

**CURB DEPRESSION FOR PUBLIC DRAINAGE AND UTILITY EASEMENT ACCESS**

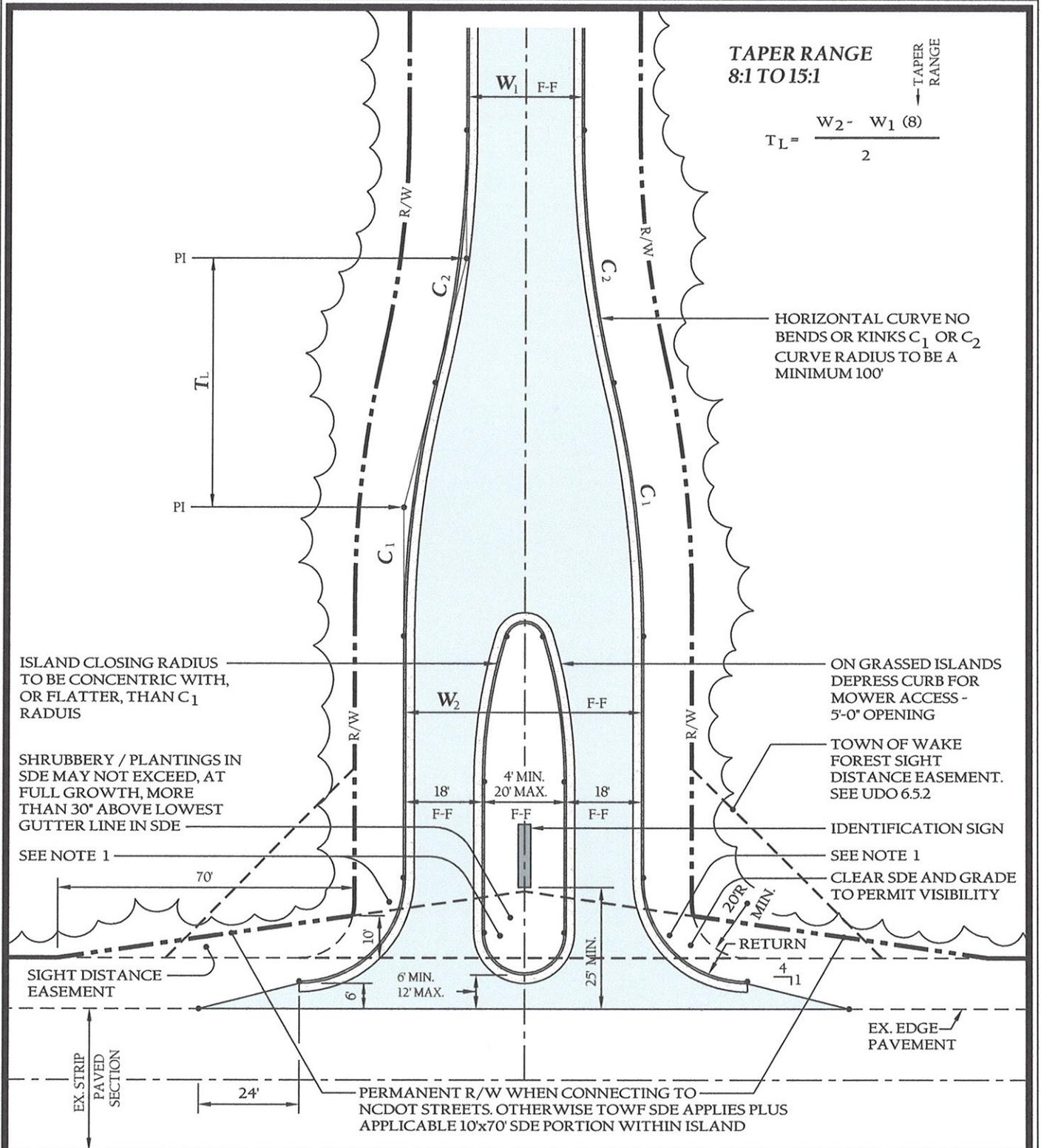


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**10' CURB DEPRESSION**

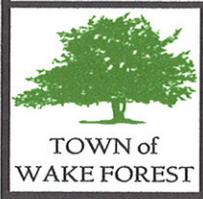
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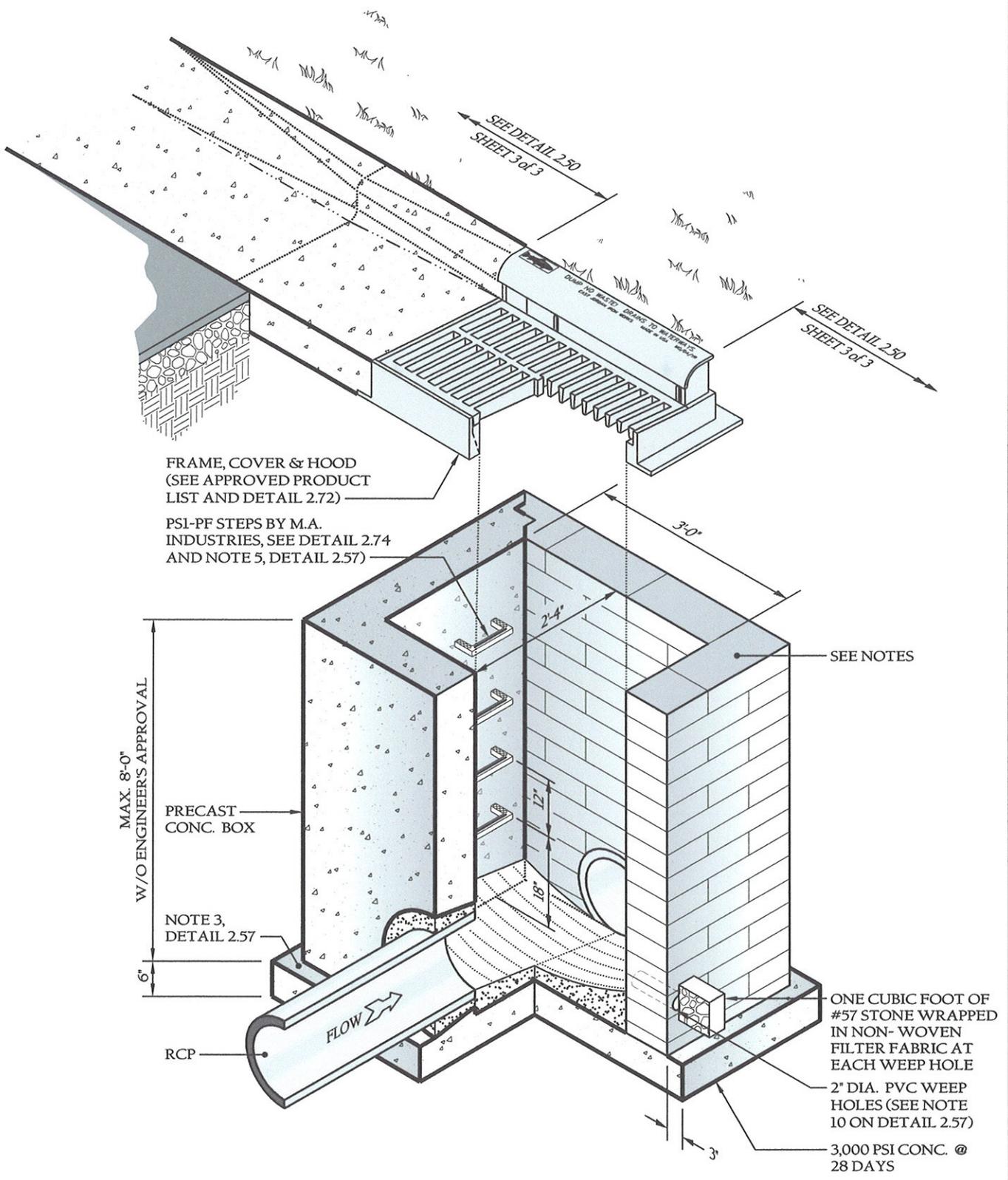


