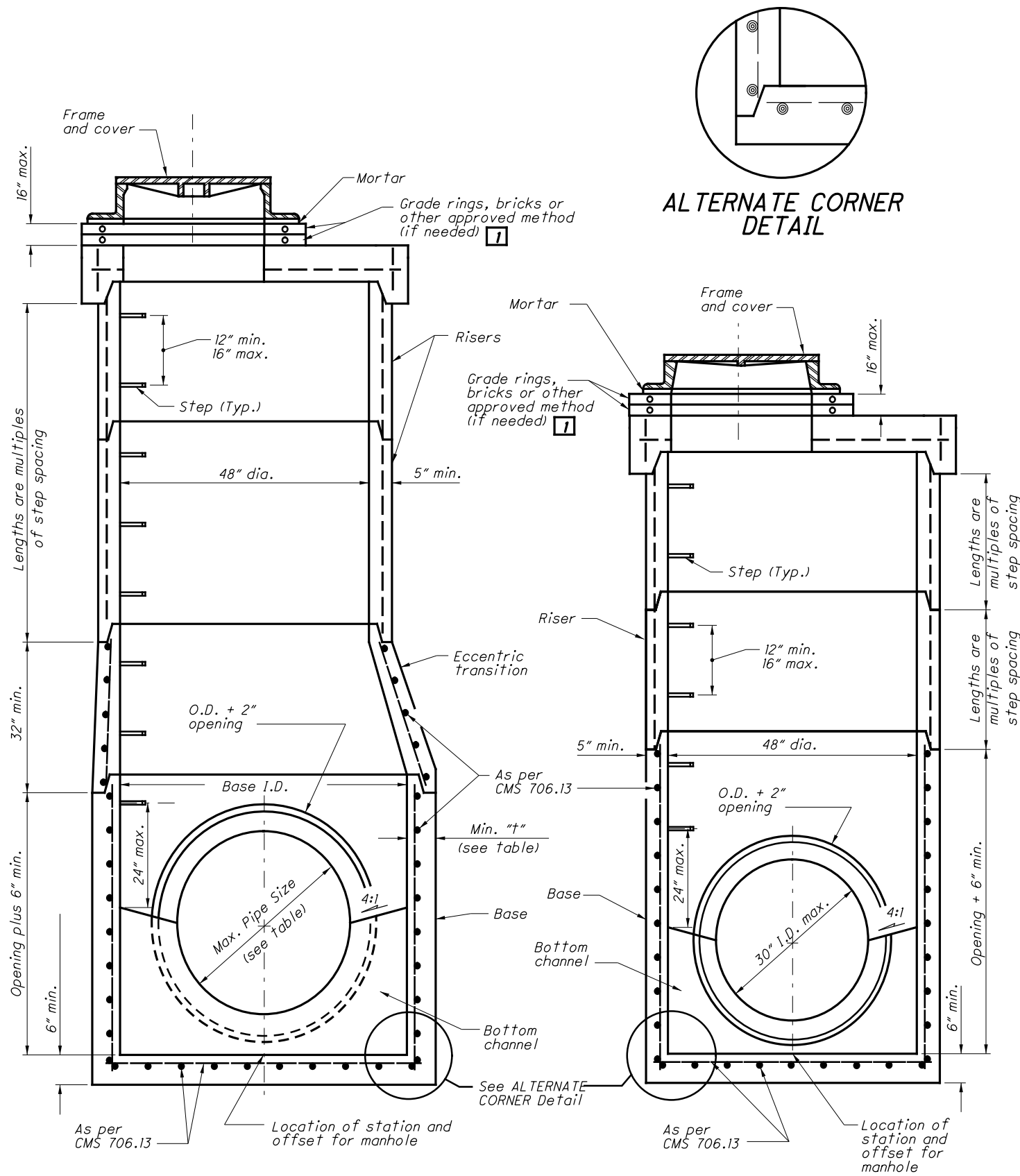
**HEAVY DUTY LIGHT DUTY  
COVERS - BOTTOM VIEW**

**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.



ALTERNATE CORNER DETAIL

60" to 108" PRECAST BASE  
SEE TABLE FOR MAXIMUM PIPE SIZES

48" PRECAST BASE  
FOR 30" AND SMALLER PIPE

SECTION VIEWS OF REINFORCED PRECAST MANHOLES

NOTES

**GENERAL:** With normal soil and site conditions, this standard precast manhole may be used for any required manhole depth. Cast and assemble sections of the precast manhole with either all tongue or all groove ends up. Lift holes may be provided in each section for handling. Leave handling device for the flat slab in place.

**TOP:** Provide a flat slab for this section unless an eccentric cone is specified.

**TRANSITION (OR REDUCER):** This section can be either eccentric cone or flat slab.

**BASE:** Manhole No. 3 is shown with a monolithic floor and riser which may be cast in one or two operations. A permissible alternate is to cast and ship the floor and barrel separately. Provide openings for inlet and outlet pipes, either when the unit is cast or later, to meet project requirements. Bottom channels may be formed of concrete, precast in the base or field constructed as shown on SCD MH-1.1 and MH-3.1.

**RISER SECTIONS:** Openings for 18" and smaller inlet pipes may be either prefabricated or cut in the field provided the sides of the pipe at the springline do not project into the manhole.

**CONNECTIONS:** Connections between precast manhole sections and pipes on sanitary sewers may be sealed with resilient connectors conforming to ASTM C 923.

**JOINT SEAL:** Furnish resilient seal between precast manhole sections on sanitary sewers and flexible gasket joints per CMS 706.11.

**OPENINGS:** The maximum pipe opening is the O.D. of the pipe being supplied plus 2" when fabricated or field cut. Fill any voids per CMS 601.

**MATERIALS:** Provide materials for bases and other precast sections, including reinforcement not specified here, that meet the requirements of CMS 706.13.

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

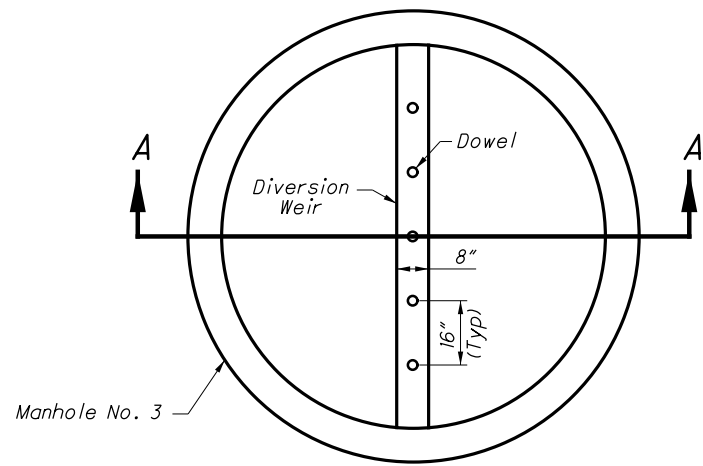
**STEPS, FRAMES AND COVERS:** Meet the requirements shown on SCD MH-1.1.

**TOP SLAB REBAR:** Use epoxy coated reinforcing steel within the top slab.

LEGEND

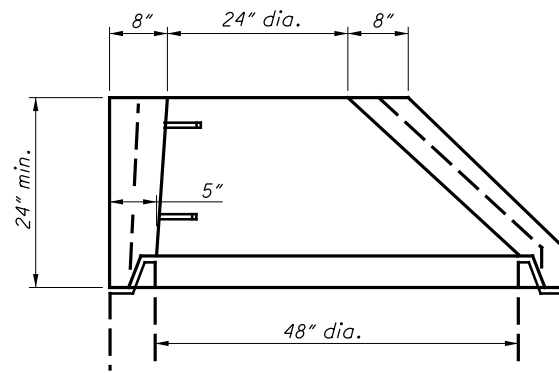
**1** Reconstruction to grade only. Approved materials are kept on file by the Office of Materials Management.

MAXIMUM PIPE SIZES		
BASE I.D.	MIN. #"	MAX. PIPE SIZE
60"	5"	36"
72"	6"	48"
84"	7"	54"
90"	7½"	60"
96"	8"	66"
108"	9"	72"

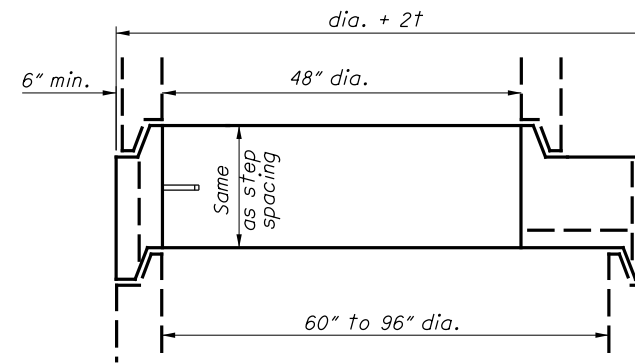


Manhole No. 3

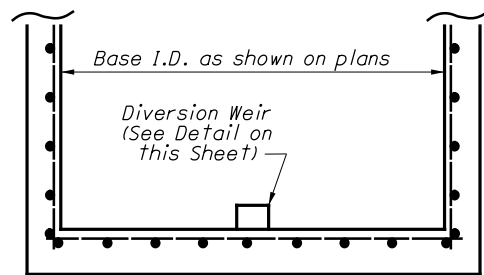
**MANHOLE NO. 3 W/  
\_\_\_" BASE I.D. AND \_\_\_" WEIR**  
(NTS)



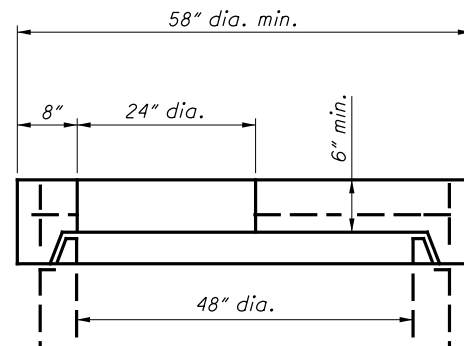
**ALTERNATE  
ECCENTRIC CONE TOP**  
(Only if specified)



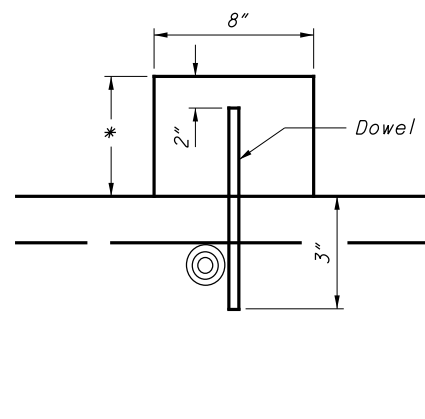
**FLAT SLAB TRANSITION**



**SECTION A-A**  
(NTS)

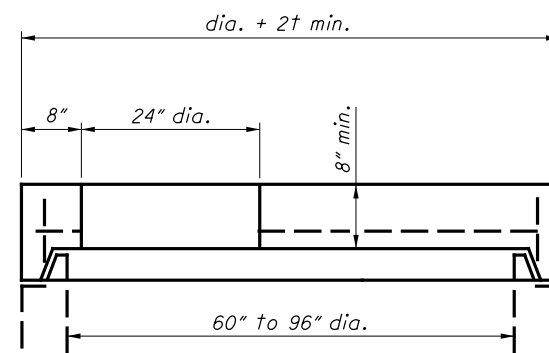


**FLAT SLAB TOP**



\* Furnish weir height as shown in plans.

**DIVERSION WEIR DETAIL**  
(NTS)



**FLAT SLAB TOP**

**NOTES**

**MANHOLE NO. 3 W/ \_\_\_" BASE I.D. AND \_\_\_" DIVERSION WEIR:**  
Furnish manhole base with precast diversion weir or construct diversion weir from Structural Concrete, 4000 psi compressive strength concrete or Brick and Masonry Units conforming to CMS 611. A bottom channel section for the manhole is not required when a diversion weir is specified on the plans.

Place diversion weir perpendicular to flow of inflowing trunk sewer. Dowel concrete or masonry units into the base of the manhole to a depth of 3" using epoxy coated #4 reinforcing bars. Start dowels at the center of the diversion weir and space 16" on center across the entire weir.

All materials and labor, including excavation and backfill, are paid for at the contract price for **ITEM 611 - MANHOLE NO. 3 WITH \_\_\_" BASE I.D. AND \_\_\_" DIVERSION WEIR.**

STATE OF OHIO DEPARTMENT OF TRANSPORTATION	STATE HYDRAULIC ENGINEER
REVISIONS	
7-20-01	
7-19-02	
7-15-06	
7-20-06	
7-20-12	
1-18-13	
ROADWAY HYDRAULIC ENGINEER	STATE HYDRAULIC ENGINEER
Matt Cozzoli	
OFFICE OF HYDRAULIC ENGINEERING	
STANDARD HYDRAULIC CONSTRUCTION DRAWING	MANHOLE No. 3
SCD NUMBER	MH-1.2
	2 / 2



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 channelization, 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 1) 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 1 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.

SD NUMBER

MT - 95.60

CLOSURE OF TWO-WAY LEFT TURN LANE

OFFICE OF ROADWAY ENGINEERING

STATE ENGINEER Stargell

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

Michael Blune ADMINISTRATOR

7-19-2013 DATE

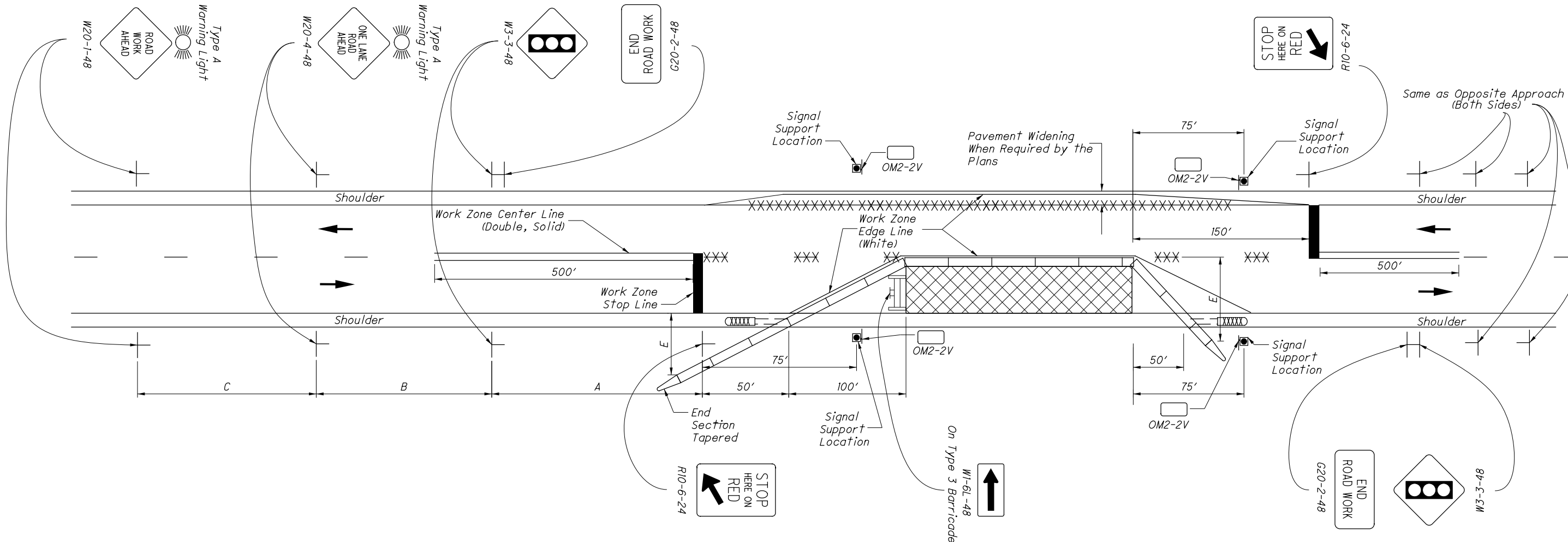


TABLE I (SIGN SPACING)

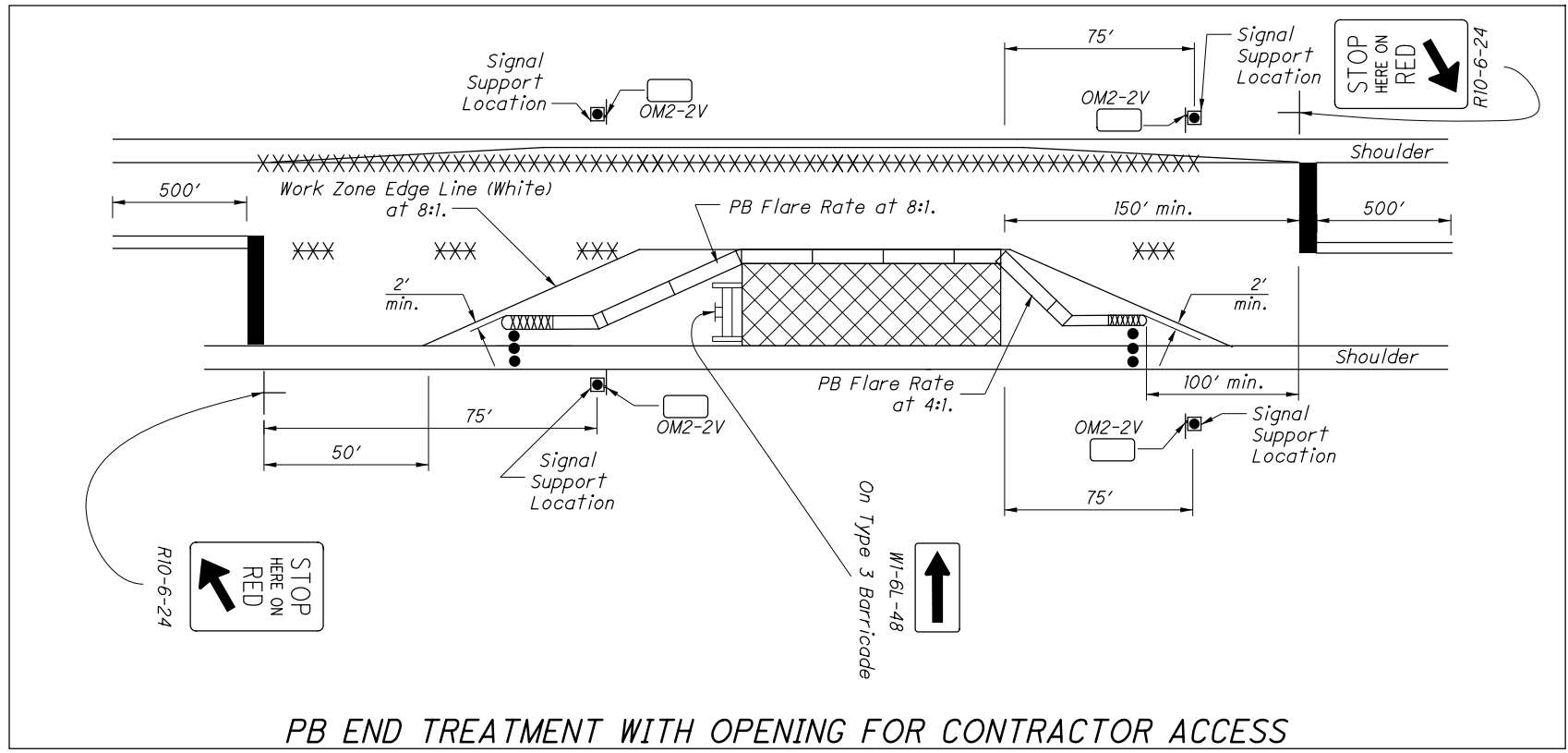
DISTANCE (FT)	A	B	C
URBAN (< 40 MPH)	100	100	100
URBAN (> 45 MPH)	350	350	350
RURAL	500	500	500

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

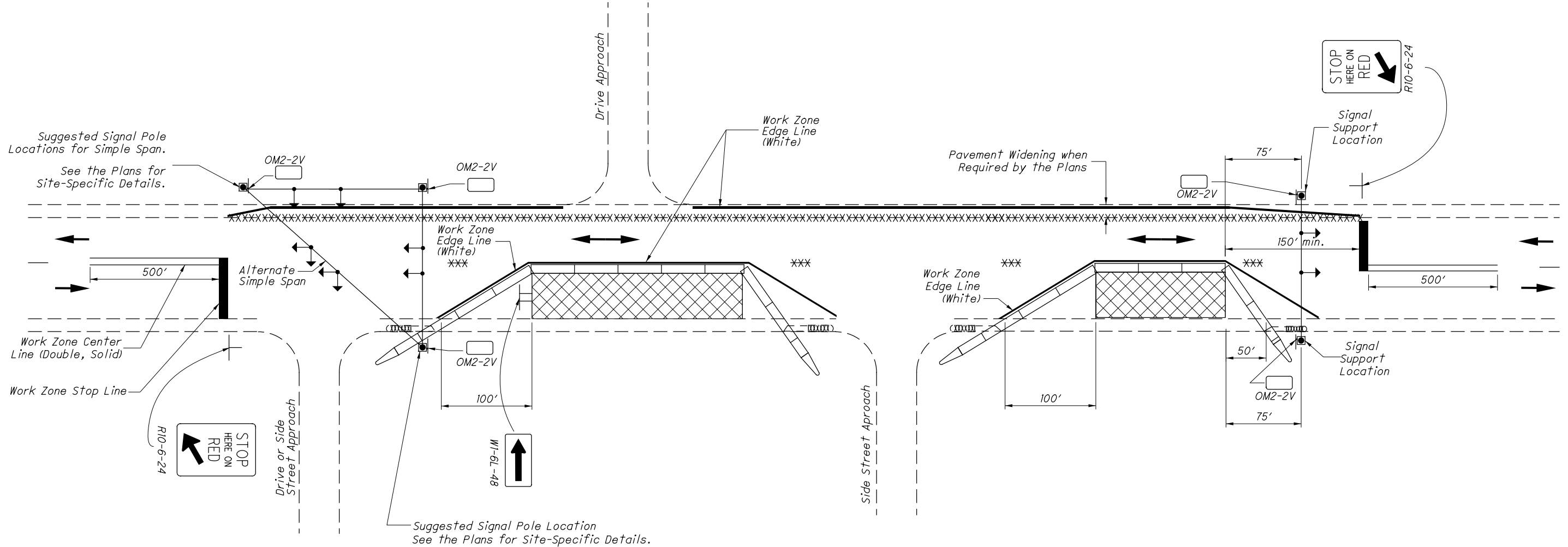


PB END TREATMENT WITH OPENING FOR CONTRACTOR ACCESS

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



Suggested Signal Pole Locations for Simple Span.  
See the Plans for Site-Specific Details.

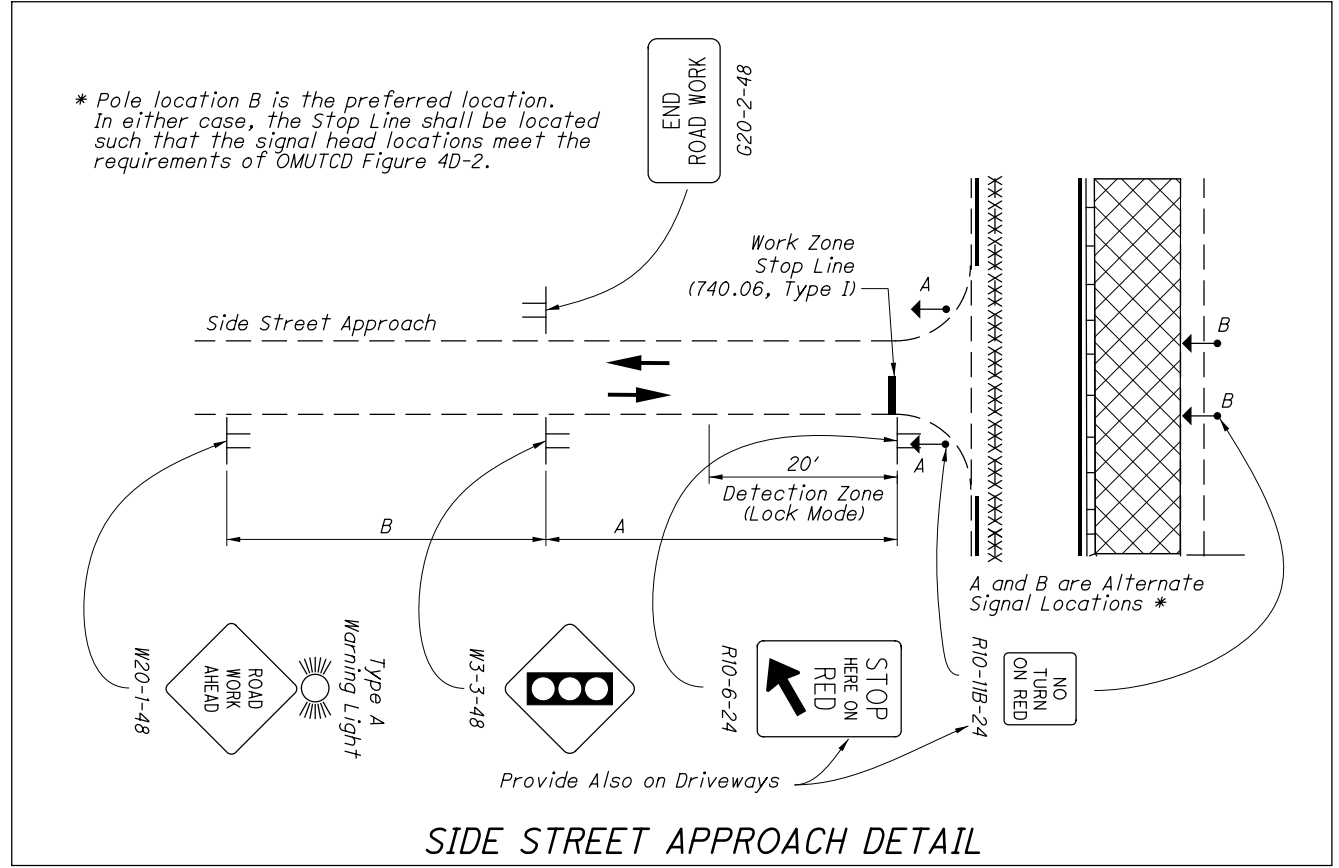


Suggested Signal Pole Location  
See the Plans for Site-Specific Details.

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	



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

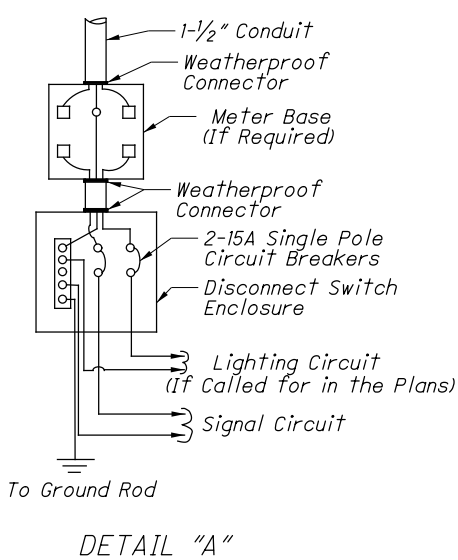
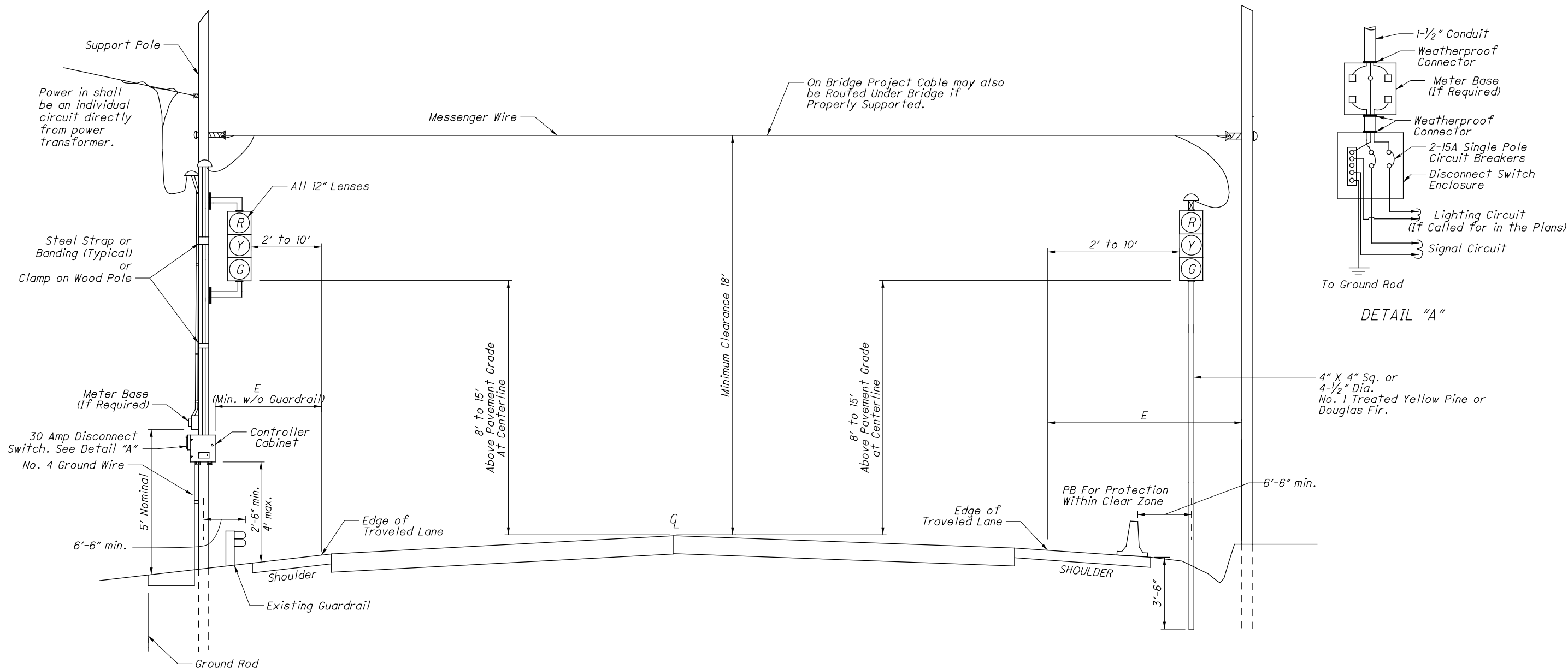
- 9. Type A flashing warning lights shown on the ROAD WORK AHEAD (W20-1) signs and on the ONE LANE ROAD AHEAD (W20-4) signs are required whenever a night lane closure is necessary.

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.



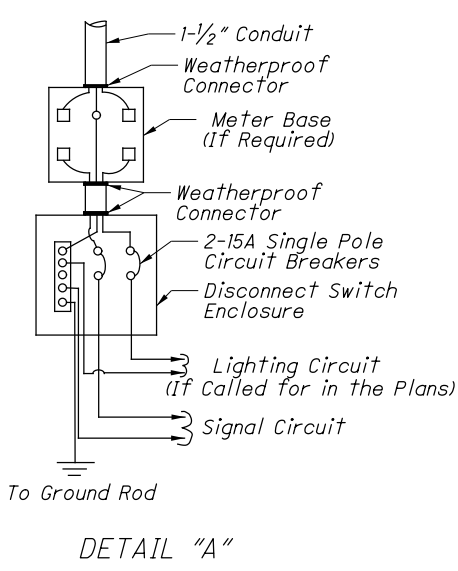
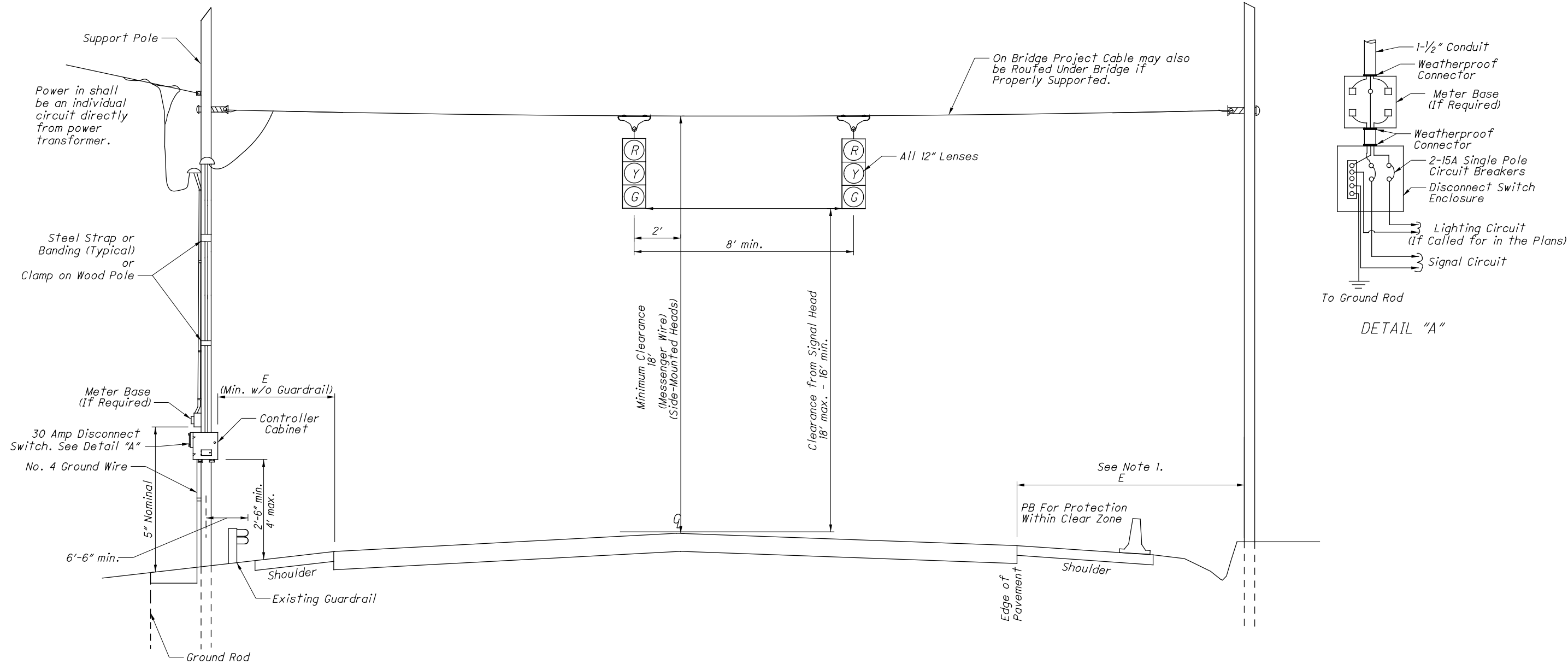
**NOTES:**

- 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".
- On bridge projects, cable may be routed under bridge as follows:
  - Cable within reach of pedestrians shall be placed in conduit.
  - Cable runs without conduit shall be supported at 10' intervals.
- Imbedded loop detectors shall not be used for concrete or asphalt unless the surface is to be resurfaced as part of this work.
- 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.
- 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.

ALL RED				ALL RED				ALL RED				ALL RED							
01G	01Y	02G	02Y	03G	03Y	04G	04Y	05G	05Y	06G	06Y	07G	07Y	08G	08Y	09G	09Y	10G	10Y
TWO-PHASE ACTUATED PHASING								PHASING FOR ACTUATED SIDE-STREET APPROACHES											

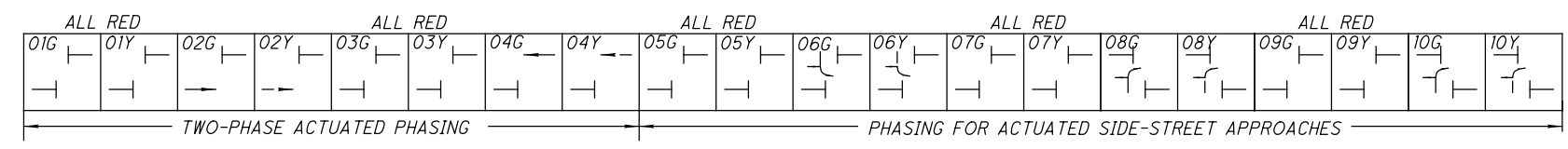
When called for in the plans, even-numbered phases shall be the green phases and shall be actuated by detectors at approach to the work zone. Odd-numbered phases shall be dummy phases to time all red interval. Timing initializes on phase one.

DETAIL "B"  
TYPICAL SIGNAL PHASING  
SIDE-MOUNTED SIGNAL HEADS



**NOTES:**

- 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".
- On bridge projects, cable may be routed under bridge as follows:
  - Cable within reach of pedestrians shall be placed in conduit.
  - Cable runs without conduit shall be supported at 10' intervals.
- Imbedded loop detectors shall not be used for concrete or asphalt unless the surface is to be resurfaced as part of this work.
- 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.
- 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**

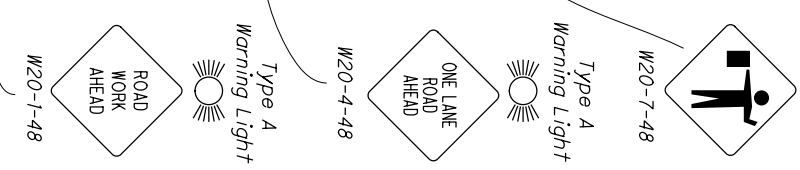
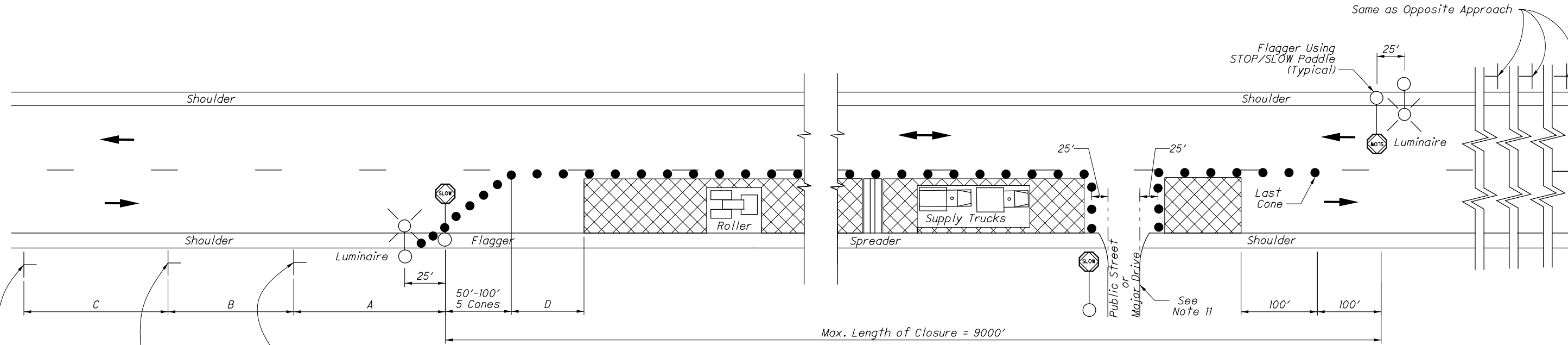


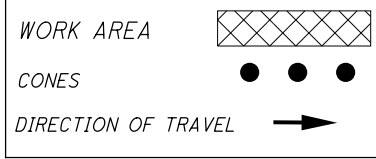
TABLE I (SIGN SPACING)

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



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. If 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.*

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)

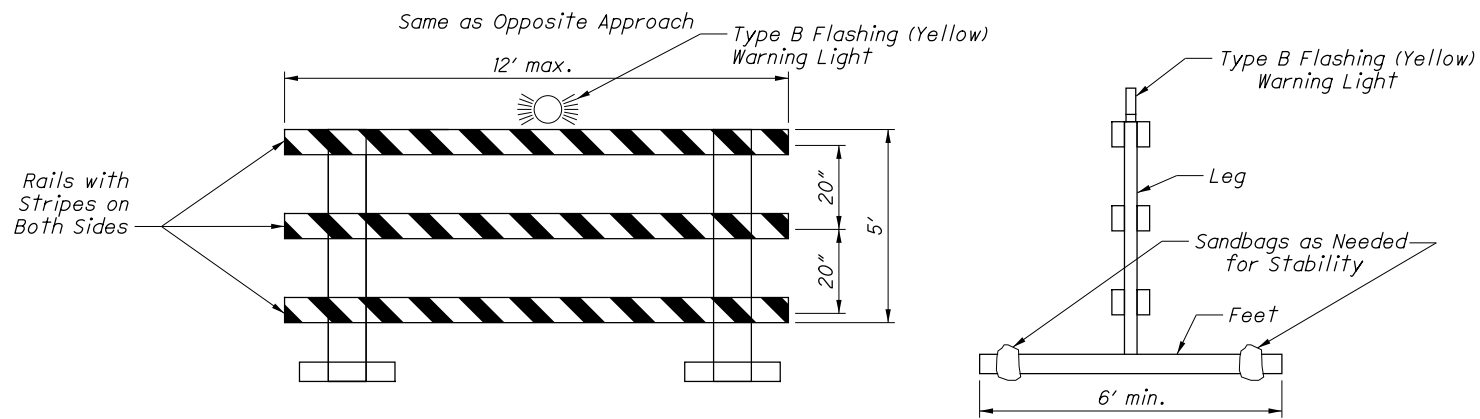
OFFICE OF ROADWAY ENGINEERING

STATE ENGINEER  
Stargell

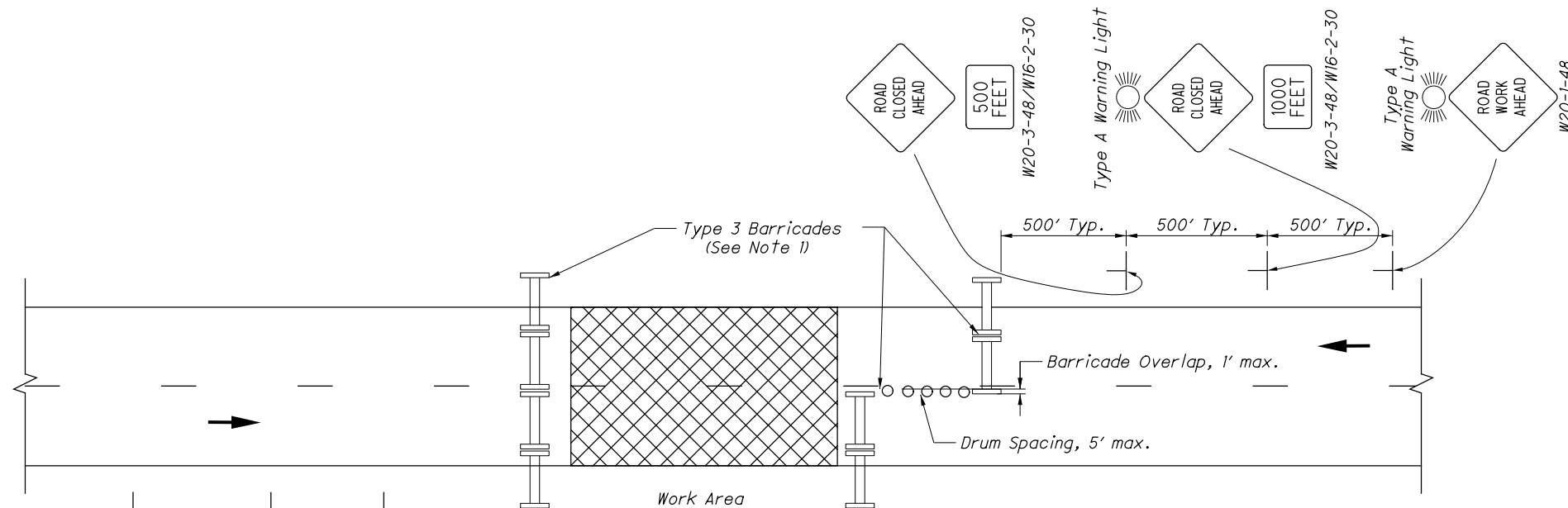
STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
Michael Blum  
ADMINISTRATOR  
7-19-2013  
DATE

MT-97.12

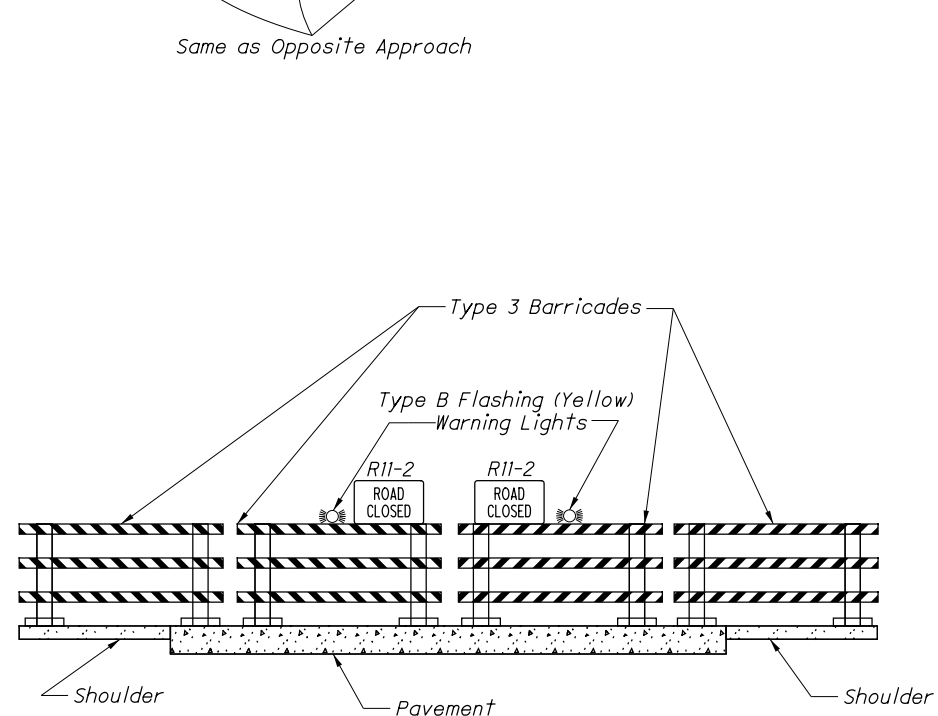
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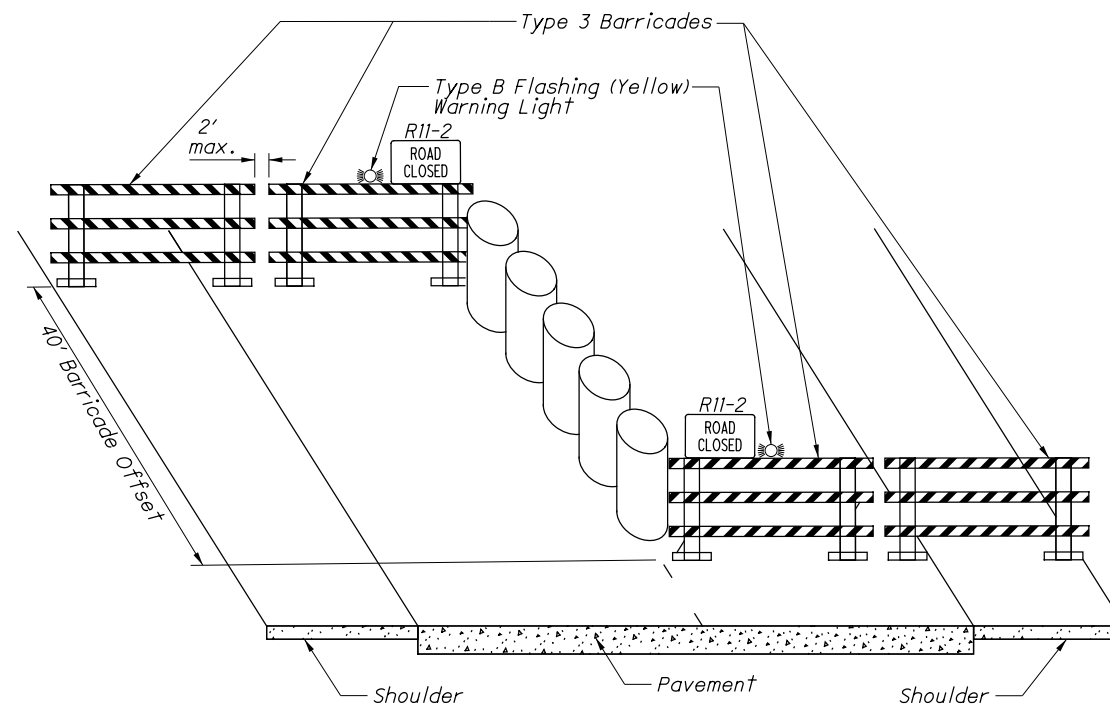
TYPE 3 BARRICADE DETAIL



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.

# 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.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

Michael Blune  
ADMINISTRATOR

7-19-2013  
DATE

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STANDARD CONSTRUCTION DRAWING

OFFICE OF  
ROADWAY  
ENGINEERING

TEMPORARY SIGN SUPPORT

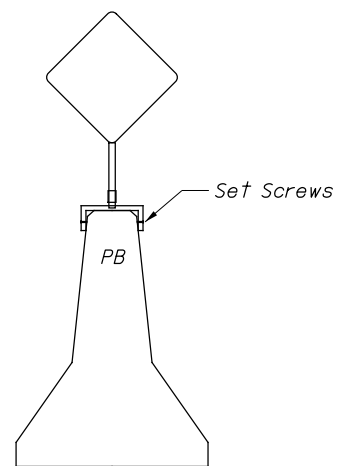
SCD NUMBER  
**MT-105.10**

1 / 2

THIS DRAWING REPLACES MT-105.10 DATED 07-20-2012.

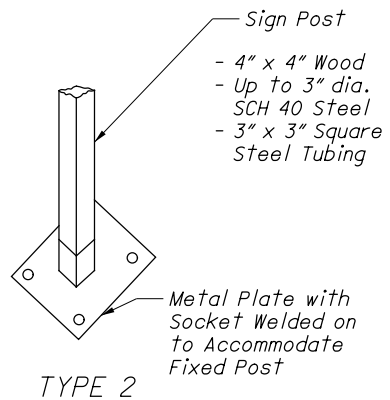


**CLASS A SUPPORTS  
FIXED**



TYPE 1

Fasten to Top of PB with Expansion Bolts, etc.



TYPE 2

Sign Post  
- 4" x 4" Wood  
- Up to 3" dia. SCH 40 Steel  
- 3" x 3" Square Steel Tubing

Metal Plate with Socket Welded on to Accommodate Fixed Post

**SOLID WOOD POSTS**

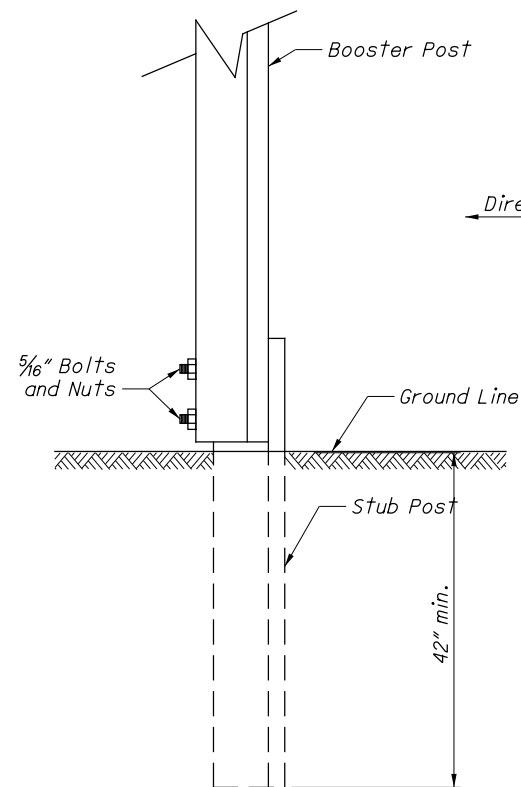


TOP VIEW

When flat sheet signing is provided, bolt the flat sheet directly to the wood posts. Do not use U-Channels.

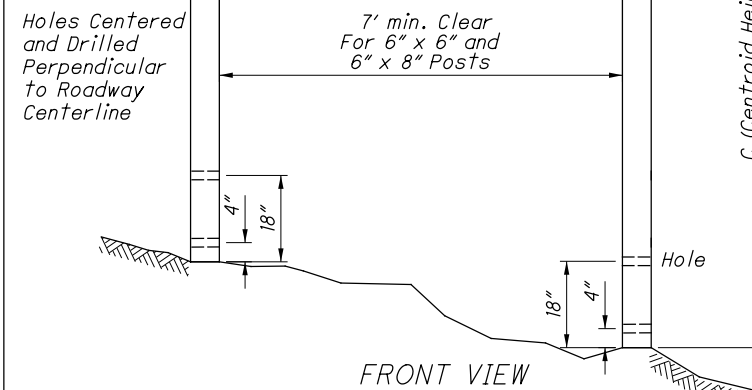
NORMAL POST SIZE (IN)	HOLE DIAMETER (IN)	NO. OF POSTS PERMITTED IN 7' PATH IN EXPOSED LOCATIONS	MINIMUM RECOMMENDED EMBEDMENT DEPTH (FT)
4 X 4	NONE	2	3.5
4 X 6	1 1/2	2	4
6 X 6	2	1	4.5
6 X 8	3	1	5

**CLASS A SUPPORTS  
STUBBING STANDARD**



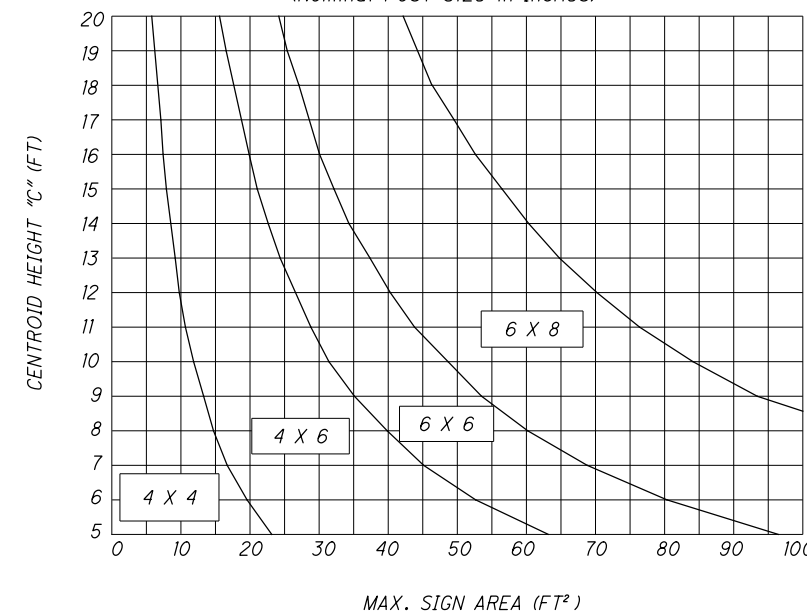
**NOTES:**

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.



FRONT VIEW

**DESIGN CHART FOR WOOD POSTS  
TWO-POST INSTALLATIONS**  
(Nominal Post Size in Inches)



THIS DRAWING REPLACES MT-105.10 DATED 07-20-2012.

SCD NUMBER

**MT-105.10**

STANDARD ROADWAY CONSTRUCTION DRAWING

**TEMPORARY SIGN SUPPORT**

OFFICE OF  
ROADWAY  
ENGINEERING

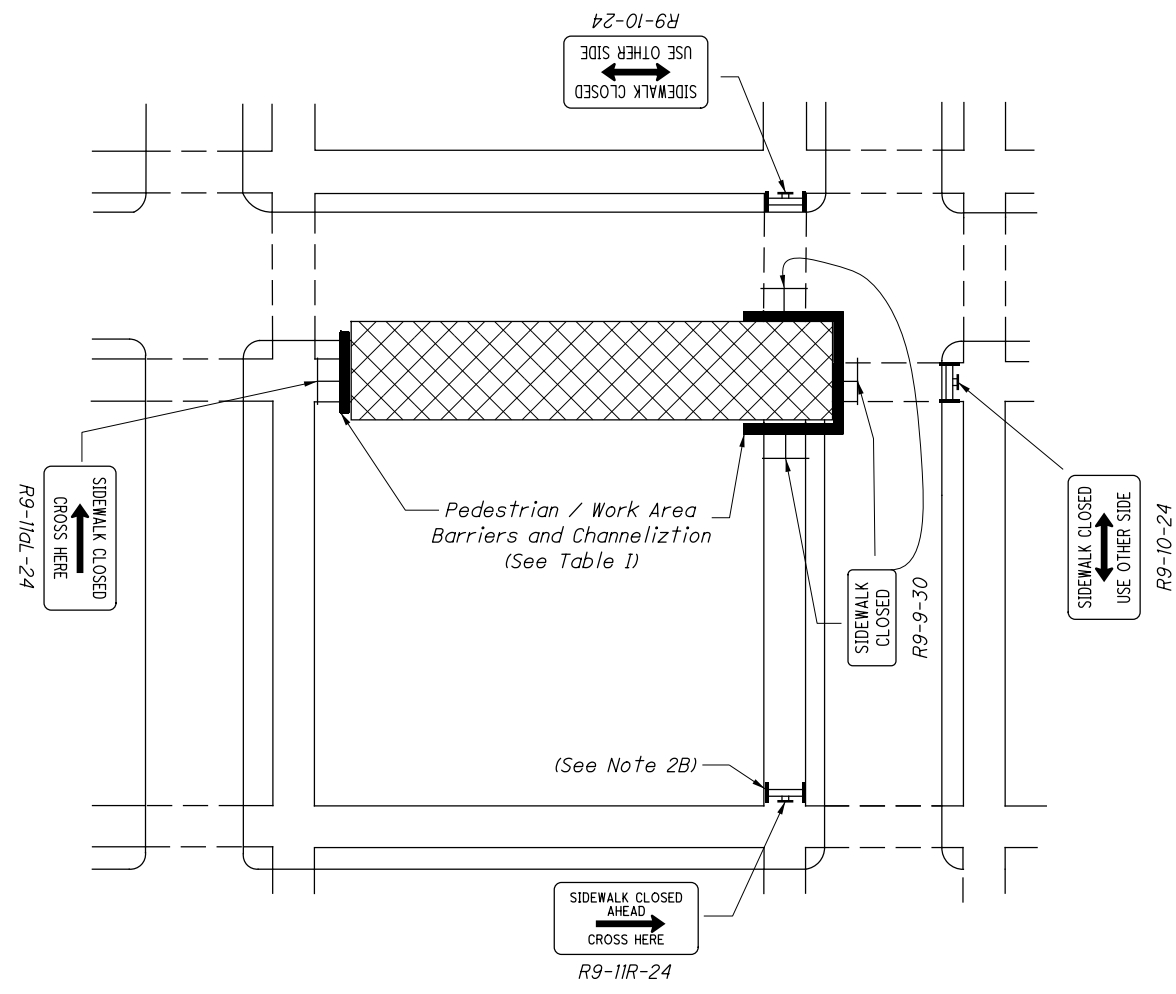
STDS  
ENGINEER

Stargell

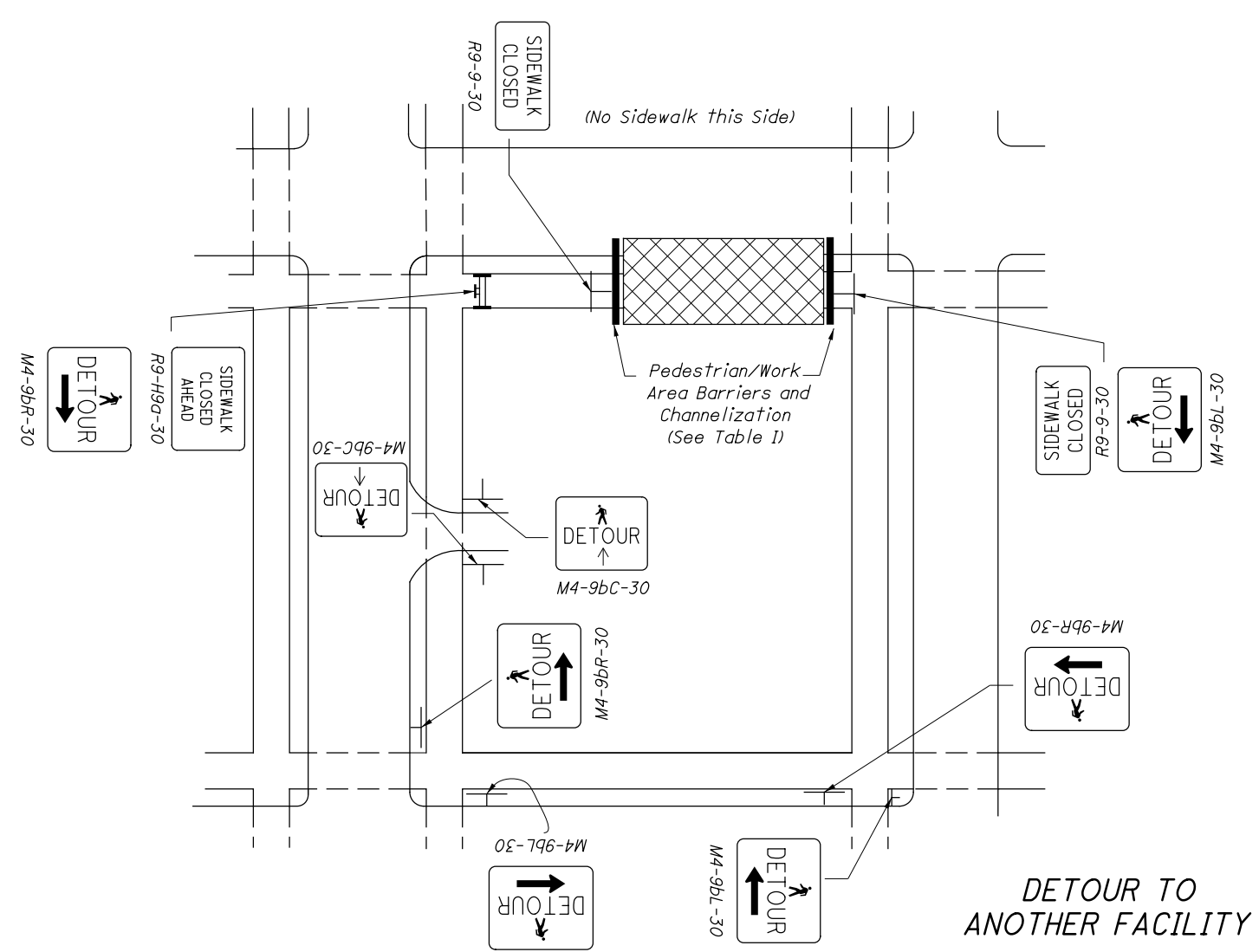
STATE OF OHIO DEPARTMENT OF TRANSPORTATION

Michael Blune  
ADMINISTRATOR

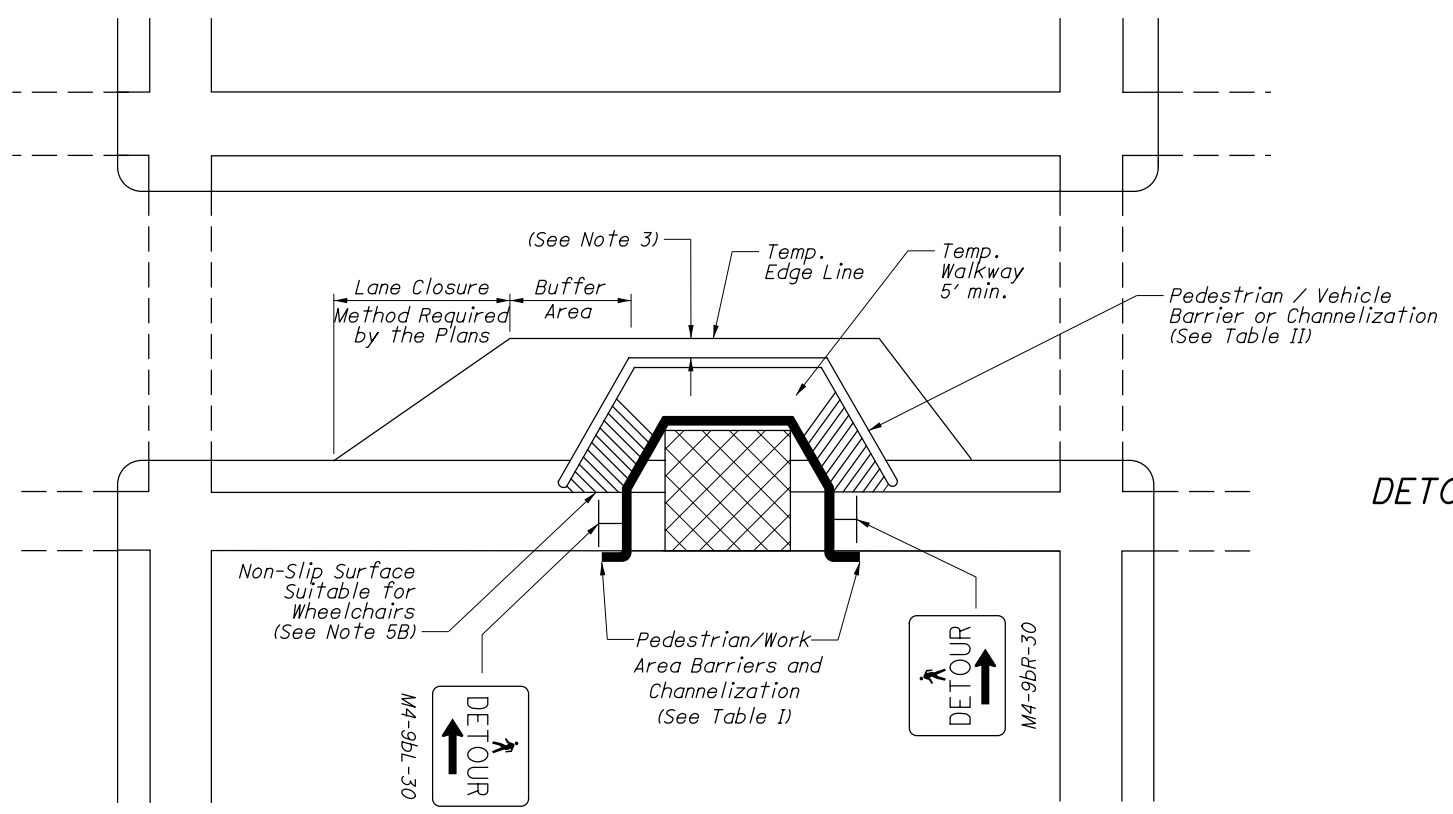
7-19-2013  
DATE



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.  
 STANDARD ROADWAY CONSTRUCTION DRAWING

SCD NUMBER  
**MT-110.10**

OFFICE OF ROADWAY ENGINEERING  
**PEDESTRIAN DETOUR METHODS**

STOS ENGINEER  
 Stargell

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

**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 5/8" 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

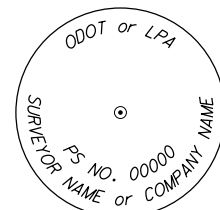
- A. Wood Railing
- B. Snow Fence, Wood or Orange Plastic Construction Fence.
- C. Chain Link Fence, Type CLT
- D. Plywood Wall
- E. Portable Barrier

STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 Michael Blune  
 ADMINISTRATOR  
 7-19-2013  
 DATE  
 STARGELL  
 ENGINEER  
 OFFICE OF ROADWAY ENGINEERING  
 PEDESTRIAN DETOUR METHODS  
 STANDARD ROADWAY CONSTRUCTION DRAWING  
 THIS DRAWING REPLACES MT-110.10 DATED 07-20-2012.  
 SCD NUMBER  
**MT-110.10**  
 2 / 2

# CAP DESIGN



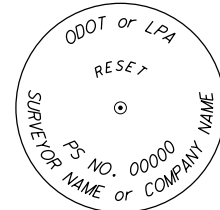
DESIGN 1



DESIGN 2

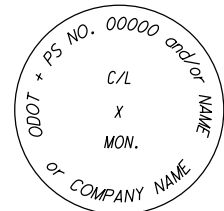


DESIGN 3



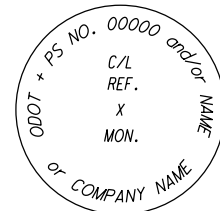
DESIGN 4

2" MIN. DIA.  
ALUMINUM CAPS  
PLAN VIEW



+DESIGN 5

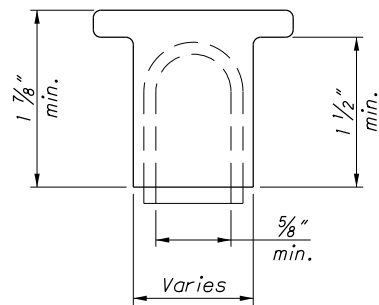
3" MIN. DIA.  
ALUMINUM CAP  
PLAN VIEW



+DESIGN 6

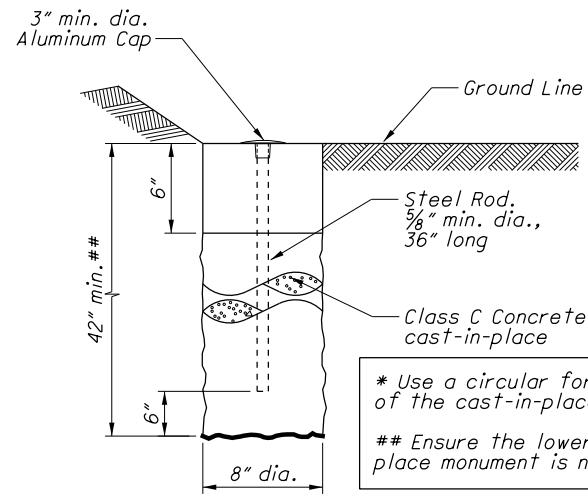
3" MIN. DIA.  
ALUMINUM CAP  
PLAN VIEW

+ Furnish a positional mark after monument is constructed. Ensure positional mark is either a Punch Mark or a Chisled X.

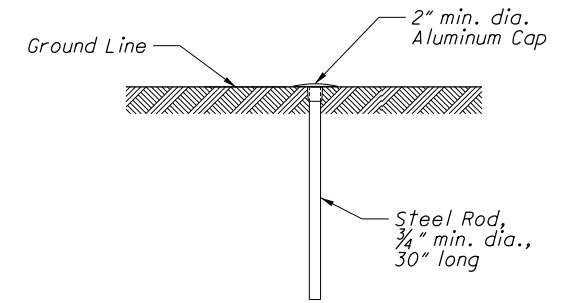


SIDE VIEW OF CAP

# MONUMENT TYPE



TYPE A

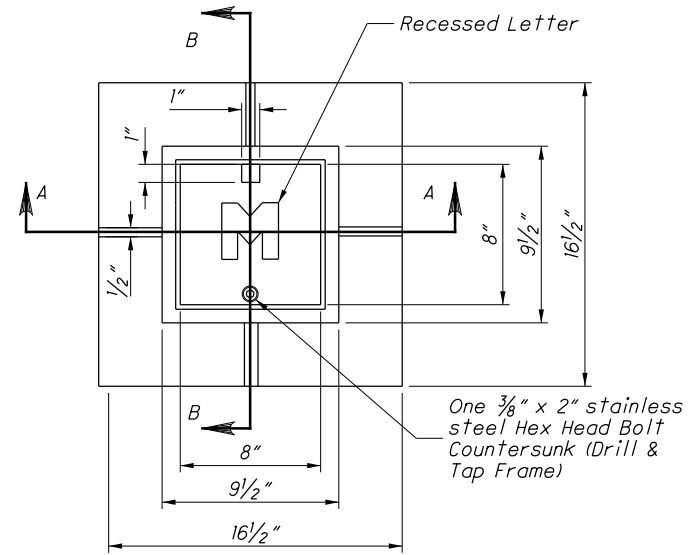


TYPE B

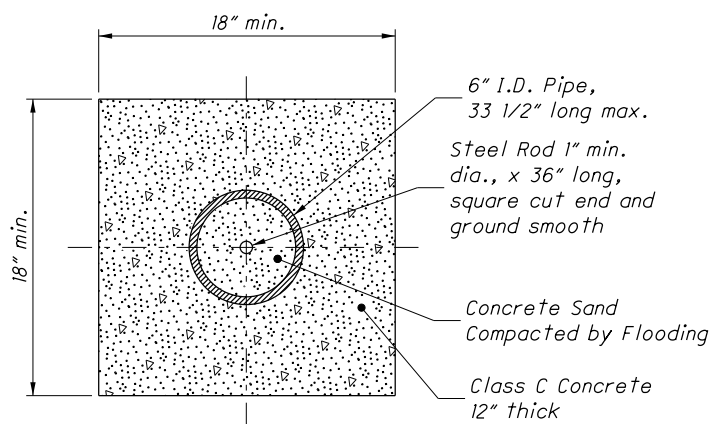
APPLICATION	MONUMENT TYPE	CAP DESIGN	PAY ITEM	DESCRIPTION
Right-of-Way	B	1	623	Right-of-Way Monument
	B	3	623	Right-of-Way Monument
E Parcels & Non-Right-of-Way	B	2	623	Right-of-Way Monument
	B	4	623	Right-of-Way Monument
Set on R/W Centerline	A	5	623	Reference Monument
	C	-	623	Monument Assembly
Offset from R/W Centerline	A	6	623	Reference Monument
	C	-	623	Monument Assembly

## NOTES

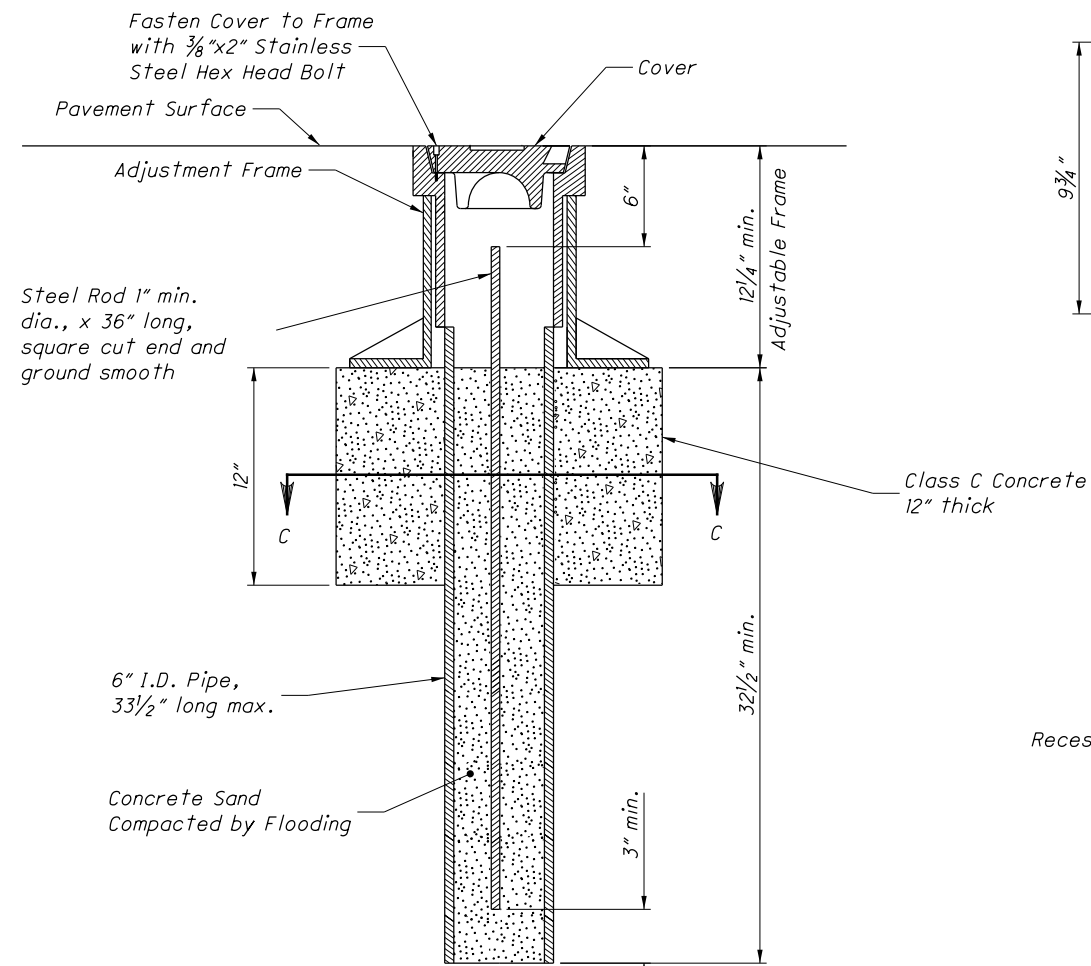
- Monument Types A & B are typically set outside pavement areas.
- Monument Type C is typically set in pavement areas.
- Cap Designs 3 and 4 are to be installed when the Right-of-Way Monuments are disturbed, destroyed, and/or damaged by construction activities and are to be reset.
- Right-of-Way Monuments are typically set prior to construction and are expected to be protected during construction unless otherwise specified in the plans.
- During construction the contractor will install the Monument Assemblies and Reference Monuments at locations specified in the Right-of-Way plans.
- All Reference Monuments and Right-of-Way Monuments set and/or reset by the contractor's surveyor will include an aluminum cap according to this drawing.



PLAN VIEW

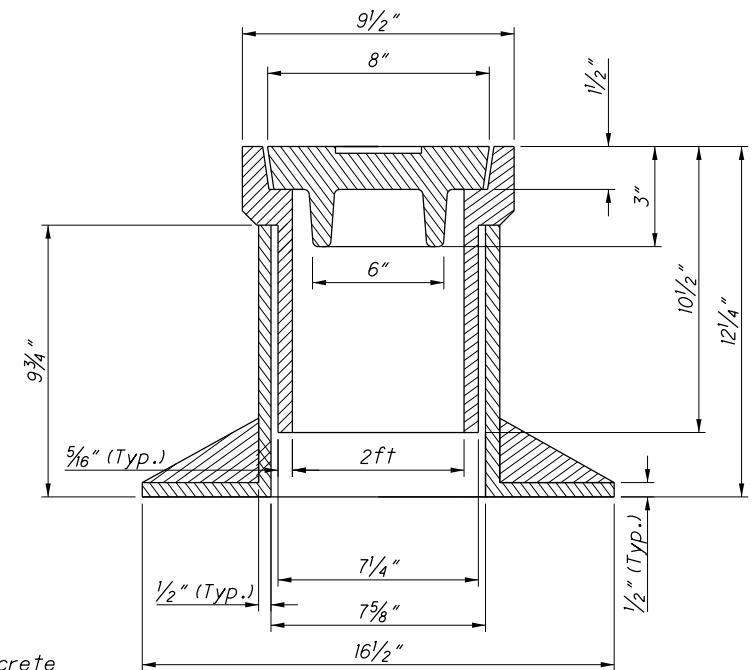


SECTION C-C

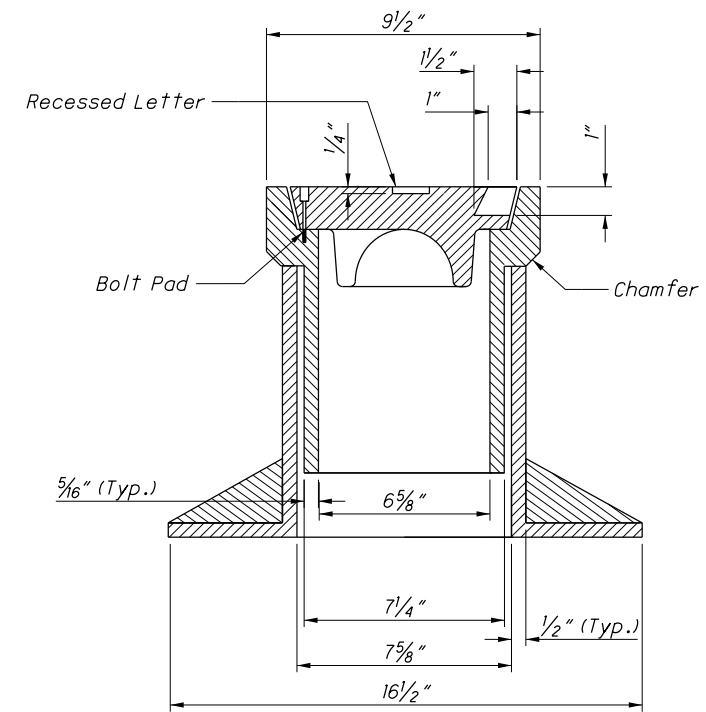


SIDE VIEW

MONUMENT TYPE C



SECTION A-A



SECTION B-B

THIS DRAWING REPLACES RM-1.1 DATED 7-15-2011.

SD NUMBER

**RM-1.1**

STANDARD ROADWAY CONSTRUCTION DRAWING

**ROADWAY MONUMENTS**

STATUS

ENGINEER

M. Ruppe

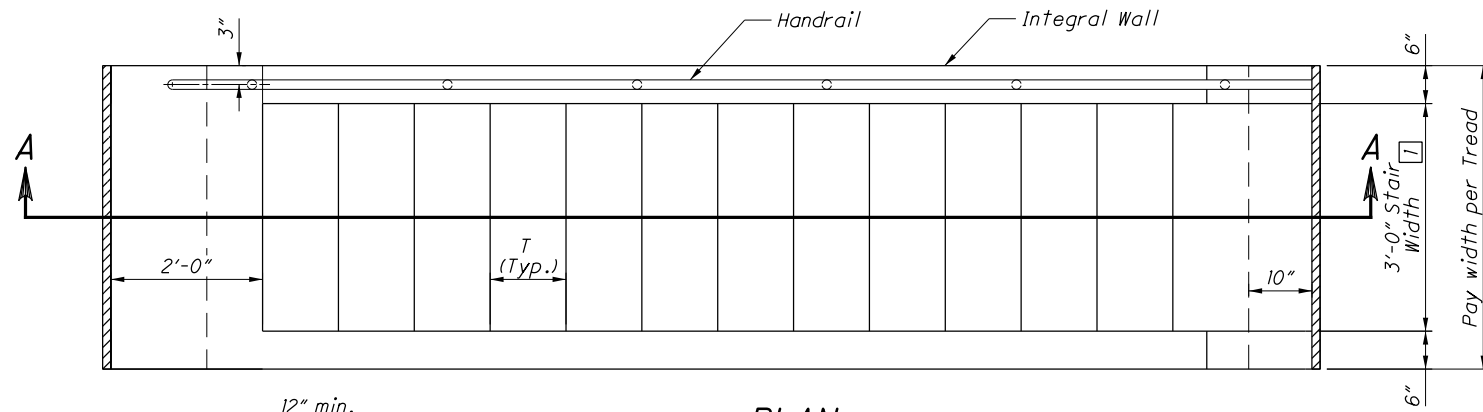
STATE OF OHIO DEPARTMENT OF TRANSPORTATION

Michael Blune

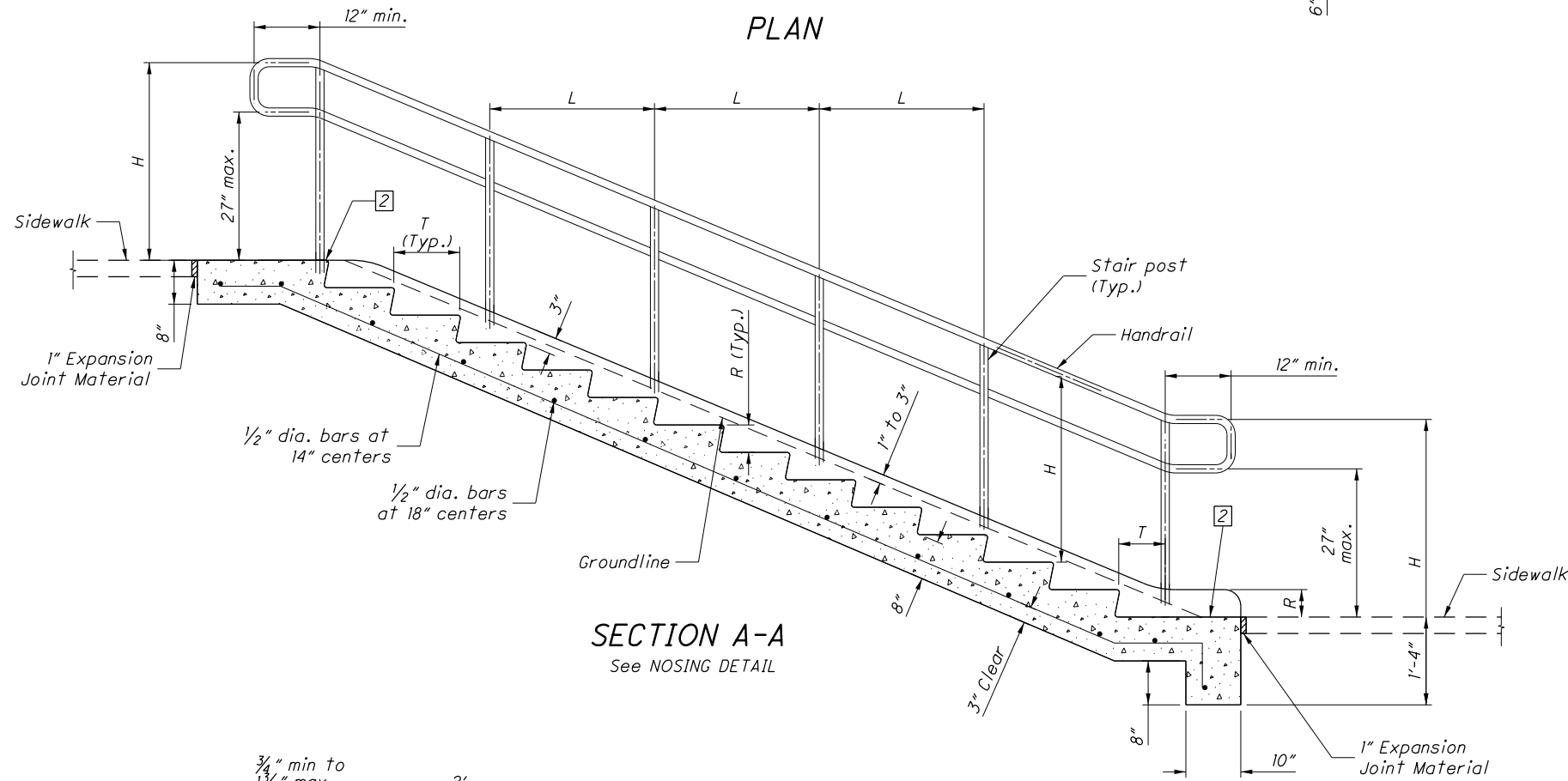
ADMINISTRATOR

1-18-2013

DATE

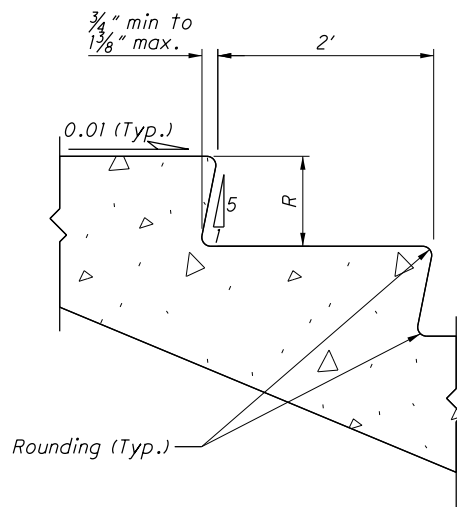


PLAN



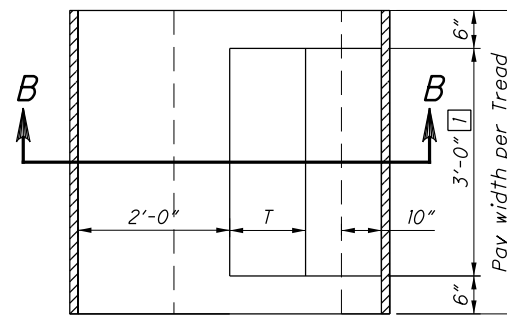
SECTION A-A  
See NOSING DETAIL

TYPE A  
(For 3 Risers or more)



NOSING DETAIL

All risers shall be of equal height and all treads shall be of equal depths on any set of stairs.



PLAN

TYPE B (Less than 3 Risers)

NOTES

**GENERAL:** Locate the top of the integral wall 1" to 3" above ground line.

**TYPE A:** Fabricate hand railing and stair posts from nominal size 1 1/2" diameter 0.145" wall thickness steel pipe meeting the requirements of the Specification for Welded and Seamless Steel Pipe ASTM A 53 Standard Weight, Schedule Number 40, or aluminum pipe meeting the requirements of the Specification for Aluminum-Alloy Pipe ASTM B 241, 6063 T6 ASA, Schedule Number 40.

Galvanize steel handrails and stair posts after fabrication, as specified in ASTM A 123. Field weld splices for steel railing. Re-galvanize areas on which the spelter coating has been damaged, as specified in AASHTO M 36, Section 24. Metalizing process or repair under the direction of the Engineer with stick-form galvanizing repair compound meeting Federal Specification O-G-93.

