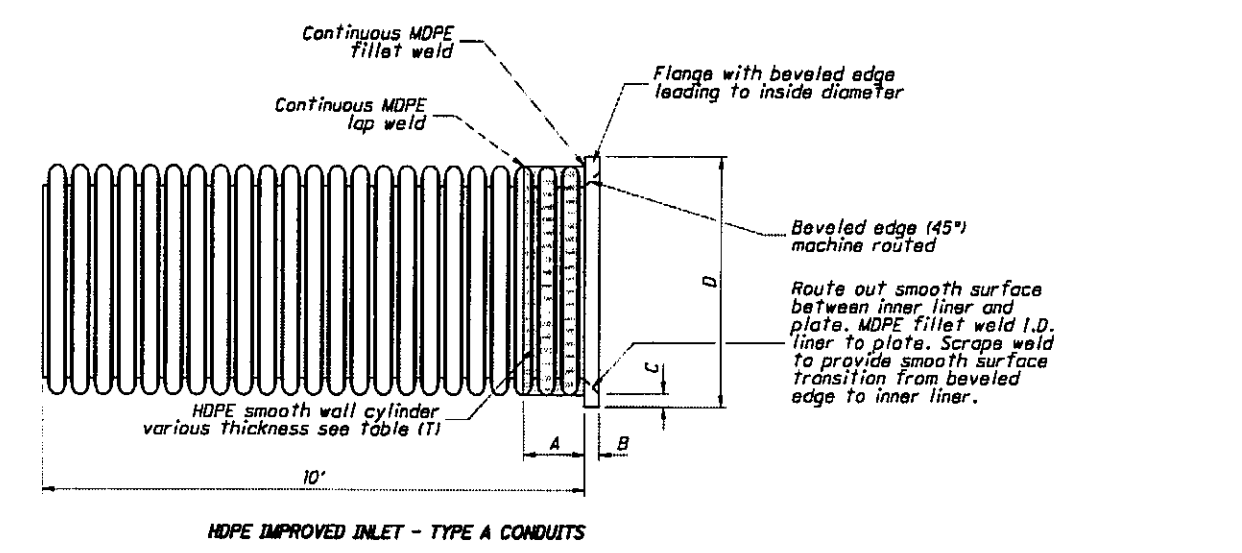
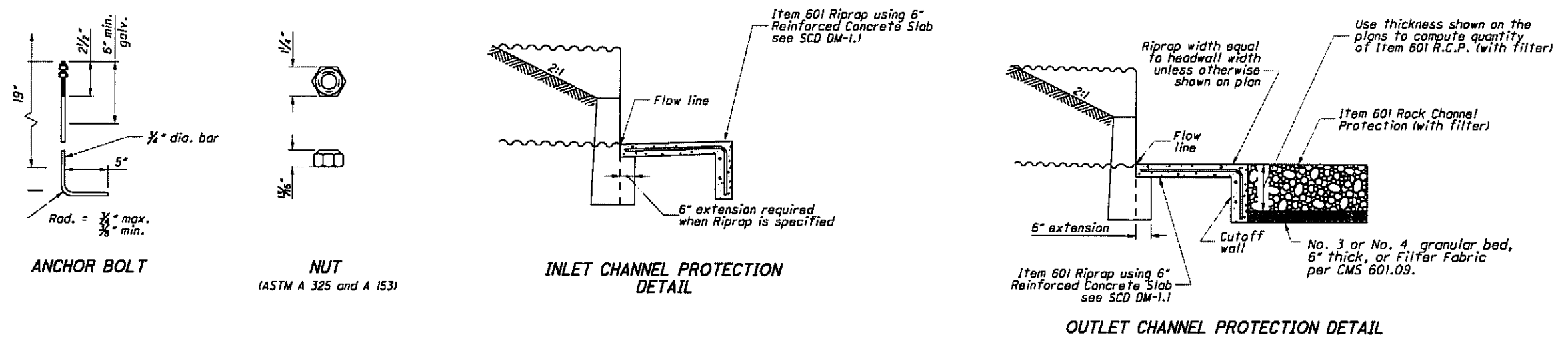


