STORM DRAIN OUTLET PROTECTION

DEFINITION

Paved and/or rip-rapped channel sections, placed below storm drain outlets.

PURPOSE

To reduce velocity of flow before entering receiving channels below storm drain outlets.

CONDITIONS

This standard applies to all storm drain outlets, road culverts, paved channel outlets, etc., discharging into natural or constructed channels. Analysis and/or treatment will extend from the end of the conduit, channel or structure to the point of entry into an existing stream or publicly maintained drainage system.

DESIGN CRITERIA

Structurally lined aprons at the outlets of pipes and paved channel sections shall be designed according to the following criteria.

Capacity

Peak storm flow from the 25-year, 24-hour frequency storm or the storm specified in Title 12-7-1 of the Official Code of Georgia Annotated or the design discharge of the water conveyance structure, whichever is greater.

Tail Water Depth

The depth of tail water immediately below the pipe outlet must be determined for the design capacity of the pipe. Manning's Equation may be used to determine tail water depth. If the tail water depth is less than half the diameter of the outlet pipe, it shall be classified as a Minimum Tail water Condition. If the tail water depth is greater than half the pipe diameter, it shall be classified as a Maximum Tail water Condition. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tail water Condition.

Apron Length and Thickness

The apron length and d50, stone median size, shall be determined from the curves according to tail water conditions: Minimum Tailwater-Use Figure 6-24.1* Maximum Tailwater-Use Figure 6-24.2* Maximum Stone Size=1.5xd50 Apron Thickness=1.5xdmax

Apron Width

If the pipe discharges directly into a well-defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tail water depth or to the top of the bank (whichever is less). If the pipe discharges onto a flat area with no defined channel, the width of the apron shall be determined as follows:

a. The upstream end of the apron, adjacent to the pipe, shall have a width three times the diameter of the outlet pipe.

b. For a Minimum Tail water Condition, the downstream end of the apron shall have a width equal to the pipe diameter plus the length of the apron. Refer to Figure 6-24.1

c. For a Maximum Tail water Condition, the downstream end shall have a width equal to the pipe diameter plus 0.4 times the length of the apron. Refer to Figure 6-24.2.

Bottom Grade

The apron shall be constructed with no slope along its length (0.0% grade). The invert elevation of the downstream end of the apron shall be equal to the elevation of the invert of the receiving channel. There shall be no overfall at the end of the apron.

Side slope

If the pipe discharges into a well-defined channel, the side slopes of the channel shall not be steeper than 2:1.

Alignment

The apron shall be located so that there are no bends in the horizontal alignment.

Geotextile

Geotextiles should be used as a seperator between the grade stone, the soil base, and the abutments. The geotextile will prevent the migration of soil particles from the subgrade stone. The geotextile should be specified in accordance with AASHTO M288-06 Section 8, Geotextile Property Requirements. The geotextile should be placed immediately adjacent to the subgrade without any voids.

Materials

The apron may be lined with riprap, grouted riprap, or concrete. The median sized stone for rip rap, d50, shall be determined from the curves, according to the tail water condition. The gradation, quality and placement of rip rap shall conform to Appendix C.*

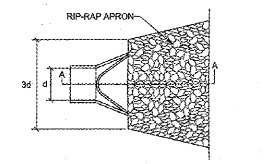
CONSTRUCTION SPECIFICATIONS

1. Ensure that the subgrade for the filter and rip rap follows the required lines and grades shown on the plan. Compact any fill required in the subgrade to the density of the surrounding undisturbed material. Low areas in the subgrade on undisturbed soil may also be filled by increasing the rip rap thickness.
2. The rip rap and gravel filter must conform to the specified grading limits shown on the plans.
3. Geotextile must meet design requirements and be properly protected from punching or tearing during installation. Repair any damage by removing the rip rap and placing another piece of filter fabric over the damaged area. All connecting joints should overlap a minimum of 1 ft. If the damage is extensive, replace the entire filter fabric.
4. Rip rap may be placed by equipment, but take care to avoid damaging the filter.
5. The minimum thickness of the rip rap should be 1.5 times the maximum stone diameter.
6. Construct the apron on zero grade with no overfall at the end. Make the top of the rip rap at the downstream end level with the receiving area or slightly below it.
7. Ensure that the apron is properly aligned with the receiving stream and preferably straight throughout its length. If a curve is needed to fit site conditions, place it in the upper section of the apron.
8. Immediately after construction, stabilize all disturbed areas with vegetation.
9. Stone quality - Select stone for rip rap from field stone or quarry stone. The stone should be hard, angular, and highly weather-resistant. The specific gravity of the individual stones should be at least 2.5.
10. Filter - Install a filter to prevent soil movement through the openings in the rip-rap The filter should consist of a graded gravel layer or a synthetic filter cloth.

MAINTENANCE

Inspect rip rap outlet structures after heavy rains to see if any erosion around or below the rip rap has taken place or if stones have been dislodged. Immediately make all needed repairs to prevent further damage.

