



EROSION & SEDIMENT CONTROL

FIELD GUIDE

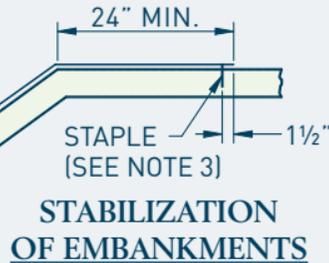
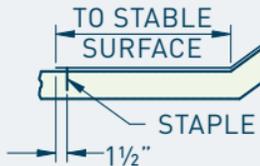
IV. STABILIZATION AND EROSION CONTROL



PLAN SYMBOL

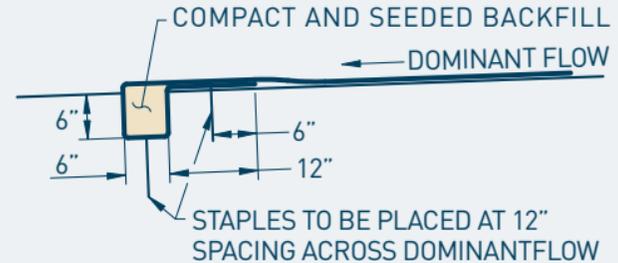
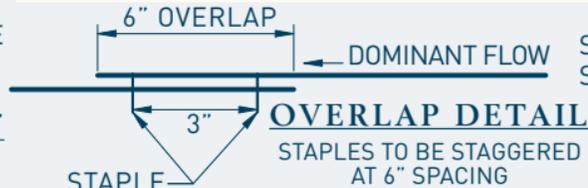
6" OVERLAP
(SEE DETAIL THIS SHEET)

EROSION CONTROL
BLANKET



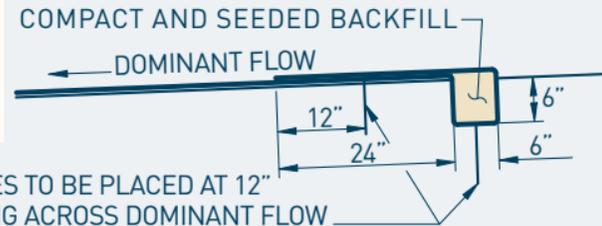
NOTES:

1. STAPLES TO BE STAGGERED AT 18" SPACING.
2. TOPSOIL UNDER EROSION CONTROL BLANKET IS TO BE TRACKED AND SEEDED.
3. WHEN OFFSITE RUNOFF OCCURS, ADDITIONAL MEASURES AS DIRECTED BY THE ENGINEER SHALL BE USED TO ENSURE STABILITY OF EMBANKMENT.