Install a single handrail to the right side of the stairs, facing up, unless otherwise shown on the plans.

For stair widths greater than 43", a handrail is required on both sides of the stairs. Install hand railings on both sides of stairs that are less than 43" wide, when required by the plans.

Provide splices for aluminum railing with internal sleeves, and after welding, be smooth and water tight.

Cast-in-place or set stair posts in sockets filled with 1:3 proportioned cement mortar. Provide a heavy coating of asphalt varnish or coal-tar pitch paint (both inside and outside) to the portion of aluminum stair posts set into concrete or mortar.

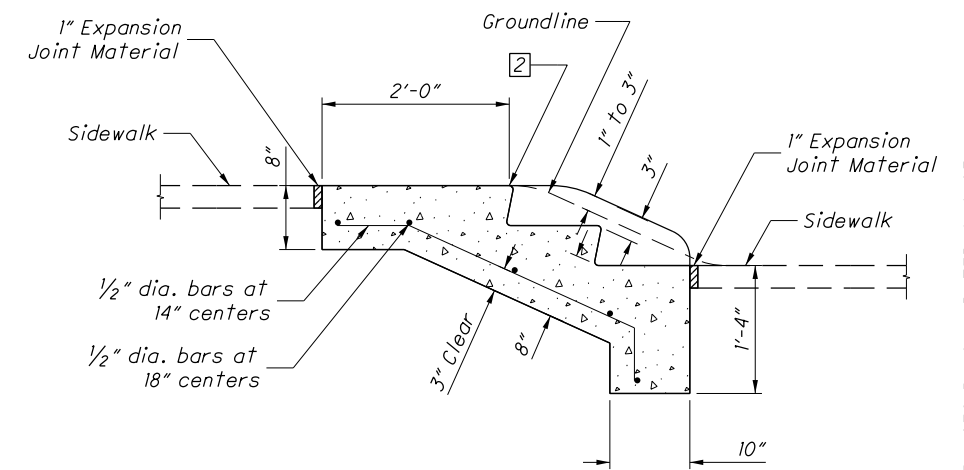
Embed the stair posts a minimum depth 4".

Install stair posts and handrails free of burrs, or sharp projections.

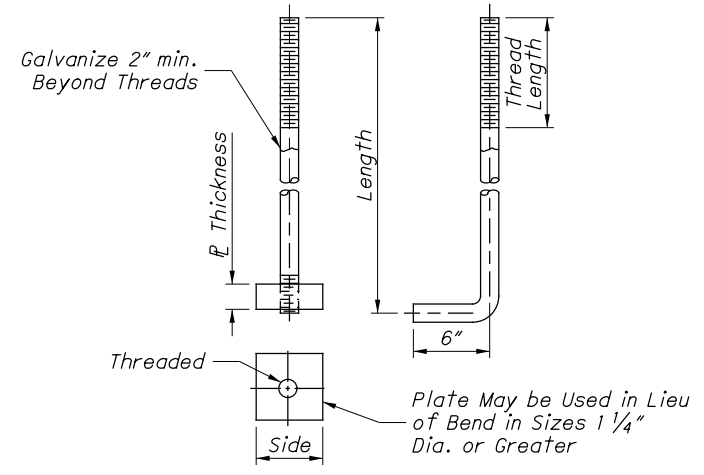
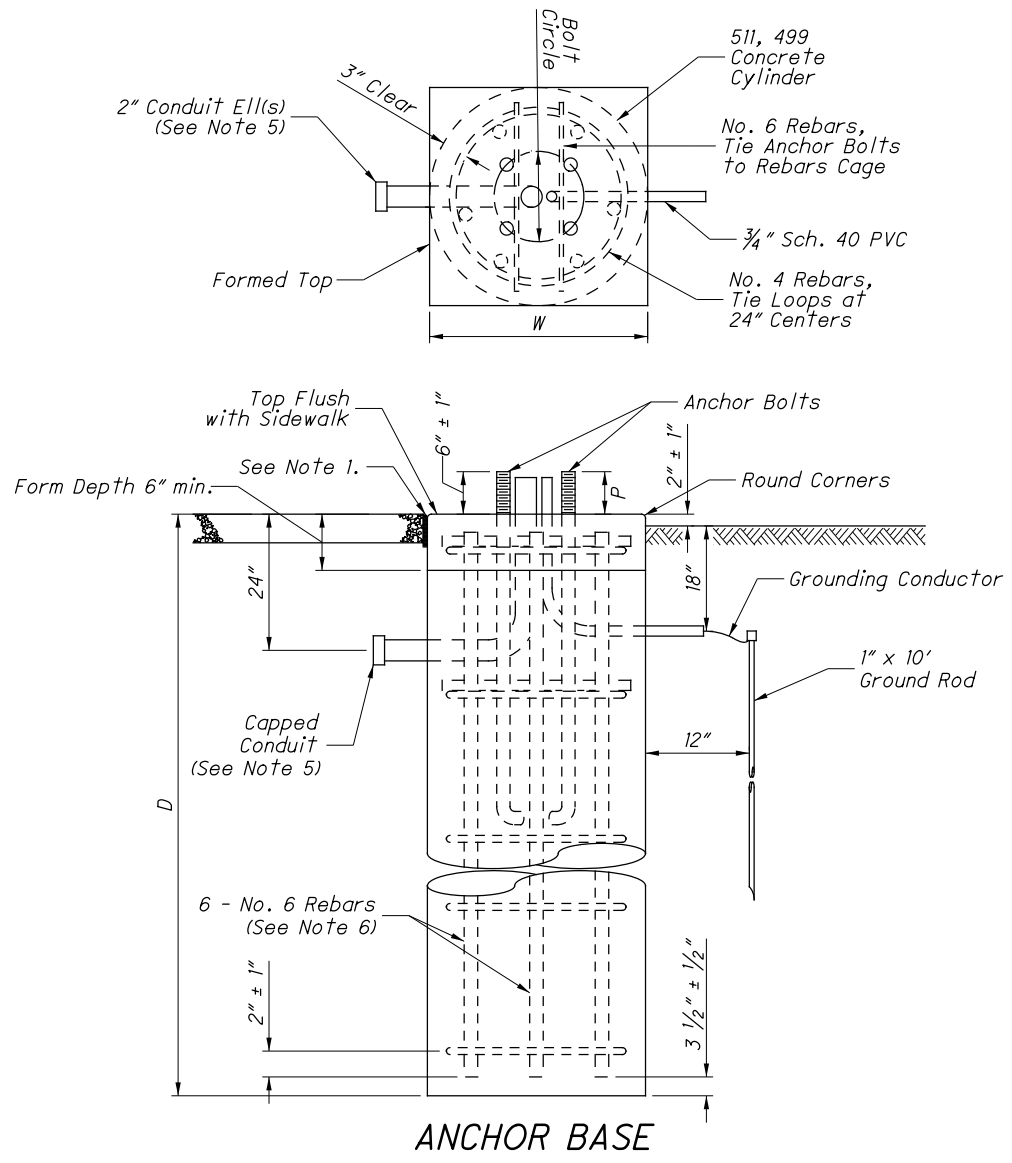
LEGEND

- H ~ 34" min., 38" max.
- R ~ 4" min., 7" max.
- T ~ 11" min., 15" max.
- L ~ Equal interior panel lengths equal. The upper and lower panel lengths may vary. Panel lengths are not to exceed 3'-0".

- [1] Unless shown otherwise on the plans.
- [2] Measurable Tread per CMS 608.08



SECTION B-B  
See NOSING DETAIL



**ALL DIMENSIONS IN INCHES**

DIA.	LENGTH	THREAD LENGTH	P THICK	P SIDE	THREADS PER INCH
1 1/4	42	8	1 1/2	4	7
1 1/2	54	9	1 1/2	4	6
1 3/4	84	9	2	5	5
2	90	9	2	5	4 1/2
2 1/4	90	10	2 1/2	6	4 1/2
2 1/2	114	10	2 1/2	6	4
3	138	12	3	7	4

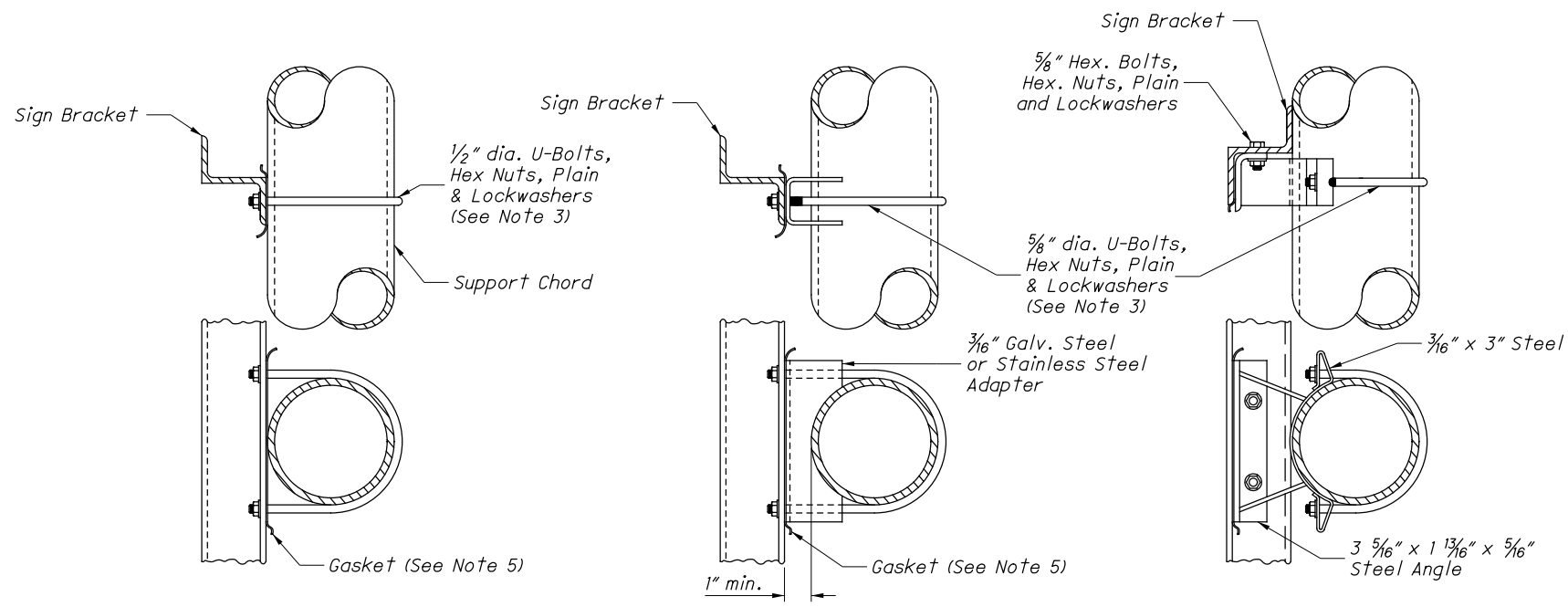
**ANCHOR BOLTS**

**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 1/2 x 54	13 1/2	6 3/4	1	8	30	1 1/2 x 54	13 1/2	6 3/4	1	7	30	1 1/4 x 42	10	5 3/4	1	9	36	1 3/4 x 84	15	7 3/4
2	8	30	1 1/2 x 54	13 1/2	6 3/4	2	8	30	1 1/2 x 54	15	6 3/4	2	7	30	1 1/2 x 54	12 1/2	6 3/4	2	9	36	1 3/4 x 84	15	7 3/4
3	9	36	1 3/4 x 84	16	7 3/4	3	9	30	1 1/2 x 54	16	6 3/4	3	8	30	1 1/2 x 54	13 1/2	6 3/4	3	11	36	2 x 90	18	8 1/2
						4	10	36	1 3/4 x 84	18	7 3/4	4	8	36	1 3/4 x 84	15	7 3/4	4	11	36	2 x 90	18	8 1/2
						5	9	36	1 3/4 x 84	15	7 3/4	5	9	36	1 3/4 x 84	16	7 3/4	5	11	36	2 x 90	22	8 1/2
						6	9	36	1 3/4 x 84	15	7 3/4	6	9	36	1 3/4 x 84	16	7 3/4	6	11	36	2 x 90	22	8 1/2
						7	9	36	1 3/4 x 84	15	7 3/4	7	10	36	2 x 90	18	8 1/2	7	15	36	2 1/2 x 114	23 1/2	9 3/4
						8	9	36	1 3/4 x 84	16	7 3/4	8	10	36	2 x 90	20	8 1/2	8	15	36	2 1/2 x 114	23 1/2	9 3/4
						9	10	36	1 3/4 x 84	18	7 3/4	9	10	36	2 x 90	22	8 1/2	9	15	36	2 1/2 x 114	23 1/2	9 3/4
						10	10	36	1 3/4 x 84	20	7 3/4	10	11	36	2 1/4 x 90	22	9	10	17	36	2 1/2 x 114	25 1/2	9 3/4
						11	10	36	1 3/4 x 84	20	7 3/4	11	11	36	2 1/4 x 90	22	9	11	17	36	2 1/2 x 114	25 1/2	9 3/4
						12	11	36	2 x 90	20	8 1/2	12	12	36	2 1/2 x 114	23 1/2	9 3/4	12	18	36	3 x 138	25 1/2	11 1/4
						13	15	36	2 x 90	22	8 1/2	13	16	36	3 x 138	26	11 3/4						
						14	15	36	2 x 90	22	8 1/2	14	16	48	3 x 138	34	11 3/4						

**NOTES:**

- Use 1/2" preformed joint filler as per CMS 705.03 between foundations and adjacent paved areas.
- A special foundation design will be required when cohesive soil with undrained shear strength of less than 2000 lb/ft<sup>2</sup> or granular soil with an angle of internal friction less than 30° and a wet density less than 120 lb/ft<sup>3</sup> is encountered.
- 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.
- 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.
- 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.
- SCD TC-81.10 type supports designs 13 and 14 shall use 6 No. 8 rebars.



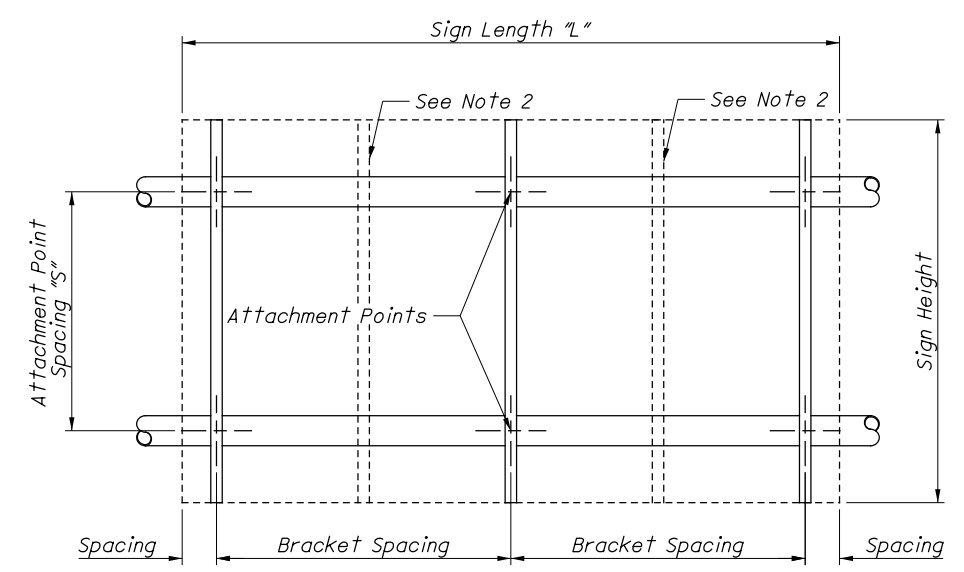
DOUBLE CHORDS

SINGLE ARM

ALTERNATE CLAMP

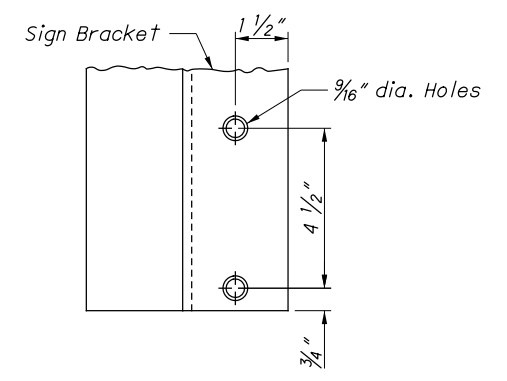
**ATTACHMENT POINT SPACING**

SUPPORT TYPE	DESIGN	S
7.2	1	2'-4"
	2	3'
	3	4'
7.3	1 & 2	3'
	3 & 4	4'
7.4	1	3'
7.5	2 & 3	4'
7.6	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	



**NOTES:**

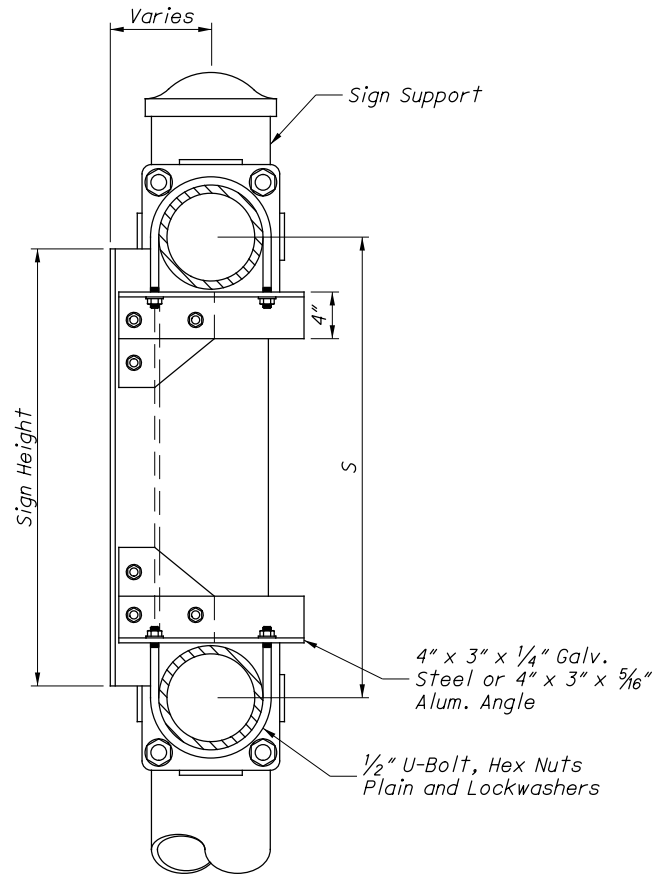
1. Sign brackets shall be a 4" x 3" x 1/4" aluminum zee at 2.85 lb/ft.
2. Provide intermediate sign brackets if the sign extends more than 4' above or below an attachment point.
3. U-bolts, other bolts, nuts and washers shall be stainless steel for use with aluminum chords. When used with galvanized 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.



DETAIL "C"  
(See Note 8)

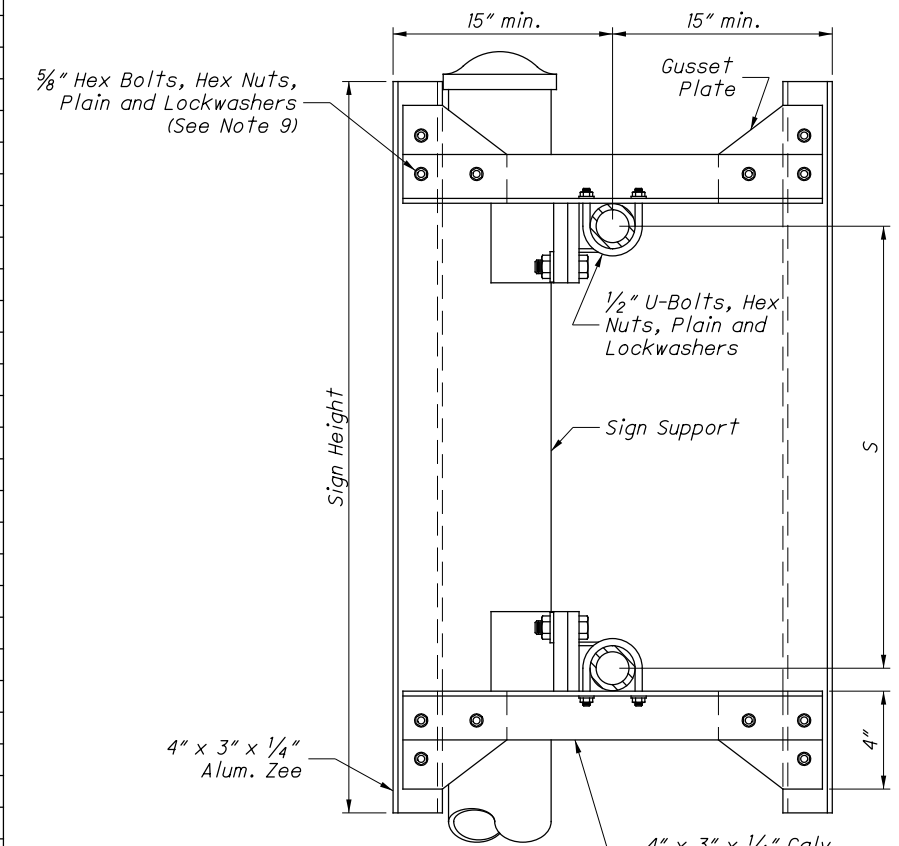
THIS DRAWING REPLACES TC-22.20 DATED 10-18-2013.  
STANDARD ROADWAY CONSTRUCTION DRAWING



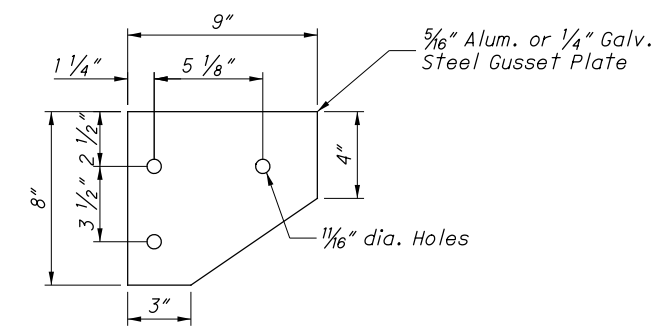


**TYPE A**  
(See Note 6)

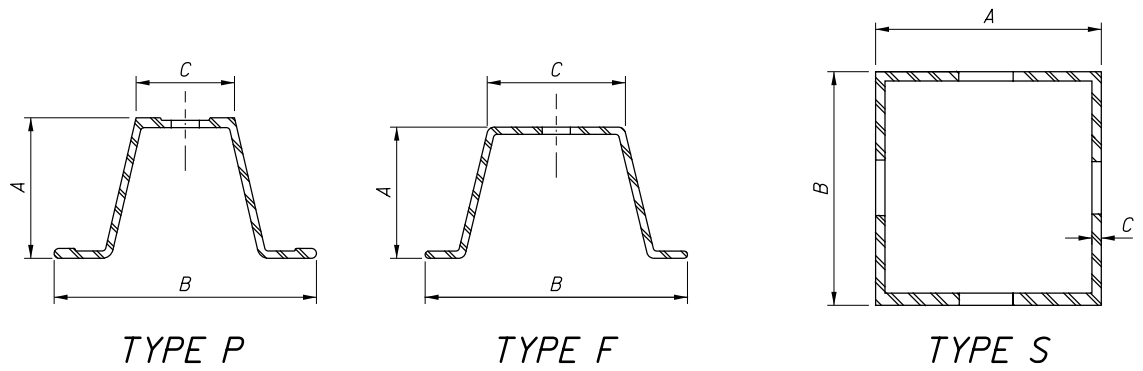
SIGN BRACKET										
L (FEET)	NUMBER OF BRACKETS	BRACKET SPACING (INCHES)								
		6	36	6						
4	2	6	36	6						
5		6	48	6						
6		6	60	6						
7		6	72	6						
8		12	72	12						
9		12	84	12						
10	3	12	96	12						
11		18	96	18						
12		6	66	66	6					
13		6	72	72	6					
14		12	72	72	12					
15		18	72	72	18					
16	4	12	84	84	12					
17		18	84	84	18					
18		12	96	96	12					
19		18	96	96	18					
20		12	72	72	72	12				
21		18	72	72	72	18				
22	5	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	6	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	7	12	96	96	96	96	12			
35		18	96	96	96	96	18			
36		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	8	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		12	84	84	84	84	84	84	12	
45		18	84	84	84	84	84	84	18	
46	9	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	10	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	11	12	96	96	96	96	96	96	96	12
59		18	96	96	96	96	96	96	96	18



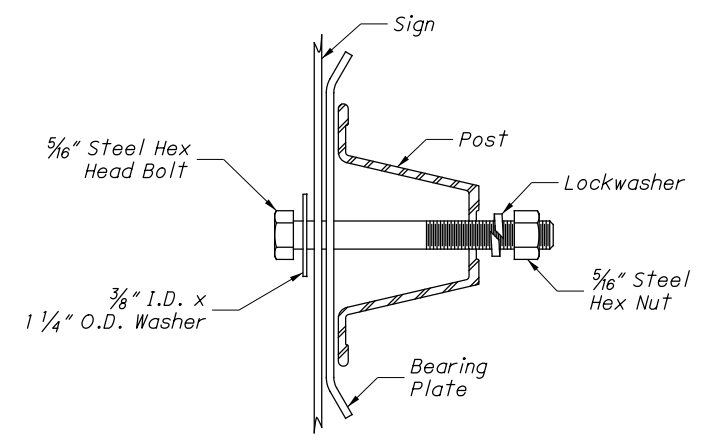
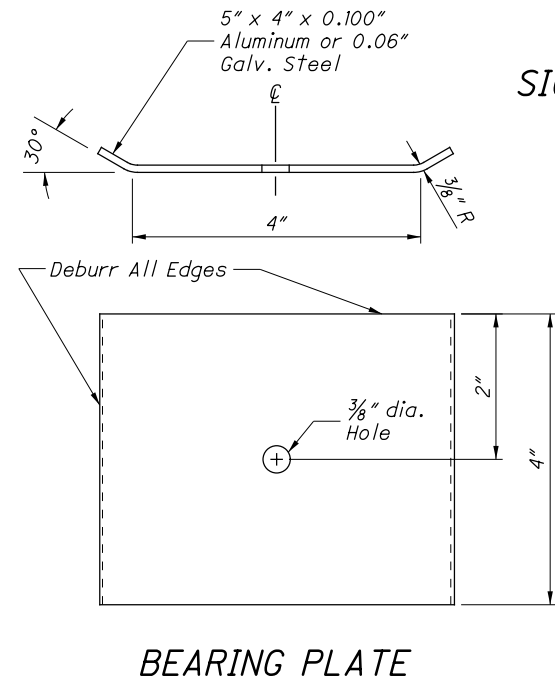
**TYPE B**  
(See Note 7)



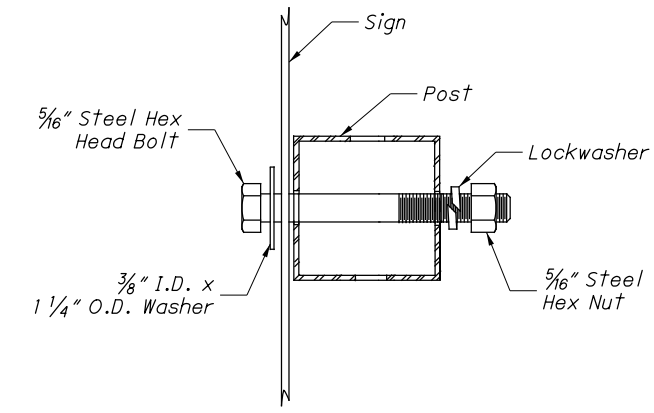
**GUSSET PLATE**



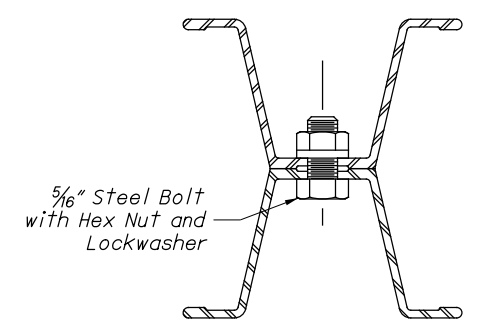
POST NO.	TYPE	LB/FT	POST DIMENSIONS (INCHES)			ANCHOR DIMENSIONS			# OF POSTS PERMITTED IN 7' PATH IN EXPOSED LOCATIONS
			A	B	C	A	B	C	
1	F	1.12	0.875	2.063	0.813				
2	P	2.00	1.469	3.063	1.281				2
	F	2.00	1.516	3.125	1.250				2
	S		1.750	1.750	0.083	2.000	2.000	0.105	2
3	P	3.00	1.875	3.500	1.313				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



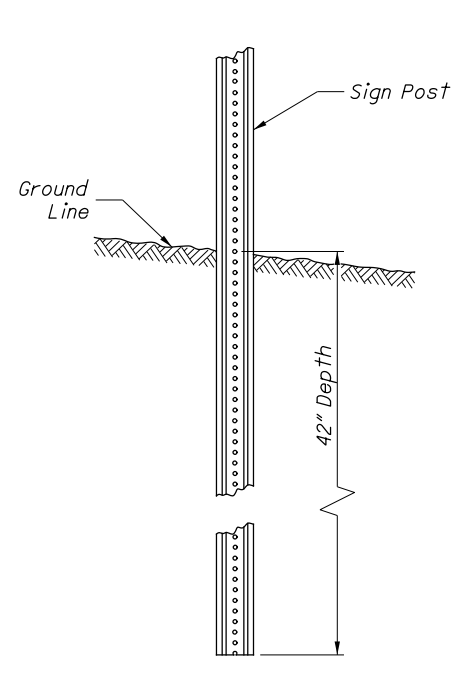
U-CHANNEL SIGN ATTACHMENT DETAIL



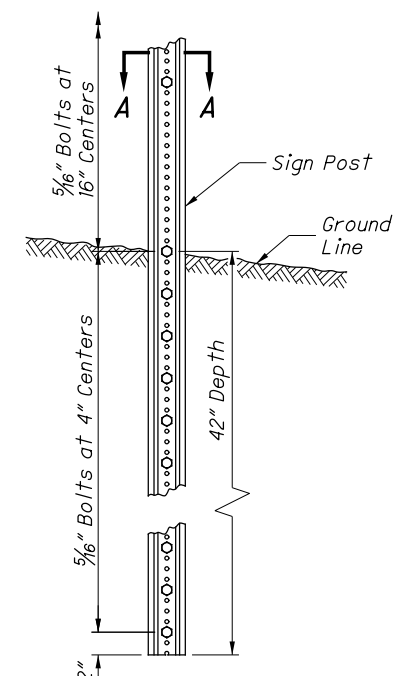
SQUARE POST SIGN ATTACHMENT DETAIL



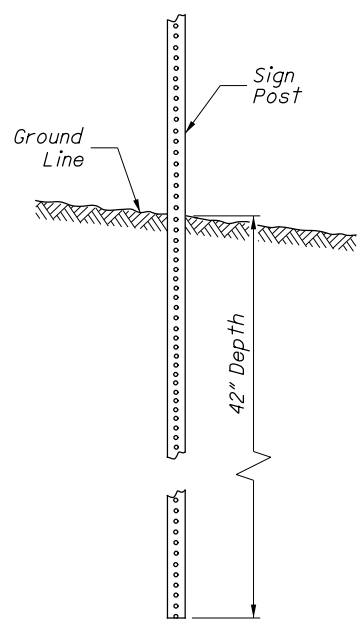
SECTION A-A



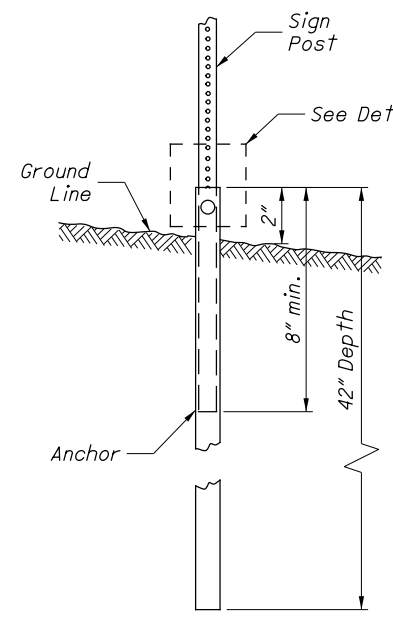
TYPICAL NO. 1, NO. 2 AND NO. 3 U-CHANNEL DRIVEN INSTALLATION



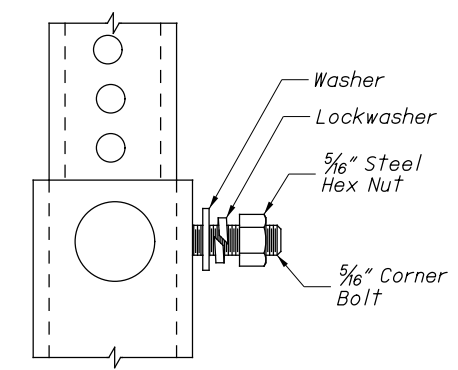
TYPICAL NO. 4 AND NO. 6 U-CHANNEL DRIVEN INSTALLATION



TYPICAL SQUARE POST DRIVEN INSTALLATION



TYPICAL SQUARE POST ANCHOR BASE INSTALLATION

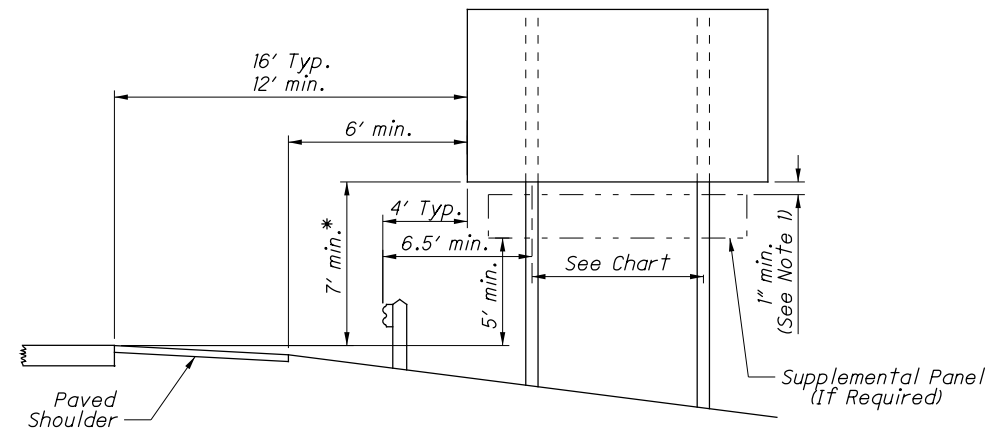


DETAIL "A"

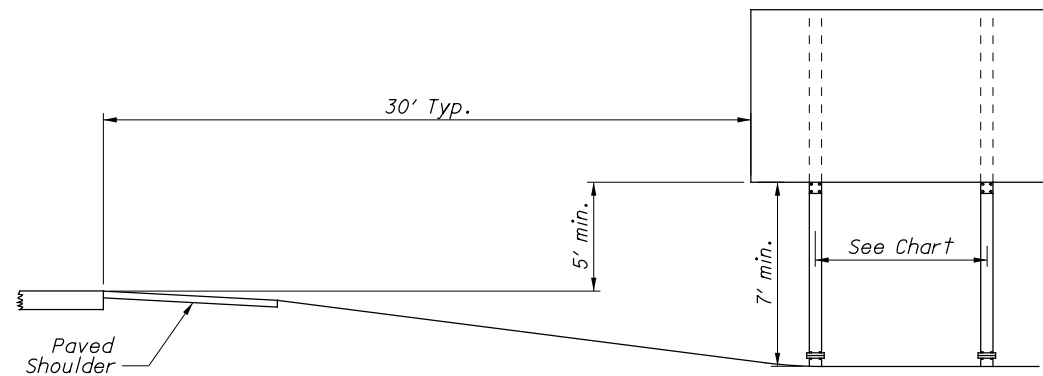
NOTES:

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.

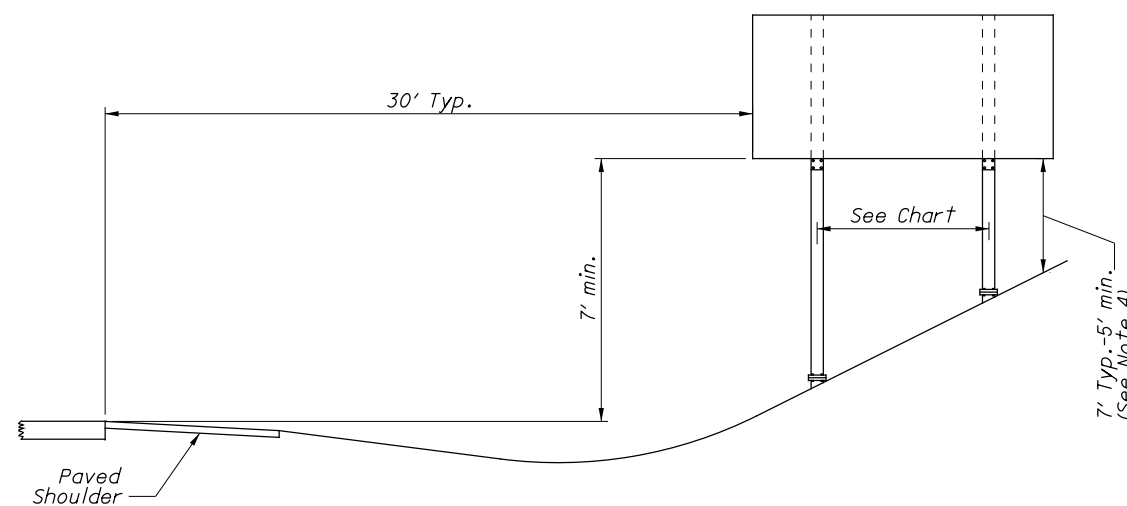
## FREEWAYS AND EXPRESSWAYS



**TYPICAL INSTALLATION WITH GUARDRAIL**  
\* 8' min. with Supplemental Panel

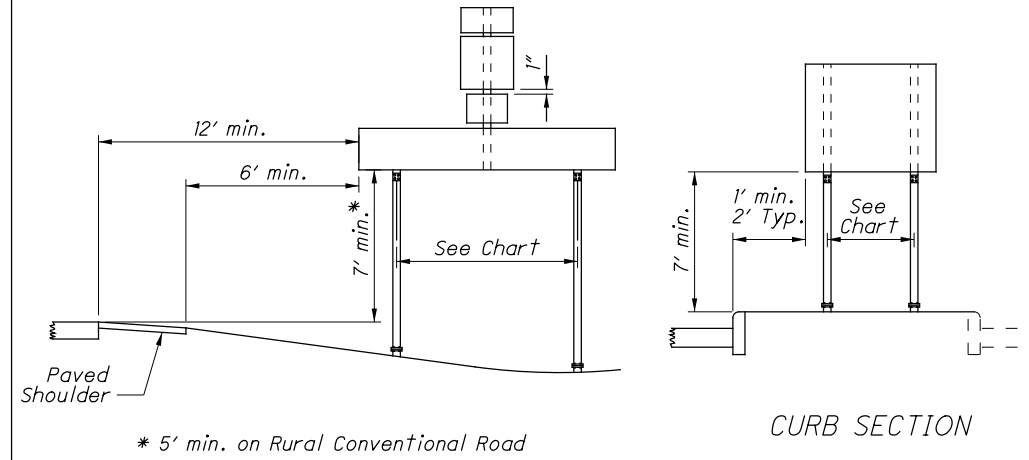


**TYPICAL INSTALLATION, FILL SECTION, 30' OFFSET**



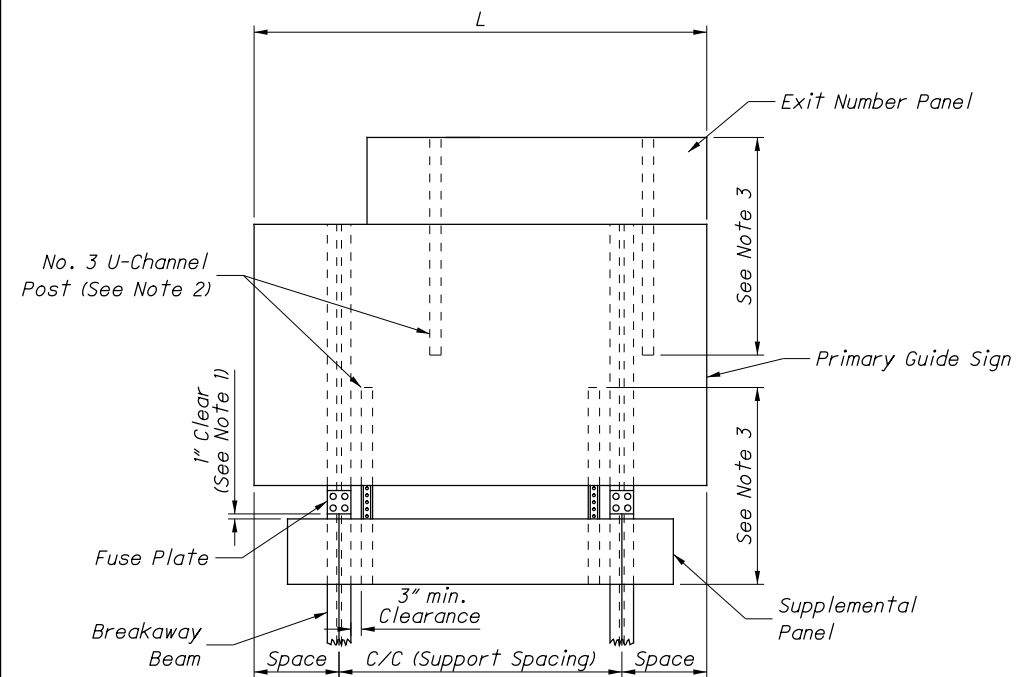
**TYPICAL INSTALLATION, CUT SECTION, 30' OFFSET**

## STREETS-RAMPS-HIGHWAYS



\* 5' min. on Rural Conventional Road

**CURB SECTION**

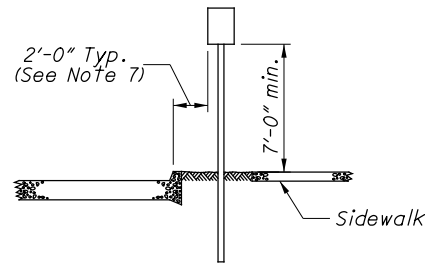


### SUPPLEMENTAL PANEL ATTACHMENT

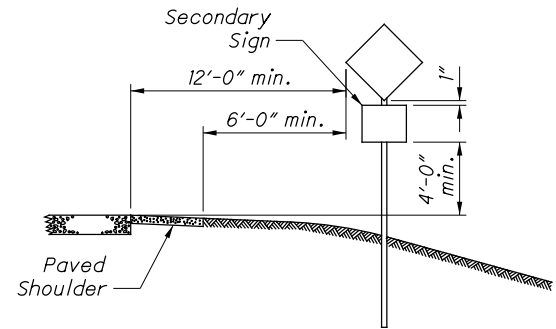
SUPPORT SPACING CHART							
2 SUPPORTS				3 SUPPORTS			
L (Feet)	SPACING (INCHES)			L (Feet)	SPACING (INCHES)		
	SPACE	c/c	SPACE		SPACE	c/c	SPACE
4	9	30	9	20	24	96	24
5	12	36	12	21	30	96	30
6	12	48	12	22	36	96	36
7	12	60	12	23	30	108	30
8	12	72	12	24	36	108	36
9	12	84	12	25	42	108	42
10	12	96	12	26	36	120	36
11	18	96	18	27	42	120	42
12	24	96	24	28	48	120	48
13	30	96	30	29	42	132	42
14	36	96	36	30	48	132	48
15	36	108	36				
16	42	108	42				
17	42	120	42				
18	48	120	48				
19	48	132	48				

### NOTES:

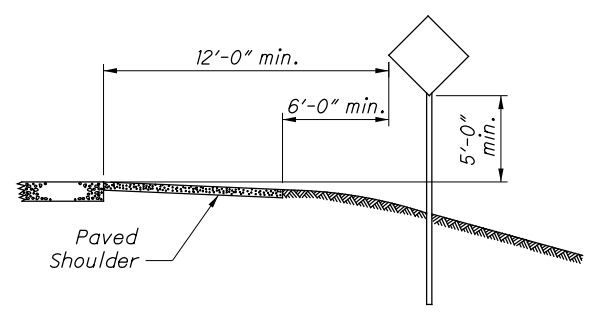
1. Mount supplemental panels 1" below the fuse plate on breakaway beam installations and 1" minimum below the guide sign when the sign supports are rigid beams.
2. Attach No. 3 U-channel drive post to both the guide sign and the exit number or other supplemental panels by mounting clips fastened alternately 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 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.



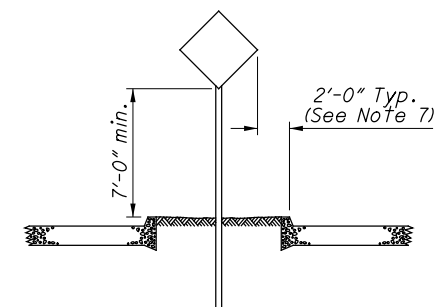
**URBAN-RESIDENTIAL AND BUSINESS**  
AND ALL AREAS WITH SIDEWALKS



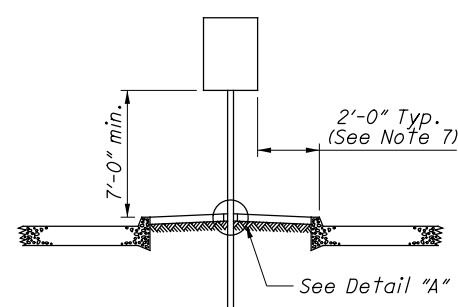
**RURAL**  
WITH SECONDARY SIGN



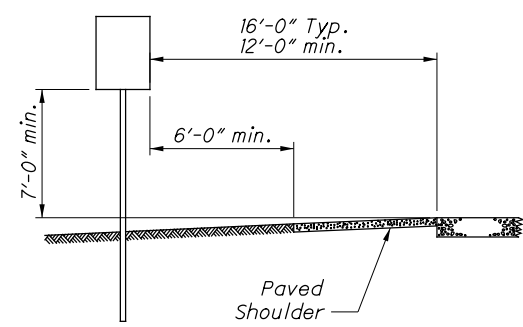
**RURAL**



**MEDIAN**



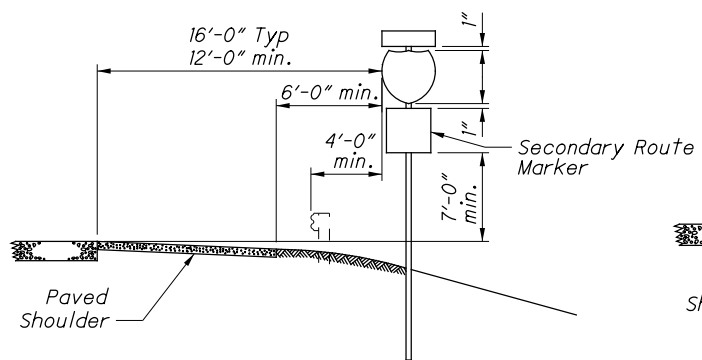
**PAVED MEDIAN**



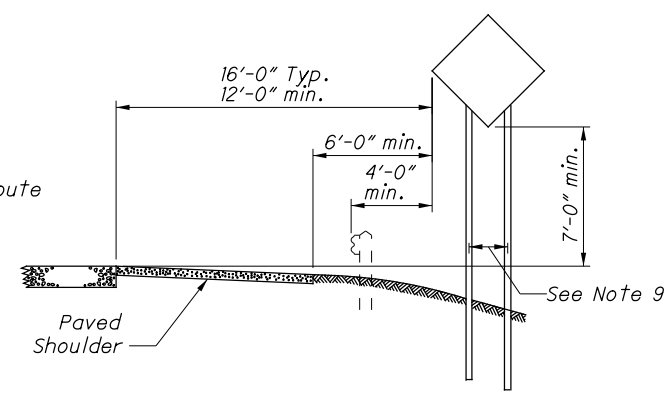
**MEDIAN - EXPRESSWAY OR FREEWAY**

**NOTES:**

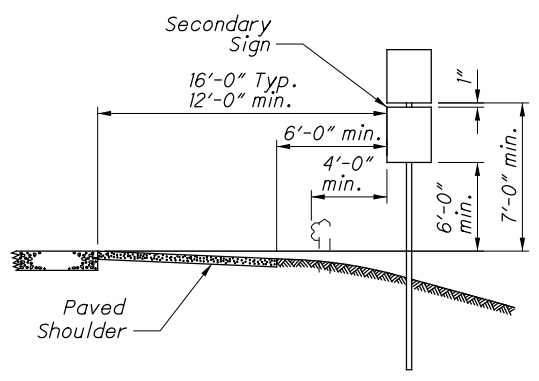
1. See Standard Construction Drawing (SCD) TC-41.20 for details on yielding supports.
2. All signs shall be placed 90° to the roadway, except as described in notes 3 and 4 below.
3. Install chevron alignment and one-direction large arrow signs on the outside of a turn or curve in line with and at approximately 90° to approaching traffic flow.
4. Install parking signs with arrows at an angle of not less than 30° nor more than 45° with the line of traffic flow.
5. Install chevron alignment signs at a minimum mounting height of 4' above the near edge of the traveled way.
6. Install object markers at a minimum mounting height of 4' above the near edge of the traveled way for obstructions 8' or less from the edge of shoulder or curb. Install object markers at a minimum mounting height of 4' above the ground for obstructions more than 8' from the edge of the shoulder or curb.
7. Install signs with a minimum lateral offset of 1' from the face of curb where sidewalk width is limited or where existing poles are close to the curb.
8. On conventional roads where it is impractical to locate a sign with the lateral offsets shown, install signs with a minimum lateral offset of 2'.
9. See SCDs TC-52.10 and TC-52.20 for dimensions between supports.



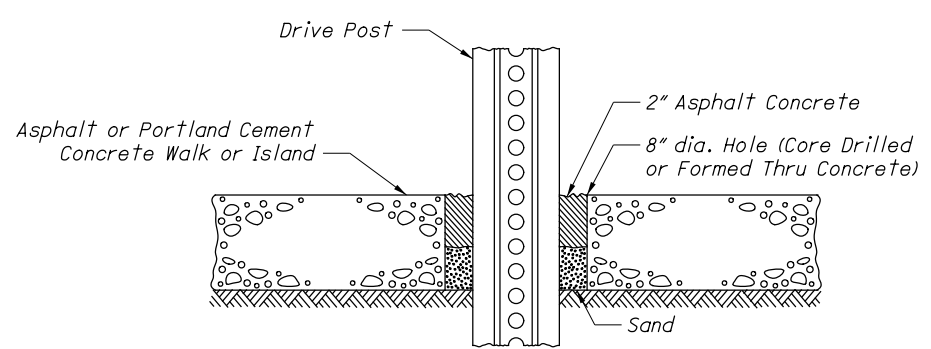
**EXPRESSWAY OR FREEWAY**  
WITH SECONDARY SIGN



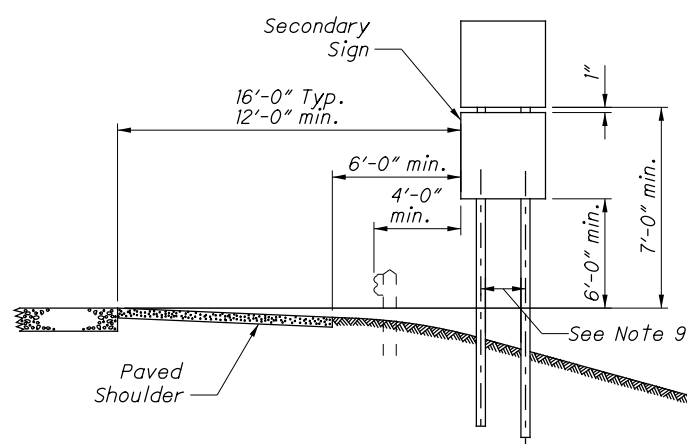
**EXPRESSWAY OR FREEWAY**



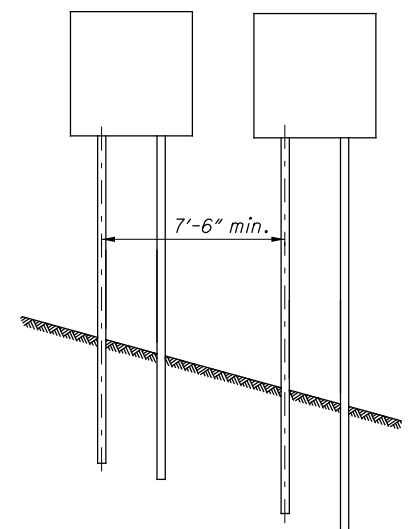
**EXPRESSWAY OR FREEWAY**  
WITH SECONDARY SIGN



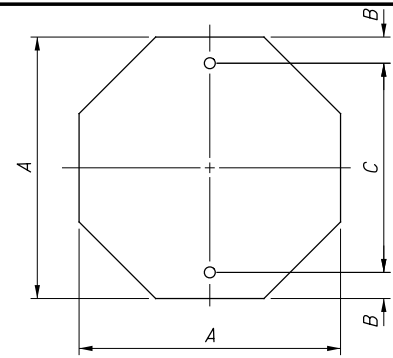
**DETAIL "A"**



**EXPRESSWAY OR FREEWAY**  
WITH SECONDARY SIGN

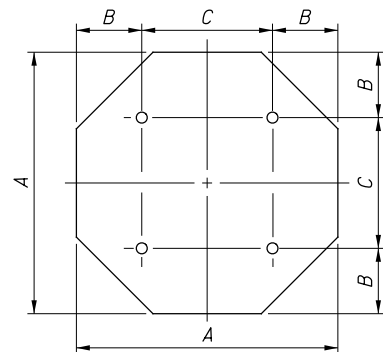


**ADJACENT SIGN INSTALLATION**  
FOR NO. 2 AND NO. 3 YIELDING POST SUPPORTS IN EXPOSED LOCATIONS



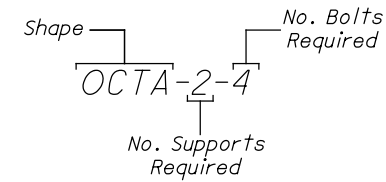
OCTA-1-2

A	B	C	THICKNESS	AREA (FT <sup>2</sup> )
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



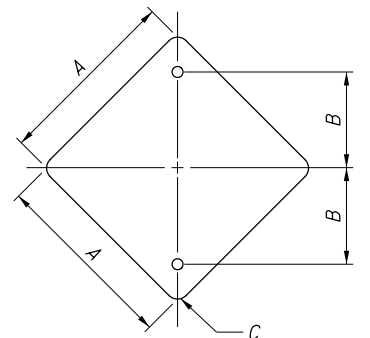
OCTA-2-4

A	B	C	THICKNESS	AREA (FT <sup>2</sup> )
48	9	30	0.100	16.00



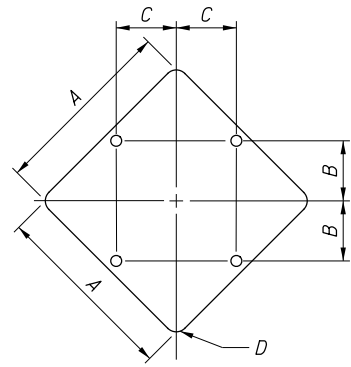
NOTES:

- All bolt holes shall be  $\frac{3}{8}$ " in diameter, and may be drilled or punched to finished size.
- Dimensions between bolt holes shall be to tolerance of  $\pm \frac{1}{32}$ ".
- All route shields shall be 0.080" thick and attached to extrusheet signs with aluminum blind rivets.
- 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.



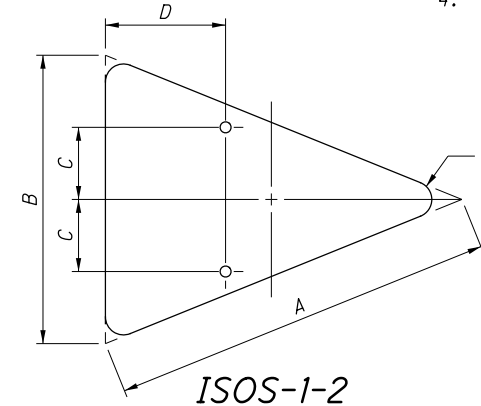
DIA-1-2

A	B	C	THICKNESS	AREA (FT <sup>2</sup> )
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



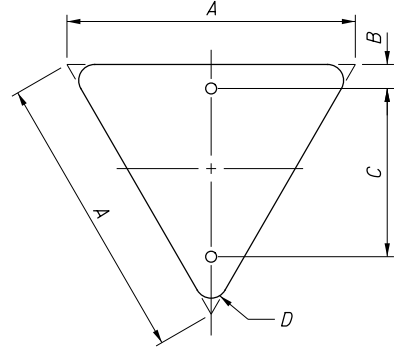
DIA-2-4

A	B	C	D	THICKNESS	AREA (FT <sup>2</sup> )
48	15	15	3	0.100	16.00
60	18	18	3.75	0.100	25.00



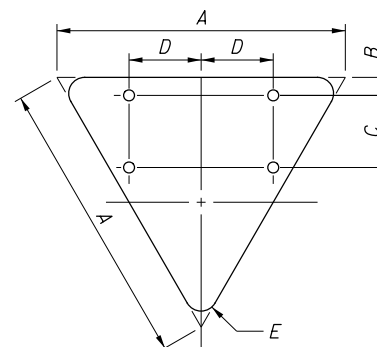
ISOS-1-2

A	B	C	D	E	THICKNESS	AREA (FT <sup>2</sup> )
40	30	7.5	12	1.875	0.080	3.86
48	36	9	15	2.25	0.100	5.56



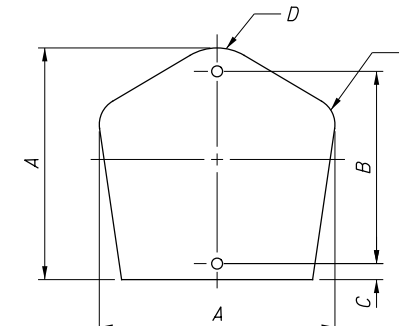
TRI-1-2

A	B	C	D	THICKNESS	AREA (FT <sup>2</sup> )
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



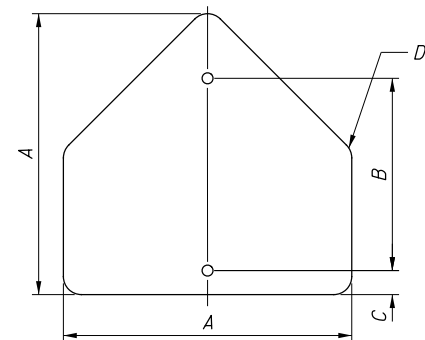
TRI-2-4

A	B	C	D	E	THICKNESS	AREA (FT <sup>2</sup> )
48	3	12	12	3	0.100	6.93
60	3	18	15	4	0.100	10.83



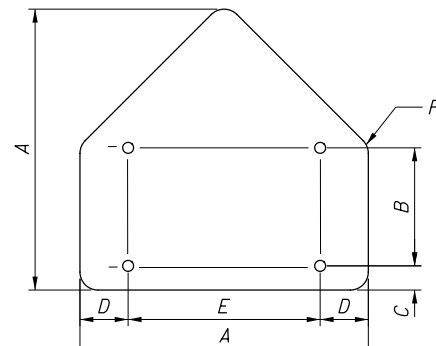
CO-1-2

A	B	C	D	E	THICKNESS	AREA (FT <sup>2</sup> )
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



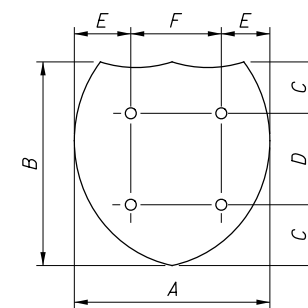
PENT-1-2

A	B	C	D	THICKNESS	AREA (FT <sup>2</sup> )
30	21	3	1.875	0.080	6.25
36	24	3	2.25	0.080	9.00



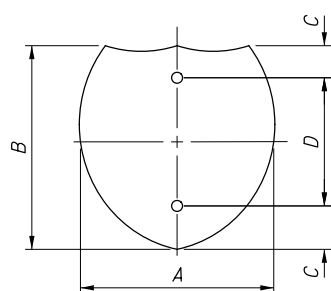
PENT-2-4

A	B	C	D	E	F	THICKNESS	AREA (FT <sup>2</sup> )
48	18	6	9	30	3	0.100	16.00



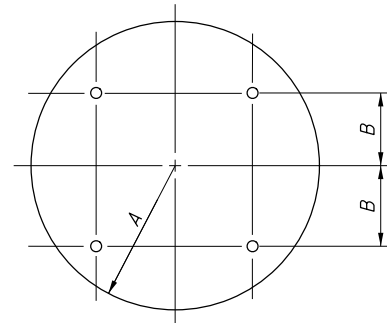
I.S.-2-4

A	B	C	D	E	F	THICKNESS	AREA (FT <sup>2</sup> )
48	48	9	30	9	30	0.100	16.00
60	48	9	30	12	36	0.100	20.00



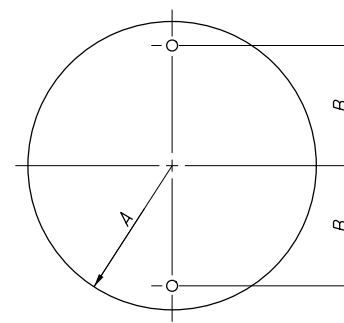
I.S.-1-2

A	B	C	D	THICKNESS	AREA (FT <sup>2</sup> )
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



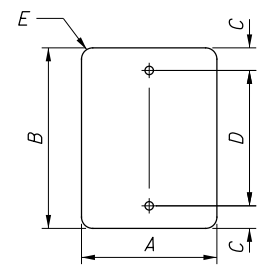
CIR-2-4

A	B	THICKNESS	AREA (FT <sup>2</sup> )
24	15	0.100	16.00

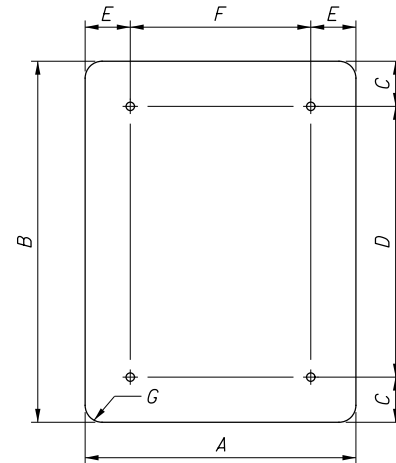


CIR-1-2

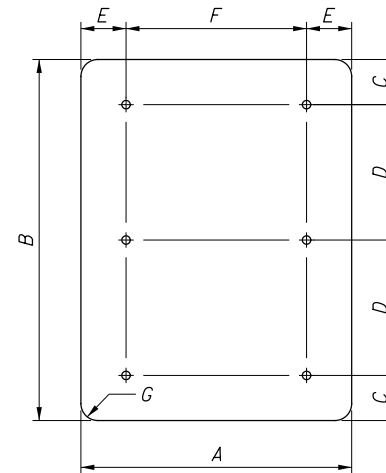
A	B	THICKNESS	AREA (FT <sup>2</sup> )
9	6	0.080	2.25
12	9	0.080	4.00
15	12	0.080	6.25
18	15	0.080	9.00



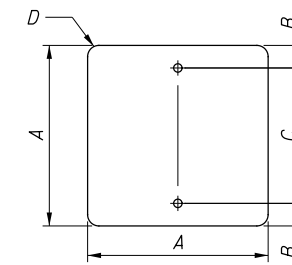
V-REC-1-2



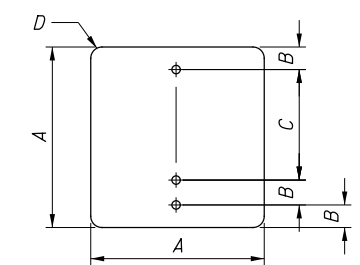
V-REC-2-4



V-REC-2-6



SQ-1-2



SQ-1-3  
(MAINTENANCE MARKER)

A	B	C	D	E	THICKNESS	AREA (FT <sup>2</sup> )
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

A	B	C	D	E	F	G	THICKNESS	AREA (FT <sup>2</sup> )
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

A	B	C	D	E	F	G	THICKNESS	AREA (FT <sup>2</sup> )
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

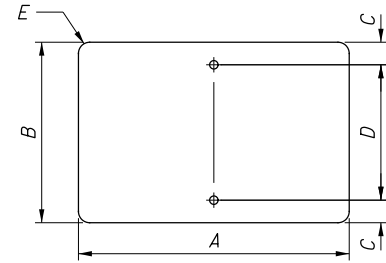
A	B	C	D	THICKNESS	AREA (FT <sup>2</sup> )
6	1.0	3	1.0	0.080	0.25
9	1.0	6	1.0	0.080	0.56
12	1.5	9	1.5	0.080	1.00
15	1.5	12	1.5	0.080	1.56
16	1.5	13	1.5	0.080	1.78
18	3	12	1.5	0.080	2.25
24	3	18	1.5	0.080	4.00
30	3	24	1.875	0.080	6.25
36	3	30	2.25	0.080	9.00

A	B	C	D	THICKNESS	AREA (FT <sup>2</sup> )
12	1	9	1.5	0.08	1



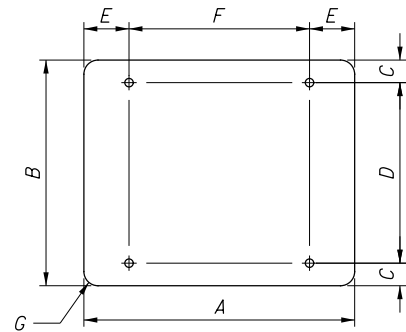
NOTES:

- All bolt holes shall be  $\frac{3}{8}$ " in diameter and may be drilled or punched to finished size.
- Dimensions between bolt holes shall be to tolerance of  $\pm \frac{1}{32}$ ".
- 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.



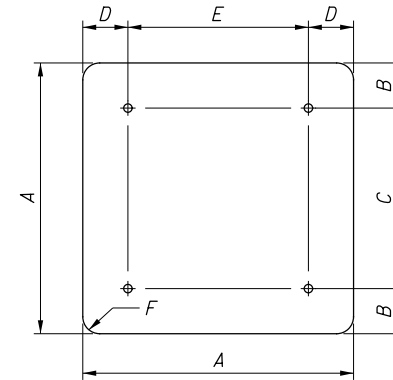
H-REC-1-2

A	B	C	D	E	THICKNESS	AREA (FT <sup>2</sup> )
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



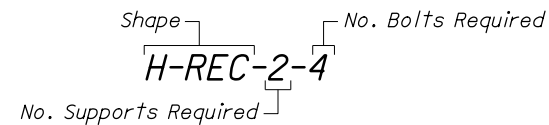
H-REC-2-4

A	B	C	D	E	F	G	THICKNESS	AREA (FT <sup>2</sup> )
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

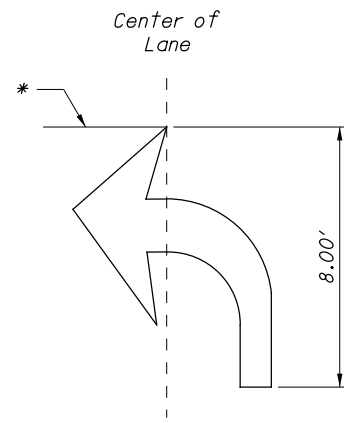
A	B	C	D	E	F	THICKNESS	AREA (FT <sup>2</sup> )
36	6	24	6	24	2.25	0.080	9.00
42	6	30	9	24	2.25	0.080	12.25
48	6	36	9	30	3	0.100	16.00



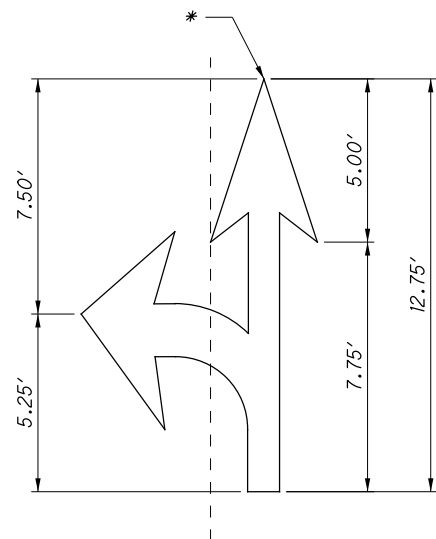
No. Supports Required

NOTES:

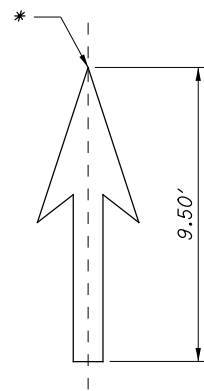
1. All bolt holes shall be  $\frac{3}{8}$ " in diameter and may be drilled or punched to finished size.
2. Dimensions between bolt holes shall be to tolerance of  $\pm \frac{1}{32}$ ".
3. For back-to-back mounting of STOP (R1-1) and DO NOT ENTER (R5-1) sign, follow details shown on Standard Construction Drawing TC-41.50.



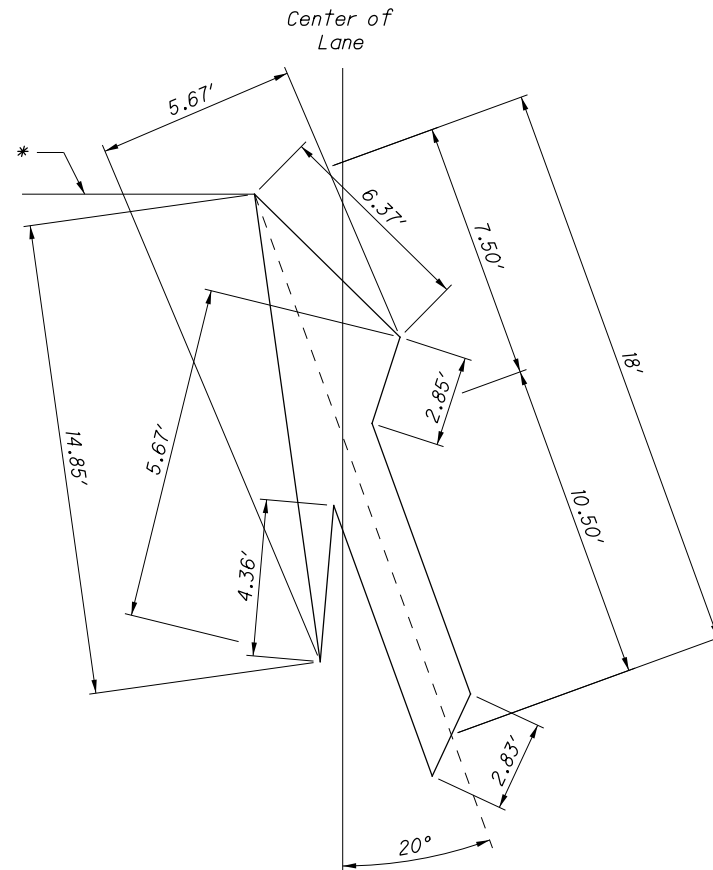
**TURN ARROW**  
(Right Arrow Opposite)



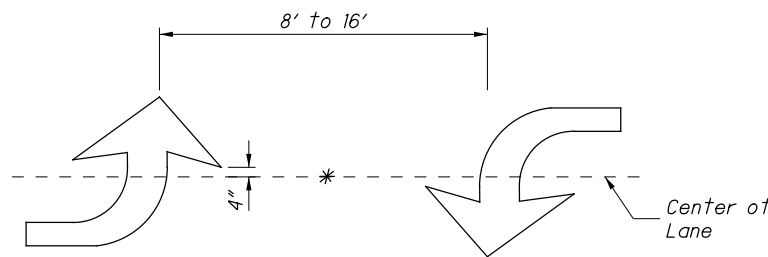
**TURN AND THROUGH ARROW**  
(Three-Headed Directional Arrows Can be Achieved by the Combination of Turn Arrows.)



**THROUGH ARROW**



**LANE-REDUCTION ARROW**  
(For Left Lane, Use Mirror Image)

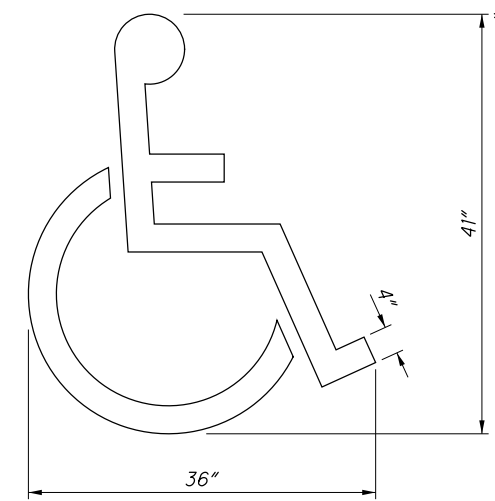


**TWO-WAY LEFT-TURN ARROWS**  
(See Note 6)

**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

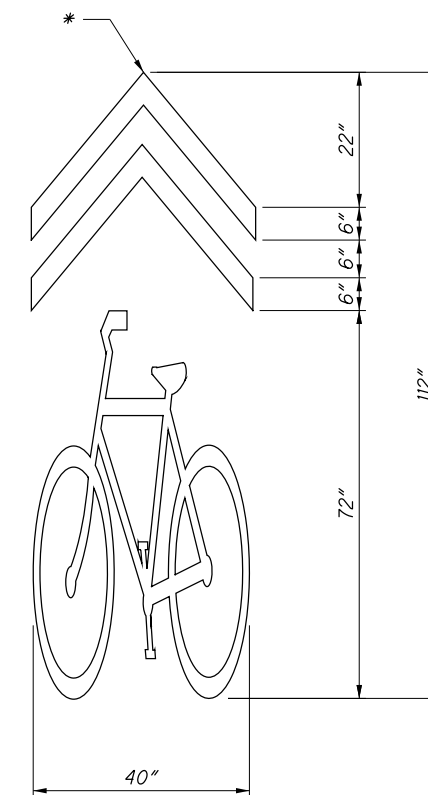
\* - Indicates Station Reference Point



**HANDICAP SYMBOL MARKING**

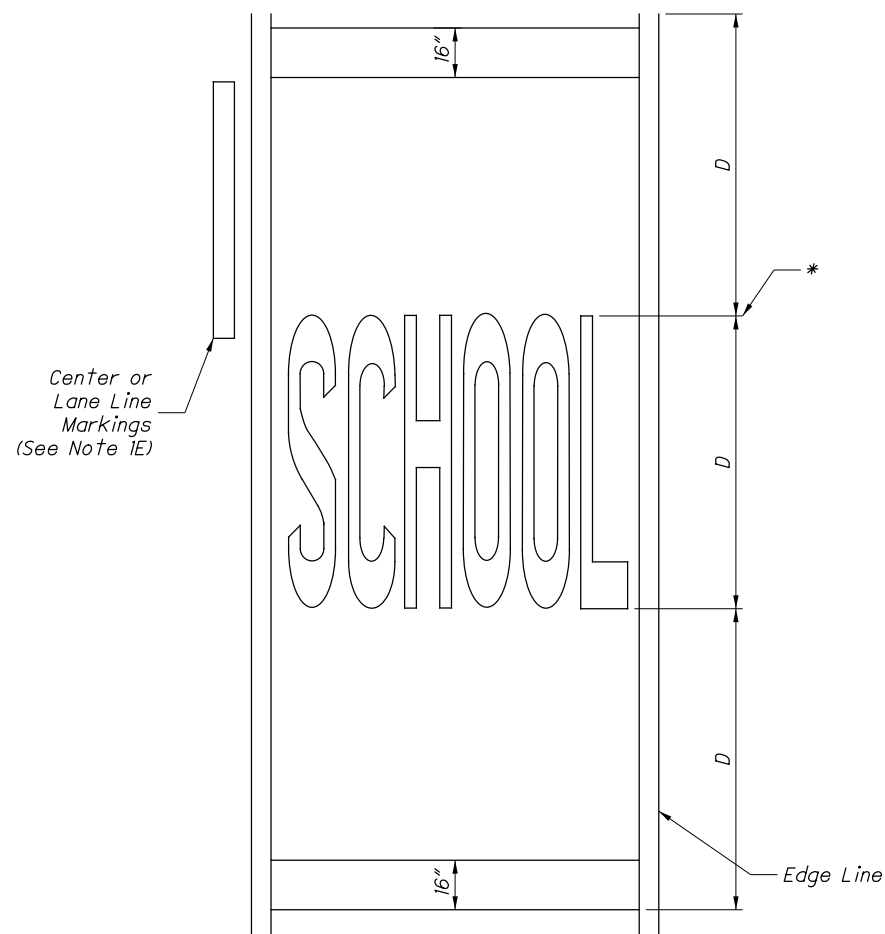
**TABLE 2 - HANDICAP, BIKE & CHEVRON MARKINGS**

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)

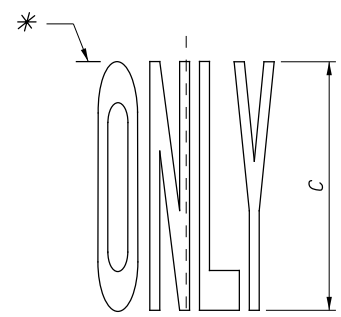


**SHARED LANE MARKING**  
(See Note 7)





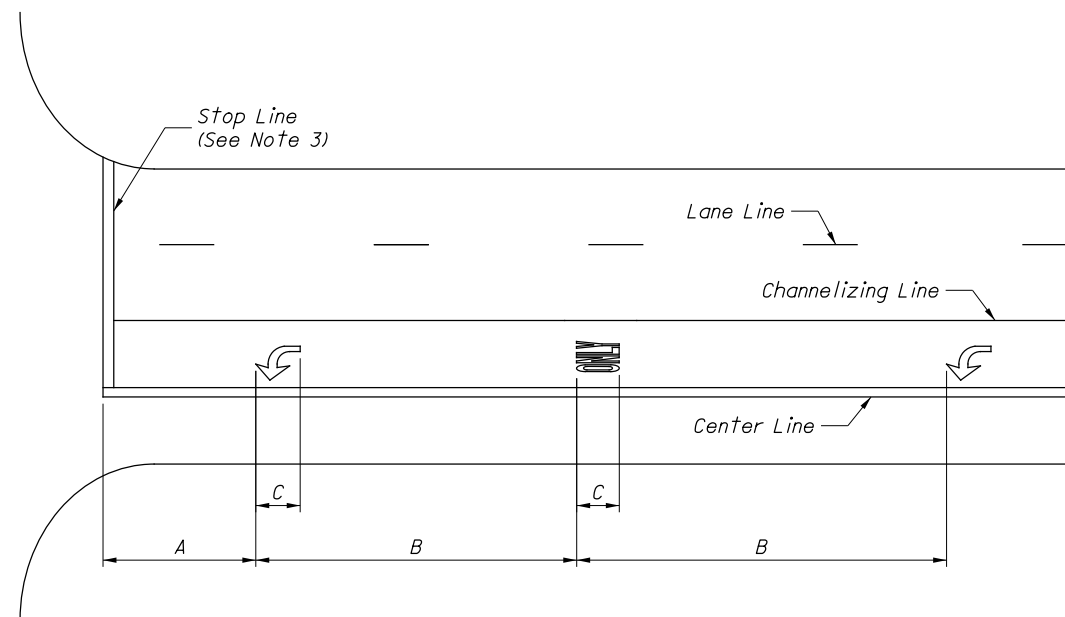
**SCHOOL WORD MARKING**  
(See Note 1)



**ONLY WORD MARKING**  
(See Note 4)

**TABLE 3 - WORDS (SQ FT)**

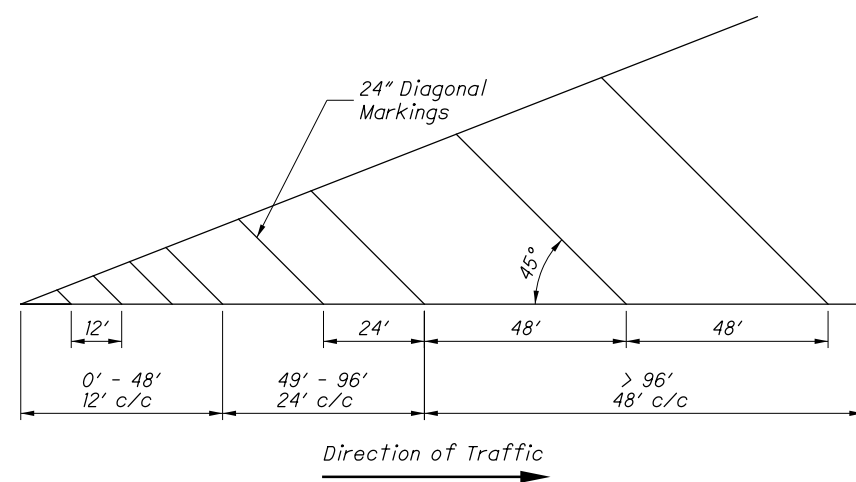
WORD	HEIGHT (C, D)		
	URBAN 6'	RURAL 8'	MULTI-LANE 10'
ONLY (C)	17	23	N/A
SCHOOL (D)	27	37	90



**TABLE 4 - LANE USE MARKINGS**

ROADWAY TYPE	DIMENSIONS (FT)		
	A (MIN.)	B	C
RURAL	30	88	8
URBAN	10	66	6

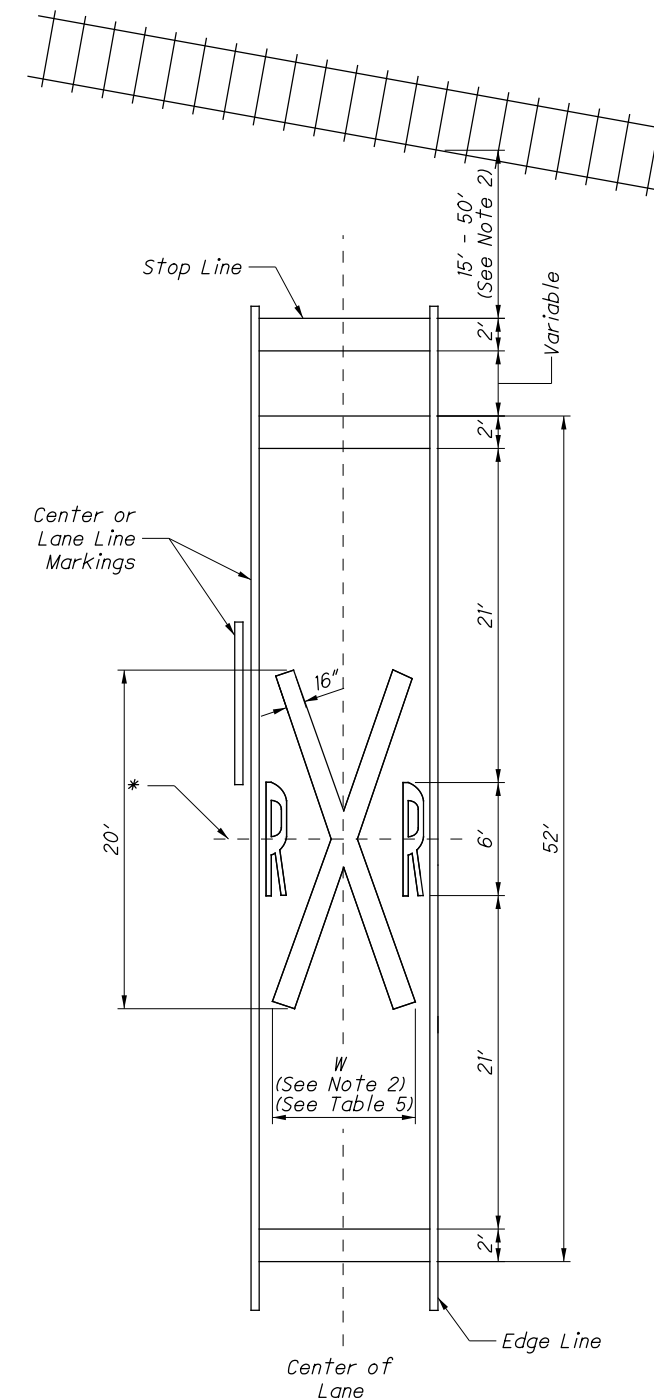
(See Note 5)



**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**

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.

SCD NUMBER

**TC-71.10**

STANDARD ROADWAY CONSTRUCTION DRAWING

**WORD AND SYMBOL PAVEMENT MARKINGS**

**OFFICE OF ROADWAY ENGINEERING**

STCS ENGINEER  
P. Singh

STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
ADMINISTRATOR  
Ryszardo Stangell  
01-17-2014  
DATE

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 approach 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

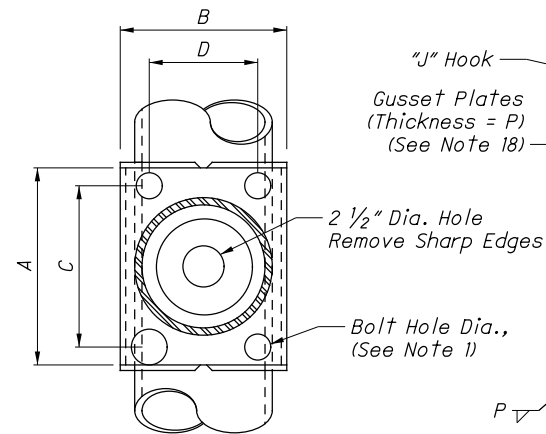
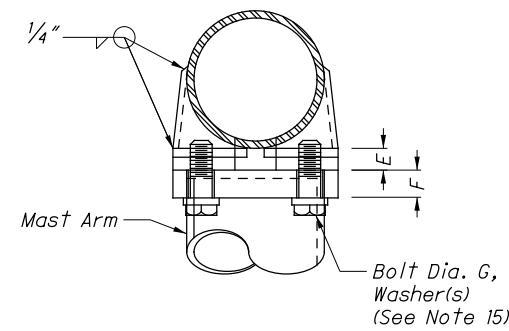
- 5A. Lane-use arrow markings are optional except where a through traffic lane(s) approaching an intersection becomes a mandatory turn lane(s).
- 5B. Where used, the spacing between markings should be based on Table 4 (sheet 2). However, based on the turn lane length, the spacing between the markings may be adjusted.

Two-Way Left-Turn Only (TWLTO) Arrows

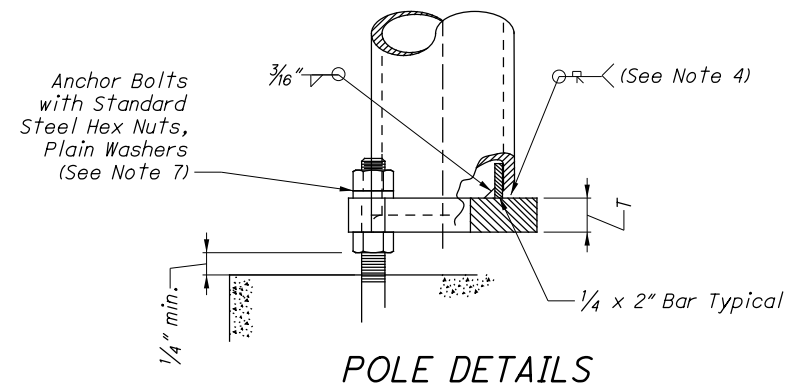
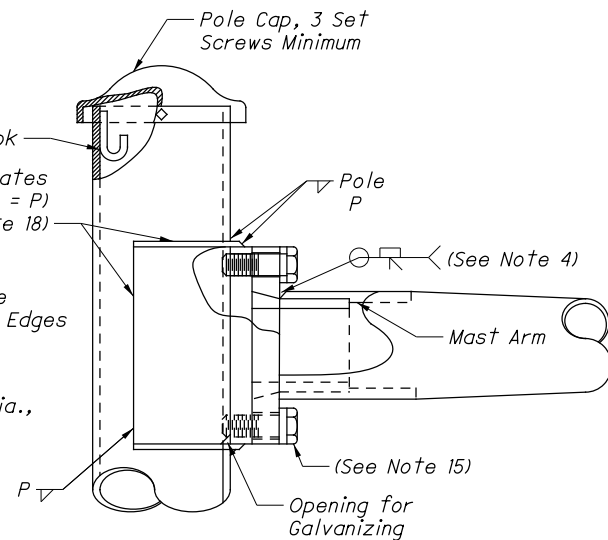
- 6A. Arrow sets should be longitudinally spaced at intervals of:
  - a.) 500' - 1000' for speeds less than or equal to 40 mph,
  - b.) 1000' - 1500' for speeds over 40 mph
- 6B. In addition, an arrow set should be placed:
  - a.) 100' - 200' from the near edge of an intersecting roadway, or
  - b.) Inside both ends of TWLTO lanes.