**CAST-IN-PLACE HW FOR CORRUGATED METAL PIPE & PLASTIC PIPE (English)**

CIRCULAR				PIPE ARCH				PIPE ARCH							
D	W	H	T	CONC. cu. yds.	SPAN	RISE	H	T	CONC. cu. yds.	SPAN	RISE	H	T	CONC. cu. yds.	
12"	2'-0"	3'-0"	12"	0.21	17'	13'	3'-0"	3'-0"	0.31	87'	63'	15'-0"	5'-5"	15'	2.50
15"	2'-6"	3'-2"	12"	0.27	17'	13'	3'-0"	3'-0"	0.31	87'	63'	15'-0"	5'-7"	17'	2.50
18"	3'-0"	3'-3"	12"	0.33	21'	15'	3'-6"	3'-0"	0.35	95'	67'	14'-0"	5'-8"	20'	3.14
24"	3'-6"	3'-4"	12"	0.59	24'	18"	4'-0"	3'-2"	0.43	123'	77'	15'-0"	5'-10"	22'	3.54
24"	4'-0"	3'-6"	12"	0.46	28'	20'	4'-5"	3'-3"	0.49	126'	75'	16'-0"	6'-1"	24'	3.56
27"	4'-6"	3'-8"	12"	0.53	35'	24'	5'-8"	3'-5"	0.61	117'	79'	17'-0"	6'-3"	25'	4.89
30"	5'-0"	3'-9"	12"	0.60	42'	28'	6'-8"	3'-7"	0.73	128'	83'	18'-0"	6'-5"	26'	5.01
33"	5'-6"	3'-10"	12"	0.68	48'	33'	7'-8"	3'-9"	0.90	137'	87'	19'-0"	6'-7"	28'	5.45
36"	6'-0"	4'-0"	12"	0.76	57'	38'	9'-0"	4'-0"	1.10	142'	91'	20'-0"	6'-9"	27'	6.31
39"	6'-6"	4'-2"	12"	0.84	64'	43'	10'-0"	4'-4"	1.31						
42"	7'-0"	4'-3"	12"	0.92	71'	47'	11'-0"	4'-8"	1.54						
48"	8'-0"	4'-6"	12"	1.10	77'	52'	11'-8"	5'-3"	1.84	146'	91'	20'-0"	6'-9"	27'	6.31
54"	9'-0"	4'-8"	12"	1.33	83'	57'	12'-8"	5'-7"	2.46	146'	91'	20'-0"	6'-9"	27'	6.31
60"	10'-0"	5'-0"	12"	1.78	89'	62'	13'-8"	6'-1"	3.41	146'	91'	20'-0"	6'-9"	27'	6.31
66"	11'-0"	5'-2"	12"	2.06	95'	67'	14'-8"	6'-5"	4.71	146'	91'	20'-0"	6'-9"	27'	6.31
72"	12'-0"	5'-4"	12"	2.37	101'	72'	15'-8"	6'-9"	6.33	146'	91'	20'-0"	6'-9"	27'	6.31
78"	13'-0"	5'-6"	12"	2.84	107'	77'	16'-8"	7'-3"	8.42	146'	91'	20'-0"	6'-9"	27'	6.31
84"	14'-0"	5'-8"	12"	3.30	113'	82'	17'-8"	7'-7"	10.33	146'	91'	20'-0"	6'-9"	27'	6.31
90"	15'-0"	6'-0"	12"	4.00	119'	87'	18'-8"	8'-1"	12.67	146'	91'	20'-0"	6'-9"	27'	6.31
96"	16'-0"	6'-2"	12"	4.40	125'	92'	19'-8"	8'-5"	15.39	146'	91'	20'-0"	6'-9"	27'	6.31
102"	17'-0"	6'-4"	12"	5.28	131'	97'	20'-8"	8'-9"	18.48	146'	91'	20'-0"	6'-9"	27'	6.31
108"	18'-0"	6'-6"	12"	6.21	137'	102'	21'-8"	9'-3"	21.96	146'	91'	20'-0"	6'-9"	27'	6.31
114"	19'-0"	6'-8"	12"	7.25	143'	107'	22'-8"	9'-7"	25.81	146'	91'	20'-0"	6'-9"	27'	6.31
120"	20'-0"	7'-0"	12"	8.36	149'	112'	23'-8"	10'-1"	30.00	146'	91'	20'-0"	6'-9"	27'	6.31
126"	21'-0"	7'-2"	12"	9.54	155'	117'	24'-8"	10'-5"	34.54	146'	91'	20'-0"	6'-9"	27'	6.31
132"	22'-0"	7'-4"	12"	10.81	161'	122'	25'-8"	10'-9"	39.48	146'	91'	20'-0"	6'-9"	27'	6.31
138"	23'-0"	7'-6"	12"	12.15	167'	127'	26'-8"	11'-3"	44.82	146'	91'	20'-0"	6'-9"	27'	6.31
144"	24'-0"	7'-8"	12"	13.56	173'	132'	27'-8"	11'-7"	50.56	146'	91'	20'-0"	6'-9"	27'	6.31
150"	25'-0"	8'-0"	12"	15.04	179'	137'	28'-8"	12'-1"	56.70	146'	91'	20'-0"	6'-9"	27'	6.31
156"	26'-0"	8'-2"	12"	16.59	185'	142'	29'-8"	12'-5"	63.24	146'	91'	20'-0"	6'-9"	27'	6.31
162"	27'-0"	8'-4"	12"	18.21	191'	147'	30'-8"	12'-9"	70.18	146'	91'	20'-0"	6'-9"	27'	6.31
168"	28'-0"	8'-6"	12"	19.90	197'	152'	31'-8"	13'-3"	77.52	146'	91'	20'-0"	6'-9"	27'	6.31
174"	29'-0"	8'-8"	12"	21.66	203'	157'	32'-8"	13'-7"	85.26	146'	91'	20'-0"	6'-9"	27'	6.31
180"	30'-0"	9'-0"	12"	23.49	209'	162'	33'-8"	14'-1"	93.40	146'	91'	20'-0"	6'-9"	27'	6.31
186"	31'-0"	9'-2"	12"	25.38	215'	167'	34'-8"	14'-5"	101.94	146'	91'	20'-0"	6'-9"	27'	6.31
192"	32'-0"	9'-4"	12"	27.33	221'	172'	35'-8"	14'-9"	110.88	146'	91'	20'-0"	6'-9"	27'	6.31
198"	33'-0"	9'-6"	12"	29.34	227'	177'	36'-8"	15'-3"	120.22	146'	91'	20'-0"	6'-9"	27'	6.31
204"	34'-0"	9'-8"	12"	31.41	233'	182'	37'-8"	15'-7"	129.96	146'	91'	20'-0"	6'-9"	27'	6.31
210"	35'-0"	10'-0"	12"	33.54	239'	187'	38'-8"	16'-1"	140.10	146'	91'	20'-0"	6'-9"	27'	6.31
216"	36'-0"	10'-2"	12"	35.73	245'	192'	39'-8"	16'-5"	150.64	146'	91'	20'-0"	6'-9"	27'	6.31
222"	37'-0"	10'-4"	12"	38.08	251'	197'	40'-8"	16'-9"	161.58	146'	91'	20'-0"	6'-9"	27'	6.31
228"	38'-0"	10'-6"	12"	40.59	257'	202'	41'-8"	17'-3"	172.92	146'	91'	20'-0"	6'-9"	27'	6.31
234"	39'-0"	10'-8"	12"	43.26	263'	207'	42'-8"	17'-7"	184.66	146'	91'	20'-0"	6'-9"	27'	6.31
240"	40'-0"	11'-0"	12"	46.09	269'	212'	43'-8"	18'-1"	196.80	146'	91'	20'-0"	6'-9"	27'	6.31
246"	41'-0"	11'-2"	12"	49.08	275'	217'	44'-8"	18'-5"	209.34	146'	91'	20'-0"	6'-9"	27'	6.31
252"	42'-0"	11'-4"	12"	52.23	281'	222'	45'-8"	18'-9"	222.28	146'	91'	20'-0"	6'-9"	27'	6.31