**NOTES:**

1. Refer to curb ramp details for requirements where sidewalks are required



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<b>ISLAND ENTRANCE TO EXISTING STRIP PAVED</b>	
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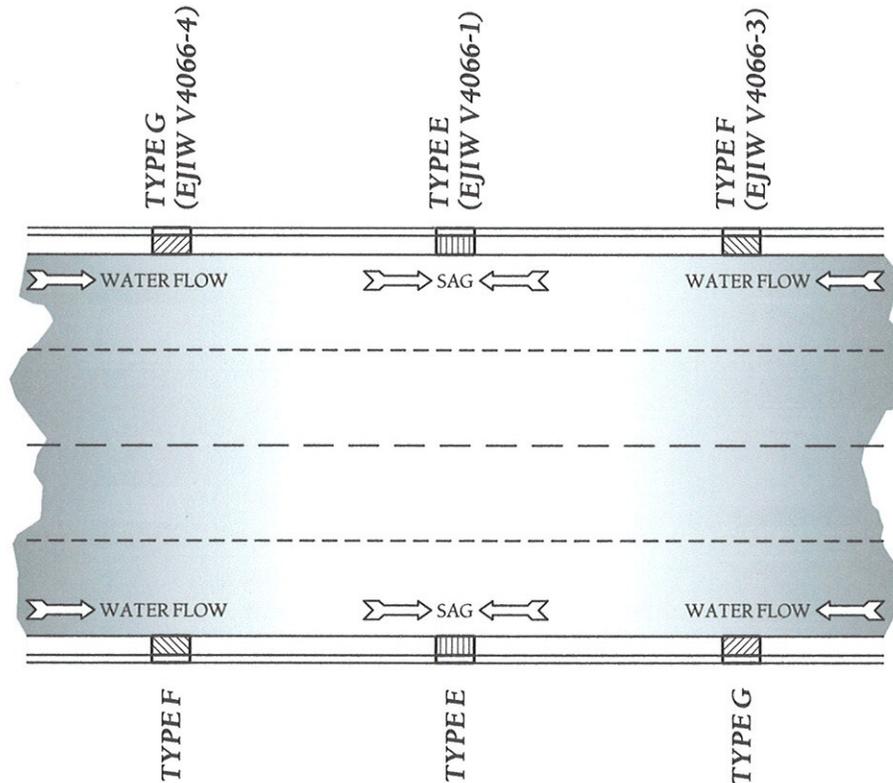
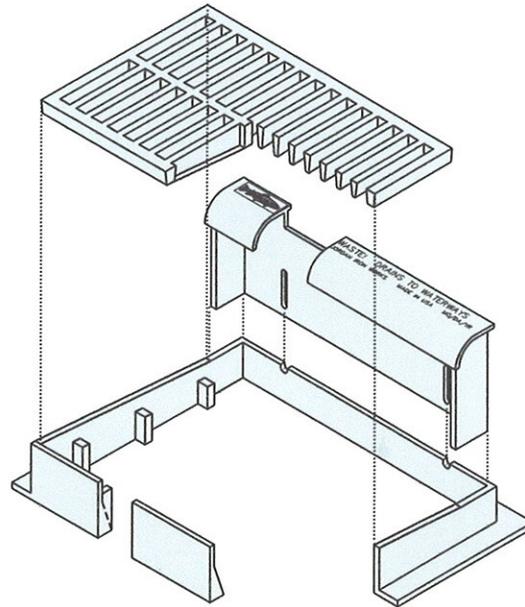


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**STD. C&G INLET W/HOOD**  
**DETAIL**

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- SEE DETAIL 2.72 AND PRE-APPROVED PRODUCT LIST. (NCDOT DETAIL 840.03 - SHOWN WITH TYPE "E" GRATE) HEAVY DUTY FRAME, COVER & HOOD
- BIKE-FRIENDLY GRATES ARE REQUIRED AT BIKE/PEDESTRIAN CORRIDORS.