Shared Lane Marking

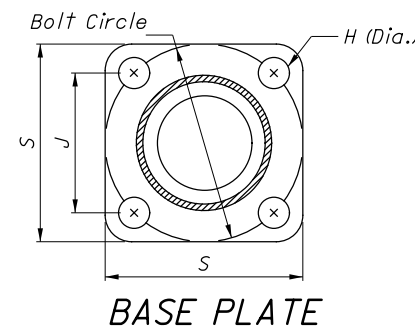
- 7A. When chevron markings are used, its area must be added to the value of the bike symbol markings (see Table 2 on sheet 1).
- 7B. When used, the shared lane marking should be placed immediately after an intersection and spaced at intervals not greater than 250' thereafter.



ARM ATTACHMENT (Typ.)



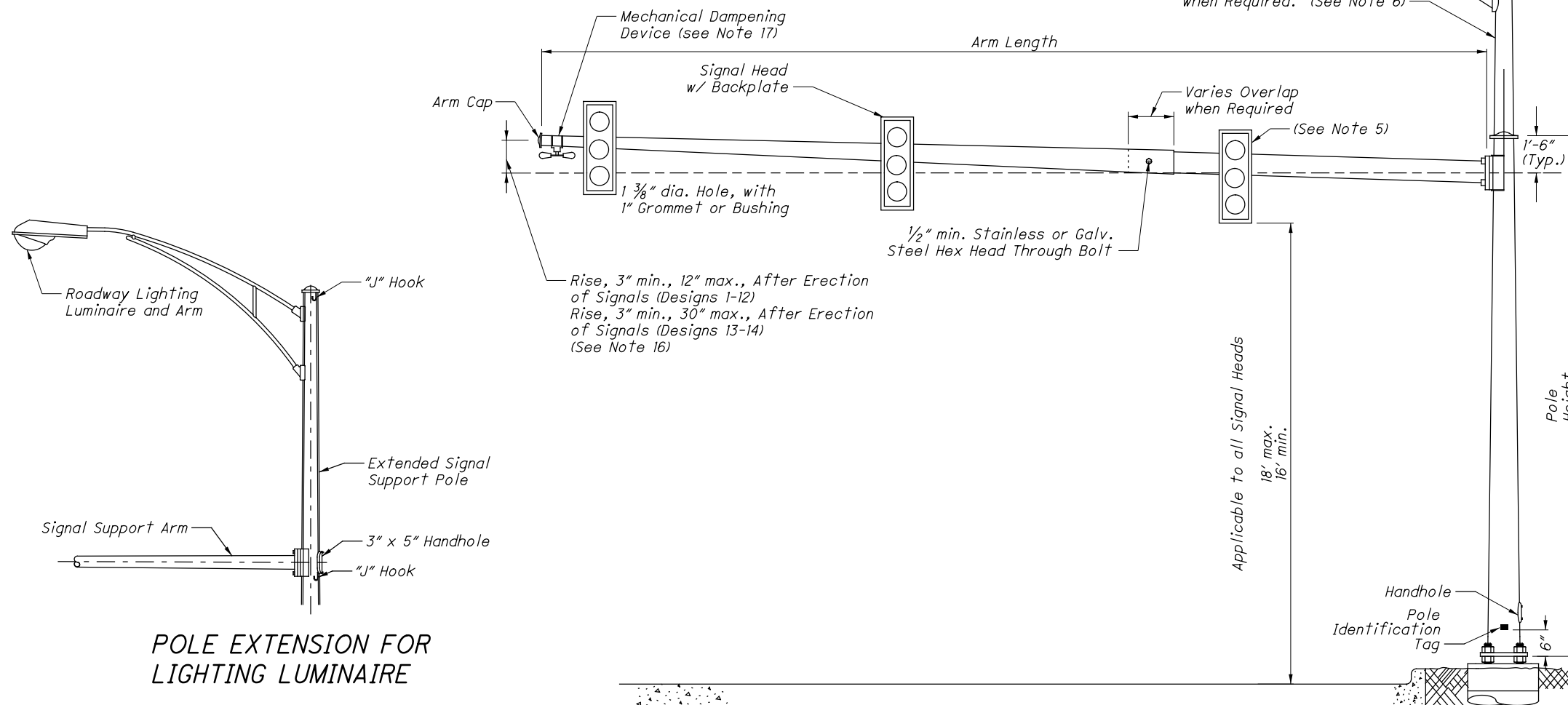
POLE DETAILS



BASE PLATE

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.



POLE EXTENSION FOR LIGHTING LUMINAIRE

These designs use full penetration welds at the arm and base plate connections.

**NOTES:**

- 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'																

THIS DRAWING REPLACES TC-81.21 DATED 07-19-2013.

STANDARD ROADWAY CONSTRUCTION DRAWING

**SINGLE ARM OVERHEAD SIGNAL SUPPORT**

**TC-81.21**

SD NUMBER

2 / 2

**OFFICE OF ROADWAY ENGINEERING**

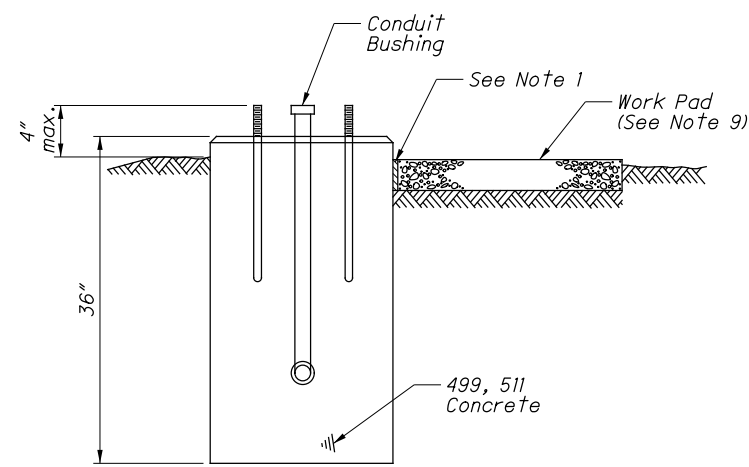
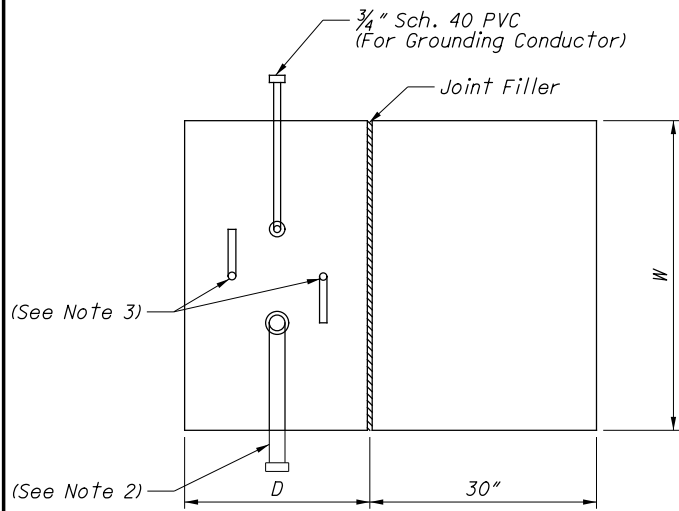
STATE ENGINEER

H. Suter

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

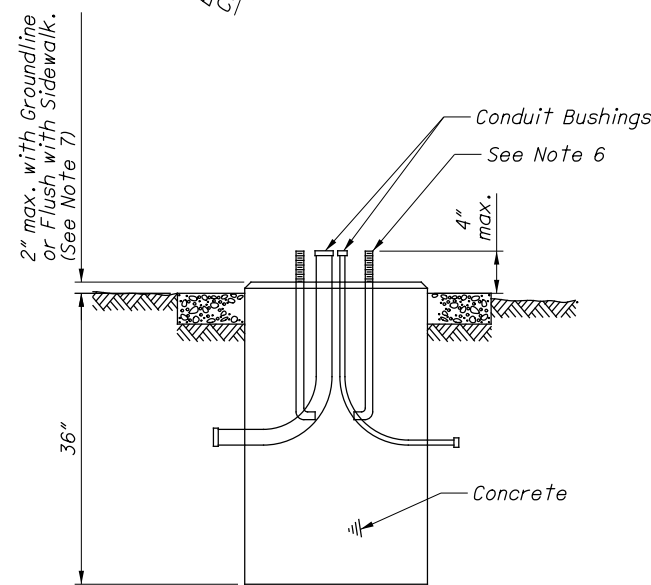
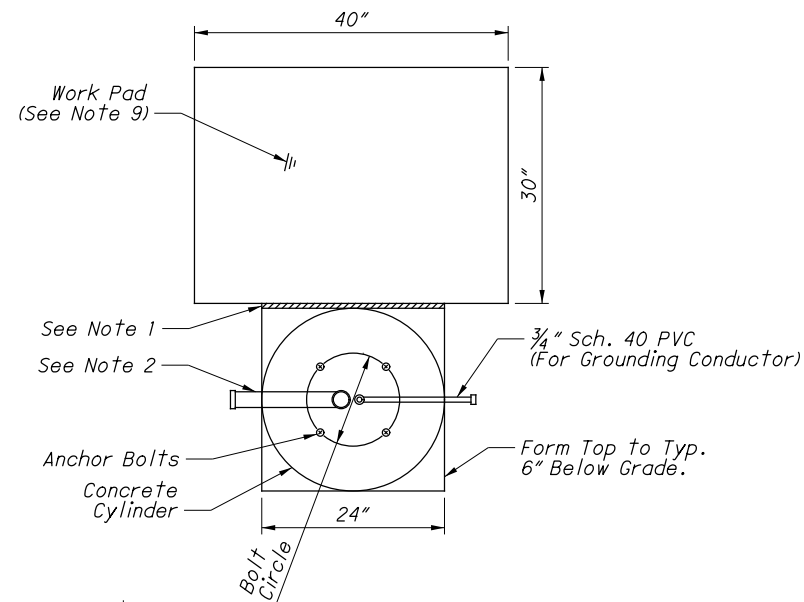
*Ronald Stangell*  
ADMINISTRATOR

01-17-2014  
DATE



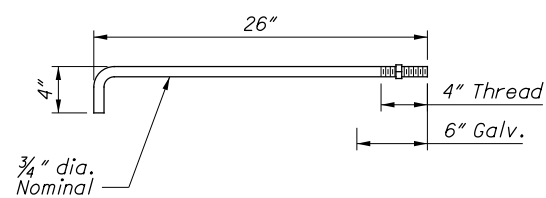
TYPE	W	D	FOUNDATION CONCRETE	WORK PAD
1	40 in	24 in	0.82 C.Y.	0.96 S.Y.
2	50 in	36 in	1.54 C.Y.	1.24 S.Y.

**GROUND-MOUNTED NEMA CABINET FOUNDATION**

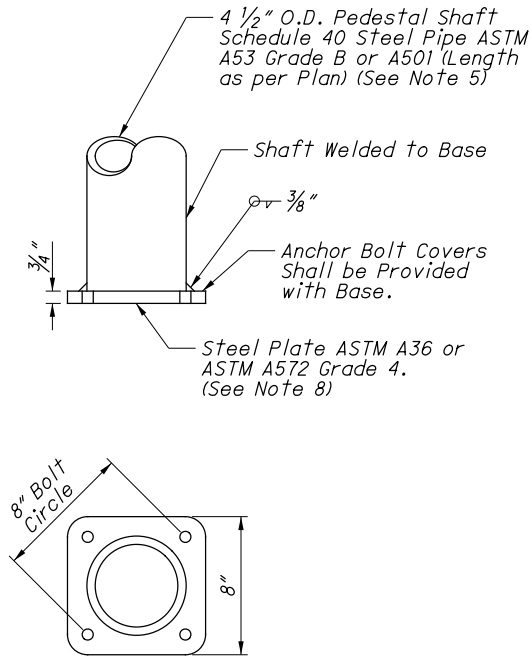


FOUNDATION CONCRETE	WORK PAD
0.42 C.Y.	0.96 S.Y.

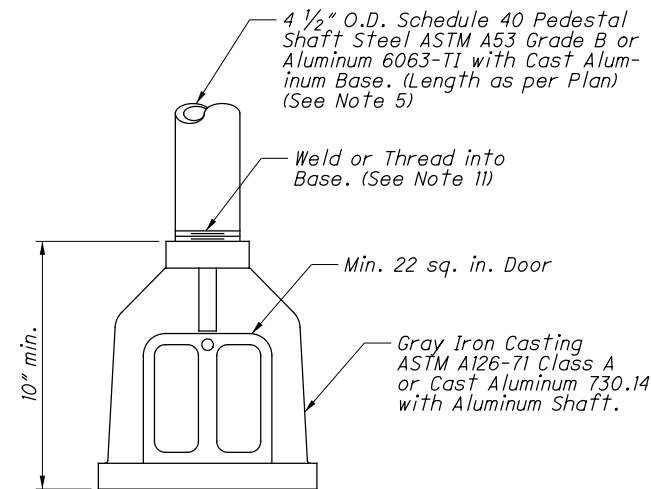
**PEDESTAL FOUNDATION**



**PEDESTAL ANCHOR BOLT  
ASTM A307 STEEL**



**PLATE PEDESTAL BASE**

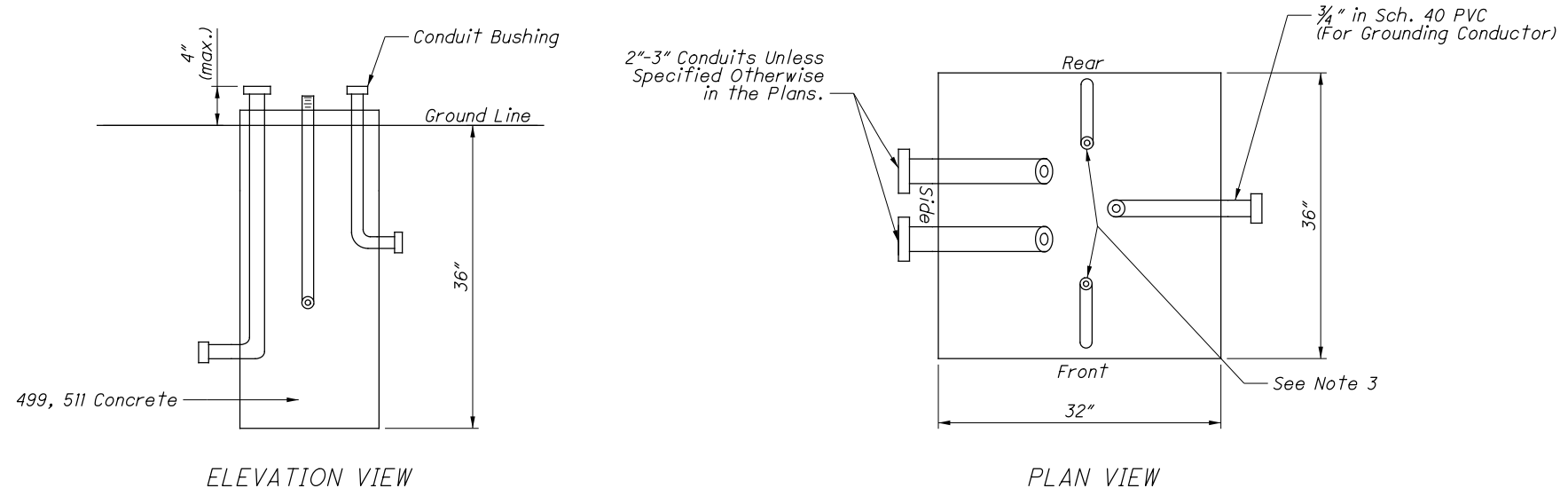


**TRANSFORMER TYPE PEDESTAL BASE**

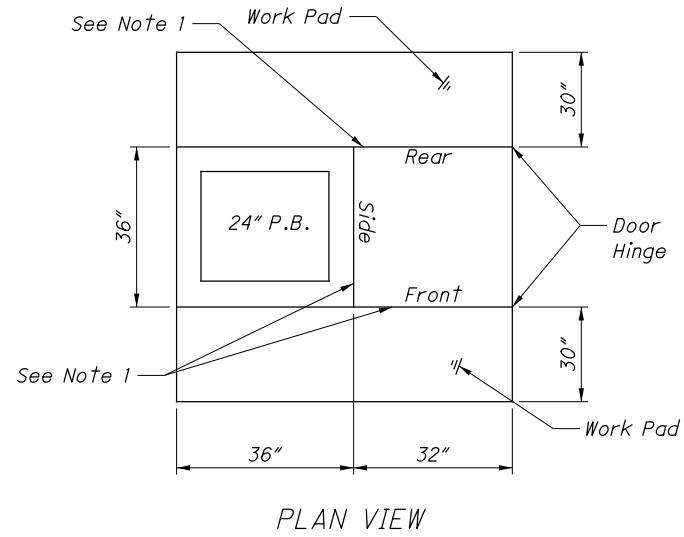
**NOTES:**

- 1/2" preformed joint filler as per CMS 705.03 shall be used between foundations and adjacent paved areas.
- The size, number and orientation of conduit ells shall be as shown in the plan, except that on 3/4" Schedule 40 PVC shall be installed in each foundation.
- The size, number and location of anchor bolts shall be in accordance with the manufacturer's recommendations.
- 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.
- The pedestal shaft length as shown in the plans includes the pedestal base height for either base design.
- 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.
- 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.
- A cast steel anchor base of equivalent strength may be used in lieu of the base plate.
- 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.
- Ground mounted controller cabinets shall be sealed to the foundation with a flexible weatherproof clear, silicone caulking compound.
- 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 1/4" and utilizing nylock or deformed-thread nuts.

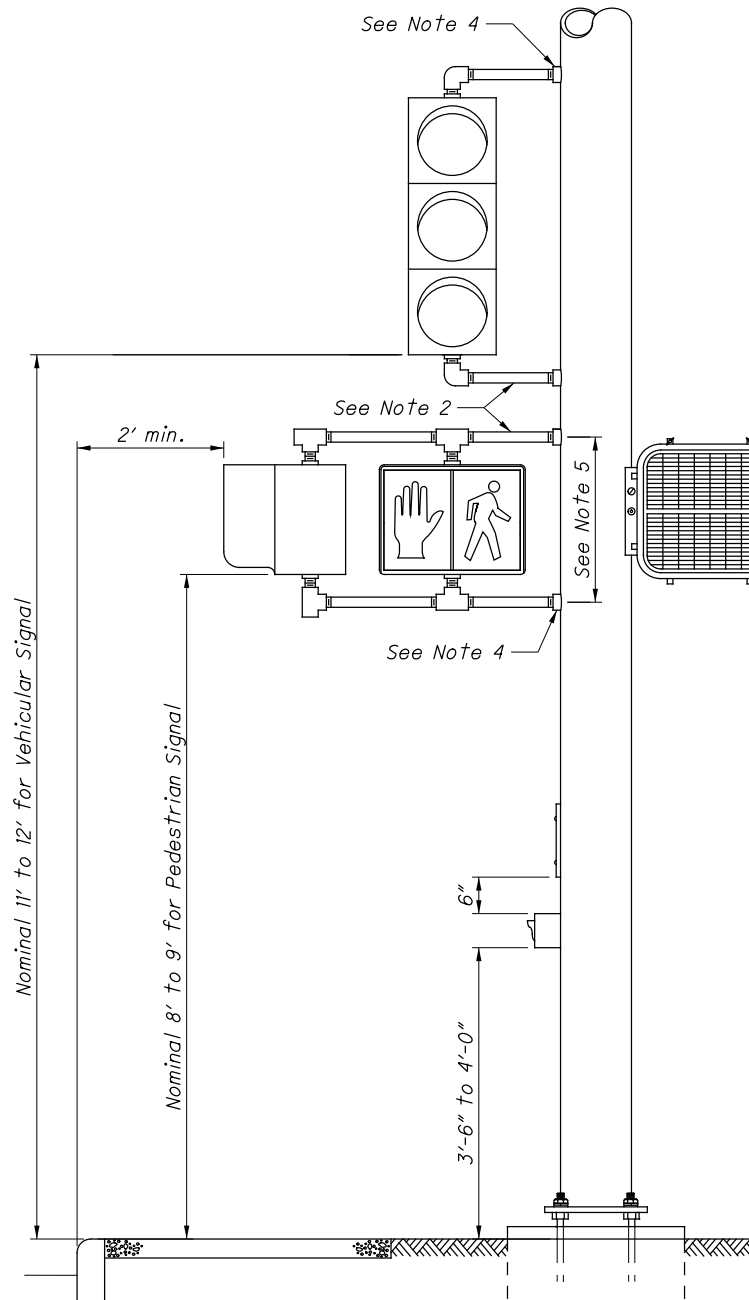
332/336 CABINET FOUNDATION



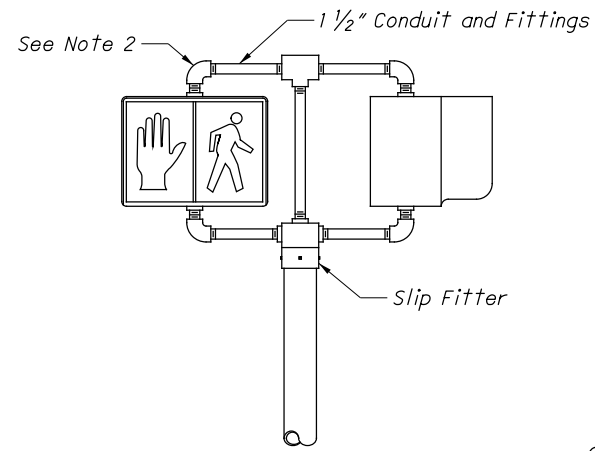
332/336 CONTROLLER WORK PAD  
(See Note 9)



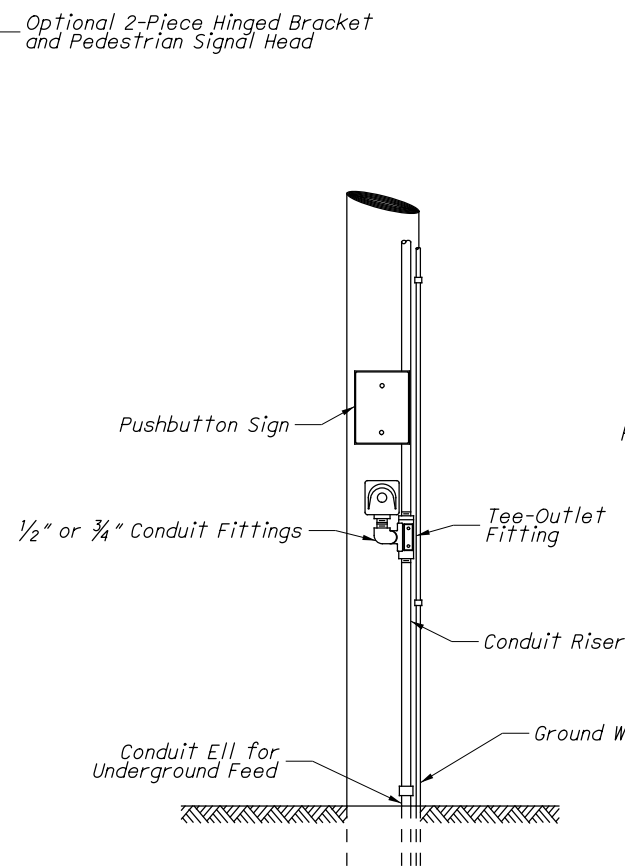
NOTE: Pullbox Shall be Placed on Opposite Side of Door Hinge



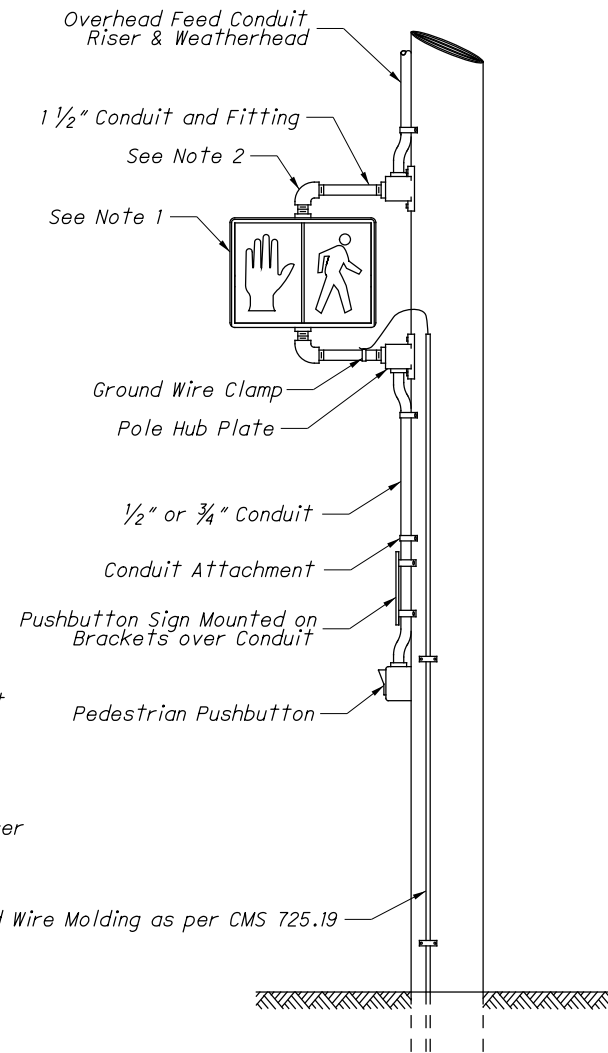
**STEEL POLE DETAIL**  
(See Note 3)



**PEDESTAL MOUNTED SIGNAL HEAD**



**UNDERGROUND FEED**



**OVERHEAD FEED**

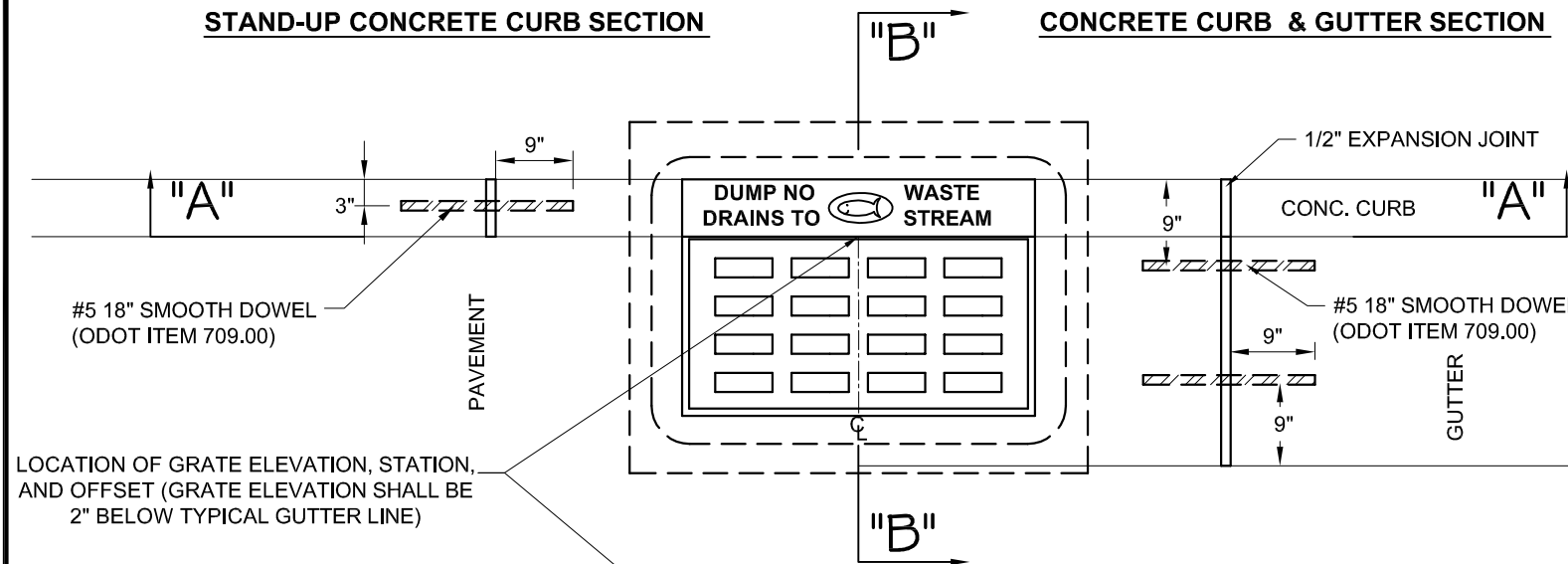
**NOTES:**

1. Vehicular signal heads shall utilize mounting brackets similar to those shown for pedestrian signal heads.
2. Signal head conduit brackets and conduit fittings shall be galvanized and painted (except pole clamps or bands) to match the body of the signal head.
3. For embedded steel poles, external conduit shall be similar to that shown in wood pole detail. External grounding will not be required unless specifically noted on the plans.
4. The signal head bracket arms shall be attached to steel poles by one of the following methods:
  - a. 1 1/2" blind half coupling welded into the pole prior to galvanizing.
  - b. Bracket arm hub plates attached to the pole as per note 7.
  - c. Pole clamp with threaded hub.

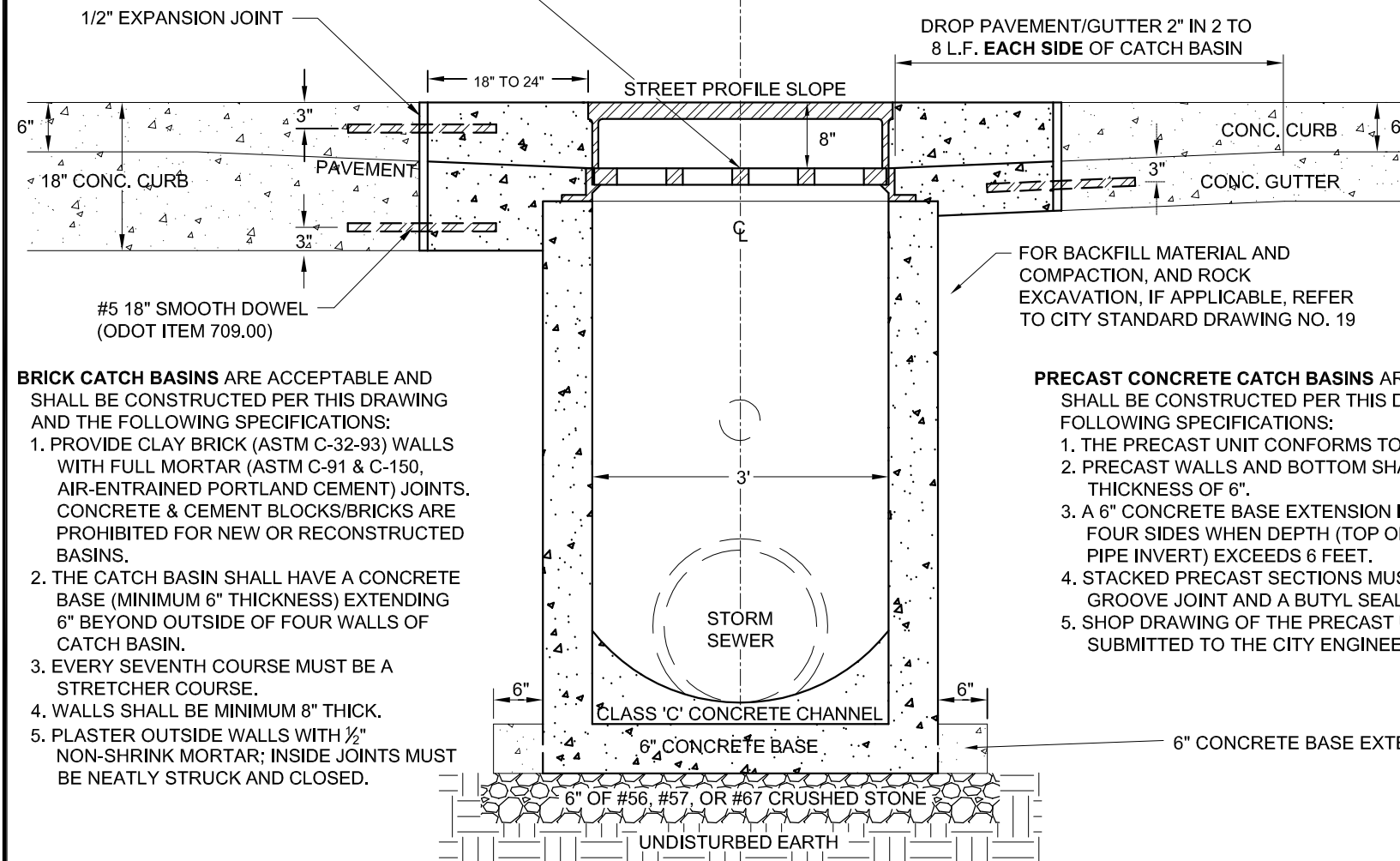
Field installation of the wiring holes for signal heads and pushbuttons will be permitted provided that the holes are drilled or hole sawn. No torch cutting or field welding will be permitted. Cut surfaces shall be filled smooth and covered with two coats of zinc rich paint. Grommets or wiring guides shall be installed in the holes.
5. Vertical spacing between bracket fittings shall be determined by the Contractor, and shall be the dimension from centerline to centerline of the bracket arms necessary to accommodate the vertical height of the signal head plus not more than 10".
6. The following minimum size fasteners shall be used for the attachment of the indicated hardware to wood poles:
  - a. CONDUIT BRACKET ARM HUB PLATES: 1/2" dia. x 3" long lag screws (two screws per hub plate).
  - b. CONDUIT STRAPS (Two hole): 1/4" x 3" long lag screws, #14 x 3" long round head wood screws, or 20d spikes.
  - c. PUSHBUTTON SIGN: with brackets - 3/8" x 3" long lag screws (two per bracket); without brackets - 3/8" x 3" long lag screws with 1/16" I.D. x 1" O.D. flat washer between the sign and pole (two per sign).
  - d. PUSHBUTTON: #14 x 3" long round head wood screws or 1/4" x 3" long lag screws (two per pushbutton).
7. The following minimum size fasteners shall be used for the attachment of the indicated hardware to steel poles:
  - a. CONDUIT BRACKET ARM HUB PLATES: 1/2" dia. screw or 3/4" wide passivated stainless steel band (two fasteners or bands per hub plate).
  - b. CONDUIT: Two hole conduit straps with 1/4" dia. screws or 3/4" wide passivated stainless steel bands.
  - c. PUSHBUTTON SIGN: 3/8" dia. screws (two per sign).
  - d. PUSHBUTTON: 1/4" dia. screws (two per pushbutton).

The screws shall utilize a drilled and tapped hole or be the self-tapping type.

**PLAN VIEW**  
NOT TO SCALE



LOCATION OF GRATE ELEVATION, STATION, AND OFFSET (GRATE ELEVATION SHALL BE 2" BELOW TYPICAL GUTTER LINE)



**SECTION A-A**  
NOT TO SCALE

(PRECAST CONCRETE CATCH BASIN SHOWN)

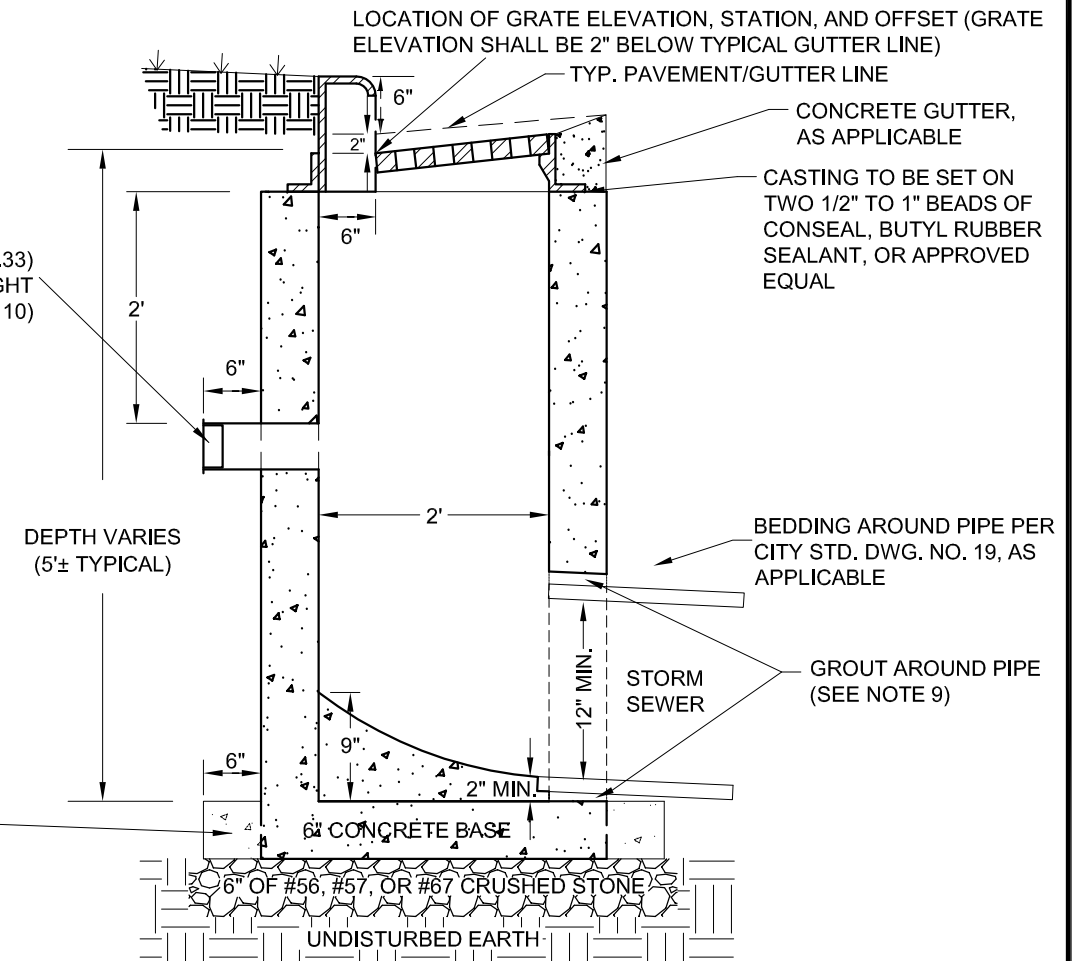
**BRICK CATCH BASINS ARE ACCEPTABLE AND SHALL BE CONSTRUCTED PER THIS DRAWING AND THE FOLLOWING SPECIFICATIONS:**

1. PROVIDE CLAY BRICK (ASTM C-32-93) WALLS WITH FULL MORTAR (ASTM C-91 & C-150, AIR-ENTRAINED PORTLAND CEMENT) JOINTS. CONCRETE & CEMENT BLOCKS/BRICKS ARE PROHIBITED FOR NEW OR RECONSTRUCTED BASINS.
2. THE CATCH BASIN SHALL HAVE A CONCRETE BASE (MINIMUM 6" THICKNESS) EXTENDING 6" BEYOND OUTSIDE OF FOUR WALLS OF CATCH BASIN.
3. EVERY SEVENTH COURSE MUST BE A STRETCHER COURSE.
4. WALLS SHALL BE MINIMUM 8" THICK.
5. PLASTER OUTSIDE WALLS WITH 1/2" NON-SHRINK MORTAR; INSIDE JOINTS MUST BE NEATLY STRUCK AND CLOSED.

**PRECAST CONCRETE CATCH BASINS ARE ACCEPTABLE AND SHALL BE CONSTRUCTED PER THIS DRAWING AND THE FOLLOWING SPECIFICATIONS:**

1. THE PRECAST UNIT CONFORMS TO ODOT ITEM 706.13.
2. PRECAST WALLS AND BOTTOM SHALL HAVE A MINIMUM THICKNESS OF 6".
3. A 6" CONCRETE BASE EXTENSION IS REQUIRED ON ALL FOUR SIDES WHEN DEPTH (TOP OF GRATE TO LOWEST PIPE INVERT) EXCEEDS 6 FEET.
4. STACKED PRECAST SECTIONS MUST HAVE A TONGUE/GROOVE JOINT AND A BUTYL SEALANT.
5. SHOP DRAWING OF THE PRECAST UNIT SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL.

4" PIPE (ODOT ITEM 707.33) STUB WITH WATERTIGHT PLUG OR CAP (SEE NOTE 10)



**SECTION B-B**  
NOT TO SCALE

**NOTES:**

1. ALL WORK SHALL CONFORM TO ODOT ITEM 604 EXCEPT AS OTHERWISE NOTED HEREIN.
2. PRECAST CONCRETE OR BRICK CATCH BASINS ARE ALLOWED AS NOTED HEREIN.
3. ALL CONCRETE SHALL CONFORM TO ODOT ITEM 499 CLASS C (4000 psi).
4. WHEN STREET PROFILE SLOPE IS 5% OR STEEPER, CONSTRUCT CATCH BASIN IN ACCORDANCE WITH CITY STD. DWG. NO. 3.
5. A CONCRETE CHANNEL SHALL BE POURED INTO THE BOTTOM OF THE CATCH BASIN USING CLASS 'C' CONCRETE. THE CHANNEL SHALL TAPER FROM 9" THICKNESS TO 2" MIN. THICKNESS AT THE LOWEST SEWER INVERT AND SHALL BE FINISHED WITH A SMOOTH SURFACE.
6. THE EXCAVATED AREA AROUND THE CATCH BASIN SHALL BE BACKFILLED WITH ODOT ITEM 703.11, TYPE 1 (304, 411, OR 617) COMPACTED IN 8" LIFTS OR ODOT ITEM 613. NO FOUNDRY SAND OR SLAG PERMITTED.
7. EXPANSION JOINT MATERIAL SHALL CONFORM TO ODOT ITEM 705.03. 1" OF JOINT SEALER (705.04) SHALL BE PLACED OVER EXPANSION JOINTS.
8. CASTINGS SHALL BE EAST JORDAN 7030 CURB INLET WITH TYPE T1 BACK AND TYPE M6 VANE GRATE, NEENAH R-3067-L, OR EQUAL APPROVED BY CITY ENGINEER (GRATE USED SHALL NOT BE SPECIFICALLY IDENTIFIED BY MANUFACTURER AS NOT SUITABLE FOR BICYCLE TRAFFIC). THE CASTING BACK (HOOD) MUST INCLUDE "ECO-SENSITIVE" MARKINGS SUCH AS: "DUMP NO WASTE; DRAINS TO STREAM" AND AN AQUATIC LIFE LOGO. THE LETTERING AND LOGO SHALL BE RAISED OR RECESSED AND INTEGRAL WITH THE CASTING OF THE BACK. ALTERNATE NOTATION OR LOGO IS SUBJECT TO THE CITY ENGINEER'S APPROVAL.
9. ALL OPENINGS AND KNOCKOUTS FOR INLET AND OUTLET PIPING SHALL BE FASHIONED NEATLY. ALL ANNULAR SPACE SHALL BE FILLED WITH CEMENT GROUT, BRICK AND MORTAR, OR CLASS 'C' CONCRETE.
10. ONE 4" DIAMETER INLET PIPE SHALL BE INSTALLED ON THE SIDE OF THE CATCH BASIN OPPOSITE THE STREET (AS SHOWN).
11. KNOCK-OUT PANELS ARE NOT ALLOWED UNLESS PRE-APPROVED BY THE CITY ENGINEER.
12. ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.



OFFICE OF THE CITY ENGINEER  
**CANTON, OHIO**

DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

APPROVED DATE: MAR. 2012

APPROVED BY: CDB, RMB, SLH

DRAWING FILE NAME: ce\_01.dwg

**REVISIONS**

DESCRIPTION	DATE	BY

**STANDARD DRAWING NO. 1**

**CURB INLET CATCH BASIN**



**NOTES:**

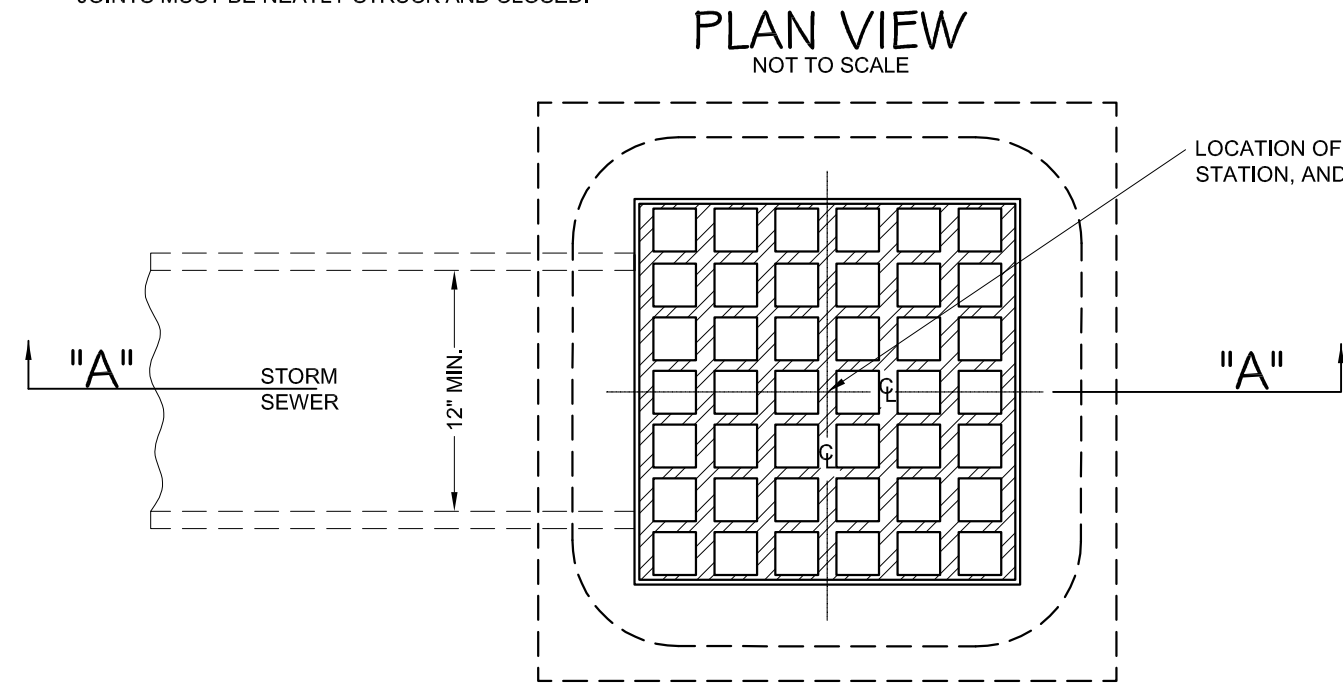
1. ALL WORK SHALL CONFORM TO ODOT ITEM 604 EXCEPT AS OTHERWISE NOTED HEREIN.
2. PRECAST CONCRETE OR BRICK CATCH BASINS ARE ALLOWED AS NOTED HEREIN.
3. IF THE CATCH BASIN WILL BE USED IN A TRAFFIC-BEARING APPLICATION, THE PRECAST CONCRETE PORTION OF AN ODOT 2-2B CATCH BASIN MAY BE USED. HOWEVER, THE INLET FRAME AND GRATE AS SPECIFIED HEREIN SHALL BE USED IN LIEU OF THE ODOT 2-2 "LAY-IN" GRATE. ALL ANNULAR SPACE REMAINING BETWEEN THE BOTTOM OF THE INLET FRAME AND THE TOP OF THE PRECAST SECTION SHALL BE FILLED WITH CEMENT GROUT OR CLASS 'C' CONCRETE. IF THE CATCH BASIN WILL BE USED IN A NON-TRAFFIC-BEARING APPLICATION, AN ODOT 2-2 CATCH BASIN MAY BE USED WITH THE STANDARD "LAY-IN" GRATE.
4. ALL CONCRETE SHALL CONFORM TO ODOT ITEM 499 CLASS C (4000 psi).
5. A CONCRETE CHANNEL SHALL BE POURED INTO THE BOTTOM OF THE CATCH BASIN USING CLASS 'C' CONCRETE. THE CHANNEL SHALL TAPER FROM 9" THICKNESS TO 2" MIN. THICKNESS AT THE LOWEST SEWER INVERT AND SHALL BE FINISHED WITH A SMOOTH SURFACE.
6. THE EXCAVATED AREA AROUND THE CATCH BASIN SHALL BE BACKFILLED WITH ODOT ITEM 703.11, TYPE 1 (304, 411, OR 617) COMPACTED IN 8" LIFTS. NO FOUNDRY SAND OR SLAG PERMITTED.
7. WHERE CATCH BASIN WILL BE LOCATED WITHIN CROSSWALK, AT ADA RAMP, OR IN DESIGNATED BIKE LANE, CASTING SHALL BE EAST JORDAN IRON WORKS (EJIW) 5250 INLET WITH V-5622080 ADA GRATE OR NEENAH R-3405-A INLET WITH TYPE 'L' GRATE, OR EQUAL APPROVED BY CITY ENGINEER. AS APPLICABLE, GRATE SHALL BE ORIENTED SUCH THAT THE LONG OPENINGS ARE PERPENDICULAR TO NORMAL DIRECTION OF BICYCLE TRAFFIC FLOW. IN OTHER LOCATIONS, CASTING SHALL BE EJIW 5250 OR NEENAH R-3405 INLET AND STANDARD GRATE MAY BE USED. IN ALL LOCATIONS, GRATE MUST INCLUDE "ECO-SENSITIVE" MARKINGS SUCH AS: "DUMP NO WASTE; DRAINS TO STREAM" AND AN AQUATIC LIFE LOGO. THE LETTERING AND LOGO SHALL BE RAISED OR RECESSED AND INTEGRAL WITH THE CASTING. ALTERNATE NOTATION OR LOGO IS SUBJECT TO THE CITY ENGINEER'S APPROVAL.
8. ALL OPENINGS AND KNOCKOUTS FOR INLET AND OUTLET PIPING SHALL BE FASHIONED NEATLY. ALL ANNULAR SPACE SHALL BE FILLED WITH CEMENT GROUT, BRICK AND MORTAR, OR CLASS 'C' CONCRETE.
9. ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.

**BRICK CATCH BASINS ARE ACCEPTABLE AND SHALL BE CONSTRUCTED PER THIS DRAWING AND THE FOLLOWING SPECIFICATIONS:**

1. PROVIDE CLAY BRICK (ASTM C-32-93) WALLS WITH FULL MORTAR (ASTM C-91 & C-150, AIR-ENTRAINED PORTLAND CEMENT) JOINTS. CONCRETE & CEMENT BLOCKS/BRICKS ARE PROHIBITED FOR NEW OR RECONSTRUCTED BASINS.
2. THE CATCH BASIN SHALL HAVE A CONCRETE BASE (MINIMUM 6" THICKNESS) EXTENDING 6" BEYOND OUTSIDE OF FOUR WALLS OF CATCH BASIN.
3. EVERY SEVENTH COURSE MUST BE A STRETCHER COURSE.
4. WALL SHALL BE MINIMUM 8" THICK.
5. PLASTER OUTSIDE WALLS WITH 1/2" NON-SHRINK MORTAR; INSIDE JOINTS MUST BE NEATLY STRUCK AND CLOSED.

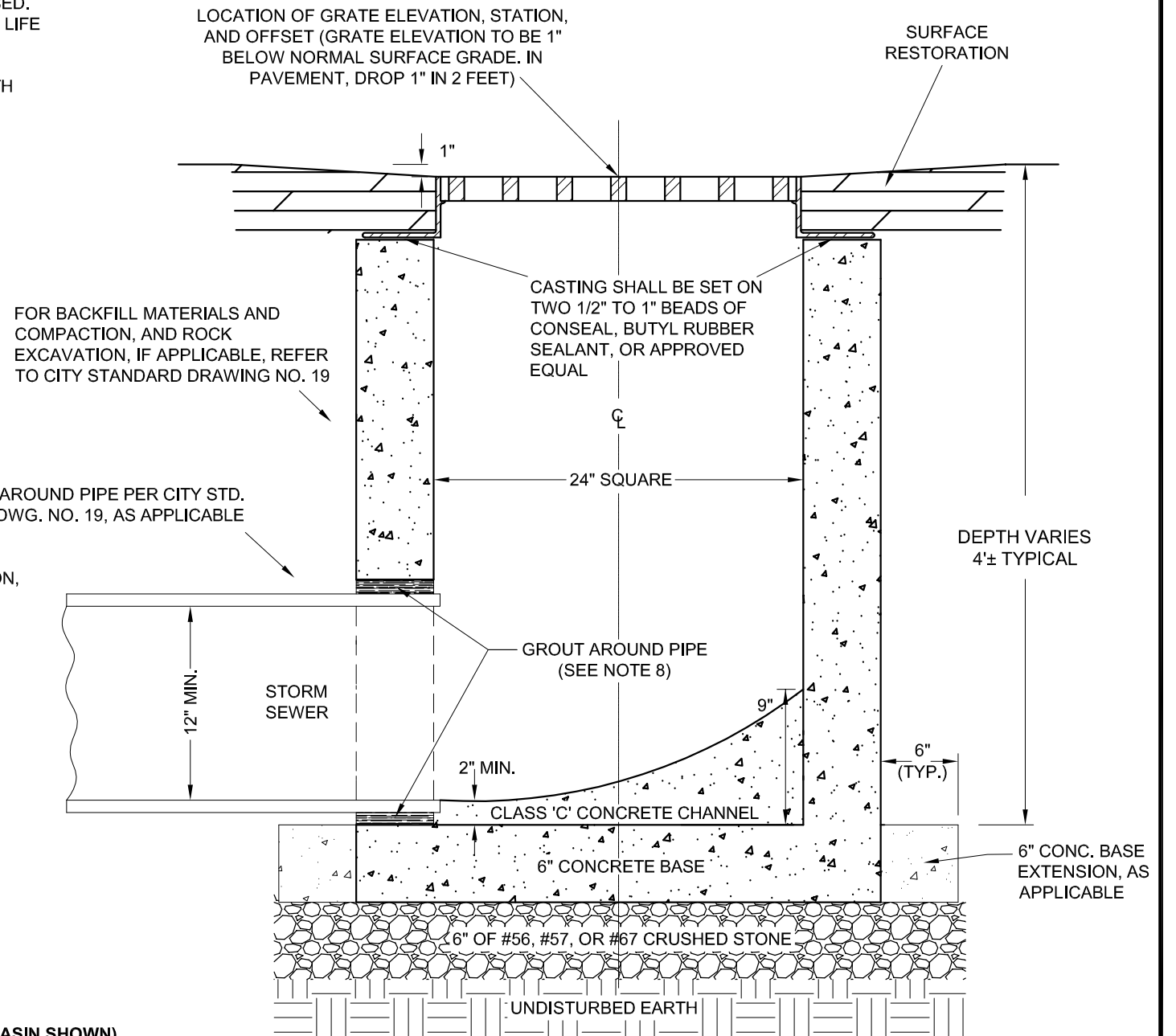
**PRECAST CONCRETE CATCH BASINS ARE ACCEPTABLE AND SHALL BE CONSTRUCTED PER THIS DRAWING AND THE FOLLOWING SPECIFICATIONS:**

1. THE PRECAST UNIT SHALL CONFORM TO ODOT ITEM 706.13.
2. PRECAST WALLS AND BOTTOM SHALL HAVE A MINIMUM THICKNESS OF 6".
3. A 6" CONCRETE BASE EXTENSION IS REQUIRED ON ALL FOUR SIDES WHEN DEPTH (TOP OF GRATE TO LOWEST PIPE INVERT) EXCEEDS 6 FEET.
4. STACKED PRECAST SECTIONS MUST HAVE A TONGUE/ GROOVE JOINT AND A BUTYL SEALANT.
5. SHOP DRAWING OF THE PRECAST UNIT SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL.



(PRECAST CONCRETE CATCH BASIN SHOWN)

**SECTION A-A**  
NOT TO SCALE



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**CANTON, OHIO**  
DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

APPROVED DATE: MAR. 2012

APPROVED BY: CDB, RMB, SLH

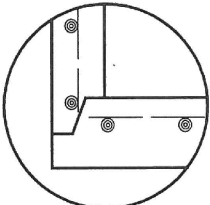
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**REVISIONS**

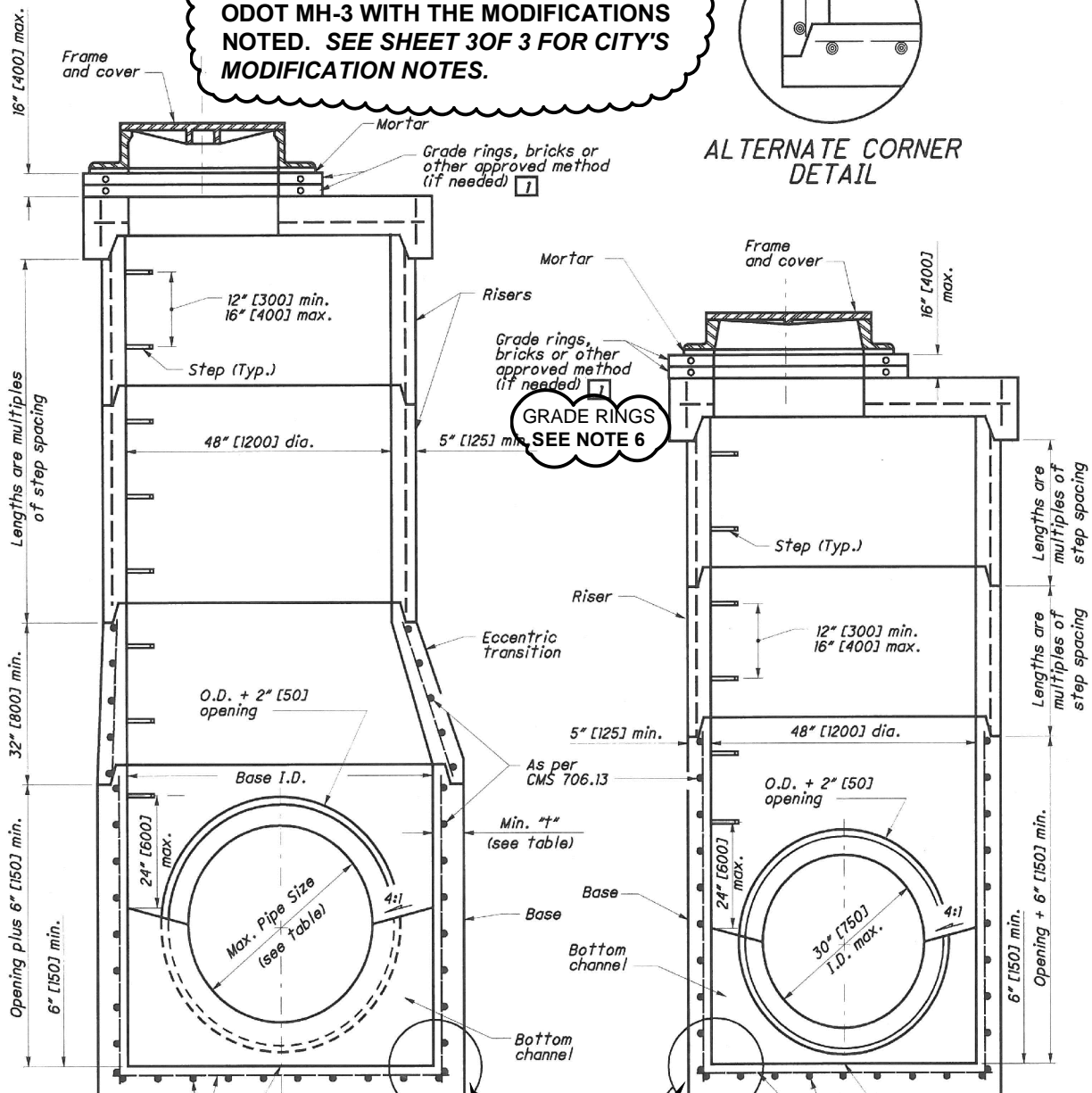
DESCRIPTION	DATE	BY

**STANDARD DRAWING NO. 4**  
**SQUARE-TOP CATCH BASIN**

THE CITY'S STANDARD MANHOLE FOR SANITARY AND STORM SEWERS IS THE ODOT MH-3 WITH THE MODIFICATIONS NOTED. SEE SHEET 3 OF 3 FOR CITY'S MODIFICATION NOTES.



ALTERNATE CORNER DETAIL



SET MANHOLE STRUCTURES ON 6" OF AASHTO M 43 NO. 56,57, OR 67 CRUSHED STONE SET ON UNDISTURBED EARTH.

60" to 108" [1500 to 2750] PRECAST BASE  
SEE TABLE FOR MAXIMUM PIPE SIZES

6" BASE EXTENSION  
SEE NOTE 3

48" [1200] PRECAST BASE  
FOR 30" [750] AND SMALLER PIPE

SECTION VIEWS OF REINFORCED PRECAST MANHOLES

NOTES

- GENERAL: With normal soil and site conditions, this standard precast manhole may be used for any required manhole depth. Sections of the precast manhole shall be cast and assembled with either all tongue or all groove ends up. Lift holes may be provided in each section for handling. Handling device for the flat slab shall be left in place.
- TOP: This section shall be a flat slab, unless an eccentric cone is specified.
- TRANSITION (OR REDUCER): This section can be either eccentric cone or flat slab.
- BASE: Manhole No. 3 is shown with a monolithic floor and riser which may be cast in one or two operations. A permissible alternate is to cast and ship the floor and barrel separately. Openings for inlet and outlet pipes shall be provided, either when the unit is cast or later, to meet project requirements. Bottom channels may be formed of concrete, precast in the base or field constructed as shown on SCD MH-1.1 and MH-3.1.
- RISER SECTIONS: Openings for 18" [450] and smaller inlet pipes may be either prefabricated, or cut in the field provided the sides of the pipe at the springline do not project into the manhole.
- CONNECTIONS: Connections between precast manhole sections, and pipes on sanitary sewers, may be sealed with resilient connectors conforming to ASTM C 923.
- JOINT SEAL: Seal between precast manhole sections on sanitary sewers shall be resilient and flexible gasket joints per CMS 706.11.
- OPENINGS: The maximum pipe opening shall be the O.D. of the pipe being supplied plus 2" [50] when fabricated or field cuts. Fill any voids per CMS 601.
- MATERIALS: Materials for bases and other precast sections, including reinforcement not specified hereon, shall comply with the requirements of CMS 706.13.
- DROP PIPE: When specified on the plans, drop pipe shall be constructed as shown on SCD MH-3.1.
- STEPS, FRAMES AND COVERS: Shall comply with the requirements set forth on SCD MH-1.1.
- TOP SLAB REBAR: Reinforcing steel used within the top slab shall be epoxy coated.

- SEE NOTE 1
- SEE NOTE 2
- SEE NOTE 2
- SEE NOTE 3
- SEE NOTE 4
- SEE NOTE 4
- SEE NOTE 4
- SEE NOTE 4
- SEE NOTE 5

LEGEND

1 Reconstruction to grade only. Approved materials are kept on file by the Office of Materials Management.

MAXIMUM PIPE SIZES		
BASE I.D.	MIN. #"	MAX. PIPE SIZE
60" [1500]	5" [125]	36" [900]
72" [1800]	6" [150]	48" [1200]
84" [2100]	7" [175]	54" [1350]
90" [2250]	7 1/2" [190]	60" [1500]
96" [2400]	8" [200]	66" [1650]
108" [2750]	9" [230]	72" [1800]

STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 REVISIONS: 7-20-01, 7-19-02, 7-15-05, 1-20-06  
 ROADWAY HYDRAULIC ENGINEER: J. Stojns  
 OFFICE OF STRUCTURAL ENGINEERING: MANHOLE No. 3  
 SCD NUMBER: MH-1.2  
 1/2

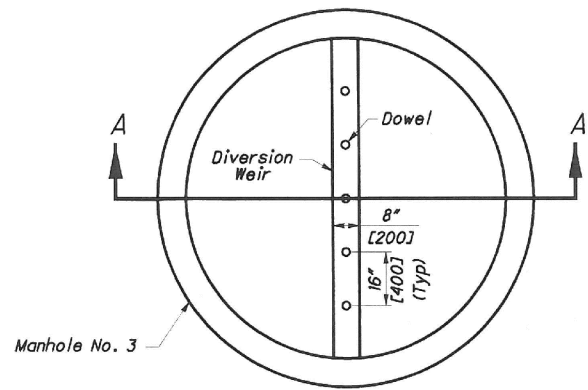


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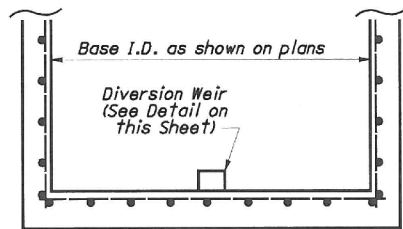
APPROVED DATE: JAN 2012  
 APPROVED BY: CDB, RMB, SLH  
 DRAWING FILE NAME: ce\_10.dwg

REVISIONS		
DESCRIPTION	DATE	BY

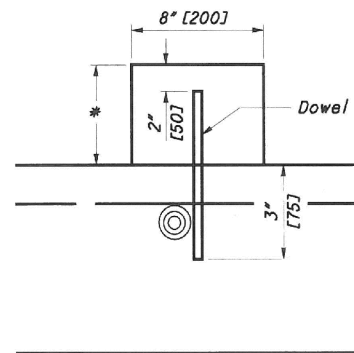
STANDARD DRAWING NO. 10  
 PRECAST STORM OR  
 SANITARY MANHOLE  
 SHEET 1 OF 3



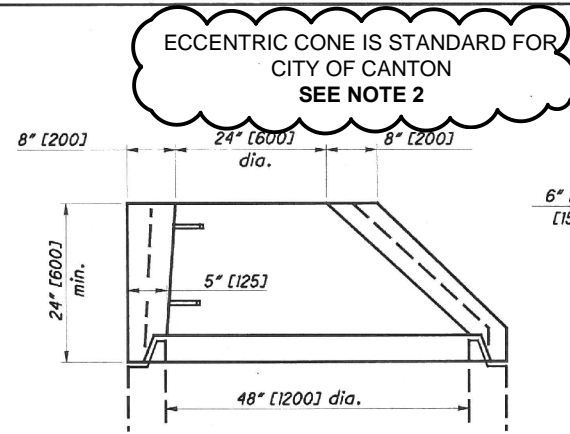
MANHOLE NO. 3 W/  
 " BASE I.D. AND " WEIR  
 (NTS)



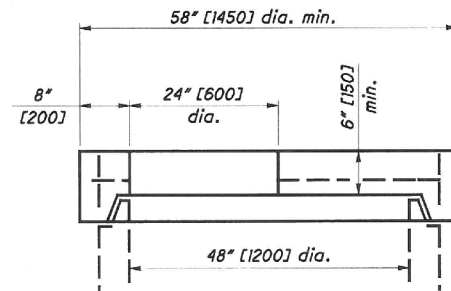
SECTION A-A  
 (NTS)



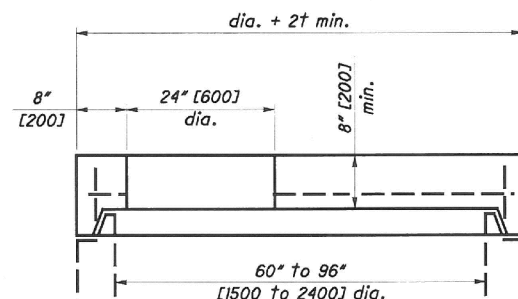
\* Furnish weir height as shown in plans.  
 DIVERSION WEIR DETAIL  
 (NTS)



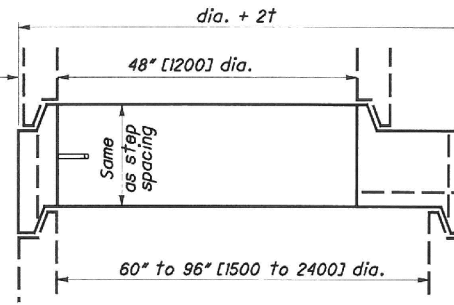
ALTERNATE  
 ECCENTRIC CONE TOP  
 (Only if specified)



FLAT SLAB TOP  
 ONLY IF SPECIFIED  
 SEE NOTE 2



FLAT SLAB TOP  
 ONLY IF SPECIFIED  
 SEE NOTE 2



FLAT SLAB TRANSITION  
 ONLY IF SPECIFIED  
 SEE NOTE 2

THE CITY'S STANDARD MANHOLE FOR  
 SANITARY AND STORM SEWERS IS THE  
 ODOT MH-3 WITH THE MODIFICATIONS  
 NOTED. SEE SHEET 3 OF 3 FOR CITY'S  
 MODIFICATION NOTES.

NOTES

MANHOLE NO. 3 W/ " BASE I.D. AND " DIVERSION WEIR:  
 Furnish manhole base with precast diversion weir or con-  
 struct diversion weir from Structure Concrete, Class C  
 or Brick and Masonry Units conforming to CMS 604. A bot-  
 tom channel section for the manhole is not required when  
 a diversion weir is specified on the plans.

Place diversion weir perpendicular to flow of inflowing  
 trunk sewer. Dowel concrete or masonry units into the  
 base of the manhole to a depth of 3" [75] using epoxy  
 coated #4 reinforcing bars. Start dowels at the center  
 of the diversion weir and space 16" [400] on center across  
 the entire weir.

All materials and labor, including excavation and backfill,  
 shall be paid for at the contract price for ITEM 604 -  
 MANHOLE NO. 3 WITH " BASE I.D. AND " DIVERSION WEIR.

C:\p\Construction Drawings\SCD\Hydraulics\MH\WH1\_2\_jan06\_v8.dwg 03-OCT-2008 10:46AM /chweck

STATE OF OHIO DEPARTMENT OF TRANSPORTATION	STATE INDRUALIC ENGINEER
REVISIONS	J. Stains
7-20-01	
7-19-02	
7-15-06	
7-20-06	
ALL METRIC DIMENSIONS ( IN BRACKETS ) ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.	OFFICE OF STRUCTURAL ENGINEERING
STANDARD HYDRAULIC CONSTRUCTION DRAWING	MANHOLE No. 3
SCD NUMBER	MH-1.2
	2 / 2



OFFICE OF THE CITY ENGINEER  
 CANTON, OHIO

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APPROVED DATE: JAN 2012

APPROVED BY: CDB, RMB, SLH

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REVISIONS

DESCRIPTION	DATE	BY

STANDARD DRAWING NO. 10

PRECAST STORM OR  
 SANITARY MANHOLE

SHEET 2 OF 3

**CANTON CONSTRUCTION STANDARDS NOTES FOR MODIFIED ODOT MANHOLE 3 (SCD MH-1.2)**

- NOTE 1. LIFT HOLES INSIDE THE MANHOLES MUST BE SEALED WITH GROUT.
- NOTE 2. TOP AND TRANSITION SECTIONS MUST BE ECCENTRIC CONE ONLY. USE FLAT SLAB FOR SHALLOW MANHOLE APPLICATIONS OR SPECIAL CIRCUMSTANCES AS DIRECTED BY THE CITY.
- NOTE 3. 6" EXTENDED BASE IS STANDARD FOR ALL SANITARY AND STORM MANHOLES. SET MANHOLE BASE ON 6" OF AASHTO M 43 NO. 56, 57, OR 62 CRUSHED STONE SET ON UNDISTURBED EARTH.
- NOTE 4. PIPE CONNECTIONS INTO THE MANHOLES MUST NOT EXTEND INTO THE MANHOLE MORE THAN 2" AT THE SIDES OF THE PIPE AT THE SPRING-LINE OF SAID PIPE.

**SANITARY CONNECTIONS**

SANITARY SEWER PIPE INLETS, WITH FLOWLINES MORE THAN 2' HIGHER THAN THE CHANNEL BENCH MUST BE OUTSIDE DROP CONNECTIONS. DROP CONNECTIONS MUST BE FABRICATED AND CAST INTEGRALLY WITH THE MANHOLE SECTIONS OR INSTALLED PER CITY STANDARD DWG. 11, OUTSIDE DROP CONNECTION FOR SANITARY MANHOLES. NO INSIDE DROPS PERMITTED FOR PRIVATE SEWER CONNECTIONS. INSIDE DROP FOR CITY-OWNED SEWERS ARE SUBJECT TO THE CITY ENGINEER'S APPROVAL.

SANITARY PIPE INLETS MUST BE FLUMED OVER THE BENCH, DIRECTING FLOW INTO THE CHANNEL, USING CONCRETE AND/OR CLAY SEWER BRICK AND MORTAR.

CAST OPENINGS MUST BE THE OUTSIDE DIAMETER OF THE PIPE PLUS 2 INCHES WITH A BUTYL RUBBER A-LOK, X-CEL GASKET, OR APPROVED EQUAL.

CORED OPENINGS MUST BE MACHINE CORED, THE OPENING SHALL BE PER PIPE-TO-MANHOLE CONNECTOR SPECS. USE "KOR-N-SEAL" FLEXIBLE PIPE-TO-MANHOLE CONNECTOR WITH STAINLESS WEDGE ASSEMBLY OR APPROVED EQUAL CONFORMING TO ASTM C-930 OR ASTM C-923.

**STORM CONNECTION**

OPENINGS FOR STORM PIPE INLETS MAY BE CAST OR MACHINE CORED. OPENINGS SHALL NOT EXCEED THE O.D. OF PIPE + 2". MAKE WATER-TIGHT JOINTS WITH NON-SHRINK CEMENT OR CLASS 'C' CONCRETE APPLIED FROM INSIDE AND OUTSIDE OF MANHOLE.

- NOTE 5. STEPS SHALL BE 1/2" STEEL REINFORCED POLYPROPYLENE STEPS 12" W X 5-3/4" BY AMERICAN STEP CO., INC. OR APPROVED EQUAL, MEETING ASTM 478.

FRAMES AND COVER SHALL CONFORM WITH CITY OF CANTON STD. DWG. NO. 12.

- NOTE 6. GRADE RINGS FOR NEW MANHOLES MAY BE PRECAST CONCRETE, RUBBER COMPOSITE, OR CLAY BRICK AND MORTAR. CONCRETE BRICK IS NOT PERMITTED.
- HEIGHT OF GRADE RINGS COLLECTIVELY SHALL NOT EXCEED 12".

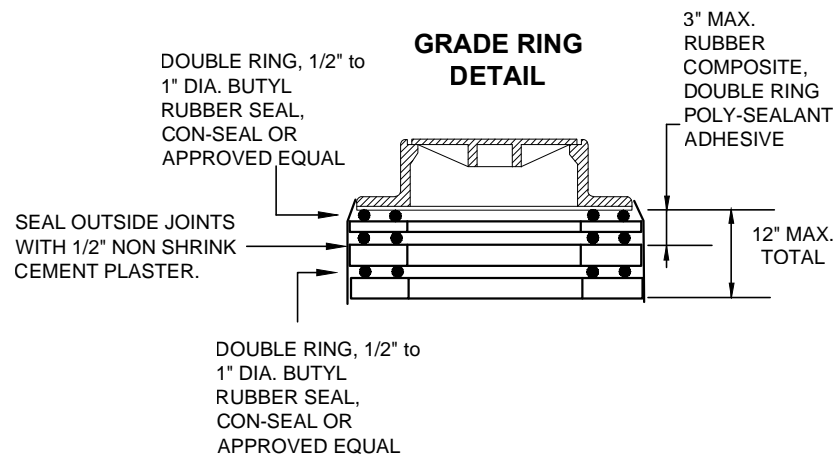
PRECAST CONCRETE GRADE RINGS MUST BE REINFORCED CLASS 'C' CONCRETE AND CONNECTED USING TWO CONCENTRIC RINGS OF 1/2" TO 1" BEADS OF BUTYL RUBBER SEALANT CON-SEAL OR APPROVED EQUAL. SEAL OUTSIDE JOINTS WITH 1/2" NON SHRINK CEMENT PLASTER.

RUBBER COMPOSITE GRADE RINGS MUST BE "INFRA-RISER" BY EJIW OR APPROVED EQUAL, AND CONNECTED USING TWO PARALLEL BEADS OF POLY-SEALANT ADHESIVE PER MANUFACTURER RECOMMENDATION. RUBBER COMPOSITE GRADE RINGS HEIGHT MUST NOT EXCEED 3" AND MUST BE PLACED DIRECTLY UNDER MANHOLE FRAME.

BRICK AND MORTAR RINGS MUST BE BELDEN BRICK, FINE GRIND, ASTM C32-90, OR APPROVED EQUAL WITH HIGH STRENGTH, AIR ENTRAINED, MORTAR. SEAL OUTSIDE JOINTS WITH 1/2" NON SHRINK CEMENT PLASTER.

USE TWO PARALLEL 3/4" BEADS OF BUTYL RUBBER SEALANT CON-SEAL OR APPROVED EQUAL, BETWEEN GRADE RINGS OF DIFFERENT MATERIAL AND BETWEEN GRADE RINGS AND MANHOLE FRAME.

- NOTE 7. FOR BACKFILL MATERIAL AND COMPACTION, AND ROCK EXCAVATION, IF APPLICABLE, REFER TO CITY STD. DWG. NO. 19.
- NOTE 8. SANITARY MANHOLES TO BE TESTED ACCORDING TO CITY ENGINEER'S SPECIFICATION 04-01 (NEGATIVE AIR PRESSURE TEST).



**OPTIONAL MANHOLE BID ITEMS**

ITEM	QTY.	UNIT	DESCRIPTION OPTION "A"
604		V.F.	MH WATERPROOFING, COAL TAR, A.P.P.

IF REQUESTED BY THE CITY ENGINEER, OR SPECIFIED IN THE PLAN, THE CONTRACTOR SHALL PROVIDE UNIT PRICE FOR WATERPROOFING THE EXTERIOR OF DESIGNATED MANHOLES. THIS ITEM IS "CITY OPTIONAL" AND THE PRICE IS PAID PER VERTICAL FOOT OF EACH MANHOLE WATERPROOFED AS DIRECTED BY THE ENGINEER. THIS OPTION IS A CONTINGENCY BID ITEM UNLESS SPECIFIED OTHERWISE.

APPLY IN THE FIELD A COAL TAR EPOXY TO THE OUTSIDE OF THE MANHOLE PER MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS FROM THE TOP OF THE EXTENDED BASE TO THE BOTTOM OF THE MANHOLE COVER CASTING.

ITEM	QTY.	UNIT	DESCRIPTION OPTION "B"
604		EACH	NEW MH, POLYMER LINING, A.P.P.
604		V.F.	EXISTING MH, POLYMER LINING, A.P.P.

IF REQUESTED BY THE CITY ENGINEER, OR SPECIFIED IN THE PLAN, THE CONTRACTOR SHALL PROVIDE UNIT PRICE FOR CORROSION RESISTANT POLYMER LININGS AS DESIGNATED. THIS ITEM IS "CITY OPTIONAL" AND THE PRICE IS PAID PER VERTICAL FOOT OR PER EACH MANHOLE LINED AS DIRECTED BY THE ENGINEER. THE UNIT COST FOR THIS ITEM INCLUDES ALL COSTS FOR LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS REQUIRED FOR SUPPLYING AND INSTALLING THE LININGS INCLUDING THE COST FOR BYPASSING EXISTING SEWER FLOWS FOR THE DURATION OF THE INSTALLATION AND CURING TIME AS SPECIFIED. THIS OPTION IS INCLUDED AS A CONTINGENCY BID ITEM. UNLESS SPECIFIED OTHERWISE.

APPLY IN THE FIELD A CORROSION RESISTANT POLYMER LINING (PLASITE 5371 BY CARBOLINE OR APPROVED EQUAL) TO THE INSIDE OF THE NEW OR EXISTING MANHOLE PER MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS. APPLY FROM THE TOP OF THE BENCH TO THE BOTTOM OF THE MANHOLE COVER CASTING.

FOR EXISTING MANHOLES, PRIOR TO POLYMER LINING APPLICATION, RESTORE INSIDE WALLS AS PER LINING MANUFACTURER'S RECOMMENDATIONS OR AS DIRECTED BY THE CITY ENGINEER.

**THE CITY'S STANDARD MANHOLE FOR SANITARY AND STORM SEWERS IS THE ODOT MH-3 WITH THE MODIFICATIONS NOTED.**



**OFFICE OF THE CITY ENGINEER  
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APPROVED DATE: JAN 2012

APPROVED BY: CDB, RMB, SLH

DRAWING FILE NAME: ce\_10.dwg

**REVISIONS**

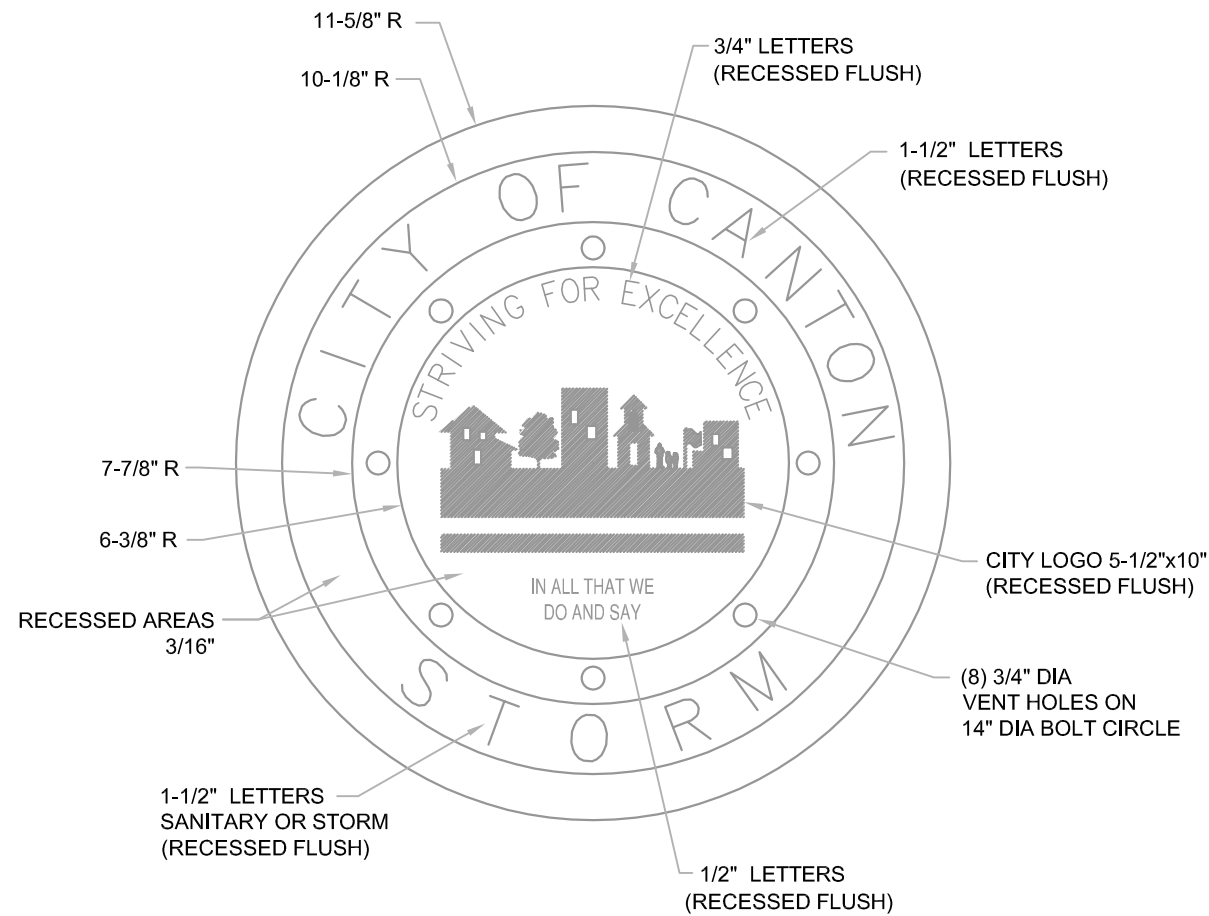
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**STANDARD DRAWING NO. 10**

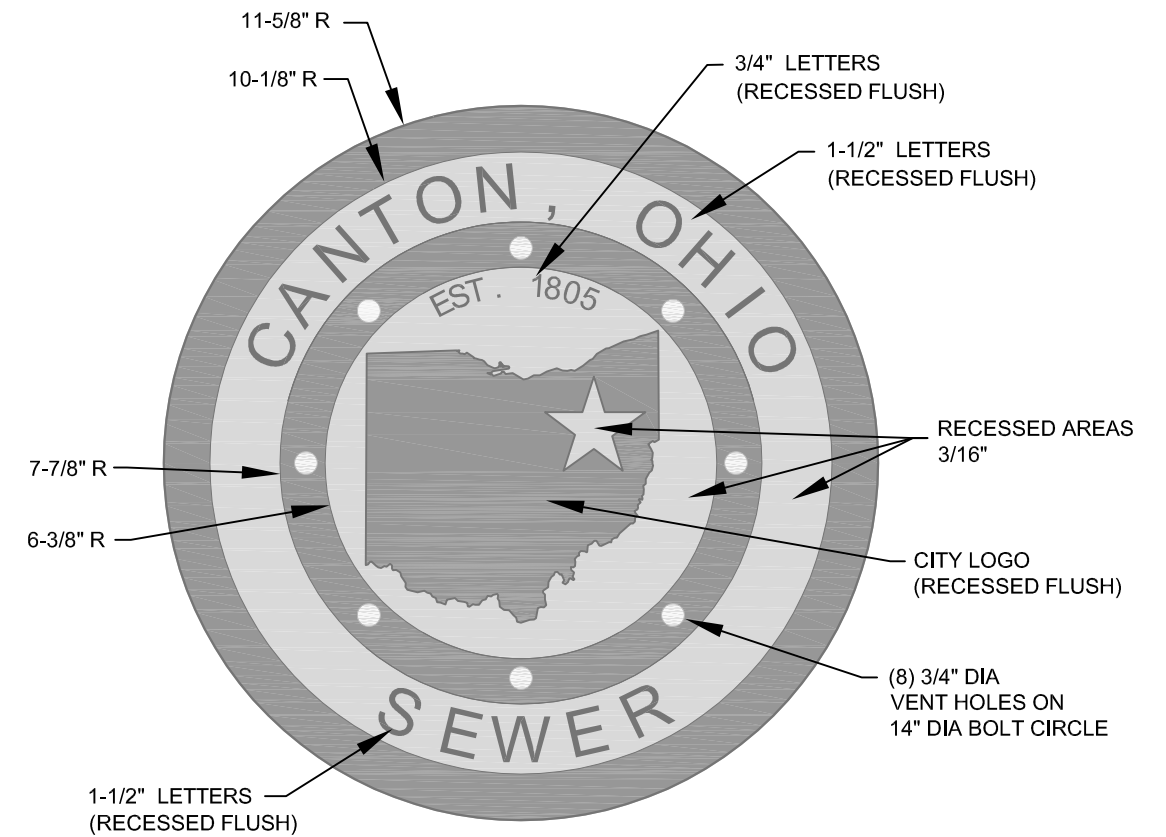
**PRECAST STORM OR  
SANITARY MANHOLE**

**SHEET 3 OF 3**

TOP OF MANHOLE COVER (OLD)  
(prior to 2014)



TOP OF MANHOLE COVER (NEW)  
(2014 Projects and Forward)



NOTES:

- COVER AND FRAME TO BE CAST OF GRAY IRON IN COMPLIANCE WITH ASTM SPEC. ASTM A-48 CLASS 35. CASTINGS SHALL BE OF THE HEAVY DUTY RATING.
- EAST JORDAN 1850 B COVER (PRODUCT NO. 185026) AND 1850 FRAME, OR NEENAH R-1654 FRAME AND LID, OR EQUAL APPROVED BY CITY ENGINEER.
- MACHINE BEARING SURFACES BETWEEN LID AND FRAME.
- CONTACT CITY ENGINEER FOR CAD DRAWING OF CITY LOGO.
- CONTRACTORS/SUPPLIER MAY USE COVERS IN STOCK WITH OLD CITY LOGO AS PERMITTED BY THE CITY ENGINEER. OTHERWISE, PROJECTS MUST USE COVERS WITH NEW LOGO.



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APPROVED DATE: JAN 2012

APPROVED BY: CDB, RMB, SLH

DRAWING FILE NAME: ce\_12.dwg

REVISIONS

DESCRIPTION	DATE	BY
MH COVER CITYLOGO	2/28/2014	RMB

**STANDARD DRAWING NO. 12**

**MANHOLE COVER**

SHEET 1 OF 1

**NOTES:**

**1. BEDDING:**

MATERIALS SHALL BE AASHTO M 43 NO. 56, 57, OR 67 CRUSHED STONE. NO ALTERNATES UNLESS APPROVED BY THE CITY ENGINEER. PRIVATE UTILITIES MAY TYPICALLY PROVIDE ALTERNATIVE BEDDING MATERIAL AS APPROVED BY THE CITY ENGINEER.