\* Determine channel configuration for pipe sizes between end treatment "A" and end treatment "B" by 2:1 slopes passing through a point 6" below the top and of each side of the headwall. For end treatment "B", 2:1 slopes are tangent to pipe.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 1730/07  
 1720/12  
 1718/13  
 OFFICE OF HYDRAULIC ENGINEERING  
 HW-2.1  
 2/3



PIPE SIZE	A	B	C	D	T
12 in.	6.00 in.	0.50 in.	1.00 in.	15.15 in.	0.13 in.
15 in.	6.00 in.	0.63 in.	1.25 in.	18.73 in.	0.19 in.
18 in.	6.00 in.	0.75 in.	1.50 in.	22.57 in.	0.25 in.
24 in.	8.00 in.	1.00 in.	2.00 in.	30.08 in.	0.25 in.
30 in.	8.00 in.	1.25 in.	2.50 in.	37.50 in.	0.38 in.
36 in.	10.00 in.	1.50 in.	3.00 in.	45.00 in.	0.38 in.
42 in.	10.00 in.	1.75 in.	3.50 in.	51.90 in.	0.38 in.
48 in.	10.00 in.	2.00 in.	4.00 in.	59.60 in.	0.38 in.
60 in.	12.00 in.	2.50 in.	5.00 in.	74.50 in.	0.38 in.

