NCDOT PIPE MATERIAL SELECTION GUIDE						
	RCP (REINFORCED CONCRETE) AASHTO M170		CSP (CORRUGATED STEEL) AASHTO M36 2 ¾ X ½ CORRUGATION <sup>3</sup>	CAAP (CORRUGATED ALUMINUM) AASHTO M196 2 <sup>2</sup> / <sub>3</sub> x ½ CORRUGATION <sup>3</sup>	HDPE AASHTO M294 ASTM F2764 PVC-ASTM OR AASHTO M330 AASHTO M304	NOTES
FILL TABLES	MIN. MAX. M 2.0' 10.0' 2 (FOR FILLS > 40' 8 METHOD. NOTE: D MUST HAVE A MI WHEN FILL HEIGH STRUCTURE AND TO AND UNDER SHOULDER BERM BARRIER ARE 1' OF WHEN THE FILL H SUBGRADE) FOR R PAVEMENT ARE 1'	CLASS III CLASS IV CLASS V  IN. MAX. MIN. MAX. MIN. MAX.  1.0' 20.0' 1.0' 30.0' 1.0' 40.0'  3 < 80' USE LRFD DIRECT DESIGN  INFECT DESIGN METHOD RCP PIPES  NIMUM DIAMETER OF 36".)  HTS (NOT INCLUDING THE PAVEMENT  CURB) FOR RCP RUNNING PARALLEL  CURB AND GUTTER, EXPRESSWAY GUTTER,  GUTTER AND ADJACENT TO MEDIAN  R LESS, SPECIFY CLASS IV RCP.  HEIGHTS (FROM TOP OF PIPE TO  CCP RUNNING UNDER/ACROSS THE  OR LESS, SPECIFY CLASS V RCP.  E CLASS OF RCP IN A SINGLE RUN	Ca   16	24"       1.0'         30"       1.0'         36"       1.0'         42"       1.0'         48"       1.0'         54"       1.0'         60"       1.0'         54"       1.0'         66"       1.0'         72"       1.0'	15"     2.0'     20'     15"     1.0'     20'     15"     2.0'     30'       18"     2.0'     20'     18"     1.0'     20'     18"     2.0'     30'	1- RCP IS NOT ALLOWED FOR GRADES >10% 2- FOR COUNTIES LISTED IN ARTICLE 310-0 OF THE STANDARD SPECIFICATIONS CSP IS NOT ALLOWED. IN OTHER COUNTIES CSP REQUIRES AN ACCEPTABLE COATING IN ACCORDANCE WITH 1032-4.  3- FOR DIFFERENT CORRUGATIONS AND ARCH PIPES REFER TO ROADWAY DESIGN MANUAL AND MANUFACTURERS SPECIFICATION.  4- MINIMUM FILL HEIGHT IS MEASURED FROM TOP OF PIPE TO SUBGRADE.  5- WHERE SITE CONDITIONS ALLOW, INCREASE PIPE SIZE A MINIMUM ONE SIZE FOR FUTURE MAINTENANCE AND REHABILITATION.  6- FOR PIPE RUNS WITH GREATER THAN 12' VERTICAL DROP TO DOWNSTREAM STRUCTURE, PROVIDE A MEANS TO REDUCE RISK OF UNINTENDED ENTRY INTO UPSTREAM END OF PIPE.  7- FILL HEIGHTS SHOWN WERE CALCULATED USING AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS. JUSTIFY FILL HEIGHT OR DESIGN DEVIATIONS WITH STRUCTURAL DESIGN BASED ON AASHTO LRFD BRIDGE DESIGN OR ASTM STANDARDS. SUBMIT DESIGN SEALED BY AN NC PE FOR REVIEW & APPROVAL BY NCDOT.