**BEDDING WIDTH TABLE**

PIPE TYPE	MIN. WIDTH, TYP.	MAX. WIDTH, TYP.
NON-RIGID PIPE (PVC, HDPE, CMP, ALUMINUM)	PIPE I.D. x 1.25 + 1'-0"	PIPE O.D. + 2'-0"
RIGID PIPE (CONC., VIT. CLAY, DUCTILE IRON)	PIPE I.D. x 1.33	PIPE O.D. + 2'-0"

CENTER PIPE HORIZONTALLY WITHIN BEDDING AREA. ANY DEVIATION TO TYPICAL BEDDING REQUIREMENTS ARE SUBJECT TO THE DISCRETION OF THE CITY ENGINEER.

THE BEDDING LIMITS SHOWN APPLY IN ALL CASES EXCEPT FOR WHEN PIPE MANUFACTURER SPECIFIES A BEDDING WIDTH DIFFERENT FROM THAT SHOWN AND THE CITY ENGINEER PERMITS SAME.

**2. BACKFILL:**

**BACKFILL WITHIN THE PUBLIC STREET R/W:**

**MATERIALS** SHALL BE ODOT 703.11, TYPE '1' GRANULAR MATERIAL (304, 411, or 617 AGGREGATE GRADATION) OR TYPE '2' GRANULAR MATERIAL, OR ODOT 613, LOW STRENGTH MORTAR; DEVIATIONS FROM THIS ARE AS FOLLOWS:

- A) NO FOUNDRY SAND OR SLAG IS PERMITTED.
- B) ALTERNATE GRANULAR MATERIAL SHALL BE PERMITTED ONLY WITH THE SUPPLEMENTAL APPROVAL OF THE CITY ENGINEER. TO PETITION FOR SUCH SUPPLEMENTAL APPROVAL, THE DEVELOPER/CONTRACTOR SHALL SUBMIT IN WRITING THE FOLLOWING:
  - \* SOURCE OF THE ALTERNATE BACKFILL MATERIAL.
  - \* GRADATION REPORT IN ACCORDANCE WITH AASHTO T II AND T 27.
  - \* PROCTOR CURVE ANALYSIS IN ACCORDANCE WITH ASTM D 698.
  - \* PROPOSED COMPACTION METHOD.

THE CITY ENGINEER RESERVES THE RIGHT TO REFUSE ANY ALTERNATE BACKFILL MATERIAL, REGARDLESS OF APPROVAL OF SIMILAR MATERIAL ON A PREVIOUS PROJECT.

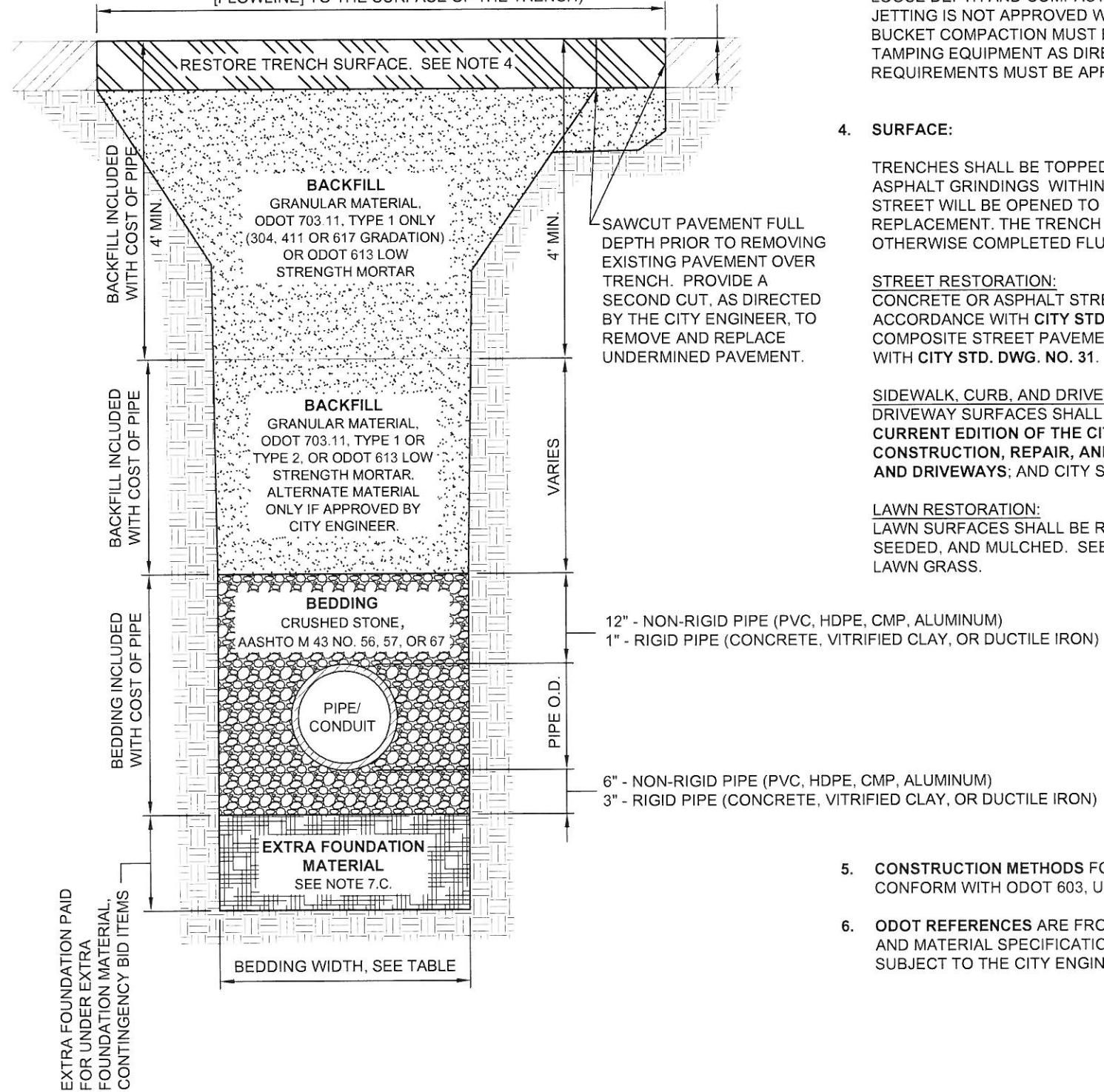
THE CITY ENGINEER FURTHER RESERVES THE RIGHT TO REFUSE ANY ALTERNATE BACKFILL MATERIAL THE CITY FINDS NOT CONSISTENT WITH THE APPROVED SOURCE, GRADATION REPORT, PROCTOR REPORT, OR COMPACTION METHOD.

- C) ODOT 703.11, TYPE 2, OR ALTERNATE MATERIALS ARE NOT PERMITTED WITHIN 4 FEET OF THE TRENCH SURFACE, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

**BACKFILL OUTSIDE OF THE PUBLIC STREET R/W:**

FOLLOW MATERIAL AND METHODS FOR BACKFILL IN ACCORDANCE WITH ODOT 603.

PAVEMENT OR SURFACE REPLACEMENT MAXIMUM PAY LIMITS  
 PIPE DEPTH OF 4' OR LESS = O.D. OF PIPE + 4'-0"  
 PIPE DEPTH BETWEEN 4' TO 8' = O.D. OF PIPE + 5'-0"  
 PIPE DEPTH GREATER THAN 8' = O.D. OF PIPE + 6'-0"  
 (PIPE DEPTH BEING MEASURED FROM THE PIPE INVERT [FLOWLINE] TO THE SURFACE OF THE TRENCH)



**NOTES: (CONTINUED)**

**3. COMPACTION:**

ALL BACKFILL SHALL BE PLACED IN LAYERS NOT TO EXCEED 12-INCHES LOOSE DEPTH AND COMPACTED BY APPROVED MECHANICAL MEANS. JETTING IS NOT APPROVED WITHOUT THE CITY ENGINEER'S APPROVAL. BUCKET COMPACTION MUST BE SUPPLEMENTED WITH VIBRATION OR TAMPING EQUIPMENT AS DIRECTED. ANY MODIFICATIONS TO THESE REQUIREMENTS MUST BE APPROVED BY THE CITY ENGINEER.

**4. SURFACE:**

TRENCHES SHALL BE TOPPED WITH 4" OF ODOT 304 LIMESTONE OR ASPHALT GRINDINGS WITHIN EXISTING STREET PAVEMENTS WHEN THE STREET WILL BE OPENED TO VEHICULAR TRAFFIC PRIOR TO PAVEMENT REPLACEMENT. THE TRENCH TOPPING MATERIAL SHALL BE ROLLED OR OTHERWISE COMPLETED FLUSH WITH THE ADJOINING PAVEMENT.

**STREET RESTORATION:**

CONCRETE OR ASPHALT STREET PAVEMENT SHALL BE REPLACED IN ACCORDANCE WITH CITY STD. DWG. NO. 32. BRICK OR ASPHALT-BRICK COMPOSITE STREET PAVEMENT SHALL BE REPLACED IN ACCORDANCE WITH CITY STD. DWG. NO. 31.

**SIDEWALK, CURB, AND DRIVEWAY RESTORATION:**

DRIVEWAY SURFACES SHALL BE REPLACED IN ACCORDANCE WITH THE CURRENT EDITION OF THE CITY OF CANTON SPECIFICATIONS FOR THE CONSTRUCTION, REPAIR, AND REPLACEMENT OF SIDEWALKS, CURBS, AND DRIVEWAYS; AND CITY STD. DWG. NOS. 28 THRU 33.

**LAWN RESTORATION:**

LAWN SURFACES SHALL BE REPLACED WITH A MINIMUM OF 4" TOPSOIL, SEEDED, AND MULCHED. SEED MIX SHALL CONFORM TO ADJOINING LAWN GRASS.

- 5. **CONSTRUCTION METHODS** FOR BEDDING AND BACKFILL SHALL CONFORM WITH ODOT 603, UNLESS STATED OTHERWISE HEREIN.

- 6. **ODOT REFERENCES** ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.



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APPROVED DATE: JAN 2012  
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REVISIONS TO NOTES 7	6/10/2013	CDB

**STANDARD DRAWING NO. 19**  
**UTILITY TRENCH REQUIREMENTS**  
 SHEET 1 OF 2

**NOTES: (CONTINUED)**

**7. PAY LIMITS FOR CITY PROJECTS**

- A) **BEDDING AND BACKFILL** IS INCLUDED WITH THE COST OF PIPE UNLESS DIRECTED TO BID OTHERWISE.
- B) **PAVEMENT RESTORATION** IS INCLUDED WITH THE COST OF PIPE UNLESS A SEPARATE PAY ITEM IS PROVIDED, WHEREBY THE WIDTH MEASUREMENT OVER THE TRENCH FOR PAVEMENT RESTORATION SHALL NOT EXCEED THE OUTSIDE DIAMETER (O.D.) OF PIPE PLUS A SET MEASUREMENT DEPENDENT ON DEPTH OF PIPE. AREA MEASUREMENTS AT MANHOLE AND CATCH BASIN STRUCTURES SHALL NOT EXCEED THE AREA OF THE BASE OF THE STRUCTURE + 3'-0" OFFSET AREA AROUND THE STRUCTURE'S BASE.
- C) **EXTRA FOUNDATION MATERIAL:** THE CONTRACTOR SHALL BE PAID FOR OVER-EXCAVATION AND BEDDING FOUNDATION MATERIAL UNDER THE CONTINGENCY BID ITEMS FOR EXTRA FOUNDATION MATERIAL.

WHEN IN THE OPINION OF THE CITY ENGINEER, SOFT/UNSTABLE MATERIALS ARE ENCOUNTERED WHICH ARE UNSUITABLE FOR BEDDING FOUNDATION, SAID MATERIAL SHALL BE REMOVED BY THE CONTRACTOR TO THE DEPTH DIRECTED BY THE ENGINEER AND REPLACED WITH SUITABLE MATERIAL.

FOR CITY PROJECTS, THE PAYABLE WIDTH OF THE EXTRA FOUNDATION MATERIAL SHALL NOT EXCEED THE LESSER OF THE APPLICABLE MINIMUM OR MAXIMUM TYPICAL BEDDING WIDTH, AS NOTED ON SHEET 1 OF STD. DWG. NO. 19.

FOR PRIVATE WORK, ALL COSTS ARE AT THE OWNER'S EXPENSE.

EXTRA FOUNDATION MATERIAL, OPTION A, B, C, & D, MAY BE USED IN ANY COMBINATION AS DIRECTED BY THE CITY ENGINEER:

- OPTION A: CRUSHED STONE, AASHTO M 43 NO. 1 AND/OR 2
- OPTION B: CRUSHED STONE, AASHTO M 43 NO. 56, 57, OR 67
- OPTION C: ODOT 703.11, TYPE 1 (304, 411 OR 617 GRADATION)
- OPTION D: TENSAR GEOGRID T1100, OR APPROVED EQUAL

**EXTRA FOUNDATION MATERIAL, CONTINGENCY BID ITEMS**

ITEM	QTY.	UNIT	DESCRIPTION
603		C.Y.	EXTRA FOUNDATION, OPTION A (#1,#2 STONE)
603		C.Y.	EXTRA FOUNDATION, OPTION B (#56,57,67 STONE)
603		C.Y.	EXTRA FOUNDATION, OPTION C (304,411,617)
603		S.F.	EXTRA FOUNDATION, OPTION D (GEOGRID)

**NOTES: (CONTINUED)**

**8. EXCAVATION OF ROCK OR BURIED/ABANDONED CONCRETE STRUCTURE REMOVAL**

**EXCAVATION FOR NEW MANHOLES AND CATCH BASINS**, UNLESS OTHERWISE SPECIFIED OR SHOWN ON CONSTRUCTION PLANS, SHALL BE MEASURED BETWEEN VERTICAL PLANES ONE (1) FOOT BEYOND THE OUTSIDE EDGE OF THE FOUNDATION OF THE STRUCTURES ON ALL SIDES, AND PARALLEL THERETO, AND FROM THE SURFACE OF THE ROCK TO THE BOTTOM OF THE ROCK OR THE NEAT LINES OF THE BOTTOM OF THE STRUCTURES PLUS THE DEPTH OF THE BASE MATERIAL. USE THE MEASUREMENT WHICH IS LESSER.

**EXCAVATION FOR NEW PIPES**, UNLESS OTHERWISE SPECIFIED OR SHOWN ON CONSTRUCTION PLANS, SHALL BE MEASURED BETWEEN TRENCH WALLS (NOT TO EXCEED PIPE O.D. + 18", AND FROM THE SURFACE OF THE ROCK TO THE BOTTOM OF THE ROCK OR THE BOTTOM OF THE PIPE BEDDING, USE THE MEASUREMENT WHICH IS LESSER.

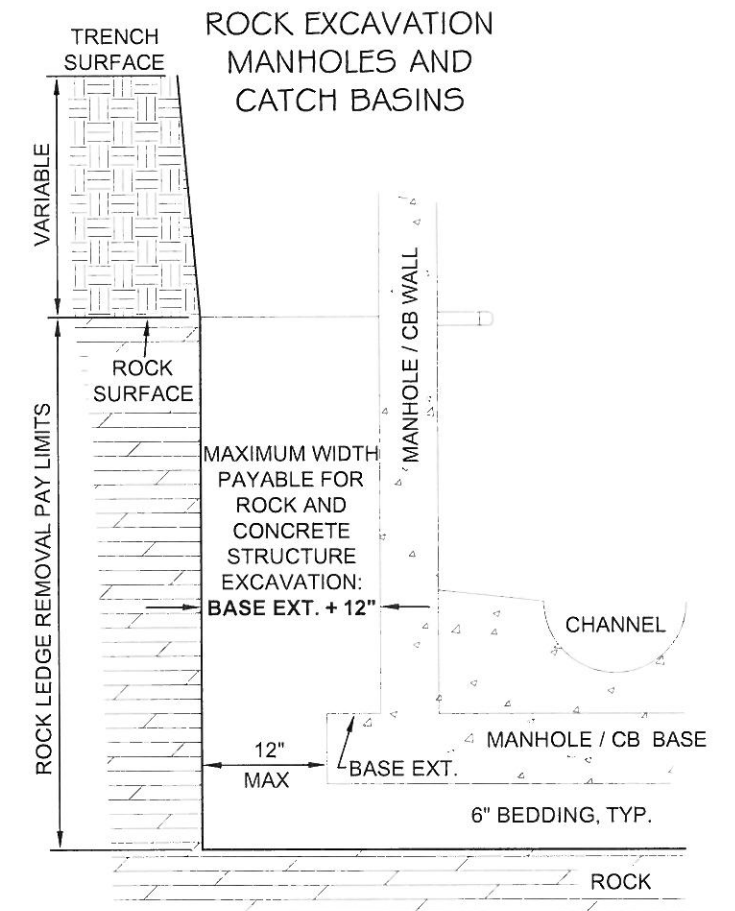
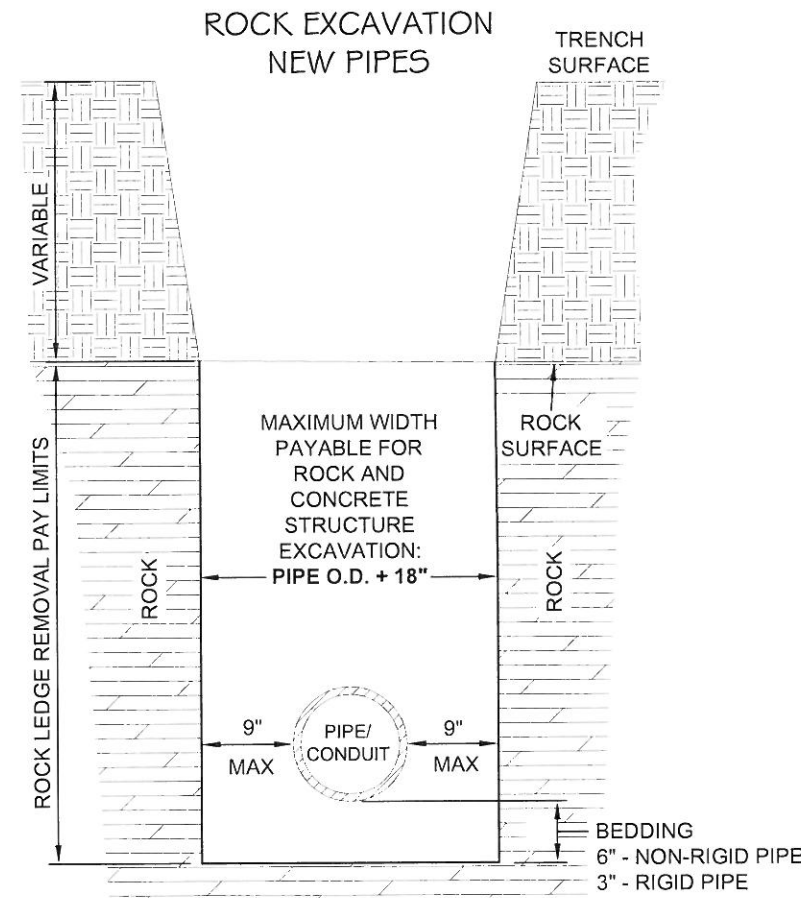
EXCAVATION OF BURIED AND ABANDONED CONCRETE STRUCTURES SHALL BE MEASURED IN THE SAME MANNER AS ROCK REMOVAL.

FOR CITY PROJECTS, THE CONTRACTOR SHALL BE PAID FOR ROCK REMOVAL AND CONCRETE STRUCTURE REMOVAL UNDER THE CONTINGENCY BID ITEMS FOR ROCK OR CONCRETE STRUCTURE REMOVAL. IF A CONTINGENCY BID ITEM IS NOT INCLUDED IN THE BID PROPOSAL, THE CONTRACTOR MAY SUBMIT A PROPOSAL (PRIOR TO WORK BEING STARTED) TO THE CITY ENGINEER FOR REVIEW AND APPROVAL.

FOR PRIVATE WORK, ALL COSTS ARE AT THE OWNER'S EXPENSE.

**ROCK AND BURIED & ABANDONED CONCRETE STRUCTURE REMOVAL, CONTINGENCY BID ITEMS**

ITEM	QTY.	UNIT	DESCRIPTION
603		C.Y.	ROCK REMOVAL
603		C.Y.	CONCRETE STRUCTURE REMOVAL



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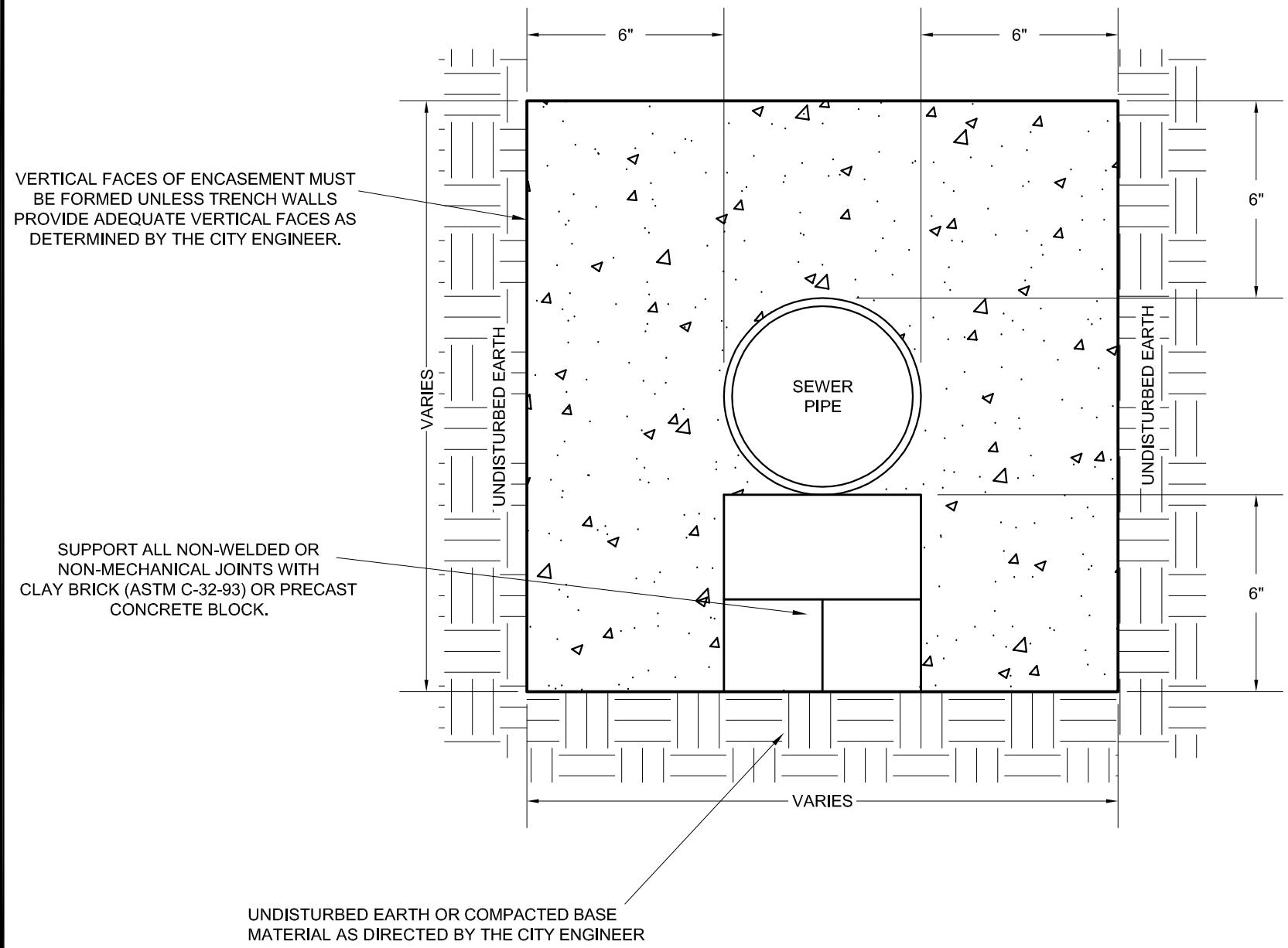
**REVISIONS**

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REVISIONS TO NOTES 7	6/10/2013	CDB

**STANDARD DRAWING NO. 19**

**UTILITY TRENCH REQUIREMENTS**

**CLASS "F" CONCRETE ENCASEMENT - 3,000 PSI TYP.**  
NOT TO SCALE



VERTICAL FACES OF ENCASEMENT MUST BE FORMED UNLESS TRENCH WALLS PROVIDE ADEQUATE VERTICAL FACES AS DETERMINED BY THE CITY ENGINEER.

SUPPORT ALL NON-WELDED OR NON-MECHANICAL JOINTS WITH CLAY BRICK (ASTM C-32-93) OR PRECAST CONCRETE BLOCK.

UNDISTURBED EARTH OR COMPACTED BASE MATERIAL AS DIRECTED BY THE CITY ENGINEER

TABLE SHOWS QUANTITIES TYPICAL FOR COMPLETE ENCASEMENT AS SHOWN IN DRAWING.

PIPE DIAMETER (INCHES)	CONCRETE PER LINEAR FOOT OF ENCASEMENT (CUBIC YARDS)
6	0.08
8	0.10
10	0.12
12	0.13
15	0.16
18	0.19
21	0.22
24	0.25
27	0.29

**NOTES:**

1. CONCRETE ENCASEMENT SHALL APPLY AS SPECIFIED IN APPLICABLE PLANS OR AS OTHERWISE DIRECTED BY THE CITY ENGINEER.
2. SANITARY SEWER MAINS AND LATERALS ARE TO BE ENCASED IF THEY ARE WITHIN 18" VERTICALLY OF WATER LINES.
3. STORM SEWER MAINS AND LATERALS ARE TO BE ENCASED IF THEY ARE WITHIN 12" VERTICALLY OF WATER LINES.
4. ALL CONCRETE SHALL CONFORM TO ODOT ITEM 499 CLASS F (3,000 psi).
5. BOTTOM OF TRENCH SHALL BE FREE OF STANDING WATER BEFORE PLACING CONCRETE.
6. ENCASEMENT OF STORM/SANITARY SEWER IS TO EXTEND FOR A LENGTH OF 2 FEET ON EACH SIDE OF THE WATER LINE. PROVIDE A BOND BREAK BARRIER BETWEEN ENCASEMENT AND OTHER PIPES OR CONDUITS AS DIRECTED BY THE ENGINEER.
7. ALTERNATIVE ENCASEMENT OPTIONS MAY BE ACCEPTED OR REQUIRED BY THE CITY ENGINEER.



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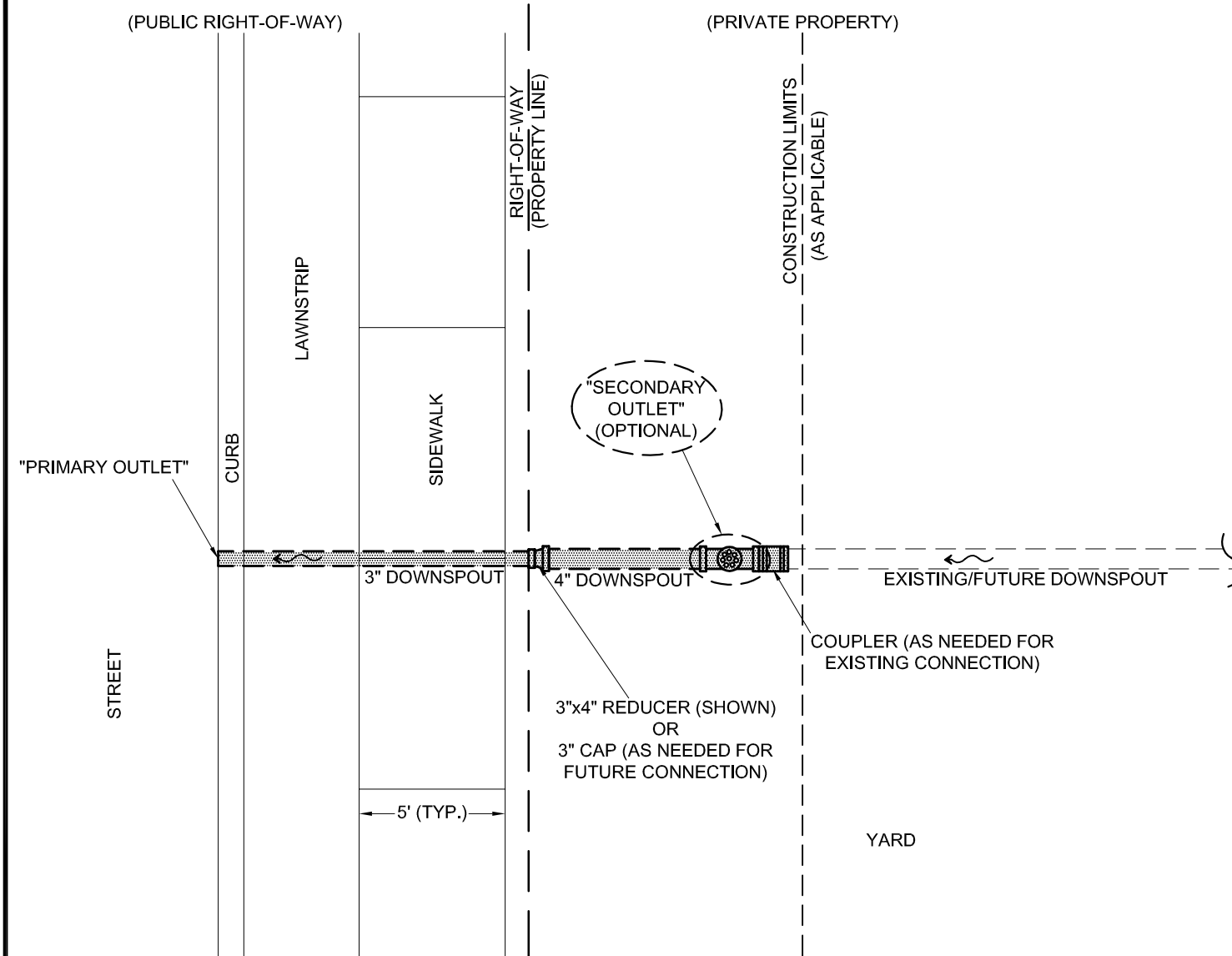
**STANDARD DRAWING NO. 21**  
**CONCRETE ENCASEMENT**  
**DETAIL**

SHEET 1 OF 1



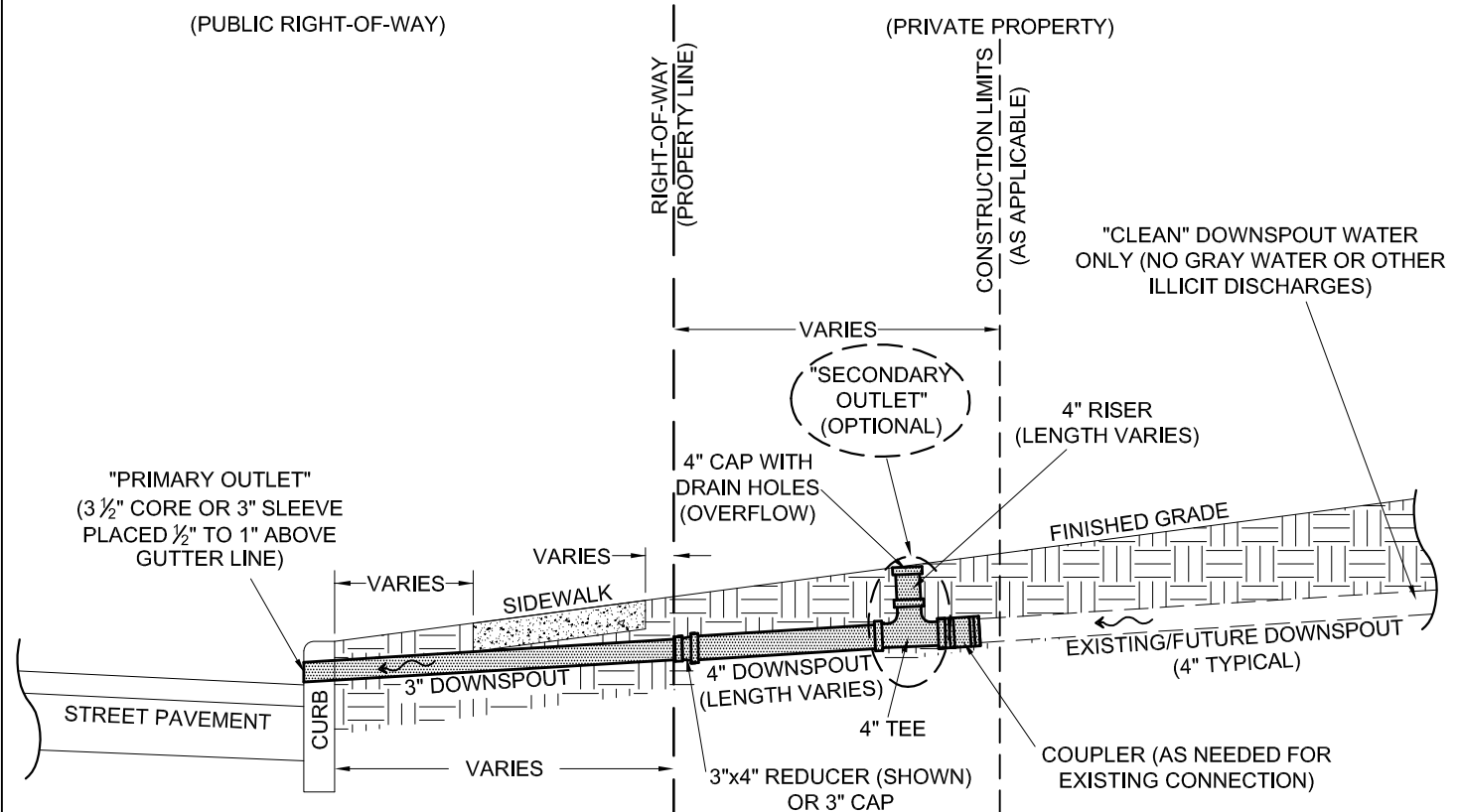
### PLAN VIEW

NOT TO SCALE



### PROFILE VIEW

NOT TO SCALE



ITEMS, MATERIALS, AND QUANTITIES PER RESIDENTIAL DOWNSPOUT OUTLET			
ITEM	MATERIAL TYPE	QUANTITY	UNIT
3" DOWNSPOUT	PVC SCH. 40 (707.43 OR 707.45)	VARIES	FT.
3" CAP (AS NEEDED)	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	1	EACH
3"x4" REDUCER (AS NEEDED)	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	1	EACH
4" DOWNSPOUT (AS NEEDED)	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	VARIES	FT.
4" TEE (OPTIONAL), CONTINGENCY	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	1	EACH
4" RISER (OPTIONAL), CONTINGENCY	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	VARIES	FT.
4" CAP WITH DRAIN HOLES (OPTIONAL), CONTINGENCY	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	1	EACH
COUPLER (AS NEEDED)	NEOPRENE WITH STAINLESS STEEL CLAMPS	1	EACH

**NOTES:**

- FOR CITY PROJECTS: WHERE THERE ARE EXISTING DOWNSPOUTS WITHIN CONSTRUCTION LIMITS, CONTRACTOR SHALL INSTALL 3" DOWNSPOUT WITHIN PUBLIC RIGHT-OF-WAY AS DIRECTED OR AS INDICATED ON PLANS. AS NEEDED, CONTRACTOR SHALL INSTALL A 3"x4" REDUCER, 4" DOWNSPOUT, AND COUPLER TO CONNECT TO EXISTING DOWNSPOUTS. THE SECONDARY OUTLET (TEE, RISER, 4" CAP WITH HOLES) IS OPTIONAL AND SHALL BE CONSTRUCTED ONLY AS DIRECTED. IF DOWNSPOUT CONTAINS GROUNDWATER FLOWS, SEE NOTE 11. APPROPRIATE QUANTITIES, PAY ITEMS, AND NOTES SHALL BE PROVIDED ON THE CONSTRUCTION PLANS.
- FOR NEW SUBDIVISIONS AND PRIVATE WORK: HOMEOWNER/BUILDER IS RESPONSIBLE FOR CONSTRUCTING DOWNSPOUT OUTLET. THE 3" DOWNSPOUT WITHIN PUBLIC RIGHT-OF-WAY IS REQUIRED WHERE APPLICABLE. THE CONFIGURATION, ITEMS, AND MATERIALS SHOWN OUTSIDE OF THE RIGHT-OF-WAY ARE RECOMMENDED UNLESS OTHERWISE REQUIRED BY THE CITY ENGINEER AS A CONDITION FOR ISSUING APPLICABLE PERMITS. IF DOWNSPOUT CONTAINS GROUNDWATER FLOWS, SEE NOTE 11.
- ALL ITEMS EXCEPT THE 3" DOWNSPOUT SHALL BE LOCATED OUTSIDE OF THE PUBLIC RIGHT-OF-WAY.
- WHEN SIDEWALK IS PRESENT/PROPOSED AND WHEN THE 3" PVC DOWNSPOUT WILL BE WITHIN THE CONCRETE OF THE SIDEWALK, THE CONTRACTOR SHALL INSTALL A CONTROL JOINT IN THE SIDEWALK OVER THE DOWNSPOUT. THE THICKNESS OF THE CONCRETE SIDEWALK OVER THE DOWNSPOUT SHALL NOT BE LESS THAN 2", OR A STEEL TROUGH OR TRENCH DRAIN MAY BE USED AS APPROVED BY THE CITY ENGINEER.
- ALL PIPE AND COMPONENTS OF DOWNSPOUT SYSTEM ARE PRIVATELY OWNED AND MAINTAINED.
- THE FOLLOWING DISCHARGE CONDITIONS APPLY:
  - DOWNSPOUT SHALL NOT DIRECTLY DISCHARGE OVER ANY PUBLIC SIDEWALK OF THE CITY (REF. CODIFIED ORDINANCE 1335.01)

- OR ONTO A SIDEWALK, STREET, OR PUBLIC GROUND WITHIN THE CITY, WHEN IN THE OPINION OF THE CITY ENGINEER A PUBLIC NUISANCE IS CAUSED BY DOING SO (REF. CODIFIED ORDINANCE 903.02).
  - DOWNSPOUT DISCHARGES SHALL NOT CONTAIN ANY GRAY WATER OR OTHER ILLICIT DISCHARGES.
  - DOWNSPOUTS SHALL NOT BE CONNECTED TO A SANITARY SEWER.
- A "STREET OPENING PERMIT" IS REQUIRED FROM THE ENGINEERING DEPARTMENT FOR ANY EXCAVATION WITHIN CITY RIGHT-OF-WAY OR OTHER CITY-OWNED PROPERTY (REF. CODIFIED ORDINANCE CHAPTER 909).
  - A "SEWER CONNECTION PERMIT" IS REQUIRED FROM THE ENGINEERING DEPARTMENT FOR ANY DIRECT OR INDIRECT CONNECTION OF A PIPE TO A CITY-OWNED STORM SEWER, CATCH BASIN, OR MANHOLE.
  - MODIFICATIONS TO THE CONFIGURATION, ITEMS, AND MATERIALS SHOWN MAY BE ALLOWED OR REQUIRED BY THE CITY ENGINEER.
  - FOR DOWNSPOUTS THAT ARE DIRECTED TO DISCHARGE TOWARD A CITY STREET WITHOUT CURB, SEE CITY STD. DWG. NO. 22.
  - FOR DOWNSPOUTS THAT CONTAIN GROUNDWATER DISCHARGES (FROM SUMP PUMPS OR GRAVITY FLOW):
    - PRIMARY OUTLET SHOULD BE DIRECTLY CONNECTED TO CATCH BASIN OR MANHOLE, IF POSSIBLE, IN LIEU OF CURB OUTLET SHOWN. DIRECT CONNECTION TO CATCH BASIN OR MANHOLE SHALL BE BY AN APPROVED CORE-AND-SEAL BOOT. APPROPRIATE PERMITS MUST BE OBTAINED FROM THE CITY ENGINEERING DEPARTMENT AND THE WORK MUST BE INSPECTED.
    - IF CATCH BASIN OR MANHOLE IS UNAVAILABLE BUT STORM SEWER IS AVAILABLE FOR DOWNSPOUT PRIMARY OUTLET DIRECT CONNECTION, CONSTRUCT DOWNSPOUT OUTLET PER CITY STANDARD DRAWING NO. 24.
    - IF NO STORM SEWER, CATCH BASIN, OR MANHOLE IS AVAILABLE FOR DIRECT CONNECTION, DOWNSPOUT OUTLET MAY BE CONSTRUCTED PER THIS DRAWING CONTINGENT UPON SATISFYING ALL STATED DISCHARGE CONDITIONS.



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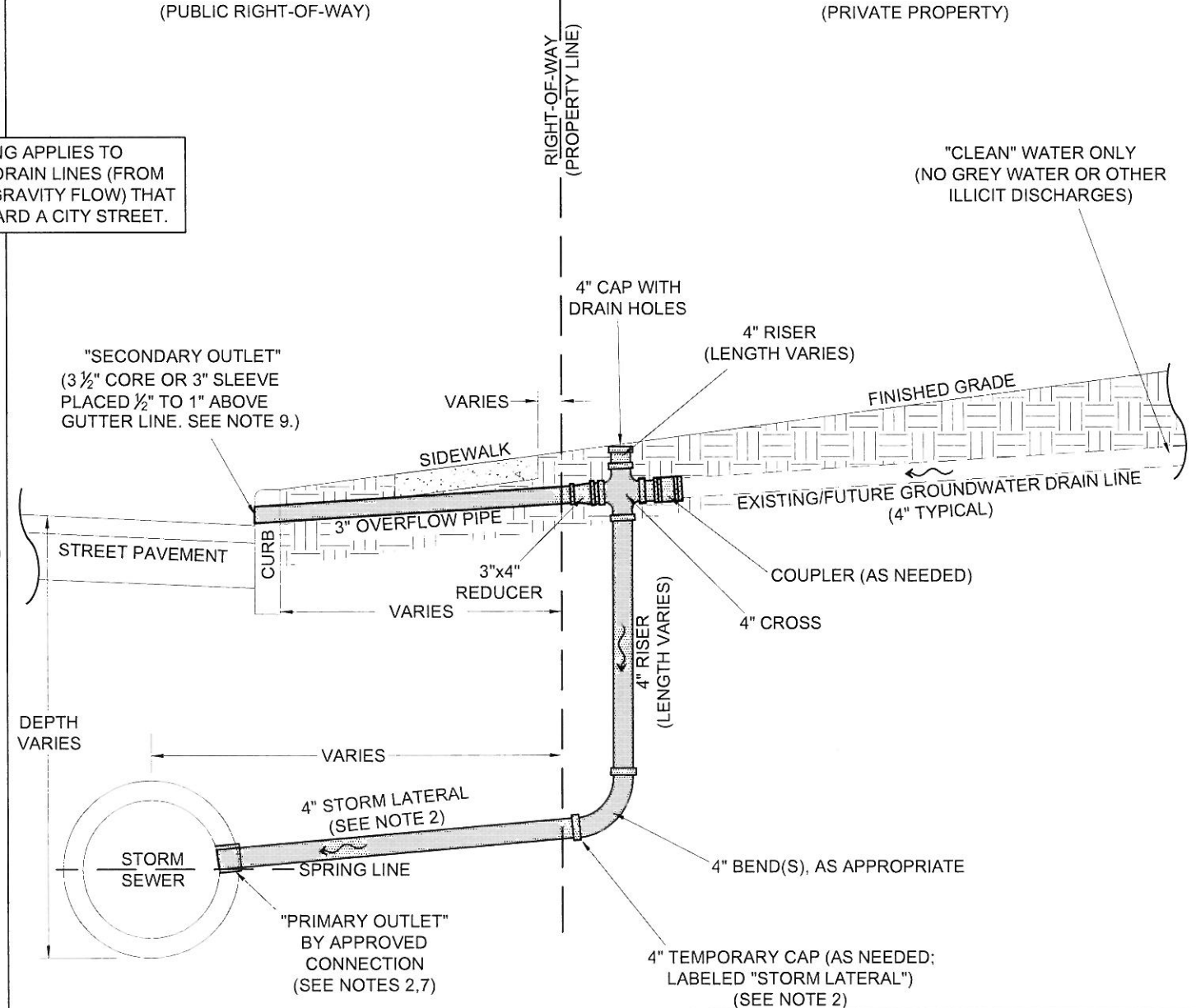
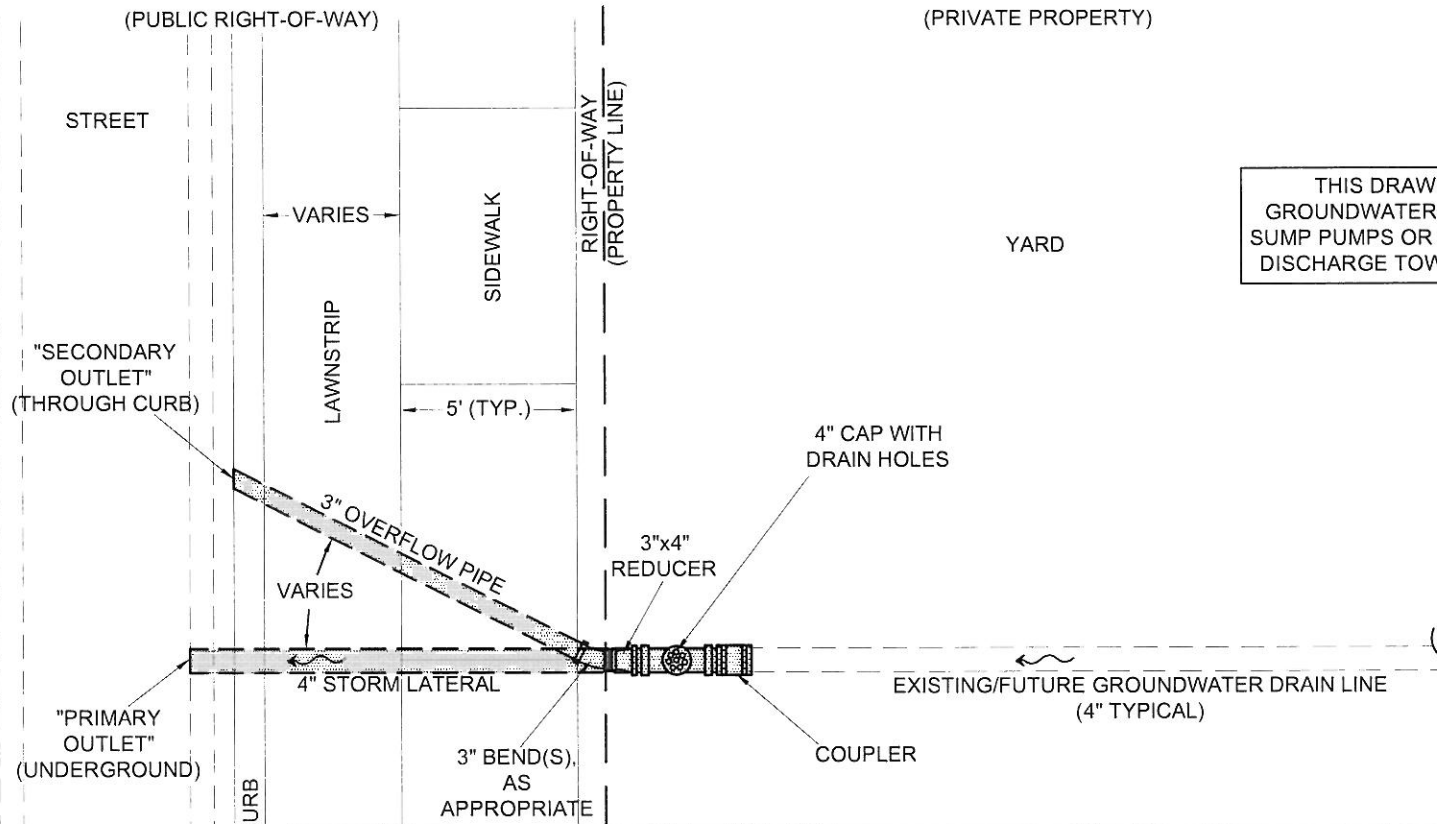
**STANDARD DRAWING NO. 23**

**DOWNSPOUT OUTLET**  
(CURBED STREET)

SHEET 1 OF 1

**PLAN VIEW**  
NOT TO SCALE

**PROFILE VIEW**  
NOT TO SCALE



THIS DRAWING APPLIES TO GROUNDWATER DRAIN LINES (FROM SUMP PUMPS OR GRAVITY FLOW) THAT DISCHARGE TOWARD A CITY STREET.

ITEMS, MATERIALS, AND QUANTITIES PER RESIDENTIAL GROUNDWATER DRAIN LINE CONNECTION			
ITEM	MATERIAL TYPE	QUANTITY	UNIT
3" OVERFLOW PIPE	PVC SCH. 40 (707.43 OR 707.45)	VARIES	FT.
3"x4" REDUCER	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	1	EACH
APPROVED CONNECTION	(SEE NOTE 5)	1	EACH
4" STORM LATERAL	PVC (SDR 35; 707.45) OR HDPE (707.33) WITH BELL AND SPIGOT RUBBER-GASKETED JOINTS	VARIES	FT.
4" TEMPORARY CAP (AS NEEDED)	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	1	EACH
3" & 4" BENDS	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	VARIES	EACH
4" RISER	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	VARIES	FT.
4" CROSS	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	1	EACH
4" CAP WITH DRAIN HOLES	PVC (707.43 OR 707.45) OR HDPE (707.32 OR 707.33)	1	EACH
COUPLER (AS NEEDED)	NEOPRENE WITH STAINLESS STEEL CLAMPS	1	EACH

- NOTES:**
- FOR CITY PROJECTS: ONE GROUNDWATER DRAIN LINE CONNECTION SHALL BE PROVIDED FOR EACH LOT AS DIRECTED BY THE CITY ENGINEER. APPROPRIATE QUANTITIES, PAY ITEMS, AND NOTES SHALL BE PROVIDED ON THE CONSTRUCTION PLANS.
  - FOR NEW SUBDIVISIONS: ONE GROUNDWATER DRAIN LINE CONNECTION SHALL BE PROVIDED FOR EACH LOT UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER. THE CONTRACTOR/DEVELOPER SHALL PROVIDE APPROVED CONNECTION FOR PRIMARY OUTLET, 4" STORM LATERAL, AND 4" TEMPORARY CAP ONLY. THE LOCATION OF THE 4" TEMPORARY CAP SHALL BE INDICATED BY A STAKE IN THE GROUND LOCATED VERTICALLY ABOVE THE CAP AND CLEARLY MARKED SHOWING STORM LATERAL DEPTH. APPROPRIATE SKETCHES, QUANTITIES, PAY ITEMS, AND NOTES SHALL BE PROVIDED ON THE CONSTRUCTION PLANS. REMAINING PORTIONS OF CONFIGURATION ARE THE RESPONSIBILITY OF THE HOME OWNER/BUILDER. ALL MATERIALS AND WORK SHALL BE AT THE DEVELOPER'S EXPENSE.
  - FOR PRIVATE WORK: THE CONFIGURATION SHOWN IS RECOMMENDED UNLESS OTHERWISE REQUIRED BY THE CITY ENGINEER AS A CONDITION FOR ISSUING APPLICABLE PERMITS OR ADDRESSING RESIDENTIAL GROUNDWATER DISCHARGES DEEMED TO BE A PUBLIC NUISANCE BY THE CITY ENGINEER. ALL MATERIALS AND WORK SHALL BE AT THE OWNER'S EXPENSE.
  - FOR NEW OR VACANT LOTS, THE LOCATION OF THE GROUNDWATER DRAIN LINE CONNECTION SHOULD BE NEAR THE LOWEST CORNER OF THE LOT ALONG THE FRONTAGE. EXCEPTIONS MAY BE APPROVED BY THE CITY ENGINEER.
  - ALL PIPE AND COMPONENTS OF GROUNDWATER DRAIN LINE SYSTEM ARE PRIVATELY OWNED AND MAINTAINED.
  - THE PRIMARY OUTLET PREFERRED CONNECTION IS TO THE BACK OF A CATCH BASIN OR STORM MANHOLE (WHEN AVAILABLE ALONG FRONTAGE) AND SHALL BE MADE BY AN APPROVED CORE-AND-SEAL BOOT. FOR PRIMARY OUTLET DIRECT CONNECTION TO STORM SEWER, CONNECT 4" STORM LATERAL ABOVE SPRING LINE OF STORM SEWER USING MANUFACTURED WYE OR TEE, A SADDLE, OR CORE-AND-SEAL BOOT CONNECTION AS APPROVED BY THE CITY ENGINEER. GROUNDWATER DRAIN LINE MAY BE MODIFIED TO DISCHARGE DIRECTLY TO A DITCH OR CREEK IF AVAILABLE IN LIEU OF A STORM SEWER, CATCH BASIN, OR MANHOLE.
  - ONLY THE 3" OVERFLOW PIPE AND THE 4" STORM LATERAL SHALL BE WITHIN PUBLIC RIGHT-OF-WAY. ALL REMAINING ITEMS TO BE LOCATED OUTSIDE OF THE PUBLIC RIGHT-OF-WAY.
  - WHEN SIDEWALK IS PRESENT/PROPOSED AND WHEN THE 3" OVERFLOW PIPE WILL BE WITHIN THE CONCRETE OF THE SIDEWALK, THE CONTRACTOR SHALL INSTALL A CONTROL JOINT IN THE SIDEWALK OVER SAID PIPE. THE THICKNESS OF THE CONCRETE SIDEWALK OVER THE DOWNSPOUT SHALL NOT BE LESS THAN 2".
  - IF CURB IS NOT AVAILABLE FOR SECONDARY OUTLET, CONSTRUCT SECONDARY OUTLET TO DISCHARGE OVERLAND PER CITY STANDARD DRAWING NO. 22.
  - A "STREET OPENING PERMIT" IS REQUIRED FROM THE ENGINEERING DEPARTMENT FOR ANY EXCAVATION WITHIN CITY RIGHT-OF-WAY OR OTHER CITY-OWNED PROPERTY (REF. CODIFIED ORDINANCE CHAPTER 909).
  - A "SEWER CONNECTION PERMIT" IS REQUIRED FROM THE ENGINEERING DEPARTMENT FOR ANY DIRECT OR INDIRECT CONNECTION OF PIPE TO A CITY-OWNED STORM SEWER, CATCH BASIN, OR MANHOLE.
  - MODIFICATIONS TO THE CONFIGURATION, ITEMS, AND MATERIALS SHOWN MAY BE ALLOWED OR REQUIRED BY THE CITY ENGINEER.
  - FOR OUTLET CONFIGURATIONS OF DOWNSPOUTS THAT DO NOT DISCHARGE GROUNDWATER, SEE CITY STD. DWGS. NO. 22 AND 23.

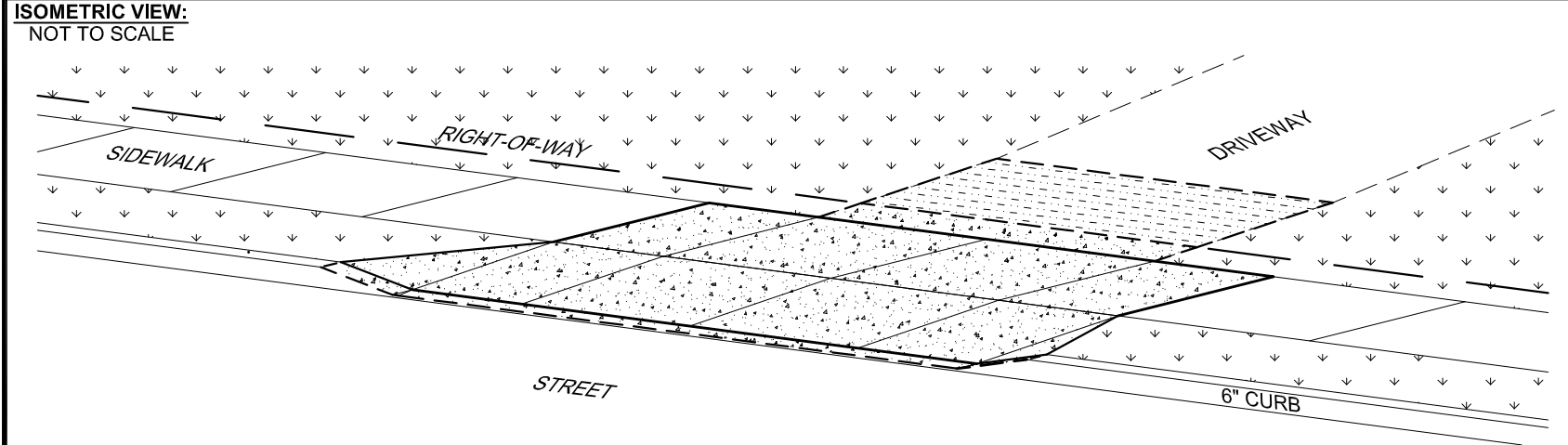
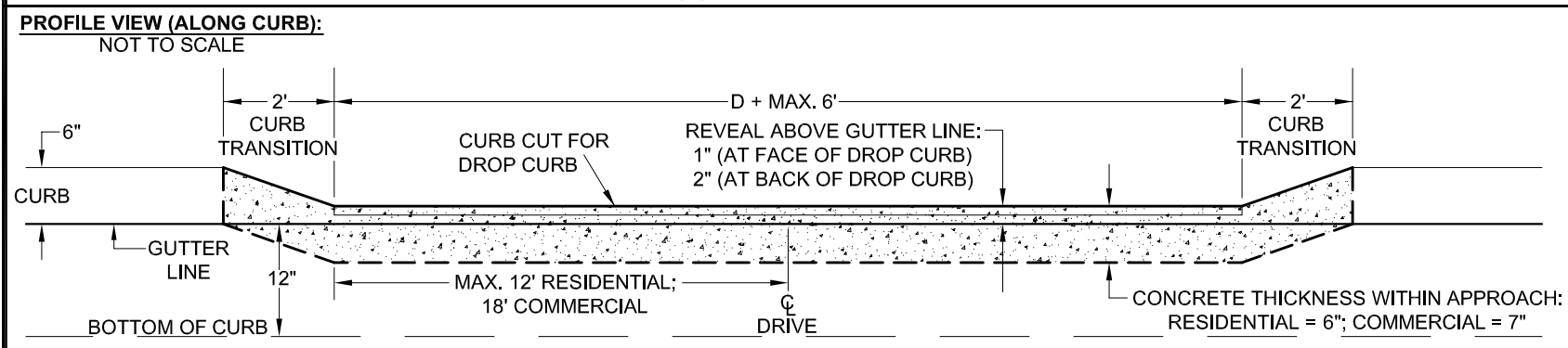
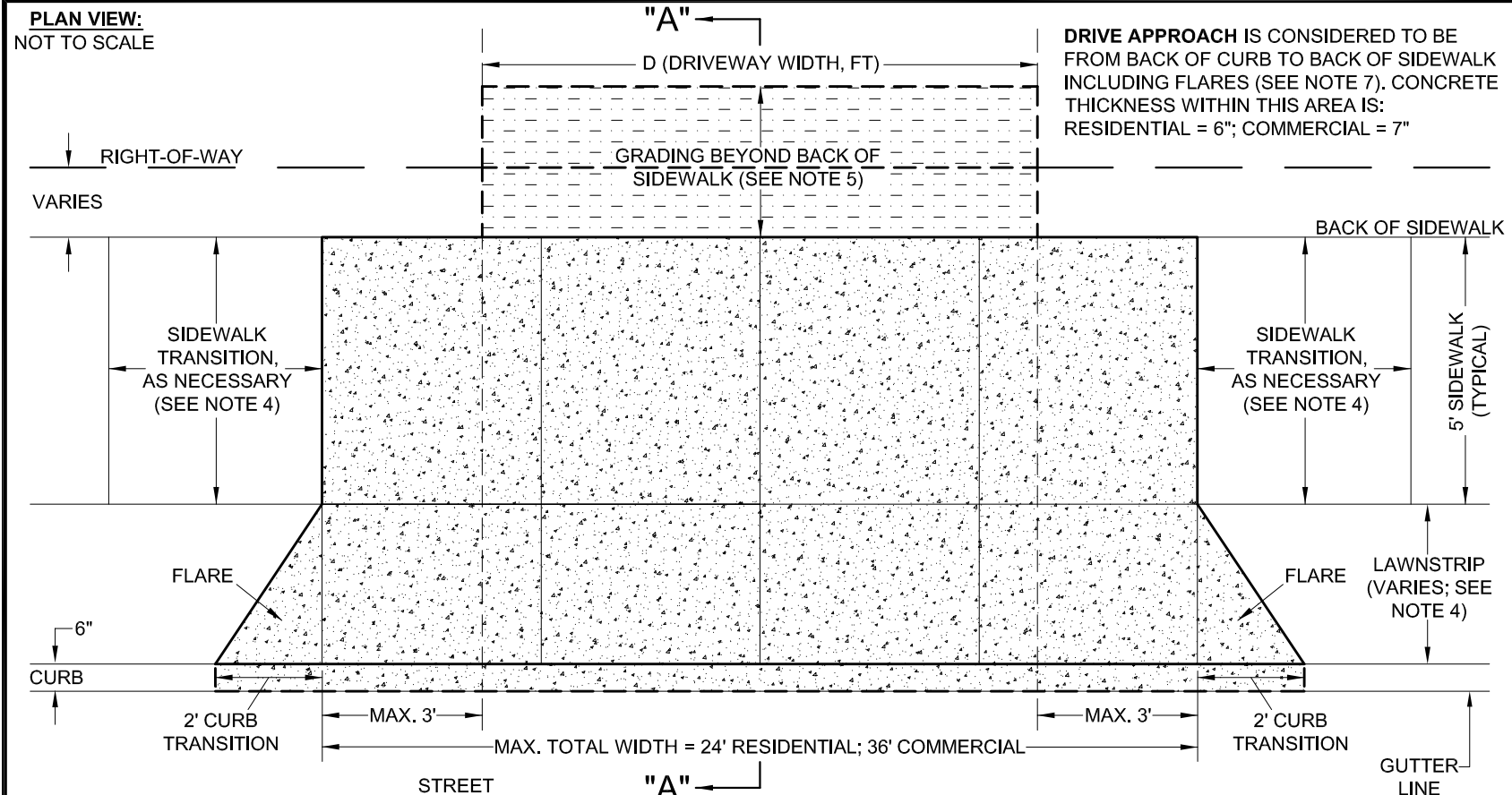


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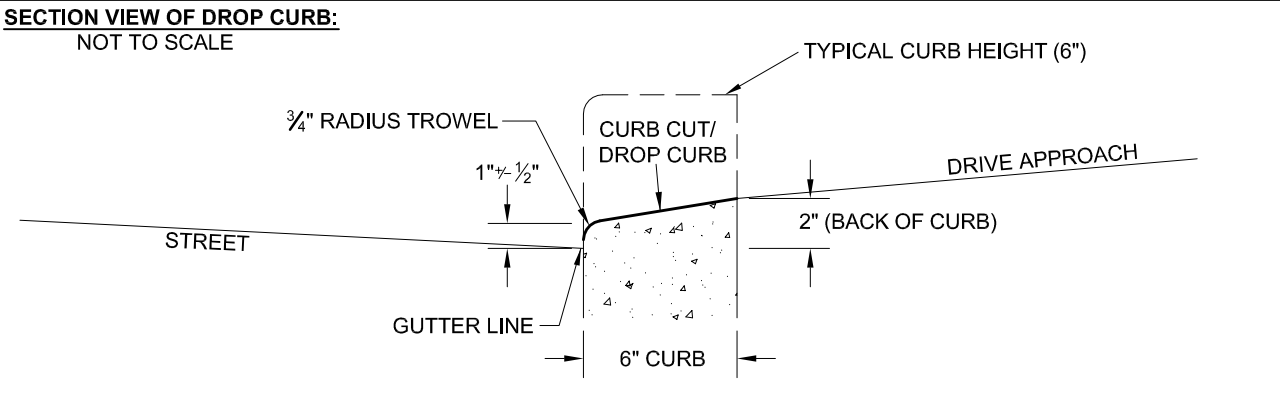
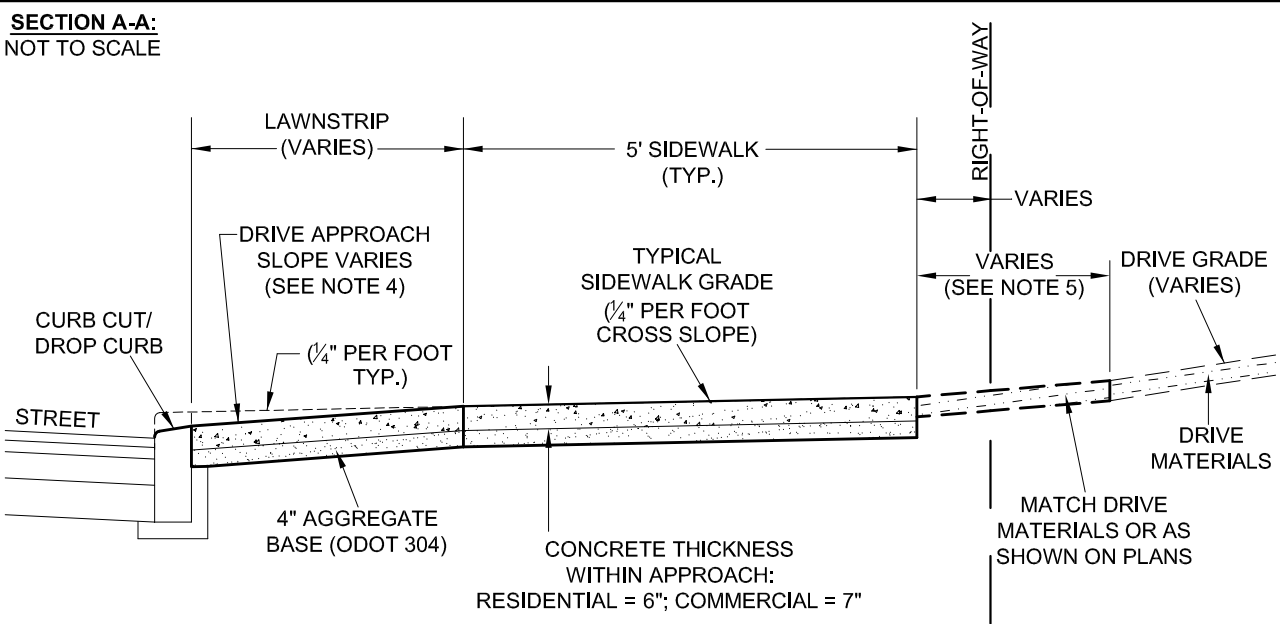
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**STANDARD DRAWING NO. 24**  
**GROUNDWATER DRAIN LINE CONNECTION**



- NOTES:**
1. SIDEWALKS, CURBS, AND DRIVEWAYS SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE CITY OF CANTON SPECIFICATIONS FOR THE CONSTRUCTION, REPAIR, AND REPLACEMENT OF SIDEWALKS, CURBS, AND DRIVEWAYS.
  2. ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY'S ENGINEER'S DISCRETION.
  3. ALTERNATIVE DESIGNS MAY BE APPROVED OR REQUIRED BY THE CITY ENGINEER FOR COMMERCIAL DRIVES.
  4. WHEN LAWNSTRIP WIDTH IS LESS THAN 3 FEET, LOWER THE DRIVE APPROACH/SIDEWALK PROFILE SO THAT DRIVE APPROACH CROSS SLOPE IS CONSTANT 1/4" PER FOOT FROM BACK OF CURB TO BACK OF SIDEWALK. CONSTRUCT SIDEWALK TRANSITIONS WITH A MAXIMUM 12:1 LONGITUDINAL SLOPE (PARALLEL TO STREET).
  5. GRADE AS APPROPRIATE OR IN ACCORDANCE WITH PLANS TO PROVIDE ADEQUATE TRANSITION TO DRIVEWAY AND YARD. FOR CITY PROJECTS, DRIVE MATERIALS AND BUILDUP SHALL MATCH EXISTING. GRADING AND MATERIALS SHALL BE PAID UNDER APPROPRIATE DRIVE RESTORATION ITEMS, ETC.
  6. FOR CITY PROJECTS AND REIMBURSEMENT PROGRAM, DRIVE APPROACH PAY LIMITS SHALL CORRESPOND WITH DRIVE APPROACH LIMITS AS INDICATED HEREIN. IF SIDEWALK TRANSITIONS ARE CONSTRUCTED (SEE NOTE 5), PAY LIMITS SHALL BE EXTENDED TO INCLUDE THE COST OF THE SIDEWALK TRANSITIONS. DRIVE APPROACHES AND PAY LIMITS DO NOT INCLUDE ANY CONCRETE PORTIONS OF DRIVE BEYOND BACK OF SIDEWALK OR ANY OTHER WORK NOT DIRECTLY RELATED TO THE CONSTRUCTION OF THE DRIVE APPROACH. THE COSTS ASSOCIATED WITH EXCAVATION, FORMING, GRADING, AND RESTORATION DIRECTLY RELATED TO THE DRIVE APPROACH AS WELL AS THE COSTS FOR THE CURB CUT/DROP CURB ARE INCIDENTAL TO THE COST OF THE DRIVE APPROACH.
  7. REFER TO CITY STANDARD DRAWING NO. 28 FOR DRIVE APPROACHES WITH SIDEWALK AGAINST CURB. CONNECT APRON TO CURB WITH DOWELS OR WIRE MESH.
  8. PLACE 1/2" EXPANSION JOINTS AGAINST EXISTING CONCRETE DRIVES AND WALKS, BUILDING WALLS, AND OTHER FIXED OBJECTS.
  9. WHEN THE LOCATION OF THE DRIVE APPROACH IS UNKNOWN AT THE TIME OF CURB CONSTRUCTION, THE DROP MAY BE SAW-CUT WITH THE CITY ENGINEER'S APPROVAL.
  10. ANY MODIFICATIONS TO THESE STANDARDS ARE SUBJECT TO THE APPROVAL OF THE CITY ENGINEER.

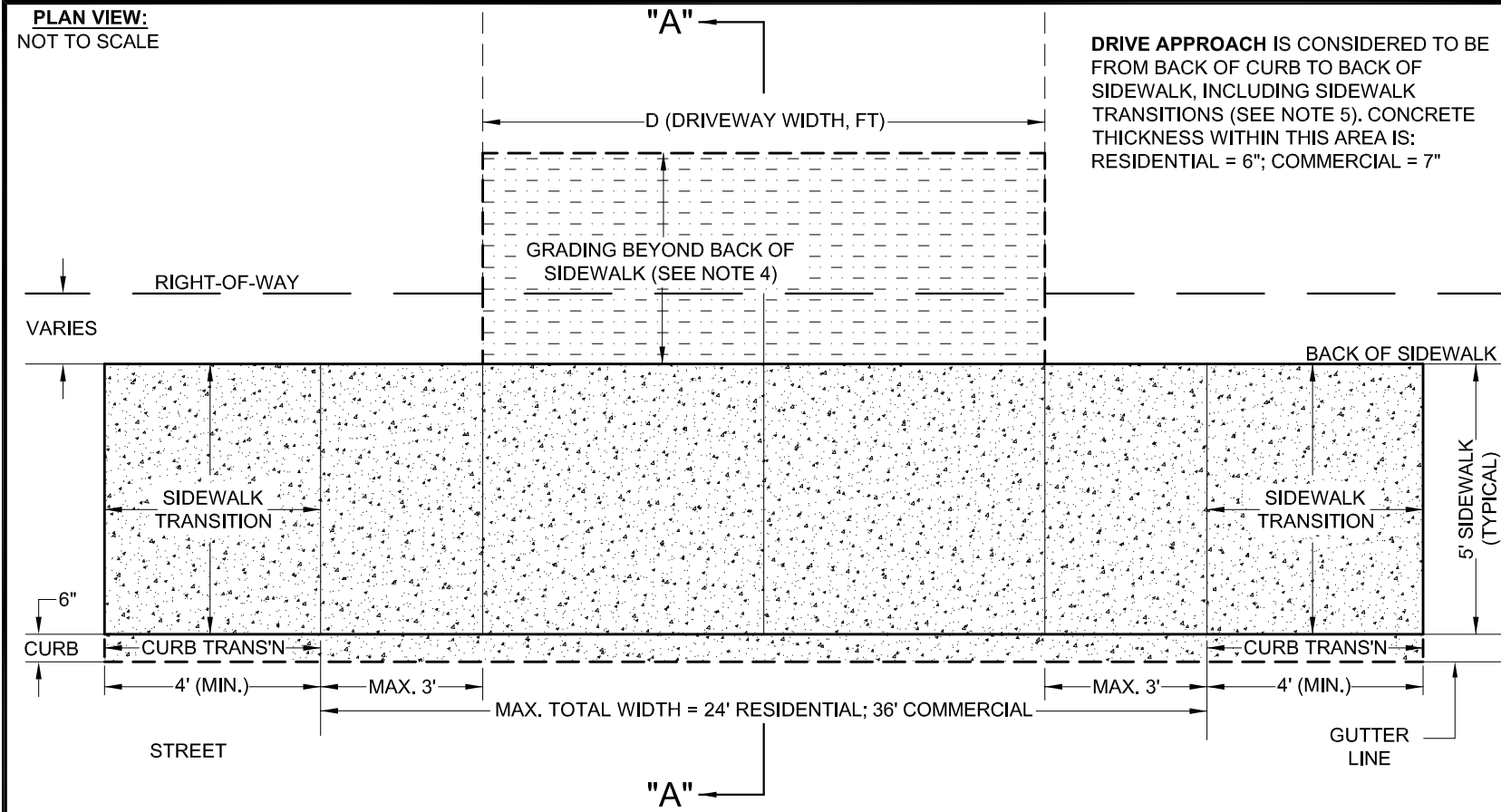


 OFFICE OF THE CITY ENGINEER  
CANTON, OHIO  
DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

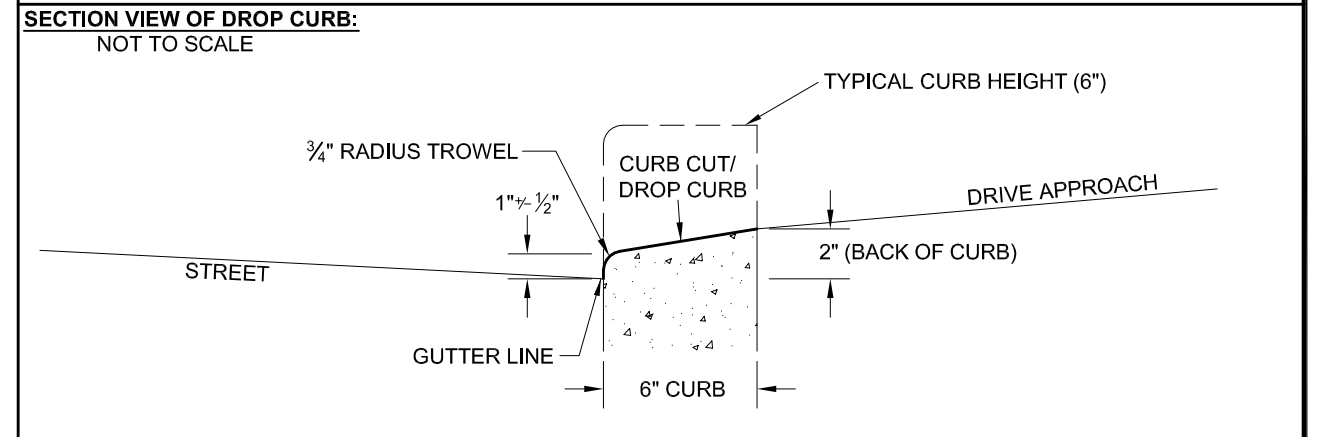
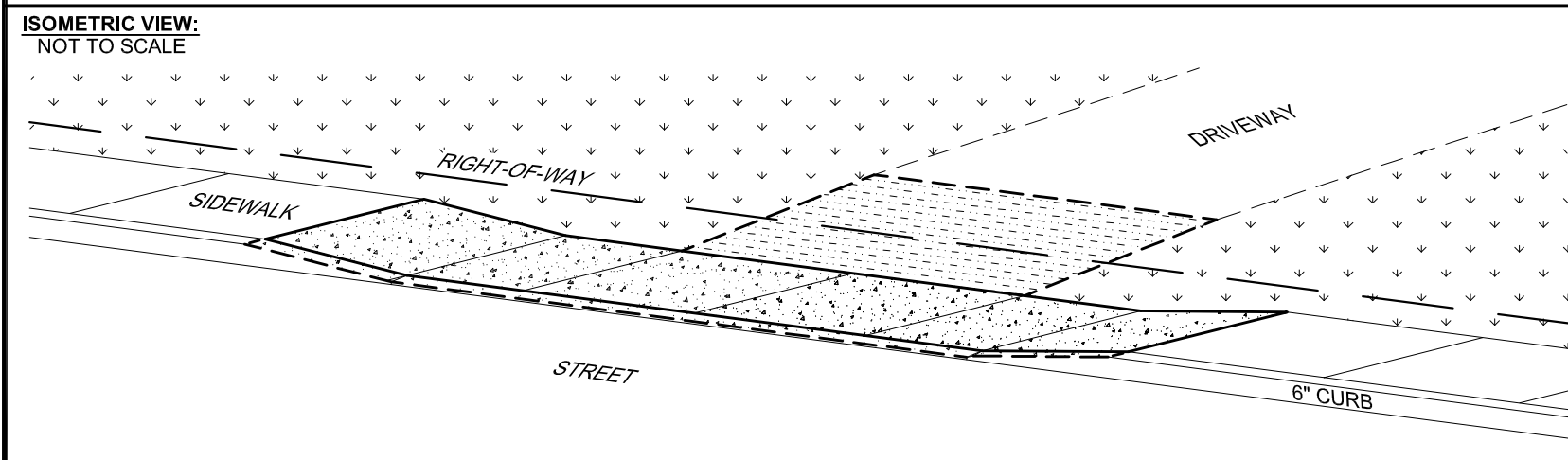
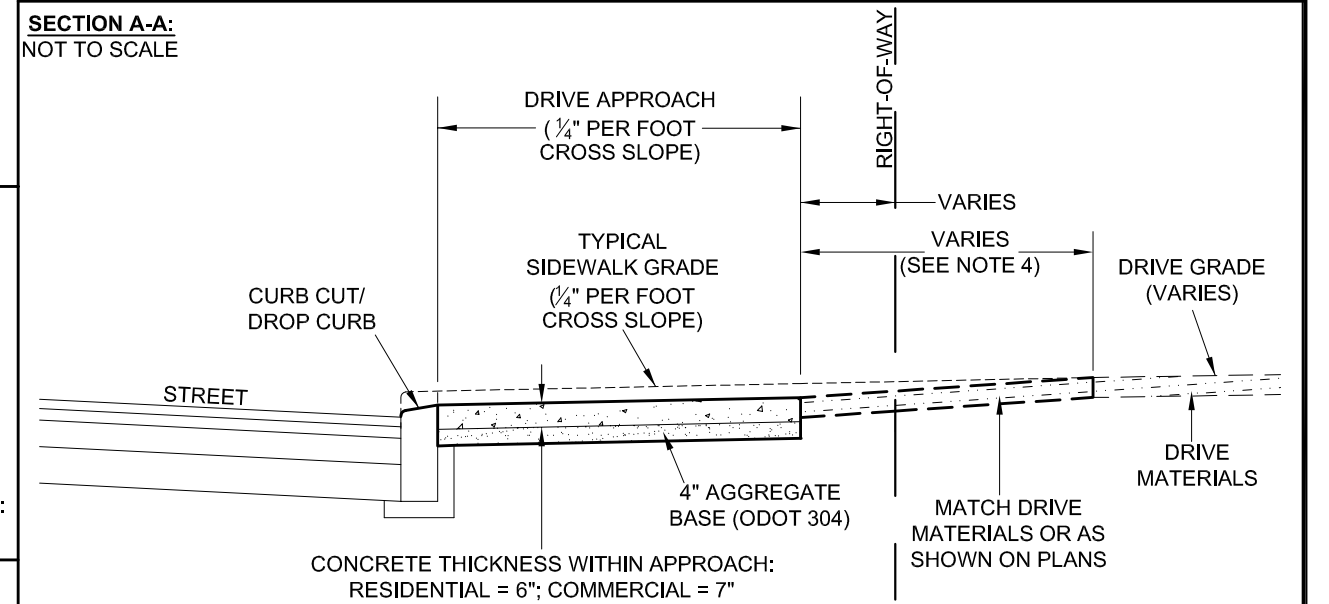
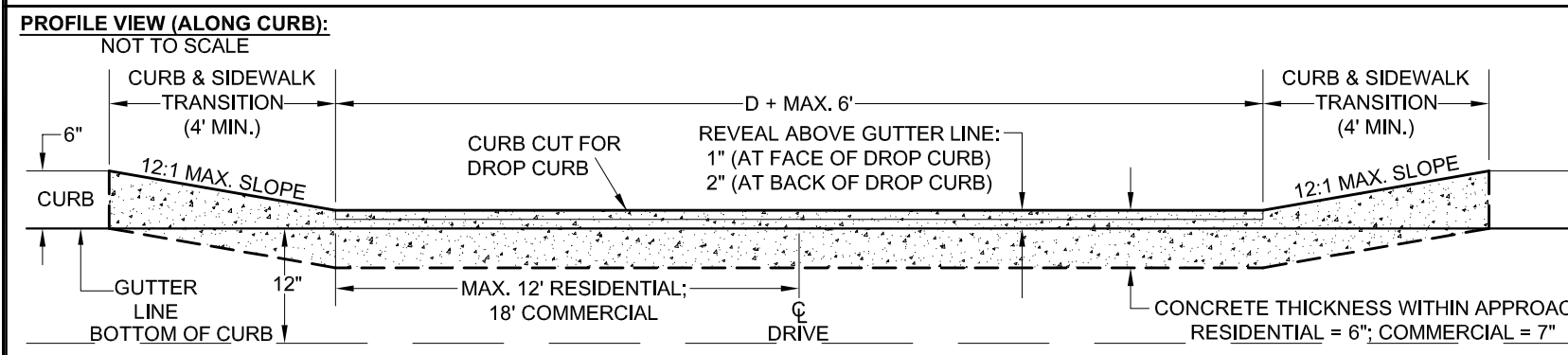
APPROVED DATE: MAR. 2012  
APPROVED BY: CDB, RMB  
DRAWING FILE NAME: ce\_28.dwg

REVISIONS		
DESCRIPTION	DATE	BY
NOTE MODIFICATIONS	4/10/12	CDB

**STANDARD DRAWING NO. 27**  
**DRIVE APPROACH**  
WITH LAWNSTRIP BETWEEN SIDEWALK & CURB  
SHEET 1 OF 1



- NOTES:**
- SIDEWALKS, CURBS, AND DRIVEWAYS SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE CITY OF CANTON SPECIFICATIONS FOR THE CONSTRUCTION, REPAIR, AND REPLACEMENT OF SIDEWALKS, CURBS, AND DRIVEWAYS.
  - ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY'S ENGINEER'S DISCRETION.
  - ALTERNATIVE DESIGNS MAY BE APPROVED OR REQUIRED BY THE CITY ENGINEER FOR COMMERCIAL DRIVES.
  - GRADE AS APPROPRIATE OR IN ACCORDANCE WITH PLANS TO PROVIDE ADEQUATE TRANSITION TO DRIVEWAY AND YARD. FOR CITY PROJECTS, GRADING AND MATERIALS SHALL BE PAID UNDER APPROPRIATE DRIVE RESTORATION ITEMS, ETC.
  - FOR CITY PROJECTS AND REIMBURSEMENT PROGRAM, DRIVE APPROACH PAY LIMITS SHALL CORRESPOND WITH DRIVE APPROACH LIMITS AS INDICATED HEREIN. DRIVE APPROACHES AND PAY LIMITS DO NOT INCLUDE FLARES OR ANY CONCRETE PORTION OF DRIVE BEYOND BACK OF SIDEWALK, OR ANY OTHER WORK NOT DIRECTLY RELATED TO THE CONSTRUCTION OF THE DRIVE APPROACH. THE COSTS ASSOCIATED WITH EXCAVATION, FORMING, GRADING, AND RESTORATION DIRECTLY RELATED TO THE DRIVE APPROACH AS WELL AS THE COSTS FOR THE CURB CUT/DROP CURB ARE INCIDENTAL TO THE COST OF THE DRIVE APPROACH.
  - DUE TO 1/4" PER FOOT CROSS SLOPE, BACK OF TYPICAL 5' SIDEWALK WITHIN APPROACH IS ONLY 3 1/4" ABOVE GUTTER LINE (EXCLUDING SIDEWALK TRANSITIONS). ALTERNATIVE DRIVE APPROACH OPTIONS MAY BE APPROVED OR REQUIRED WHEN DEPTH OF STORM WATER RUNOFF ALONG THE CURB IS ANTICIPATED TO RESULT IN EXCESSIVE PONDING WITHIN THE DRIVE APPROACH AREA OR CAUSE OTHER DRAINAGE PROBLEMS IN THE VICINITY.
  - REFER TO CITY STANDARD DRAWING NO. 29 FOR COMBINED CURB AND SIDEWALK DETAILS. CONNECT APRON TO CURB WITH DOWELS OR WIRE MESH.
  - PLACE 1/2" EXPANSION JOINTS AGAINST EXISTING CONCRETE DRIVES AND WALKS, BUILDING WALLS AND OTHER FIXED OBJECTS.
  - WHEN THE LOCATION OF THE DRIVE APPROACH IS UNKNOWN AT THE TIME OF CURB CONSTRUCTION, THE DROP MAY BE SAW-CUT WITH THE CITY ENGINEER'S APPROVAL.
  - ANY MODIFICATIONS TO THESE STANDARDS ARE SUBJECT TO THE APPROVAL OF THE CITY ENGINEER.