**DETAIL SHOWING TYPES OF GRATES TO BE USED ACCORDING TO WATER FLOW**

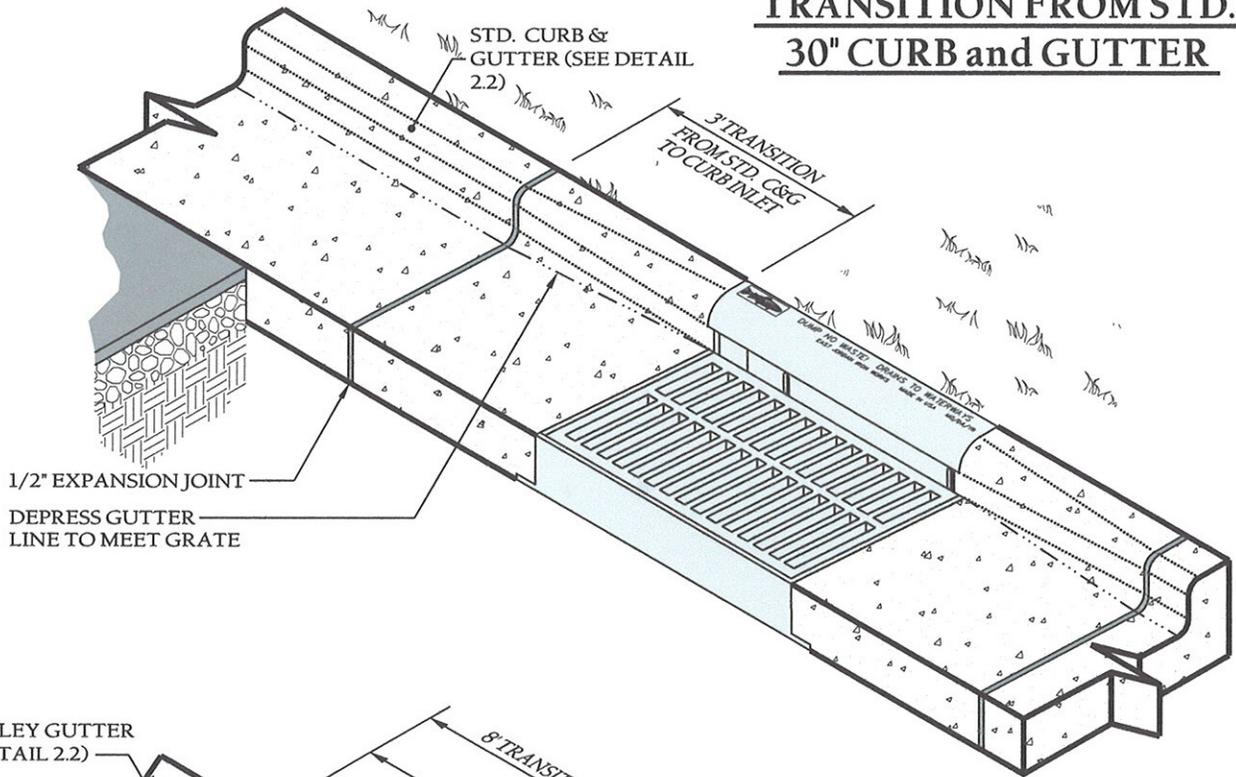


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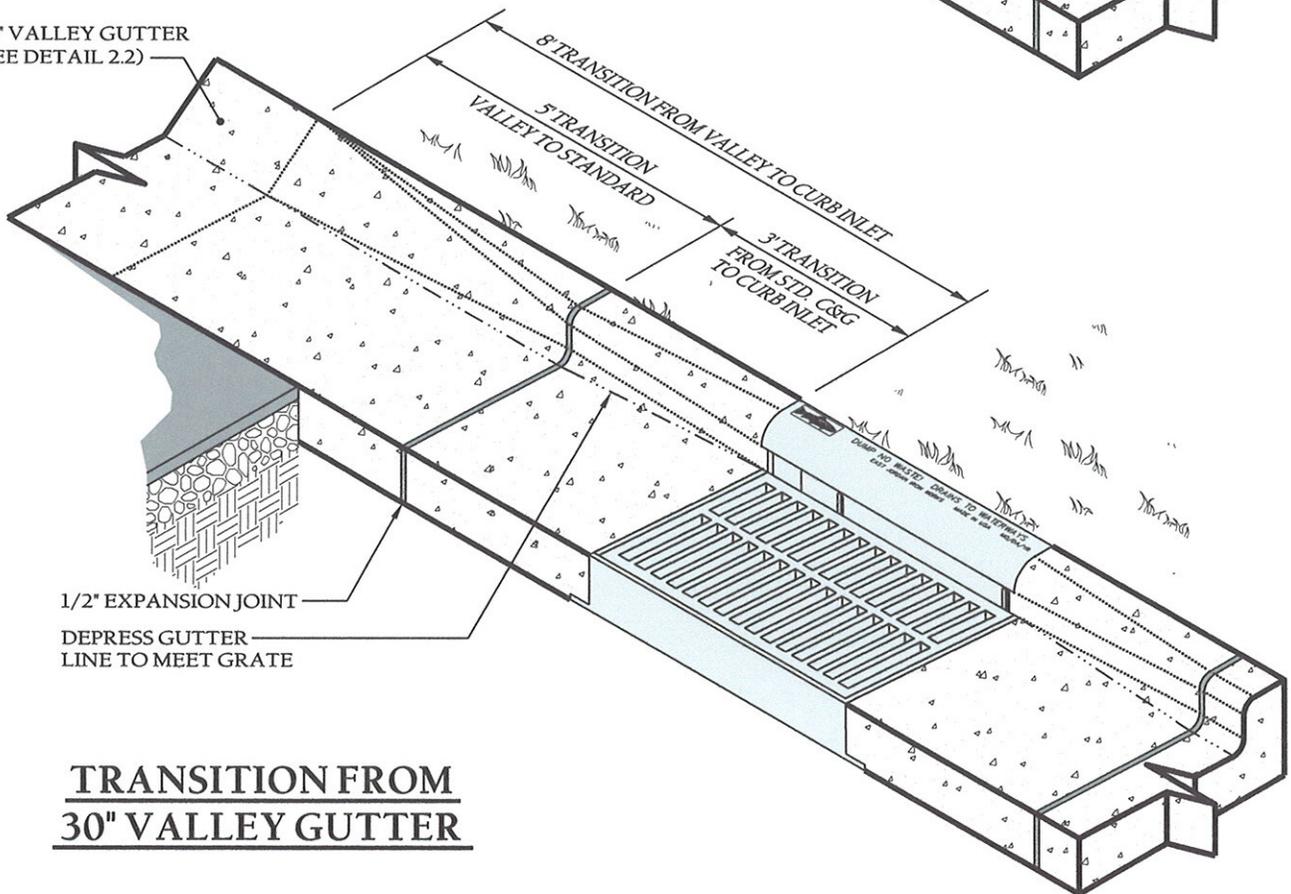
**STD. C&G INLET W/HOOD**  
**DETAIL**

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**TRANSITION FROM STD.  
30" CURB and GUTTER**



30" VALLEY GUTTER  
(SEE DETAIL 2.2)



**TRANSITION FROM  
30" VALLEY GUTTER**



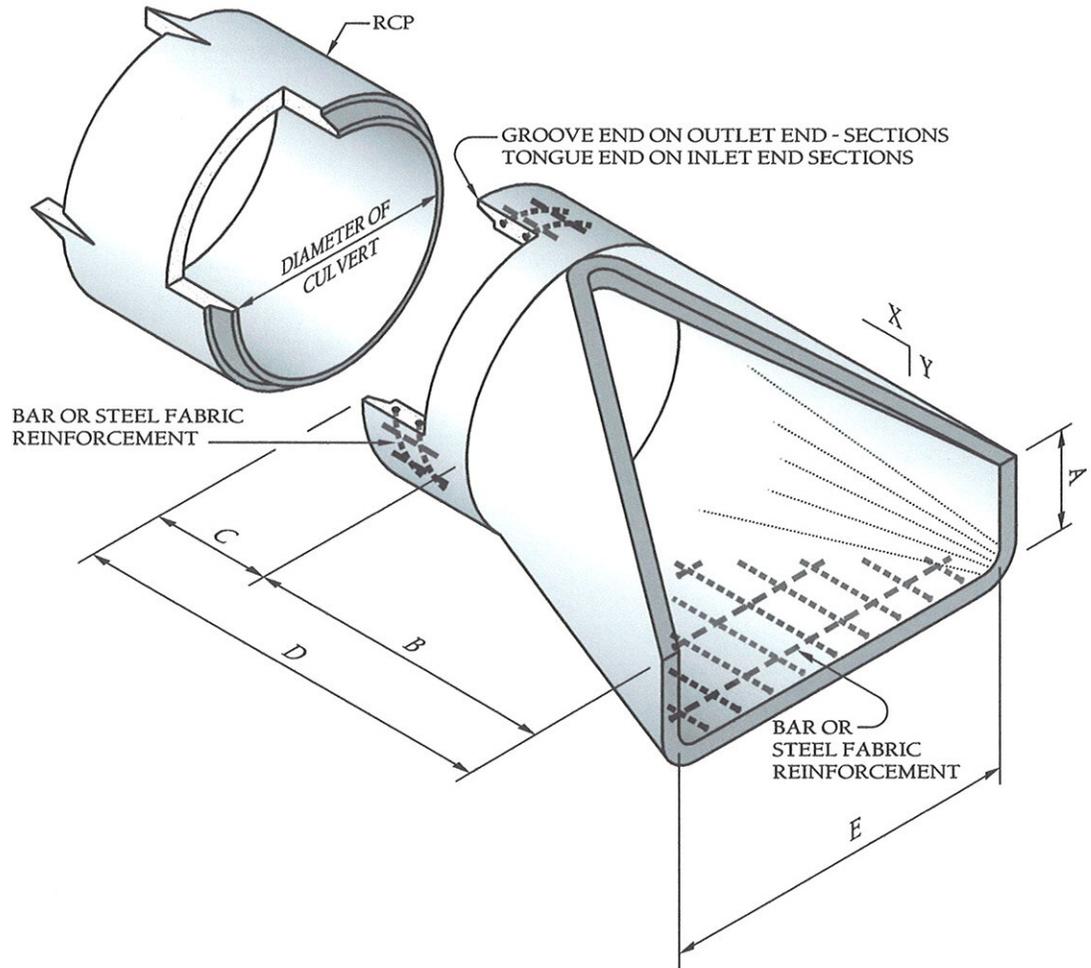
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**STD. C&G INLET W/HOOD  
DETAIL**

