

REFERENCES NATIONAL DOCUMENTS

AASHTO M294. ASTM D1149. ASTM D2321. ASTM D3350. ASTM F477

SCOOT DOCUMENTS

SCOOT SUPPLEMENTAL TECHNICAL
SPECIFICATION SC-W-714.
ENGINEERING DIRECTIVE MEMORANDUM 24.
INSTRUCTIONAL BULLETIN 2010-01.
QUALIFIED PRODUCT LIST 30.

RELATED DRAWINGS & KEYWORDS 714-005-00 714-505-00 714-990-MD

PRECONSTRUCTION SUPPORT ENGINEER



ESEagle SIGNATURE

APRIL 30, 2010

DATE

Nev			
13	7		
4			
131	3/2010	JBH	GENERAL REVISIONS
ĺŽλ	3/2009	HJC	UPDATE PAY ITEMS
M	7/2008	HJC	ADD CASE 6
0	3/2008	DSO	NEW STANDARD
#	DATE	CHK	DESCRIPTION



SOUTH CAMOLINA DEPARTMENT OF TRANSPORTATION
DESIGN STANDARDS OFFICE
955 PARK STREET
ROOM 405
COLUMBIA, SC 29201

STANDARD DRAWING

PIPE CULVERTS SMOOTH WALL (FLEXIBLE HIGH DENSITY POLYETH. (HDPE TYPE S) DETAILS & FILL HEIGHT)

714-705-01

TABLE 714-705A: CORRUGATED HIGH DENSITY POLYETHYLENE PIPE TYPE S FILL HEIGHT

NOMINAL PIPE DIAMETER (IN)	MINIMUM HYDRAULIC AREA (FT ²)	MANNING'S ROUGHNESS COEFFICIENT	ESTIMATED MINIMUM TRENCH WIDTH (IN)	CASE 1 MAXIMUM ALLOWABLE COVER HEIGHT (FT)	CASE 1A STRUCTURAL BACKFILL ENVELOPE HEIGHT (FT)	MINIMUM COVER (FT)		CASE 4	CASE 6
						CASE 2 HL-93 VEHICLE LOADING	CASE 3 CONSTRUCTION VEHICLE LOADING 75 KIP/AXLE	UNIVERSIAL HL-93 DRIVEWAY MIN. COVER (FT NOT FOR USE UNDER ROADWAY	MAX COVER WITH INVERT AT 2 X O.D. BELOW GROUNDWATER (FT)
12	0.79	SEE MFG	39	15	0.5	0.5	1.2	0.5	14
15	1.22	SEE MFG	42	14	0.5	0.6	1.3	0.75	13
18	1.77	0.012	46	12	0.5	0.9	1.7	1.0	10
24	3.14	0.012	54	14	0.5	0.6	1.4	0.75	12
30	4.91	0.012	65	12	0.5	0.8	1.7	1.0	9
36	7.07	0.012	74	13	0.5	1.0	2.0	1.0	9
42	9.35	0.012	84	14	0.5	1.2	2.2	1.25	310
48	12.36	0.012	94	13	0.5	1.5	2.5	1.5	8
54						-	-		
60	19.31	0.012	112	14	0.5	1.7	2.7	1.75	390

STRUCTURAL DESIGN NOTES:
S1. ALL VALUES NOTED AS "--" TYPICALLY INDICATE THAT PIPE SIZE IS NOT AVAILABLE OR IS NOT RECOMMENDED FOR THIS CONDITION.

S2. THE HIGH DENISTY POLYETHYLENE PIPE FILL HEIGHT TABLE IS BASED ON THE FOLLOWING CRITERIA:

LOAD CASE 1 - TYPICAL STANDARD INSTALLATION

NUMBERS PUBLISHED ARE BASED ON MINIMUM (MOST CONSERVATIVE) VALUES CALCULATED BY MANUFACTURERS LISTED ON QUALIFIED PRODUCT LIST 30 FOR HOPE PIPE CULVERTS OR SCOOT DEEP INSTALLATION CUTOFF. FOR CASE 1A, THE STRUCTURAL BACKFILL ENVELOPE CASE WAS ADDED TO MINIMIZE THE SELECT BACKFILL VOLUME USED FOR TYPICAL INSTALLATIONS. DO NOT INSTALL HOPE PIPE DEEPER THAN MAXIMUM COVER SHOWN UNLESS DESIGNED PIPE IS APPROVED BY THE RPG STRUCTURAL ENGINEER.