INITIAL TRENCH ANCHOR DETAIL

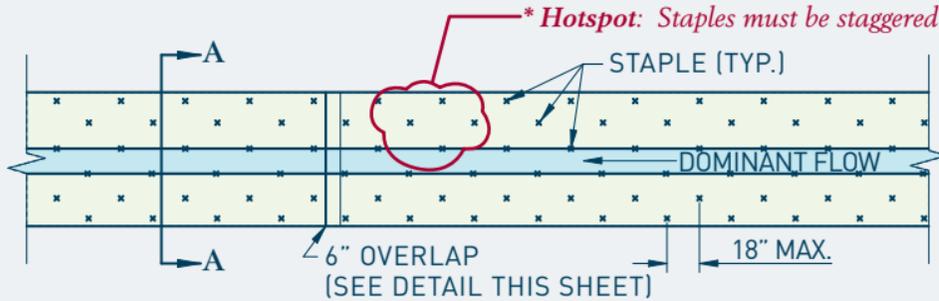
APPLIED AT THE DOWNSTREAM END OF DITCH



TERMINAL TRENCH ANCHOR DETAIL

APPLIED AT THE UPSTREAM END OF DITCH

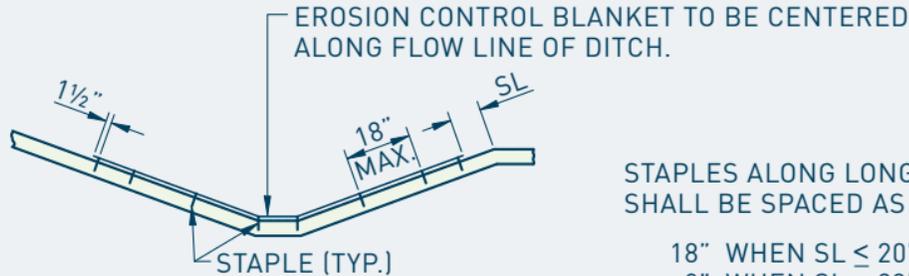
IV. STABILIZATION AND EROSION CONTROL



STABILIZATION OF DITCHES PLAN

NOTES

1. ADDITIONAL STAPLES NOT SHOWN ARE REQUIRED AT OVERLAPS SEE OVERLAP DETAIL FOR STAPLE PLACEMENT.
2. STAPLES ARE TO BE STAGGERED.
3. TOPSOIL UNDER EROSION CONTROL BLANKET IS TO BE TRACKED AND SEEDED.

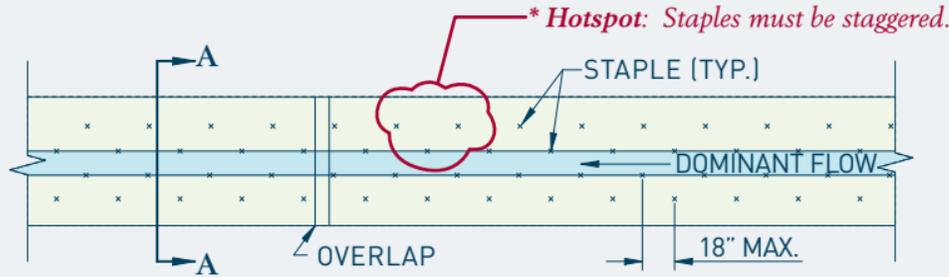


STABILIZATION OF DITCHES
SECTION A-A

STAPLES ALONG LONGITUDINAL EDGES SHALL BE SPACED AS FOLLOWS:

- 18" WHEN $SL < 20'$
- 9" WHEN $SL > 20'$

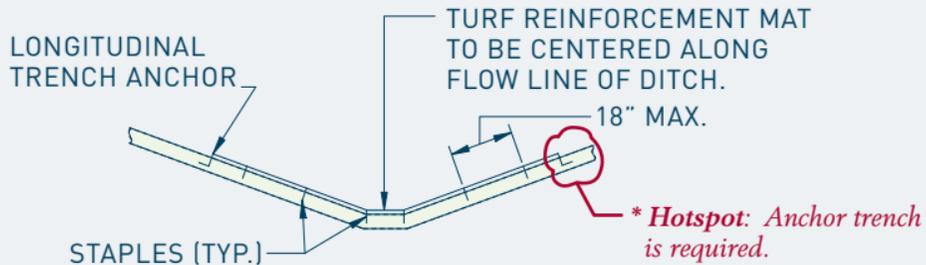
IV. STABILIZATION AND EROSION CONTROL



STABILIZATION OF DITCHES
PLAN

NOTES:

1. ADDITIONAL STAPLES NOT SHOWN REQUIRED AT OVERLAPS ENDS, CHECK SLOTS AND EDGES. SEE APPROPRIATE DETAILS FOR STAPLE PLACEMENT.
2. STAPLES ARE TO BE STAGGERED.
3. TOPSOIL UNDER TURF REINFORCEMENT MAT IS TO BE TRACKED AND SEEDING.