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END SECTION DIMENSIONS						
DIA.	A	B	C	D	E	X:Y
15"	6"	2'-3"	3'-10"	6'-1"	2'-8"	2.4:1
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"	2.4:1
24"	10"	3'-8"	2'-6"	6'-2"	4'-0"	2.3:1
30"	1'-0"	4'-6"	1'-8"	6'-2"	5'-0"	2.5:1
36"	1'-3"	5'-3"	2'-11"	8'-2"	6'-0"	2.5:1
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"	2.5:1



**NOTES:**

1. Design Of End-section Shall Conform To Standard Reinforced Sectional Concrete Culvert Pipe.
2. Any Twin Barrel System Greater Than 42" Rcp Requires a headwall.
3. Any System Of More Than 2 Pipes Requires a headwall.
4. See NCDOT "Roadway Standard Drawings" for headwall construction details.
5. See Erosion & Sedimentation Manual for dissipation pad design requirements.



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**STD. FLARED END SECTIONS**  
**DESIGN AID DETAIL**

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Table 1 Equivalent USCS <sup>a</sup> and AASHTO Soil Classifications for SIDD <sup>b</sup> Soil Designations		
SIDD	USCS	NCDOT/AASHTO
Gravelly Sand (Category I)	SW, SP, GW, GP	- NCDOT Class II-Type I (crushed stone screenings), LL < 30; PI ≤ 6. - NCDOT Class III, Type 1 (2S or 2MS), LL < 30; PI ≤ 6.
Sandy Silt (Category II)	GM, SM, Also GC, SC with less than 20% passing #200 sieve	- NCDOT Class II Type 1 (crushed stone screenings) and Class II, Type 2 (AASHTO M145 for A-2-4 with maximum PI of 6, A-4 w/ max 45% passing No. 200 Sieve and a maximum PI of 6) - NCDOT Class III, Type 1 (2S or 2MS) or Class III, Type 2 (AASHTO M145 for soil classification A-1 or A-3)
Silty Clay (Category III)	CL, MH, GC, SC	A5, A6

<sup>a</sup> Unified Soil Classification System

<sup>b</sup> Standard Installations Direct Design

Table 2 Standard Installations Soils and Minimum Compaction Requirements				
Installation Type	Bedding Thickness	Outer Bedding (B1) Note 5 (% compaction/Category)	Haunch Zone & Select Backfill Area (% compaction/Category)	Location
Type 1	B1 = Di/6 (6" min) B2 = If Rock foundation or over unsuitable foundation, 1/2"/ft of 'H', 12" min/24" max	95% Category I	90% Category I, 95% Category II	Paved Areas with 2' or less bury
Type 2	B1 = Di/6 (6" min) B2 = If Rock foundation or over unsuitable foundation, 1/2"/ft of 'H', 12" min/24" max	90% Category I	85% Category I, 90% Category II	Paved Areas with greater than 2' of bury
Type 3	B1 = Di/6 (6" min) B2 = If Rock foundation or over unsuitable foundation, 1/2"/ft of 'H', 12" min/24" max	85% Category I 90% Category II	85% Category I, 90% Category II, or 95% Category III	In R/W outside of Pavement
Type 4	B1 = Di/6 (6" min) B2 = If Rock foundation or over unsuitable foundation, 1/2"/ft of 'H', 12" min/24" max	No Compaction required, except if Category III, use 85% Category III	No Compaction required, except if Category III, use 85% Category III	Natural Areas

**NOTES:**

1. Compaction and soil symbols - i.e. "95% Category I" - refers to Category I soil material with minimum standard Proctor compaction of 95%.
2. Soil in the outer bedding, haunch, and lower side zones, except under the middle 1/3 of the pipe, shall be compacted to at least the same compaction as the majority of the soil in the overfill (backfill) zone.
3. For trenches, the top elevation shall be no lower than 0.1H below finished grade or, for road ways, its top shall be no lower than an elevation of 1-foot below the bottom of the pavement base material.
4. For trenches, the width shall be wider than shown if required for adequate space to attain the specified compaction in the haunch and bedding zones.
5. Compact outer bedding after pipe is placed and prior to placement of select fill. Middle bedding is uncompacted.
6. Overfill (Backfill) soils to be placed per standard specification 02700 Storm Drainage for the applicable backfill type and bury limitations.
7. These two tables were excerpted from Design Data 9 and modified to generally conform to the NCDOT Standards as shown in Detail 300.01, Rigid Pipe in Trench Condition.

**Reference Sources:**

1. ACPA Design Data 9 [April, 2009] (formerly Design Data 40).
2. 2012 NCDOT Standard Specifications for Roads and Structures and NCDOT Standard Details 300.01 for Rigid Pipe, "Trench Condition."



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**STORM DRAIN  
PIPE INSTALLATION**

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<b>Fill Height Table<sup>a</sup></b>				
<b>Inside Pipe Diameter D<sub>i</sub> (inches)</b>	<b>Type 3 (Bedding) Installation (0.01 Inch Crack)</b>		<b>Type 4 (Bedding) Installation (0.01 Inch Crack)</b>	
	<b>Class III Pipe Maximum Bury H (feet)</b>	<b>Class IV Pipe Maximum Bury H (feet)</b>	<b>Class III Pipe Maximum Bury H (feet)</b>	<b>Class IV Pipe Maximum Bury H (feet)</b>
15	2 min, 12 max	1 min, 20 max	3 min, 7 max	2 min, 12 max
18	2 min, 12 max	1 min, 20 max	3 min, 7 max	1 min, 13 max
24	1 min, 12 max	1 min, 20 max	2 min, 8 max	1 min, 13 max
30	1 min, 12 max	1 min, 20 max	1 min, 8 max	1 min, 13 max
36	1 min, 12 max	1 min, 20 max	1 min, 8 max	1 min, 13 max
42	1 min, 12 max	1 min, 20 max	1 min, 8 max	1 min, 13 max
48	1 min, 12 max	1 min, 19 max	1 min, 8 max	1 min, 13 max
54	1 min, 12 max	1 min, 19 max	1 min, 8 max	1 min, 13 max
60	1 min, 12 max	1 min, 19 max	1 min, 8 max	1 min, 13 max
72	1 min, 11 max	1 min, 19 max	1 min, 7 max	1 min, 13 max

**Fill Height Tables Based On:**

1. Ys= 120 pcf (backfill load)
2. AASHTO HL-93 live load
3. Positive Projecting Embankment Condition (this gives conservative results in comparison to trench conditions).
4. Pipe = Reinforced Concrete Pipe meeting ASTM C76 (AASHTO M170), wall C thickness.
5. Concrete pipe should be installed in accordance with AASHTO LRFD Bridge Construction Specifications, Section 27 or ASTM C1479.