LOAD CASE 2 - TYPICAL MINIMUM COVER INSTALLATION NUMBERS PUBLISHED ARE BASED ON MAXIMUM (MOST CONSERVATIVE) VALUES CALCULATED BY MANUFACTURERS LISTED ON THE HDPE PIPE CULVERT QUALIFIED PRODUCT LIST 30.

LOAD CASE 3 - TYPICAL MINIMUM COVER FOR CONSTRUCTION LOADING
NUMBERS PUBLISHED ARE BASED ON MAXIMUM (MOST CONSERVATIVE) VALUES CALCULATED BY MANUFACTURERS LISTED ON THE HDPE PIPE
CULVERT OUALIFIED PRODUCT LIST 30. MINIMUM VALUE INCLUDES AASHTO BRIDGE CONSTRUCTION SPECIFICATION MINIMUM FOR 75
K/AXLE CONSTRUCTION LOAD AS SHOWN IN TABLE 26.6. IF HEAVIER EQUIPMENT LOADING IS EXPECTED. CONTACT PIPE
MANUFACTURER AND DESIGN STANDARDS OFFICE.

LOAD CASE 4 - UNIVERSIAL HL-93 DRIVEWAY APPLICATIONS ONLY WHEN MINIMUM COVER (CASE 2) CANNOT BE ACHIEVED. NUMBERS PUBLISHED ARE BASED ON MINIMUM (MOST CONSERVATIVE) VALUES CALCULATED BY MANUFACTURERS LISTED ON QUALIFIED PRODUCT LIST FOR PIPE CULVERTS.

LOAD CASE 6- INSTALLATION BELOW GROUNDWATER TABLE
NUMBERS PUBLISHED ARE BASED ON MINIMUM (MOST CONSERVATIVE) VALUES CALCULATED BY MANUFACTURERS LISTED ON QUALIFIED
PRODUCT LIST OR SCOOT
DEEP INSTALLATION CUTOFF. PIPE INSTALLED DEEPER THAN 2 X O.D. BELOW GROUNDWATER TABLE ELEVATION OR DEEPER THAN
INDICATED FOR LOAD CASE 6 CONDITIONS, REQUIRE CUSTOM DESIGN, AND APPROVAL OF THE ENGINEER OF RECORD.

ACCORDANCE WITH SCOOT INSTRUCTIONAL BULLETIN 2010-01 CULVERT PIPE STRUCTURAL DESIGN CRITERIA. CALCULATIONS IN SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF SOUTH CAROLINA AND SUBMITTED FOR REVIEW BY THE DEPARTMENT BEFORE SUPPLYING PIPE TO SCOOT PROJECTS.

S5. FOR INSTALLATIONS DEEPER THAN THE VALUE INDICATED FOR CASE 1 OR CASE 6, OR INSTALLED DEEPER THAN 2 X 0.D. BELOW THE GROUNDWATER TABLE, SPECIAL DESIGNED PIPE IS REQUIRED. SITE CONDITIONS OTHER THAN TYPICAL INSTALLATION MAY ALSO REQUIRE SPECIAL DESIGNED PIPE. FOR THESE CONDITIONS, OTHER PIPE TYPES MAY BE MORE APPROPRIATE. CONTACT PIPE MANUFACTURER BEFORE SPECIFYING THIS TYPE OF PIPE TO CONFIRM THAT CUSTOM PIPE IS

SG. THIS FILL HEIGHT TABLE IS FOR USE IN ROADWAY APPLICATIONS ONLY AND SHOULD NOT BE USED FOR ANY OTHER TRANSPORTATION FACILITY.