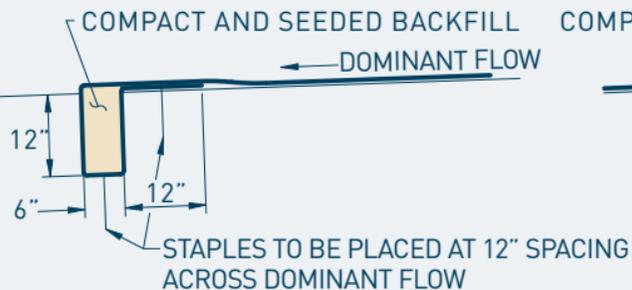


STABILIZATION OF DITCHES
SECTION A-A



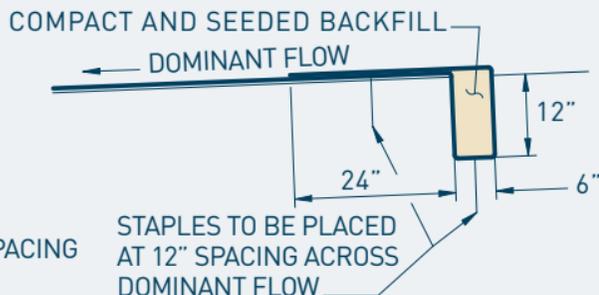
STAPLE DETAIL

IV. STABILIZATION AND EROSION CONTROL



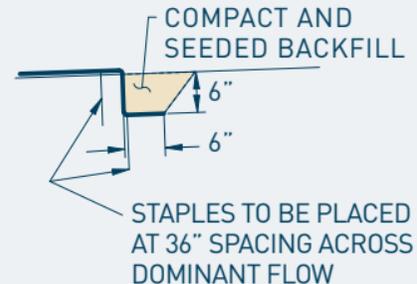
INITIAL TRENCH ANCHOR DETAIL

APPLIED AT THE DOWNSTREAM END OF DITCH

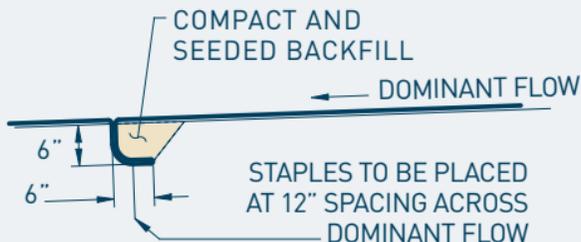


TERMINAL TRENCH ANCHOR DETAIL

APPLIED AT THE DOWNSTREAM END OF DITCH

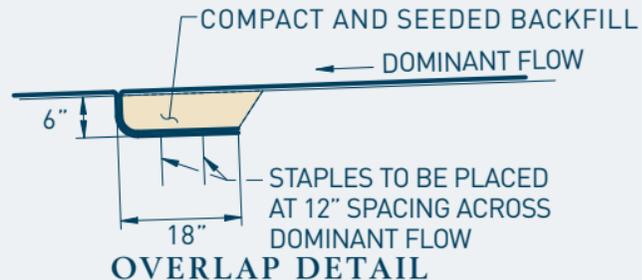


LONGITUDINAL TRENCH ANCHOR DETAIL



CHECK SLOT DETAIL

(AS NEEDED PER PLANS)



OVERLAP DETAIL

IV. STABILIZATION AND EROSION CONTROL

Anchor trenches.



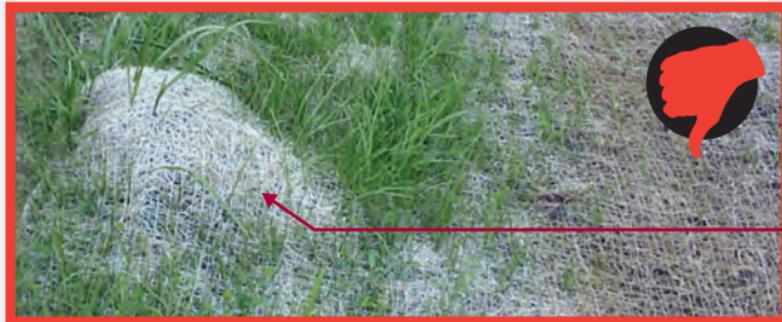
No anchor trenches.



IV.

A/B. Blanket and Matting

IV. STABILIZATION AND EROSION CONTROL



IV. STABILIZATION AND EROSION CONTROL

SEEDING :

The work included in this item shall consist of providing an acceptable uniform stand of established perennial turf grasses, including mulching, on all areas to be treated as shown on the plans or where designated by the Engineer. The Contractor shall refer to the most current standard seeding specification (Section 734) for specific information regarding temporary and permanent turf establishment. The information contained in this section of the Erosion and Sediment Control Field Guide highlights basic guidance for turf establishment.

ACCEPTABLE MATERIALS:

- Water: Any water used for this item shall conform to the requirements of Section 803.
- Mulch: Use only mulch that is biodegradable and free of contaminants.
- Grass and Agricultural Seed Mixes: The Seeding Charts on the following pages shall be used for the following specified seeding:

- ◆ Permanent Grass Seeding - Dry Ground (PGS-DG)
- ◆ Permanent Grass Seeding - Wet Ground (PGS-WG)
- ◆ Permanent Grass Seeding - Subdivision (PGS-SUB)
- ◆ Temporary Grass Seeding - Dry Ground (TGS-DG)
- ◆ Temporary Grass Seeding - Wet Ground (TGS-WG)