<sup>a</sup>Fill Height Tables, the portion excerpted here, was developed by the American Concrete Pipe Association (ACPA) using the indirect design method in accordance with Section 12.10.4.3 of the AASHTO LRFD Bridge Design Specification, 4th Edition, 2007 with 2008 Interim.

**NOTES:**

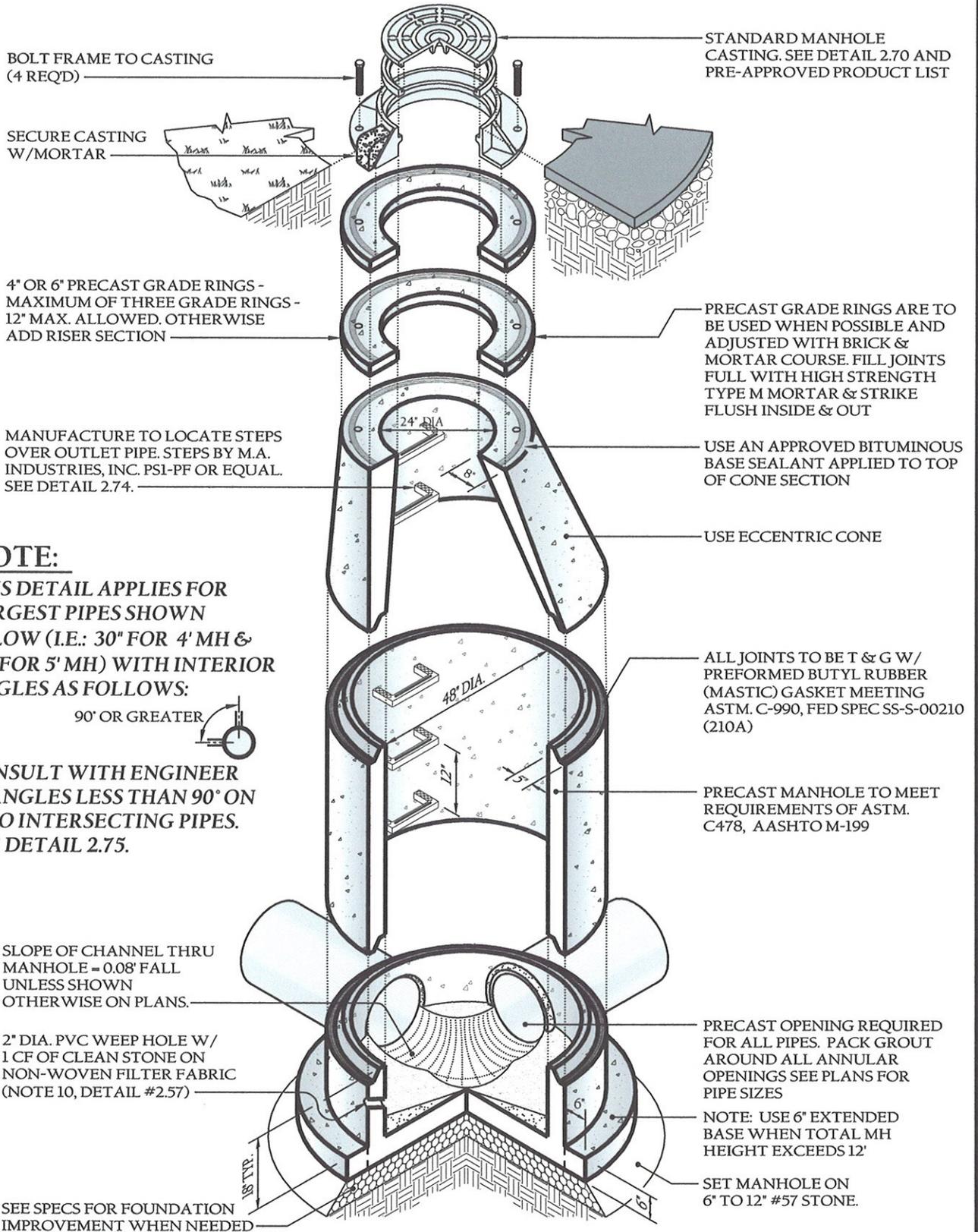
1. Greater bury depths than those shown above are achievable by either using Type 1 or 2 Installation, using Class V pipe, controlling backfill type, calculating depth using a trench condition, or by Special Design. See also Design Data 9 published by the ACPA for design methodology.
2. In lieu of calculating bury depth for other conditions, first see "LRFD Fill Height Tables for Concrete Pipe", last revised July 2009 (or later), prepared by the ACPA for other bury depth possibilities.



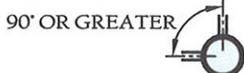
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**STORM DRAIN  
PIPE INSTALLATION**

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**NOTE:**  
 THIS DETAIL APPLIES FOR LARGEST PIPES SHOWN BELOW (I.E.: 30" FOR 4' MH & 42" FOR 5' MH) WITH INTERIOR ANGLES AS FOLLOWS:



CONSULT WITH ENGINEER IF ANGLES LESS THAN 90° ON TWO INTERSECTING PIPES. SEE DETAIL 2.75.

SLOPE OF CHANNEL THRU MANHOLE = 0.08' FALL UNLESS SHOWN OTHERWISE ON PLANS.

2" DIA. PVC WEEP HOLE W/ 1 CF OF CLEAN STONE ON NON-WOVEN FILTER FABRIC (NOTE 10, DETAIL #2.57)

SEE SPECS FOR FOUNDATION IMPROVEMENT WHEN NEEDED

NOTE: USE 6" EXTENDED BASE WHEN TOTAL MH HEIGHT EXCEEDS 12'