**NOTES**

**GENERAL:** Provide a riprap reinforced concrete slab according to SCD 04-1.1. If the pipe is depressed or it is specified in the plan, payment for the slab is made per square yard of Item 601 Riprap Using 6" Reinforced Concrete Slab and includes the cost of the cutoff wall.

This drawing is for cast-in-place half-height concrete headwalls. When furnishing precast half-height headwalls, conform to pre-approved designs on file with the Office of Materials Management. Precast half-height headwalls are only approved for round conduits with a maximum conduit diameter of 76". When precast headwalls are furnished, provide openings for the anchor cable and fill with grout after placement of the anchor cable. If anchor bolts are to be used with a precast headwall, fill the anchor cable openings with grout.

**CONCRETE:** Use 4000 psi compressive strength concrete for headwall. Concrete quantities are based on headwalls without the 6" extension under the channel protection.

**ANCHOR BOLTS:** Furnish bolts (see detail sheet 2/3) that meet ASTM A 307 for anchoring both ends of metal pipe. The top 6" min. of the bolt must be galvanized according to ASTM A 153. Cost of anchors is included in the price bid per foot of Item 611.

Headwall dimensions are based on end treatment "A" for pipe sizes up to and including 108" and end treatment "B" for sizes over and including 132", 138" and 144".

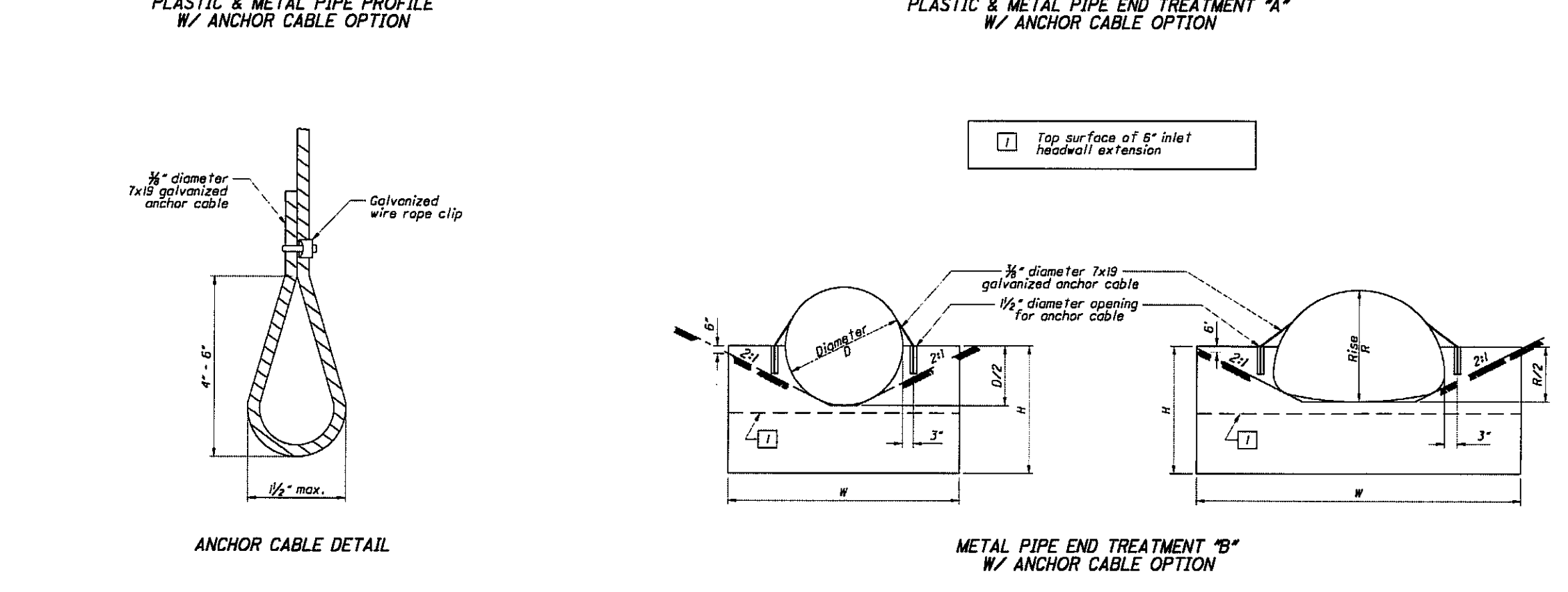
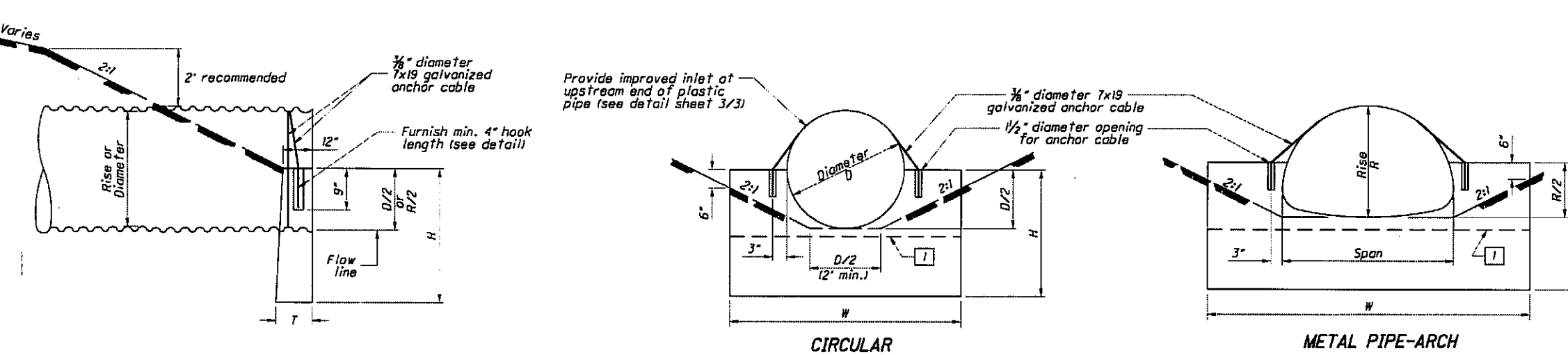
**PLASTIC PIPE:** Plastic pipe may not be available in all the sizes specified on this drawing.

