



THIS FIGURE IS ONLY MEANT TO DEFINE THE MINIMUM INFORMATION REQUIRED BY THE CITY OF CHARLOTTE TO BE INCLUDED IN A DETAIL FOR THIS TYPE OF TECHNIQUE. THIS FIGURE IS NOT MEANT TO REPRESENT A STANDARD DESIGN METHOD FOR THIS TYPE OF TECHNIQUE AND SHALL NOT BE USED AS SUCH.

NOT TO SCALE



CHARLOTTE-MECKLENBURG
STORM WATER SERVICES
GENERIC DETAIL REQUIREMENTS

TOE PROTECTION - BOULDER AND RIPRAP

DRAFT - NOT TO BE USED FOR CONSTRUCTION

SHEET NUMBER	
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PHOTO: RIPRAP TOE PROTECTION

DIMENSIONS (VALUES TO BE PROVIDED BY DESIGNER)			
VARIABLE	VALUES	TYPICAL UNIT	DESCRIPTION
X1		IN. OR FT.	TOE PROTECTION PLACEMENT FROM TOP OF BANK
X2		IN. OR FT.	TOE PROTECTION HEIGHT
X3		IN. OR FT.	TOE PROTECTION RELATIONSHIP TO APPROXIMATE BASE FLOW WATER LEVEL
X4		IN. OR FT.	TRANSPLANT HEIGHT
X5		FT.	BOULDER TOE PROTECTION/BEDDING MATERIAL WIDTH
X6		FT.	COARSE BACKFILL/RIPRAP HEIGHT
X7		IN. OR FT.	BOULDER LENGTH
X8		IN. OR FT.	BOULDER WIDTH
X9		IN. OR FT.	BOULDER THICKNESS
X10		IN.	D50 OF COARSE BACKFILL OR RIPRAP
X11		IN. OR FT.	TRANSPLANT SPACING
X12		IN. OR FT.	TOE PROTECTION EMBEDMENT INTO STREAMBED
X13		FT.	MAXIMUM SCOUR WIDTH
X14		FT.	BOULDER BEDDING MATERIAL DEPTH

NOTES:

1. RIPRAP OR BOULDER TOE PROTECTION MAY BE USED ALONE OR IN COMBINATION WITH ANOTHER STREAM BANK/SLOPE STABILIZATION MEASURE. IF USED IN COMBINATION WITH ANOTHER MEASURE, INFORMATION REGARDING THE OTHER MEASURE(S) SHALL BE ADDED TO THE TOE PROTECTION DETAIL OR DETAILED SEPARATELY AND REFERENCED HEREIN.
2. BOULDER TOE PROTECTION SHALL CONSIST OF ONE OR MORE ROWS OF STACKED BOULDERS. THE BOULDERS SHOULD BE FLAT-SIDED AND OF A SIZE SPECIFIED BY THE DESIGNER. BOULDERS SHALL BE INSTALLED A SPECIFIED DEPTH BELOW THE STREAM BED. A BEDDING MATERIAL AS SPECIFIED BY THE DESIGNER SHALL BE USED UNDER THE BOULDERS IF NECESSARY.
3. A COARSE BACKFILL AS SPECIFIED BY THE DESIGNER SHALL BE PLACED TO FILL THE VOIDS BETWEEN AND BEHIND THE STACKED BOULDERS.
4. SOIL BACKFILL SHALL BE PLACED TO TRANSITION BETWEEN THE STREAM BANK AND TOE PROTECTION. TRANSPLANTS MAY BE INSTALLED ABOVE BOULDER OR RIPRAP TOE PROTECTION. TRANSPLANT SPECIES AND SIZE SHALL BE SHOWN IN A TABLE ON THIS DETAIL OR DETAILED SEPARATELY (E.G. – ON A PLANTING PLAN) AND REFERENCE HEREIN.
5. RIPRAP TOE PROTECTION SHALL CONSIST OF ANGULAR, GRADED BLAST ROCK AS SPECIFIED BY THE DESIGNER. THICKNESS OF RIPRAP TOE PROTECTION MAY VARY, WITH A THICKER LAYER AT THE APPROXIMATE BASE FLOW WATER LEVEL.
6. FILTER FABRIC SHALL BE PLACED UNDER TOE PROTECTION. THE TYPE OF FABRIC SHALL BE SPECIFIED BY THE DESIGNER.
7. THE PLAN VIEW ILLUSTRATES A PERPENDICULAR PERSPECTIVE OF EACH SURFACE DEPICTED IN THE CROSS SECTION. THERE IS NO FORESHORTENING OF THE STREAM BANK (OR ANY OTHER SLOPED SURFACE) IN THE PLAN VIEW.

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