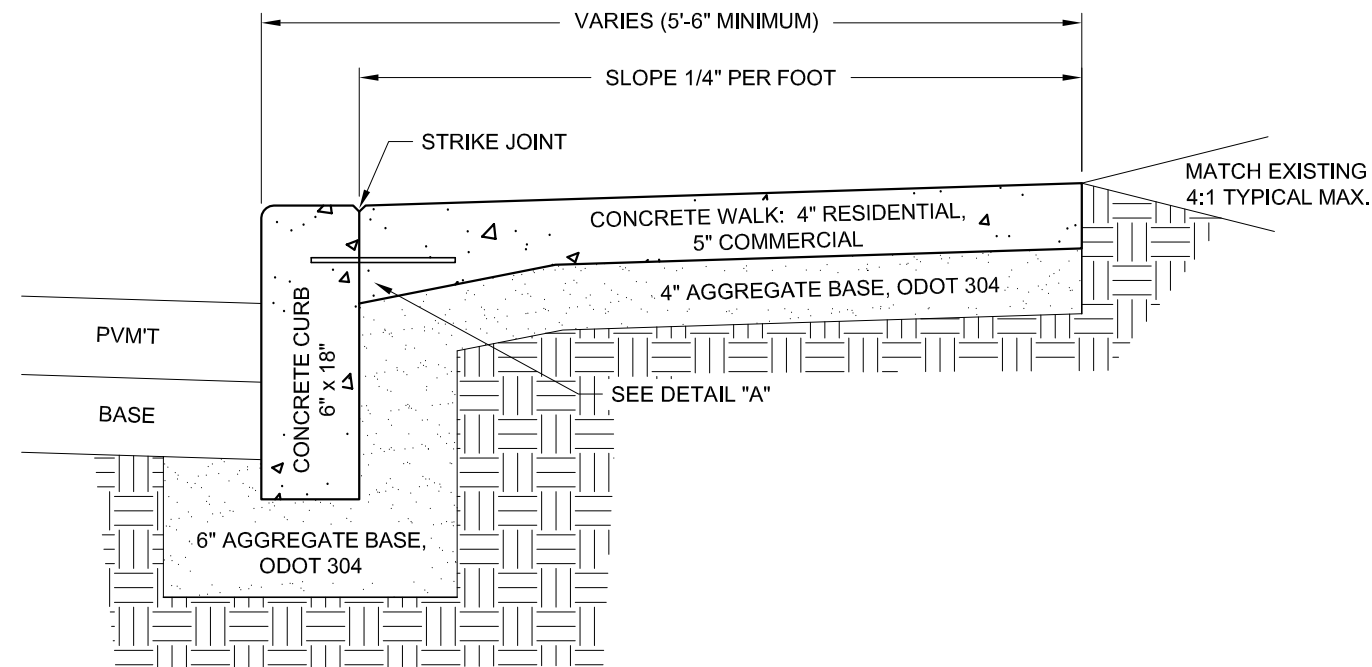
**OFFICE OF THE CITY ENGINEER**  
**CANTON, OHIO**  
DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

APPROVED DATE: MAR. 2012  
APPROVED BY: CDB, RMB, SLH  
DRAWING FILE NAME: ce\_28.dwg

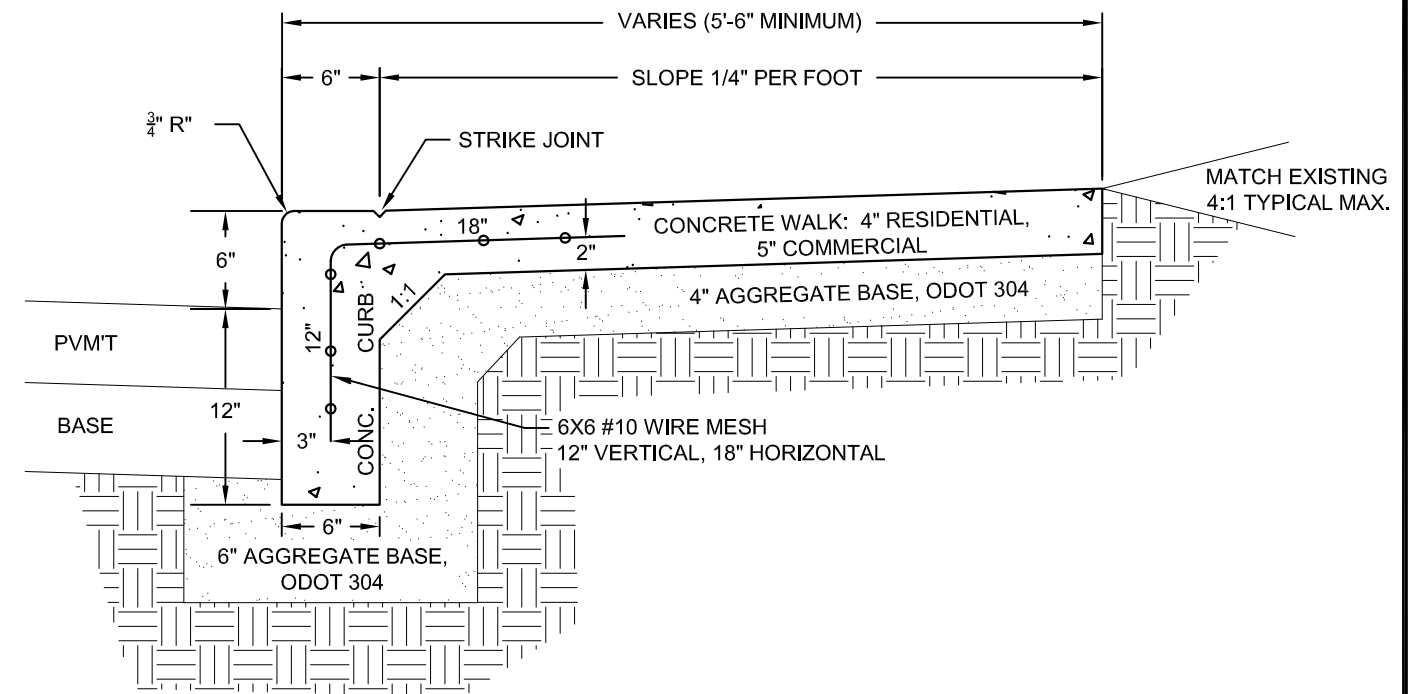
REVISIONS		
DESCRIPTION	DATE	BY
NOTE MODIFICATIONS	4/10/12	CDB
MINOR FORMAT EDIT	6/4/12	CDB

**STANDARD DRAWING NO. 28**  
**DRIVE APPROACH**  
**WITH SIDEWALK AGAINST CURB**  
SHEET 1 OF 1

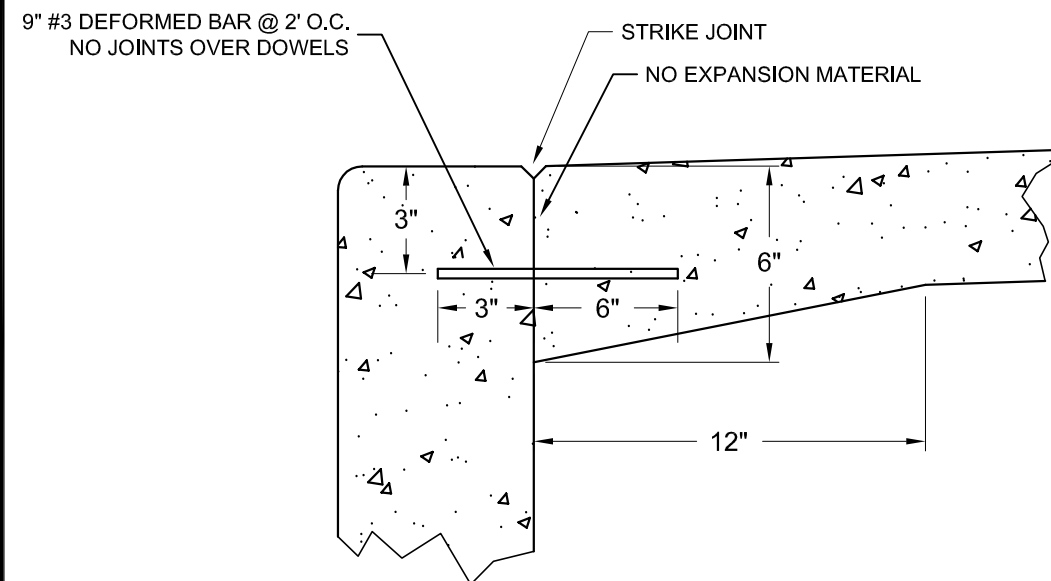
TYPE A  
CONCRETE WALK  
ADJACENT TO CURB



TYPE B  
INTEGRAL CONCRETE WALK  
AND CURB



DETAIL "A"



NOTES:

1. CURB CONSTRUCTION MUST TO CONFORM TO ODOT 609 AND THE CURRENT CITY OF CANTON SPECIFICATIONS FOR THE CONSTRUCTION, REPAIR, AND REPLACEMENT OF SIDEWALKS, CURBS, AND DRIVEWAYS.
2. CONCRETE MATERIAL FOR CURB AND WALK MUST BE ODOT 499 CLASS 'C' CONCRETE WITH LIMESTONE AGGREGATE.
3. NO FOUNDRY SAND OR SLAG PERMITTED IN AGGREGATE BASE, ODOT 304.
4. CONCRETE WALK REPLACED OR INSTALLED ADJACENT TO EXISTING CONCRETE CURB MUST BE DOWELED TO THE EXISTING CURB, UNLESS DETERMINED OTHERWISE BY THE CITY ENGINEER.
5. CURB CONTRACTION JOINT MUST BE SPACED 10 FEET TYPICALLY; WALK CONTRACTION JOINTS MUST BE SPACED 5 FEET TYPICALLY, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER. CURB EXPANSION JOINTS MUST BE INSTALLED AT CURB INLET CATCH BASIN AND AT ANY OTHER RIGID STRUCTURES. CURB EXPANSION AND CONSTRUCTION JOINTS MUST BE DOWELED WITH TWO (2) #5 THRU #8 SMOOTH BARS, 18" LONG, EXTENDING 9" INTO EACH CURB.
6. ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.



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APPROVED DATE: MARCH 2012

APPROVED BY: CDB, RMB

DRAWING FILE NAME: ce\_29.dwg

REVISIONS

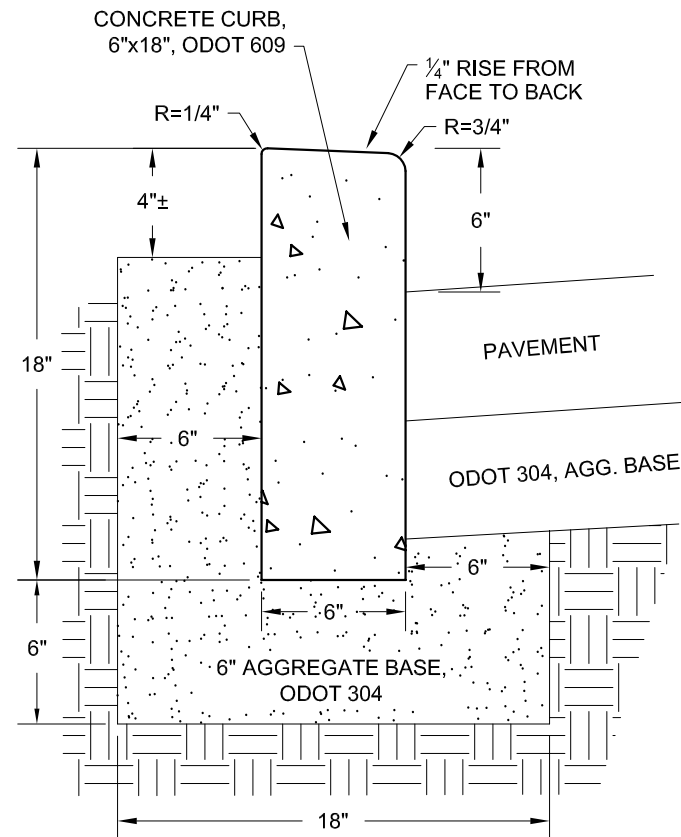
DESCRIPTION	DATE	BY

STANDARD DRAWING NO. 29

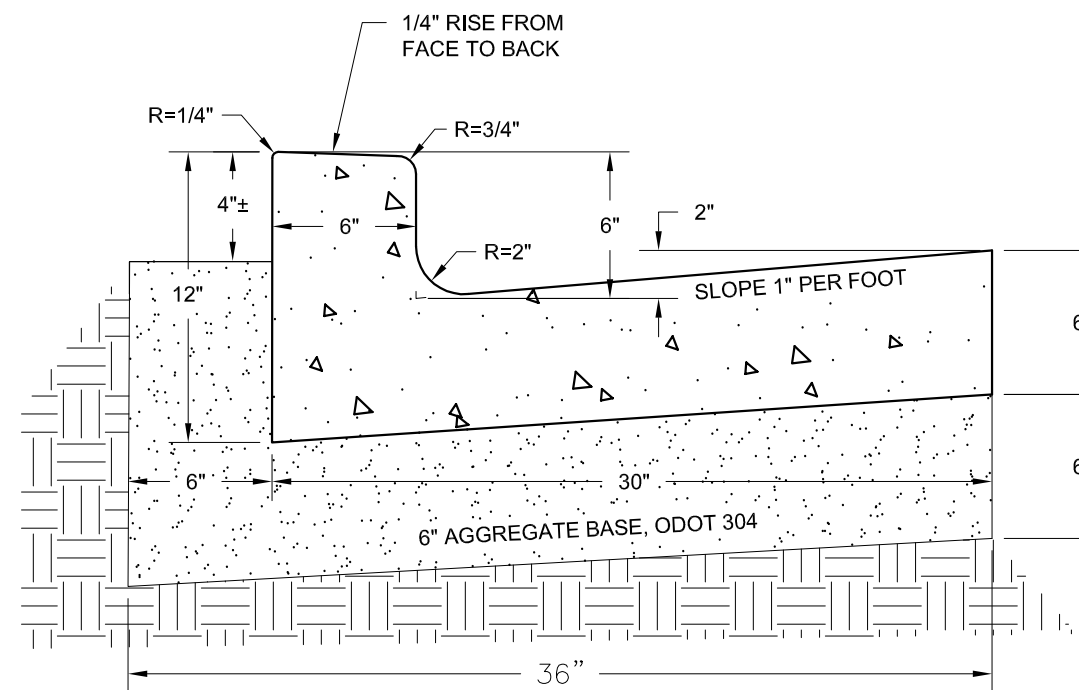
COMBINED CURB & WALK

SHEET 1 OF 1

CANTON TYPE 1  
STANDARD CONCRETE CURB



CANTON TYPE 2  
STANDARD CONCRETE COMBINED  
CONCRETE & GUTTER



NOTES:

1. CURB CONSTRUCTION MUST TO CONFORM TO ODOT 609 AND THE CURRENT CITY OF CANTON SPECIFICATIONS FOR THE CONSTRUCTION, REPAIR, AND REPLACEMENT OF SIDEWALKS, CURBS, AND DRIVEWAYS.
2. CONCRETE MATERIAL FOR CURB AND WALK MUST BE ODOT 499 CLASS 'C' CONCRETE WITH LIMESTONE AGGREGATE.
3. NO FOUNDRY SAND OR SLAG PERMITTED IN AGGREGATE BASE, ODOT 304.
4. CURB CONTRACTION JOINT MUST BE SPACED 10 FEET TYPICALLY; WALK CONTRACTION JOINTS MUST BE SPACED 5 FEET TYPICALLY, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER. CURB EXPANSION JOINTS MUST BE INSTALLED AT CURB INLET CATCH BASIN AND AT ANY OTHER RIGID STRUCTURES. CURB EXPANSION AND CONSTRUCTION JOINTS MUST BE DOWELED WITH TWO (2) #5 THRU #8 SMOOTH BARS, 18" LONG, EXTENDING 9" INTO EACH CURB.
5. CONCRETE WALK REPLACED OR INSTALLED ADJACENT TO EXISTING CONCRETE CURB MUST BE DOWELED TO THE EXISTING CURB, UNLESS DETERMINED OTHERWISE BY THE CITY ENGINEER (SEE CITY STD. DWG. 29).
6. ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.
7. ODOT CURB TYPE 6 AND TYPE 2 (ODOT STD CONST. DWG. BP-5.1) ARE ACCEPTABLE OPTIONS RESPECTIVELY TO CITY STANDARD CURB TYPE 1 AND 2 FOR NEW ROADWAY OR CITY PROJECTS, AS APPROVED BY THE CITY ENGINEER. WHEN A CANTON CURB TYPE ABUTS AN ODOT CURB TYPE, THE CONTACTOR MUST TRANSITION THE CURB FACE AND TOP TO MATCH THE EXISTING CURB FACE AND TOP WITHIN A 4' LENGTH, BUT NOT LESS THAN 1' LENGTH.



OFFICE OF THE CITY ENGINEER  
CANTON, OHIO

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APPROVED DATE: MAR 2012

APPROVED BY: RMB

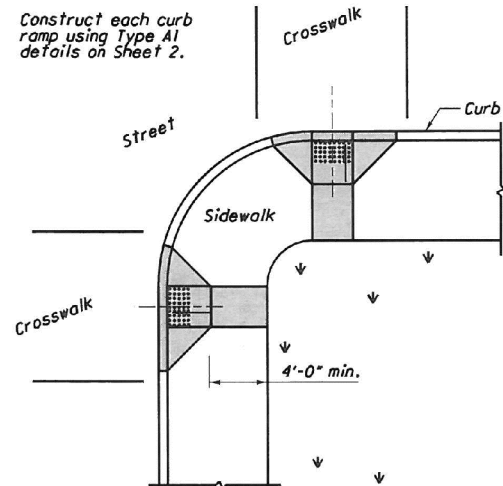
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REVISIONS

DESCRIPTION	DATE	BY

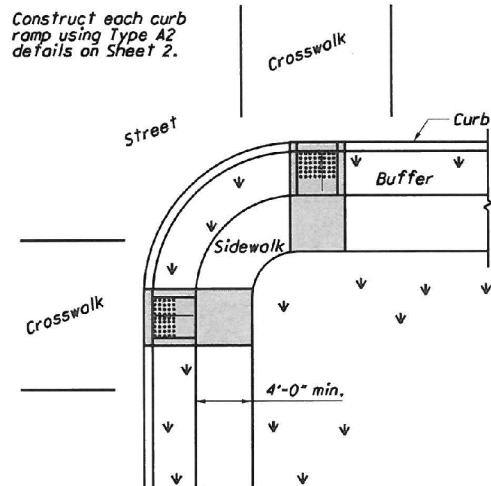
**STANDARD DRAWING NO. 30**  
**CONCRETE CURB AND**  
**COMBINED CURB & GUTTER**

SHEET 1 OF 1



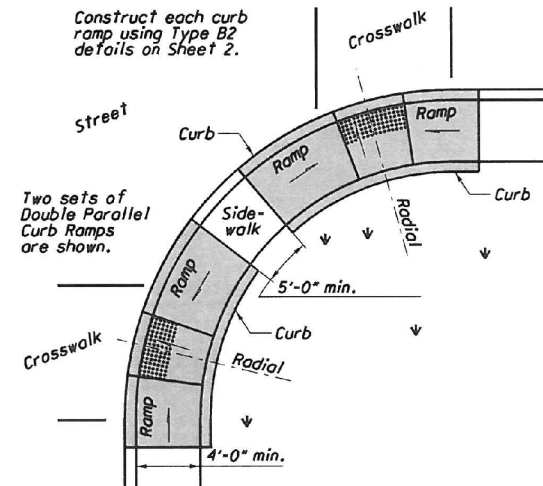
Use curb ramps with flared sides at locations with wide sidewalks.

PERPENDICULAR CURB RAMPS



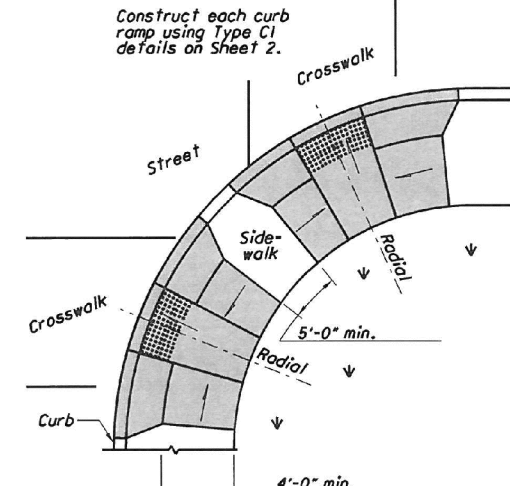
Use curb ramps with returned curbs where buffer is wide enough to accommodate ramp slope.

PREFERRED CONSTRUCTION PLACEMENT



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

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 1/8" between the 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.

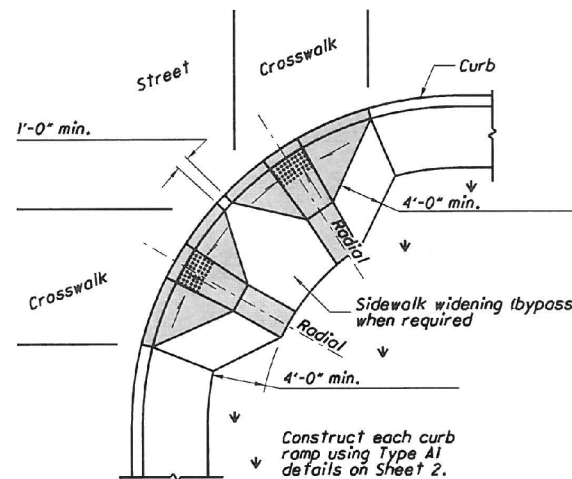
**JOINTS:** Provide expansion joints in the curb ramp as extensions of walk joints and consistent with Item 608.03 requirements for a new concrete walk. Provide a 1/2" Item 705.03 expansion joint filler around the edge of ramps built in existing concrete walks. Lines shown on this drawing indicate the 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.

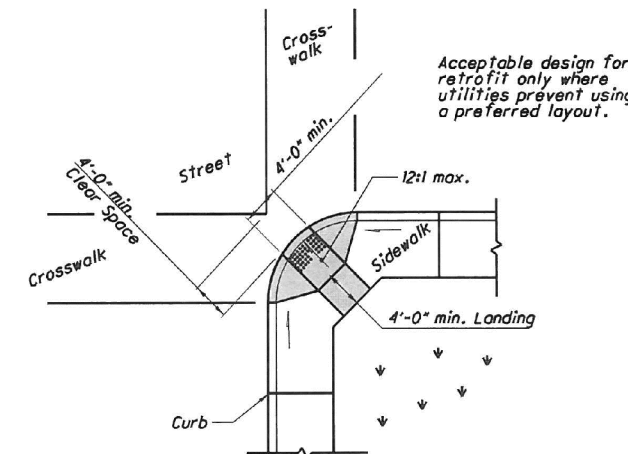
Work beyond the shaded ramp/landing area is paid for as curb (609) and walk (608). Removal of existing curb, walk (or existing curb ramps) are paid under Item 202.

For at-grade crossing locations where only detectable warnings are required in order to achieve 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.

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

SD NUMBER  
BP-7.1

1 / 3

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

STATUS  
ENGINEER

OFFICE OF  
ROADWAY  
ENGINEERING

DATE  
10-15-10

ADMINISTRATOR  
D. B. Brown

THE CITY'S STANDARD WHEEL CHAIR RAMP IS THE ODOT BP-7.1 WITH THE MODIFICATIONS NOTED.  
SEE SHEET 4 OF 4 FOR CITY'S APPROVED TRUNCATED DOME PRODUCTS.



OFFICE OF THE CITY ENGINEER  
CANTON, OHIO

DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

APPROVED DATE: MAY 2012

APPROVED BY: RMB

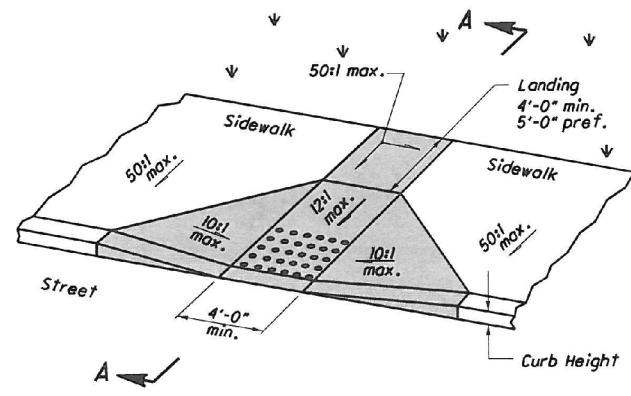
DRAWING FILE NAME: ce\_33.dwg

REVISIONS

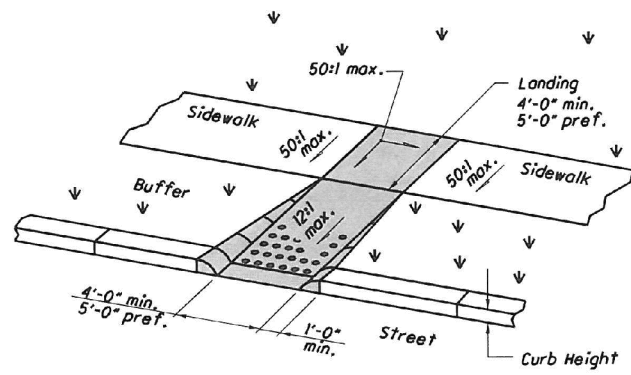
REVISIONS	DESCRIPTION	DATE	BY
		6/29/12	RMB

STANDARD DRAWING NO. 33

WHEEL CHAIR RAMP

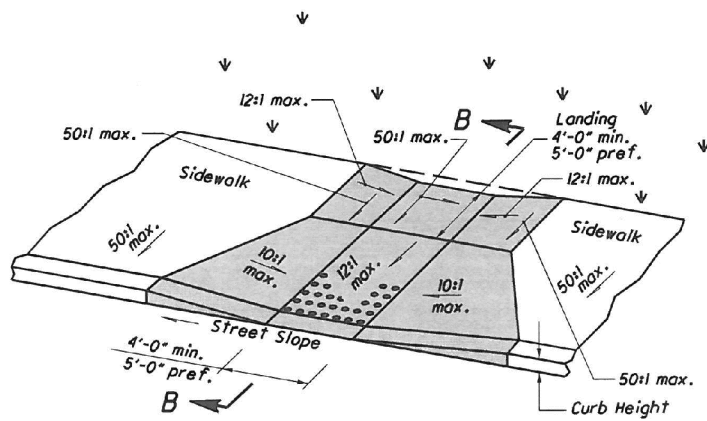


Type A1 (Perpendicular with flared sides)

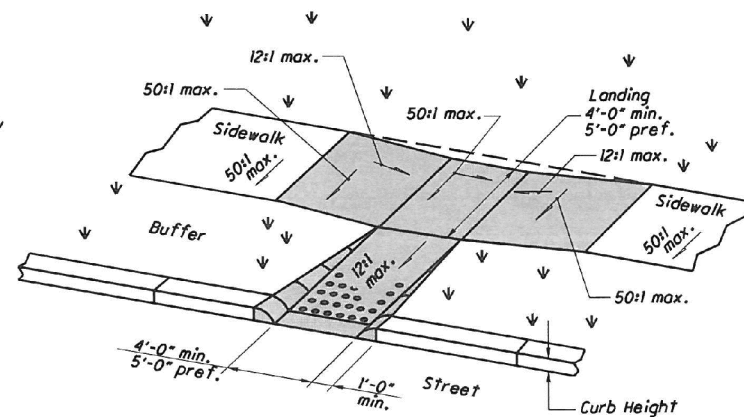


Type A2 (Perpendicular with returned curb)

PERPENDICULAR CURB RAMP DETAILS

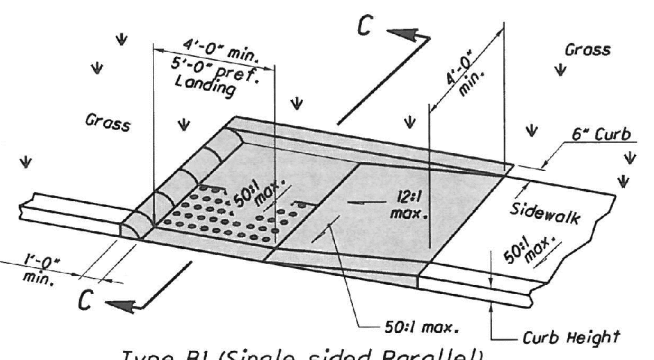


Type C1 (Combined with flared sides)

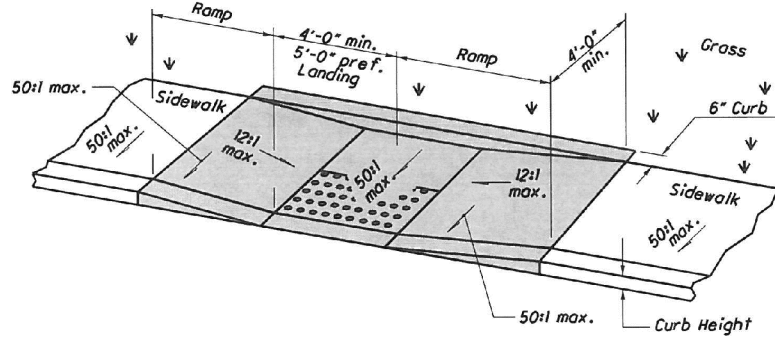


Type C2 (Combined with returned curb)

COMBINED CURB RAMP DETAILS

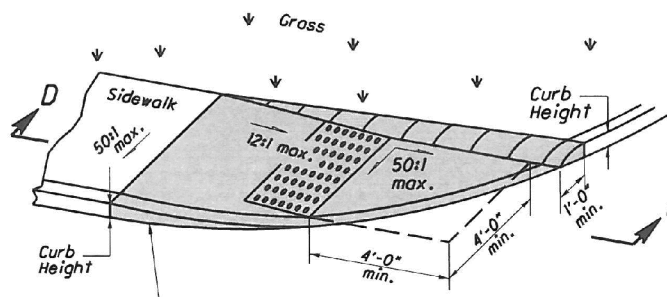


Type B1 (Single sided Parallel)



Type B2 (Double sided Parallel)

PARALLEL CURB RAMP DETAILS



Type B3 (Single sided Parallel)

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 indefinitely, the transition from existing 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 or 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.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 10-15-10 DATE  
 ADMINISTRATOR  
 M. Blaine  
 ENGINEER  
 OFFICE OF ROADWAY ENGINEERING  
 STANDARD ROADWAY CONSTRUCTION DRAWING  
 NEW CURB RAMPS (with Detectable Warnings)  
 BP-7.1  
 THIS DRAWING REPLACES BP-7.1 DATED 1-19-07.  
 2 / 3

THE CITY'S STANDARD WHEEL CHAIR RAMP IS THE ODOT BP-7.1 WITH THE MODIFICATIONS NOTED.  
 SEE SHEET 4 OF 4 FOR CITY'S APPROVED TRUNCATED DOME PRODUCTS.



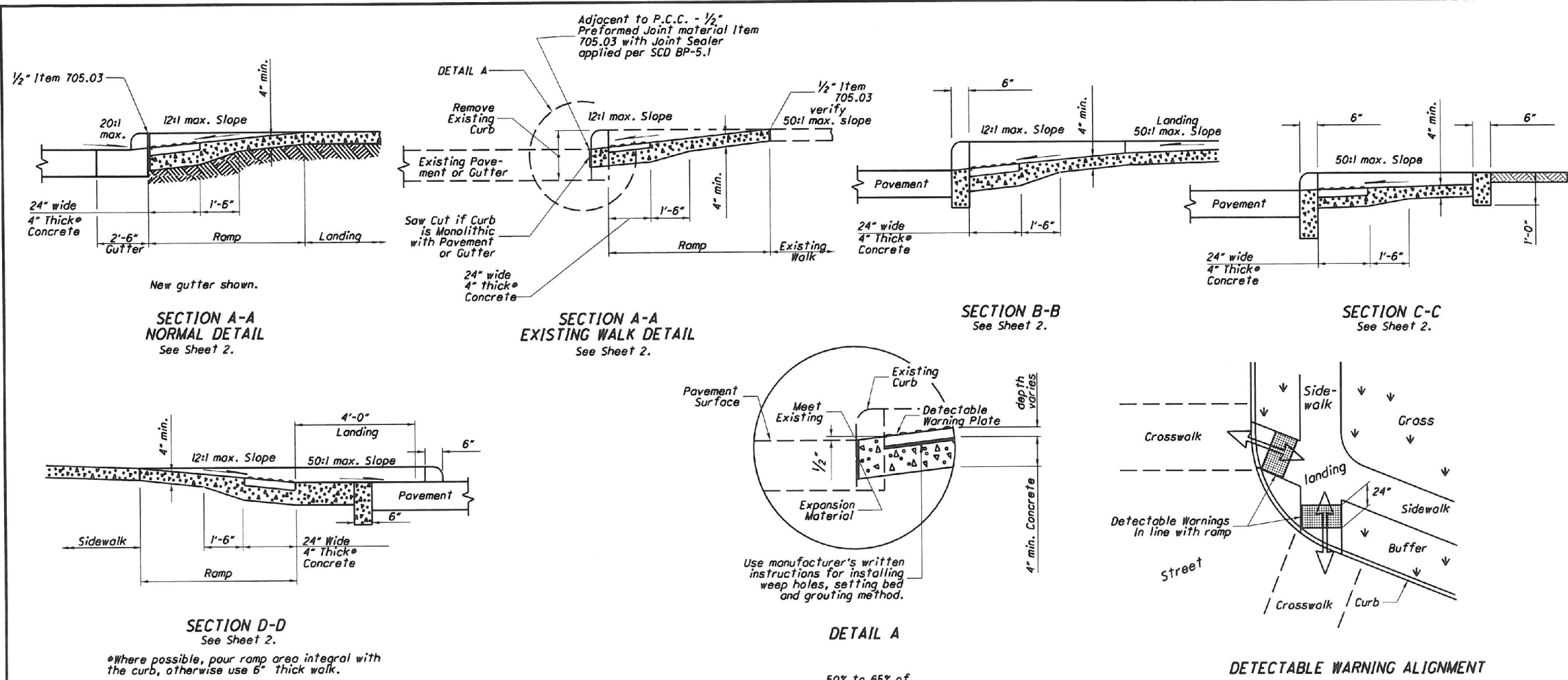
OFFICE OF THE CITY ENGINEER  
 CANTON, OHIO  
 DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
 2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

APPROVED DATE: MAY 2012  
 APPROVED BY: RMB  
 DRAWING FILE NAME: ce\_33.dwg

REVISIONS		
DESCRIPTION	DATE	BY
REVISIONS	6/29/12	RMB

STANDARD DRAWING NO. 33  
 WHEEL CHAIR RAMP





**DETECTABLE WARNINGS NOTES**

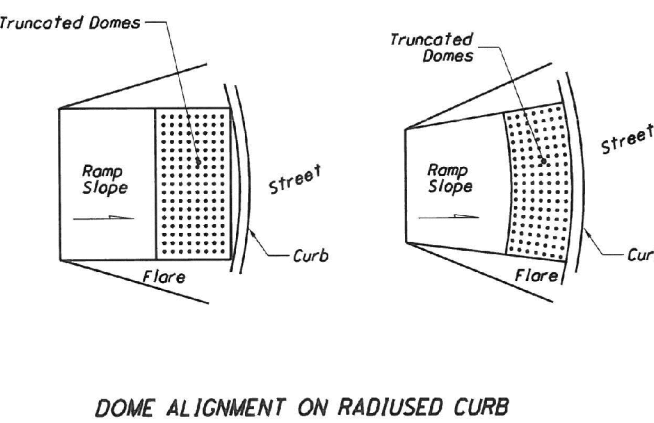
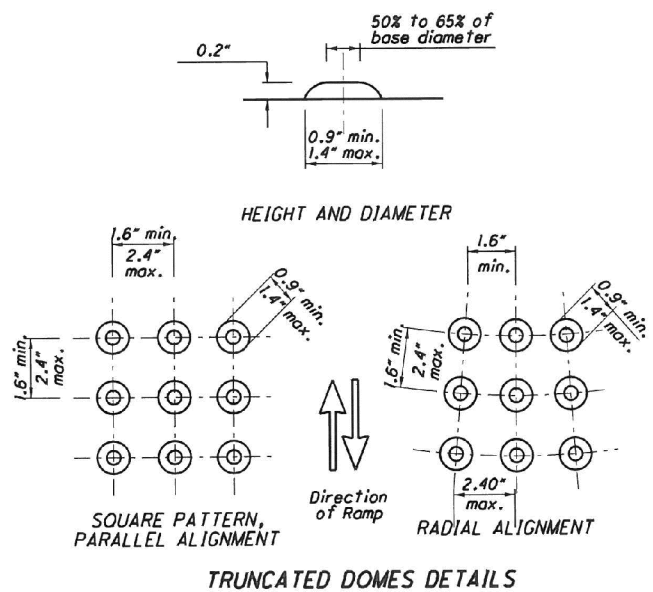
**GENERAL:** Detectable Warnings are a distinctive surface pattern of truncated domes which are detectable by cane or underfoot to alert people with vision impairments of their approach to streets and hazardous drop-offs.

**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.



**SEE SHEET 4 OF 4 FOR CITY'S APPROVED TRUNCATED DOME PRODUCTS.**

THIS DRAWING REPLACES BP-7.1 DATED 1-19-07.  
 STANDARD ROADWAY CONSTRUCTION DRAWING  
 NEW CURB RAMPS  
 (with Detectable Warnings)  
 3 / 3  
 STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 OFFICE OF ROADWAY ENGINEERING  
 M. Blime  
 ENGINEER  
 DATE: 10-15-10  
 ADMINISTRATOR: *Dirk B. Swann*

**THE CITY'S STANDARD WHEEL CHAIR RAMP IS THE ODOT BP-7.1 WITH THE MODIFICATIONS NOTED. SEE SHEET 4 OF 4 FOR CITY'S APPROVED TRUNCATED DOME PRODUCTS.**



**OFFICE OF THE CITY ENGINEER**  
**CANTON, OHIO**  
 DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
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APPROVED DATE: MAY 2012  
 APPROVED BY: RMB  
 DRAWING FILE NAME: ce\_33.dwg

REVISIONS		
DESCRIPTION	DATE	BY
REVISIONS	6/29/12	RMB

**STANDARD DRAWING NO. 33**  
**WHEEL CHAIR RAMP**

DETECTABLE WARNING DOMES

BRICK PAVERS

TRUNCATED DOME BRICK IS REQUIRED FOR ALL STREETScape AREAS **IN THE CENTRAL BUSINESS DISTRICT** AS DETERMINED BY CITY ENGINEER'S OFFICE.

Brick Pavers will meet ASTM C 902 Class SX, Type 1, or C 936, or C 1272 Type R. (SEE OPTION 3 and 4 FOR NON-BRICK)

Acceptable manufacturers and products are:

- 1) Whitacre-Greer Fireproofing Company,  
1400 S. Mahoning Ave, Alliance, OH, 44601, (800) WG PAVER  
ADA Paver, 4"x8"x2-1/4", Clear Red (Rustic) #30.
- 2) The Belden Brick Company  
PO Box 20910, Canton, OH 44701 330-456-0031  
City Line ADA Paver, Regimental Red 2-1/4"x4"x8" or 2-1/4"x8"x8"

OR APPROVED EQUAL.

Pavers will be laid on top of a 4" unreinforced concrete base. Setting bed to be mortared in accordance with manufacturer's instruction, or with a maximum 1/2" thick bed of latex modified cement mortar. SWEEP POLYMERIC SAND (TECHNI SEAL OR APPROVED EQUAL) INTO JOINTS. Joint width must not exceed 1/8" or be less than 1/16" wide.

Pavers shall be laid such that joints are level with adjoining joints so as to provide a smooth transition from brick to brick and brick to concrete surface.

The surface of any two adjacent units should not differ by more than 1/8" [3] in height. Bricks shall be placed in a running bond pattern. Face of all brick shall be clean of cement and protected so as to avoid chipping during construction.

PANELS, WET SET

REPLACEABLE TRUNCATED DOME PANELS SET IN WET CONCRETE MUST BE USED IN RAMPS **OUTSIDE THE CENTRAL BUSINESS DISTRICT**.

Acceptable manufacturers and products are:

- 1) Armorcast Products Company  
North Hollywood, CA 818-982-3800  
Armorcast Detectable Warning Panels (Wet Set Panels)  
24"x24", 24"x36", 24"x48"; also 6'-15' Radius  
Polymer Concrete, Red Brick color
- 2) ADA Solutions, Inc.  
N. Billerica, MA 01862  
Cast-in-Place Replaceable Tactile (Wet Set)  
2'x3', 2'x4', 2'x5', and 2' w/radius  
Glass and Carbon Composite, Brick Red color

OR APPROVED EQUAL

ADHESIVE MATS

REPLACEABLE TRUNCATED DOME MATS THAT SET ON CONCRETE RAMPS BY ADHESIVE WILL ONLY BE CONSIDERED IN THE EVENT AN EXISTING WHEEL CHAIR RAMP NEEDS DETECTABLE WARNING DOMES INSTALLED AND THE RAMP REQUIRES NO OTHER MODIFICATIONS. INSTALLATION IS SUBJECT TO THE CITY ENGINEER'S APPROVAL.

Acceptable manufacturers and products are:

- 1) Submit product specification, color and sample for review/approval by the City Engineer



**OFFICE OF THE CITY ENGINEER  
CANTON, OHIO**

DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

APPROVED DATE: MAY 2012

APPROVED BY: RMB

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**REVISIONS**

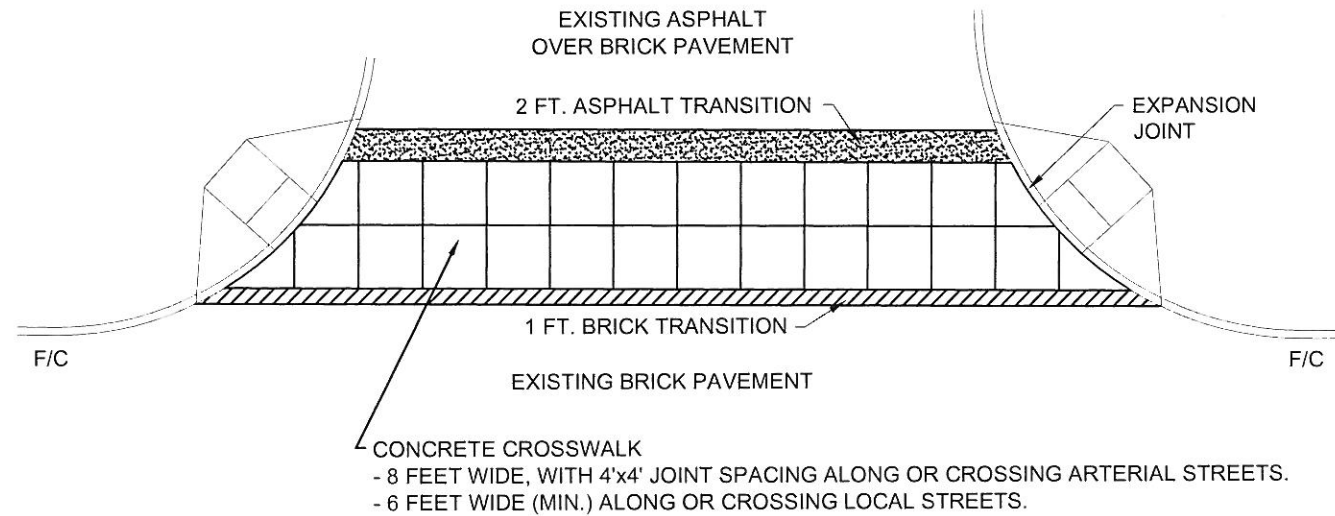
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REVISIONS	6/29/12	RMB

**STANDARD DRAWING NO. 33**

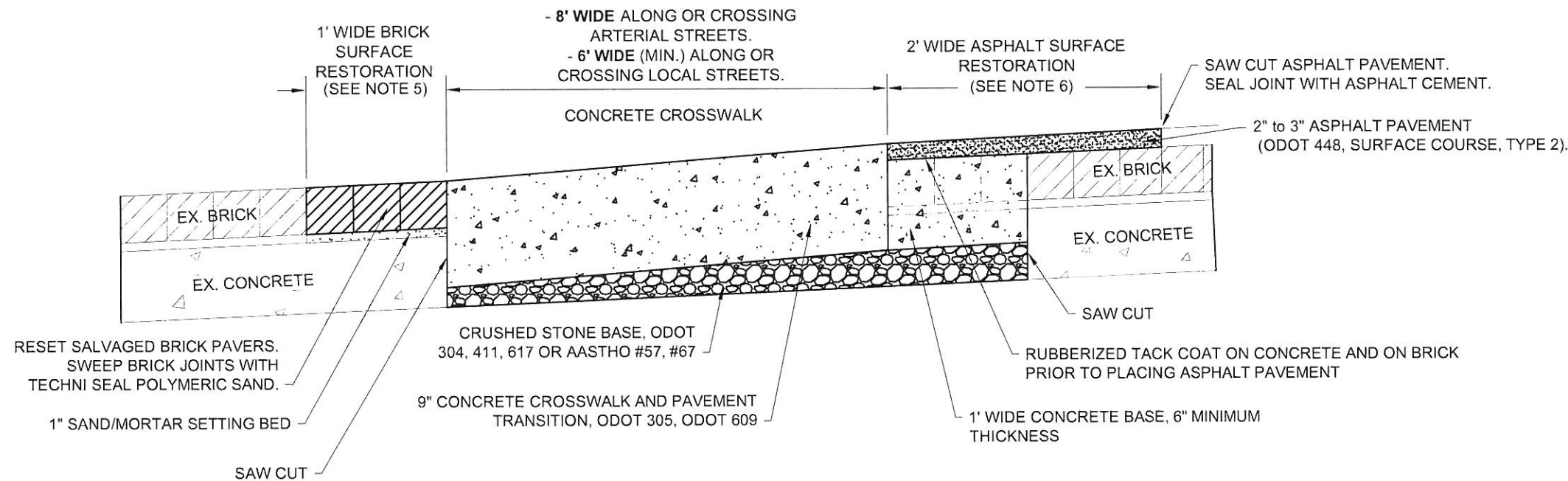
**WHEEL CHAIR RAMP**

SHEET 4 OF 4

PLAN VIEW



SECTION VIEW



NOTES:

1. CONCRETE CROSS WALKS MUST BE CONSTRUCTED IN THE ROADWAY WHEN EXISTING PAVEMENT IS DISTURBED WHERE BRICK ROADS TRANSITION TO ASPHALT ROADS BY OVERLAY OF ASPHALT ON BRICK PAVERS; UNLESS DETERMINED OTHERWISE BY THE CITY ENGINEER.
2. CROSS WALK CONSTRUCTION MUST CONFORM TO ODOT 608 AND THE CURRENT CITY OF CANTON SPECIFICATIONS FOR THE CONSTRUCTION, REPAIR, AND REPLACEMENT OF SIDEWALKS, CURBS, AND DRIVEWAYS.
3. SECTION PROFILE OF CROSS WALK TO BE FIELD DETERMINED BASED ON EXISTING ASPHALT AND BRICK PAVEMENT ELEVATIONS. PROFILE OF THE CROSSWALK MUST BE SET IN A MANNER THAT DOES NOT IMPEDE THE STORMWATER DRAINAGE.
4. DURING REMOVAL OF PAVEMENT FOR INSTALLATION OF NEW CONCRETE CROSS WALK, CONTRACTOR MUST STABILIZE BRICK PAVERS AND PREVENT BRICKS, THAT ARE TO REMAIN IN PLACE, FROM COMING LOOSE.
5. CONTRACTOR TO REPLACE BRICK PAVEMENT WITH SALVAGED BRICK SET ON A 6" CONCRETE BASE AND 1" SAND/MORTAR SETTING BED. REUSE OF EXISTING CONCRETE BASE UNDER BRICK IS ACCEPTABLE IF CITY ENGINEER DEEMS EXISITING CONCRETE BASE IS IN SATISFACTORY CONDITION; OTHERWISE NEW CONCRETE BASE MAY BE REQUIRED. SWEEP BRICK JOINTS WITH TECHNI-SEAL POLYMERIC SAND (OR APPROVED EQUAL). ALL BRICK PAVERS RESET MUST MEET THE GRADES ESTABLISHED BY THE ENGINEER. SURFACE ELEVATION FROM BRICK TO BRICK, OR BRICK TO CONCRETE MUST NOT EXCEED 1/8".
6. CONTRACTOR MUST PLACE TRANSITIONAL ASPHALT PAVEMENT (ODOT 448, SURFACE COURSE, TYPE 2) MATCHING THE SURFACE OF THE NEW CONCRETE CROSS WALK AND EXISTING ASPHALT PAVEMENT. ASPHALT PAVEMENT THICKNESS MUST NOT BE LESS THAN 2", OR GREATER THAN 3". ASPHALT PAVEMENT MUST BE SET ON A CONCRETE BASE WITH A MINIMUM THICKNESS OF 6". THE CONCRETE BASE MUST LOCK-IN THE EXISTING BRICK PAVERS. APPLY RUBBERIZED TACK COAT ON CONCRETE BASE AND BRICK BASE PRIOR TO INSTALLING ASPHALT PAVEMENT.
7. CONCRETE MATERIAL FOR CROSS WALK AND BASE MUST BE ODOT 499 CLASS 'C' CONCRETE WITH LIMESTONE AGGREGATE.
8. NO FOUNDRY SAND OR SLAG PERMITTED IN AGGREGATE BASE.
9. ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.



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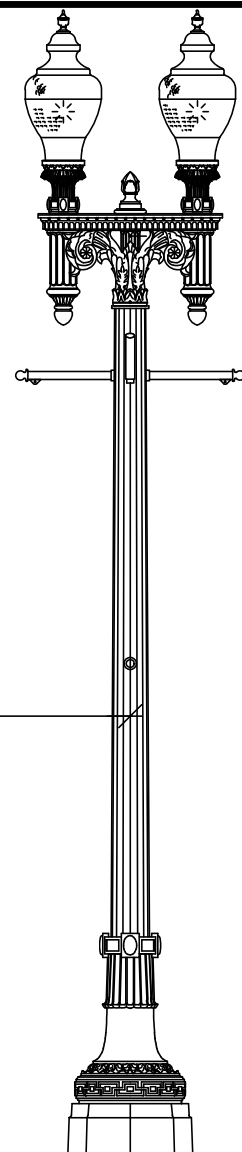
STANDARD DRAWING NO. 34

CONCRETE CROSSWALK  
AND PAVEMENT TRANSITION

SHEET 1 OF 1

NOTE 1: WHEN ASPHALT OVERLAYS BRICK, REPLACE CONCRETE BASE COURSE TO THE TOP OF THE EX. BRICK. FINISH FACE OF CURB TO THE TOP OF BRICK ELEVATION. PLACE EXPANSION JOINT BETWEEN CONC. ROAD BASE AND CURB. CITY REPLACES ASPHALT SURFACE ON PERMITTED PRIVATE PROJECTS ONLY.

NOTE 2: FOR SLIP FORM CONSTRUCTION USING CITY STD. 30 OR ODOT TYPE 6 CURB, USE 9 IN. #3 DOWELS 3 IN INTO CURB AND EXTENDING 6 IN. INTO CONC. WALK, SPACED 2 FT ON CENTER IN LIEU OF MESH. SEE CITY STANDARD DRAWING 29, TYPE A, FOR DETAIL.



INSTALL POLE WITH FLAGPOLE HOLDER FACING AND PERPENDICULAR TO THE ROADWAY AND THE LUMINAIRES IN-LINE WITH AND PARALLEL TO THE ROADWAY. POLE AND LUMINAIRES ARE SHOWN IN THIS DRAWING 90° FROM TYPICAL POSITION.

4X8 BRICK PAVER, 2 1/4" THICK – PAWNEE PAVER BY BELDEN BRICK – TERRA COTTA RANGE EXCLUDED. USE PERPENDICULAR HERRINGBONE PATTERN.

SWEEP JOINTS WITH DRY MIXTURE OF POLYMERIC SAND Techni-Seal OR APPROVED EQUAL. USE PLATE TAMPER WITH RUBBER MAT OR OTHER PROTECTION FOR BRICK. REMOVE EXCESS AND MOISTEN TO SET JOINT SEALANT SAND.

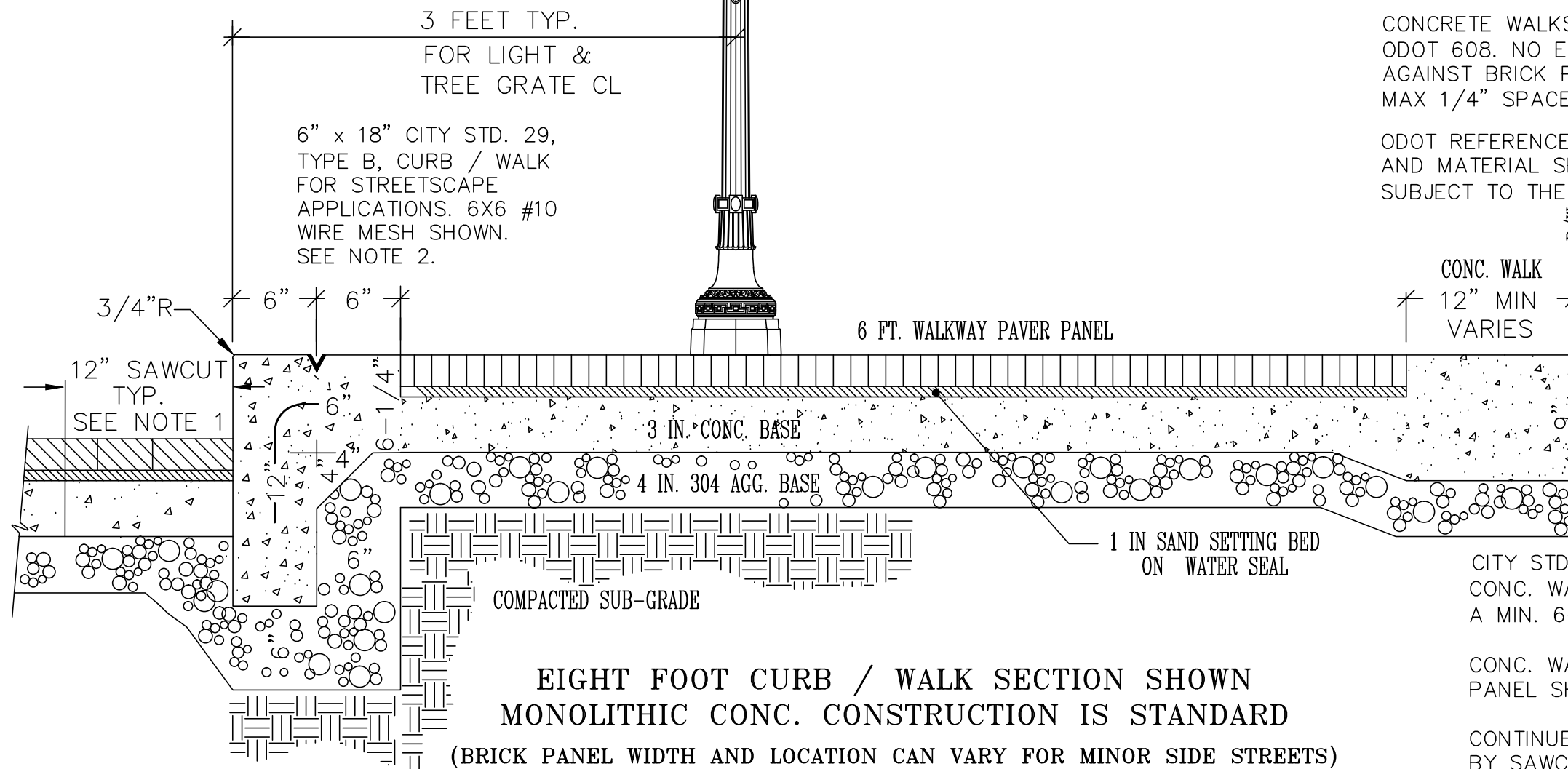
SEAL CONC. BRICK BASE TO 1" UP SIDES USING NON FIBROUS NEOPRENE CONCRETE SEALANT (BASEMENT SEALER) – APPLY WITH SQUEEGEE – SEAL ALL JOINTS AND CRACKS.–

1" MAX COMPACTED CONCRETE SAND ODOT 703.02 (ASTM C 33) SETTING BED ON NEOPRENE SEALANT.

USE INTERIOR FORMING PINS FOR WEEP HOLES ON DOWNSLOPE SIDES AND INTERIOR CORNERS. MAX 4 FT. CENTERS. – COVER W/ FILTER FABRIC.

CONCRETE WALKS AND PAVER BASE IS TO BE CLASS "C" ODOT 608. NO EXPANSION JOINTS ARE TO BE PLACED AGAINST BRICK PAVER SECTIONS. MAX 1/4" SPACE BETWEEN BRICK AND CONCRETE.

ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.



EXPANSION JOINTS IN WALKS AND AGAINST ALL BUILDINGS USE 1/2" CLOSED CELL SEALTIGHT CERAMAR FOAM OR EQUAL, 1/2" PEEL STRIP PRE CUT

EXPANSION JOINT AT 60' MAX. O.C. USE POLYURETHANE ELASTOMERIC SEALANT TREMCO THC 900 / 901 OR EQUAL

CITY STD. CONC. WALK (COMMERCIAL) IS 5 IN. THICK. CONC. WALK WITHIN 6 IN. OF BRICK PANEL SHALL BE A MIN. 6-1/4" THICK.

CONC. WALK WITHIN 12 IN. OF R/W AND NEXT TO BRICK PANEL SHALL BE A MIN. 9 IN. THICK.

CONTINUE TRANSVERSE WALK CONTROL JOINTS BY SAWCUTTING ACROSS BRICK CONC. BASE.

**EIGHT FOOT CURB / WALK SECTION SHOWN**  
**MONOLITHIC CONC. CONSTRUCTION IS STANDARD**  
 (BRICK PANEL WIDTH AND LOCATION CAN VARY FOR MINOR SIDE STREETS)



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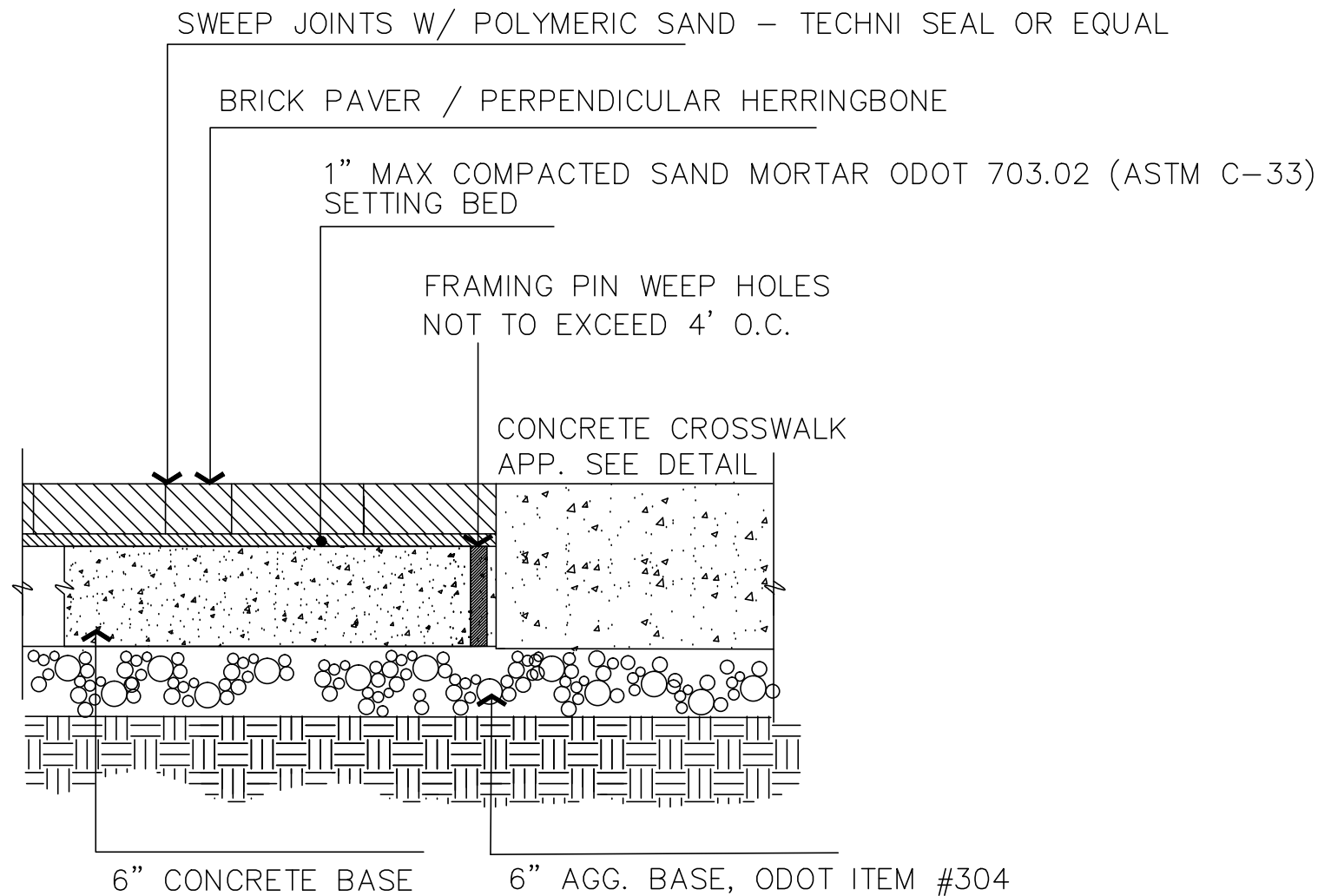
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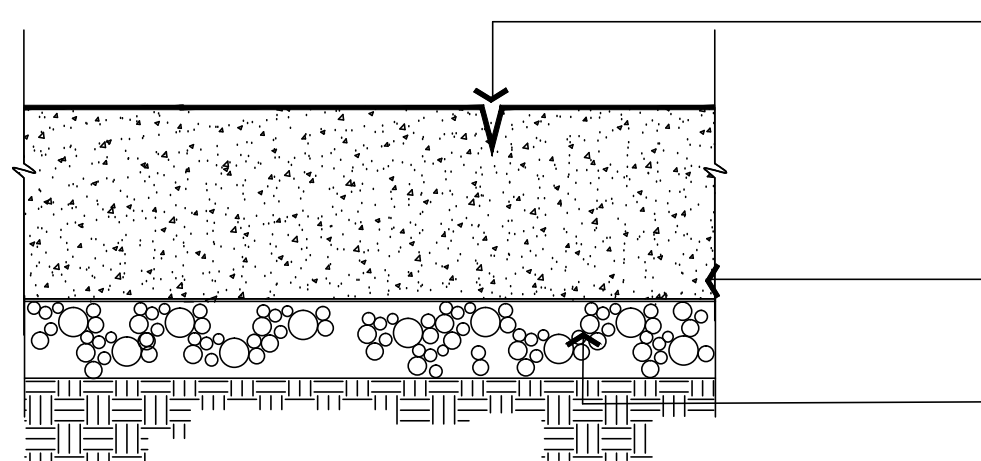
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**STANDARD DRAWING NO. 40**  
**TYPICAL STREETSCAPE**  
**CORRIDOR**  
 SHEET 1 OF 1



NOTE: NO FOUNDRY SAND OR SLAG IS PERMITTED IN AGGREGATE BASE (304).

**CROSSWALK DETAIL**



TYPICAL TOOLED AND CUT CONTROL JOINT

1/4" DEPTH OF SLAB – SPACING OF JOINTS TO BE 4' O.C. –

ALIGN CONCRETE CROSSWALK AND CONCRETE WALK JOINTS

FILL JOINTS WITH POLYURETHANE ELASTOMERIC SEALANT TYP.

TREMCO THC 900 / 901 OR EQUAL FOR CONTROL & EXPANSION JOINTS

1/2" CLOSED CELL EXPANSION JOINT FILLER TO BE SEALTIGHT CERAMAR OR EQUAL – 60FT O.C. MAX

10" ITEM 452 PLAIN PORTLAND CEMENT CLASS C (LIMESTONE)

CONCRETE PAVEMENT

COMPACTED AGGREGATE BASE

ODOT ITEM 304, 6" TYP.

4X8 BRICK PAVER, 2 3/4" THICK – ROADWAY PAVER BY BELDEN BRICK – ASTM C1272 TRAFFIC TYPE F APPL. PX WEATHER SX – 10,000 PSI – COLOR JUMBO REGIMENTAL

BRICK ALTERNATE – WHITACRE GREER 4 X 8-1/2 X 3-1/2 WEATHER CLASS SX, TRAFFIC F, APPLICATION PX – COLOR 33 DARK ANTIQUE – 10,000 PSI ASTM C1272 BRICK TO HAVE BEVELED EDGE AND LUGS.

USE PERPENDICULAR HERRINGBONE PATTERN IN INTERSECTION.

SWEEP JOINTS WITH DRY MIXTURE OF POLYMERIC SAND Techni-Seal OR APPROVED EQUAL. USE PLATE TAMPER WITH RUBBER MAT OR OTHER PROTECTION FOR BRICK. REMOVE EXCESS AND MOISTEN TO SET JOINT SEALANT SAND.

1" MAX COMPACTED CONCRETE SAND ODOT 703.02 (ASTM C 33) SETTING BED W/ MORTAR.

USE INTERIOR FORMING PINS FOR WEEP HOLES ON DOWNSLOPE SIDES AND INTERIOR CORNERS. MAX 4 FT. CENTERS. – COVER W/ FILTER FABRIC.

CONCRETE CROSSWALK AND PAVER BASE IS TO BE CLASS "C" ODOT 499.03 – HIGH EARLY. NO EXPANSION JOINTS ARE TO BE PLACED AGAINST BRICK PAVER SECTIONS.

MAX 1/4" SPACE BETWEEN BRICK AND CONCRETE. PROVIDE 1/4" RADIUS ON ALL SLAB EDGES.

ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.

ALL CONCRETE CONSTRUCTION TO CONFORM TO CURRENT CITY OF CANTON SPECIFICATIONS FOR CONSTRUCTION, REPAIR AND REPLACEMENT OF SIDEWALKS, CURBS AND DRIVEWAYS.



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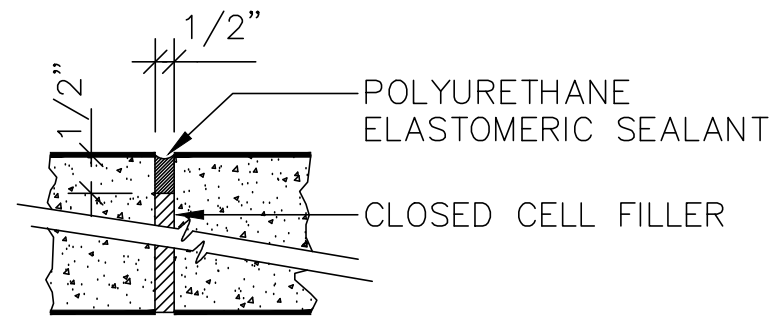
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**STANDARD DRAWING NO. 41**  
**ROADWAY BRICK & CROSSWALK PAVEMENT**  
**DETAILS**  
 SHEET 1 OF 1



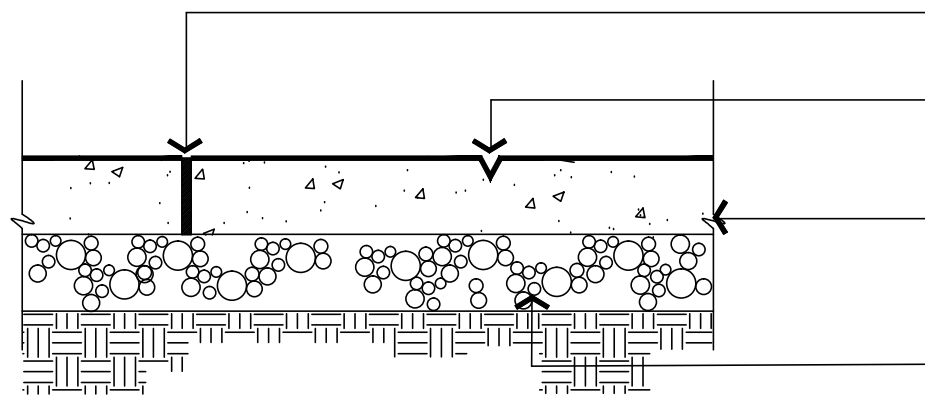
EXPANSION JOINT DETAIL  
NOT TO SCALE

NOTES:

- EXPANSION JOINTS TO BE 60' MAX. O.C. CONTROL JOINTS TO BE @ 4' O.C. OR AS SHOWN ON PLAN OR DIRECTED BY ENGINEER.
- PROVIDE LIGHT BROOM FINISH ON ALL CONCRETE SURFACES AFTER JOINT & EDGE TOOLING. PROVIDE 1/4" RADIUS ON ALL SLAB EDGES.

SAWCUT CONTROL JOINTS MAY BE PERMITTED IN STREETScape AREAS IF APPROVED BY THE PROJECT ARCHITECT/ENGINEER AND THE CITY ENGINEER PRIOR TO BID AND CONSTRUCTION.

CONCRETE WALK TO BE CLASS "C" ODOT 499 NO. 57 OR 67 LIMESTONE (SEE BELOW) NO EXPANSION JOINTS ARE TO BE PLACED AGAINST BRICK PAVER SECTIONS



1/2" CLOSED CELL EXPANSION JOINT FILLER IN WALK AND AGAINST BUILDINGS TO BE SEALTIGHT CERAMAR FOAM OR EQUAL, 1/2" PEEL STRIP CUT EXPANSION JOINT AT 60' MAX. O.C.

TYPICAL TOOLED AND CUT CONTROL JOINT, 1/5 DEPTH OF SLAB W/POLYURETHANE ELASTOMERIC SEALANT  
- TREMCO THC 900 / 901 OR EQUAL  
5" PLAIN PORTLAND CEMENT CONCRETE PAVEMENT, ODOT ITEM 608 AND 499, AS PER PLAN.

4" COMPACTED THICKNESS AGGREGATE BASE COURSE, ODOT ITEM #304.

NOTE: NO FOUNDRY SAND OR SLAG IS PERMITTED IN AGGREGATE BASE (304).  
AGGREGATE IN SURFACE CONCRETE SHALL BE AASHTO M NO. 57 OR 67 LIMESTONE ONLY.  
ALL CONCRETE FOR CURB AND WALKS SHALL BE ODOT 499, CLASS C.  
CLASS C OPTION 1 MAY BE USED BETWEEN MAY 1 AND OCTOBER 15.  
AGGREGATE IN SURFACE CONCRETE SHALL BE NO. 57 OR 67 LIMESTONE ONLY.

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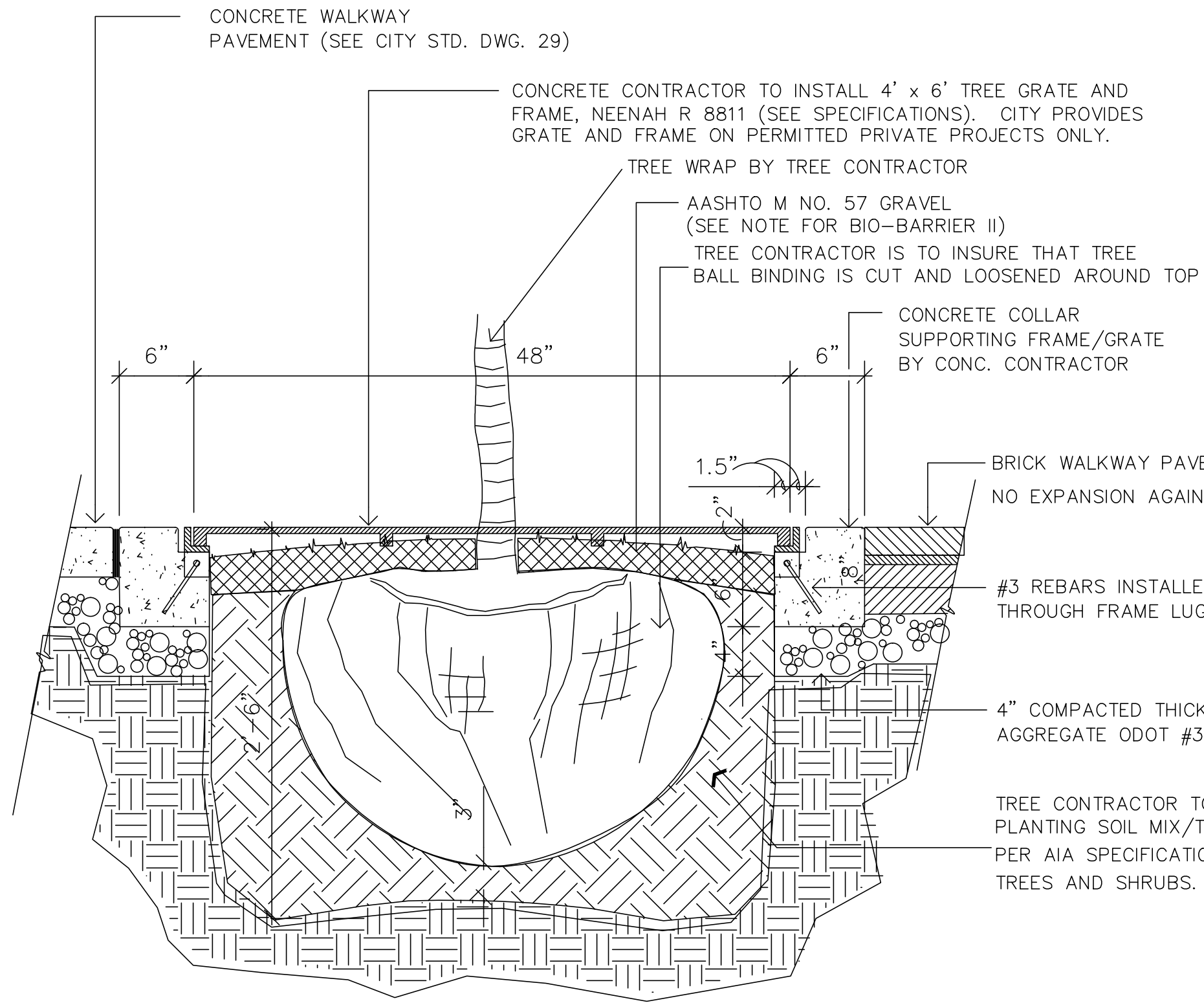
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STANDARD DRAWING NO. 42

STREETScape CONCRETE  
WALK PAVEMENT DETAILS



NOTES:

- CONCRETE COLLAR TO BE FORMED USING 2 X 6 (FRAME SUPPORTED METHOD) OR 2 X 8 (INSIDE FORM METHOD)
- ASSURE THAT CONCRETE COMPLETELY FILLS FORMS W/ NO VOIDS. AFTER FORM REMOVAL GROUT ALL HONEYCOMB VOIDS.
- TREE BOX TO BE CLEARED TO LIMIT SHOWN BY CONCRETE CONTRACTOR. CONTRACTOR TO SET GRATE AND INSURE PROPER FIT WITH NO ROCKING OR BINDING. COVER OPENING TO PREVENT PEDESTRIAN TRIP HAZARD.
- BIO BARRIER II WEED CONTROL IS TO BE PLACED UNDER AASHTO M NO. 57 GRAVEL PER MFR. SPECS. BY TREE CONTRACTOR.
- GATOR BAGS TO BE PROVIDED AND FILLED BY TREE CONTRACTOR. TREE TO BE GUARANTEED FOR TWO GROWING SEASONS.
- CONCRETE CONTRACTOR IS TO PROVIDE A UNIT LUMP SUM PRICE FOR THE FORMING AND PLACING OF THE CONCRETE COLLAR COMPLETE WITH THE SETTING OF THE FRAME AND GRATE AND EXCAV. AND CLEARING OF THE TREE PIT.
- TREE CONTRACTOR TO PROVIDE AND PLANT TREES INCLUDING ALL MATERIALS SPECIFIED IN PROPOSAL.

304 (M) - NO FOUNDRY SAND, ACBFS, GS OR OTHER SLAG PERMITTED



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**STANDARD DRAWING NO. 43**

**TREE FRAME & GRATE  
CONSTRUCTION DETAILS**

SHEET 1 OF 1

THE GENERAL OR CONCRETE CONTRACTOR SHALL VERIFY THROUGH THE OWNER THE EXISTANCE OF UNDERGROUND VAULTS, BASEMENTS OR OTHER OPENINGS UNDER THE PROPOSED WALK REPLACEMENT AREA AND IF THE UNDERGROUND AREA IS TO REMAIN.

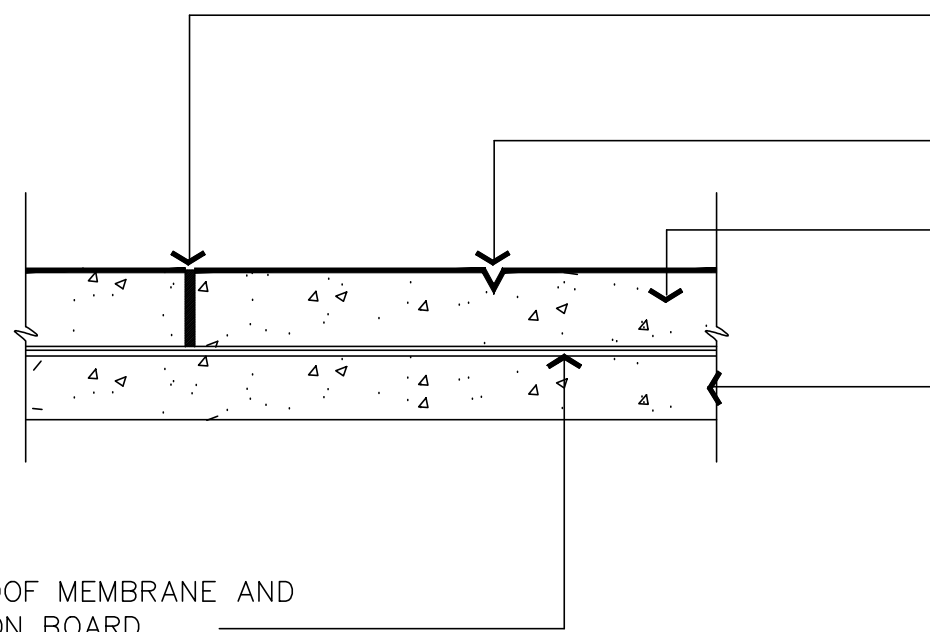
FOR PERMITTED PRIVATE PROJECTS: IF THE UNDERGROUND BASEMENTS, VAULTS OR OPENINGS ARE DISCOVERED DURING THE DEMOLITION PROCESS, ALL WORK IS TO BE SUSPENDED UNTIL THE OWNER PROVIDES FOR CORRECTIVE ACTIONS. THE CITY IS NOT RESPONSIBLE FOR ANY COSTS INCURRED FOR REMEDIAL ACTIONS FOR PRIVATE PROJECTS.

THE CITY DEEMS SUCH OPENINGS TO BE AN ENCROACHMENT AND AS SUCH REQUIRES THE OWNER TO ENTER INTO A LICENSE OR AGREEMENT FOR ITS CONTINUED USE.

NO WALK IS TO BE CONSTRUCTED UNTIL THE CITY ENGINEER IS NOTIFIED OF THE ENCROACHMENT AND REMEDIAL ACTIONS ARE APPROVED CONFORMING TO THESE STANDARDS.

ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.

ALL CONCRETE CONSTRUCTION TO CONFORM TO CURRENT CITY OF CANTON SPECIFICATIONS FOR CONSTRUCTION, REPAIR AND REPLACEMENT OF SIDEWALKS, CURBS AND DRIVEWAYS.



EXPANSION JOINT AT 60 FT. MAX O.C.  
1/2" CLOSED CELL EXPANSION JOINT IN WALK AND AGAINST BLD'G, SEALTIGHT CERAMAR FOAM W/ 1/2" PEEL STRIP CUT OR EQUAL. POLYURETHANE ELASTOMERIC SEALANT TO BE TREMCO THC 900/901

TYP. CONTROL JOINT 4 FT. O.C. OR AS DIRECTED, 1/5 DEPTH OF SLAB W/ POLYURETHANE ELASTOMERIC SEALANT, TYP.

VARIABLE DEPTH PORTLAND CEMENT CONCRETE ODOT 499, CLASS C, SIDEWALK, ODOT 608 - AGGREGATE TO BE # 57, 67 LIMESTONE AGGREGATE AND AS RE-INFORCED IN SPECIFICATIONS PROVIDED BY OWNER'S ENGINEER LIGHT BROOM FINISH ON SURFACE. PROVIDE 1/4" RADIUS ON SLAB EDGES.

ROOF OF VAULT / BASEMENT CONCRETE SLAB.  
IT IS THE OWNER'S ARCHITECT / ENGINEER'S RESPONSIBILITY TO INDICATE ON THE SURFACE THE EXTENT OF THE VAULT / BASEMENT ROOF STRUCTURE AND DEPTH. THE OWNER'S ARCHITECT / ENGINEER WILL INSPECT THE ROOF AND STRUCTURE FOR STABILITY AND MAKE ALL NECESSARY REPAIRS PRIOR TO WALK CONSTRUCTION OR REPLACEMENT.

WATERPROOF MEMBRANE AND PROTECTION BOARD.

SEALTIGHT MEL-ROL SELF ADHERING WATERPROOFING MEMBRANE AND PROTECTION BOARD FROM W.R. MEADOWS, INC. IS ACCEPTABLE

FOR PERMITTED PRIVATE PROJECTS THE OWNER MAY PROVIDE SPECIFACATIONS FOR MEMBRANE AND BOARD PRIOR TO WALK REPLACEMENT.

FOR PRIVATE PROJECTS, THE CITY IS NOT RESPONSIBLE FOR ANY DAMAGE TO THE STRUCTURE OR CONSTRUCTION / RE-CONSTRUCTION COSTS. THE CITY WILL NOT REMOVE CONCRETE OVER VAULT / BASEMENT STRUCTURES.

FOR PRIVATE PROJECTS, IT IS THE OWNER'S RESPONSIBILITY TO PROTECT THE VAULT / BASEMENT STRUCTURE FROM DUST / DIRT OR RAINWATER DURING CONSTRUCTION.

## CONCRETE WALK PAVEMENT OVER VAULT / BASEMENT TO REMAIN

FOR VAULT / BASEMENT TO BE ABANDONED SEE CITY STANDARD DRAWING 46



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**STANDARD DRAWING NO. 44**  
**CONCRETE WALK OVER VAULT**  
CONSTRUCTION DETAILS  
SHEET 1 OF 1



THE GENERAL OR CONCRETE CONTRACTOR SHALL VERIFY THROUGH THE OWNER THE EXISTANCE OF UNDERGROUND VAULTS, BASEMENTS OR OTHER OPENINGS UNDER THE PROPOSED WALK REPLACEMENT AREA AND IF THE UNDERGROUND AREA IS TO REMAIN.

FOR PERMITTED PRIVATE PROJECTS: IF THE UNDERGROUND BASEMENTS, VAULTS OR OPENINGS ARE DISCOVERED DURING THE DEMOLITION PROCESS, ALL WORK IS TO BE SUSPENDED UNTIL THE OWNER PROVIDES FOR CORRECTIVE ACTIONS. THE CITY IS NOT RESPONSIBLE FOR ANY COSTS INCURRED FOR REMEDIAL ACTIONS FOR PRIVATE PROJECTS.

THE CITY DEEMS SUCH OPENINGS TO BE AN ENCROACHMENT AND AS SUCH REQUIRES THE OWNER TO ENTER INTO A LICENSE OR AGREEMENT FOR ITS CONTINUED USE.

NO WALK IS TO BE CONSTRUCTED UNTIL THE CITY ENGINEER IS NOTIFIED OF THE ENCROACHMENT AND REMEDIAL ACTIONS ARE APPROVED CONFORMING TO THESE STANDARDS.

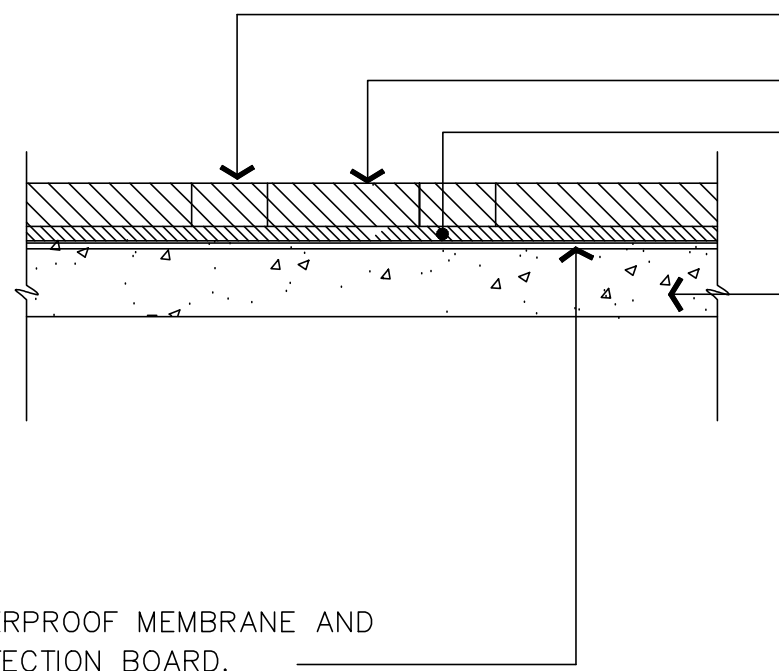
4X8 BRICK PAVER, 2 1/4" THICK – PAWNEE PAVER BY BELDEN BRICK – TERRA COTTA RANGE EXCLUDED. USE PERPENDICULAR HERRINGBONE PATTERN.

SWEEP JOINTS WITH DRY MIXTURE OF POLYMERIC SAND Techni-Seal OR APPROVED EQUAL. USE PLATE TAMPER WITH RUBBER MAT OR OTHER PROTECTION FOR BRICK. REMOVE EXCESS AND MOISTEN TO SET JOINT SEALANT SAND.

SEAL CONC. BRICK BASE TO 1" UP SIDES USING NON FIBROUS NEOPRENE CONCRETE SEALANT (BASEMENT SEALER) – APPLY WITH SQUEEGEE – SEAL ALL JOINTS AND CRACKS.–

NO EXPANSION JOINT IS TO BE USED BETWEEN BRICK AND ADJOINING WALK.

IF 4" MIN DEPTH OF BRICK BOX CANNOT BE MET – USE STD. DRAWING 44 CONCRETE WALK OVER VAULT DETAILS.



BRICK BOX WITH 4X8 BRICK PAVERS, 2 1/4" THICK

SWEEP JOINTS WITH POLYMERIC SAND MIXTURE – SEE NOTE

MIN. 1" PLAIN PORTLAND CEMENT CONCRETE PAVEMENT ITEM 608 AND ODOT 499 CLASS "C" – AGGREGATE TBD  
MIN. DEPTH NEEDED FROM F/G TO TOP OF VAULT IS 4".

USE CONCRETE SAND (ASTM C-33) AS NEEDED FOR LEVELING UP TO 1/2"

ROOF OF VAULT / BASEMENT CONCRETE SLAB.  
IT IS THE OWNER'S ARCHITECT / ENGINEER'S RESPONSIBILITY TO INDICATE ON THE SURFACE THE EXTENT OF THE VAULT / BASEMENT ROOF STRUCTURE AND DEPTH. THE OWNER'S ARCHITECT / ENGINEER WILL INSPECT THE ROOF AND STRUCTURE FOR STABILITY AND MAKE ALL NECESSARY REPAIRS PRIOR TO WALK CONSTRUCTION OR REPLACEMENT.

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SEALTIGHT MEL-ROL SELF ADHERING WATERPROOFING MEMBRANE AND PROTECTION BOARD FROM W.R. MEADOWS, INC. IS ACCEPTABLE

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ALL CONCRETE CONSTRUCTION TO CONFORM TO CURRENT CITY OF CANTON SPECIFICATIONS FOR CONSTRUCTION, REPAIR AND REPLACEMENT OF SIDEWALKS, CURBS AND DRIVEWAYS.

## BRICK WALKWAY PAVERS OVER VAULT TO REMAIN

FOR VAULT / BASEMENT TO BE ABANDONED SEE CITY STANDARD DRAWING 46



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**STANDARD DRAWING NO. 45**

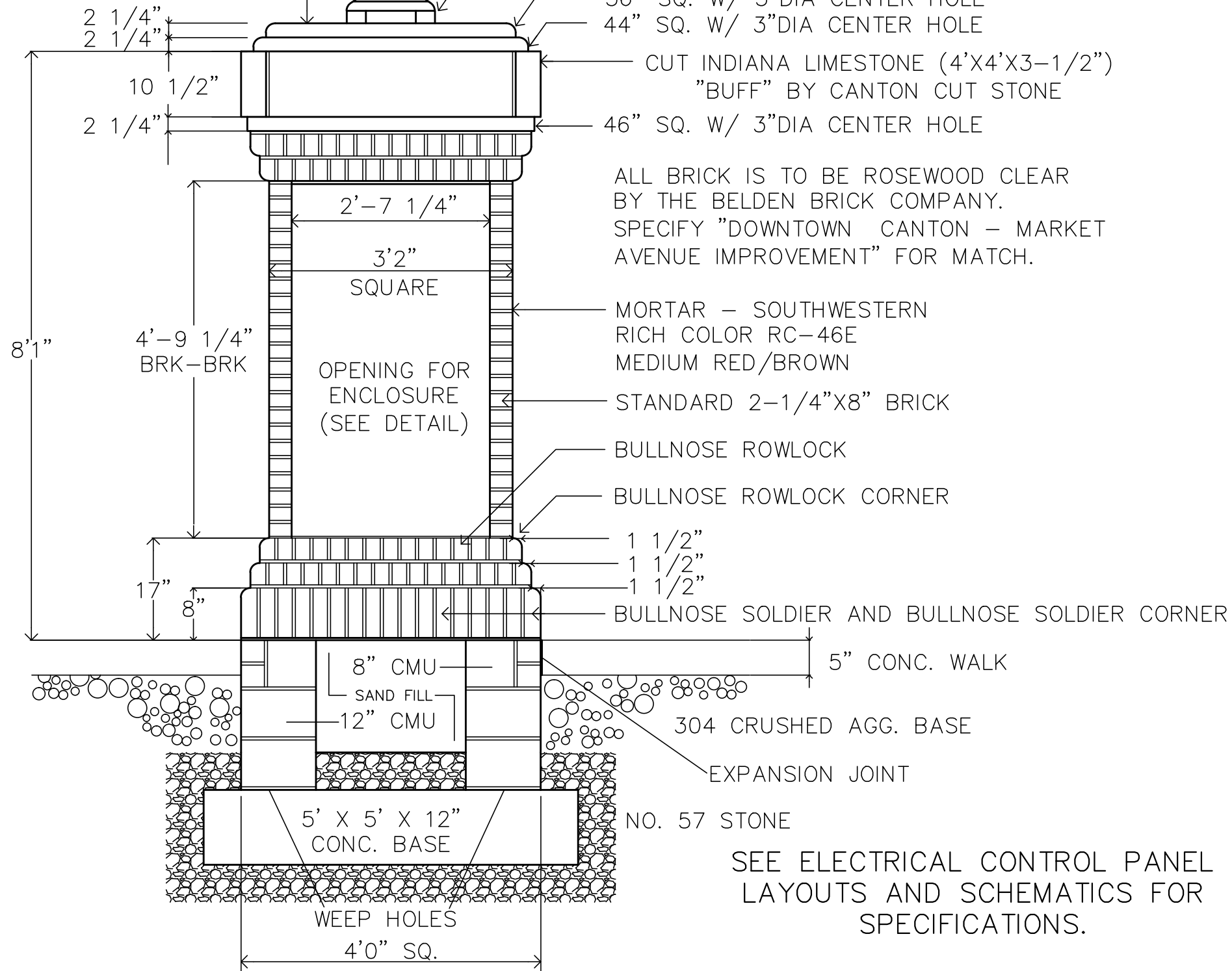
**BRICK WALK OVER VAULT  
CONSTRUCTION DETAILS**

SHEET 1 OF 1

UNION METAL CORP. N1063-YF  
NOSTALGIC GATEPOST LIGHT  
ONE PIECE WHITE ACRYLIC /  
16" DIA. GLOBE W/ 5" DIA.  
CHROMED REFLECTOR

UNION METAL CORP. # 48  
CAST ALUMINUM BASE W/  
7-1/4" I.D. GLOBE HOLDER RING.  
OCTAGONAL BASE W/ 14-1/8" FLATS  
CANTON "CBD GREEN" COLOR

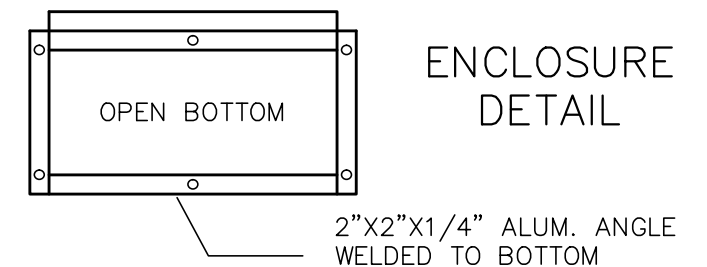
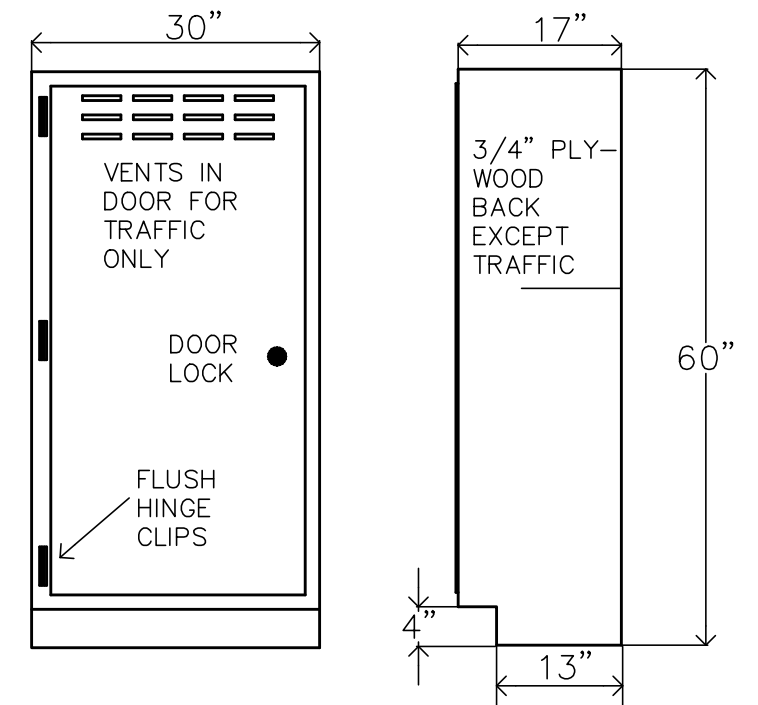
BRICK COLUMN FOR LIGHTING CONTROL  
PANEL, TRAFFIC CONTROL PANEL & SPECIAL  
EVENT PANEL ENCLOSURES.