**ANCHOR CABLE:** Furnish anchor cable (see detail sheet 2/3) that meets ASTM A 603 for anchoring both ends of plastic pipe. Wire rope clip must be galvanized according to ASTM A 153. Cost of anchor cable and wire rope clip is included in the unit price bid per foot of Item 611.

**IMPROVED INLET FOR HOPE PIPE:** Furnish improved inlet at upstream end of culverts and open-ended storm sewers using plastic pipe.

Use HOPE smooth cap and flange materials according to ASTM D 1350 345464C.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 1730/07  
 1720/12  
 1718/13  
 OFFICE OF HYDRAULIC ENGINEERING  
 HW-2.1  
 3/3



**NOTES**

Wrap galvanized anchor cable one time completely around the circumference of the conduit. Furnish hook at least 4" long of the ends of the anchor cable as shown above.

Cut galvanized anchor cable to length required.

Form or drill 1/2" diameter opening for anchor cable at locations shown. Alternatively, place anchor cable in wet concrete at the dimensions shown above to secure conduit to headwall.

Fill any openings made for anchor cables with grout after anchor cables are placed to a tight fit.

STATE OF OHIO DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 1730/07  
 1720/12  
 1718/13  
 OFFICE OF HYDRAULIC ENGINEERING  
 HW-2.1  
 2/3

JOB NO 12269F	SCALE AS NOTED
DRAWN BY MJD	CHKD BY CJO
DWG NAME 12269C-det	DATE SEPTEMBER, 2014

**HILLSIDE ESTATES - PHASE 4**  
**STORM SEWER DETAILS**  
 TOWNSHIP OF COPLEY, COUNTY OF SUMMIT, STATE OF OHIO

**NEFF & ASSOCIATES**  
 Civil Engineers + Landscape Architects + Planners + Surveyors  
 6405 York Road | Parma Heights, Ohio 44130  
 Tel: 440.884.3100 | Fax: 440.884.3104

REV NO	DATE	DESCRIPTION	BY
3	02/27/15	REV. PER COSE & SUMMIT SWCD	CJO
2	11/17/14	REV. PER COSE,DOES,AKRON WTR.	CJO
1	09/15/14	ORIGINAL SUBMITTAL	CJO

**SHEET NO.**  
**C7.3**