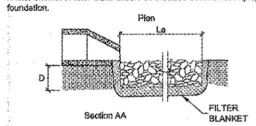
Pipe Outlet to Flat Area- No Well-defined Channel



NOTES:

1. La is the length of the rip rap apron.
2. D = 1.5 times the maximum stone diameter but not less than 6".
3. In a well-defined channel extend the apron up the channel banks to an elevation of 6" above the maximum tail water depth or to the top of the bank, whichever is less.
4. A filter blanket or filter fabric should be installed between the riprap and soil foundation.

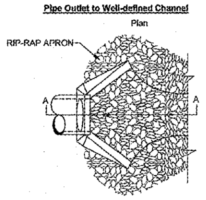
Plan

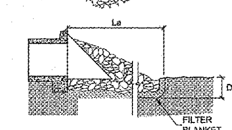


Section AA

Pipe Outlet to Well-defined Channel

Plan





Section AA

STORM DRAIN OUTLET PROTECTION

NTS

St

TREE PROTECTION

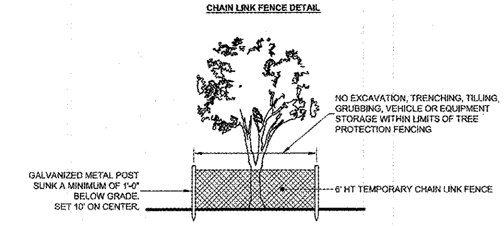
DEFINITION

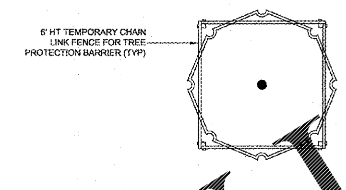
To protect desirable trees from injury during construction activity.

PURPOSE

To insure the survival of desirable trees where they will be effective for erosion and sediment control, watershed protection, landscape beautification, dust and pollution control, noise reduction, shade and other environmental benefits while the land is being converted from forest to urban-type uses.

CHAIN LINK FENCE DETAIL





Barrier constructed to protect tree trunk, crown, and root system from injury. Barriers shall be located at the limits of the tree's critical root zone (a radius of one and a half feet per inch of the tree's diameter at breast height). Barriers shall be kept in good condition for the duration of the project and is to remain in place until the notice of termination.

FOR ADDED PROTECTION

- Provide 4" deep organic mulch over any unprotected root zone.
- Provide temporary irrigation where practical and feasible.

TREE PROTECTION

NTS

Tr

DUST CONTROL ON DISTURBED AREA

DEFINITION

Controlling surface and air movement of dust on construction sites, roads, and demolition sites.

PURPOSE

1. To prevent surface and air movement of dust from exposed soil surfaces.
2. To reduce the presence of airborne substances which may be harmful or injurious to human health, welfare, or safety, or to animals or plant life.

CONDITIONS

This practice is applicable to areas subject to surface and air movement of dust where on and off-site damage may occur without treatment.

Method and materials

A. Temporary methods

1. Mulches.

   See standard Ds1 - disturbed area stabilization (with mulching only). Synthetic resins may be used instead of asphalt to bind mulch material. Refer to specification Tac - tackifiers. Resins should be used according to manufacturer's recommendations.

2. Vegetative cover.

   See specification Ds2 - Disturbed area stabilization (with temporary seeding).

3. Spray-on adhesives.

   These are used on mineral soils (not effective on muck soils). keep traffic off these areas. refer to standard Tac-Tackifiers.

4. Tillage.

   This practice is designed to roughen and bring clods to the surface. it is an emergency measure which should be used before wind erosion starts. begin plowing on windward side of site. Chisel-type plows spaced about 12 inches apart, spring-toothed harrows, and similar plows are examples of equipment which may produce the desired effect.

5. Irrigation.

   This is generally done as an emergency treatment. site is sprinkled with water until the surface is wet. Repeat as needed.

6. Barriers.

   Solid board fences, snowfences, burlap fences, crate walls, bales of hay and similar material can be used to control air currents and soil blowing. Barriers placed at right angles to prevailing currents at intervals of about 15 times their height are effective in controlling wind erosion.

7. Calcium chloride.

   Apply at rate that will keep surface moist. may need re-treatment.

B. Permanent methods

1. PERMANENT VEGETATION

   See specification Ds3 - disturbed area stabilization (with permanent vegetation). Existing trees and large shrubs may afford valuable protection if left in place.

2. Topsoiling.

   This entails covering the surface with less erosive soil material. see specification Tp - topsoiling.

3. Stone.

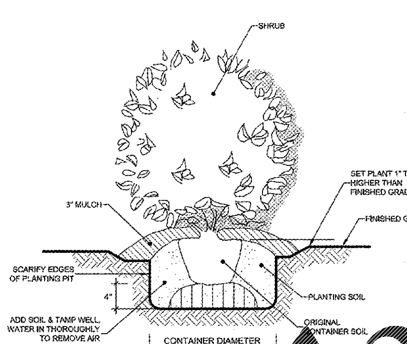
   Cover surface with crushed stone or coarse gravel. see specification Cr - construction road stabilization.