0.125" 5052-H32  
MARINE GRADE  
ALUMINUM ENCLOSURE

NEMA 3R CONSTRUCTION

12"X6"X6" REMOTE POLICE  
PANEL WITH LOCK TO BE  
MOUNTED ON BRICK COL.  
AS DIRECTED BY ENGINEER.



SEE ELECTRICAL CONTROL PANEL  
LAYOUTS AND SCHEMATICS FOR  
SPECIFICATIONS.



OFFICE OF THE CITY ENGINEER  
CANTON, OHIO

DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

APPROVED DATE: FEB. 2012

APPROVED BY: JTD

DRAWING FILE NAME:  
ce\_40-47\_STREETSCAPE.dwg

REVISIONS

DESCRIPTION	DATE	BY

STANDARD DRAWING NO. 47

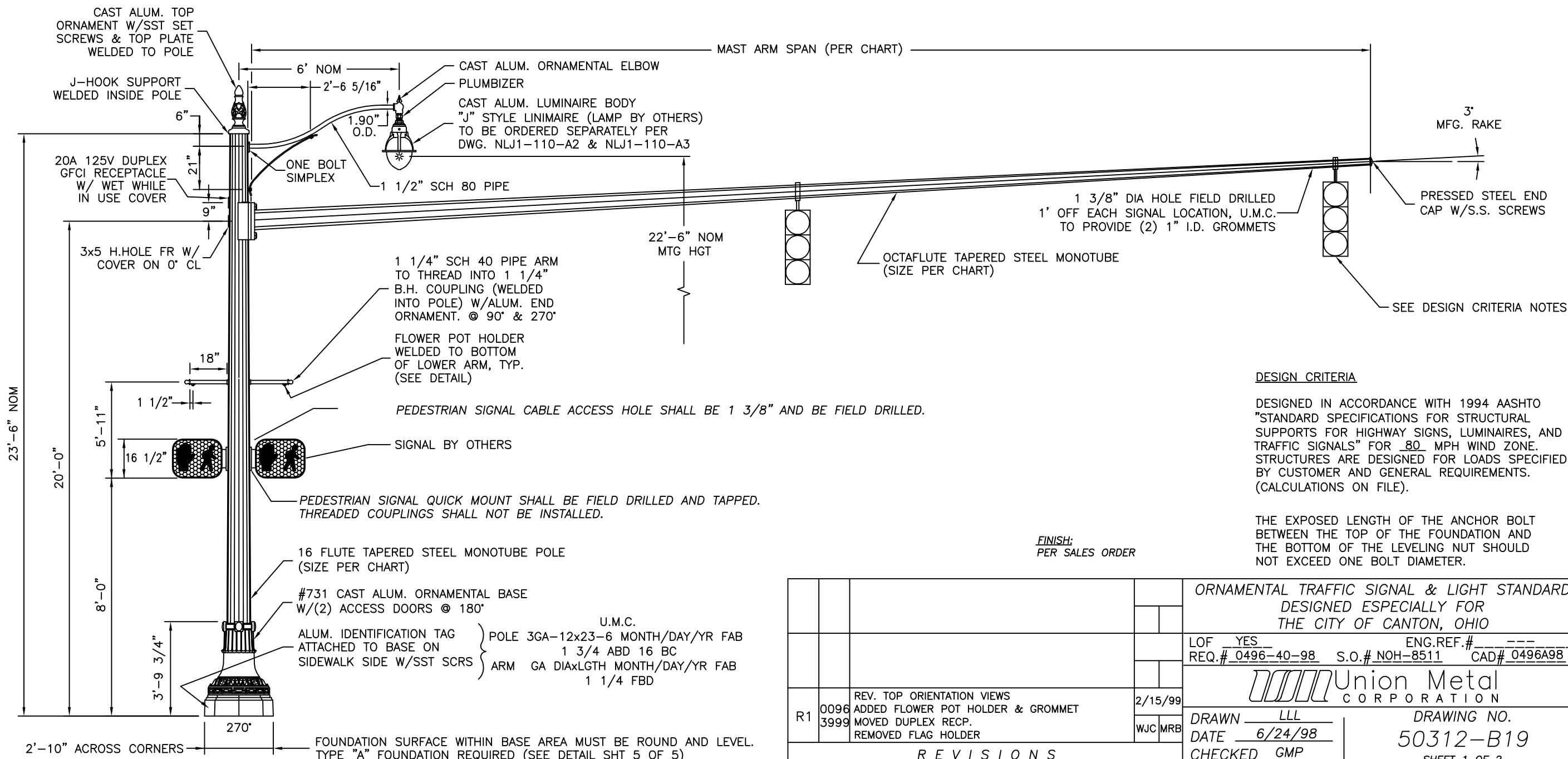
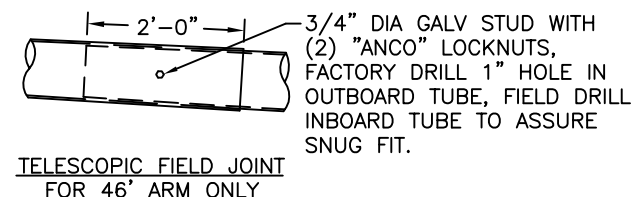
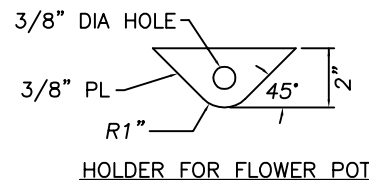
GATEWAY COLUMN  
(4 FT x 4 FT) DETAILS

SHEET 1 OF 1

MATERIAL SPECIFICATIONS

TUBES: CHEM. & PHYSICAL PROP. OF ASTM A595 GR A PLATE, BAR: ASTM A709 GR 36  
 ANCHOR BOLTS: ASTM F1554 GR55 TOP END GALV TO A153  
 ANCHOR BOLT NUTS: ASTM A563 GR A GALV TO A153  
 MISC. HDWE: (STN STL) AISI 300 SERIES (18-8)  
 POLE TOP: CAST ALUMINUM-AA319F  
 TRAFFIC ARM CONN. BOLTS: ASTM-A325  
 H.H. FRAME: ASTM-A576  
 H.H. COVER: C1010 STEEL  
 PEDESTAL BASE: CAST ALUMINUM SPLIT BASE:A319F  
 STEEL PIPE: ASTM-A53 GR B OR A501  
 GALV & FINISH PAINT PER SALES ORDER.

NOTE:  
 SEE 50312-B19 - SHT. 2 OF 5  
 FOR TOP ORIENTATION VIEW



DESIGN CRITERIA

DESIGNED IN ACCORDANCE WITH 1994 AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS" FOR 80 MPH WIND ZONE. STRUCTURES ARE DESIGNED FOR LOADS SPECIFIED BY CUSTOMER AND GENERAL REQUIREMENTS. (CALCULATIONS ON FILE).

THE EXPOSED LENGTH OF THE ANCHOR BOLT BETWEEN THE TOP OF THE FOUNDATION AND THE BOTTOM OF THE LEVELING NUT SHOULD NOT EXCEED ONE BOLT DIAMETER.

FINISH:  
 PER SALES ORDER

		ORNAMENTAL TRAFFIC SIGNAL & LIGHT STANDARD DESIGNED ESPECIALLY FOR THE CITY OF CANTON, OHIO	
		LOF YES	ENG. REF. #
		REQ. # 0496-40-98	S.O. # NOH-8511 CAD# 0496A98
		<b>Union Metal</b> CORPORATION	
R1	0096 3999	REV. TOP ORIENTATION VIEWS ADDED FLOWER POT HOLDER & GROMMET MOVED DUPLEX RECP. REMOVED FLAG HOLDER	2/15/99 WJC MRB
		DRAWN LLL	DRAWING NO. 50312-B19
		DATE 6/24/98	SHEET 1 OF 2
		CHECKED GMP	



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 CANTON, OHIO  
 DANIEL J. MOEGLIN, P.E., CITY ENGINEER  
 2436 30th St. NE 44705 : 330-489-3381 : www.cantonohio.gov/engineering

APPROVED DATE: APRIL 2012

APPROVED BY: EEM

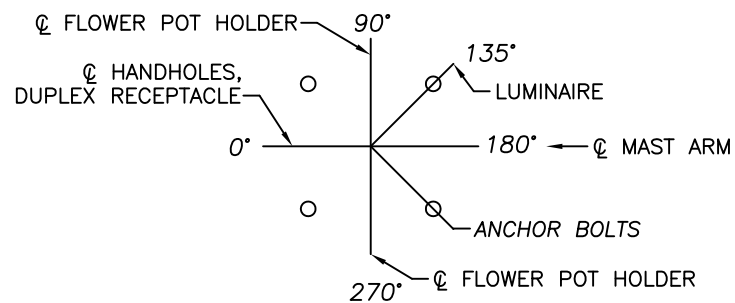
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 ce\_61-65\_LIGHTPOLES.dwg

REVISIONS		
DESCRIPTION	DATE	BY

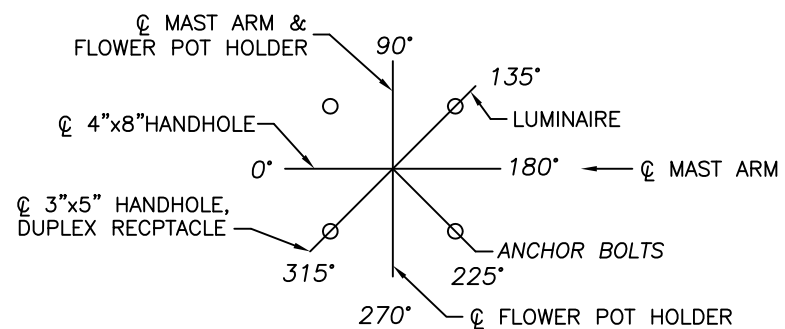
STANDARD DRAWING NO. 61

NOSTALGIC POLE FOUNDATION &  
 WIRING DIAGRAM

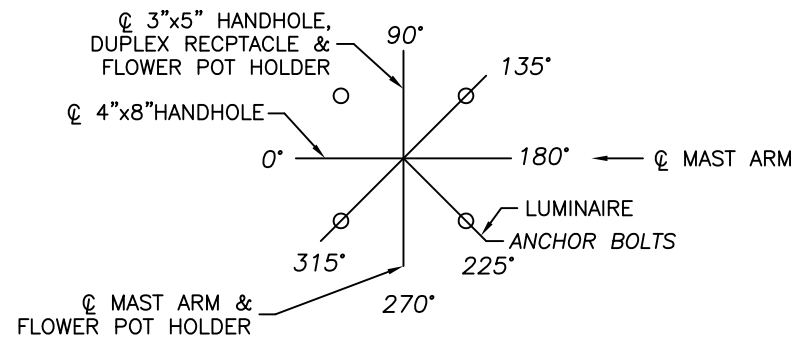
SHEET 1 OF 1



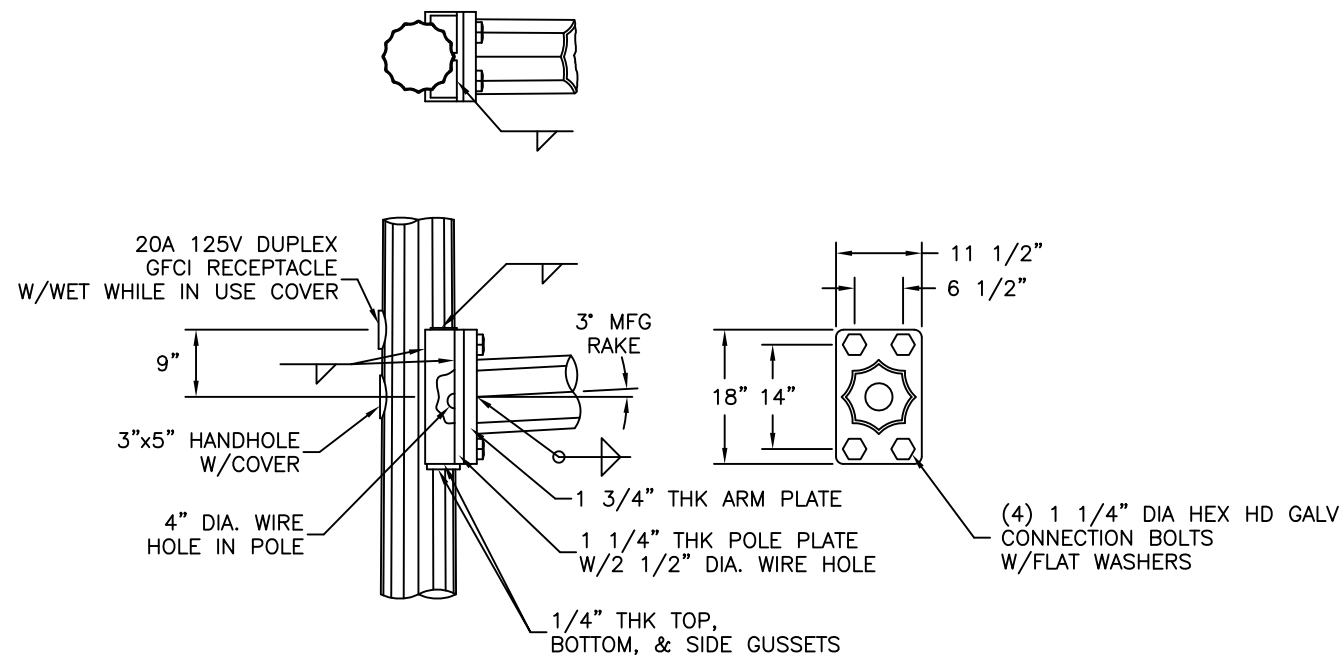
TOP VIEW ORIENTATION  
SINGLE MAST ARMPOLES



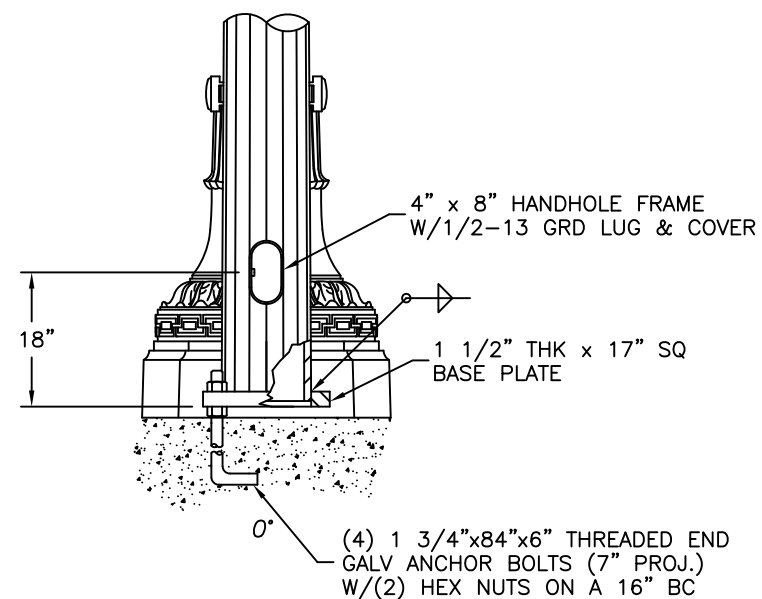
TOP VIEW ORIENTATION  
TWIN MAST ARM DESIGNS  
50312-Y99 THRU -Y102



TOP VIEW ORIENTATION  
TWIN MAST ARM DESIGN  
50312-Y103



ARM CONNECTION DETAIL  
SINGLE ARM CONNECTION SHOWN



BASE DETAIL

FINISH:  
PER SALES ORDER

			ORNAMENTAL TRAFFIC SIGNAL & LIGHT STANDARD DESIGNED ESPECIALLY FOR THE CITY OF CANTON, OHIO		
LOF _____			ENG. REF. # _____		
REQ. # 0496-40-98			S.O. # NOH-8511		
			CAD # 0496B98		
DRAWN LLL			DRAWING NO.		
DATE 6/24/98			50312-B19		
CHECKED GMP			SHEET 2 OF 5		
REVISIONS					
DESCRIPTION		DATE	BY		



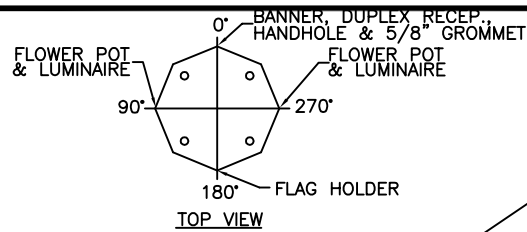
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2436 30th St. NE 44705 : 330-489-3381 : www.cantonohio.gov/engineering

APPROVED DATE: APRIL 2012

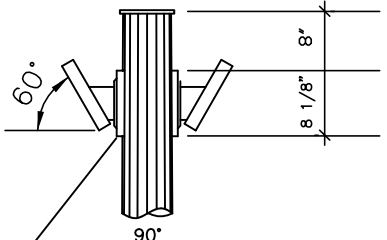
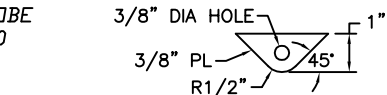
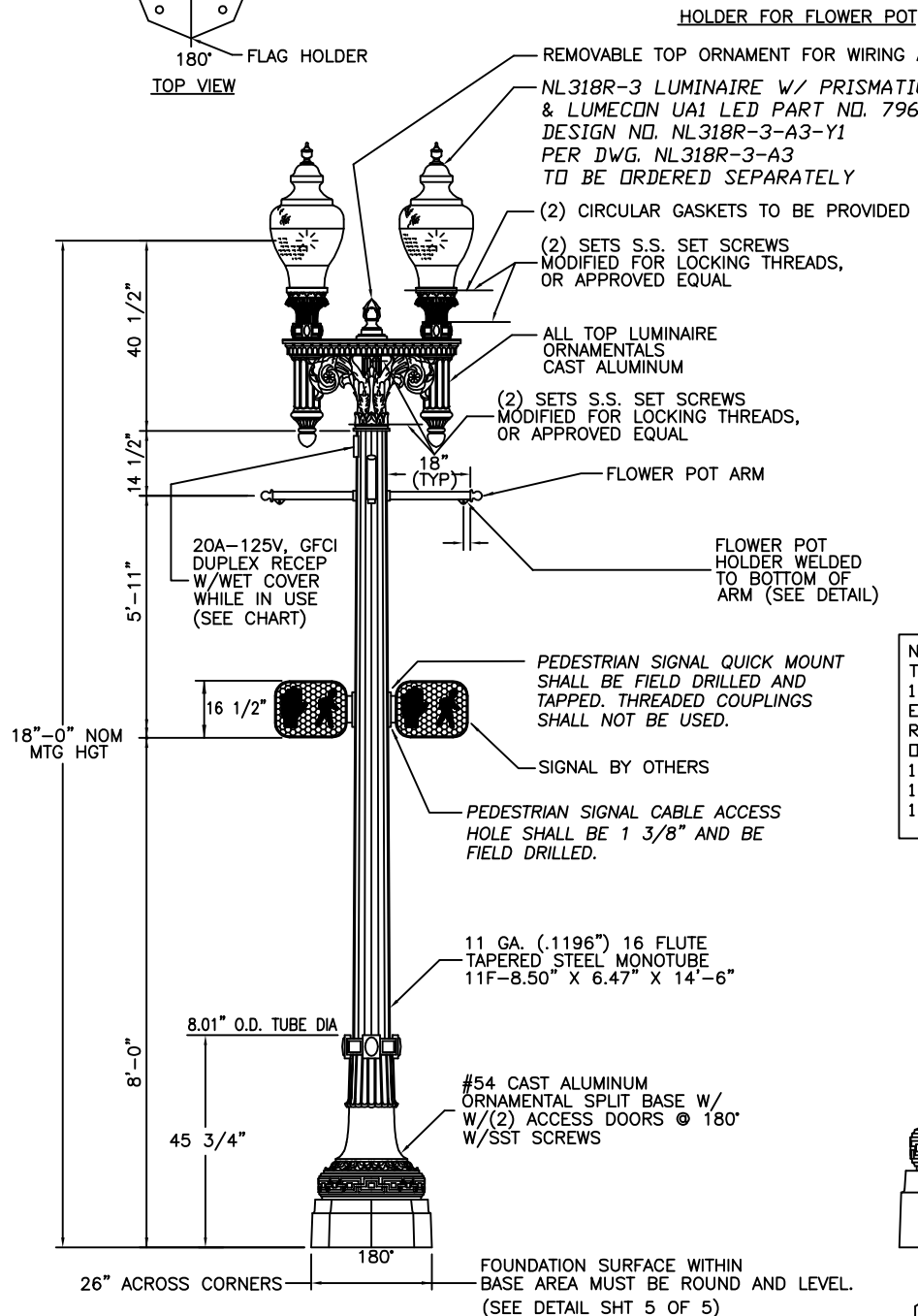
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DRAWING FILE NAME:  
ce\_61-65\_LIGHTPOLES.dwg

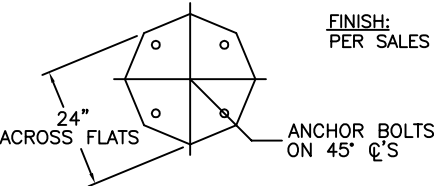
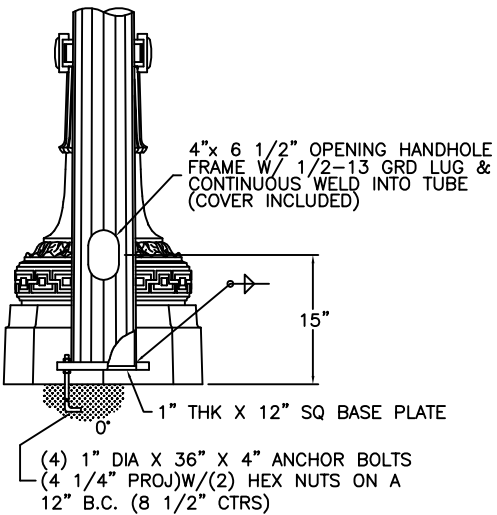
**STANDARD DRAWING NO. 62**  
NOSTALGIC POLE FOUNDATION &  
WIRING DIAGRAM



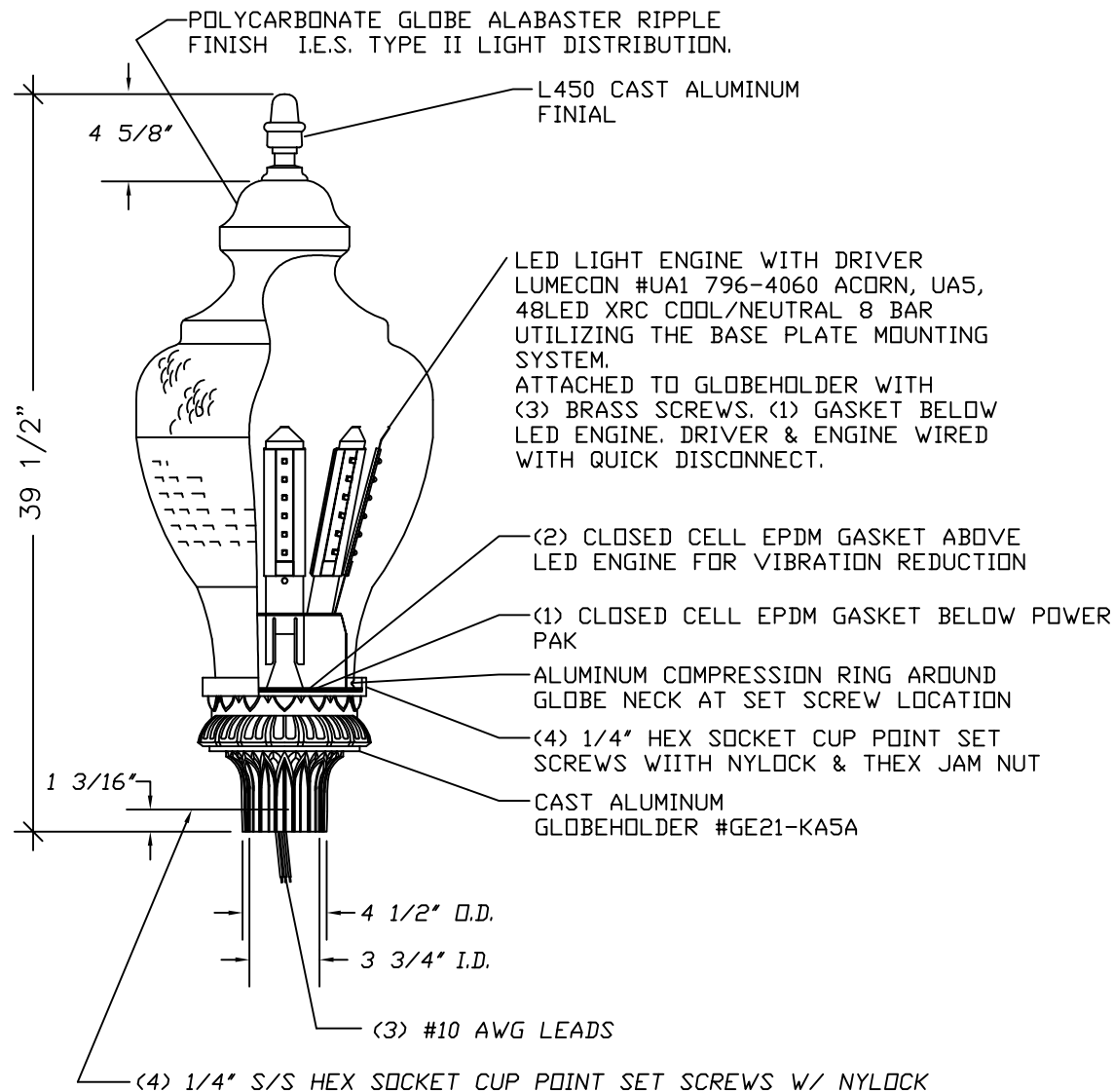
DESIGN NO.	BANNER ARMS
B2473-54-B14-Y1	YES
B2473-54-B14-Y2	NO



NOTE:  
 THE CONTRACTOR SHALL PROVIDE PER LIGHT POLE:  
 1 HEAVY DUTY NYLON 3' X 5' US FLAG CONSTRUCTED WITH EMBROIDERED OR APPLIED STARS, SEWN STRIPS AND REINFORCED FLY ENDS, MADE OF NYLON, MANUFACTURED FOR OUTDOOR USE, MADE IN THE USA.  
 1 6' X 1' 1" PIECE FIBER GLASS POLE.  
 1 NEV-R-WRAP FLAG UNFURLER THAT FITS 1" POLE DIAMETER.  
 1 GOLD VINYL SLIP FIT BALL THAT FITS 1" POLE DIAMETER.



STATE:	REQ# / SO# :	REQ	REV	DESCRIPTION	DATE	REV BY/CHK BY
PROJECT NAME: PROJ-NAME						
REVISIONS						
TITLE 1						
TITLE 2						
DESIGNED BY	CHECKED BY	DATE	SCALE	ENG REF		
DGMR	EJL	DATE	SCALE	ENG_REF		
DRAWING-NUMBER				REVISION	SHEET	
				REV	SHT OF SHTS	



NOTES:  
 1. GLOBEHOLDER & FINIAL POWDER COATED CITY OF CANTON CBD GREEN.  
 2. GLOBE STREET SIDE POSITIONED BETWEEN TWO LED BARS. STREET SIDE OF LUMINAIRE MARKED ON OUTSIDE OF GLOBEHOLDER.

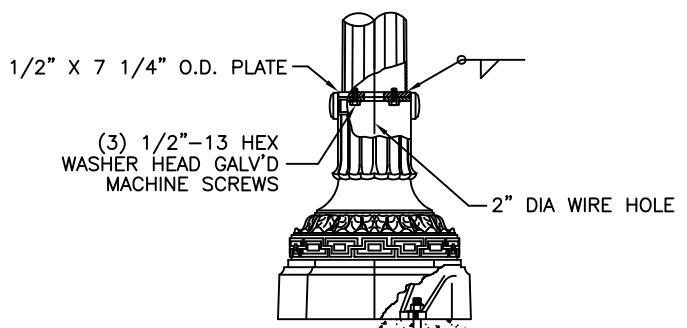
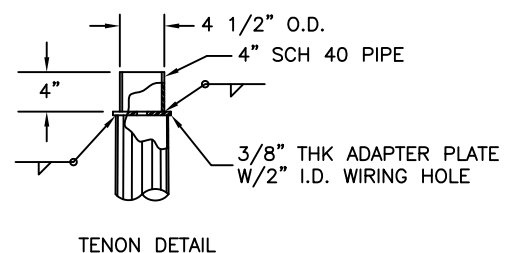
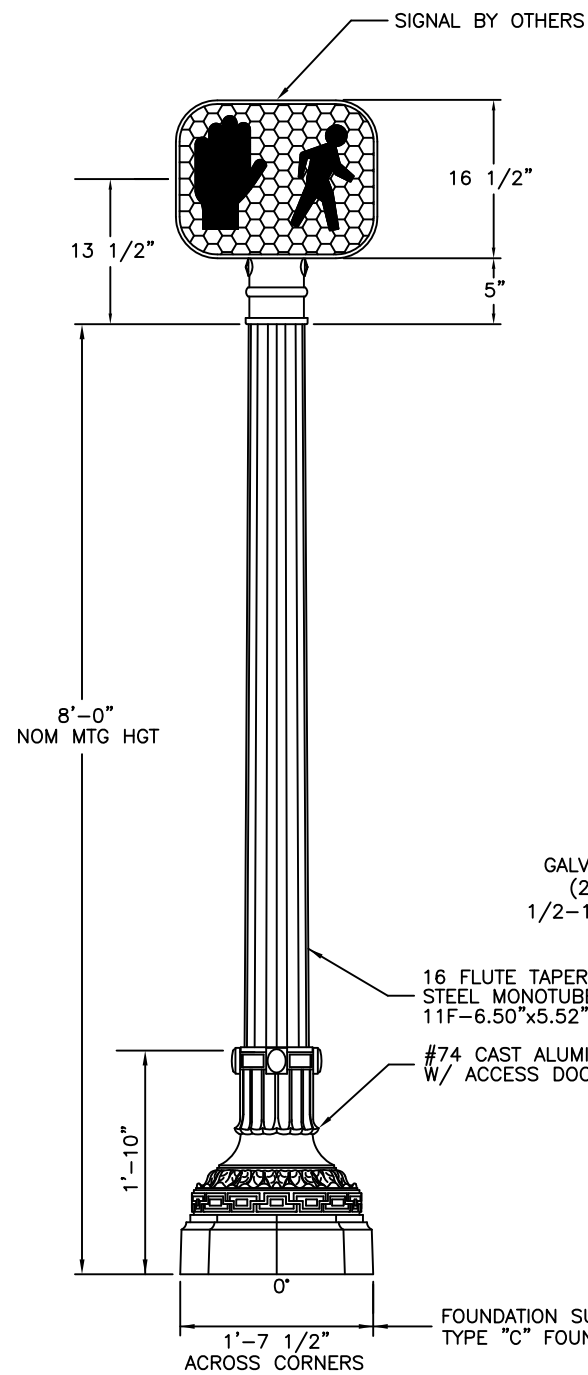
STATE:	REQ# / SO# :	REQ	REV	DESCRIPTION	DATE	REV BY/CHK BY
PROJECT NAME: PROJ-NAME						
REVISIONS						
NOSTALGIA LUMINAIRE NL318R WITH LED						
DESIGNED BY	CHECKED BY	DATE	SCALE	ENG REF		
DGMR	EJL	DATE	SCALE	ENG_REF		
DRAWING-NUMBER				REVISION	SHEET	
				REV	SHT OF SHTS	

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**CANTON, OHIO**  
**DANIEL J. MOEGLIN, P.E., CITY ENGINEER**  
 2436 30th St. NE 44705 : 330-489-3381 : [www.cantonohio.gov/engineering](http://www.cantonohio.gov/engineering)

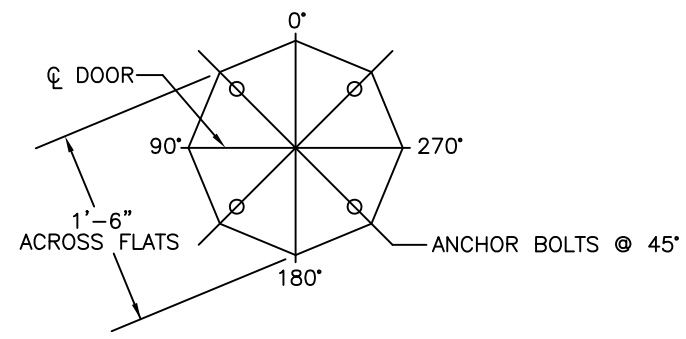
APPROVED DATE: MARCH 2014  
 APPROVED BY: EEM  
 DRAWING FILE NAME:  
 ce\_61-65\_LIGHTPOLES.dwg

REVISIONS		
DESCRIPTION	DATE	BY

**STANDARD DRAWING NO. 63**  
**NOSTALGIA LIGHT POLE & LUMINAIRE**  
 SHEET 1 OF 1



- (4) 3/4" X 30" LG GALV'D ANCHOR BOLTS (2 1/2" PROJ) W/(1) GALV'D HEX NUT, (1) 1" GALV'D FLAT WASHER & (1) 3/4" GALV'D FLAT WASHER ON 12" B.C. (8 1/2" CTRS)
- (2) #16 GA GALV'D SHIMS PER POLE INCLUDED
- 1/2-13 GROUND SCREW PROVIDED IN ANCHOR LUG

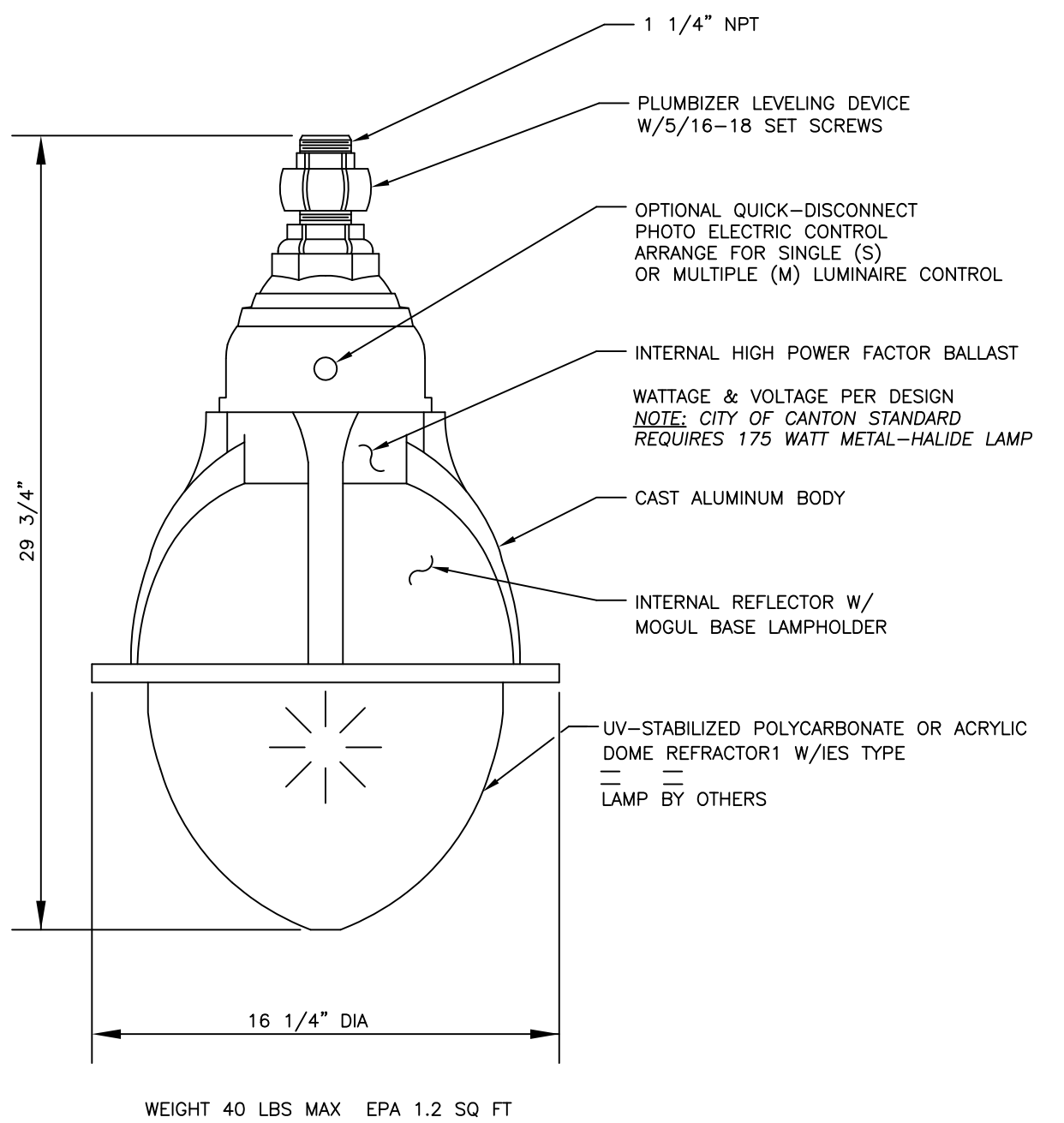


ORNAMENTAL PEDESTRIAN POLE  
DESIGNED FOR CANTON, OHIO  
U.M.C. DESIGN NO. P2000-74-B9-Y1

LOF \_\_\_\_\_ ENG. REF.# \_\_\_\_\_  
REQ.# 0329-40-98 S.O.# \_\_\_\_\_ CAD# 0329C98

**Union Metal CORPORATION**

DRAWN WJC DRAWING NO. \_\_\_\_\_  
DATE 4/24/98 N2000-74-B9  
CHECKED GMP



"J" STYLE LUMINAIRE W/PLUMBIZER

**UNION METAL CORPORATION**

SCALE \_\_\_\_\_ DRAWING NO. \_\_\_\_\_  
DWG. CAS  
DATE 10-28-94 **NLJ1-110-A2**  
CHK'D MRB

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2436 30th St. NE 44705 : 330-489-3381 : [www.cantonohio.gov/engineering](http://www.cantonohio.gov/engineering)

APPROVED DATE: APRIL 2012

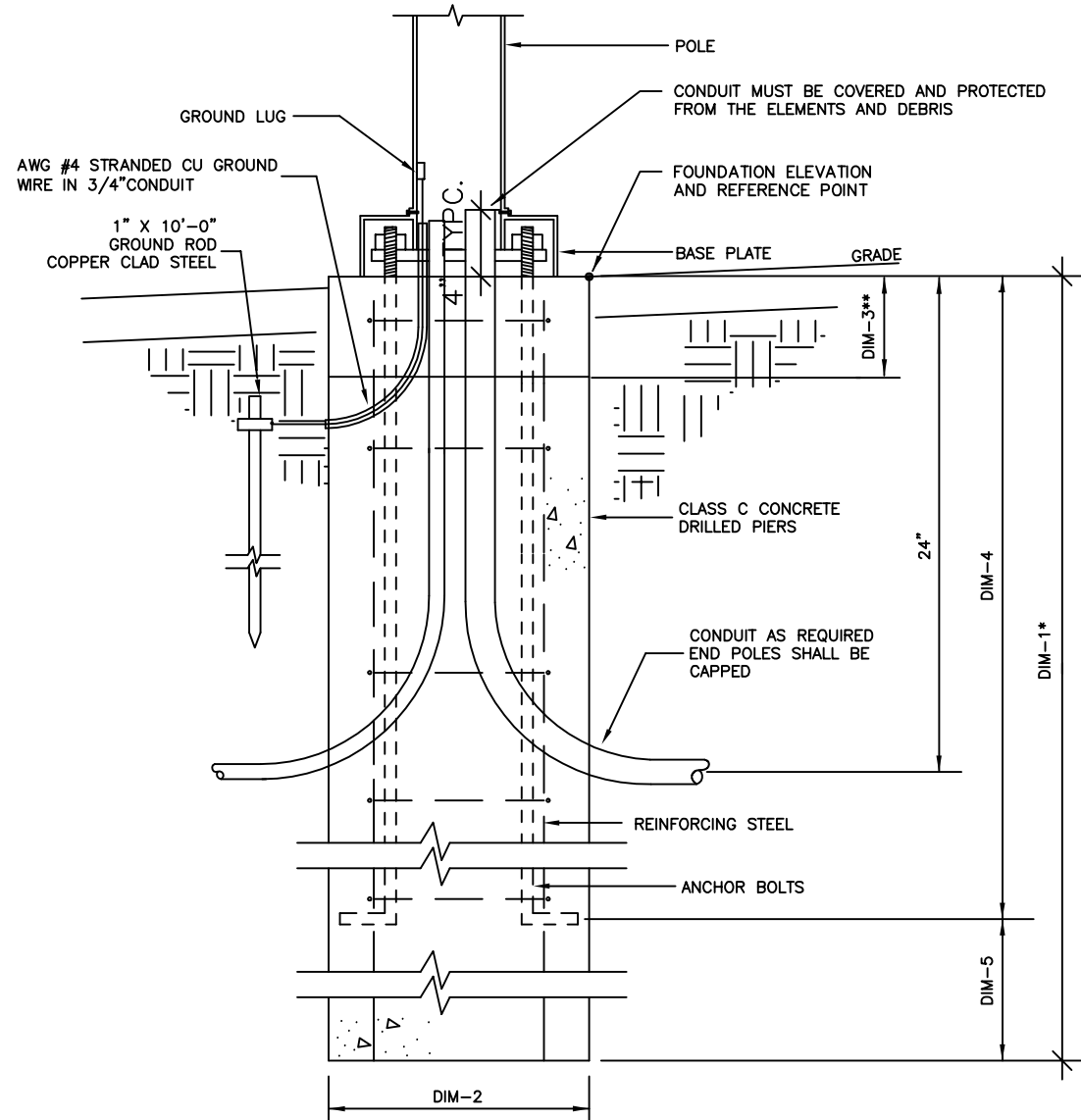
APPROVED BY: EEM

DRAWING FILE NAME:  
**ce\_61-65\_LIGHTPOLES.dwg**

REVISIONS		
DESCRIPTION	DATE	BY

**STANDARD DRAWING NO. 64**  
NOSTALGIC POLE FOUNDATION &  
WIRING DIAGRAM

SHEET 1 OF 1

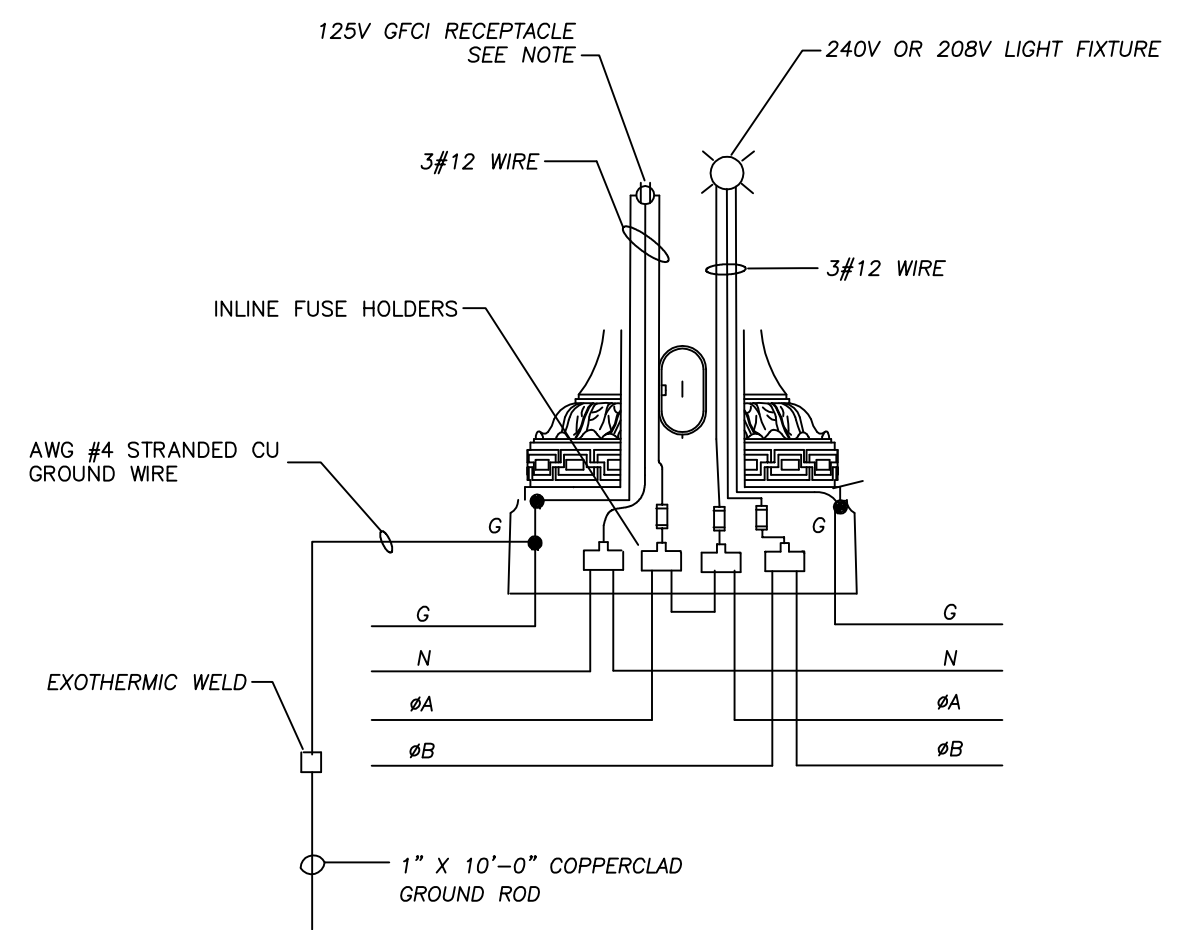


**NOSTALGIC FOUNDATION DETAIL**  
NO SCALE

**NOTES:**

1. ALL FOUNDATIONS SHALL BE DRILLED PIERS TO AVOID DISTURBING SURROUNDING SOIL. A TEMPORARY STEEL CASING MAY BE REQUIRED. IF UTILITIES OR ANOTHER CONFLICT IS IN CLOSE PROXIMITY TO THE FOUNDATION, THEN THOSE FOUNDATIONS MAY HAVE TO BE EXCAVATED BY HAND.
  2. ANCHOR BOLT PATTERN SHALL BE PROVIDED BY POLE MANUFACTURER (U.M.C.).
  3. REINFORCING STEEL SHALL BE ASSEMBLED IN CAGES USING #4 TIES.
  4. FOUNDATION TOP SHALL BE ROUND AND LEVEL FOR DECORATIVE HOUSING.
- \* MINIMUM DEPTH MAY VARY BASED ON SOIL CONDITION.  
 \*\* ONLY APPLICABLE IN SIDEWALK AREAS.
- A. TUBE TO BE PLACED W/TOP AT LEAST 1" ABOVE PROJECTED FINISHED SIDEWALK GRADE.
  - B. FOUNDATION TO BE POURED TO A MIN. 8" BELOW PROJECT FINISHED SIDEWALK GRADE.
  - C. ONCE SIDEWALK IS PROVIDED AND/OR FINAL FINISHED GRADE ESTABLISHED, TUBE SHALL BE CUT TO PROPER ELEVATION AND FOUNDATION CAP POURED AND LEVELED WITHIN THE TUBE.
    1. CUT AND REMOVE EXPOSED TUBE TO FINISHED GRADE AFTER CONCRETE IS CURED.

FOUNDATION	DIM-1*	DIM-2	DIM-3**	DIM-4	DIM-5
SIGNAL	9'-0"	36"	N/A	84"	24"
LUMINARIES	6'-0"	30"	8"	32"	40"
PEDESTRIAN	4'-0"	24"	8"	30"	18"



**POLE WIRING DIAGRAM**  
NO SCALE

**NOTE:**

1. THE COST FOR WIRING TO ALL NOSTALGIA LUMINARIES AND RECEPTACLES SHALL BE INCIDENTAL TO THE NOSTALGIA BID ITEMS. ALL WIRING IN POLES AND CONDUITS TO LIGHTS AND RECEPTACLES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
2. ALL WIRING INTO EACH NOSTALGIA POLE BASE SHALL BE NO. 6 AWG WIRE AND CONNECTED TO IN-LINE FUSE HOLDERS. THE COST FOR THIS WIRE SHALL BE INCIDENTAL TO THE NOSTALGIA BID ITEMS.
3. IN-LINE FUSE HOLDERS SHALL BE BUSSMAN (HEB-AW-RYC). INSTALL FUSES IN PHASE LINES AND SOLID LINK IN NEUTRAL (HET-AW-RYC) FOR GROUND USE SPLIT BOLT CONNECTOR. COPPER GROUND CABLE SHALL BE EXOTHERMICALLY WELDED TO THE GROUND ROD. RUN CABLE FREE END THROUGH 3/4" EMT AND CONNECTED AS SHOWN IN THE POLE WIRING DIAGRAM. THE COST FOR THE IN-LINE FUSE HOLDERS AND ALL RELATED ITEMS SHALL BE INCIDENTAL TO THE NOSTALGIA BID ITEMS.
4. THE POLE RECEPTACLE SHALL BE ALTERNATELY WIRED TO PHASE A AND PHASE B AS SHOWN IN THE POLE WIRING DIAGRAM.
5. FOR LIGHTS, USE 5 AMP FUSES. FOR RECEPTACLES, USE 10 AMP FUSES. AMP RATINGS SHALL BE BASED UPON 75 DEGREE C RATINGS.
6. UNLESS OTHERWISE NOTED IN THESE PLANS, ALL WIRING SHALL BE MINIMUM NO. 12 AWG, COPPER, 600 VOLT RATED WITH THE EXCEPTION OF NO. 14 AWG, COPPER SHALL BE PERMISSIBLE FOR CONTROL CIRCUITRY. THE FOLLOWING SHALL APPLY TO ALL WIRING:
  - A. ALL WIRING SHALL BE STRANDED "XHNN/XHWN".
  - B. UNDERGROUND BRANCH CIRCUIT WIRING SHALL BE "XHHW".
7. CONDUCTORS SHALL BE PULLED FROM LIGHT POLE TO LIGHT POLE AND FROM LIGHTING CONTROL PANEL TO LIGHT POLE WITHOUT SPLICES.



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APPROVED DATE: MARCH 2014  
 APPROVED BY: EEM  
 DRAWING FILE NAME:  
 ce\_61-65\_LIGHTPOLES.dwg

REVISIONS		
DESCRIPTION	DATE	BY

**STANDARD DRAWING NO. 65**  
**NOSTALGIC POLE FOUNDATION & WIRING DIAGRAM**  
 SHEET 1 OF 1

**STATE OF OHIO  
DEPARTMENT OF TRANSPORTATION  
SUPPLEMENTAL SPECIFICATION 800  
REVISIONS TO THE 2013 CONSTRUCTION & MATERIAL SPECIFICATIONS**

**DATED 01-17-2014**

**103.05**

On page 17, **Replace** the subsection with the following:

**103.05 Requirement of Contract Bond.** Furnish Contract Bonds within 10 days after receiving notice of award. Furnish Contract Bonds to the Director on the prescribed form, in the amount of the contract, and according to ORC 5525.16.

**105.17**

On page 29, **Replace** the last paragraph with the following section:

Clean hard fill consisting of reinforced or non-reinforced concrete, asphalt concrete, brick, block, tile or stone that is free of all steel as per 703.16 shall be managed in one or more of the following ways:

1. Recycled into a usable construction material.
2. Disposed in licensed construction and demolition debris facility.
3. Used in legitimate fill operations on the site of generation according to 105.16.
4. Used in legitimate fill operations on a site other than the site of generation to bring a site up to grade on an existing roadbed or parking lot project.

A Beneficial Reuse Certification form needs to be properly executed by the Recipient prior to any material leaving the project.

**106.09.E**

On page 33, **replace** the subsection with the following:

**E. Manufactured Products.** In order for a manufactured product to be subject to Federal requirements, the product must consist of at least 90% steel or iron content when it is delivered to the job site for installation.

Examples of products subject to Federal requirements include, but are not limited to, the following:

1. Steel or iron products used in pavements, bridges, tunnels or other structures, which include , but are not limited to, the following: fabricated structural steel, reinforcing steel, piling, high strength bolts, anchor bolts, dowel bars, permanently incorporated sheet piling, bridge bearings, cable wire/strand, prestressing/post-tensioning wire, motor/machinery brakes and other equipment for moveable structures;
2. Guardrail, guardrail posts, end sections, terminals, cable guardrail;
3. Steel fencing material, fence posts;
4. Steel or iron pipe, conduit, grates, manhole covers, risers;
5. Mast arms, poles, standards, trusses, or supporting structural members for signs, luminaires, or traffic control systems; and
6. Steel or iron components of precast concrete products, such as reinforcing steel, wire mesh and pre-stressing or post-tensioning strands or cables



The miscellaneous steel or iron components, subcomponents and hardware necessary to encase, assemble and construct the above components (or manufactured products that are not predominately steel or iron) are not subject to Federal requirements. Examples include, but are not limited to, cabinets, covers, shelves, clamps, fittings, sleeves, washers, bolts, nuts, screws, tie wire, spacers, chairs, lifting hooks, faucets, door hinges, etc.

**F. Proof of Domestic Origin.** Furnish documentation to the Engineer showing the domestic origin of all steel and iron products covered by this section, before they are incorporated into the Work. Products without a traceable domestic origin will be treated as a non-domestic product.

#### 107.10

On page 36, **Replace** the paragraph starting with “All areas proposed” with the following section:

Except for locations utilized specifically for;

1. parking of equipment between workdays for maintenance type projects;
2. disposal or stockpile locations that currently hold a Federal, ODNR or OEPA sanctioned permit that specifically allows the disposal or stockpiling activity. This exception requires the contractor to provide the Engineer with the permitted facility’s name, location, site ID number and the permit holder’s certification that disposal or stockpiling the project generated material is compliant with the recipient’s permit.

All areas proposed to be utilized by the Contractor outside the project construction limits and not described above shall be reviewed by environmental contractor(s) that are prequalified by the Department for each environmental resource. This exception applies to projects with “maintenance” in the project description. Have the consultant(s) certify that the proposed site to be utilized for the contractor will not impact:

#### 107.19

On page 43, **Replace** the entire subsection with the following:

**107.19 Environmental Protection.** Comply with all Federal, State, and local laws and regulations controlling pollution of the environment. Avoid polluting streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, sediments, or other harmful materials, and avoid polluting the atmosphere with particulate and gaseous matter.

By execution of this contract, the Contractor, will be deemed to have stipulated as follows:

- A. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.
- B. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.
- C. That the firm shall promptly notify the Department of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.
- D. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

Fording of streams is prohibited. Causeways for stream and river crossings or for Work below a bridge are permitted provided:

A. The causeway complies with the requirements of the 404 Permit the Department obtained for the Project.

B. The Contractor obtains a 404 Permit from the U.S. Army Corps of Engineers if the Department has not obtained such a permit. Obtain the 404 Permit prior to beginning construction of the causeway. The Department does not guarantee that the Contractor will be able to obtain a 404 Permit.

Comply with all current provisions of the Ohio Water Pollution Control Act, (OWPCA), (ORC Chapter 6111). The Department will obtain a storm water permit under the OWPCA provisions when the plan work acreage requires a permit. Apply for a permit to cover operations outside the Project limits shown on the plans as required by the OWPCA provisions. When the Department has not applied for a permit on the Project and a permit is required under the provisions of the OWPCA because of the total area of the Contractor's work, apply for, obtain, and comply with the required permit for both the Work within Project limits and the Contractor's work.

The Department has obtained the required permits from the U.S. Army Corps of Engineers and Ohio EPA for Work in the "Waters of the United States" and isolated wetlands under ORC Chapter 6111. Comply with the requirements of these permits.

When equipment is working next to a stream, lake, pond, or reservoir, appropriate spill response equipment is required. Do not stockpile fine material next to a stream, lake, pond, or reservoir.

Take precautions to avoid demolition debris and discharges associated with the excavation and hauling of material from entering the stream. Remove any material that does fall into the stream as soon as possible.

When excavating in or adjacent to streams, separate such areas from the main stream by a dike or barrier to keep sediment from entering the stream. Take care during the construction and removal of such barriers to minimize sediment entering the stream.

Contain, collect, characterize and legally dispose of all waste water and sludge generated during the work. Do not mix waste water with storm water. Do not discharge any waste water without the appropriate regulatory permits. Manage waste water and sludge in accordance with ORC Chapter 6111 and all other laws, regulations, permits and local ordinances relating to this waste. Waste water management is incidental to the Work unless otherwise specified in the contract.

Control the fugitive dust generated by the Work according to OAC-3745-17-07(B), OAC-3745-17-08, OAC-3745-15-07, and OAC-3745-17-03 and local ordinances and regulations. Prior to the initiation of abrasive coating removal, pavement cutting or any other construction operation that generates dust, demonstrate to the Engineer that construction related dust will be controlled with appropriate Reasonable Available Control Measures (RACM) as described in OEPA Engineering Guide #57 (<http://epa.ohio.gov/dapc/engineer/eguides.aspx>).

In addition, use dust control measures when fugitive dust creates unsafe conditions as determined by the Engineer. Perform this work without additional compensation except for Item 616.

Perform open burning according to 105.16.

#### **109.05.C.6**

On page 74, **Replace** the first paragraph with the following:

6. Subcontract Work. For Work performed by an approved subcontractor, the Department will pay an amount to cover administrative costs of 8% on the first \$10,000 of work and 5% for work in

excess of \$10,000 as provided in 109.05.C.2 through 109.05.C.5. No additional mark-up is allowed for work of a sub-subcontractor or trucking services employed by a subcontractor.

#### **109.05.C.6**

On page 74, **Delete** Table 109.05-2.

#### **109.05.C.8.a**

On page 75, **Replace** the first paragraph of 109.05.C.8.a with:

8. Trucking.

a. Trucking firms and owner operators not subject to prevailing wage will be paid at the invoiced cost plus 8% on the first \$10,000 of trucking and 5% for trucking in excess of \$10,000 to cover administrative costs.

#### **109.05.C.8.a**

On page 75, **Delete** Table 109.05-3.

#### **202.02**

On page 89, **Replace** the third paragraph of 204.02 with the following:

Use removed or excavated materials in the Work when the material conforms to the specifications; if not, then dispose of the material according to 105.16 and 105.17.

#### **205.04.A**

On page 113, **Replace** the second sentence of the third paragraph of 205.04.A with the following:  
Control dust according to 107.19.

#### **208**

On page 119, **Replace** the section title of 208.10 with the following: **208.10 Cushion Blasting**

#### **208.01**

On page 119, **Replace** the last sentence of the second paragraph with the following:

Controlled blasting techniques include presplitting, cushion blasting, and sliver cut blasting.

#### **208.10**

On page 126, **Replace** the section title with the following: **208.10 Cushion Blasting.**

#### **251.03**

On page 136, **Replace** the last paragraph of 251.03 with the following:

If the Contract does not include resurfacing, seal the perimeter surface of the repaired area by applying a 2 inch (50mm) to 4 inch (100 mm) wide strip of approved 705.04 material or 702.01 approved PG binder.

#### **255.07**

On page 145, **Replace** the last paragraph of 255.07 with the following:

Seal the perimeter surface of the repaired areas by applying a 2 inch (50 mm) to 4 inch (100 mm) wide strip of approved 705.04 material or 702.01 approved PG binder.

### 255.08

On page 145, **Replace** the last paragraph of 255.08 with the following:

If maintaining traffic in adjacent lanes, schedule work in order to place the concrete in the prepared repair area within 48 hours after removing the existing pavement. In accordance with standard drawing MT-101.90, drums may be used as a separator to the adjacent traveled lane for repairs 60 feet or less in length. If unable to complete placement of the concrete in the exposed repair area by the end of the daily work shift, fill repair areas less than 4 feet from the traveled lane with a temporary patch material suitable to the Engineer or cover unfilled repair areas 10 feet (3 m) or less in length with a steel plate. Do not leave repair areas unfilled with concrete when work is suspended on weekends or holidays. If unable to complete placement of the concrete in the exposed repair area before suspending work for a weekend or holiday or within the time specified above, fill the excavation with an asphalt concrete mixture or other suitable temporary patch material with a durable surface as the Engineer directs. Maintain the temporary patches while they are in service.

### 301.02

On page 155, **Replace** the second paragraph of 301.02 with the following:

Submit for the Laboratory's approval the desired percentage of the aggregate passing the No. 4 (4.75 mm) sieve and blend of individual components. The Contractor may use reclaimed asphalt concrete pavement according to 401.04. The Laboratory will establish the required binder content within a range of 4.7 to 7 percent. Do not make changes in these JMF values due to unsatisfactory results or other conditions except as authorized by the Laboratory. Obtain a new JMF approval for any desired change to an existing JMF.

### 301.04

On page 155, **Replace** 301.04 with the following:

**301.04 Spreading and Finishing.** Ensure that the maximum compacted depth of any one layer is 6 inches (150 mm). Ensure that the temperature of the mixture when delivered to the paver is a minimum of 250 °F (120 °C). Ensure the temperature of the mixture is sufficient for the roller coverage to be effective in compacting the mixture.

### 302.02

On page 157, **Replace** the third, fourth and fifth paragraph of 302.02 with the following:

The Contractor may use reclaimed asphalt concrete pavement according to 401.04. Should problems with proper coating or other material issues related to the use of reclaimed asphalt concrete pavement or reclaimed asphalt shingles be evident, the Laboratory may restrict the allowable percentage of reclaimed asphalt concrete pavement to the reduced limits shown in tables 401.04-1 and 401.04-2 or may eliminate use of reclaimed asphalt shingles. In this case the virgin binder content will be adjusted by the Laboratory.

Add hydrated lime in the dry form at a rate of 0.75 percent by the dry weight of aggregate for asphalt concrete base, if antistripping additive is required and hydrated lime is used.

Design the asphalt concrete base to yield 4.0 percent air voids and the following properties:

Property	Acceptable Range of Values	
	Minimum	Maximum
Binder Content, %	Note 1	6.0[Total]
Stability, lb (N), 70 blow	3000 (13,345)	--
Flow, 0.25 mm, 70 blow	--	28
Voids in Mineral Aggregate % Note 1: See Tables in 401.04	12.0	--

### 302.04

On page 158, **Replace** 302.04 with the following:

**302.04 Spreading and Finishing.** Ensure that the compacted depth of any one layer is a minimum of 4 inches (100 mm) and a maximum of 7.75 inches (190 mm). Ensure that the temperature of the mixture when delivered to the paver is a minimum of 250 °F (120 °C). Ensure the temperature of the mixture is sufficient for the roller coverage to be effective in compacting the mixture.

### 401.17

On page 181, **Add** the following after the 1<sup>st</sup> paragraph of 401.17:

Construct longitudinal joints using string line or other controls as a point of reference to provide a straight longitudinal joint. Prior to placing adjacent pavement, trim any locations along the longitudinal joint that deviate horizontally from the point of reference. Maintain a consistent overlap of 1 inch to 1 ½ inches on adjacent pavement when closing longitudinal joints.

### 402.03

Beginning on page 183, Replace the first two paragraphs of 402.03 with the following:

**402.03 Polymer Binders.** If an asphalt binder is modified by SBR at an asphalt concrete mixing plant, equip the plant with an automated SBR flow control and monitoring system. Obtain the Department's approval of the system before operating and demonstrate the system calibration to the District. If the District waives the demonstration, provide a letter documenting calibration data for the flow system to the DET for each project. Obtain written approval from the Laboratory for the use of SBR and ensure the QCP contains methods for properly controlling and sampling SBR binder blends.

For drum mix plants, introduce the SBR directly into the asphalt binder line through means of an in-line motionless blender or other device approved by the Laboratory which is able to provide a homogeneous blend. Ensure the in-line motionless blender design provides aggressive interaction of asphalt binder and SBR emulsion to provide a homogenous blend at the sampling port. Some blenders such as 'swirl' type blenders do not accomplish proper blending. The Astec in line SBR blender or similar design accomplishes proper blending. Locate a sampling valve between the in-line blender and the plant drum, at least 12 ft (3 m) downstream of the in-line blender and at least 5 ft (1 m) downstream of a piping elbow. Ensure the sampling valve port is at least 1 in. (2.54cm) in diameter. Ensure the sampling valve can be opened quickly for maximizing sample flow for the purpose of obtaining a proper sample. In place of an in-line sampling valve, a sample may be taken from a 3-5 gallon (11-19 liter) surge tank as long as the tank is downstream of the required blender and the in-line flow can be quickly and directly diverted to the surge tank. Contents of the tank should be drained into a 5 gallon (19 liter) sampling bucket and stirred before filling the required

sample container. Provide a sampling valve port that is in a position to safely obtain the required sample volume in the required 5 gallon (19 liter) sampling bucket. Provide a stable sampling rack to obtain a sample.

#### **402.04**

On page 184, **Replace** Item 2 in the first paragraph of 402.04 with the following:

2. Injection equipment has variable water injection control controlled by the plant operation rate and the water injection can never exceed 2.2 percent by weight of asphalt binder.

#### **403.03**

On page 185, **Replace** the entire subsection 403.03 with the following:

**403.03 Quality Control Program (QCP).** Create and implement a Quality Control Program (QCP) for each paving season. The QCP will cover processes conducted to provide an asphalt mixture at the paving site that is uniform in composition, conforms to the specification requirements and that when placed is free of any defect (ex. segregation, lack of mixture and texture uniformity, raveling, rutting, holes, debris etc.) within the Contractor's control at project completion. A minimum of 3 weeks before mix production, but no later than February 28, submit a hard copy of the proposed QCP to the Laboratory for review and approval.

Send a hard copy and a digital copy (if available) of the approval letter and approved QCP to the DET in every District in which work is performed. Keep copies of the approval letter and the approved QCP in each Contractor plant laboratory and plant operation control room. Digital copies of the approved QCP and approval letter in pdf format are allowed in each Contractor plant laboratory and plant operation control room with the following requirements: The file icon must be appropriately labeled and be on the computer desktop of a computer in each area, the QCP must contain a Table Of Contents inside the front cover locating all sections by page number and the QCP must be page numbered, and out of date QCPs must be removed from the computer desktop.

Failure to comply with the approved QCP may result in removal of personnel in accordance with Supplement 1041, removal from VA, and adversely affect the Contractor's Prequalification rating.

The QCP is a reflection of a Contractor's sincerity and ability in producing a quality product. Development of this program beyond the minimum requirements specified below is encouraged and is taken into consideration by the QCQC when reviewing Contractor plant operation for qualification for VA.

Include in the program:

A. The assignment of quality control responsibilities. Quality control includes all efforts required to achieve a product meeting specifications. The QCP will list individuals as required below and note their designated responsibilities to meet QCP requirements. Provide a Quality Control Manager holding a Supplement 1041 Level 3 approval and who is a company employee. Assign Level 2 technicians for all Level 2 QC testing duties, and provide a list designating their responsibilities and expected actions. Ensure only approved personnel handle and test samples at all times. If Level 2 consultant technicians are used provide a document in the QCP and to them listing designated responsibilities and expected actions (if different from employee expectations). Define in the QCP who is responsible at plants and specific methods for assuring haul vehicles meet all requirements and proper bed release products are used. Provide a Field Quality Control Supervisor (FQCS), holding Supplement 1041 Field Quality Control Supervisor approval and who is a company employee, who is routinely and usually at the paving site during placement of any non-temporary

asphalt concrete pavement. Ensure personnel obtaining and handling cores at the project site are approved Level 2 technicians, FQCS or personnel approved by the Laboratory.

B. Provisions to meet the Department mix specifications.

C. Procedures for extra testing (e.g., job start, responses to poor test results or field mix problems, aggregate stock testing, reclaimed asphalt concrete pavement checks, moistures) and any other testing necessary to control materials not already defined in these Specifications.

D. Methods to maintain all worksheets, including all handwritten records, and other test and sample records from the plant or project for the duration of the contract or 5 years, whichever is longer. Define the test record process. Define company records retention requirements. Provide copies of all test reports and forms used in the quality control process.

E. Procedures for equipment calibration and documentation for Level 2 lab equipment. Provide documentation that all Level 2 lab equipment has been calibrated at the time of the Level 2 lab approval inspection. Procedures for calibration record storage.

F. Method of Quick Calibration and documentation for each plant type.

G. Procedure for random sampling to be used at the plant and documentation method. Procedures for sample taking, tracking, handling and documentation method for all samples taken at the project paving site including taking of all cores used for density determination or density gauge correlation.

H. All procedures to meet the processing, testing and documentation requirements for RAP and RAS in 401.04 including test forms, record keeping, technician responsibilities, etc.

I. Procedure for ensuring that every Contractor employee involved in the testing of asphalt mix and operation of the asphalt plant facility has read the QCP and has on site access to all applicable Department specifications, proposals, policies, and the current approved JMF.

J. Means to meet the handling and storage requirements of 402.03 and asphalt binder suppliers for all asphalt binders.

K. Means to meet delivered mixture uniformity/coating and hauling/trucking requirements.

L. Define the roles and responsibilities of the Field Quality Control Supervisors. List approved Field Quality Control Supervisors.

M. Signature of the Quality Assurance Manager and, if different, the person in authority to enforce all operations covered by the QCP as outlined in this subsection.

N. Specify in the QCP warning bands to be used by technicians for all tests and give specific instruction how they will be used for tests in concert with Table 441.10-1 specification requirements.

#### **421.04**

On page 208, **Replace** 421.04 with the following:

**421.04 Weather Limitations.** Apply the mixture only when it is not raining and the existing pavement surface and atmospheric temperature is a minimum of 45 degrees and rising and there is no forecast of an atmospheric temperature below 32 degrees within 24 hours from the time the mixture is applied. Between September 30 and May 1, do not apply the mixture if the existing pavement surface temperature is less than 50 °F (10 °C).

#### **421.08**

On page 209, **Replace** the entire subsection 421.08 with the following:

**421.08 Surface Preparation.** Before applying the mixture, thoroughly clean the surface.

Remove raised pavement markers according to 621.08, when specified. The Contractor may fill the depression caused by the removal of the casting with material meeting this specification.

Remove any existing pavement markings, except 740.02 (traffic paint), using an abrasion method conforming to 614.11.G.

Apply a tack coat conforming to Item 407, consisting of one part asphalt emulsion and three parts water. Apply the tack coat at a rate of 0.06 to 0.12 gallon per square yard (0.25 to 0.45 L/m<sup>2</sup>).

Protect drainage structures, monument boxes, water valve, etc. during material application.

#### **421.10**

On page 210, **Replace** the third and fourth paragraphs of 421.10 with the following:

If a leveling course and a surface course are specified, apply the paving mixture at  $14 \pm 2$  pounds per square yard ( $7.6 \pm 1.1$  kg/m<sup>2</sup>) for the leveling course and  $16 \pm 1$  pounds per square yard ( $8.7 \pm 0.6$  kg/m<sup>2</sup>) for the surface course. Apply the two courses at a minimum combined rate of 30 pounds per square yard (16.3 kg/m<sup>2</sup>), regardless of the above tolerances

If a surface course is specified and it is not placed on another Microsurfacing course, apply the paving mixture at a minimum of 18 pounds per square yard (9.8 kg/m<sup>2</sup>).

#### **421.10**

On page 210, **Add** the following to the end of the seventh paragraph of 421.10:

Provide uniform appearance of the entire surface area regardless of the means used to spread material.

#### **421.13**

On page 211, **Replace** the second paragraph of 421.11 with the following:

The cost of any removal of any existing pavement markings according to 421.08 is incidental to Microsurfacing.

#### **422.02 Materials**

On page 212, **Replace** the 1<sup>st</sup> full paragraph with the following:

Use polymer emulsified binder conforming to 702.16 Type A.

#### **422.04**

On page 214, **Replace** the entire section 422.04 with the following:

**422.04 Weather Limitations.** Place the chip seal when the pavement temperature is between 60 °F (16 °C) and 140 °F (60 °C). Do not schedule the performance of this work for the time period before May 1 or after September 1. Do not place chip seal if any of the following conditions exist:

- A. The atmospheric temperature is below 70 °F (21 °C).
- B. Impending weather conditions do not allow for proper curing.
- C. If temperatures are forecasted below 50 °F (10 °C) within 24 hours from the time of work.

#### **422.06**

On page 215, **Replace** the 2<sup>nd</sup> paragraph of 422.06 with the following:

Remove all existing pavement markings, except 740.02 (traffic paint), using an abrasion method conforming to 614.11,G.

#### **442.02**

On page 238, **Replace** the first paragraph of 442.02 with the following:



**442.02 Type A Mix Design.** Design the mixture composition for a Type A mix according to 441.02 and the most recent *Asphalt Institute Superpave Mix Design Manual* (SP-2) for design procedures and material properties except as modified by this subsection. Include in the JMF submittal the standard Department cover and summary page; all printouts from the gyratory compactor (all gyratory points not necessary); and analysis covering the required mix properties. Unless otherwise directed submit one compacted gyratory sample and loose mix for compaction of another sample, in addition to a 5-pound (2000 g) loose sample, for each JMF.

#### **446.05**

Starting on page 247, **Replace** the 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> paragraphs of 446.05 with the following:

For each Lot three cores will be taken as follows from cold longitudinal joints and seven cores will be taken from the mat not including the joints. If locations not according to this specification are given, immediately inform the Engineer. Do not take cores from ramp joints. Take joint cores from the first, last and randomly from one of the three middle sublots. Determine the longitudinal location of the joint core within the subplot randomly and also randomly determine whether or not the cold longitudinal joint core is to be taken from a confined or unconfined joint if both exist in the mat to be cored. Do not take cores on the sloped face of a wedge before the adjoining lane is placed. Take joint cores such that the core's closest edge is six inches (150 mm) from the edge of the joint upper notch of a wedge joint or 4 inches (100 mm) from the edge of a vertical face joint. If a nine inch or wider wedge joint is used take the core three inches from the upper wedge joint notch. Take the seven random mat cores that are not for the joint coring such that the core's closest edge is at least twelve inches from the cold longitudinal joint wedge joint upper notch or vertical face edge. If taken, locate cores for the Contractor's quality control (QC sister core) longitudinally from and within four inches (100 mm) of the random core. In addition to the QC sister cores, three extra cores may be taken from the first lot of a JMF for testing to correlate density gauges. Do not take additional cores beyond what is noted above unless clearly identified in the approved Contractor's QCP. Clearly label all cores with mat locations so that they may be readily identified. Any unlabeled cores may be destroyed by the Department. Notify the Laboratory if any questions arise. Do not store additional cores anywhere (project, in vehicles or at the plant) beyond what are required to be taken for testing. Test all Contractor QC cores and maintain records of all tests (core tests and correlated gauge tests) per the QCP. Destroy all cores immediately after testing is complete.

The Department will determine the pay factor for each Lot cored by the pay schedule in Table 446.05-1 for Lots with three cold longitudinal joint cores and Table 446.05-2 for Lots with less than three cold longitudinal joint cores. The Department will verify the MTD if the MSG determination has a deviation from the MTD of less than or equal to 0.020. If the MTD is not verified, establish a new MTD according to the procedures established in 441.09. If less than 10 cores are available for determining the mean, the Laboratory will determine disposition of the Lot.

Fill core holes by the next workday with asphalt concrete. Before filling, ensure the holes are dry and tack them with asphalt material conforming to 407.02. Properly compact the asphalt concrete used for filling the hole and leave it flush with the pavement.

#### **451.09**

Starting on page 256, **Replace** the entire subsection **451.09 Joints** with the following:

**451.09 Joints.** Unless otherwise directed, construct all transverse joints normal to the centerline of the pavement lane and of the type, dimensions, and at locations specified.

Determine contraction and longitudinal joint sawing time limits to protect the concrete from early cracking by using HIPERPAV software. Obtain the software according to Supplement 1033.

Twenty four (24) hours before placing concrete pavement create a HIPERPAV project data file according to Supplement 1033.

Provide the completed file and the printout to the Engineer. When HIPERPAV predicts early age slab cracking will occur, whether due to standard construction practices, joint sawing methods, mix design or curing, either do not start construction until modifications have been made to eliminate HIPERPAV's predicted slab cracking or do not pave.

Perform a HIPERPAV analysis for each pour.

If software analysis determines joint sawing could exceed twenty four (24) hours, assure all joints are sawed by the 24th hour.

A HIPERPAV analysis showing paving can proceed does not eliminate the requirements of 451.17.

Accurately mark the correct locations of all joints that will be saw cut along both edges of the pavement. Ensure the method of marking remains clearly visible after the paver passes and until the joint saw cut is completed.

**A. Longitudinal Joint.** Construct longitudinal joints between simultaneously placed lanes by sawing.

When a standard (water cooled diamond bladed) concrete saw is used to make the longitudinal joint between simultaneously placed lanes, saw the joint within the timeframe provided in the HIPERPAV output. For pavement less than or equal to 10 inches (255 mm), saw the joint to a minimum depth of one-fourth the specified pavement thickness. For pavements greater than 10 inches (255 mm) thick, saw the joint to a minimum depth of one-third the specified pavement thickness. Saw joints  $1/4 \pm 1/16$  inch ( $6 \pm 1.6$  mm) wide measured at the time of sawing.

When using early-entry (dry cut, light weight) saws to make the longitudinal joint between simultaneously placed lanes, only use saw blades and skid plates as recommended by the saw manufacturer for the coarse aggregate type being used in the concrete. Perform the early-entry sawing after initial set and before final set. Saw the joint  $1/8$  inch (3 mm) wide and  $2 \frac{1}{4}$  to  $2 \frac{1}{2}$  inches (56 to 63 mm) deep.

Place deformed epoxy coated steel tiebars or the epoxy coated hook bolt alternate (wiggly bolt) with epoxy coated coupling, in longitudinal joints during consolidation of the concrete. Install them at mid-depth in the slab by approved mechanical equipment. As an alternate procedure, rigidly secure them on chairs or other approved supports to prevent displacement. Provide tie bars or wiggly bolts of the size and spaced as shown on the standard construction drawings. If used, securely fasten hook bolts or wiggly bolts with couplings to the form at the longitudinal construction joint as shown on the standard construction drawings.

**B. Transverse Joints**

Unless otherwise directed, construct all transverse joints normal to the centerline of the pavement lane and of the type, dimensions, and at locations specified.

For all transverse joints, install round, straight, smooth, steel dowel bars of the size shown in Table 451.09-1.

<b>TABLE 451.09-1 DOWEL SIZE</b>	
<b>Thickness of Pavement (T)</b>	<b>Diameter of Steel Dowel</b>
Less than 8 1/2 inches (215 mm)	1 inch (25 mm)
8 1/2 to 10 inches (215 to 255 mm)	1 1/4 inches (32 mm)
Over 10 inches (255 mm)	1 1/2 inches (38 mm) or as shown on the plans

Within 2 hours prior of placing concrete coat the full length of all dowels with a thin uniform coat of new light form oil as a bond-breaking material.

**Load Transfer Assemblies.**

Use load transfer (dowel basket) assemblies in transverse contraction joints conforming to and placed according to the standard drawings to hold the dowels in a position parallel to the surface and centerline of the slab at mid-depth of the slab thickness.

Preset all dowel basket assemblies before the day's paving unless the Engineer determines complete presetting is impractical.

Completely install dowel basket assemblies before shipping and spacer wires are removed.

Immediately before paving, remove all shipping and spacer wires from the dowel basket assemblies; check the dowel basket assemblies are held firmly in place; check the dowels are parallel to the grade and parallel to centerline of pavement.

For each joint assembly used to hold dowels in position, provide a continuous assembly between longitudinal joints or between the longitudinal joint and pavement edge. Drive at least eight 1/2-inch (13 mm) diameter steel pins a minimum of 18 inches (460 mm) long at an angle to brace the assembly from lateral and vertical displacements during the placing of concrete. Drive two of these pins opposite each other at each end of the assembly, and drive the remaining pins in staggered positions on each side of the assembly. Where it is impractical to use the 18-inch (460 mm) length pins, such as where hardpan or rock is encountered, and provided the assembly is held firmly, the Engineer may authorize use of shorter pins. Where the dowel basket assembly is placed on granular material that may allow settlement or distortion, anchor the assembly with a combination of pins and steel plates, or by some other means satisfactory to the Engineer to prevent settlement.

When concrete pavement is placed on an existing concrete pavement or on a stabilized base, secure dowel basket assemblies from lateral and vertical displacement during concrete placement using power-driven fasteners and appropriate clips or pins driven in predrilled holes of a diameter slightly less than the pin diameter. Use either of the above methods or a combination of the two in sufficient numbers to adequately secure the basket assemblies.

Where widths other than 12 feet (3.6 m) are specified, the Contractor may use standard dowel basket assemblies with dowel spacings adjusted as follows. Maintain 6-inch (150 mm) dowel spacing at the longitudinal joint and increase the spacing at the outer edge of the lane up to 12 inches (300 mm). Where an odd width of lane occurs and if the standard dowel basket assembly would provide for a space exceeding 12 inches (300 m), place a dowel 6 inches (150 mm) from the outer edge of the lane). Hold such a dowel rigidly in proper position by a method satisfactory to the Engineer or cut and splice a dowel basket assembly of greater length than required to attain the required length.

**Slip Form Paver with Mechanical Dowel Bar Inserter.**

The Contractor may propose to use a slip form paver with mechanical dowel bar inserter (DBI) to place dowels in transverse contraction joints the full thickness of pavement and spaced per the requirements of the standard construction drawings. Submit details and specifications of the

proposed equipment to the Engineer at least 14 calendar days prior to mobilizing the equipment to the project.

The use of any slip form paver with DBI is allowed only after acceptable performance is demonstrated with a test section and approved by the Engineer. Continued verification during all contract paving is required for each production day as detailed below.

Provide all equipment, perform all testing, and evaluate the slip form paver with DBI as detailed in the following sections.

**1. MIT Scan-2 Equipment and Reporting**

Provide MIT Scan-2 equipment to determine the location of dowel bars in either fresh or hardened concrete including horizontal translation, longitudinal translation, vertical translation, horizontal skew, vertical tilt, and cover.

Provide equipment for determining dowel bar alignment that has an onboard computer that runs the test; collects and stores the test data on a memory card; performs the preliminary evaluation; and provides a printout of results immediately after scanning. Provide MagnoProof software to provide a detailed report of all required alignment parameters in an Excel spreadsheet and a graphical color representation.

Ensure the equipment is properly calibrated conforming to the manufacturer's specifications and for the specific project conditions. Provide calibration documentation to the Engineer prior to the start of construction. Establish a standard protocol for scanning direction.

Provide trained personnel to operate the equipment and documentation of training prior to start of construction.

Provide a print out, at the time of scanning, for horizontal translation, longitudinal translation, vertical translation, horizontal skew, vertical tilt, and cover for each bar in each joint scanned. For each Test Section and daily, for each day of production, provide a complete report to the Engineer at the completion of scanning along with a digital copy of all data collected in the manufacturer's native file format as well as all calibration files. Include the standard report generated using the MagnoProof software in Excel format and with color graphical representation of each joint. Include in the report project contract number, county-route-section, placement date, scan date, station location and lane, joint ID number, name of operator, and all required alignment parameters.

If non-magnetic dowel bar materials are to be used, propose and demonstrate alternative measurement equipment to the Engineer showing capability to provide measures equal or similar to the acceptance and rejection criteria of Table 451.09-2. Obtain the Engineer's approval of alternative equipment prior to paving. If no alternative equipment can demonstrate the required capability, do not use the slip form paver with DBI.

Prior to paving, review the measurement equipment applicability for the project conditions with the Engineer, including: ambient moisture conditions, dowel material, metallic concrete aggregate and potential contributors to magnetic interference (presence of tiebars, reinforcing steel or other embedded or underlying steel items that may affect measurement accuracy). Establish how the measurement device can meet the project conditions. If the measurement device cannot meet the project conditions, do not use the slip form paver with DBI.

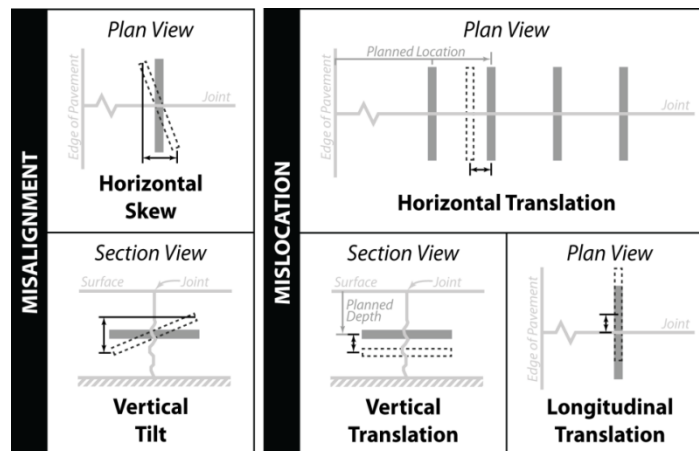
**2. Acceptance/Rejection**

The required dowel bar tolerances are given in Table 451.09-2. Dowel bar alignment is measured as detailed below. Any dowel bar exceeding any Acceptance Tolerance in Table 451.09-2 is considered misaligned. Rejection Criteria is in absolute inches.

**Table 451.09-2  
Individual Dowel Bar Alignment Tolerances**

Alignment Parameter	Acceptance Tolerance (inches)	Rejection Criteria (inches)
Horizontal Translation <sup>a</sup>	±2.0	±3.0
Longitudinal Translation <sup>b</sup>	±2.0	±4.0
Vertical Translation <sup>c</sup>	±1.0	± T/6
Horizontal Skew <sup>d</sup>	±0.60	±1.0
Vertical Tilt <sup>e</sup>	±0.60	±1.0
Cover <sup>f</sup>	-	2.5 minimum

- Horizontal Translation - the total difference, measured horizontally, between the actual dowel bar location and the plan required dowel bar location along the transverse contraction joint.
- Longitudinal Translation - the total difference, measured in the longitudinal direction, from the center of the transverse contraction joint to the actual dowel bar center. Also termed as “side shift”.
- Vertical Translation - the total difference, measured vertically, between the centerline of the actual dowel bar location and the mid-depth of the slab. (T = Pavement Thickness in inches)
- Horizontal Skew - the total difference, measured from end to end of a dowel bar, of the dowel in the horizontal plane.
- Vertical Tilt - the total difference, measured from end to end of a dowel bar, of the dowel bar in the vertical plane.
- Cover - the least distance between the surface of embedded reinforcement and the outer surface of the concrete.