IV. STABILIZATION AND EROSION CONTROL

SEEDING CHART

Type	Species	Max. % Weed Seed ¹	% Purity	% Germination	Seeding Rate (lb/acre)
PGS-DG (≤ 1V:3H)	Turf Type Fall Fescue (<i>Lolium arundinaceum</i> , formerly; <i>Festuca arundinacea</i>)	0.5	98	90	200

IV. STABILIZATION AND EROSION CONTROL

SEEDING CHART					
Type	Species	Max. % Weed Seed ¹	% Purity	% Germination	Seeding Rate (lb/acre)
PGS-SUB	Perennial Ryegrass (<i>Lolium perene</i>)	0.4	90	90	20
	Kentucky Bluegrass (<i>Poa pratensis</i>)	0.4	90	80	30
	Redtop (<i>Argrostis alba</i>) (PGS-DG ONLY)	0.75	95	90	5
	Annual Ryegrass - Option ⁵ (<i>Lolium multiflorum</i>)	0.15	95	90	10

IV. STABILIZATION AND EROSION CONTROL

SEEDING CHART

Type	Species	Max. % Weed Seed ¹	% Purity	% Germination	Seeding Rate (lb/acre)
PGS-DG (> 1V:3H)	Hard Fescue Mixture (<i>Festuca longifolia</i> and <i>Festuca trachyphylla</i>)	0.15	98	85	140
	Creeping Red Fescue (<i>Poa pratensis</i>)	0.15	98	85	85
	Redtop (<i>Argrostis alba</i>)	0.75	95	90	5
	Annual Ryegrass (<i>Lolium multiflorum</i>)	0.15	95	90	10

IV. STABILIZATION AND EROSION CONTROL

SEEDING CHART					
Type	Species	Max. % Weed Seed ¹	% Purity	% Germination	Seeding Rate (lb/acre)
PGS-WG ³	Redtop (<i>Argrostis alba</i>)	0.75	95	90	40
	Creeping Red Fescue (<i>Poa pratensis</i>)	0.75	98	90	25
	Sheep Fescue ² (<i>Festuca ovina</i>)	0.5	98	85	35
	Rough-Stalked Bluegrass (<i>Poa trivialis</i>)	0.5	98	80	25

IV. STABILIZATION AND EROSION CONTROL

SEEDING CHART

Type	Species	Max. % Weed Seed ¹	% Purity	% Germination	Seeding Rate (lb/acre)
TGS-DG	Annual Ryegrass - Optional (<i>Lolium multiflorum</i>)	0.15	95	90	40
TGS-WG ⁴	Annual Barnyard Grass/Duck Millet (<i>Echinochloa spp.</i>)	1.00	90	90	40

IV. STABILIZATION AND EROSION CONTROL

- ¹ Title 3 Delaware Code, Chapter 15, Seeds and its associated regulations identify several species of seed designated as Noxious Weeds by the Delaware Department of Agriculture and therefore may not be part of the allowable percentage of weed seeds in any quantity.
- ² *Festuca ovina* shall be an improved variety of Sheep Fescue as approved by the Department. Selection should be based on performance within the Mid-Atlantic region as determined by the most current National Turfgrass Evaluation Program Progress Report.
- ³ Permanent Seeding - Wet Ground should be used on saturated or seasonally flooded areas as dictated by the wetland limits on the Plans.
- ⁴ Wet, bare ground, leaf litter covered or partially vegetated retention ponds, traps, or basins, or all intermittently flooded sites in general may be seeded with Temporary Seeding - Wet Ground. No wood fiber mulch shall be added to the hydroseeder. Unless indicated on the Plans, *Echinocloa spp.* is equivalent to *E. muricata*, *E. crusgalli*, or *E. walteri*. No mulching, fertilizer or limestone shall be applied with this seeding.
- ⁵ The Contractor has the option of adding at his or her expense, up to 10 lbs. Annual Ryegrass (*Lolium multiflorum*) to the PGS-DG (≤1V:3H) and PGS-SUB seed mixes.

IV. STABILIZATION AND EROSION CONTROL

CONSTRUCTION NOTES:

- General: This work shall consist of preparing the soil, placing the seed and applying any soil supplements necessary to provide a suitable stand of turf grass and placing mulch.
- Seeding Season. The calendar dates for seeding shall be Spring – March 1 to May 15 and Fall – August 15 to October 31. Sussex County fall season is August 15 to November 15. All disturbed soil areas shall be treated during the seeding seasons as follows:
 - ◆ Areas meeting final grade. Seeding and mulching shall be completed.
 - ◆ “Out of Season” Periods. During “out of season” periods, unseeded areas shall be treated in accordance with temporary stabilization as per Section 110.09 (d).
 - ◆ “Out of Season” seeding. “Out of Season” seeding shall be performed in the same manner

as “in-season” seeding. Requests for out of season seeding will be considered if sufficient written justification is provided, with the understanding that in-season re-seeding will be required, at no cost to the Department, if the turf stand fails to conform to 734.07.