S7. SPECIAL DESIGN MAY BE REQUIRED FOR INSTALLATIONS OUTSIDE OF SCOOT RIGHT OF WAY - SEE RIGHT OF WAY/UTILITY/MUNICIPAL AGREEMENT FOR THESE INSTALLATIONS.

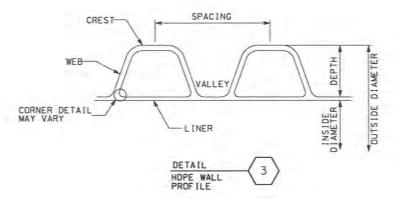
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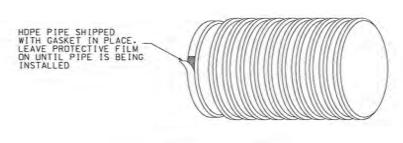
NOTES:

1. SEE SHEET 714-505-00 FOR GENERAL NOTES, AND TRENCH INSTALLATION REQUIREMENTS.

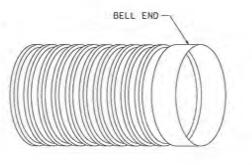
 USE MANUFACTURER LISTED ON SCOOT QUALIFIED PRODUCT LIST 30.
 SEE 714-990-MO FOR RESIDENTIAL DRIVEWAY INSTALLATIONS FOR MAINTENANCE APPLICATIONS.

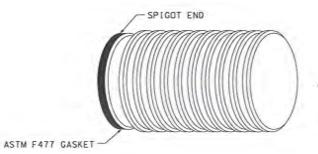
PAY ITEMS:
7143xxx __"SMOOTH WALL PIPE.....LF
7141xxx __"CORR.HDPE PIPE(TYPE S)....LF
2034xxx __"PIPE ADDITIONAL FOUNDATION WORK...LF
(__) = (DIAMETER)