Perform a Joint Score Analysis conforming to CPTP Tech Brief *Best Practices for Dowel Placement Tolerances* (FHWA-HIF-07-021) for every joint. Joint Score is a measure of the combined effects of horizontal skew and vertical tilt. To calculate the Joint Score: calculate the Single Dowel Misalignment (SDM) by the square root of the sum of the squares of the Horizontal Skew and Vertical Tilt of each dowel in the joint; determine the weighing factor (W) for each bar from Table 451.09-3; sum the W values for every dowel in the joint and add one (1).

$$\text{Single Dowel Misalignment (SDM)} = \sqrt{(\text{Horizontal Skew})^2 + (\text{Vertical Tilt})^2}$$

*Joint Score (JS)* – Evaluated for a single transverse joint between adjacent longitudinal joint(s) and/or pavement edge(s) (i.e., a typical 12 ft [3.6 m] standard lane or up to 14 ft [4.3 m] widened lane), and calculated as:

$$\text{Joint Score (JS)} = 1 + \sum_{i=1}^n W_i$$

where:

$n$  = number of dowels in the single joint

$W_i$  = weighting factor (Table 451.09-3) for dowel  $i$

<b>Table 451.09-3</b>	
<b>Weighting Factors in Joint Score (JS) Determination</b>	
<b>Single Dowel Misalignment (SDM)</b>	<b>W, Weighting Factor</b>
SDM ≤ 0.6 in. (15 mm)	0
0.6 in. (15 mm) < SDM ≤ 0.8 in. (20 mm)	2
0.8 in. (20 mm) < SDM ≤ 1 in. (25 mm)	4
1 in. (25 mm) < SDM ≤ 1.5 in. (38 mm)	5
1.5 in. (38 mm) < SDM	10

*Joint Score Trigger (JST)* – A scaling of the Joint Score risk value to account for the actual number of dowels required in a single joint for pavement width other than 12 ft (3.6 m), calculated as:

$$\text{Joint Score Trigger (JST)} = 10 * \frac{\text{\# of Dowel Bars in Single Joint}}{12}$$

Include the Joint Score and Joint Score Trigger for every joint scanned in the report to the Engineer. Any joint with a Joint Score equal to or greater than the Joint Score Trigger is considered locked and rejectable.

### **3. Test Section**

Prior to production use of a DBI slip form paver, perform at least a 500-foot (150 m) long test section for acceptance of the machine. Measure the alignment and location of each dowel bar in the test section using the MIT Scan-2. The test section will be considered acceptable if the following acceptance criteria are met:

1. Each Joint Score (JS) is less than Joint Score Trigger (JST);
2. Ninety percent (90%) of the dowel bars meet the Acceptance Tolerances of Table 451.09-2;
3. None of the dowels exceed the Rejection Tolerances of 451.09-2.

If the test section acceptance criteria is not met, use the data to refine the paving process and reduce/eliminate misalignments and mislocations. Modify, repair or replace any slip form paver with DBI that does not meet the acceptance criteria and perform another test section. Do not begin production paving until the slip form paver with DBI test section acceptance criteria is met.

Perform corrective action of all joints in the test section according to Section 5 below.

Perform a new test section for any new slip form paver with DBI that will be used for any contract item of work.

Perform a new test section at the beginning of every construction season; after major paver maintenance/repairs; at mobilization or remobilization to a project, for major concrete mix design changes or different concrete mix designs; and as required by Section 4 of this specification.

If the length of the section to be paved makes it unreasonable to perform the test section, scan all joints for conformance with the requirements of Section 2, Acceptance/Rejection. Correct any joints with dowels found to be rejectable or JS greater than JST according to Section 5, Corrective Action.

Determine during the test section if embedded tiebars are affecting the Rejection Tolerances and JS's. If the test section demonstration shows interference, exclude from the JS and JST calculations any dowel bar(s) closer than 12 in. (300 mm) in any direction to tiebars in the longitudinal joint(s). At the Engineer's discretion, establish the location of excluded dowels by another equivalent non-destructive method or by probing.

#### **4. Paving Quality Control Testing (QCT) for Dowel Bar Inserters**

When using the accepted slip form paver and DBI for any contract item of work, perform quality control scans with the MIT-Scan 2 equipment at the following minimum:

- a. Measure the alignments and location for every 10th joint and calculate the JS and JST for each measured joint. Acceptable QCT is when all measures are within the acceptance tolerances in Table 451.09-2 and JS is less than JST.
- i. When the daily QCT finds more than 10 percent of the joints scanned have dowels exceeding the acceptance tolerances of Table 451.09-2 but the JS is less than the JST, increase the scanning frequency to every 5th joint. Evaluate the paving process to reduce/eliminate misalignments and mislocations and continue to pave. The QCT frequency will revert back to every 10th joint when two consecutive days of scanning every 5th joint show no dowels exceeding the acceptance tolerances of Table 451.09-2 and all JSs are less than the JST.
- ii. When QCT finds any individual dowel bars exceeding the rejection criteria of Table 451.09-2 or the JS is found to exceed the JST, the joint is considered to be locked and immediate investigation needs to be made as follows:
  1. Scan joints in front and behind the locked joint location until five (5) consecutive joints in both directions are found with no dowel bars exceeding the rejection criteria of Table 451.09-2 and no JS is found to exceed the JST.
  2. If the additional scanned joints show no additional dowel bars exceeding the rejection criteria of Table 451.09-2 and no JS exceeding the JST, evaluate equipment to determine what caused the original problem. Before continuing paving increase the frequency of QCT to conform to 4.a.i.
  3. If the additional scanned joints show additional dowel bars exceeding rejection criteria of Table 451.09-2 or joints with a JS exceeding the JST, stop paving. Investigate to determine the cause of the dowel bar rejection issues and provide the causes and alternative corrections to the Engineer.

The Engineer will determine if the corrections will correct the problem and may allow paving to temporarily continue to validate if the corrections work. During any evaluation, scan all joints to determine if the corrections were successful. If successful, continue QCT scanning at the frequency of 4.a.i. If not successful, discontinue paving, repair or replace the slip form paver and DBI, and repeat the Test Section
- b. All dowel bars found beyond rejection criteria of Table 451.09-2 or joints with a JS exceeding the JST require a corrective action proposal conforming to Section 5, Corrective Action.

Provide report formats as described in Section 1, MIT Scan-2 Equipment and Reporting.

#### **5. Corrective Action**

Submit a proposal for corrective action to the Engineer for any dowel that exceeds the rejection criteria in Table 451.09-2 or any joint that has a JS greater than the JST. As a minimum, include the following in the corrective action proposal:

1. Locations of rejectable dowels with identification information as described in Section 1, MIT Scan-2 Equipment and Reporting.
2. Locked joint identification information as described in Section 1, MIT Scan-2 Equipment and Reporting.
3. Proposed method of remediation for each identified location, including supporting documentation of the effectiveness of the means of proposed remediation.

The Department may not require corrective action for random dowels that exceed the rejection criteria of Table 451.09-2 depending on location; what alignment parameter was the cause for the rejection; and the frequency of the rejectable dowels.

The Department may not require corrective action for all JS exceeding the JST, if they are random in nature. Up to two (2) consecutive joints with a JS exceeding the JST may be accepted, provided that the adjacent three (3) joints before or after do not have dowels exceeding Table 451.09-2 rejection limits and have JS's less than the JST. The Department will require corrective action where there are more than two (2) consecutive joints with a JS exceeding the JST.

Do not proceed with any corrective action until the Engineer approves the proposed method(s) of correction.

**C. Expansion Joints.** Where a pressure relief joint is not provided adjacent to a bridge structure, construct expansion joints at the first two regularly spaced joint locations adjacent to the bridge approach slab on each side of the bridge. If the pavement is constructed in two or more separately placed lanes, construct the transverse expansion joints in a continuous line for the full width of the pavement and shoulders.

Construct expansion joints according to the standard construction drawings. Install the face of the expansion joint perpendicular to the concrete surface except when expansion joint is installed at a skewed bridge approach slab.

Use round, straight, smooth, steel dowels, and within 2 hours of placing concrete, coat the dowels with a thin uniform coat of new light form oil as a bond-breaking material to provide free movement. After coating the dowel, install a sleeve of metal or other approved material approximately 3 inches (75 mm) long, with crimped end, overlapping seams fitting closely around the dowel, and a depression or interior projection to stop the dowel a sufficient distance from the crimped end to allow 1 inch (25 mm) for longitudinal dowel movement with pavement expansion on one free end of each dowel. If approved by the Engineer, use other means to allow for 1 inch (25 mm) of expansion.

Punch or drill proper size dowel holes into the preformed expansion joint filler to assure a tight fit around each dowel.

Form a 1-inch (25 mm) wide and 1-inch (25 mm) deep opening on top of the expansion joint filler and seal this opening with 705.04 joint sealers.

**D. Contraction Joints.** For pavement less than or equal to 10 inches (225 mm) thick, saw contraction joints with a standard (water cooled diamond bladed) concrete saw to a minimum depth of one-fourth of the specified pavement thickness. For pavement greater than 10-inches (255 mm) thick, saw contraction joints to a minimum depth of one-third the specified pavement thickness. When cutting joints using a standard (water cooled diamond blade) saw assure the joint is  $1/4 \pm 1/16$ -inch ( $6 \pm 1.6$  mm) wide when measured at the time of sawing.

When using the option of early-entry (dry cut, light weight) saws, only use saw blades and skid plates as recommended by the saw manufacturer for the coarse aggregate type being used in the concrete. Perform the early entry contraction joint sawing after initial set and before final set. Saw



the contraction joint 2-1/4 to 2-1/2-inches (56 to 63 mm) deep. Ensure any early entry saw joints are approximately 1/8-inch (3 mm) wide at the time of sawing.

If the pavement is constructed in two or more separately placed lanes, install the joints continuous for the full width of the pavement. Saw the pavement with sawing equipment approved by the Engineer as soon as the saw can be operated without damaging the concrete. Provide saws with adequate guides, blade guards, and a method of controlling the depth of cut. After wet sawing, clean the joint using a jet of water. After dry sawing clean the joint using air under pressure. During sawing of contraction joints, maintain a standby saw in working condition with an adequate supply of blades.

**E. Construction Joints.** Install dowelled construction joints at the end of each day's work and when work is suspended for a period of more than 30 minutes.

Use dowels in transverse construction joints. Within 2 hours of placing concrete, coat the free half of all dowels with a thin uniform coat of new light form oil. Use an adequate bulkhead, with openings provided for dowel bars spaced as specified and shaped to fit the typical section of the pavement, to form a straight joint. During placing of concrete, hold dowels rigidly in position.

Locate construction joints at or between contraction joints. If located between contraction joints, construct the construction joint no closer than 10 feet (3 m) to the last contraction joint.

#### 451.10

On page 264, **Replace** paragraph 3 and 4 with the following two paragraphs:

Texture the surface in the longitudinal or transverse direction using a broom to produce a uniform, gritty, texture. Immediately following the broom drag texture, tine the pavement in the longitudinal direction using an approved device that produces uniform tine spacing 3/4 inches wide (19 mm), 1/8 inch deep (3 mm) and 1/8 inch wide (3 mm). Do not tine within 3 inches (75 mm) of pavement edges or longitudinal joints. Only use equipment that will tine the full width of the pavement in one operation and uses string line controls for line and grade to assure straight tining texture.

Use transverse tining in small areas only with the approval of the Engineer. Use equipment that produces a random pattern of grooves [0.05 inch (1.3 mm) to 0.08 inch (2.0 mm) deep and 0.10 inch (3 mm) wide] spaced at 3/8 to 1-3/4 inches (10 to 45 mm), with 50 percent of spacings less than 1 inch (25 mm). Transverse tining may be used as an option for shoulders of main line or shoulders of ramps and gore areas. Tine all mainline shoulders or all ramp shoulders in a consistent direction if choosing this option. Request the use of transverse tining and identify the locations for approval at the preconstruction meeting.

#### 501.05.B

On page 295, after the fourth paragraph, and sentence **change** the first section to:

This section applies to working drawings for the following:

1. Cofferdams and Excavation Bracing, impacting active traffic, or with an exposed height over eight feet, except when a complete design is already shown in the plans. Perform all work as specified below:

- a. Locate Cofferdams and Excavation Bracing according to the contract, if shown.
- b. Maintain temporary horizontal and vertical clearances according to the contract.
- c. Include the effects of AASHTO live and dead load surcharges as necessary.
- d. Design Cofferdams and Excavation Bracing in accordance with the latest *AASHTO Guide Design Specifications for Bridge Temporary Works*, Section 4

#### 506.01

On page 306, **change** the last sentence to:

When subsequent static load tests are specified, the Office of Geotechnical Engineering will determine whether subsequent static load tests are to be performed and the location of all piles to be tested

#### 506.02

On page 306, in the second paragraph, **change** the last sentence to:

If the Contractor finds it necessary to use a different hammer, the Office of Geotechnical Engineering will determine if an additional static load test is necessary.

#### 506.04

On page 309, **change** the first sentence of the first paragraph to:

If the Contractor subsequently finds it necessary to use a different hammer, the Office of Geotechnical Engineering will determine if an additional static load test is necessary; the Contractor shall complete any such additional test at no additional cost to the Department.

#### 507.04

On page 310, **change** the eight paragraph to:

When using open ended diesel hammers, provide electronic equipment, such as a saximeter, or equivalent, for the Engineer's use to accurately measure and record the average stroke for each unit of length driven.

#### 508.02

On page 316, after the third and last paragraph of this section, **add** the following sentence, Inserts cast into prestressed members for the purposes of falsework support shall be galvanized according to 711.02 and shall be shown in the shop drawings according to 515.06.

#### 511.05

On pages 325 and 326, **Replace** section 511.05, (delete the second paragraph), with the following: Mix concrete according to 499.08.

#### 511.07

On page 326, **Replace** the 2nd paragraph of 511.07 with the following:

Place and finish concrete to the lines and grades shown in the plans. Unless otherwise noted, the proposed beam seat elevations shown in the plans for prestressed beam superstructures are based on the design midspan camber for prestressed beams which are 30 days old (D30). Adjust each beam seat elevation using measured midspan camber data provided by the fabricator if available. In the absence of measured midspan camber, adjust each beam seat elevation using the following:

$$\Delta Y = Dt - D30 \geq 0$$

Where:

$\Delta Y$  = Distance that each seat elevation shall be lowered from plan elevation to account for midspan camber growth rounded to the nearest 1/8-inch

$Dt$  =  $(1 + \psi) D0$

$D30$  = Design Midspan Camber at Day 30 provided in the plans; inch

$D0$  = Design Midspan Camber at Day 0 provided in the plans; inch

$\psi$	=	1.97 KS KF KTD
KS	=	$1.45 - 0.13 (V/S) \geq 1.0$
V/S	=	Ratio of the prestressed concrete member's volume-to-surface area exposed to the atmosphere. For each of the standard I-beam sections, this ratio is provided on PSID-1-13; inch
KF	=	$5/(1 + f'ci)$
f'ci	=	Compressive strength of prestressed concrete at release provided in the plans; ksi
KTD	=	$t/(61 - 4 f'ci + t)$
t	=	Age of prestressed concrete measured between release of prestressing force (i.e. 0.75 days) and time of deck placement; days

Provide the Engineer with revised plan sheets and Design Camber calculations or measured camber data signed, sealed and dated by an Ohio Registered Professional Engineer at least 7 days prior to constructing the beam seats. The revised plan sheets shall include the measured camber data (if available), Design Camber (Dt) and beam age (t) assumed for establishing the revised elevations. Provide haunch reinforcement for prestressed I-beam members as necessary to extend the beam's composite reinforcement at least two inches into the design deck thickness. All revisions resulting from adjusted beam seat elevations shall be clearly marked as revised. Do not begin work until the Engineer approves the revised plan.

#### 511.09

On page 331, **Revise** the fourth paragraph to the following:

Form construction joints using bulkheads with keyways. Locate keyways clear of exposed surfaces by approximately one-third the thickness of the joint. Construct transverse or longitudinal construction joints in deck slabs with keys located between the reinforcing mats and having a depth of 3/4 inch (19 mm).

#### 511.19

On page 339, **Revise** the 1<sup>th</sup> paragraph to:

After completing all curing operations and allowing the deck to thoroughly dry, seal the following areas with a high molecular weight methacrylate (HMWM) sealer. Flood the areas and squeegee off the excess material as specified in Item 512 before opening the deck to traffic:

#### 511.24

On page 343, **Add** the following after the 1st paragraph of 511.24:

Work necessary to adjust seat elevations and deck haunches for prestressed beam members is incidental to the affected structural concrete items. The Department will pay for final quantities as measured and field verified.

#### 512.03.F

On page 346, **Change** the second paragraph of 512.03.F to:

Use one of the following methods to produce a surface profile that feels and looks like 100 grit sandpaper or coarser. Provide the Engineer sandpaper for comparison. Perform the ASTM D7682-12, Method B, Standard Test Method for Replication and Measurement of Concrete Surface Profile Using Replica Putty to obtain a replica coupon of the prepared concrete surface on a flat, test section, on the first day of production, and as requested by the Engineer. With a micrometer, measure the surface profile obtained on the coupon, and provide the coupon to the Engineer.

1. Water blast at 7,000 psi (48 MPa) minimum, or
2. Abrasive blast, followed by air brooming or power sweeping, to remove dust from the surface and opened pores,
3. or use a combination of water blast and abrasive blast.

#### **512.03.G.1.b**

On page 347, **Change** 512.03.G.1.b to:

b. Provide documentation to the Engineer that the ambient, surface and material temperature is 50 °F (10 °C) or above, 5 °F higher than the dew point, and the relative humidity is 80% or below during the application of the sealer.

#### **513.03**

On page 361, under the Level UF, Description of Capabilities, **change** the last sentence to:

Quality assurance of shop drawings, material test reports, and inspection according to Supplement 1078.

Under the Level 1, Description of Capabilities, **change** the last sentence to:

Quality assurance of shop drawings, material test reports, and inspection according to Supplement 1078.

Under the Level 2, Description of Capabilities, **change** the last sentence to:

Quality assurance of shop drawings, material test reports, and inspection according to Supplement 1078.

Under the Level 3, Description of Capabilities, **change** the last sentence to:

Quality assurance of shop drawings, material test reports, and inspection according to Supplement 1078.

Under the Level 4, Description of Capabilities, **change** the last sentence to:

Quality assurance of shop drawings, material test reports, and inspection according to Supplement 1078.

Under the Level 5, Description of Capabilities, **change** the last sentence to:

Quality assurance of shop drawings, material test reports, and inspection according to Supplement 1078.

Under the Level 6, Description of Capabilities, **change** the last sentence to:

Quality assurance of shop drawings, material test reports, and inspection according to Supplement 1078.

#### **513.22**

On page 372, in the third paragraph, **change** the last sentence to:

For galvanized structures with welded shear connectors, remove the galvanic coating by grinding at each connector prior to welding.

#### **514.19**

On page 396, **Revise** the first paragraph to:

(QCP #9). After the intermediate coat cures and before applying the finish coat, caulk gaps or crevices greater than 1/8 inch (3 mm). Allow for the cure of the caulk, per the Manufacturer’s recommendations prior to the application of the finish coat.

**515.08**

On page 404, **add** the following material to the list:  
Welded wire reinforcement.....709.12

**Change** the last sentence to:

For gradation, use No. 6, 67, 68, 7, 78 or 8 size coarse aggregate.

**515.14**

On page 407, at the end of the section **add** the following paragraph:  
Unless otherwise shown in the plans, do not install inserts or holes in the beam web within a distance of 1.5 times the beam height from the end of the beam.

**515.15**

On page 407, **change** B to:  
B. W/c ratio (maximum = 0.40)

**515.15**

On page 408, **change** the 8th paragraph to:  
Screed the top surface of composite members and finish the surface with a wire broom, in a transverse direction and penetrating the finished surface approximately 1/4 inch(6 mm) + 1/16 inch (1.5 mm) -1/8 inch (3 mm) at a maximum spacing of 1-1/2 inches (38 mm).

**515.17**

On page 411, **Replace** the Beam Sweep and Camber Tolerances table with the following:

**Beam Sweep and Camber Tolerances**

<b>Description</b>	<b>Box Beam</b>	<b>I Beam</b>
<b>Horizontal Sweep</b>	$\pm 1/8"$ per 10 ft (1 mm/m) max $\pm 3/4"$ (19 mm)	$\pm 1/8"$ per 10 ft (1 mm/m) max $\pm 1"$ (25 mm)
<b>Max Gap between beam</b>	1" (25 mm)	N/A
<b>Deviation from Design camber (Dt) [1]</b>	+ Sacrificial Haunch[2] or $-1/8"$ per 10 ft (1 mm/m) max $-1/2"$ (13 mm)	+ Sacrificial Haunch[2] or
<b>Variation in camber between beams in same span</b>	max $1/2"$ (13 mm)	N/A

[1] Design camber (Dt) calculated in accordance with 511.07.

[2] Unless otherwise noted, the Sacrificial Haunch thickness is 2".

**515.18**

On page 411, **Add** the following after the 3rd paragraph of 515.18:

The Department will not accept for shipping, prestressed members with measured camber exceeding the Design Camber (Dt), used to establish the seat elevations, according to 511.07, by more than the Sacrificial Haunch thickness, until a corrective work plan has been approved by the Engineer. The plan shall be signed, sealed and dated by an Ohio Registered Engineer and shall include all revised plan information necessary to place the deck to the plan thickness. If the prestressed members are acceptable, exclusive of the deviation from Design Camber, the Department will pay for all costs incurred resulting from measured camber exceeding Design Camber calculated for the actual beam age at the time of deck placement, as Extra Work, 109.05.

#### 516.07

On page 415, **change** the second paragraph to:

Accurately set, level and align elastomeric bearings, bearing plates and bolsters. Set bearing plates and bolsters on 1/8-inch (3 mm) thick sheet lead conforming to 711.19.

#### 523.04

On page 430, **change** the last sentence to:

Submit an electronic version of the report and data files from the testing and analysis to the Office of Geotechnical Engineering and the Office of Construction Administration.

#### 524.09

On page 436, **change** the second paragraph of this section to the following;

Tie and support the reinforcing steel so it remains within the required tolerances. Securely tie spacers at quarter points around the cage perimeter and space at intervals not to exceed 5 feet (1.5 m) along the length of the cage. If the size of the longitudinal reinforcing steel equals or exceeds 1-inch (25 mm) in diameter, the Contractor may increase the distance between the spacing devices to a maximum of 10 feet (3 m). Use spacers of adequate dimensions to ensure a minimum annular space between outside of cage and side of hole or casing of 3 inches (75 mm) for shaft diameters up to 4 feet (1.2 m) and 6 inches (150 mm) for shaft diameters larger than 4 feet (1.2 m). The Contractor may use round plastic spacers.

#### 526.04

On page 440, **change** the paragraph to:

Immediately before placing concrete according to Item 511.07, thoroughly moisten the subgrade or subbase with water in the amount and manner directed by the Engineer. When the bridge superstructure and the approach slab require QC/QA, make at least one set of test cylinders for each 50 cubic yards (35 cubic meters) of concrete. Include the results of the cylinders into the LOT for the 511 superstructure item.

#### 526.08

On page 440, **change** the 1<sup>st</sup> paragraph to:

The Department will calculate the final adjusted payment per 511 and Supplement 1127. The Department will pay for accepted quantities at the contract price as follows which includes all concrete, curbs, reinforcing steel, dowels, joints, and other materials:

#### 526.08

On page 440, **Add** the new item as follows:

Item	Unit	Description
526	Square Yard (Square Meter)	Reinforced Concrete Approach Slabs with QC/QA

**602.03**

On page 447, **Replace** the first sentence of 602.03 C.:  
 Cast-in-place structures are headwalls, wingwalls, pipe cradles, collars, and other units.

**608.01**

On page 460, **Replace** the entire section 608.01 Description with the following:  
**608.01 Description.** This work consists of constructing walks, curb ramps, and steps as per plans, specifications and standard drawings.

**608.02**

On page 460, **Replace** the entire section **608.02 Materials** with the following:

- 608.02 Materials.** Furnish materials conforming to:
- Aggregate Base .....304.01 and 304.02
  - Asphalt concrete Type 1 ..... 448
  - Concrete,
    - Class QC Misc or QC 1\* ..... 499
    - Reinforcing steel ..... 509.02
  - Crushed aggregate meeting
    - grading requirements of ..... 703.10
  - Detectable Warning Devices..... 712.14
  - Expansion joint material ..... 705.03

\* Replacing Coarse aggregate in the concrete mixes with Recycled Concrete Aggregate conforming to Supplement 1117 is an option

**608.07**

On page 462, **Replace** the entire section **608.07 Curb Ramps** with the following:  
**608.07 Curb Ramps.** Excavate, form, place, finish, and cure according to 608.03.A, 608.03.B, 608.03.C, and 608.03.E. Finish ramps to a rougher final surface texture than the adjacent walk and with striations transverse to the ramp slope using a coarse broom or other method approved by the Engineer.  
 Provide detectable warning devices conforming to 712.14 in curb ramps. Install the detectable warning devices according to manufacturer’s written recommendations and standard drawings. Provide a warranty to conform with the requirements of 712.14. Provide the manufacturer’s written installation instructions and the 5-year warranty to the Engineer at or before the pre construction meeting.

**611.02**

On page 472, **Remove** “with welded bell inlet” from the second to last item of 611.02 A.:  
 Corrugated polyethylene smooth lined pipe ..... 707.33

On page 472, **Remove** “with welded bell inlet” from the last item of 611.02 A.:  
 Steel reinforced thermoplastic ribbed pipe ..... SS938

#### **611.04.A**

On page 476, **Replace** the entire section **611.04.A Shop Drawings** with the following:

**A. Shop Drawings.** Prepare shop drawings and calculations for C&MS items 706.051, 706.052, 706.053, 706.13 and “Special Design” 706.02 as required below. Have an Ohio Registered Engineer prepare, sign, seal and date all drawings and calculations. Have another Ohio Registered Engineer check all drawings and calculations, then sign, and seal and date all drawings and calculations. Submit load rating report in accordance to the most current version of ODOT’s Bridge Design Manual along with one copy of the shop drawings and one copy of the calculations to the Office of Structural Engineering for all structures with a 10 foot or larger span. Submit an additional copy of the shop drawings and calculations to the Engineer.

1. If Reinforced Concrete Circular Pipe, 706.02, requires a “Special Design” with a specified D-load requirement other than Tables 706.02-1 through 706.02-4, submit shop drawings and design calculations. Design the pipe to meet the D-load requirements to ensure the performance of this specification. Include the following information in the submittal: all structural design and loading information, all material specifications, all dimensions, and the installation plan.

2. Submittals for Precast reinforced concrete 3-sided flat topped culverts, precast reinforced concrete arch sections, or precast reinforced concrete round sections, (706.051, 706.052, or 706.053) shall include structural analysis methods, structural design criteria and calculations, structure details, and shop drawings. Include details for a precast slab bottom if required.

3. To substitute a precast reinforced concrete 3-sided flat topped culvert (706.051), a reinforced concrete arch section (706.052), or a precast reinforced concrete round section (706.053) for one another, the submittal shall include hydraulic calculations. The proposed culvert shall meet or exceed the same hydraulic requirements as the specified culvert and minimum cover requirements. If the specified culvert is on pedestal walls, include the shop drawings for the pedestal wall design in the submittal because 3-sided flat topped culverts, arch culverts, and round sections require different pedestal wall designs.

4. To substitute either a precast reinforced concrete 3-sided flat topped culvert, a precast reinforced concrete arch section, or a precast reinforced concrete round section (706.051, 706.052, or 706.053) placed on a precast or cast-in-place slab bottom for a precast reinforced concrete box culvert (706.05), the submittal shall include hydraulic calculations. The proposed culvert shall meet or exceed the same hydraulic requirements as the specified box culvert and minimum cover requirements. The Department may allow the bottom slab to be cast-in-place but will not issue a time extension for any delays resulting from the use of a cast-in-place bottom slab.

Department approval of shop drawings and calculations is not required.

#### **611.04.B**

On page 477 through 479, **Replace** the entire section **611.04 B. Installation Plan** with the following:

Submit a written installation plan to the Engineer for installing all conduit and drainage structures for review and acceptance.

Submit the installation plan at least 15 days before any conduit or drainage structure work begins. Do not perform work without an accepted installation plan.

Include the following required information for each conduit type and size:



1. Trench and excavation cross-sections with dimensions.
2. Locations where the conduit is installed in a cut situation and where it is installed in a fill situation.
3. Type of bedding and backfill material used and maximum lift thickness.
4. Compaction density requirements for bedding and backfill and compaction equipment.
5. Identify the starting location (outlet or inlet) for each run of conduit. All conduit must be laid from the outlet to the inlet unless approved by the Engineer. Bell or groove-end Type A conduit must have a bell or groove-end at the inlet.
6. Maximum allowable joint gap between conduit sections.
7. Other installation details as necessary.
8. Provide written confirmation from the conduit manufacturer that the pipe material and strength supplied are appropriate for the material and density requirements described in the installation plan for the backfill and bedding as well as the height of cover. Ensure the pipe material meets the durability design specified in the plans. This confirmation by the conduit manufacturer will not relieve the Contractor of the responsibility for obtaining the required results.

Include the following required information for each type of drainage structure:

1. Trench and excavation cross-sections with dimensions.
2. Locations where the drainage structure is installed in a cut situation and where it is installed in a fill situation.
3. Type of bedding and backfill material used and maximum lift thickness.
4. Compaction density requirements for bedding and backfill and compaction equipment.
5. Location.
6. Other installation details as necessary.

Deviations from the installation plan during construction require a revision of the installation plan. Resubmit all revisions to the installation plan to the Engineer within 14 days of the change with the conduit manufacturer's written confirmation that the pipe material and strength supplied are appropriate for the material and density requirements described in the newly revised installation plan for the backfill and bedding. If the conduit manufacturer does not provide this written confirmation to the newly revised installation plan, all the conduit installed according to the unconfirmed plan must be replaced. No new installation plans will be considered until all previous installation plans have been confirmed and accepted.

Provide the conduit manufacturer's structural calculations when specified or within 10 days when requested by the Engineer.

For structural plate and metal pipe arch conduit with a span of 57 inches (1440 mm) or larger, ensure the manufacturer provides match-marked ends on the conduit. Include a layout drawing in the installation plan.

For metal conduit with two structural plate thicknesses specified, identify the location of the thicker plates. For precast concrete 3-sided flat and arch topped structures (706.051 and 706.052) provide a 3 inch (75 mm) deep keyway centered on the leg and at least 6 inches (150 mm) wider than the thickness of the leg at the bottom. For precast concrete round sections (706.053) provide an 8-inch (200 mm) deep keyway for spans up to 24 feet (7.3 m) and a 10-inch (254 mm) deep keyway for spans greater than 24 feet, (7.3 m). Center the keyway on the precast arch base. The width of the keyway must be 8 inches (200 mm) greater than the thickness of the precast arch base. For non-

vertical leg arches set on pedestal walls, a one sided keyway is acceptable if the required pedestal wall design thickness is not sufficient for a full keyway.

#### **611.04.C**

On page 478, **Replace** the first sentence.

Perform work so that it can be verified by the Contractor's representative doing the inspection.

#### **611.04.D**

On page 479, **Replace** the first sentence.

Provide a performance report for each performance inspection.

#### **611.04.D**

On page 479, **Delete** "D. Conduit diameter report from the Manufacturer"

On page 479, **Add** "J. Conduit Evaluation"

On page 480, **Replace** the first sentence of the first paragraph with the following:

Submit a performance report to the Engineer within 14 days of completing the performance inspection of the conduit run or drainage structure.

#### **611.05**

On page 480, **Delete** the entire third paragraph.

"Provide a firm bed for the full width and length of the trench. If bedding material is not provided, loosen the middle third of the bed to seat the conduit. Provide a firm bed beneath the drainage structure."

#### **611.07**

On page 480, **Replace** the second sentence of the first paragraph.

Any planned temporary diversion of flows and drainage is the responsibility of the Contractor. Maintain flows and drainage or provide temporary diversion at no additional cost to the Department.

On page 480, **Delete** "in the presence of the Engineer" from the first sentence of the second paragraph.

#### **611.08**

On page 482, **Delete** "in the presence of the Engineer" from the third sentence of the first paragraph of **611.08 Joining Conduit**.

On page 483, **Replace** the entire first sentence of **611.08.B.3**

For precast reinforced concrete box culverts, precast reinforced concrete 3-sided flat topped culverts, precast reinforced concrete arch sections, and precast reinforced concrete round sections (706.05, 706.051, 706.052, and 706.053), place the sections according to the installation plan.

On page 483, **Replace** the entire first sentence of **611.08.B.3.c**

For precast reinforced concrete arch sections and precast reinforced concrete round sections (706.052 and 706.053), install a 7/8 x 1 3/8-inch (24 x 34 mm) preformed flexible joint sealant (706.14) along the outside joint chamfer.

On page 483 & 484, **Replace** the entire first sentence of **611.08.B.3.d**

For precast reinforced concrete box culverts, precast reinforced concrete 3-sided flat topped culverts, precast reinforced concrete arch sections, and precast reinforced concrete round sections (706.05, 706.051, 706.052, and 706.053), apply an approved epoxy-urethane sealer per the plans to all top surfaces not covered by membrane waterproofing.

#### **611.10**

On page 485, **Delete** “in the presence of the Engineer” from the first sentence of the second paragraph.

#### **611.11**

On page 486, in the last paragraph, first sentence, **Replace** “4 x 4-W1.4 x W1.4” with “2 x 2-W0.9 x W0.9”

On page 486, in the last paragraph, after the second sentence, **Add** the sentence:  
Provide support beneath the mesh where necessary using galvanized support chairs or #4 reinforcing steel, meeting the material requirements of 509.02

On page 487, in the second paragraph, **Delete** the second sentence “Provide galvanized reinforcing steel support chairs beneath the mesh where necessary.”

#### **611.12**

On page 487, **Replace** the entire sixth paragraph.

In each phase of construction of a conduit, perform the inspection no sooner than 30 days and no later than 90 days after the completion of the finished grade when not below pavement and after the completion of the rough subgrade when any portion of the conduit is below pavement. The Engineer may permit inspection beyond the 90 day limit. If any corrections are made to the installed pipe after the completion of the finished grade or rough subgrade and prior to the performance inspection, wait 30 days after the correction was made to do the performance inspection. If the contract duration will not permit a 30 day waiting period then the Engineer may adjust the waiting period.

#### **611.13**

On page 489, **Replace** the entire first sentence of the first paragraph.

Have an independent Registered Engineer evaluate the Performance Inspection results and any defects as required by AASHTO [\*LRFD Bridge Construction Specifications\*](#), Section 26 for metal

conduit, Section 27 for concrete conduit, and Section 30 for plastic conduit, with modifications according to this specification.

**611.17**

On page 493, in the first paragraph, **Replace** the last sentence with:

When a pay item calls for conduit to be field paved, all work and materials necessary for the item are included in the contract unit price for each conduit.

**611.17**

On page 493, **Add** the following paragraph after the second paragraph.

All conduits and drainage structures installed without required submittals per 611.04 are considered unacceptable materials per 106.07.

On page 493, **Replace** the third paragraph.

The Department will pay for accepted quantities at the contract prices as follows:

On page 493, **Delete** the following pay structure from the third paragraph.

“After installation of conduit or drainage structure 60%  
After performance inspection is completed 10%”  
After acceptance of the conduit or drainage structure 30%”

**614.03**

On page 499, **Add** the following paragraph after the fourth paragraph

Furnish object markers that are a minimum size of 6 x 12 inches and that consists of reflective sheeting adhered to an aluminum or plastic plate.

**614.08**

On page 502, **Replace** the last sentence in the second paragraph with the following:

The Contractor may, instead of using flaggers, or supplemental to them, furnish, install, maintain and operate a traffic signal or signals, for the purpose of regulating traffic according to a written agreement approved by the Engineer.

**614.08**

On page 502, **Add** the following paragraph after the second paragraph:

The Contractor may (supplemental to using flaggers) furnish, install, maintain and operate automated flagger assistance devices (AFADs) with incidental items, for the purpose of assisting the flagger(s) in regulating traffic according to a written agreement approved by the Engineer. AFADs shall be furnished per the Department’s Approved List and shall be used in accordance with Supplemental Specification 830.

**614.11.G**

On page 506, **Add** the following sentence before the first sentence:

Conflicting markings are considered to be any markings not actively in use, not behind channelizing devices or portable barrier and/or could be misinterpreted by the traveling public or cause confusion to the driver as determined by the engineer.

**615.05**

On page 516, **Replace** the 5<sup>th</sup> paragraph of 615.05 with the following:

Where Class A or Class B pavement is shown on the plans, provide either rigid pavement or flexible pavement conforming to the following minimum requirements:

**MINIMUM COURSE THICKNESS REQUIRED**

<b>Pavement Type</b>	<b>Course Make-Up</b>	<b>Class A</b>	<b>Class B</b>
Rigid	452	9 in (230 mm)	7 in (180 mm)
Flexible	448 Type 1[1]	1-1/4 in (32 mm)	1-1/4 in (32 mm)
	448 Type 2[2][5]	1-3/4 in (45 mm)	1-1/2 in (38 mm)
	302[3][5]	5-1/2 in (140 mm)	3-1/2 in (90 mm)
	304[4][5]	6 in (150 mm)	6 in (150 mm)

[1] Meet surface course requirements. The Contractor may use Type 2 surface.

[2] Meet intermediate course requirements.

[3] The Contractor may use 301 or 448 Type 2 intermediate course.

[4] The Contractor may use 2-1/2 inches (65 mm) 301, 302, or 448 Type 2 intermediate course in lieu of 6 inches (150 mm) of 304.

[5] The Engineer may waive maximum placement lift thicknesses if quality control testing conforming to Supplement 1055 is performed and a final density between 93 and 96.5 percent is achieved.

**625.22**

On page 548, **Replace** the first sentence in the third paragraph with the following:

Foundations for light poles or light towers include excavation, dewatering, sleeving, casing, reinforcing steel, raceways, concrete, backfilling, and when required the 8 foot or 10 foot foundation section of concrete barrier, and the disposal of surplus excavation.

**630.07.B**

On page 560, **Replace** the section with the following:

Use self-aligning aluminum mounting clips, stainless steel T-bolts, stainless steel washers, and stainless steel nylon insert lock nuts, to attach extrusheet signs to sign attachment assemblies, beam or U-channel post supports, and for U-channel post sections used to attach exit number and supplemental panels to extrusheet signs. Use aluminum bolts, washers, lock washers, and nuts to assemble extrusheet signs shipped in two pieces. Tighten nuts and lock nuts using hand tools only. Do not use pneumatic, hydraulic, battery, electric or other power-assisted tools.

**630.14**

On page 561, **Replace** the first paragraph with the following

**Method of Measurement.** The Department will measure Ground Mounted Post Support by the number of feet (meters) measured from the bottom of the support to the top of the support, and will include driving, hardware for anchor base installation, and furnishing and placing of patching materials for excavations in paved areas. The Department will not measure the overlap length of post for the anchor base installation.

**630.14**

On page 561, **Replace** the first sentence in the second paragraph with the following

The Department will measure Foundations for ground mounted pipe supports, ground mounted structural beam supports, rigid overhead sign supports and span wire sign supports by the number of each for one pipe, structural beam, pole, end frame or strain pole, and will include excavation, dewatering, sleeving, casing, reinforcing steel, concrete, backfilling raceways, and when required the 10 foot (3m) foundation section of concrete barrier, and the disposal of surplus excavation.

#### 630.14

On page 562, **Replace** the first paragraph with the following

The Department will measure One Way Support and Street Name Sign Support by the number of feet (meters) measured from the bottom of the support to the top of the support, and will include driving, hardware for anchor base installation, and furnishing and placing of patching materials for excavations in paved areas. The Department will not measure the overlap length of post for the anchor base installation.

#### 632.06

On page 574, **Add** the following sentences at the end of the second paragraph

Before closing serrations, apply a bead of Room-Temperature Vulcanizing (RTV) silicone to all serrated surfaces and then tighten. RTV silicone shall be white to facilitate visual inspection. On heads with dual concentric serrated rings, completely fill the space between the rings with RTV silicone.

#### 632.11

On page 575, **Replace** the last sentence in the second paragraph with the following:

Conform to all applicable state and local nuisance dust regulations, and OAC 3745-17-08 while saw cutting.

#### 632.24

On page 546, **Add** the following paragraph after the 2<sup>nd</sup> paragraph

Furnish each enclosure with at least one padlock. Use padlocks with a bronze or brass lock body and a corrosion protected steel shackle. Obtain the appropriate master key number from the maintaining agency.

#### 632.29

On page 549, **Replace** the 6<sup>th</sup> paragraph with the following:

The Department will measure Power Service by the number of complete units, and will include weatherhead, conduit, fittings, clamps and other necessary hardware, installation of meter base, ground wire connection, and disconnect switch with enclosure and padlock.

#### 632.30

On page 583, **Replace** the first and second Item with the following:

632 Each Vehicular Signal Head, (Yellow or Black), (Aluminum or Polycarbonate), \_\_\_-  
Section \_\_\_ inch (\_\_\_ mm) Lens \_\_\_-Way (with Backplate)

632 Each Vehicular Signal Head, Optically Programmed, (Yellow or Black), (Aluminum or Polycarbonate), \_\_\_-Section, \_\_\_ inch (\_\_\_ mm) Lens, \_\_\_-Way (with Backplate)

**632 .30**

On page 564, **Replace** this individual item description with the following:

632 Each Pedestrian Signal Head, (Aluminum or Polycarbonate) (Countdown), Type \_\_\_

**644.04**

On page 617, **Replace** the second sentence in the first paragraph with the following:

However, if applying thermoplastic to pavements that are older than six months, ensure that both the pavement surface and the ambient air temperature at the time of application are not less than 70 °F (21 °C) and rising.

**648.05**

On page 630, **Replace** the second sentence in the first paragraph with the following:

However, if applying spray thermoplastic to pavements that are older than six months, ensure that both the pavement surface and the ambient air temperature at the time of application are not less than 70 °F (21 °C) and rising.

**659.01**

On page 638, **Replace** paragraphs one through four with the following:

**659.01 Description.** This work consists of placing topsoil, preparing the seed bed, and placing and incorporating seed, agricultural lime, commercial fertilizer, and placing mulching material used to achieve NPDES final stabilization.

Perform this work in areas shown on the plans for seeding and mulching.

Perform seeding and mulching after completing all work in the area and within 7 days of obtaining final grade. If it is anticipated that future work may disturb an area, place temporary NPDES compliant Best Management Practices as needed until final stabilization measures under this item can be installed. If the Contractor disturbs a final area, then the Contractor shall restore this area. With the Engineer's approval, the Contractor may apply permanent seed between October 30 and March 1 on projects started and completed within the same calendar year.

**702.01**

On page 696, **Replace** the entire section **702.01 Asphalt Binders** with the following:

**702.01 Asphalt Binders.**

General. According to AASHTO M 320-10 Table 1 except as follows.

Ensure PG 70-22M, PG 76-22M, PG 88-22M, and PG 64-28 meet the requirements of Table 702.01-1.

An independent laboratory will not be owned or operated, in whole or part, by the binder supplier, Contractor, or affiliates of either.

Materials and Manufacture. Replace the requirements of AASHTO M 320-10 Table 1 Section 5 "Materials and Manufacture" Section with the following:

5.1 Supply PG Binder from the refining of crude petroleum, or combination of asphalt binders from the refining of crude petroleum, or asphalt binders and suitable liquid from the refining of crude petroleum, and possible organic modifiers for performance enhancement. Material from the

crude refining stream is considered neat. Liquid from crude refining may be used for adjustments, but do not use liquid from crude refining for the purpose of substitution of crude refined asphalt binder in a PG Binder. In the event of a failure investigation where asphalt binders exhibit unusual properties a supplier may be requested by the Laboratory to supply information about the makeup of a PG Binder. Failure to cooperate will mean removal from Supplement 1032 certification.

5.2 A modifier may be any approved material of suitable manufacture that is proven compatible with asphalt binder (does not separate appreciably in routine storage), and that is dissolved or reacted in asphalt binder to improve its performance. Performance enhancement is defined as a decrease in the temperature susceptibility of the asphalt binder while maintaining or improving desirable properties in a neat asphalt binder such as coat ability, adhesiveness and cohesiveness. Unless otherwise noted limit modifiers to no more than 6.0 percent by PG Binder weight.

5.3 The use of previously used materials in a PG Binder must be approved by the Department. Since no standard test procedures exist for reprocessed materials (and original tests were not developed with the use of such materials in mind), appropriate test methods may be chosen by the Department for review. Department approval does not relieve the binder supplier from full responsibility for content and use of any previously used material in a PG Binder nor guarantee suitable performance enhancement as defined above. The detected presence in a PG Binder sample of any unapproved previously used material will mean immediate removal from Supplement 1032 certification. Limit approved reprocessed materials to 6.0 percent by PG Binder weight.

5.4 Ensure the PG Binder is homogeneous, free from water and deleterious materials, and does not foam when heated to 350 °F (175 °C). Prove the asphalt binder (before modification or after modification if liquid modifier used) is fully compatible with a negative result by means of the Spot Test per AASHTO T 102 using standard naphtha solvent. If standard naphtha shows a positive result, a retest using reagent grade 35 percent Xylene/ 65 percent Heptane (volume) may be used.

5.5 Ensure the PG Binder is at least 99.0 percent soluble as determined by AASHTO T44. Ensure any insoluble component is free of fibers or discrete particles more than 75 µm.

5.6 Ensure flash point is 500 °F (260 °C) minimum. Ensure mass change on RTFO of the final PG Binder grade is 0.5 percent maximum.

5.7 Ensure that PG 64-22 has a Penetration (AASHTO T49) of no more than 75.

5.8 Direct Tension testing is not required, unless otherwise required in this specification.

**Requirements for PG Modified Binder.** Furnish PG Modified Binder according to the requirements of Table 702.01-1 by modifying a non-oxidized, non-air blown, neat asphalt binder by using a styrene butadiene latex rubber compound (SBR polymer), a styrene butadiene styrene polymer block copolymer (SB, SBS polymer), an ethylene/ nbutyl acrylate/ glycidyl methacrylate copolymer (Elvaloy) as specified or Ground Tire Rubber (GTR) according to Supplemental Specification 887. For SB, SBS products the polymer supplier will certify to the refiner and Contractor that the polymer used meets a minimum 68 percent by weight butadiene content. Perform SB, SBS, Elvaloy or GTR modification prior to shipment to the asphalt concrete mixing plant (pre-blend). Perform SBR modification at the asphalt concrete mixing plant (post-blend) or prior to shipment to the asphalt concrete mixing plant (pre-blend) where allowed by specification.

Polyphosphoric acid (PPA) is allowed in PG binders as follows. PPA is a polymer of orthophosphoric acid. When using PPA ensure all the applicable requirements of the required PG binder in Table 702.01-1 are met. Ensure PPA does not contain water. To retain Supplement 1032 certification suppliers of PPA modified asphalt will provide a written certification to OMM that the



amount of PPA used is less than 1.0% by weight of neat binder. Suppliers of PPA can have their Supplement 1032 certification removed for not following the above PPA requirements.

For each project, the PG Modified Binder supplier will give the Contractor a handling guide specifying temperature, circulation, shelf life, and other requirements for assuring the PG Modified Binder will perform as desired. Give this handling guide to the Monitoring Team and place a copy in the plant control room and plant laboratory.

If PG Modified Binder is retained at the asphalt concrete mixing plant for more than two weeks before use or beyond the supplier recommended shelf life, whichever is less, a top and bottom sample test (material property difference between samples taken from the top and bottom of the storage tank) will be performed by the Laboratory on samples retrieved by the Contractor at the District's direction. Do not use material on hand until approved.

**Table 702.01-1  
Material Requirements for PG Modified Binder**

Test / Requirement	SBR Polymer		Pre Blended Binder				Note
	70-22M (a, b)	64-28 (b)	64-28 (a)	70-22M (a,k)	76-22M (a,k)	88-22M (a,l)	
Final PG Binder Grade							c
Actual Pass Temperatures	Report						i
RTFO Mass Change, percent max	0.5						d
Phase Angle, max	78		80	76			d
Elastic Recovery, min			65	75	90		e, d
Toughness, in. lb	125	105					f, d
Tenacity, in lb.	70	80					f, d
Elongation, in. min	20	20					f, d
Ductility, in. min	28	28					j, d
Separation, F max	10						g, d
Homogeneity			None Visible				h, d

a. Pre-blended Binder. Use a base neat asphalt binder that is a -22 grade for 70-22M and 76-22M. Use a base neat asphalt binder that is a -28 grade for 64-28. 64-28 can be neat, PPA modified or modified with SB, SBS or Elvaloy. Ensure SB, SBS or Elvaloy modified 64-28 meets all requirements listed. Rotational viscosity for 88-22 not required.

b. Post-blended Binder made from neat Supplement 1032 certified or preapproved standard PG Binder grade and SBR solids amount equal to or above 3.5 percent by weight of total binder to achieve the PG Binder grade. Ensure all listed properties are met.

c. Without Direct Tension, graded with actual pass temperatures

d. PG Modified Binder

e. AASHTO T301, 10cm @ 77 °F (25 °C), hold 5 min. before cutting, on RTFO material for SB, SBS, Elvaloy

f. ASTM D 5801, 50cm/min @ 77 °F (25 °C)

g. Softening point difference of top and bottom of tube sample conditioned at 340 °F (171 °C) for 48 hours. Compatibility of polymer and neat binder is sole responsibility of supplier. Formulate PG Modified Binder to retain dispersion for 3 days minimum.

h. Heat a minimum 400 gram sample at 350 °F (177 °C) for 2.5-3 hours. Pour entire sample over a hot No 50 (300 µm) sieve at 340°F (171 °C). Look for retained polymer lumps.

- i. Actual high and low temperature achieved by PG Modified Binder beyond required grade, but will not grade out to the next standard PG Binder grade for low temperature.
- j. AASHTO T51, @ 39 °F (4 °C), 1 cm/min
- k. SB, SBS, Elvaloy or Supplemental Specification 887 GTR
- l. SB, SBS, Elvaloy

#### **706.02**

On page 742, **Replace** part 6.2.4 with the following:

6.2.4 Ensure that no more than two holes are cast, drilled, or otherwise neatly made in the shell of each piece of pipe for the purpose of handling or laying. Taper the holes unless drilled, and before backfilling, fill the tapered holes with portland cement mortar, precast concrete plugs secured with portland cement mortar, or a device on the Department's approved list specifically designed for filling the hole. Fill drilled holes with portland cement mortar.

#### **706.04**

On page 749, **Replace** part 10 with the following:

10 Ensure that no more than two holes are cast, drilled, or otherwise neatly made in the shell of each piece of pipe for the purpose of handling or laying. Taper the holes unless drilled, and before backfilling, fill the tapered holes with portland cement mortar, precast concrete plugs secured with portland cement mortar, or a device on the Department's approved list specifically designed for filling the hole. Fill drilled holes with portland cement mortar.

#### **706.05:**

On page 752, **Replace** the first paragraph with the following:

7.1 For the following box sizes, span by rise, refer to ASTM C1577: 8x4, 5, 6, 7; 10x5, 6, 7, 8, 9; and 12x4, 6, 8, 10 feet. For the following box sizes, span by rise, refer to SS940: 14x4, 5, 6, 7, 8, 9, 10; 16x4, 5, 6, 7, 8, 9, 10; 18x4, 5, 6, 7, 8, 9, 10; and 20x4, 5, 6, 7, 8, 9, 10 feet.

#### **706.051**

On page 752, **Revise** the 4th paragraph of 706.051 as follows:

Ensure that the manufacturer submits design calculations, a structural load rating and shop drawings according to 611.04. Ensure that the shop drawings include the following:

#### **706.052**

On page 757, **Revise** the 4th paragraph of 706.052 as follows:

5. Ensure the manufacturer submits design calculations, a structural load rating and shop drawings according to 611.04. Ensure the shop drawings include the following:

#### **706.053**

On page 761, **Revise** the 4th paragraph of 706.053 as follows:

5. Ensure the manufacturer submits design calculations, a structural load rating and shop drawings according to 611.04. Ensure the shop drawings include the following:

#### **706.13**

On page 767, **Replace** part 7 with the following:

7.0 Ensure that no more than two holes are cast, drilled, or otherwise neatly made in the shell of each piece of each riser section for the purpose of handling or laying. Taper the holes unless drilled, and before backfilling fill the tapered holes with portland cement mortar, precast concrete plugs secured with portland cement mortar, or a device on the Department's approved list specifically designed for filling the hole. Fill drilled holes with portland cement mortar.

**708.01**

On page 784, **Revise** the second paragraph to:

5.1 A green colorant approximately No. 34159 of FS 595C.

**708.02.B.1.f**

On page 785, **Revise** sentence in **f. Color** to:

Greenish gray, approximating **FS-595C-34159**, visual comparison.

**708.02.C.1.f**

On page 785, **Revise** sentence in **a. Color** to:

White, meeting or exceeding, **FS-595C-37875** according to **ASTM E 1347**.

**708.02.D.1.a**

On page 786, **Revise** sentence in **a. Finish, Specular gloss, ASTM D 523** to:

Use Fed. Std. 595C-16440 Gray: 70 % minimum after 3000 hours weathering resistance. Color change less than 2.0  $\Delta E^*$ , (C.I.E 1976  $L^*a^*b^*$ ) ASTM D2244.

**708.02.D.1.f.(1)**

On page 786, **Revise** the table in **f. Colors** to:

( 1) **Specified.**<sup>[2]</sup>

Brown	FS-595C, 10324
Green	FS-595C, 14277
Blue	FS-595C, 15526
<sup>[2]</sup> Contractor's choice unless specified on plans	

**712.14**

On page 815, **Add** the entire section **712.14 Detectable Warning Devices** as follows:

**712.14 Detectable Warning Devices** Furnish materials conforming to the following requirements:

Products must be compliant with the Americans with Disabilities Act (ADA).

Products will be designed to be physically embedded into concrete and be of a color that visually contrasts with the concrete. Do not use black as a color.

Products may be manufactured from materials of cast iron, stainless steel, polymer concrete, reinforced polymer composite, or granite. Products may be designed as either one time installation products or replaceable products.

Surface applied, stamped concrete, concrete, and brick products will not be permitted.

Detectable Warning Devices will be provided with a minimum 5 year written warranty with at least the following:

1. The installed device will remain ADA compliant for the term of the warranty period.
2. During the warranty period at least 85% of the truncated domes on installed device will remain entirely intact.

3. The installed device will remain securely affixed to and flush with the concrete substrate.
4. Any surface coating applied to the installed product will remain in place and color fast.
5. At no cost to the Department, the manufacturer will replace the product, including all installation costs, if during the 5 year warranty period the product fails to comply with the above warranty requirements. Any new device installed under the warranty will meet the requirements of this specification

As part of the Department Acceptance process for inclusion on the Qualified Product's List (QPL) submit the proposed warranty to the Department along with material samples, dimensional drawings, and written installation procedures.

Upon acceptance by the Department the materials will be listed on the QPL  
Furnish materials according to the Department's Qualified Product List (QPL)

Begin warranty period upon Contract acceptance.

At the preconstruction meeting provide the Engineer with the written warranty signed by the executive officer of the manufacturing company

#### 725.11.C

On page 777, **Delete** the following sentence from the second paragraph:

If the ballast is to be wired line to grounded neutral or phase to grounded neutral, the ballast may be either the isolated primary winding design or the auto transformer design.

#### 730.14

On page 838, **Replace** the entire section with the following

Furnish sand castings according to ASTM B 26/B 26M, 356-T6 or T7. Furnish self-aligning aluminum extrusheet sign mounting clips with manufacturer identification mark conspicuously incorporated in relief on the top surface of the casting, and in accordance with Supplemental Specification 992. Furnish permanent mold castings according to ASTM B 108, 356-T6 or T7. Furnish certified material according to Supplement 1092 or 1093.

#### 732.01

On page 843, **Add** the following sentence after the sixth sentence in the third paragraph of the section:

Tri-studs shall be secured to the head using stainless steel nylon-insert or distorted thread locknuts.

#### 732.01

On page 843, **Add** the following sentence after the third paragraph of the section:

For polycarbonate signal heads, obtain proper exterior colors by use of colored plastic rather than painting.

#### 732.11

On page 853, **Add** the following sentences at the end of the first paragraph:

A rectangular, rounded-corner aluminum Pole Identification Tag with minimum dimensions of 1 x 3 x 0.040 inches shall be attached to the pole at a height of 6 inches above the base plate. The Pole Identification Tag shall be clearly and deeply stamped with the ODOT Standard Construction Drawing Number, Design Number, and the fabrication date of the pole (e.g., TC-81.21, DES. 12, 05-12) in characters with a minimum height of 3/8 in. Attach to the pole with four stainless steel 3/16 inch rivets.

### 732.11

On page 853, **Replace** the last sentence in the third paragraph with the following:  
Weld according to 513.21

### 732.12

On page 854, **Add** the following sentences at the end of the first paragraph:  
A rectangular, rounded-corner aluminum Pole Identification Tag with minimum dimensions of 1 x 3 x 0.040 inches shall be attached to the pole at a height of 6 inches above the base plate. The Pole Identification Tag shall be clearly and deeply stamped with the ODOT Standard Construction Drawing Number, Design Number, and the fabrication date of the pole (e.g., TC-81.21, DES. 12, 05-12) in characters with a minimum height of 3/8 in. Attach to the pole with four stainless steel 3/16 inch rivets.

### 733.03

On page 862, **Add** the following paragraph after the fifth paragraph:  
Any fasteners (rivets, bolts, etc.) that penetrate the cabinet exterior shall be tack-welded or brazed on the inside surface to prevent punch-thru if the fastener head is ground off from the outside. The preferred method of cabinet construction uses no such fasteners, but internal welds only.

#### 733.03.A.2.i

On page 867, **Replace** the third sentence in the section with the following:  
Wire a second non-GFCI convenience outlet, not fed thru the UPS system (if used).

#### 733.03.B.1.i

On page 871, **Replace** the second sentence in the section with the following:  
Furnish a pushbutton with a 5-foot (1.5 m) cord, and panel connector, not hard wired, unless a strain-relieving panel feed-thru bushing is provided.

#### 733.03.B.1.k

On page 871, **Replace** the third sentence in the section with the following:  
This relay shall maintain output equal to or exceeding the requirements of the cabinet main overcurrent protective device over the NEMA TS-2 Environmental Operating Range of -30 to +165 degrees Fahrenheit.

#### 733.03.C.4.a

On page 874, **Add** the following sentence after the first paragraph:  
Flash Transfer Relays shall use AC coils only; the use of a series rectifier in combination with a DC coil is prohibited.

#### 733.03.C.4.b

On page 874, **Replace** the section in its entirety with the following:  
Furnish a rack mounted detector test panel with test switches. Test switches shall call vehicle phases 1-8, pedestrian phases 2,4,6,8 and EVPE channels A,B,C,D as defined in the published ODOT Plan Insert Sheet for default 332/336 cabinet input file assignments. Furnish switches with three position “on/off/momentary on” switches.

### 733.03.E.1

On page 884, **Replace** the section in its entirety with the following:

**1. General.** Furnish Model 336 cabinets that meet the basic cabinet specifications “Traffic Signal Control Equipment Specifications”, California Department of Transportation, latest edition. Ensure that the manufacturer of these Model 336 cabinets is listed on the ODOT QPL.

### 733.09.A

On page 891, **Replace** the second paragraph in its entirety with the following:

Ensure the UPS cabinet has a mastic tape, neoprene foam, or silicone weather-resistant seal between the cabinet bottom flange and the concrete foundation. Minimum tape thickness shall be 1/8-inch (3 mm) and the tape shall be continuous with no gaps between tape pieces or between cabinet and foundation. Sealing tape shall completely cover the bottom cabinet flange and shall be rated for a temperature range of at least -30 °F to +140° F.

### 733.03.D

On page 884 **Add** the following subsection:

#### **D. Type 334.**

**1. General.** Furnish Model 334C cabinets that meet the specifications “Traffic Signal Control Equipment Specifications” and “Transportation Electrical Equipment Specifications”, California Department of Transportation. Ensure that the manufacturer of the cabinets is listed on the CalTrans QPL at the time of the project award.

**2. Cabinets.** Furnish cabinets that are constructed of aluminum and are supplied unpainted. An anodic coating is not required. Supply galvanized anchor bolts with nuts and washers with each cabinet. Furnish 3/4-inch (19 mm) diameter by 16 inches (0.4 m) minimum length anchor bolts with an “L” bend on the unthreaded end.

**3. Terminals and Wiring.** Ensure that the vehicle detector field wiring inputs connect to side mounted terminal blocks. Install terminal blocks and associated wiring to the input file. Label the field wiring terminals of the side mounted terminal block by a permanent screening process to identify the input panel (I), the input file slot number (1 through 14) and the channel terminal (D, E, J, or K). An example is “I4-E”. Ensure that all terminals on these detector blocks are accessible without removing equipment from the EIA mounting rack.

#### **4. Accessories.**

a. Fully equip the cabinets with two channel loop detector sensors, transfer relay, power supply, conflict monitor and switchpacks. When ramp meter warning signs with flashers are used, include a NEMA or Caltrans type flasher wired for control from the controller.

b. Furnish a police panel in each cabinet with the Caltrans required switches. No pushbutton with cord is provided.

c. Furnish an aluminum shelf with integral storage compartment in the rack below the controller. Ensure that the storage compartment has telescoping drawer guides for full extension. Ensure that the compartment top has a non-slip plastic laminate attached.

d. Ensure that each cabinet has two fluorescent lights installed at the top of the cabinet, one near each door. Wire the lights to the door switches such that opening either door will turn on both lights.

**5. Lightning/Surge Protection.** Comply with the requirements of 733.03.C.5.

**6. Conflict Monitor.** Furnish a Model 208 conflict monitor unit.

Furnish 334 cabinet according to the Department's Qualified Products List (QPL).

**740.09**

On page 853 **Replace** the entire section with the following:

**740.09 Glass Beads.**

Furnish certified test data for the arsenic and lead content of all glass bead samples sent to the Department for testing to ensure that all glass beads furnished to the Department contain no more than 200 parts per million of arsenic or lead as determined in accordance with Environmental Protection Agency testing methods 3052, 6010B, or 6010C, according to SEC 1504 STANDARDS. Section 109 of title 23, United States Code, (r) Pavement Markings.

**A. Type A.** Furnish Type A glass beads for traffic paint conforming to Supplement 1008 and to AASHTO M 247, Type 1 without flotation properties but dual coated (for moisture resistance and adhesion), with the following exception: 4.6 Flotation Test.

Ensure that the glass beads for traffic paint are packaged in bags designated "740.02". Use materials certified according to Supplement 1089.

**B. Type B.** Furnish Type B glass beads for polyester marking material conforming to Supplement 1008 and AASHTO M 247, Type 1 with  $50 \pm 5$  percent flotation coating and ensure that a  $50 \pm 5$  percent moisture resistant coating is retained on each sieve, with the following exception: 4.6 Flotation Test. Ensure that the minimum percent floating equals 90 of flotation coated beads or 40.5 percent of total mixture.

Ensure that the glass beads for polyester marking material are packaged in bags designated "POLY".

Use materials certified according to Supplement 1089.

**C. Type C.** Furnish Type C glass beads for thermoplastic material conforming to Supplement 1008 and meeting the following specification.

Sieve Size	Percent Retained		
No. 16 (1.18 mm)	3 maximum	<b>Refractive Index</b>	1.50 to 1.60
No. 20 (850 $\mu$ m)	5 to 20	<b>Roundness</b>	80 minimum
No. 40 (425 $\mu$ m)	65 to 95	<b>Coating</b>	Moisture resistant (for drop-on beads only)
No. 50 (300 $\mu$ m)	0 to 5		

Ensure the glass bead packaging is clearly marked "THERMO"

Use materials certified according to Supplement 1089.

**D. Type D.** Furnish Type D glass beads for Epoxy Pavement Marking conforming to Supplement 1008.

Ensure that the glass bead packaging clearly indicates EPOXY - SIZE I or EPOXY SIZE II.

Ensure that the glass beads have the following gradation when tested according to Supplement 1089.

SIZE I		SIZE II	
Sieve Size	Percent Retained	Sieve Size	Percent Retained
No. 10 (2.00 mm)	0	No. 20 (850 µm)	0 to 5
No. 12 (1.70 mm)	0 to 5	No. 30 (600 µm)	5 to 20
No. 14 (1.40 mm)	5 to 20	No. 50 (300 µm)	30 to 75
No. 16 (1.18 mm)	40 to 80	No. 80 (180 µm)	9 to 32
No. 18 (1.00 mm)	10 to 40	No. 100 (150 µm)	0 to 5
No. 20 (850 µm)	0 to 5	Pan	0 to 2
Pan	0 to 2		

**Reflective Media:** Ensure that the glass beads are smooth, clear, free from any air inclusions, and scratches that might affect their functions as a retro-reflective media, and that have the characteristics listed below.

**Roundness (Percent by Weight):** Ensure that not more than 20 percent of the glass beads are irregular or fused spheroids and that at least 80 percent of the beads are true beads.

**Index of Refraction:** Ensure that the refractive index of the beads is a minimum of 1.50 as determined by the liquid immersion method at 77 °F (25 °C). Ensure that the silica content of glass beads is not less than 60 percent.

**Coating:** Furnish Size I glass beads that are coated with a silane-type adherence coating to enhance its embedment in, and adherence to the applied binder film. Ensure that the coated beads emit a yellow-green fluorescence when tested by the Dansyl Chloride test procedure. Furnish Size II glass beads that are treated with a moisture-proof coating. Ensure that both types of glass beads show no tendency to absorb moisture in storage and remain free of clusters and lumps. Ensure that they flow freely from the dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations.

Determine the moisture-resistance of the glass beads on the basis of the following test:

Place 2.2 pounds (1 kg) of beads in a washed cotton bag, having a thread count of 50 per square inch (8/cm<sup>2</sup>) (warp and woof) and immerse the bag in a container of water for 30 seconds. Remove the bag and force the excess water from the sample by squeezing the bag. Suspend and allow them to drain for two hours at room temperature 70 to 72 °F (21 to 22 °C). After draining, mix the sample in the bag by shaking thoroughly. Transfer a sample slowly to a clean, dry glass funnel having a stem 4 inches (100 mm) in length, with a 3/8-inch (10 mm) inside diameter stem entrance opening, and a minimum exit opening of 1/4 inches (6 mm). Ensure that the entire sample flows freely through the funnel without stoppage. When first introduced to the funnel, if the beads clog, it is permissible to tap the funnel to initiate flow.

Use materials certified according to Supplement 1089.



**STATE OF OHIO  
DEPARTMENT OF TRANSPORTATION**

**SUPPLEMENTAL SPECIFICATION 832  
TEMPORARY SEDIMENT AND EROSION CONTROL**

**January 17, 2014**

- 832.01 Description**
- 832.02 Definitions**
- 832.03 SCD References**
- 832.04 Requirements and Provisions**
- 832.05 Locate and Furnish BMP**
- 832.06 Causeways and Access Fills (Stream and River Crossings and Fills)**
- 832.07 Causeway and Access Fills Construction and Payment**
- 832.08 Maintenance**
- 832.09 Storm Water Pollution Prevention Plan**
- 832.10 SWPPP Acceptance**
- 832.11 Inspections and SWPPP Updates**
- 832.12 Compensation**
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- 832.14 Basis of Payment**

**832.01 Description.** This work consists of locating, furnishing, installing, and maintaining temporary sediment and erosion control Best Management Practices (BMP) for earth disturbing activity areas, developing a Storm Water Pollution Prevention Plan, and filing a Co-Permittee form as required. Furnish a Storm Water Pollution Prevention Plan if required prior to any earth disturbing activity. Furnish and install temporary sediment and erosion control best management practices in compliance with all NPDES and surface water permits. Amend the Storm Water Pollution Prevention Plan in accordance with the OEPA NPDES Permit. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, State, or local agencies, adhere to the more restrictive laws, rules, or regulations.

**832.02 Definitions**

**BMP.** Temporary sediment and erosion control best management practices designed and installed by methods compliant with the Ohio NPDES Permit (Appendix E of this specification Part III. G. 2.), by this specification and location shown on the SWPPP. .

**C&MS.** Construction and Material Specifications of the Ohio Department of Transportation dated as shown on the plans.

**CECI.** Contractor's Erosion Control Inspector. Must have active CESSWI or CPESC certification.

**CESSWI.** Certified Erosion, Sediment, and Storm Water Inspector sponsored by the Soil and Water Conservation Society and International Erosion Control Association. Information on certified individuals is available at [www.cesswi.org](http://www.cesswi.org).

**CPESC.** Certified Professional in Erosion and Sediment Control as sponsored by the Soil and Water Conservation Society and International Erosion Control Association. Information on certified individuals is available at [www.cpesc.net](http://www.cpesc.net).

**Co-Permittee.** A requirement of OEPA NPDES Permit (Appendix E of this specification, Part I. F. Notice of Intent Requirements).

**EDA.** Earth Disturbing Activity is any activity that exposes bare ground or an erodible material to storm water, including any “Disturbance” as defined in OEPA NPDES Permit, Part VII, Definition H.

**Contractor EDA.** Any EDA that is not shown on the plans as part of the project. EDA not shown on the plans and occurring within the project limits is also Contractor EDA.

**Project EDA.** Any EDA that is shown on the plans as part of the project.

**Total EDA.** Combined Project EDA and Contractor EDA.

**EPA.** Environmental Protection Agency.

**Isolated Wetland Permit.** Ohio EPA permit allowing the discharge of fill material into an isolated wetland.

**NOI.** Notice of Intent.

**NOT.** Notice of Termination.

**NPDES.** National Pollutant Discharge Elimination System.

**OEPA.** Ohio Environmental Protection Agency.

**OEPA NPDES Permit.** Ohio EPA Storm Water Construction General Permit (OHC 000004) Appendix E of this specification.

**OES.** Office of Environmental Services-ODOT.

**OHWM.** The line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas or defined in accordance with the most current version of 33 CFR 328.

**Operator.** As defined in OEPA NPDES Permit ( Appendix E of this specification, Part VII. Definitions, Q.)

**OWPCA.** Ohio Water Pollution Control Act (Ohio Revised Code 6111.01 et seq.).

**PCN.** Pre-Construction Notification for 404 permit.

**SCD.** Standard Construction Drawing.

**SWPPP.** Storm Water Pollution Prevention Plan.

**USACE.** United States Army Corps of Engineers.

**404 Permit.** USACE permit authorizing discharge of fill material into Waters of the US, per Section 404 of the Clean Water Act.

**401 Water Quality Certification (401 WQC).** Ohio EPA permit authorizing discharge of fill material, per Section 401 of the Clean Water Act.

**Waters of the United States.** Defined in Code of Federal Regulations, 33 CFR Part 328.

**832.03 SCD References.** Construct the following features according to the SCDs as listed on the plan title sheet.

Construction Fence .....	DM-4.3
Dikes .....	DM-4.3
Filter Fabric Ditch Check .....	DM-4.4
Inlet Protection.....	DM-4.4
Perimeter Filter Fabric Fence .....	DM-4.4
Rock Channel Protection Type C or D with/without Filter .....	DM-4.3/4.4
Sediment Basins and Dams .....	DM-4.3
Slope Drains.....	DM-4.3
Construction Entrance (Type 1 Driveway).....	BP 4.1

**832.04 Requirements and Provisions.** Furnish a SWPPP to represent compliance with OEPA NPDES Permit (See Appendix E), related rules, specifications, SCD, and permits. The Department will furnish the Contractor a copy of the NOI and the OEPA approval letter at or before the Pre-Construction meeting.

Locate, furnish, install, and maintain temporary sediment and erosion control Best Management Practices (BMP) that are compliant with the Clean Water Act (33 USC Section 1251 et seq.), the OWPCA, the 404 permit, the 401 WQC, the Isolated Wetland Permit, local government agency requirements, specifications, SCD, and other related rules and permits.

File a Co-Permittee form when the project requires a Notice of Intent (NOI) to the Ohio EPA.. Information about the Co-Permittee form can be found at [http://epa.ohio.gov/Portals/35/storm/StormWater\\_Co-Permittee\\_NOI.pdf](http://epa.ohio.gov/Portals/35/storm/StormWater_Co-Permittee_NOI.pdf) For a copy of the Co-Permittee form see Appendix D. When a co-permittee form is required, furnish the Department with a copy of the OEPA Co-permittee NOI approval letter at or before the Pre-Construction meeting.

Post Construction controls described in Appendix E (Part III.G.2.e) are not temporary erosion control features. Construction requirements and compensation for post construction controls are

detailed in the project plans. Provide protective measures that ensures sediment, debris and any contamination will not enter the Post Construction controls. All costs associated with these protective measures are included in the compensation for post construction controls.

The following provisions survive the completion and/or termination of the contract.

**Provision 1.** If a governmental agency or a local governmental authority finds a violation of the above noted requirements, or that the BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely, full responsibility is borne by the Contractor to make all corrections.

**Provision 2.** If a governmental agency or a local governmental authority furnishes an assessment, damage judgment or finding, fine, penalty, or expense for a violation of the above noted requirements, or that the BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely, the Contractor will reimburse the Department within 10 Calendar Days of the amount for any of the above. The Department may withhold the amount of money requested for the above from the Contractor's next pay estimate and deliver that sum to the governmental agency or local governmental authority issuing the assessment, damage judgment or finding, fine, penalty or expense.

**Provision 3.** The Contractor agrees to indemnify and hold harmless the Department, and will reimburse the Department for any assessments, damage judgment or finding, fine, penalty, or expense as a result of the failure of performing this portion of the Contract. The Department may withhold the amount of any assessments, damage judgment or finding, fine, penalty or expense from the Contractor's next pay estimate.

**Provision 4.** If a governmental agency or a local governmental authority furnishes a stop work order for any of the following: a violation of the above noted requirements; BMP are incomplete; SWPPP is incomplete; implementation of the SWPPP is not being performed correctly or completely, the Department will find the Contractor in default.

**Provision 5.** If the Department or any government regulatory agency finds a violation of the above noted requirements, or that the BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely, the Contractor shall correct and mitigate the conditions within 48 hours of notification by the Department or regulatory agency. Failure to correct non-compliant site conditions may result in the Department suspending work for the entire project until the corrections are performed. Repeated non-compliance with the SWPPP or failure to regularly update the SWPPP as needed to match the site conditions may result in removal of the Contractors Superintendent in accordance with C&MS 108.05.

**EDA Requirements.** Furnish appropriate BMP for all EDA. Unless otherwise indicated, BMP will be compensated provided that the BMP are designed, installed and maintained appropriately. For projects that do not require a SWPPP as indicated in the table below, furnish a written plan for acceptance by the Engineer that identifies the location, extent and purpose of the BMP proposed. Compensation will not be provided for the written plan.

An estimated amount is established in the proposal for BMP to be used for project EDA and estimated Contractor EDA as outlined below:

**Scenarios for Routine Maintenance Projects**  
(as identified on the Plan Title Sheet)

Project EDA (acres)	Estimated Contractor EDA (acres) <sup>[1]</sup>		
	EDA = 0	0 < EDA < 1	1 ≤ EDA < 5
EDA = 0	A	B	C
0 < EDA < 5	B	B	C

**Scenarios for Non Routine Maintenance Projects**

Project EDA (acres)	Estimated Contractor EDA (acres) <sup>[1]</sup>		
	EDA = 0	0 < EDA < 1	EDA ≥ 1
EDA = 0	A	B	D
0 < EDA < 1	E	<sup>[2]</sup>	F
EDA ≥ 1	F	F	F

- [1] If the actual Contractor EDA in the SWPPP exceeds the estimated Contractor EDA on the Title Sheet resulting in a Total EDA > 1 acre (0.4 ha), use Scenario D.
- [2] If project EDA and estimated Contractor EDA are less than 1 acre (0.4 ha), use Scenario E. If Project EDA and Estimated Contractor EDA are greater than 1 acre (0.4 ha), use Scenario F. If the actual Contractor EDA exceeds the estimated Contractor EDA and results in the Total EDA exceeding 1 acre (0.4 ha), use Scenario D.

Scenario A:	No requirements for SWPPP, NOI and NOT.
Scenario B:	Furnish BMP for Contractor EDA. No SWPPP, NOI or NOT are required. BMP used for Contractor EDA will not be compensated.
Scenario C:	Furnish a BMP, SWPPP, NOI, and NOT for Contractor EDA only. BMP used for Contractor EDA, SWPPP, NOI and NOT will not be compensated.
Scenario D:	Furnish a NOI, SWPPP with BMP, and a NOT for all EDA areas. The NOI, SWPPP, BMP, and the NOT will not be compensated.
Scenario E:	Furnish BMP for all EDA. No SWPPP, NOI or NOT are required. BMP used for the Project EDA will be compensated.
Scenario F:	Furnish a SWPPP with BMP for all EDA areas and file a Co-Permittee form. The SWPPP and these BMP will be compensated. The Department will furnish a NOI and NOT.

**832.05 Locate and Furnish BMP.** Locate and furnish the BMP in accordance with the OEPA NPDES Permit and the SWPPP.

The Department may accept other materials or alternative controls as BMP provided the Contractor submits a written proposal for the alternatives to the Engineer. Alternative controls, upon acceptance by the Engineer, will be compensated per unit price for the BMP as shown in Appendix F.

Furnish filter fabric ditch checks, inlet protection, perimeter filter fabric fence, sediment basins and dams, dikes, slope drains, construction entrances, erosion control mat and rock channel protection materials as specified on the SCD.

**A. Perimeter Controls.** Use perimeter filter fabric fence to capture construction related sediment carried in sheet flow runoff. Restrict the use of perimeter filter fabric fence to the extent allowed in the OEPA NPDES Permit.

Use dikes to divert and control surface water and sediment flow to prevent discharge of construction related sediment from the project.

Install perimeter filter fabric fence and dikes before any clearing and grubbing operations.

Ensure that the ponding of water behind the perimeter filter fabric fence or dike will not damage property or threaten human health and safety.

**B. Inlet Protection.** Construct the inlet protection for existing inlets at the beginning of construction and for new inlets immediately after completing the sump. Ensure that the ponding of water behind the inlet will not damage property or threaten human health and safety.

**C. Construction Seeding and Mulching.** Furnish commercial fertilizer, seed, and mulch materials conforming to C&MS Item 659. Apply seed and straw mulch materials according to C&MS Item 659 as modified below.

Apply straw mulch at a rate of 3 tons per acre (0.7 metric ton/1000 m<sup>2</sup>). Seed and mulch during construction. This BMP may only be installed after March 15 and before October 15. Use wood fiber or compost mulch only with concurrence of the Department. Fertilize construction seeding areas at one-half the application rate specified in C&MS Item 659. If project conditions prevent fertilizing the soil and preparing the seed bed, then the fertilizing and preparation requirements of C&MS Item 659 may be waived. Do not place construction seed or fertilizer on frozen ground. Apply seed for this BMP at the rates shown below:

Seed Mixture		Number of Bales
Fawn Tall Fescue	3.0 lb/1000 ft <sup>2</sup> (15 kg/1000 m <sup>2</sup> )	2 / 1000 ft <sup>2</sup> (0.01 ha)
	and	
Annual Ryegrass	2 lb/1000 ft <sup>2</sup> (10 kg/1000 m <sup>2</sup> )	

**D. Construction Mulch.** Construction Mulch is the application of straw mulch applied directly to the disturbed soil surface. Use straw according to C&MS Item 659. C&MS 659 wood fiber or compost mulch may only be used with concurrence of the Department. Apply Construction Mulch only to disturbed areas which will remain idle for 14 days or less or areas of exposed subgrade that require temporary stabilization. Use a mechanical crimping implement or other suitable implement accepted by the Engineer when installing Construction Mulch on exposed subgrade. Apply Construction Mulch at a rate of 3 tons per acre (0.7 metric ton/1000 m<sup>2</sup>).

**E. Winter Seeding and Mulching.** Apply seed and straw mulch materials according to C&MS Item 659 as modified above. Apply straw mulch at a rate of 3 tons per acre (0.7 metric ton/1000 m<sup>2</sup>). Winter Seed and Mulch is required for EDA operations occurring between October 15 and March 15 and can only be installed during that time. When straw mulch is used in this BMP, it is required to be crimped in place. Crimped mulch is required to be anchored into the soil surface with a mechanical crimping implement or other suitable implement accepted by the Engineer. Bonded Fiber Matrix may be used instead of straw mulch. All mulch and BFM used in this BMP must be capable of providing sufficient durable protective cover that provides OEPA NPDES Permit compliant erosion control for a minimum of 6 months. Provide maintenance of the BMP throughout the 6 month period. The Department will not provide compensation for reapplication or repair of this BMP during the 6 month period. The use of other seed and/or mulch materials in this time period requires specific Department approval. The use of winter seeding and mulching is not an acceptable practice for protecting the subgrade surface.

**F. Slope Protection.** Place dikes, install slope drains, and construct ditches to divert water from bare non-vegetated areas and to protect cut and fill slopes. Protect the side slopes from erosion by placing dikes at the top of fill slopes prior to construction of the slope. Construct ditches and dikes prior to construction of cut slopes to divert runoff away from the slope. Ensure that all sediment-laden discharges from slope protection are directed into an appropriate sediment control BMP.

Furnish Construction Slope Protection at the required locations as the slopes are constructed. Furnish all permanent slope protection as shown in the construction plans when final grade is complete.

**G. Ditch Checks and Ditch Protection.** Place filter fabric ditch checks or rock checks across a ditch and perpendicular to the flow. Use rock checks to protect the ditch from erosion. Use filter fabric ditch checks to filter sediment from the flowing water only when appropriate and when sediment dams/basins are considered a safety hazard or infeasible as determined by the Engineer

Place ditch checks as soon as the ditch is cut. If working on a ditch, replace the ditch checks by the end of the workday.

Install filter fabric ditch checks for drainage areas less than or equal to 2 acres (0.8 ha) as shown in the SCD. Install rock checks for drainage areas between 2 to 5 acres (0.8 to 2.0 ha) as shown in the SCD.

Install ditch checks in conjunction with Sediment Basins and Dams when appropriate.

Furnish Construction Ditch Protection at the required locations as the ditches are cut. Furnish all permanent ditch protection as shown in the construction plans when final grade is complete.

**H. Sediment Basins and Dams.** Design and construct Sediment Basins and Dams in accordance with and as described in the OEPA NPDES Permit for “sediment settling ponds”. Design and construct Sediment Basins and Dams at concentrated and critical flow locations to settle out sediment before the water leaves the EDA area. Do not construct Sediment Basins and Dams in any jurisdictional waterways .

All sediment basins requiring a dewatering device (riser and outlet pipe) shall incorporate a surface water dewatering device as described in the OEPA NPDES Permit. The Department will provide compensation for appropriately sized outlet pipes and surface dewatering device as described in Appendix F.

Compensation will not be provided for dewatering devices not included in the SWPPP and appropriately sized by the PE/CPESC. Compensation will be provided once for each dewatering device purchased exclusively for the project.

Complete the construction of the Sediment Basins and Dams before starting EDA operations.

When needed or when directed by the Engineer, install construction fence around the Sediment Basins and Dams.

**I. River, Stream, and Water Body Protection.** Provide appropriate river, stream and water body protection to all surface waters on and, adjacent to the project. River, Stream, and Water Body Protection may include diverting project water flow using dikes and slope protection. The Contractor may use a combination of BMP. Show all surface waters located within & adjacent to Project and Contractor EDA on the SWPPP.

**J. Stream Relocation, Temporary Channels and Ditches that carry Waters of the United States.** Perform this work in compliance with the OEPA NPDES Permit and any other applicable permits (i.e. 404/401 Permits). Stabilize Stream Relocation, Temporary Channels and Ditches with Construction Slope Protection or 70 percent grass growth before diverting flow into the new channel.

**K. Concrete washout areas BMP.** Compensation for this BMP is incidental to the concrete work.

**L. Construction Entrances.** Furnish Construction Entrance materials conforming to C&MS 712.09 Type B Filter Blankets for Rock Channel Protection and C&MS 703.01, Size Number 1 and 2, CCS aggregate. Furnish Construction Entrance protection at the locations shown on the SWPPP and as required below:

1. At locations where construction vehicles enter or leave EDA areas.
2. At all points of egress to public roads.
3. At all access locations where runoff from the construction access road is not protected by sediment controls.

Provide the appropriate size culvert as needed to prevent water from flowing onto paved surfaces and from overtopping the construction entrance surface. Identify the culvert size on the SWPPP. Install a maximum of three Construction Entrances per mile along the length of the project. The length of the project is the plan length along the project's longest axis. Additional construction entrances in excess of the maximum require acceptance from the Engineer.

Locate and identify all Construction Entrances on the SWPPP.



Provide a configuration consisting of 6 inches of aggregate over geotextile fabric. Provide geometry according to a Type 1 Driveway as shown in the SCD. Provide a minimum 10 foot width and length measuring a minimum of 150 feet and not exceeding 200 feet from edge of pavement.

Construction Entrance removal includes the appropriate disposal of geotextile fabric and pipe. Aggregate may be incorporated into embankment work when approved by the Department.

**M. Project fueling and refueling BMP locations.** Compensation for this BMP is incidental to the project.

The SWPPP shall include BMP to prevent and respond to spills or leaks as required by the OEPA NPDES Permit.

The Contractor will provide a separate Spill Prevention Control & Countermeasure Plan if required for the project as described in 40 CFR Part 112. The Contractor will not be compensated for the SPCC Plan.

**N.** All other BMP that are required and not specifically referenced in Appendix F will not be paid as a separate item, but will be included by the Contractor as part of the total project cost.

**832.06 Causeways and Access Fills (Stream and River Crossings and Fills).** Forging of jurisdictional waters, including all streams and rivers is not allowed. Evaluate the 404/401 permits to determine whether or not causeway and access fills are permitted in the contract. If a causeway and access fills have been permitted, construct fill(s) per the 404/401 permits, and the application submitted for those permits. Only the footprint area (acreage) of temporary fill, and volume of temporary fill as permitted and contained in the permit application will be allowed. The footprint area (acreage) of temporary fill, and volume of temporary fill may be furnished in the construction plans. The construction plans may furnish additional information or restrictions for causeways or access fills. If the Contractor proposes a causeway and access fill(s) which has not been permitted through the 404/401 permit process, the Contractor is required to coordinate the request for the causeway and access fill(s) with the project engineer and OES. The Department makes no guarantee to granting the request. The causeway and access fills request will be coordinated by OES with the USACE and OEPA where applicable.

Supply the project engineer/OES with the following information:

- A. A plan and profile drawing showing the causeway and access fills with OHWM elevation.
- B. Volume of temporary fill below the OHWM.
- C. The surface area of temporary fill below the OHWM.
- D. A restoration plan for the area affected by the causeway and access fills.
- E. Time frames for placement and removal of the causeway and access fills.
- F. Temporary Access Fill Checklist

The time frame allowed for the coordination of the causeway and access fill(s) will be 60 days, at a minimum, and the causeway and access fill(s) will not occur prior to the 404 Permit being authorized by the USACE and Ohio EPA, if an individual 401 is required. All coordination with the USACE and/or OEPA will be performed through OES.

**832.07 Causeway and Access Fills Construction and Payment.** Begin planning and installing causeways and access fills as early in construction as possible to avoid conflicts with 404/401 permits or other environmental commitments that have been included in the construction plans.

Access fills in streams or rivers may include, but are not limited to, cofferdams, access pads, temporary bridges, etc.

Make every attempt to minimize disturbance to water bodies during construction, maintenance and removal of the causeway and access fills. Construct the causeway and access fills as narrow as practical and perpendicular to the stream banks. Make the causeway and access fills in shallow areas rather than deep pools where possible. Minimize clearing, grubbing, and excavation of stream banks, bed, and approach sections. Construct the causeway and access fills as to not erode stream banks or allow sediment deposits in the channel.

Prior to the initiation of any in-stream work, establish a monument upstream of proposed temporary crossing or temporary construction access fill to visually monitor the water elevation in the waterway where the fill is permitted. Maintain the monument throughout the project. Provide a visual mark on the monument that identifies the elevation 1 foot above the Ordinary High Water Mark (OHWM). If the OHWM is not shown on the plans, the Department will establish the OHWM based on the definition of OHWM (832.02) or the peak discharge from the 2 year event, using the method described in the most current version of the Department's Location and Design Manual Volume II.

Ensure that the monument can be read from the bank of the waterway. Have this elevation set and certified by an Ohio Registered Surveyor.

Temporary causeway and access fill placed by the contractor above the OHWM are not subject to the 404/401 permit constraints.