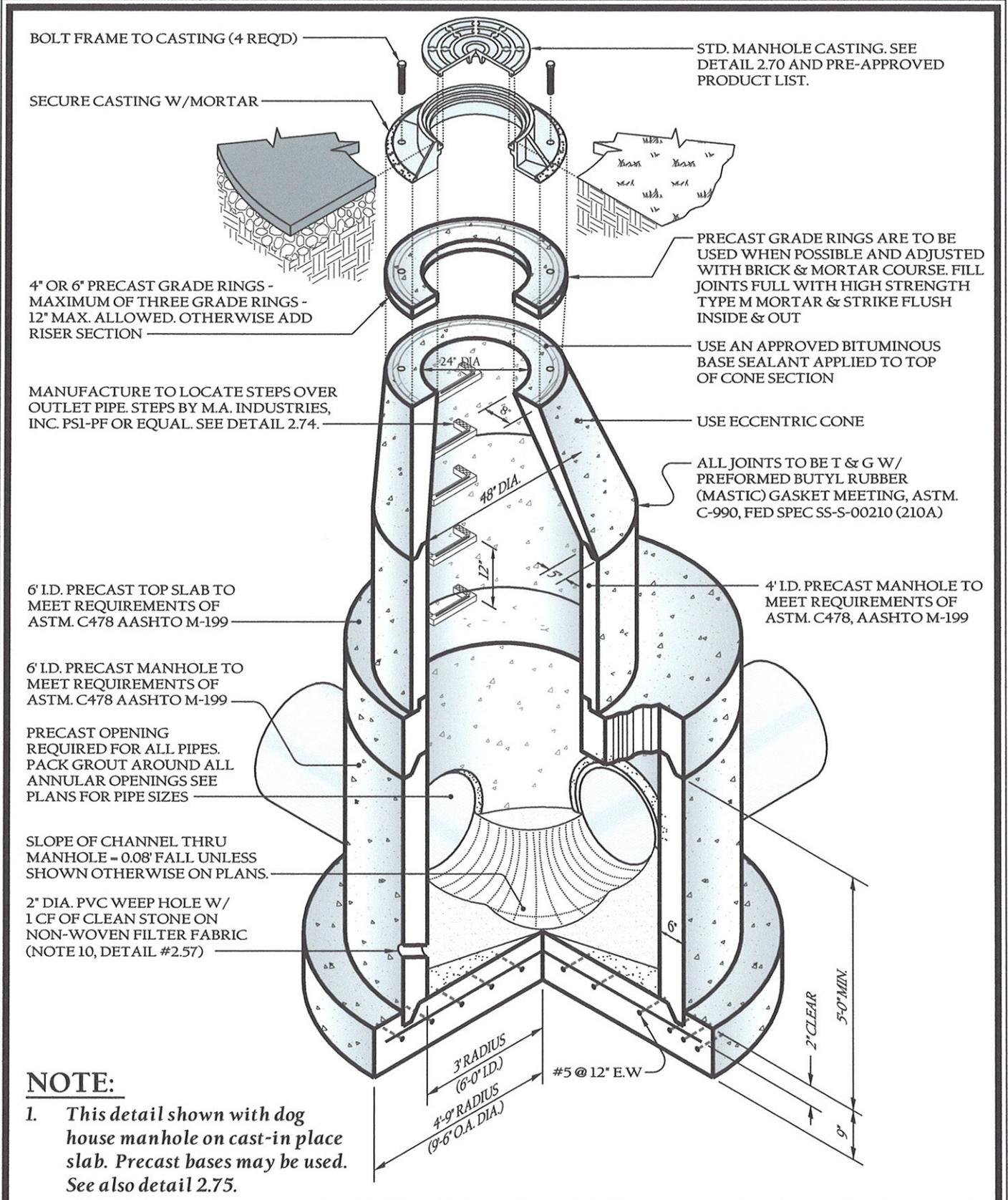
SET MANHOLE ON 6" TO 12" #57 STONE.



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**PRECAST CONCRETE**  
**4' DIA. MH JB**

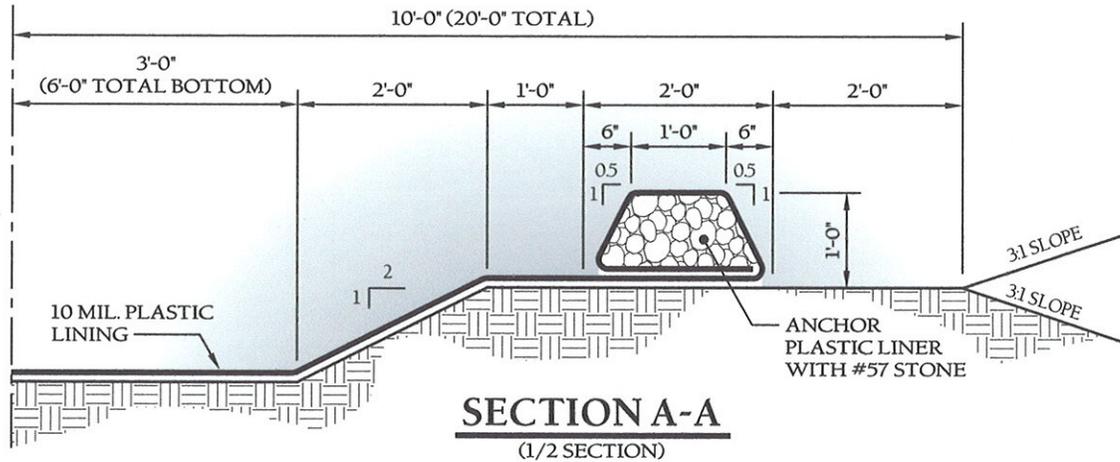
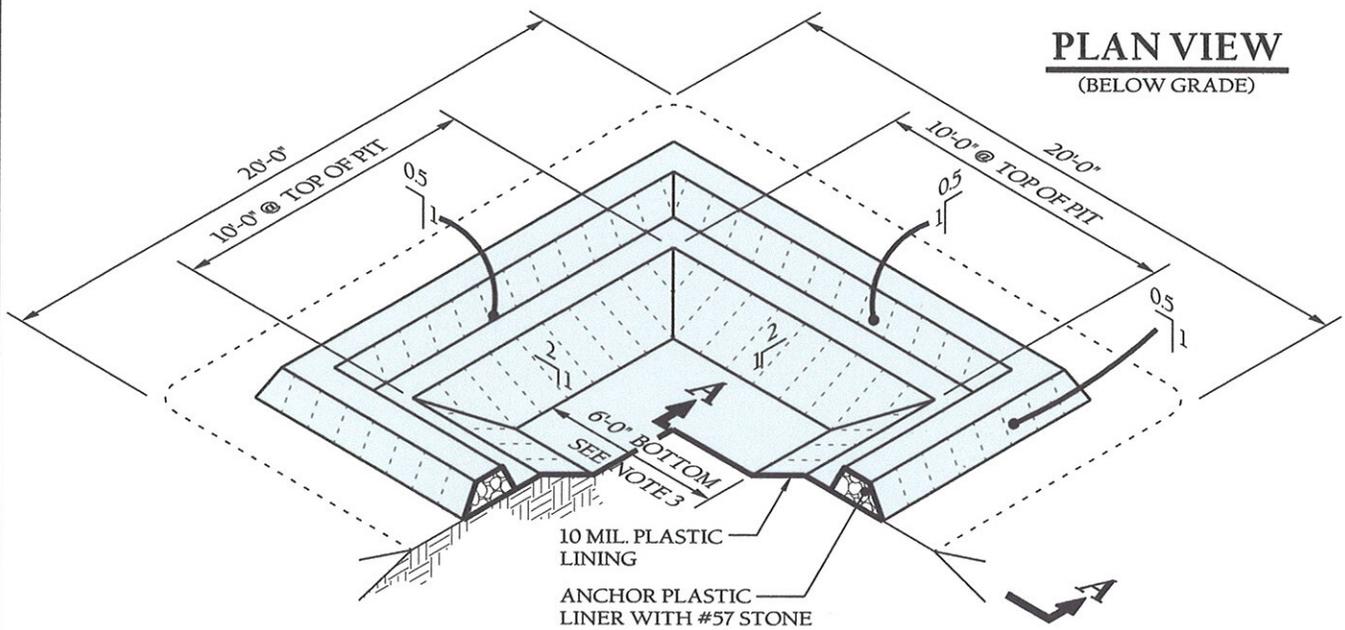
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**PRECAST CONCRETE**  
**6' TO 4' DIA. MHJB**