DUST CONTROL ON DISTURBED AREA

NTS

Du

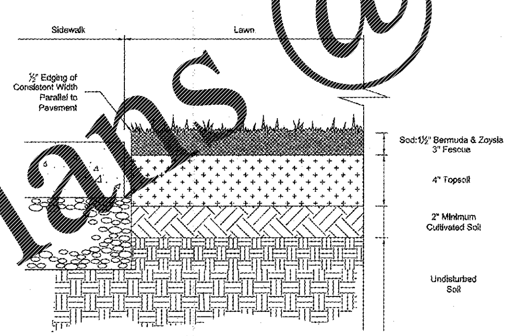
SHRUB PLANTING DETAIL



SHRUB PLANTING DETAIL

NTS

SOD INSTALLATION DETAIL



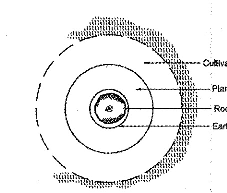
SOD INSTALLATION DETAIL

NTS

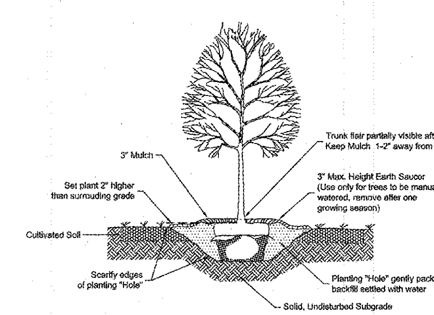
TREE PLANTING DETAIL

NOTES:

1. Planting "Hole" to be 3 times as wide as rootball.
2. Cultivated area to be 5 times as wide as rootball.
3. Remove burlap from top third of rootball after placing in hole. Remove all strapping and top 12" of wire baskets.
4. Set tree plumb prior to backfilling.
5. Only stake trees which are subject to vandalism, windy conditions, or planting in unstable soils (See staking details).



PLAN VIEW
NTS



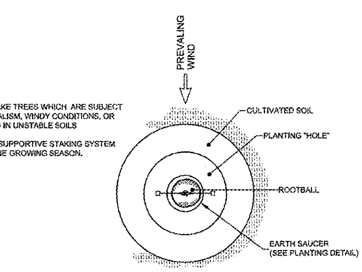
TREE PLANTING DETAIL

NTS

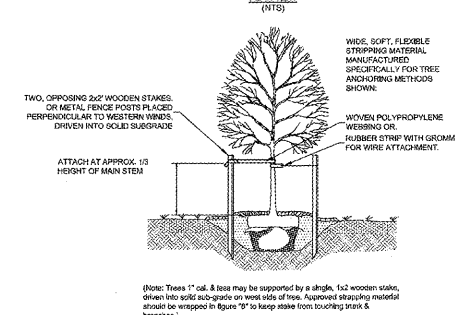
TREE STAKING DETAIL (2" CAL. & LESS)

NOTES:

1. ONLY STAKE TREES WHICH ARE SUBJECT TO VANDALISM, WINDY CONDITIONS, OR PLANTING IN UNSTABLE SOILS
2. REMOVE SUPPORTIVE STAKING SYSTEM AFTER ONE GROWING SEASON.



PLAN VIEW
(NTS)



(Note: Trees 1" cal. & less may be supported by a single, 1x2 wooden stake, driven into solid sub-grade on west side of tree. Approved strapping material should be wrapped in figure "8" to keep stake from touching trunk & branches.)

ELEVATION VIEW
(NTS)

TREE STAKING DETAIL (2" CAL. & LESS)

NTS

NO	DATE	DESCRIPTION	BY
6			
5			
4			
3			
2			
1			
0	03/12/2020	ADDRESS COMMENTS	DW

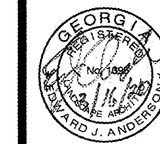
REVISIONS

Travis Pruitt & Associates, Inc.
ENGINEERS • SURVEYORS • ENVIRONMENTAL SCIENTISTS • LANDSCAPE ARCHITECTS
4317 Park Drive, Suite 400
Norcross, Georgia 30093
Phone: (770) 416-7511
Fax: (770) 416-6759
www.travispruitt.com
CONTACT PERSON: EDWARD J. ANDERSON
e-mail: tanderson@travispruitt.com

CONSTRUCTION DETAILS

FREEDOM PARK PHASE 3

3301 ROFF AVENUE, MACON, GA 31204 • LAND LOTS 2 AND 3 • 11TH DISTRICT • CITY OF MACON • BIBB COUNTY GEORGIA



For The Firm
Travis Pruitt & Associates, Inc.

DATE: 02/14/2020
SCALE: N/A
CN: 190452PN
JN: 190452
FN: 166-D-038
SHEET NO: C6.8