Should the water elevation of the waterway, exceed the elevation 1 foot above OHWM, the Department will compensate the Contractor for repair of any resulting damage to the permitted temporary access fill up to the elevation of 1 foot above the OHWM. The Department will not pay for repair and maintenance of temporary access structures that are related to the construction access fill.

If the pool elevation of the waterway exceeds the 1 foot above the OHWM elevation as read from the monument, the contractor is entitled to an excusable, non-compensable delay in accordance with Section 108.06 of the Construction & Materials Specifications.

All costs associated with furnishing and maintaining the above referenced monument is incidental to the work.

Construct the causeway and access fills to a water elevation at least 1 foot (0.3 m) above the OHWM. If the causeway fills more than one-third the width of the stream, then use culvert pipes to allow the movement of aquatic life. Maintain normal downstream flows. Ensure that any ponding of water behind the causeway and access fills will not damage property or threaten human health and safety.

The following minimum requirements apply to causeways where culverts are used.

- A. Furnish culverts on the existing stream bottom.
- B. Avoid a drop in water elevation at the downstream end of the culvert.
- C. Furnish culverts with a diameter at least two times the depth of normal stream flow measured at the causeway centerline or with a minimum diameter of 18 inches (0.5 m) whichever is greater.
- D. Furnish a sufficient number of culverts normal to the flow to completely cross the channel from stream bank to stream bank with no more than 10 feet (3 m) between each culvert.

For all fill and surface material placed in the channel, around the culverts, or on the surface of the causeway and access fills furnish clean, non-erodible, nontoxic dumped rock fill, Type B, C, or D, as specified in C&MS 703.19.B. Extend rock fill up the slope from original stream bank for 50 feet (10 m) to catch and remove erodible material from equipment.

When the work requiring the causeway and access fills all portions of the causeway (including all rock and culverts) and access fills will be removed in its entirety. The material will not be disposed in other waters of the US or isolated wetland. The stream bottom affected by the causeway and access fills will be restored to its pre-construction elevations. The causeway and access fills will not be paid as a separate item but will be included by the Contractor as part of the total project cost.

All environmental protection and control associated with the 404/401 permit activities are incidental to the work within the boundaries of the 404/401 permit or as otherwise identified in the 404/401 permit application.

**832.08 Maintenance.** Properly maintain all BMP throughout all phases and sequencing of construction activities. Dispose of silt removed from BMP according to C&MS 105.16. When the Contractor properly places the erosion control Items then the Department will pay for the cost to maintain or replace these items of work by the following:

If a recorded rain event is greater than 0.5 inches (13mm), the Department will pay to replace all BMP that have failed during the event at the unit price for those BMP including Sediment Removal as described in Appendix F.

*Example: A 0.6 inch rain event damaged a 300 ft. segment of a 900 ft. run of filter fabric fence. The damaged segment was repaired and the sediment was removed. How do we pay for the 300 ft of repair and sediment removed?*

*Pay for 300 ft. of new Item Perimeter Filter Fabric Fence and Item Miscellaneous Sediment Removal.*

If a recorded rain event is less than or equal to 0.5 inches (13mm), the Department will pay to remove the sediment per the unit price for Sediment Removal as described in Appendix F. No compensation will be provided for BMP that fail during rain events of less than equal to 0.5 inches (13mm).

For all Perimeter Filter Fabric Fence, Filter Fabric Ditch Checks, Rock Checks, and Inlet Protection, Dikes, remove trapped sediment and any other debris which has accumulated when sediment reaches a height of one-half the BMP. Compensation will be paid at the unit price for Miscellaneous Sediment Removal as described in Appendix F.

When the sediment fills the sediment storage zone (as described in the OEPA NPDES Permit) of a Sediment Basin or Dam, remove deposited sediment per the unit price for Basin Sediment Removal as described in Appendix F. Remove Sediment Basins and Dams after the contributing drainage area has been stabilized.

When erodible materials accumulate at the surface of the construction entrance, furnish additional stone as needed to prevent tracking. Compensation for additional stone needed to maintain the Construction Entrance will be paid at the unit price for Construction Entrance. If tracking occurs, restore and clean the affected roadway surface at no additional cost to the Department.

Remove all BMP before the project is accepted. Dispose of the removed materials including sediment according to C&MS 105.16 and C&MS 105.17. Maintain the BMP until the up-slope permanent grass coverage is greater than 70% and the site reaches final stabilization in accordance with the OEPA NPDES Permit (See Appendix E, Part VII, J). At this stage, remove the BMP.

**832.09 Storm Water Pollution Prevention Plan.** If required, prepare the SWPPP as outlined in this specification. All activity identified by the SWPPP that is not specifically identified as a pay item elsewhere shall be included in the Lump Sum price bid for the SWPPP. At a minimum, the design and information requirements that must be included in the SWPPP are as follows:

- A. Provide a site specific SWPPP designed and sealed by a Professional Engineer who holds a current CPESC certification.
- B. Location of the required BMP for both on and off project EDA areas.
- C. Furnish quantity totals for all BMP required for the execution of the proposed plan.
- D. Location of a minimum of 100 feet (30 m) from the water's edge of any stream, ephemeral stream, wetland, or body of water:
  1. Concrete or asphalt plant areas
  2. Material and equipment staging or storage areas
  3. Dewatering Areas
  4. Concrete truck wash out BMP areas
  5. Construction access BMP locations
  6. Vehicle fueling and refueling locations
- E. Furnish an implementation schedule for each construction sequence.
- G. Furnish the total EDA areas in acres and identify each drainage area (watershed) impacted by the proposed construction.

- H. Locate all slopes that will be inactive for 14 calendar days or longer.
- I. Furnish the names of the individuals on site who will serve as the PE/CPESC SWPPP designer and CECI.
- J. Describe the type of construction activities that will be taking place.
- K. Furnish an estimated quantity for Basin Sediment Removal and Miscellaneous Sediment Removal for removing sediment from Sediment Basins and Dams, inlet protection, ditch checks, rock checks, perimeter filter fabric fence, and all other types of filter fabrics, straw or hay bales, or any other BMP.
- L. Furnish signatures of all contractors and subcontractors involved in BMP practices (see Appendix B).

If there are plan sheets which meet any of the requirements in Appendix E, use that information. Design files may be furnished to the awarded Contractor in electronic form upon request.

**832.10 SWPPP Acceptance.** Furnish the initial SWPPP to the Department for acceptance. The Department will allow work to begin upon receiving an acceptable SWPPP. See Appendix C for a sample acceptance form. The Department may assess critically the following:

- A. The type and location of BMP with totals.
- B. The SWPPP is for this project.
- C. There is no language in the SWPPP about any BMP being directed for use by the Engineer.
- D. The total estimated BMP quantities agree with the (per Each) “Erosion Control” amount identified in the proposal.
- E. The SWPPP accounts for the various phases of construction and the associated degree of earthwork disturbance over the life of the project.
- F. The SWPPP delineates overall watershed areas and individual BMP watersheds. Enough detail is shown in the SWPPP to verify that the BMP are appropriate for the application. If topographic mapping contained in the plans is not sufficient to identify and delineate the watersheds associated with the work, provide the appropriate mapping. .
- G. All perimeter filter fabric fence is identified in the SWPPP and supporting runoff calculations are attached.

- H. The SWPPP identifies the locations and specific geometry of the required Sediment Basins and Dams and related control structures. Provide the following information for each Sediment Basin and Sediment Dam:
1. Calculations demonstrating compliance with the 48 hour draw down time (if required by the OEPA NPDES Permit),
  2. Size of the contributing drainage area,
  3. Volume of the Sediment Storage Zone
  4. Volume of the Dewatering Zone (if required by the OEPA NPDES Permit),
  5. Basin excavation quantity or dam embankment quantity
  6. Quantity of rock channel protection
  7. Riser Pipe and outlet structure details (if required by the OEPA NPDES Permit).

Revise the accepted SWPPP as needed to maintain compliance with OEPA NPDES Permit. Revisions and amendments (See Appendix E, Part III, D) to the accepted SWPPP will be at no additional cost to the Department.

**832.11 Inspections and SWPPP Updates.** Perform the required OEPA NPDES Permit inspections and prepare inspection reports (see Appendix E).

The inspections must be performed by one of the following parties:

- A. The PE/CPESC who signed and sealed the SWPPP.
- B. The CPESC inspector who is under the supervision of the Engineer who signed and sealed the SWPPP.
- C. The CESSWI inspector who is under the supervision of the Engineer who signed and sealed the SWPPP.

Prepare the inspection reports for projects that have a SWPPP. Submit inspection reports to the Engineer every 7 days and within 24 hours of a 0.5 inch (13 mm) or greater rainfall event throughout the life of the contract. The inspection frequency may be reduced per the Ohio NPDES Permit Part III.G.2.i.

The reporting CECI will update, amend and revise the SWPPP as the contractor's operations and site conditions warrant. Identify all revisions and updates to the SWPPP and indicate what measures will be taken to maintain OEPA NPDES Permit compliance in the report. Include the following in the inspection report; the OEPA NPDES Permit inspection checklist (see appendix E, Part III.G.2.i), a map identifying all BMP needed, installed, maintained or removed since the last inspection report, certification that all construction activities are compliant with the SWPPP and the signature of the CECI responsible for the inspection. Provide a record of all written questions and comments from the Engineer related to the SWPPP. Include all responses to the Engineer's questions and comments in the inspection report. The signature of the PE/CPESC who sealed the SWPPP is required as part of the inspection report, on a monthly basis or when modifications to the SWPPP design are made. Include the certification requirements according to OEPA NPDES Permit (Part V. H.) with all reporting sign offs.

A BMP Inventory form is furnished in Appendix A to assist in documenting and recording the BMP quantities for payment. The BMP inventory form in Appendix A is not a substitute for the inspection report described above.

The CECI is required to notify the Department within 24 hours of any compliance deficiencies or verified complaints related to the SWPPP or OEPA NPDES Permit. Within 48 hours of the Department's or CECI's notice of deficiency, the contractor is required to construct, install, repair or correct the BMP measures needed to resume OEPA NPDES Permit compliance.

**832.12 Compensation.** The Department will furnish Item 832 Each, Erosion Control with an amount in the proposal to pay for BMP work. The fixed amount shown in the proposal is included (as any other bid items) in the Total Bid Amount. This fixed amount is the Department's estimate of the total cost of BMP work required to be performed for the project. If the BMP work exceeds this amount, the BMP work will still be paid at the pre-determined prices. All BMP work will be paid at the proposal pre-determined unit price times the correctly installed BMP number of units. The payment due will be deducted from Item 832 Each, Erosion Control. C&MS Table 104.02-2 does not apply to reductions in this contract item.

The Lump Sum amount bid for the SWPPP includes all work associated with development, design, NPDES required inspection, modification, revision, updates, amendments and reporting related to the SWPPP. Changes made to the SWPPP, but not caused by the Department, are the financial responsibility of the Contractor. Additional compensation will only be permitted for Department accepted amendments to the SWPPP resulting from revisions to the contract documents as per sections 104.02.B, 104.02.D and 104.02.F. Provide the additional costs for the amended SWPPP to the Department prior to beginning the associated revised work. All costs associated with providing and maintaining the required CPESC and CESSWI personnel, conducting the NPDES required inspections, and support engineering services are included in the contract Lump Sum bid for SWPPP. The Department will only pay for one accepted SWPPP regardless of the number of Construction phases, revisions, amendments or project redesigns.

### **832.13 Method of Measurement**

The Department will measure the SWPPP as a Lump Sum.

The Department will measure Construction Seeding and Mulching by the number of square yards (square meters).

The Department will measure Slope Drains by the number of feet (meters) of conduit.

The Department will measure Sediment Basins by the number of cubic yards (cubic meters) of excavation.

The Department will measure Sediment Basin surface dewatering device by each.

The Department will measure Sediment Dams by the number of cubic yards (cubic meters) of embankment.

Any pipe required for the outlet structure of a sediment basin or dam is incidental to the unit price paid for Sediment Basins and Dams.

The Department will measure Perimeter Filter Fabric Fence, and Construction Fence by the number of feet (meters).

The Department will measure Filter Fabric Ditch Check by the number of feet (meters).

The Department will measure Inlet Protection by the number of feet (meters).

The Department will measure Dikes by the number of cubic yards (cubic meters) of embankment.

The Department will measure Construction Ditch Protection and Construction Slope Protection by the number of square yards (square meters).

The Department will measure Rock Channel Protection, Type C or D (with or without filter) by the number of cubic yards (cubic meters).

The Department will measure Sediment Removal by the number of cubic yards (cubic meters).

The Department will measure Construction Mulching by the number of square yards (square meters) regardless if the application is crimped or not.

The Department will measure Winter Seeding and Mulching by the number of square yards (square meters).

The Department will measure Construction Entrance protection by the number of cubic yards (cubic meters)

#### **832.14 Basis of Payment**

The Department will pay the contract Lump Sum price bid for the SWPPP.

The Department will make partial payments for the Storm Water Pollution Prevention Plan according to C&MS Section 109.09 and as modified by the following schedule:

The Department will release 60 percent of the lump sum amount bid for Storm Water Pollution Prevention Plan to the Contractor with the first regular estimate payable after the Engineer has accepted the Storm Water Pollution Prevention Plan submission.

The Department will release 30 percent of the lump sum amount bid for Storm Water Pollution Prevention Plan to the Contractor with the first regular estimate payable after 50 percent of the project is complete.

The Department will release the remaining 10 percent of the lump sum amount bid for Storm Water Pollution Prevention Plan to the Contractor with the first regular estimate payable after 90 percent of the project is complete.

The Department will pay for appropriate, properly installed and accepted BMP per Item 832 Each, Erosion Control. BMP compensation will be based on the unit prices shown in Appendix F.



The Department will not pay for BMP Items which are required as a result of the Contractor's negligence, carelessness, or failure to install permanent controls.

The Department will not pay for BMP that does not provide effective sediment and erosion control for the EDA.

The Department will not pay for any causeway and access fills.

The Department will not pay to replace BMP that have failed as a result of improper maintenance or installation.

The Department will not pay for concrete washout area BMP. Concrete washout area BMP are considered incidental to the concrete work.

The Department will not pay for BMP which are required as a part of the work and are not specifically identified as a separate item. Compensation for BMP that are required for NPDES Permit compliance and are not included in Appendix F of this specification are considered incidental to the work.

<b>Item</b>	<b>Unit</b>	<b>Description</b>
832	Lump Sum	Storm Water Pollution Prevention Plan
832	Each	Erosion Control

Appendix A

**Weekly and Rain Event Erosion Control  
BMP Inventory**

Contractor \_\_\_\_\_

Project No. \_\_\_\_\_ Co-Rt-Sec \_\_\_\_\_ Date \_\_\_\_\_

R=Replacement    W=Working    M=Maintenance    I=Install    D=Delete    Rain Amt

Station to Station	Side	Offset	Balloon Ref.	Perimeter Control	Inlet Protection	Constr. Speed	Dikes Fill Slopes	Dikes Cut Slopes	Slope Drains	FF Ditch Checks	Rock Ditch Checks	Sediment Basins	Stream Relocate	Stream Crossing	Date work was Complete

Notes:

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This form is furnished to assist in documenting and recording the BMP quantities for payment.  
This form is not a substitute for the inspection report described in 832.11.



Appendix C

**Sample SWPPP Acceptance Form**

The Department has received the SWPPP for Project: \_\_\_\_\_

Co-Rt-Sec: \_\_\_\_\_

The submittal is dated: \_\_\_\_\_

The Department Accepts the Submittal.

\_\_\_\_\_  
Project Engineer, Project Supervisor

\_\_\_\_\_  
Date



## Co-Permittee Notice of Intent for Coverage Under Ohio EPA Storm Water Construction General Permit

Submission of this NOI constitutes notice that the party identified in Section I of this form intends to be authorized by Ohio's NPDES general permit for storm water associated with construction activity. Becoming a permittee obligates a discharger to comply with the terms and conditions of the permit. **NOTE: All necessary information must be provided on this form. Read the accompanying instructions *carefully* before completing the form. Do not use correction fluid on this form. Forms transmitted by fax will not be accepted. There is no fee associated with submitting this form.**

### I. Applicant Information/Mailing Address

Company (Applicant) Name: \_\_\_\_\_  
 Mailing (Applicant) Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
 Contact Person: \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 Contact E-Mail Address: \_\_\_\_\_

### II. Facility/Site Location Information

Existing Ohio EPA Facility Permit Number:   \_\_ GC \_\_ \_ \_ \_ \_ \* \_\_ G           OR    OHR1   \_ \_ \_ \_ \_  
 Initial Permittee Name: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Facility/Site Name: \_\_\_\_\_  
 City: \_\_\_\_\_ Township(s): \_\_\_\_\_  
 County(ies): \_\_\_\_\_ State: Ohio Zip Code: \_\_\_\_\_  
 Facility Contact Person: \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 Facility Contact E-Mail Address: \_\_\_\_\_

### III. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Applicant Name: \_\_\_\_\_ Title: \_\_\_\_\_  
 Applicant Signature: \_\_\_\_\_ Date: \_\_\_\_\_

OHIO E.P.A.  
APR 11 2013  
ENTERED DIRECTOR'S JOURNAL

Issuance Date: April 11, 2013  
Effective Date: April 21, 2013  
Expiration Date: April 20, 2018



OHIO ENVIRONMENTAL PROTECTION AGENCY

**GENERAL PERMIT AUTHORIZATION FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**

In compliance with the provisions of the federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et. seq. hereafter referred to as "the Act") and the Ohio Water Pollution Control Act [Ohio Revised Code ("ORC") Chapter 6111], dischargers of storm water from sites where construction activity is being conducted, as defined in Part I.B of this permit, are authorized by the Ohio Environmental Protection Agency, hereafter referred to as "Ohio EPA," to discharge from the outfalls at the sites and to the receiving surface waters of the state identified in their Notice of Intent ("NOI") application form on file with Ohio EPA in accordance with the conditions specified in Parts I through VII of this permit.

It has been determined that a lowering of water quality of various waters of the state associated with granting coverage under this permit is necessary to accommodate important social and economic development in the state of Ohio. In accordance with OAC 3745-1-05, this decision was reached only after examining a series of technical alternatives, reviewing social and economic issues related to the degradation, and considering all public and intergovernmental comments received concerning the proposal.

This permit is conditioned upon payment of applicable fees, submittal of a complete NOI application form and written approval of coverage from the director of Ohio EPA in accordance with Ohio Administrative Code ("OAC") Rule 3745-38-02.

  
\_\_\_\_\_  
Scott J. Nally  
Director

**I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.**

By: Joseph Cassider Date: 4-11-13

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**PART I. COVERAGE UNDER THIS PERMIT**

**A. Permit Area.**

This permit covers the entire State of Ohio.

**B. Eligibility.**

1. Construction activities covered. Except for storm water discharges identified under Part I.B.2, this permit may cover all new and existing discharges composed entirely of storm water discharges associated with construction activity that enter surface waters of the state or a storm drain leading to surface waters of the state.

For the purposes of this permit, construction activities include any clearing, grading, excavating, grubbing and/or filling activities that disturb the threshold acreage described in the next paragraph. Discharges from trench dewatering are also covered by this permit as long as the dewatering activity is carried out in accordance with the practices outlined in Part III.G.2.g.iv of this permit.

Construction activities disturbing one or more acres of total land, or will disturb less than one acre of land but are part of a larger common plan of development or sale that will ultimately disturb one or more acres of land will be eligible for coverage under this permit. The threshold acreage includes the entire area disturbed in the larger common plan of development or sale.

This permit also authorizes storm water discharges from support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided:

- a. The support activity is directly related to a construction site that is required to have NPDES permit coverage for discharges of storm water associated with construction activity;
  - b. The support activity is not a commercial operation serving multiple unrelated construction projects and does not operate beyond the completion of the construction activity at the site it supports;
  - c. Appropriate controls and measures are identified in a storm water pollution prevention plan (SWP3) covering the discharges from the support activity; and
  - d. The support activity is on or contiguous with the property defined in the NOI (offsite borrow pits and soil disposal areas, which serve only one project, do not have to be contiguous with the construction site).
2. Limitations on coverage. The following storm water discharges associated with construction activity are not covered by this permit:
    - a. Storm water discharges that originate from the site after construction activities have been completed, including any temporary support activity, and the site has achieved



- final stabilization. Industrial post-construction storm water discharges may need to be covered by an NPDES permit;
- b. Storm water discharges associated with construction activity that the director has shown to be or may reasonably expect to be contributing to a violation of a water quality standard; and
  - c. Storm water discharges authorized by an individual NPDES permit or another NPDES general permit;
3. Waivers. After March 10, 2003, sites whose larger common plan of development or sale have at least one, but less than five acres of land disturbance, which would otherwise require permit coverage for storm water discharges associated with construction activities, may request that the director waive their permit requirement. Entities wishing to request such a waiver must certify in writing that the construction activity meets one of the two waiver conditions:
- a. Rainfall Erosivity Waiver. For a construction site to qualify for the rainfall erosivity waiver, the cumulative rainfall erosivity over the project duration must be five or less and the site must be stabilized with a least a 70 percent vegetative cover or other permanent, non-erosive cover. The rainfall erosivity must be calculated according to the method in U.S. EPA Fact Sheet 3.1 Construction Rainfall Erosivity Waiver dated January 2001 and be found at: [http://epa.ohio.gov/portals/35/permits/USEPAfact3-1\\_s.pdf](http://epa.ohio.gov/portals/35/permits/USEPAfact3-1_s.pdf). If it is determined that a construction activity will take place during a time period where the rainfall erosivity factor is less than five, a written waiver certification must be submitted to Ohio EPA at least 21 days before construction activity is scheduled to begin. If the construction activity will extend beyond the dates specified in the waiver certification, the operator must either: (a) recalculate the waiver using the original start date with the new ending date (if the R factor is still less than five, a new waiver certification must be submitted) or (b) submit an NOI application form and fee for coverage under this general permit at least seven days prior to the end of the waiver period; or
  - b. TMDL (Total Maximum Daily Load) Waiver. Storm water controls are not needed based on a TMDL approved or established by U.S. EPA that addresses the pollutant(s) of concern or, for non-impaired waters that do not require TMDLs, and equivalent analysis that determines allocations for small construction sites for the pollutant(s) of concern or that determines that such allocations are not needed to protect water quality based on consideration of existing in-stream concentrations, expected growth in pollutant contributions from all sources, and a margin of safety. The pollutant(s) of concern include sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the construction activity. The operator must certify to the director of Ohio EPA that the construction activity will take place, and storm water discharges will occur, within the drainage area addressed by the TMDL or equivalent analysis. A written waiver certification must be submitted to Ohio EPA at least 21 days before the construction activity is scheduled to begin.

4. Prohibition on non-storm water discharges. All discharges covered by this permit must be composed entirely of storm water with the exception of the following: discharges from firefighting activities; fire hydrant flushings; potable water sources including waterline flushings; irrigation drainage; lawn watering; routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; springs; uncontaminated ground water from trench or well point dewatering and foundation or footing drains where flows are not contaminated with process materials such as solvents. Dewatering activities must be done in compliance with Part II.C and Part III.G.2.g.iv of this permit. Discharges of material other than storm water or the authorized non-storm water discharges listed above must comply with an individual NPDES permit or an alternative NPDES general permit issued for the discharge.

Except for flows from firefighting activities, sources of non-storm water listed above that are combined with storm water discharges associated with construction activity must be identified in the SWP3. The SWP3 must identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

5. Spills and unintended releases (Releases in excess of Reportable Quantities). This permit does not relieve the permittee of the reporting requirements of Title 40 of the Code of Federal Regulations ("CFR") Part 117 and 40 CFR Part 302. In the event of a spill or other unintended release, the discharge of hazardous substances in the storm water discharge(s) from a construction site must be minimized in accordance with the applicable storm water pollution prevention plan for the construction activity and in no case, during any 24-hour period, may the discharge(s) contain a hazardous substance equal to or in excess of reportable quantities.

40 CFR Part 117 sets forth a determination of the reportable quantity for each substance designated as hazardous in 40 CFR Part 116. The regulation applies to quantities of designated substances equal to or greater than the reportable quantities, when discharged to surface waters of the state. 40 CFR Part 302 designates under section 102(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, those substances in the statutes referred to in section 101(14), identifies reportable quantities for these substances and sets forth the notification requirements for releases of these substances. This regulation also sets forth reportable quantities for hazardous substances designated under section 311(b)(2)(A) of the Clean Water Act (CWA).

- C. Requiring an individual NPDES permit or an alternative NPDES general permit.**

1. The director may require an alternative permit. The director may require any operator eligible for this permit to apply for and obtain either an individual NPDES permit or coverage under an alternative NPDES general permit in accordance with OAC Rule 3745-38-04. Any interested person may petition the director to take action under this paragraph.

The director will send written notification that an alternative NPDES permit is required. This notice shall include a brief statement of the reasons for this decision, an application

form and a statement setting a deadline for the operator to file the application. If an operator fails to submit an application in a timely manner as required by the director under this paragraph, then coverage, if in effect, under this permit is automatically terminated at the end of the day specified for application submittal.

2. Operators may request an individual NPDES permit. Any owner or operator eligible for this permit may request to be excluded from the coverage of this permit by applying for an individual permit. The owner or operator shall submit an individual application with reasons supporting the request to the director in accordance with the requirements of 40 CFR 122.26. If the reasons adequately support the request, the director shall grant it by issuing an individual NPDES permit.
3. When an individual NPDES permit is issued to an owner or operator otherwise subject to this permit or the owner or operator is approved for coverage under an alternative NPDES general permit, the applicability of this permit to the individual NPDES permittee is automatically terminated on the effective date of the individual permit or the date of approval for coverage under the alternative general permit, whichever the case may be.

**D. Permit requirements when portions of a site are sold**

If an operator obtains a permit for a development, and then the operator (permittee) sells off lots or parcels within that development, permit coverage must be continued on those lots until a Notice of Termination (NOT) in accordance with Part IV.B is submitted. For developments which require the use of centralized sediment and erosion controls (i.e., controls that address storm water runoff from one or more lots) for which the current permittee intends to terminate responsibilities under this permit for a lot after sale of the lot to a new owner and such termination will either prevent or impair the implementation of the controls and therefore jeopardize compliance with the terms and conditions of this permit, the permittee will be required to maintain responsibility for the implementation of those controls. For developments where this is not the case, it is the permittee's responsibility to temporarily stabilize all lots sold to individual lot owners unless an exception is approved in accordance with Part III.G.4. In cases where permit responsibilities for individual lot(s) will be terminated after sale of the lot, the permittee shall inform the individual lot owner of the obligations under this permit and ensure that the Individual Lot NOI application is submitted to Ohio EPA.

**E. Authorization**

1. Obtaining authorization to discharge. Operators that discharge storm water associated with construction activity must submit an NOI application form in accordance with the requirements of Part I.F of this permit to obtain authorization to discharge under this general permit. As required under OAC Rule 3745-38-06(E), the director, in response to the NOI submission, will notify the applicant in writing that he/she has or has not been granted general permit coverage to discharge storm water associated with construction activity under the terms and conditions of this permit or that the applicant must apply for an individual NPDES permit or coverage under an alternate general NPDES permit as described in Part I.C.1.
2. No release from other requirements. No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations. Other permit requirements commonly associated with construction activities

include, but are not limited to, section 401 water quality certifications, isolated wetland permits, permits to install sanitary sewers or other devices that discharge or convey polluted water, permits to install drinking water lines, single lot sanitary system permits and disturbance of land which was used to operate a solid or hazardous waste facility (i.e., coverage under this NPDES general permit does not satisfy the requirements of OAC Rule 3745-27-13 or ORC Section 3734.02(H)). The issuance of this permit is subject to resolution of an antidegradation review. This permit does not relieve the permittee of other responsibilities associated with construction activities such as contacting the Ohio Department of Natural Resources, Division of Water, to ensure proper well installation and abandonment of wells.

**F. Notice of Intent Requirements**

1. **Deadlines for notification.**
  - a. **Initial coverage:** Operators who intend to obtain initial coverage for a storm water discharge associated with construction activity under this general permit must submit a complete and accurate NOI application form and appropriate fee at least 21 days prior to the commencement of construction activity. If more than one operator, as defined in Part VII of this general permit, will be engaged at a site, each operator shall seek coverage under this general permit. Coverage under this permit is not effective until an approval letter granting coverage from the director of Ohio EPA is received by the applicant. Where one operator has already submitted an NOI prior to other operator(s) being identified, the additional operator shall request modification of coverage to become a co-permittee. In such instances, the co-permittees shall be covered under the same facility permit number. No additional permit fee is required.
  - b. **Individual lot transfer of coverage:** Operators must each submit an individual lot notice of intent (Individual Lot NOI) application form (no fee required) to Ohio EPA at least seven days prior to the date that they intend to accept responsibility for permit requirements for their portion of the original permitted development from the previous permittee. The original permittee may submit an Individual Lot NOT at the time the Individual Lot NOI is submitted. Transfer of permit coverage is not granted until an approval letter from the director of Ohio EPA is received by the applicant.
2. **Failure to notify.** Operators who fail to notify the director of their intent to be covered and who discharge pollutants to surface waters of the state without an NPDES permit are in violation of ORC Chapter 6111. In such instances, Ohio EPA may bring an enforcement action for any discharges of storm water associated with construction activity.
3. **Where to submit an NOI.** Operators seeking coverage under this permit must submit a signed NOI form, provided by Ohio EPA, to the address found in the associated instructions.
4. **Additional notification.** NOIs and SWP3s are considered public documents and shall be made available to the public in accordance with Part III.C.2. The permittee shall make NOIs and SWP3s available upon request of the director of Ohio EPA, local agencies approving sediment and erosion control plans, grading plans or storm water management plans, local governmental officials, or operators of municipal separate storm sewer systems (MS4s) receiving drainage from the permitted site. Each operator

that discharges to an NPDES permitted MS4 shall provide a copy of its Ohio EPA NOI submission to the MS4 in accordance with the MS4's requirements, if applicable.

5. **Re-notification.** Existing permittees having coverage under the previous generations of this general permit (OHC000003, OHC000002 and OHR100000) shall have continuing coverage under OHC000004 with the submittal of a timely renewal application. Existing permittees will receive a renewal application and instructions for how to continue coverage under OHC000004. Within 90 days of receiving a renewal application from Ohio EPA, existing permittees shall submit the completed renewal application expressing their intent for continued coverage. In accordance with Ohio Administrative Code (OAC) 3745-38-02(E)(2)(a)(i), a renewal application fee will only apply to existing permittees having general permit coverage for 5 or more years as of the effective date of this general permit. Permit coverage will be terminated if Ohio EPA does not receive the renewal application within this 90 day period.

## Part II. NON-NUMERIC EFFLUENT LIMITATIONS

You shall comply with the following non-numeric effluent limitations for discharges from your site and/or from construction support activities. Part III of this permit contains the specific design criteria to meet the objectives of the following non-numeric effluent limitations.

- A. **Erosion and Sediment Controls.** You shall design, install and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants. At a minimum, such controls shall be designed, installed and maintained to:
  1. Control storm water volume and velocity within the site to minimize soil erosion;
  2. Control storm water discharges, including both peak flowrates and total storm water volume, to minimize erosion at outlets and to minimize downstream channel and streambank erosion;
  3. Minimize the amount of soil exposed during construction activity;
  4. Minimize the disturbance of steep slopes;
  5. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls shall address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting storm water runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site;
  6. If feasible, provide and maintain a 50-foot undisturbed natural buffer around surface waters of the state, direct storm water to vegetated areas to increase sediment removal and maximize storm water infiltration. If it is infeasible to provide and maintain an undisturbed 50-foot natural buffer, you shall comply with the stabilization requirements found in Part II.B for areas within 50 feet of a surface water; and
  7. Minimize soil compaction and, unless infeasible, preserve topsoil.

- B. Soil Stabilization.** Stabilization of disturbed areas shall, at a minimum, be initiated in accordance with the time frames specified in the following tables.

**Table 1: Permanent Stabilization**

Area requiring permanent stabilization	Time frame to apply erosion controls
Any areas that will lie dormant for one year or more	Within seven days of the most recent disturbance
Any areas within 50 feet of a surface water of the state and at final grade	Within two days of reaching final grade
Any other areas at final grade	Within seven days of reaching final grade within that area

**Table 2: Temporary Stabilization**

Area requiring temporary stabilization	Time frame to apply erosion controls
Any disturbed areas within 50 feet of a surface water of the state and not at final grade	Within two days of the most recent disturbance if the area will remain idle for more than 14 days
For all construction activities, any disturbed areas that will be dormant for more than 14 days but less than one year, and not within 50 feet of a surface water of the state	Within seven days of the most recent disturbance within the area  For residential subdivisions, disturbed areas must be stabilized at least seven days prior to transfer of permit coverage for the individual lot(s).
Disturbed areas that will be idle over winter	Prior to the onset of winter weather

Where vegetative stabilization techniques may cause structural instability or are otherwise unobtainable, alternative stabilization techniques must be employed. Permanent and temporary stabilization are defined in Part VII.

- C. Dewatering.** Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls.
- D. Pollution Prevention Measures.** Design, install, implement and maintain effective pollution prevention measures to minimize the discharge of pollutants. At a minimum, such measures must be designed, installed, implemented and maintained to:
1. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters shall be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;

2. Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials present on the site to precipitation and to storm water; and
  3. Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures.
- E. Prohibited Discharges.** The following discharges are prohibited:
1. Wastewater from washout of concrete, unless managed by an appropriate control;
  2. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
  3. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance; and
  4. Soaps or solvents used in vehicle and equipment washing.
- F. Surface Outlets.** When discharging from sediment basins utilize outlet structures that withdraw water from the surface, unless infeasible. (Note: Ohio EPA believes that the circumstances in which it is infeasible to design outlet structures in this manner are rare. Exceptions may include time periods with extended cold weather during winter months. If you have determined that it is infeasible to meet this requirement, you shall provide documentation in your SWP3 to support your determination.)

### **PART III. STORM WATER POLLUTION PREVENTION PLAN (SWP3)**

#### **A. Storm Water Pollution Prevention Plans.**

A SWP3 shall be developed for each site covered by this permit. For a multi-phase construction project, a separate NOI shall be submitted when a separate SWP3 will be prepared for subsequent phases. SWP3s shall be prepared in accordance with sound engineering and/or conservation practices by a professional experienced in the design and implementation of standard erosion and sediment controls and storm water management practices addressing all phases of construction. The SWP3 shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges associated with construction activities. The SWP3 shall be a comprehensive, stand-alone document, which is not complete unless it contains the information required by Part III.G of this permit. In addition, the SWP3 shall describe and ensure the implementation of best management practices (BMPs) that reduce the pollutants in storm water discharges during construction and pollutants associated with post-construction activities to ensure compliance with ORC Section 6111.04, OAC Chapter 3745-1 and the terms and conditions of this permit.

#### **B. Timing**

A SWP3 shall be completed prior to the timely submittal of an NOI and updated in accordance with Part III.D. Upon request and good cause shown, the director may waive the requirement to have a SWP3 completed at the time of NOI submission. If a waiver has been granted, the

SWP3 must be completed prior to the initiation of construction activities. The SWP3 must be implemented upon initiation of construction activities.

If you wish to continue coverage from the previous generations of this permit (OHR100000, OHC000002 and OHC000003) you shall review and update your SWP3 to ensure that this permit's requirements are addressed within 180 days after the effective date of this permit. If it is infeasible for you to comply with a specific requirement in this permit because (1) the provision was not part of the permit you were previously covered under (OHR100000, OHC000002 and OHC000003), and (2) because you are prevented from compliance due to the nature or location of earth disturbances that commenced prior to the effective date of this permit, you shall include documentation within your SWP3 of the reasons why it is infeasible for you to meet the specific requirement. (Note: Ohio EPA believes examples of OHC000004 permit conditions that would be infeasible for permittees renewing coverage to comply with include: (1) Post-Construction Storm Water Management requirements, if general permit coverage was obtained prior to April 21, 2003, and (2) Sediment settling pond design requirements, if the general permit coverage was obtained prior to the effective date of this permit and the sediment settling pond has been installed.)

**C. SWP3 Signature and Review.**

1. Plan Signature and Retention On-Site. The SWP3 shall include the certification in Part V.H, be signed in accordance with Part V.G., and be retained on site during working hours.
2. Plan Availability
  - a. On-site: The plan shall be made available immediately upon request of the director or his authorized representative and MS4 operators or their authorized representative during working hours. A copy of the NOI and letter granting permit coverage under this general permit also shall be made available at the site.
  - b. By written request: The permittee must provide the most recent copy of the SWP3 within 10 days upon written request by any of the following:
    - i. The director or the director's authorized representative;
    - ii. A local agency approving sediment and erosion plans, grading plans or storm water management plans; or
    - iii. In the case of a storm water discharge associated with construction activity which discharges through a municipal separate storm sewer system with an NPDES permit, to the operator of the system.
  - c. To the public: All NOIs, general permit approval for coverage letters, and SWP3s are considered reports that shall be available to the public in accordance with the Ohio Public Records law. The permittee shall make documents available to the public upon request or provide a copy at public expense, at cost, in a timely manner. However, the permittee may claim to Ohio EPA any portion of an SWP3 as confidential in accordance with Ohio law.



3. **Plan Revision.** The director or authorized representative may notify the permittee at any time that the SWP3 does not meet one or more of the minimum requirements of this part. Within 10 days after such notification from the director or authorized representative (or as otherwise provided in the notification), the permittee shall make the required changes to the SWP3 and, if requested, shall submit to Ohio EPA the revised SWP3 or a written certification that the requested changes have been made.

**D. Amendments**

The permittee shall amend the SWP3 whenever there is a change in design, construction, operation or maintenance, which has a significant effect on the potential for the discharge of pollutants to surface waters of the state or if the SWP3 proves to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity. Amendments to the SWP3 may be reviewed by Ohio EPA in the same manner as Part III.C.

**E. Duty to inform contractors and subcontractors**

The permittee shall inform all contractors and subcontractors not otherwise defined as "operators" in Part VII of this general permit who will be involved in the implementation of the SWP3 of the terms and conditions of this general permit. The permittee shall maintain a written document containing the signatures of all contractors and subcontractors involved in the implementation of the SWP3 as proof acknowledging that they reviewed and understand the conditions and responsibilities of the SWP3. The written document shall be created and signatures shall be obtained prior to commencement of work on the construction site.

**F. Total Maximum Daily Load (TMDL) allocations**

If a TMDL is approved for any waterbody into which the permittee's site discharges and requires specific BMPs for construction sites, the director may require the permittee to revise his/her SWP3.

**G. SWP3 Requirements**

Operations that discharge storm water from construction activities are subject to the following requirements and the SWP3 shall include the following items:

1. **Site description.** Each SWP3 shall provide:
  - a. A description of the nature and type of the construction activity (e.g., low density residential, shopping mall, highway, etc.);
  - b. Total area of the site and the area of the site that is expected to be disturbed (i.e., grubbing, clearing, excavation, filling or grading, including off-site borrow areas);
  - c. An estimate of the impervious area and percent imperviousness created by the construction activity;

- d. A calculation of the runoff coefficients for both the pre-construction and post-construction site conditions;
- e. Existing data describing the soil and, if available, the quality of any discharge from the site;
- f. A description of prior land uses at the site;
- g. An implementation schedule which describes the sequence of major construction operations (i.e., designation of vegetative preservation areas, grubbing, excavating, grading, utilities and infrastructure installation) and the implementation of erosion, sediment and storm water management practices or facilities to be employed during each operation of the sequence;
- h. The name and/or location of the immediate receiving stream or surface water(s) and the first subsequent named receiving water(s) and the areal extent and description of wetlands or other special aquatic sites at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project. For discharges to an MS4, the point of discharge to the MS4 and the location where the MS4 ultimately discharges to a stream or surface water of the state shall be indicated;
- i. For subdivided developments where the SWP3 does not call for a centralized sediment control capable of controlling multiple individual lots, a detail drawing of a typical individual lot showing standard individual lot erosion and sediment control practices.  
  
This does not remove the responsibility to designate specific erosion and sediment control practices in the SWP3 for critical areas such as steep slopes, stream banks, drainage ways and riparian zones;
- j. Location and description of any storm water discharges associated with dedicated asphalt and dedicated concrete plants covered by this permit and the best management practices to address pollutants in these storm water discharges;
- k. A copy of the permit requirements (attaching a copy of this permit is acceptable);
- l. A cover page or title identifying the name and location of the site, the name and contact information of all construction site operators, the name and contact information for the person responsible for authorizing and amending the SWP3, preparation date, and the estimated dates that construction will start and be complete;
- m. A log documenting grading and stabilization activities as well as amendments to the SWP3, which occur after construction activities commence; and
- n. Site map showing:

- i. Limits of earth-disturbing activity of the site including associated off-site borrow or spoil areas that are not addressed by a separate NOI and associated SWP3;
  - ii. Soils types for all areas of the site, including locations of unstable or highly erodible soils;
  - iii. Existing and proposed contours. A delineation of drainage watersheds expected during and after major grading activities as well as the size of each drainage watershed, in acres;
  - iv. Surface water locations including springs, wetlands, streams, lakes, water wells, etc., on or within 200 feet of the site, including the boundaries of wetlands or stream channels and first subsequent named receiving water(s) the permittee intends to fill or relocate for which the permittee is seeking approval from the Army Corps of Engineers and/or Ohio EPA;
  - v. Existing and planned locations of buildings, roads, parking facilities and utilities;
  - vi. The location of all erosion and sediment control practices, including the location of areas likely to require temporary stabilization during the course of site development;
  - vii. Sediment and storm water management basins noting their sediment settling volume and contributing drainage area. Ohio EPA recommends the use of data sheets (see ODNR's Rainwater and Land Development manual for examples) to provide data for all sediment traps, sediment basins and storm water management treatment practices noting important inputs to design and resulting parameters such as their contributing drainage area, disturbed area, water quality volume, sedimentation volume, practice surface area, facility discharge and dewatering time, outlet type and dimensions;
  - viii. The location of permanent storm water management practices to be used to control pollutants in storm water after construction operations have been completed;
  - ix. Areas designated for the storage or disposal of solid, sanitary and toxic wastes, including dumpster areas, areas designated for cement truck washout, and vehicle fueling;
  - x. The location of designated construction entrances where the vehicles will access the construction site; and
  - xi. The location of any in-stream activities including stream crossings.
2. Controls. In accordance with Part II.A, the SWP3 shall contain a description of the controls appropriate for each construction operation covered by this permit and the operator(s) shall implement such controls. The SWP3 shall clearly describe for each

major construction activity identified in Part III.G.1.g: (a) appropriate control measures and the general timing (or sequence) during the construction process that the measures will be implemented; and (b) which contractor is responsible for implementation (e.g., contractor A will clear land and install perimeter controls and contractor B will maintain perimeter controls until final stabilization). The SWP3 shall identify the subcontractors engaged in activities that could impact storm water runoff. The SWP3 shall contain signatures from all of the identified subcontractors indicating that they have been informed and understand their roles and responsibilities in complying with the SWP3. Ohio EPA recommends that the primary site operator review the SWP3 with the primary contractor prior to commencement of construction activities and keep a SWP3 training log to demonstrate that this review has occurred.

Ohio EPA recommends that the erosion, sediment, and storm water management practices used to satisfy the conditions of this permit should meet the standards and specifications in the most current edition of Ohio's Rainwater and Land Development (see definitions) manual or other standards acceptable to Ohio EPA. The controls shall include the following minimum components:

- a. Non-Structural Preservation Methods. The SWP3 shall make use of practices which preserve the existing natural condition as much as feasible. Such practices may include: preserving existing vegetation and vegetative buffer strips, phasing of construction operations in order to minimize the amount of disturbed land at any one time and designation of tree preservation areas or other protective clearing or grubbing practices. For all construction activities immediately adjacent to surface waters of the state, the permittee shall comply with the buffer non-numeric effluent limitation in Part II.A.6, as measured from the ordinary high water mark of the surface water.
- b. Erosion Control Practices. The SWP3 shall make use of erosion controls that are capable of providing cover over disturbed soils unless an exception is approved in accordance with Part III.G.4. A description of control practices designed to restabilize disturbed areas after grading or construction shall be included in the SWP3. The SWP3 shall provide specifications for stabilization of all disturbed areas of the site and provide guidance as to which method of stabilization will be employed for any time of the year. Such practices may include: temporary seeding, permanent seeding, mulching, matting, sod stabilization, vegetative buffer strips, phasing of construction operations, use of construction entrances and the use of alternative ground cover.
  - i. **Stabilization.** Disturbed areas shall be stabilized in accordance with Table 1 (Permanent Stabilization) and Table 2 (Temporary Stabilization) in Part II.B of this permit.
  - ii. **Permanent stabilization of conveyance channels.** Operators shall undertake special measures to stabilize channels and outfalls and prevent erosive flows. Measures may include seeding, dormant seeding (as defined in the most current edition of the Rainwater and Land Development manual), mulching, erosion control matting, sodding, riprap, natural channel design with bioengineering techniques or rock check dams.

- c. Runoff Control Practices. The SWP3 shall incorporate measures which control the flow of runoff from disturbed areas so as to prevent erosion from occurring. Such practices may include rock check dams, pipe slope drains, diversions to direct flow away from exposed soils and protective grading practices. These practices shall divert runoff away from disturbed areas and steep slopes where practicable. Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel to provide non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected.
- d. Sediment Control Practices. The plan shall include a description of structural practices that shall store runoff allowing sediments to settle and/or divert flows away from exposed soils or otherwise limit runoff from exposed areas. Structural practices shall be used to control erosion and trap sediment from a site remaining disturbed for more than 14 days. Such practices may include, among others: sediment settling ponds, silt fences, earth diversion dikes or channels which direct runoff to a sediment settling pond and storm drain inlet protection. All sediment control practices must be capable of ponding runoff in order to be considered functional. Earth diversion dikes or channels alone are not considered a sediment control practice unless those are used in conjunction with a sediment settling pond.

The SWP3 shall contain detail drawings for all structural practices.

- i. **Timing.** Sediment control structures shall be functional throughout the course of earth disturbing activity. Sediment basins and perimeter sediment barriers shall be implemented prior to grading and within seven days from the start of grubbing. They shall continue to function until the up slope development area is restabilized. As construction progresses and the topography is altered, appropriate controls shall be constructed or existing controls altered to address the changing drainage patterns.
- ii. **Sediment settling ponds.** A sediment settling pond is required for any one of the following conditions:
- Concentrated storm water runoff (e.g., storm sewer or ditch);
  - Runoff from drainage areas, which exceed the design capacity of silt fence or other sediment barriers;
  - Runoff from drainage areas that exceed the design capacity of inlet protection; or
  - Runoff from common drainage locations with 10 or more acres of disturbed land.

The permittee may request approval from Ohio EPA to use alternative controls if the permittee can demonstrate the alternative controls are equivalent in effectiveness to a sediment settling pond.

In accordance with Part II.F, if feasible, sediment settling ponds shall be dewatered at the pond surface using a skimmer or equivalent device. The sediment settling pond volume consists of both a dewatering zone and a sediment storage zone. The volume of the dewatering zone shall

be a minimum of 1800 cubic feet (ft<sup>3</sup>) per acre of drainage (67 yd<sup>3</sup>/acre) with a minimum 48-hour drain time for sediment basins serving a drainage area over 5 acres. The volume of the sediment storage zone shall be calculated by one of the following methods:

Method 1: The volume of the sediment storage zone shall be 1000 ft<sup>3</sup> per disturbed acre within the watershed of the basin. OR

Method 2: The volume of the sediment storage zone shall be the volume necessary to store the sediment as calculated with RUSLE or a similar generally accepted erosion prediction model.

The accumulated sediment shall be removed from the sediment storage zone once it's full. When determining the total contributing drainage area, off-site areas and areas which remain undisturbed by construction activity shall be included unless runoff from these areas is diverted away from the sediment settling pond and is not co-mingled with sediment-laden runoff. The depth of the dewatering zone shall be less than or equal to five feet. The configuration between inlets and the outlet of the basin shall provide at least two units of length for each one unit of width (> 2:1 length:width ratio); however, a length to width ratio of 4:1 is recommended. When designing sediment settling ponds, the permittee shall consider public safety, especially as it relates to children, as a design factor for the sediment basin and alternative sediment controls shall be used where site limitations would preclude a safe design. The use of a combination of sediment and erosion control measures in order to achieve maximum pollutant removal is encouraged.

- iii. **Silt Fence and Diversions.** Sheet flow runoff from denuded areas shall be intercepted by silt fence or diversions to protect adjacent properties and water resources from sediment transported via sheet flow. Where intended to provide sediment control, silt fence shall be placed on a level contour downslope of the disturbed area. This permit does not preclude the use of other sediment barriers designed to control sheet flow runoff. The relationship between the maximum drainage area to silt fence for a particular slope range is shown in the following table:

**Silt Fence Maximum Drainage Area Based on Slope**

Maximum drainage area (in acres) to 100 linear feet of silt fence	Range of slope for a particular drainage area (in percent)
0.5	< 2%
0.25	≥ 2% but < 20%
0.125	≥ 20% but < 50%

Placing silt fence in a parallel series does not extend the size of the drainage area. Storm water diversion practices shall be used to keep runoff away from disturbed areas and steep slopes where practicable. Such devices, which include swales, dikes or berms, may receive storm water runoff from areas up to 10 acres.

- iv. **Inlet Protection.** Other erosion and sediment control practices shall minimize sediment laden water entering active storm drain systems, unless the storm drain system drains to a sediment settling pond. All inlets receiving runoff from drainage areas of one or more acres will require a sediment settling pond.
  - v. **Surface Waters of the State Protection.** If construction activities disturb areas adjacent to surface waters of the state, structural practices shall be designed and implemented on site to protect all adjacent surface waters of the state from the impacts of sediment runoff. No structural sediment controls (e.g., the installation of silt fence or a sediment settling pond) shall be used in a surface water of the state. For all construction activities immediately adjacent to surface waters of the state, the permittee shall comply with the buffer non-numeric effluent limitation in Part II.A.6, as measured from the ordinary high water mark of the surface water. Where impacts within this buffer area are unavoidable, due to the nature of the construction (e.g., stream crossings for roads or utilities), the project shall be designed such that the number of stream crossings and the width of the disturbance within the buffer area are minimized.
  - vi. **Modifying Controls.** If periodic inspections or other information indicates a control has been used inappropriately or incorrectly, the permittee shall replace or modify the control for site conditions.
- e. Post-Construction Storm Water Management Requirements. So that receiving stream's physical, chemical and biological characteristics are protected and stream functions are maintained, post-construction storm water practices shall provide perpetual management of runoff quality and quantity. To meet the post-construction requirements of this permit, the SWP3 shall contain a description of the post-construction BMPs that will be installed during construction for the site and the rationale for their selection. The rationale shall address the anticipated impacts on the channel and floodplain morphology, hydrology, and water quality. Post-construction BMPs cannot be installed within a surface water of the state (e.g., wetland or stream) unless it's authorized by a CWA 401 water quality certification, CWA 404 permit, or Ohio EPA non-jurisdictional wetland/stream program approval. Note: localities may have more stringent post-construction requirements.

Detail drawings and maintenance plans shall be provided for all post-construction BMPs. Maintenance plans shall be provided by the permittee to the post-construction operator of the site (including homeowner associations) upon completion of construction activities (prior to termination of permit coverage). For sites located within a community with a regulated municipal separate storm sewer system (MS4), the permittee, land owner, or other entity with legal control of the property may be required to develop and implement a maintenance plan to comply with the requirements of the MS4. Maintenance plans shall ensure that pollutants collected within structural post-construction practices, be disposed of in accordance with local, state, and federal regulations. To ensure that storm water management systems function as they were designed and constructed, the post-construction operation and maintenance plan shall be a stand-alone

document, which contains: (1) a designated entity for storm water inspection and maintenance responsibilities; (2) the routine and non-routine maintenance tasks to be undertaken; (3) a schedule for inspection and maintenance; (4) any necessary legally binding maintenance easements and agreements; and (5) a map showing all access and maintenance easements. Permittees are not responsible under this permit for operation and maintenance of post-construction practices once coverage under this permit is terminated.

Post-construction storm water BMPs that discharge pollutants from point sources once construction is completed, may in themselves, need authorization under a separate NPDES permit (one example is storm water discharges from regulated industrial sites).

Construction activities that do not include the installation of any impervious surface (e.g., soccer fields), abandoned mine land reclamation activities regulated by the Ohio Department of Natural Resources, stream and wetland restoration activities, and wetland mitigation activities are not required to comply with the conditions of Part III.G.2.e of this permit. Linear construction projects, (e.g., pipeline or utility line installation), which do not result in the installation of additional impervious surface, are not required to comply with the conditions of Part III.G.2.e of this permit. However, linear construction projects shall be designed to minimize the number of stream crossings and the width of disturbance and achieve final stabilization of the disturbed area as defined in Part VII.J.1.

Large Construction Activities. For all large construction activities (involving the disturbance of five or more acres of land or will disturb less than five acres, but is a part of a larger common plan of development or sale which will disturb five or more acres of land), the post construction BMP(s) chosen shall be able to detain storm water runoff for protection of the stream channels, stream erosion control, and improved water quality. The BMP(s) chosen must be compatible with site and soil conditions. Structural post-construction storm water treatment practices shall be incorporated into the permanent drainage system for the site. The BMP(s) chosen must be sized to treat the water quality volume ( $WQ_v$ ) and ensure compliance with Ohio's Water Quality Standards in OAC Chapter 3745-1. The  $WQ_v$  shall be equivalent to the volume of runoff from a 0.75-inch rainfall and shall be determined according to the following equation:

$$WQ_v = C * P * A / 12$$

where:

$WQ_v$  = water quality volume in acre-feet

C = runoff coefficient appropriate for storms less than 1 inch

(Either use the following formula:  $C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$ ,

where  $i$  = fraction of post-construction impervious surface or use Table 1)

P = 0.75 inch precipitation depth

A = area draining into the BMP in acres



**Table 1**  
**Runoff Coefficients Based on the Type of Land Use**

Land Use	Runoff Coefficient
Industrial & Commercial	0.8
High Density Residential (>8 dwellings/acre)	0.5
Medium Density Residential (4 to 8 dwellings/acre)	0.4
Low Density Residential (<4 dwellings/acre)	0.3
Open Space and Recreational Areas	0.2

Where the land use will be mixed, the runoff coefficient should be calculated using a weighted average. For example, if 60% of the contributing drainage area to the storm water treatment structure is Low Density Residential, 30% is High Density Residential, and 10% is Open Space, the runoff coefficient is calculated as follows  $(0.6)(0.3) + (0.3)(0.5) + (0.1)(0.2) = 0.35$ .

An additional volume equal to 20 percent of the  $WQ_v$  shall be incorporated into the BMP for sediment storage. Ohio EPA recommends that BMPs be designed according to the methodology included in the most current edition of the Rainwater and Land Development manual or in another design manual acceptable for use by Ohio EPA.

The BMPs listed in Table 2 below shall be considered standard BMPs approved for general use. However communities with a regulated MS4 may limit the use of some of these BMPs. BMPs shall be designed such that the drain time is long enough to provide treatment, but short enough to provide storage for successive rainfall events and avoid the creation of nuisance conditions. The outlet structure for the post-construction BMP shall not discharge more than the first half of the  $WQ_v$  or extended detention volume (EDv) in less than one-third of the drain time. The EDv is the volume of storm water runoff that must be detained by a structural post-construction BMP. The EDv is equal to 75 percent of the  $WQ_v$  for wet extended detention basins, but is equal to the  $WQ_v$  for all other BMPs listed in Table 2.

**Table 2  
Structural Post-Construction BMPs & Associated  
Drain (Drawdown) Times**

Best Management Practice	Drain Time of WQv
Infiltration Basin or Trench <sup>1</sup>	48 hours
Permeable Pavement – Infiltration <sup>1</sup>	48 hours
Permeable Pavement – Extended Detention	24 hours
Dry Extended Detention Basin <sup>2</sup>	48 hours
Wet Extended Detention Basin <sup>3</sup>	24 hours
Constructed Wetland (above permanent pool) <sup>4</sup>	24 hours
Sand & Other Media Filtration <sup>5</sup>	24 hours
Bioretention Area/Cell <sup>5,6</sup>	24 hours
Pocket Wetland <sup>7</sup>	24 hours

- <sup>1</sup> Practices that are designed to fully infiltrate the WQv (basin, trench, permeable pavement) shall empty within 48 hours to provide storage for the subsequent storm events.
- <sup>2</sup> Dry basins must include forebay and micropool each sized at 10% of the WQv.
- <sup>3</sup> Provide both a permanent pool and an EDv above the permanent pool, each sized at 0.75 WQv.
- <sup>4</sup> Extended detention shall be provided for the WQv above the permanent water pool.
- <sup>5</sup> The surface ponding area (WQv) shall completely empty within 24 hours so that there is no standing water. Shorter drawdown times are acceptable as long as design criteria in Ohio's Rainwater and Land Development manual have been met.
- <sup>6</sup> This would include Grassed Linear Bioretention which was previously called Enhanced Water Quality Swale.
- <sup>7</sup> Pocket wetlands must have a wet pool equal to the WQv, with 25% of the WQv in a pool and 75% in marshes. The EDv above the permanent pool must be equal to the WQv.

The permittee may request approval from Ohio EPA to use alternative structural post-construction BMPs if the permittee can demonstrate that the alternative BMPs are equivalent in effectiveness to those listed in Table 2 above. Construction activities shall be exempt from this condition if it can be demonstrated that the WQv is provided within an existing structural post-construction BMP that is part of a larger common plan of development or if structural post-construction BMPs are addressed in a regional or local storm water management plan. A municipally operated regional storm water BMP can be used as a post-construction BMP provided that the BMP can detain the WQv from its entire drainage area and release it over a 24 hour period.

Transportation Projects. The construction of new roads and roadway improvement projects by public entities (i.e., the state, counties, townships, cities, or villages) may implement post-construction BMPs in compliance with the current version (as of the effective date of this permit) of the Ohio Department of Transportation's "Location and Design Manual, Volume Two Drainage Design" that has been accepted by Ohio EPA as an alternative to the conditions of this permit.

Offsite Mitigation of Post-Construction. Ohio EPA may authorize the offsite mitigation of the post-construction requirements of Part III.G.2.e of this permit on a case by case basis provided the permittee clearly demonstrates the BMPs listed in Table 2 are not feasible and the following criteria is met: (1) a maintenance agreement or policy is established to ensure operations and treatment in perpetuity; (2) the offsite location discharges to the same HUC-14 watershed unit; and (3) the mitigation ratio of the WQv is 1.5 to 1 or the WQv at the point of retrofit, whichever is greater. Requests for offsite mitigation must be received prior to receipt of the NOI applications.

Redevelopment Projects Sites that have been previously developed where no post-construction BMPs were installed shall either ensure a 20 percent net reduction of the site impervious area, provide for treatment of at least 20 percent of the WQv, or a combination of the two. A one-for-one credit towards the 20 percent net reduction of impervious area can be obtained through the use of green roofs. Where projects are a combination of new development and redevelopment, the total WQv that must be treated shall be calculated by a weighted average based on acreage, with the new development at 100 percent WQv and redevelopment at 20 percent WQv.

Non-Structural Post-Construction BMPs The size of the structural post-construction can be reduced by incorporating non-structural post-construction BMPs into the design. Practices such as preserving open space will reduce the runoff coefficient and, thus, the WQv. Ohio EPA encourages the implementation of riparian and wetland setbacks. Practices which reduce storm water runoff include green roofs, rain barrels, conservation development, smart growth, low-impact development, and other site design techniques. For examples, see the Ohio Lake Erie Commission's Balanced Growth Program at <http://balancedgrowth.ohio.gov/>.

In order to promote the implementation of such practices, the Director may consider the use of non-structural practices to demonstrate compliance with Part III.G.2.e of this permit for areas of the site not draining into a common drainage system of the site, i.e., sheet flow from perimeter areas such as the rear yards of residential lots, for low density development scenarios, or where the permittee can demonstrate that the intent of pollutant removal and stream protection, as required in Part III.G.2.e of this permit is being addressed through non-structural post-construction BMPs based upon review and approval by Ohio EPA.

Use of Alternative Post-Construction BMPs This permit does not preclude the use of innovative or experimental post-construction storm water management technologies. However, the Director may require these practices to be tested using the protocol outlined in the Technology Acceptance Reciprocity Partnership's (TARP) Protocol for Stormwater Best Management Practice Demonstrations or other approvable protocol. For guidance, see the following:

- <http://www.nistormwater.org>
- <http://www.mastep.net/>

The Director may require discharges from such structures to be monitored to ensure compliance with Part III.G.2.e of this permit. Permittees shall request

approval from Ohio EPA to use alternative post-construction BMPs if the permittee can demonstrate that the alternative BMPs are equivalent in effectiveness to those listed in Table 2 above. To demonstrate this equivalency, the permittee shall show that the alternative BMP has a minimum total suspended solids (TSS) removal efficiency of 80 percent under both laboratory and field conditions. Tests shall be conducted by an independent, third party tester. Also, the WQV discharge rate from the practice shall be reduced to prevent stream bed erosion and protect the physical and biological stream integrity unless there will be negligible hydrological impact to the receiving surface water of the state. The discharges will have a negligible impact if the permittee can demonstrate that one of the following four conditions exist:

- i. The entire WQV is recharged to groundwater;
- ii. The larger common plan of development or sale will create less than one acre of impervious surface;
- iii. The project is a redevelopment project within an ultra-urban setting (i.e., a downtown area or on a site where 100 percent of the project area is already impervious surface and the storm water discharge is directed into an existing storm sewer system); or
- iv. The storm water drainage system of the development discharges directly into a large river (fourth order or greater) or to a lake and where the development area is less than 5 percent of the watershed area upstream of the development site, unless a TMDL identified water quality problems into the receiving surface waters of the state.

The Director shall only consider the use of alternative BMPs on projects where the permittee can demonstrate that the implementation of the BMPs listed in Table 2 is infeasible due to physical site constraints that prevent the ability to provide functional BMP design. Alternative practices may include, but are not limited to, underground detention structures, vegetated swales and vegetated filter strips designed using water quality flow, natural depressions, rain barrels, green roofs, rain gardens, catch basin inserts, and hydrodynamics separators. The Director may also consider non-structural post-construction approaches where no local requirements for such practices exist.

Small Construction Activities For all small land disturbance activities (which disturb one or more, but less than five acres of land and is not a part of a larger common plan of development or sale which will disturb five or more acres of land), a description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed must be included in the SWP3. Structural measures should be placed on upland soils to the degree attainable. Such practices may include, but are not limited to: storm water detention structures (including wet basins); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff onsite; and sequential systems (which combine several practices). The SWP3 shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed pre-development levels.

- f. Surface Water Protection. If the project site contains any streams, rivers, lakes, wetlands or other surface waters, certain construction activities at the site may be regulated under the CWA and/or state isolated wetland permit requirements. Sections 404 and 401 of the Act regulate the discharge of dredged or fill material into surface waters and the impacts of such activities on water quality, respectively. Construction activities in surface waters which may be subject to CWA regulation and/or state isolated wetland permit requirements include, but are not limited to: sewer line crossings, grading, backfilling or culverting streams, filling wetlands, road and utility line construction, bridge installation and installation of flow control structures. If the project contains streams, rivers, lakes or wetlands or possible wetlands, the permittee shall contact the appropriate U.S. Army Corps of Engineers District Office. (CAUTION: Any area of seasonally wet hydric soil is a potential wetland - please consult the Soil Survey and list of hydric soils for your County, available at your county's Soil and Water Conservation District. If you have any questions about Section 401 water quality certification, please contact the Ohio Environmental Protection Agency, Section 401 Coordinator.)

U.S. Army Corps of Engineers (Section 404 regulation):

- Huntington, WV District (304) 399-5210 (Muskingum River, Hocking River, Scioto River, Little Miami River, and Great Miami River Basins)
- Buffalo, NY District (716) 879-4330 (Lake Erie Basin)
- Pittsburgh, PA District (412) 395-7155 (Mahoning River Basin)
- Louisville, KY District (502) 315-6686 (Ohio River)

Ohio EPA 401/404 and non-jurisdictional stream/wetland coordinator can be contacted at (614) 644-2001 (all of Ohio)

Concentrated storm water runoff from BMPs to natural wetlands shall be converted to diffuse flow before the runoff enters the wetlands. The flow should be released such that no erosion occurs downslope. Level spreaders may need to be placed in series, particularly on steep sloped sites, to ensure non-erosive velocities. Other structural BMPs may be used between storm water features and natural wetlands, in order to protect the natural hydrology, hydroperiod, and wetland flora. If the applicant proposes to discharge to natural wetlands, a hydrologic analysis shall be performed. The applicant shall attempt to match the pre-development hydroperiods and hydrodynamics that support the wetland. The applicant shall assess whether their construction activity will adversely impact the hydrologic flora and fauna of the wetland. Practices such as vegetative buffers, infiltration basins, conservation of forest cover, and the preservation of intermittent streams, depressions, and drainage corridors may be used to maintain wetland hydrology.

- g. Other controls.

- i. **Non-Sediment Pollutant Controls.** In accordance with Part II.E, no solid (other than sediment) or liquid waste, including building materials, shall be discharged in storm water runoff. The permittee must implement all necessary BMPs to prevent the discharge of non-sediment pollutants to the drainage system of the site or surface waters of the state. Under

no circumstance shall wastewater from the washout of concrete trucks, stucco, paint, form release oils, curing compounds, and other construction materials be discharged directly into a drainage channel, storm sewer or surface waters of the state. Also, no pollutants from vehicle fuel, oils, or other vehicle fluids can be discharged to surface waters of the state. No exposure of storm water to waste materials is recommended. The SWP3 must include methods to minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, and sanitary waste to precipitation, storm water runoff, and snow melt. In accordance with Part II.D.3, the SWP3 shall include measures to prevent and respond to chemical spills and leaks. You may also reference the existence of other plans (i.e., Spill Prevention Control and Countermeasure (SPCC) plans, spill control programs, Safety Response Plans, etc.) provided that such plan addresses conditions of this permit condition and a copy of such plan is maintained on site.

- ii. **Off-site traffic.** Off-site vehicle tracking of sediments and dust generation shall be minimized. In accordance with Part II.D.1, the SWP3 shall include methods to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. No detergents may be used to wash vehicles. Wash waters shall be treated in a sediment basin or alternative control that provides equivalent treatment prior to discharge.
- iii. **Compliance with other requirements.** The SWP3 shall be consistent with applicable State and/or local waste disposal, sanitary sewer or septic system regulations, including provisions prohibiting waste disposal by open burning and shall provide for the proper disposal of contaminated soils to the extent these are located within the permitted area.
- iv. **Trench and ground water control.** In accordance with Part II.C, there shall be no turbid discharges to surface waters of the state resulting from dewatering activities. If trench or ground water contains sediment, it shall pass through a sediment settling pond or other equally effective sediment control device, prior to being discharged from the construction site. Alternatively, sediment may be removed by settling in place or by dewatering into a sump pit, filter bag or comparable practice. Ground water which does not contain sediment or other pollutants is not required to be treated prior to discharge. However, care must be taken when discharging ground water to ensure that it does not become pollutant-laden by traversing over disturbed soils or other pollutant sources.
- v. **Contaminated Sediment.** Where construction activities are to occur on sites with contamination from previous activities, operators shall be aware that concentrations of materials that meet other criteria (is not considered a Hazardous Waste, meeting VAP standards, etc.) may still result in storm water discharges in excess of Ohio Water Quality Standards. Such discharges are not authorized by this permit. Appropriate BMPs include, but are not limited to:

- The use of berms, trenches, and pits to collect contaminated runoff and prevent discharges;
- Pumping runoff into a sanitary sewer (with prior approval of the sanitary sewer operator) or into a container for transport to an appropriate treatment/disposal facility; and
- Covering areas of contamination with tarps or other methods that prevent storm water from coming into contact with the material.

Operators should consult with Ohio EPA Division of Surface Water prior to seeking permit coverage.

- h. Maintenance. All temporary and permanent control practices shall be maintained and repaired as needed to ensure continued performance of their intended function. All sediment control practices must be maintained in a functional condition until all up slope areas they control are permanently stabilized. The SWP3 shall be designed to minimize maintenance requirements. The applicant shall provide a description of maintenance procedures needed to ensure the continued performance of control practices.
- i. Inspections. At a minimum, procedures in an SWP3 shall provide that all controls on the site are inspected at least once every seven calendar days and within 24 hours after any storm event greater than one-half inch of rain per 24 hour period. The inspection frequency may be reduced to at least once every month if the entire site is temporarily stabilized or runoff is unlikely due to weather conditions (e.g., site is covered with snow, ice, or the ground is frozen). A waiver of inspection requirements is available until one month before thawing conditions are expected to result in a discharge if all of the following conditions are met: the project is located in an area where frozen conditions are anticipated to continue for extended periods of time (i.e., more than one month); land disturbance activities have been suspended; and the beginning and ending dates of the waiver period are documented in the SWP3. Once a definable area is finally stabilized, the area may be marked on the SWP3 and no further inspection requirements apply to that portion of the site. The permittee shall assign "qualified inspection personnel" to conduct these inspections to ensure that the control practices are functional and to evaluate whether the SWP3 is adequate and properly implemented in accordance with the schedule proposed in Part III.G.1.g of this permit or whether additional control measures are required.

Following each inspection, a checklist must be completed and signed by the qualified inspection personnel representative. At a minimum, the inspection report shall include:

- i. the inspection date;
- ii. names, titles, and qualifications of personnel making the inspection;
- iii. weather information for the period since the last inspection (or since commencement of construction activity if the first inspection) including a best estimate of the beginning of each storm event, duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any discharges occurred;
- iv. weather information and a description of any discharges occurring at the time of the inspection;

- v. location(s) of discharges of sediment or other pollutants from the site;
- vi. location(s) of BMPs that need to be maintained;
- vii. location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
- viii. location(s) where additional BMPs are needed that did not exist at the time of inspection; and
- ix. corrective action required including any changes to the SWP3 necessary and implementation dates.

Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of or the potential for pollutants entering the drainage system. Erosion and sediment control measures identified in the SWP3 shall be observed to ensure that those are operating correctly. Discharge locations shall be inspected to ascertain whether erosion and sediment control measures are effective in preventing significant impacts to the receiving waters. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site vehicle tracking.

The permittee shall maintain for three years following the submittal of a notice of termination form, a record summarizing the results of the inspection, names(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the SWP3 and a certification as to whether the facility is in compliance with the SWP3 and the permit and identify any incidents of non-compliance. The record and certification shall be signed in accordance with Part V.G. of this permit.

- i. **When practices require repair or maintenance.** If the inspection reveals that a control practice is in need of repair or maintenance, with the exception of a sediment settling pond, it shall be repaired or maintained within 3 days of the inspection. Sediment settling ponds shall be repaired or maintained within 10 days of the inspection.
  - ii. **When practices fail to provide their intended function.** If the inspection reveals that a control practice fails to perform its intended function and that another, more appropriate control practice is required, the SWP3 shall be amended and the new control practice shall be installed within 10 days of the inspection.
  - iii. **When practices depicted on the SWP3 are not installed.** If the inspection reveals that a control practice has not been implemented in accordance with the schedule contained in Part III.G.1.g of this permit, the control practice shall be implemented within 10 days from the date of the inspection. If the inspection reveals that the planned control practice is not needed, the record shall contain a statement of explanation as to why the control practice is not needed.
3. Approved State or local plans. All dischargers regulated under this general permit must comply, except those exempted under state law, with the lawful requirements of municipalities, counties and other local agencies regarding discharges of storm water from construction activities. All erosion and sediment control plans and storm water



management plans approved by local officials shall be retained with the SWP3 prepared in accordance with this permit. Applicable requirements for erosion and sediment control and storm water management approved by local officials are, upon submittal of a NOI form, incorporated by reference and enforceable under this permit even if they are not specifically included in an SWP3 required under this permit. When the project is located within the jurisdiction of a regulated municipal separate storm sewer system (MS4), the permittee shall certify that the SWP3 complies with the requirements of the storm water management program of the MS4 operator.

4. Exceptions. If specific site conditions prohibit the implementation of any of the erosion and sediment control practices contained in this permit or site specific conditions are such that implementation of any erosion and sediment control practices contained in this permit will result in no environmental benefit, then the permittee shall provide justification for rejecting each practice based on site conditions. Exceptions from implementing the erosion and sediment control standards contained in this permit will be approved or denied on a case-by-case basis.

The permittee may request approval from Ohio EPA to use alternative methods to satisfy conditions in this permit if the permittee can demonstrate that the alternative methods are sufficient to protect the overall integrity of receiving streams and the watershed. Alternative methods will be approved or denied on a case-by-case basis.

#### **PART IV. NOTICE OF TERMINATION REQUIREMENTS**

##### **A. Failure to notify.**

The terms and conditions of this permit shall remain in effect until a signed Notice of Termination (NOT) form is submitted. Failure to submit an NOT constitutes a violation of this permit and may affect the ability of the permittee to obtain general permit coverage in the future.

##### **B. When to submit an NOT.**

1. Permittees wishing to terminate coverage under this permit shall submit an NOT form in accordance with Part V.G. of this permit. Compliance with this permit is required until an NOT form is submitted. The permittee's authorization to discharge under this permit terminates at midnight of the day the NOT form is submitted. Prior to submitting the NOT form, the permittee shall conduct a site inspection in accordance with Part III.G.2.i of this permit and have a maintenance agreement in place to ensure all post-construction BMPs will be maintained in perpetuity.
2. All permittees shall submit an NOT form within 45 days of completing all permit requirements. Enforcement actions may be taken if a permittee submits an NOT form without meeting one or more of the following conditions:
  - a. Final stabilization (see definition in Part VII) has been achieved on all portions of the site for which the permittee is responsible (including, if applicable, returning agricultural land to its pre-construction agricultural use);
  - b. Another operator(s) has assumed control over all areas of the site that have not been finally stabilized;

- c. For residential construction only, temporary stabilization has been completed and the lot, which includes a home, has been transferred to the homeowner. (Note: For individual lots without housing, which are sold by the developer, the individual lot permittee shall implement final stabilization prior to the individual lot permittee terminating permit coverage.); or
- d. An exception has been granted under Part III.G.4.

**C. How to submit an NOT.**

Permittees shall use Ohio EPA's approved NOT form. The form shall be completed and mailed according to the instructions and signed in accordance with Part V.G of this permit.

**PART V. STANDARD PERMIT CONDITIONS.**

**A. Duty to comply.**

The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of ORC Chapter 6111 and is grounds for enforcement action.

Ohio law imposes penalties and fines for persons who knowingly make false statements or knowingly swear or affirm the truth of a false statement previously made.

**B. Continuation of an expired general permit.**

An expired general permit continues in force and effect until a new general permit is issued.

**C. Need to halt or reduce activity not a defense.**

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

**D. Duty to mitigate.**

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

**E. Duty to provide information.**

The permittee shall furnish to the director, within 10 days of written request, any information which the director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the director upon request copies of records required to be kept by this permit.

**F. Other information.**

When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the NOI, SWP3, NOT or in any other report to the director, he or she shall promptly submit such facts or information.

**G. Signatory requirements.**

All NOIs, NOTs, SWP3s, reports, certifications or information either submitted to the director or that this permit requires to be maintained by the permittee, shall be signed.

1. These items shall be signed as follows:
  - a. For a corporation: By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
    - i. A president, secretary, treasurer or vice-president of the corporation in charge of a principal business function or any other person who performs similar policy or decision-making functions for the corporation; or
    - ii. The manager of one or more manufacturing, production or operating facilities, provided, the manager is authorized to make management decisions that govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
  - b. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or
  - c. For a municipality, State, Federal or other public agency: By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (1) the chief executive officer of the agency or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA).
2. All reports required by the permits and other information requested by the director shall be signed by a person described in Part V.G.1 of this permit or by a duly authorized representative of that person. A person is a duly authorized representative only if:
  - a. The authorization is made in writing by a person described in Part V.G.1 of this permit and submitted to the director;

- b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of manager, operator of a well or well field, superintendent, position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
  - c. The written authorization is submitted to the director.
3. Changes to authorization. If an authorization under Part V.G.2 of this permit is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part V.G.2 of this permit must be submitted to the director prior to or together with any reports, information or applications to be signed by an authorized representative.

**H. Certification.**

Any person signing documents under this section shall make the following certification:

*"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."*

**I. Oil and hazardous substance liability.**

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject under section 311 of the CWA or 40 CFR Part 112. 40 CFR Part 112 establishes procedures, methods and equipment and other requirements for equipment to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable surface waters of the state or adjoining shorelines.

**J. Property rights.**

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

**K. Severability.**

The provisions of this permit are severable and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

**L. Transfers.**

Ohio NPDES general permit coverage is transferable. Ohio EPA must be notified in writing sixty days prior to any proposed transfer of coverage under an Ohio NPDES general permit. The transferee must inform Ohio EPA it will assume the responsibilities of the original permittee transferor.

**M. Environmental laws.**

No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

**N. Proper operation and maintenance.**

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of SWP3s. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of the permit.

**O. Inspection and entry.**

The permittee shall allow the director or an authorized representative of Ohio EPA, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;
2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment); and
4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

**P. Duty to Reapply**

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.

**Q. Permit Actions**

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

**R. Bypass**

The provisions of 40 CFR Section 122.41(m), relating to "Bypass," are specifically incorporated herein by reference in their entirety. For definition of "Bypass," see Part VII.C.

**S. Upset**

The provisions of 40 CFR Section 122.41(n), relating to "Upset," are specifically incorporated herein by reference in their entirety. For definition of "Upset," see Part VII.GG.

**T. Monitoring and Records**

The provisions of 40 CFR Section 122.41(j), relating to "Monitoring and Records," are specifically incorporated herein by reference in their entirety.

**U. Reporting Requirements**

The provisions of 40 CFR Section 122.41(l), relating to "Reporting Requirements," are specifically incorporated herein by reference in their entirety.

**PART VI. REOPENER CLAUSE**

If there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with construction activity covered by this permit, the permittee of such discharge may be required to obtain coverage under an individual permit or an alternative general permit in accordance with Part I.C of this permit or the permit may be modified to include different limitations and/or requirements.

Permit modification or revocation will be conducted according to ORC Chapter 6111.

**PART VII. DEFINITIONS**

- A. "Act" means Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117 and Pub. L. 100-4, 33 U.S.C. 1251 et. seq.
- B. "Best management practices (BMPs)" means schedules of activities, prohibitions of practices, maintenance procedures and other management practices (both structural and non-structural) to prevent or reduce the pollution of surface waters of the state. BMP's also include treatment requirements, operating procedures and practices to control plant and/or construction site runoff, spillage or leaks, sludge or waste disposal or drainage from raw material storage.
- C. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
- D. "Commencement of construction" means the initial disturbance of soils associated with clearing, grubbing, grading, placement of fill, or excavating activities or other construction activities.

- E. "Concentrated storm water runoff" means any storm water runoff which flows through a drainage pipe, ditch, diversion or other discrete conveyance channel.
- F. "Director" means the director of the Ohio Environmental Protection Agency.
- G. "Discharge" means the addition of any pollutant to the surface waters of the state from a point source.
- H. "Disturbance" means any clearing, grading, excavating, filling, or other alteration of land surface where natural or man-made cover is destroyed in a manner that exposes the underlying soils.
- I. "Drainage watershed" means for purposes of this permit the total contributing drainage area to a BMP, i.e., the "watershed" directed to the practice. This would also include any off-site drainage.
- J. "Final stabilization" means that either:
  - 1. All soil disturbing activities at the site are complete and a uniform perennial vegetative cover (e.g., evenly distributed, without large bare areas) with a density of at least 70 percent cover for the area has been established on all unpaved areas and areas not covered by permanent structures or equivalent stabilization measures (such as the use of mulches, rip-rap, gabions or geotextiles) have been employed. In addition, all temporary erosion and sediment control practices are removed and disposed of and all trapped sediment is permanently stabilized to prevent further erosion; or
  - 2. For individual lots in residential construction by either:
    - a. The homebuilder completing final stabilization as specified above or
    - b. The homebuilder establishing temporary stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and informing the homeowner of the need for and benefits of, final stabilization. (Homeowners typically have an incentive to put in the landscaping functionally equivalent to final stabilization as quick as possible to keep mud out of their homes and off sidewalks and driveways.); or
  - 3. For construction projects on land used for agricultural purposes (e.g., pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its pre-construction agricultural use. Areas disturbed that were previously used for agricultural activities, such as buffer strips immediately adjacent to surface waters of the state and which are not being returned to their pre-construction agricultural use, must meet the final stabilization criteria in (1) or (2) above.
- K. "Individual Lot NOI" means a Notice of Intent for an individual lot to be covered by this permit (see Part I of this permit).

- L. "Larger common plan of development or sale"- means a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.
- M. "MS4" means municipal separate storm sewer system which means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) that are:
1. Owned or operated by the federal government, state, municipality, township, county, district(s) or other public body (created by or pursuant to state or federal law) including special district under state law such as a sewer district, flood control district or drainage districts or similar entity or a designated and approved management agency under section 208 of the act that discharges into surface waters of the state; and
  2. Designed or used for collecting or conveying solely storm water,
  3. Which is not a combined sewer and
  4. Which is not a part of a publicly owned treatment works.
- N. "National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits and enforcing pretreatment requirements, under sections 307, 402, 318 and 405 of the CWA. The term includes an "approved program."
- O. "NOI" means notice of intent to be covered by this permit.
- P. "NOT" means notice of termination.
- Q. "Operator" means any party associated with a construction project that meets either of the following two criteria:
1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
  2. The party has day-to-day operational control of those activities at a project which are necessary to ensure compliance with an SWP3 for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWP3 or comply with other permit conditions).
- As set forth in Part I.F.1, there can be more than one operator at a site and under these circumstances, the operators shall be co-permittees.
- R. "Ordinary high water mark" means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.
- S. "Owner or operator" means the owner or operator of any "facility or activity" subject to regulation under the NPDES program.



- T. "Permanent stabilization" means the establishment of permanent vegetation, decorative landscape mulching, matting, sod, rip rap and landscaping techniques to provide permanent erosion control on areas where construction operations are complete or where no further disturbance is expected for at least one year.
- U. "Percent imperviousness" means the impervious area created divided by the total area of the project site.
- V. "Point source" means any discernible, confined and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or the floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.
- W. "Qualified inspection personnel" means a person knowledgeable in the principles and practice of erosion and sediment controls, who possesses the skills to assess all conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity.
- X. "Rainwater and Land Development" is a manual describing construction and post-construction best management practices and associated specifications. A copy of the manual may be obtained by contacting the Ohio Department of Natural Resources, Division of Soil & Water Conservation.
- Y. "Riparian area" means the transition area between flowing water and terrestrial (land) ecosystems composed of trees, shrubs and surrounding vegetation which serve to stabilize erodible soil, improve both surface and ground water quality, increase stream shading and enhance wildlife habitat.
- Z. "Runoff coefficient" means the fraction of total rainfall that will appear at the conveyance as runoff.
- AA. "Sediment settling pond" means a sediment trap, sediment basin or permanent basin that has been temporarily modified for sediment control, as described in the latest edition of the Rainwater and Land Development manual.
- BB. "State isolated wetland permit requirements" means the requirements set forth in Sections 6111.02 through 6111.029 of the ORC.
- CC. "Storm water" means storm water runoff, snow melt and surface runoff and drainage.
- DD. "Steep slopes" means slopes that are 15 percent or greater in grade. Where a local government or industry technical manual has defined what is to be considered a "steep slope," this permit's definition automatically adopts that definition.
- EE. "Surface waters of the state" or "water bodies" means all streams, lakes, reservoirs, ponds, marshes, wetlands or other waterways which are situated wholly or partially within the boundaries of the state, except those private waters which do not combine or effect a junction with natural surface or underground waters. Waters defined as

sewerage systems, treatment works or disposal systems in Section 6111.01 of the ORC are not included.

- FF. "SWP3" means storm water pollution prevention plan.
- GG. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
- HH. "Temporary stabilization" means the establishment of temporary vegetation, mulching, geotextiles, sod, preservation of existing vegetation and other techniques capable of quickly establishing cover over disturbed areas to provide erosion control between construction operations.
- II. "Water Quality Volume (WQ<sub>v</sub>)" means the volume of storm water runoff which must be captured and treated prior to discharge from the developed site after construction is complete. WQ<sub>v</sub> is based on the expected runoff generated by the mean storm precipitation volume from post-construction site conditions at which rapidly diminishing returns in the number of runoff events captured begins to occur.

**Temporary Sediment and Erosion Control Best Management Practices (BMP)  
Unit Price Schedule, October 2013**

**EROSION CONTROL PRICES**

Item	Unit	Description	Project Identified EDA (acres)					Fixed Price	Comment
			<5	5 to 10	10 to 15	15 to 20	>20		
			Price (\$)						
832	Sq. Yd.	Construction Seeding and Mulching	1.00	0.92	0.83	0.75	0.74		Based on NOI acres
832	Feet	Slope Drains						12.00	
832	Cu. Yd.	Sediment Basins and Dams						13.50	[3]
832	Feet	Perimeter Filter Fabric Fence	4.05	3.10	2.85	2.55	2.30		Based on NOI acres
832	Feet	Filter Fabric Ditch Check						11.00	
832	Feet	Inlet Protection						11.25	
832	Cu. Yd.	Dikes						3.00	
832	Sq. Yd.	Construction Ditch Protection						2.50	
832	Cu. Yd.	Rock Channel Protection, Type C or D with Filter						55.00	[1]
832	Cu. Yd.	Rock Channel Protection, Type C or D without Filter						50.00	[1]
832	Cu. Yd.	Basin Sediment Removal						10.00	
832	Cu. Yd.	Miscellaneous Sediment Removal						15.50	
832	Feet	Construction Fence						5.75	
832	Sq. Yd.	Construction Mulching	0.79	0.71	0.58	0.56	0.54		Based on NOI acres
832	Sq. Yd.	Winter Seeding and Mulching	1.08	1.00	0.92	0.85	0.81		Based on NOI acres
832	Cu. Yd.	Construction Entrance						75.25	

[1] Add the following amount per cubic yard for the cost of Type C or D Rock materials.

[3] Add the amount for the appropriately sized surface dewatering device for sediment basin outlet.

**BMP ROCK MATERIAL SCHEDULE**

District <sup>[2]</sup>	Purchase & Delivered to Job		Produced on Job	
	Type C	Type D	Type C	Type D
1	\$ 60.00	\$ 58.00	\$ 27.50	\$ 27.50
2	\$ 60.00	\$ 58.00	\$ 27.50	\$ 27.50
3	\$ 67.00	\$ 65.00	\$ 27.50	\$ 27.50
4	\$ 71.00	\$ 68.00	\$ 27.50	\$ 27.50
5	\$ 63.00	\$ 60.00	\$ 27.50	\$ 27.50
6	\$ 65.00	\$ 63.00	\$ 27.50	\$ 27.50
7	\$ 65.00	\$ 63.00	\$ 27.50	\$ 27.50
8	\$ 65.00	\$ 63.00	\$ 27.50	\$ 27.50
9	\$ 66.00	\$ 65.00	\$ 27.50	\$ 27.50
10	\$ 70.00	\$ 68.00	\$ 27.50	\$ 27.50
11	\$ 65.00	\$ 63.00	\$ 27.50	\$ 27.50
12	\$ 71.00	\$ 68.00	\$ 27.50	\$ 27.50

[2] Based on the District in which the project is administered.

**SEDIMENT BASIN SURFACE DEWATERING DEVICE**

Device Size	Purchase & Delivered to Job
1 1/2"	\$598.00
2"	\$750.00
2 1/2"	\$915.00
3"	\$1,100.00
4"	\$1,590.00
5"	\$2,375.00
6"	\$3,650.00
8"	\$6,000.00

[3] Surface dewatering device sized appropriately for sediment basin

**Designer Note:**

Provide this Supplemental Specification on all plans.

Under the Erosion Control heading, provide the following Reference Items:

Item 832 Each Erosion Control - Provide an encumbered dollar value to be placed in the proposal for Item: 832 Each Erosion Control. This amount is for both the “quantity” and “total” fields. This amount should only be provided in the C2 Estimate, the Special Considerations Field on the Plan Package Submittal Form, and in the Plans.

Example: \$10,000 set up for Item 832 Each Erosion Control then 10,000 placed in the “quantity” and “total” fields.

Item 832 Lump Sum Storm Water Pollution Prevention Plan - Provide a Lump Sum item for Storm Water Pollution Prevention Plan for projects that have 1 or more acres of estimated Total EDA.

Delete all C&MS 207 Items and all SS 877 Items.

For additional guidance on the NPDES process for ODOT projects, see the NPDES Construction Permit Implementation Plan flowchart on the Office of Structural Engineering website.

For help estimating the encumbered dollar value for the Item 832 - Erosion Control, see the BMP Estimator on the DRRC website (<http://www.dot.state.oh.us/drrc/>).

Projects that require OEPA Watershed Specific Storm Water Permits (such as the Big Darby or Olentangy) will need to modify this specification by Special Provision Note.