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**EXCAVATED PIT WITH STONE SUPPORT**  
NOT TO SCALE

**STONE SUPPORT NOTES:**

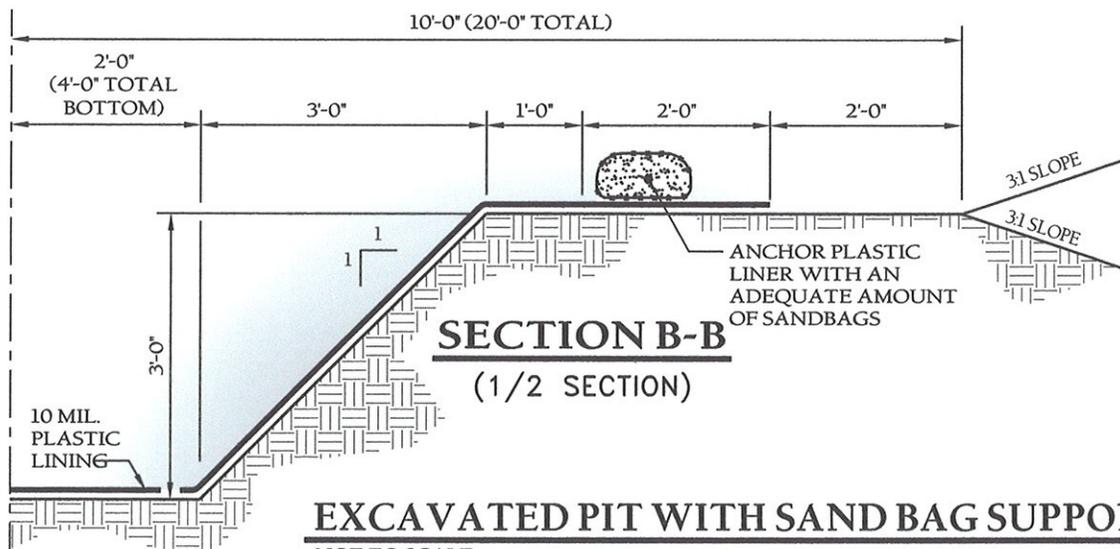
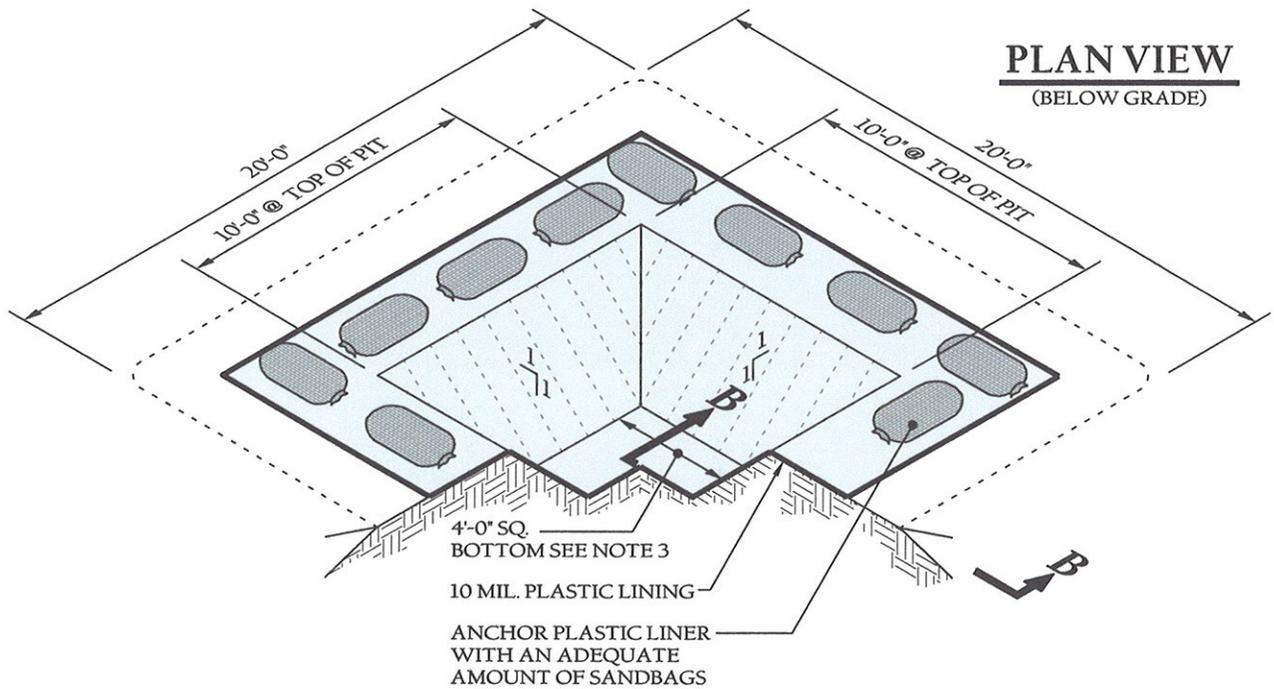
1. Actual layout to be determined in field.
2. The "concrete washout" sign shall be installed within 30 ft of the temporary concrete washout facility.
3. Pit capacity is minimum of 6 cu ft per 10 cu yd of concrete.
4. Contractor to coordinate with usage contracting officer for proper disposal of concrete.



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**CONCRETE WASHOUT  
PIT DETAIL**