OPEN END CROSS PIPES	PRIMARY SECONDARY	CAN BE USED  CAN BE USED  CAN BE USED	USE ONLY IF PIPE SLOPE IS GREATER THAN 10%  USE ONLY IF PIPE SLOPE IS GREATER THAN 10%  CAN BE USED  USE ONLY AT SYSTEM INLETS &	USE ONLY IF PIPE SLOPE IS GREATER THAN 10%  USE ONLY IF PIPE SLOPE IS GREATER THAN 10%  CAN BE USED  USE ONLY AT SYSTEM INLETS &	DO NOT USE  USE ONLY IF TRAFFIC < 10000 ADT & <200 DUALS & <100 TTST  CAN BE USED	FOUND IN CHAPTER 5 OF THE ROADWAY DESIGN MANUAL. THE APPROPRIATE CLASS OF PIPE FOR RCP AND GAUGE THICKNESS FOR CSP/CAAP SHOULD BE SELECTED BASED ON FILL HEIGHT.  SITE SPECIFIC CONDITIONS MAY LIMIT A PARTICULAR MATERIAL BEYOND WHAT IS IDENTIFIED IN THE TABLE. THESE CONDITIONS INCLUDE, BUT ARE NOT LIMITED TO, ABRASION, ENVIRONMENTAL, SOIL RESISTIVITY AND PH, HIGH GROUND WATER AND SPECIAL LOADING CONDITIONS. THE HYDRAULIC
STORM DRAIN SYSTEMS	INTERSTATE PRIMARY	CAN BE USED	SYSTEM OUTLET IF PIPE SLOPE IS GREATER THAN 10% USE ONLY AT SYSTEM INLETS & SYSTEM OUTLET IF PIPE SLOPE	SYSTEM OUTLET IF PIPE SLOPE  IS GREATER THAN 10%  USE ONLY AT SYSTEM INLETS &  SYSTEM OUTLET IF PIPE SLOPE	USE ONLY IF TRAFFIC < 10000 ADT & <200 DUALS & <100	DESIGN ENGINEER WILL DETERMINE IF ADDITIONAL RESTRICTIONS ARE NECESSARY.  DEFINITIONS
	SECONDARY	CAN BE USED	IS GREATER THAN 10%  USE ONLY AT SYSTEM INLETS & SYSTEM OUTLET IF PIPE SLOPE IS GREATER THAN 10%  USE ONLY IF PIPE SLOPE	IS GREATER THAN 10%  USE ONLY AT SYSTEM INLETS & SYSTEM OUTLET IF PIPE SLOPE IS GREATER THAN 10%  USE ONLY IF PIPE SLOPE	CAN BE USED  DO NOT USE	SIDE DRAINS— STORM DRAIN PIPES RUNNING PARALLEL TO THE ROADWAY TO INCLUDE PIPES IN THE MEDIANS, OUTSIDE DITCHES, DRIVEWAYS AND UNDER SHOULDER BERM GUTTER ALONG
TRANSVERSE MEDIAN PIPES	PRIMARY  SECONDARY	CAN BE USED  CAN BE USED  CAN BE USED	IS GREATER THAN 10%  USE ONLY IF PIPE SLOPE IS GREATER THAN 10%  CAN BE USED	IS GREATER THAN 10%  USE ONLY IF PIPE SLOPE IS GREATER THAN 10%  CAN BE USED	USE ONLY IF TRAFFIC < 10000 ADT & <200 DUALS & <100 TTST  CAN BE USED	OUTSIDE SHOULDERS GREATER THAN 4' WIDE. MAY OR MAY NOT BE OPEN ENDED. 1' MINIMUM COVER FOR ALL SIDE DRAIN PIPE IN ACCORDANCE WITH STANDARD SPECIFICATIONS.  STORM DRAIN SYSTEMS— LATERAL DRAIN PIPE UNDER CURB AND GUTTER, EXPRESSWAY GUTTER AND SHOULDER BERM GUTTER (WITH
SLOPE DRAINS	INTERSTATE	DO NOT USE	CAN BE USED	CAN BE USED	CAN BE USED	SHOULDERS 4' WIDE OR LESS) THAT CONNECT DRAINAGE STRUCTURES AND IS NOT OPEN ENDED. ALSO INCLUDES CROSS DRAIN CONNECTING TWO OR MORE SYSTEMS OR SYSTEM OUTLETS. ONLY PIPE WITH SMOOTH WALL INSIDE WALLS WILL BE ALLOWED FOR
	PRIMARY SECONDARY	DO NOT USE	CAN BE USED  CAN BE USED	CAN BE USED	CAN BE USED	STORM DRAIN SYSTEMS.  TRANSVERSE MEDIAN PIPES— SHALLOW CROSS DRAIN PIPE THAT COLLECTS DRAINAGE IN A MEDIAN DITCH OR CURB SECTION AND DEPOSITS IT OUTSIDE DITCHES OR NATURAL
SIDE DRAINS	INTERSTATE	CAN BE USED	CAN BE USED	CAN BE USED	CAN BE USED	DRAINAGE CHANNELS. MAY OR MAY NOT BE OPEN ENDED.  ALTERNATE PIPE – PIPE IN WHICH MATERIAL IS UNSPECIFIED ON THE DRAINAGE SUMMARY SHEET AND DRAINAGE PLANS.
	PRIMARY	CAN BE USED	CAN BE USED	CAN BE USED	CAN BE USED	HDPE- HIGH DENSITY POLYETHYLENE  PP- POLYPROPYLENE  Printed 10/1/2019 Revised 09/24/2019