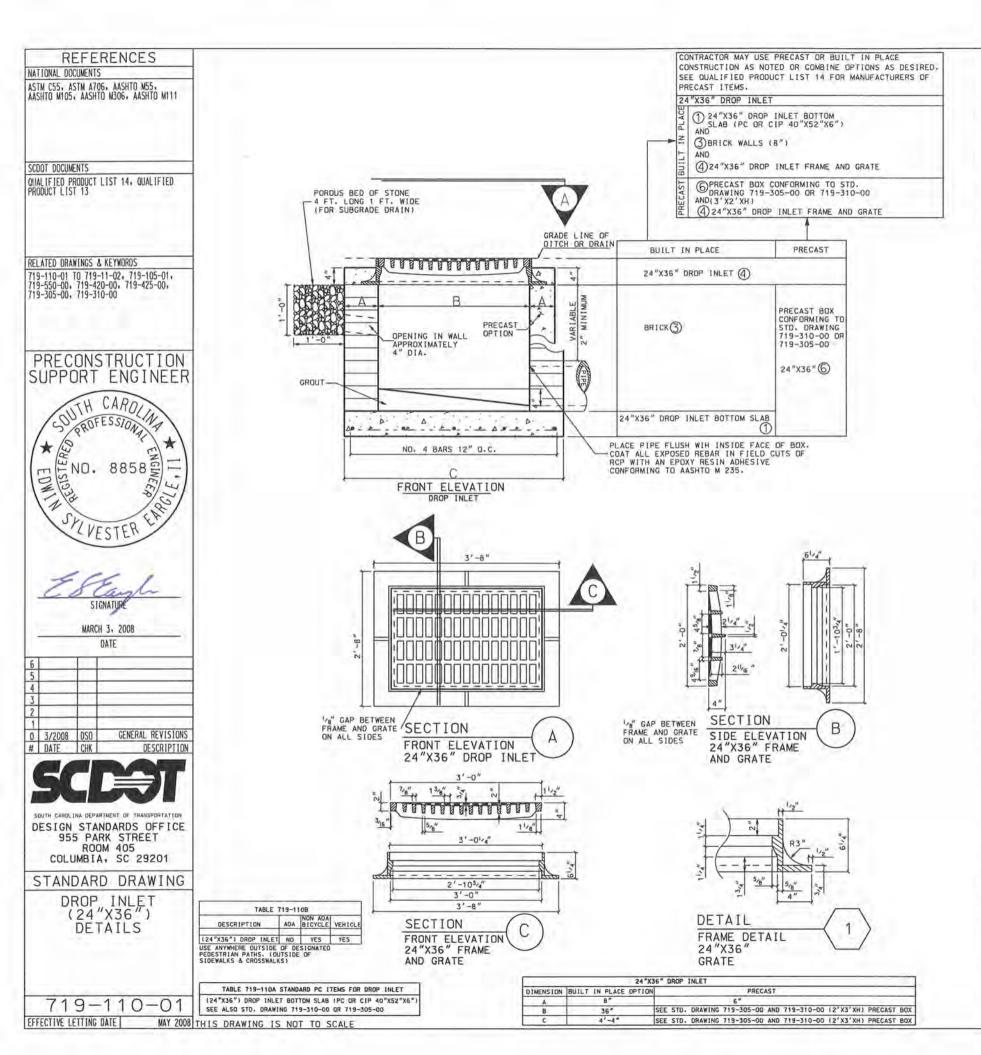






DETAIL
HIGH DENSITY
POLYETHYLENE
PIPE COMPONENTS

STANDARD JOINT [SEE SC-M-714 FOR FIELD FABRICATED JOINT]



NOTES:

1. SEE 719-105-01 FOR DROP INLET (24X24). FOR BUILT IN PLACE CONSTRUCTION OF THE CATCH BASIN WALLS, EITHER BRICK MASONRY (WALLS ONLY) OR CIP CLASS 3000 CONCRETE MAY BE USED. FOR PRECAST CONSTRUCTION. A MINIMUM OF CLASS 4000P CONCRETE SHALL BE USED.

2. CONCRETE WALLS ARE TO BE 6" THICK WITH A MINIMUM REINFORCING STEEL AREA 0.20 SQUARE INCHES PER FOOT UNLESS NOTED. FOR BRICK, THE WALLS ARE TO BE 8" THICK CONCRETE BRICK AND SIMILAR SOLID UNITS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C 55. GRADE S-11. THE INTERIOR DIMENSIONS ARE TO REMAIN AS SHOWN FOR EITHER TYPE OF CONSTRUCTION.

3. THE BOTTOM SLAB OF THE BOX SHALL BE A MINIMUM OF 6" THICK REINFORCED CONCRETE (CLASS 3000 OR 4000P) WITH A REINFORCING STEEL AREA OF 0.20 SOUARE INCHES PER FOOT. WIRE MESH BE USED IN LIEU OF STEEL BARS PROVIDED A MINIMUM OF 0.20 SOUARE INCHES PER FOOT I S MET.

4. MORTAR SHALL BE TYPE S OR M.

5. REINFORCING STEEL SHALL BE ASTM A-706, LOW-ALLOY STEEL DEFORMED BARS FOR CONCRETE REINFORCEMENT, GRADE 60. WIRE MESH SHALL CONFORM TO AASHTO M 55 AND M.

6. SEE STANDARD DRAWING 719-550-00 FOR STEPS, WHICH ARE REQUIRED WHEN STRUCTURE DEPTH EXCEEDS 4^{\prime} -6".

7. SEE STANDARD DRAWINGS 719-420-00 AND 719-425-00 FOR DEPTHS GREATER THAN 12'. PRECAST CONCRETE CIRCULAR DRAINAGE STRUCTURES ARE REQUIRED WHEN THE DEPTH FROM THE TOP OF THE DRAINAGE BOX BOTTOM SLAB TO THE TOP OF THE GROUND EXCEEDS 12'-0".