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**SAND BAG SUPPORT NOTES:**

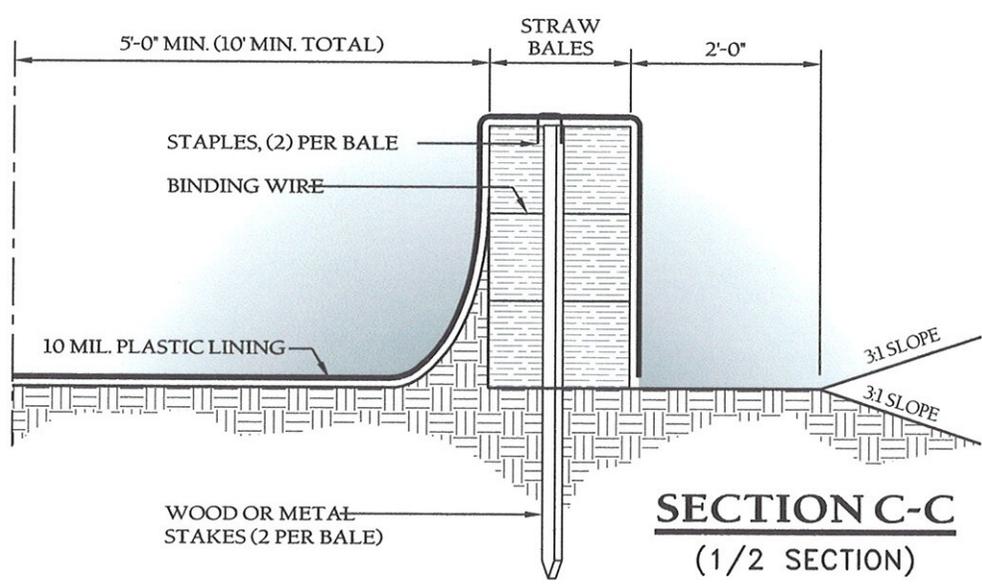
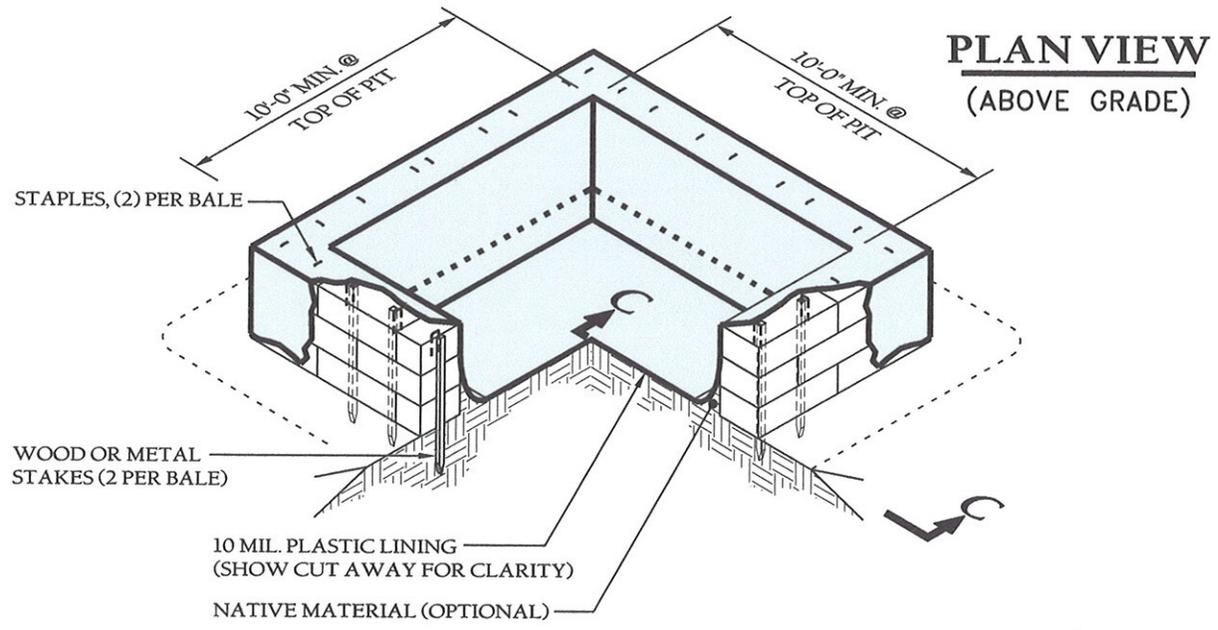
1. Actual layout to be determined in field.
2. The "concrete washout" sign shall be installed within 30 ft of the temporary concrete washout facility.
3. Pit capacity is minimum of 6 cu ft per 10 cu yd of concrete.
4. Contractor to coordinate with usage contracting officer for proper disposal of concrete.



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**CONCRETE WASHOUT  
PIT DETAIL**

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**ELEVATED PIT WITH STRAW BALE DETENTION WALLS**  
NOT TO SCALE

**STRAW BALE DETENTION NOTES:**

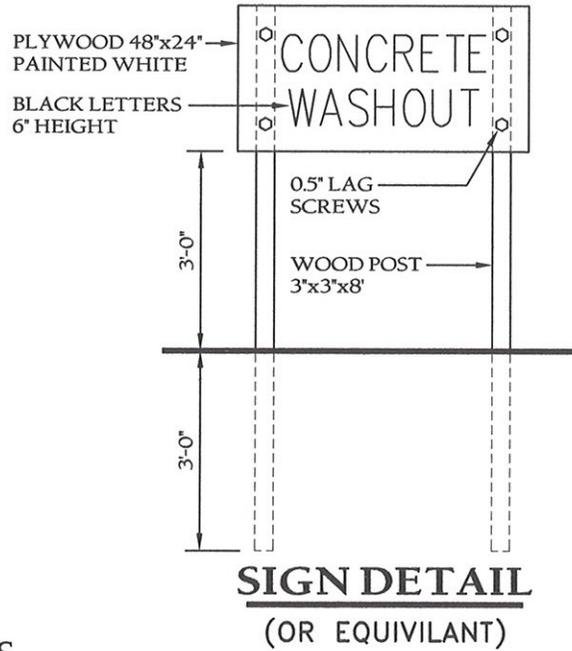
1. Actual layout to be determined in field.
2. The "concrete washout" sign shall be installed within 30 ft of the temporary concrete washout facility.
3. Pit capacity is minimum of 6 cu ft per 10 cu yd of concrete.
4. Contractor to coordinate with usage contracting officer for proper disposal of concrete.



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**CONCRETE WASHOUT  
PIT DETAIL**

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**CONCRETE WASHOUT DETAIL NOTES**

Concrete washouts are used to contain concrete and liquids when the chutes of concrete mixers and hoppers of concrete pumps are rinsed out after delivery. The washout facilities consolidate solids for easier disposal and prevent runoff of liquids. The wash water is alkaline and contains high levels of chromium, which can leach into the ground and contaminate groundwater. It can also migrate to a storm drain, which can increase the pH of area waters and harm aquatic life. Revised NPDES and NC General Construction Permits require the use of concrete washout areas on all sites using concrete:

1. No concrete or cement slurry shall be discharged from the site.
2. Any hardened concrete residue shall be disposed of, or recycled on site, in accordance with local and state solid waste regulations.
3. Concrete washout area to be minimum 50' from storm drain inlets and surface waters (ie, detention pond, ditches, etc).
4. Prefabricated washout container or pit equal detail provided may be used if approved by Engineer.
5. Install concrete washout pit at all construction entrances used by concrete trucks.
6. Dimensions may be modified to fit topography. Provide minimum 100 Sf. of surface area level.
7. Locations shown on plans are for illustrative purposes only. Contractor shall determine final number of pits required, and their placement.
8. Inspection:
  - a. Contractor to check all concrete washout facilities daily to determine if they have been filled to 75% capacity, which is when materials need to be removed.
  - b. Both above- and below- ground self-installed washouts should be inspected daily to ensure that plastic linings are intact and sidewalls have not been damaged by construction activities. Contractor to repair plastic lining as needed.
  - c. Prefabricated washout containers should be inspected daily as well to ensure the container is not leaking or nearing 75 percent capacity.
  - d. Inspectors should also note whether the facilities are being used regularly.
6. Material Removal:
  - a. Concrete washouts are designed to promote evaporation where feasible. However, if stored liquids have not evaporated and the washout is nearing capacity, vacuum and dispose of them in an approved manner - check with the local sanitary sewer authority to determine if there are special disposal requirements for concrete wash water.
  - b. Remove liquids or cover the structures before predicted rainstorms to prevent overflows. Companies that offer prefabricated and watertight washout containers generally offer a vacuum service to remove the liquid material.
  - c. Contractor to remove hardened solids or reuse onsite or haul them away for recycling.
  - d. When removing materials from the concrete washout, building a new structure or, if the previous structure is still intact, Contractor is to inspect the structure for signs of weakening or damage and make any necessary repairs. Line the structure with new plastic that is free of holes or tears and replace signage if necessary. It is very important that new plastic is used after every cleaning because pumps and concrete removal equipment can damage the existing liner.
7. At completion of project, washout area to be backfilled and graded to be level with existing grade..
8. General Contractor is to educate concrete subcontractors, post signage indicating the location and designated use of these areas, and provide careful oversight to inspect for evidence of improper dumping of concrete waste and wash water. Contractor should include requirements in contracts with concrete delivery companies that drivers must use designated concrete washout facilities.



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**CONCRETE WASHOUT  
PIT DETAIL**

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