8. LOCATION AND SIZE OF PIPES ARE SITE SPECIFIC. (SEE DRAINAGE PLANS). THE BOTTOM OF THE CATCH BASIN IS TO BE GROUTED TO THE LOWEST FLOW LINE ELEVATION OF ALL PIPES. BOTTOM SLAB IS CAST IN PLACE WITH PIPES INSTALLED. BOTTOM SLAB THICKNESS MUST BE ACHIEVED BEYOND PIPE OUTSIDE DIAMETER.

9. THE FLOOR OF THE BASIN MUST SLOPE IN THE DIRECTION OF THE OUTLET PIPE AS SHOWN AND THE INSIDE OF OUTLET PIPE SHALL BE FLUSH WITH FLOOR OF BASIN.

10. SEE STANDARD DRAWING 719-305-00 OR 719-310-00 FOR MAXIMUM PIPE DIAMETERS. THE PIPE SIZES SHOWN ARE MAXIMUM FOR BRICK AND PRECAST BOXES WHEN PIPE ENTERS PERPENDICULAR AND AT THE CENTER OF THE BOX WALL. CONTRACTOR SHOULD CONFIRM THAT PIPE USED FITS APPROPRIATELY INTO BOX.

11. ALL CASTINGS SHALL CONFORM TO AASHTO M 105. CLASS 358 AND THE SPECIFICATIONS OF AASHTO M 306

12. (q) STEEL GRATES AND FRAME MAY BE USED IN LIEU OF CAST IRON AS LONG AS THE LOADING (NOTE 12d) AND HYDRAULIC REQUIREMENTS ARE MET. AND ARE ON THE DEPARTMENT'S LIST OF APPROVED SUPPLIERS. (OUALIFIED PRODUCT LIST 45)
(b) STEEL GRATES SHALL BE HOT OIP GALVANIZED IN ACCORDANCE WITH AASHTO M 111.
(c) STEEL GRATES AND FRAMES SHALL BE DIMENSIONED TO BE INTERCHANGEABLE WITH EACH PIECE OF THE CAST IRON GRATE AND FRAME SHOWN. STEEL GRATES MUST HAVE POSITIVE MEANS TO BE RETAINED IN THE FRAME.
(d) STRENGTH REQUIREMENTS OF STEEL GRATES AND FRAMES MUST MEET AASHTO M 306
(e) MANUFACTURERS DESIRING TO BE PLACED ON THE DEPARTMENT'S OUALIFIED PRODUCT LIST SHOULD CONTACT THE MATERIALS AND RESEARCH ENGINEER FOR PROCEDURES.

13. THE LONGEST DIMENSIONS OF THE OPENING IN THE IRON GRATE SHOULD BE ORIENTED IN THE DIRECTION OF FLOW. IF PRACTICABLE. THIS GRATE IS NOT SUITABLE FOR PEDESTRIAN TRAFFIC BECAUSE GRATE OPENINGS EXCEED 2.

14. AS SHOWN BY THIS DRAWING, THE FRAME IS SET LEVEL, BUT THE RESIDENT CONSTRUCTION ENGINEER MAY SET SAME ON SLOPE AS REQUIRED BY LOCAL DRAINAGE CONDITIONS.

15. AFTER THE FRAME IS SET IN ITS FINAL POSITION, IT IS TO BE ENCASED WITH CONCRETE AS SHOWN BY DRAWING.

16. ALL MANUFACTURING PROCESSES FOR THE FRAME AND GRATE MUST OCCUR IN THE UNITED STATES.
PRECAST NOTES:

17. THE USE OF PRECAST UNITS WILL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF OBTAINING SATISFACTORY INSTALLATIONS. SEE STANDARD DRAWINGS FOR PRECAST CONCRETE DRAININGS BOX OR STRUCTURE FOR ADDITIONAL DETAILS AND SPECIFICATIONS.

18. LIFT HOLES AND/OR DEVICES MAY BE PLACED AS NECESSRY. ALL LIFT HOLES SHALL BE GROUTED SHUT PRIOR TO COMPLETION OF THE INSTALLATION. ALL LIFTING METHODS MUST MEET OSHA REGULATIONS.

19. THE CONTRACTOR SHALL USE A SINGLE SOURCE MANUFACTURER CHOSEN FROM THE LIST ON OUALIFIED PRODUCT LIST 14 FOR PRECAST ITEMS ON THIS DRAWING.

20. FOLLOW QUALIFIED PRODUCT POLICY 14 IN ORDER TO BE LISTED ON QUALIFIED PRODUCT LIST 14.

21. CONTRACTOR MAY SUBMIT DESIGN DRAWINGS AND CALCULATIONS FOR MODIFICATIONS TO THIS ITEM ON A PROJECT BY PROJECT BASIS. MODIFICATIONS TO THESE ITEMS WILL NOT BE LISTED ON ANY QUALIFIED PRODUCT LIST. SUBMIT ALL PROPOSALS FOR PROJECT SPECIFIC MODIFICATIONS TO THE RESIDENT ENGINEER FOR REVIEW BY THE ENGINEER OF RECORD.

22. JOINTS BETWEEN INSTALLED PIECES AND PRECAST ITEMS TO BE PLACED SHALL BE SEALED WITH A'z' GROUT LIFT OR AN APPROPRIATE PLASTIC PREFORMED GASKET (FROM QUALIFIED PRODUCT LIST 13.)

23. BED SHALL BE PREPARED AND COMPACTED FOR PRECAST DRAINAGE STRUCTURE AS REQUIRED BY SCOOT STANDARD SPECIFICATIONS FOR PRECAST ITEMS. ELEVATION OF BEDDING MATERIAL SHALL BE APPROPRIATE TO ACCOMMODATE ELEVATION DF ALL PIPES AND REQUIRED BOX TOP FIFVATION.

24. PLACE AND LEVEL PRECAST BOX OR SLAB.

25. PIPES SHALL BE INSTALLED AND GROUTED IN PLACE.

26. PIPES AND BOX SHALL BE BACKFILLED AND COMPACTED AS REQUIRED BY SCDOT STANDARD SPECIFICATIONS.

27. ANY LOCATION WHERE THE ABOVE REQUIREMENTS CANNOT BE MET SHALL BE COMPLETED USING CAST IN PLACE MATERIALS MEETING THE REQUIREMENTS OF THIS STANDARD DRAWING. ANY ADDITIONAL MATERIALS OR COSTS ASSOCIATED WITH THE USE OF PRECAST SHALL BE PAID FOR BY THE CONTRACTOR AND MAY NOT BE CHARGED TO SCOOT.

28. THE CONTRACT UNIT PRICE FOR DROP INLETS SHALL INCLUDE THE COST OF FURNISHING ALL MATERIALS, (BUILT IN PLACE OR PRECAST), AND WORK INCIDENTAL TO THE CONSTRUCTION OF THE STRUCTURE COMPLETE IN PLACE AS SHOWN, INCLUDING THE CURB AND GUTTER, IN ACCORDANCE WITH THE SCOOT STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (LATEST EDITION).

29. PRECAST CONCRETE CIRCULAR STRUCTURES (AS SHOWN ON 719-420-00) ARE REQUIRED FOR THE FOLLOWING APPLICATIONS UNLESS PROHIBITED BY THE PLANS OR SPECIAL PROVISIONS.

(a) ON DRAINAGE STRUCTURES WITHA A DEPTH EQUAL TO DR GREATER THAN 12 FEET.

(b) ON DRAINAGE STRUCTURES WHERE THE FLOW LINE ELEVATION OF THE INLET PIPE IS EQUAL TO OR HIGHER THAN THE INSIDE TOP (SOFFIT) OF THE OUTLET PIPE.

(c) AS REQUIRED BY THE PROJECT PLANS.

30. THE PAY ITEM SHALL BE:
DROP INLET (24"X36")_____EA

USE SHEETS 719-110-01 THROUGH 719-110-02 FOR THIS ITEM.