- ◆ Temporary grass seeding. Temporary grass seeding, when required, prior to Permanent Grass Seeding, shall be mowed and tracked (tracking shall be accomplished by driving clefted equipment such as a bulldozer over the surface).

MAINTENANCE

- The Contractor shall maintain all seeded and mulched areas free from weeds and debris in accordance with Section 105.13. Grass mowing shall be completed at the direction of the Engineer or as specified in the contract. Payment for grass mowing shall be incidental to the project unless it is included in another item of work.

IV. STABILIZATION AND EROSION CONTROL

ACCEPTANCE OF PERMANENT AND TEMPORARY GRASS SEEDING

- Acceptance of permanent grass seeding will require production of a uniform stand of established perennial grass species, as specified in Section 734.04, having attained a height of 3 inches with a density of 70% of the seeded area (a minimum of 100 plants per square foot). Any area identified without a uniform density of 70% specified perennial grass cover shall be repaired at the Contractor's expense. Acceptance of Temporary seeding will be made at time of placement, provided the seed is mixed and placed as specified in Section 734.04

MAINTENANCE BOND

- Upon Substantial Completion of the Work, the Contractor shall furnish to the Department a Maintenance Bond on the form provided by the Department for item 734XXX - Seeding. The Maintenance Bond shall meet the all of the following requirements:

- ♦ A sum equal to 100% of the value of all Permanent Grass Seeding Items paid to the Contractor.
- ♦ All signatures are original signatures, in ink, and not mechanical reproductions or facsimiles of any kind.
- ♦ The Contractor is the named principle.
- ♦ The term of the bond is for one full year.
- ♦ Seeding Work items associated with permanent seeding requires completion after substantial completion of the Project. The term of the Maintenance Bond will be for a period of one year beyond the completion of permanent seeding Work.
- ♦ Written by a Surety or insurance company that is in good standing and currently licensed to write surety bonds in the State of Delaware by the Delaware Department of Insurance.

IV. STABILIZATION AND EROSION CONTROL

METHOD OF MEASUREMENT

- The Engineer will measure the quantity of acceptably placed permanent or temporary grass seed. The quantity of seeding will be measured in square yards (square meters) of surface area. Unless otherwise specified on the plans, mulching will not be measured.

WORKING DAYS

- When the sequence of construction precludes completion of 734 – Seeding Work items associated with permanent seeding within the Calendar Day Contract Completion date, the Contractor will submit with his/her bid proposal a separate Working Day schedule to govern completion of 734 – Seeding items. The Contractor shall submit a separate schedule in Bar Chart Format reflecting all work associated with this item for review and approval at the preconstruction meeting. Failure to submit an acceptable Working Day schedule for completion of

734 – Seeding items may result in delay in “Notice to Proceed.” Failure to complete 734 – Seeding items within the specified number of Working Days above will result in assessment of Liquidated Damages based on the total of Item 734xxx, per Working Day as detailed in Subsection 108.09, Schedule of Liquidated Damages. Sections 734.09, Method of Measurement, and Section 734.10, Basis of Payment, remain unaffected by this requirement.

IV. STABILIZATION AND EROSION CONTROL



IV.

C. Seeding

IV. STABILIZATION AND EROSION CONTROL



Poor seeding application.

IV. STABILIZATION AND EROSION CONTROL



Insufficient Cover.



IV. STABILIZATION AND EROSION CONTROL



Crabgrass not acceptable.

IV. STABILIZATION AND EROSION CONTROL

IV.D - Mulching

- This work consists of furnishing, placing, and anchoring mulch over seeded areas.
- Small Grain Straw for mulching shall be from oats, wheat, rye, or other approved grain crops that are free from noxious weeds, mold, or other objectionable material. Straw mulch shall be in an air-dry condition and shall be suitable for placing with an approved mechanical blower.
- Construction Methods.
 - ❑ Small Grain Straw mulching shall be used on all slopes flatter than 3:1 (vertical to horizontal) with the exception of slopes or sites not accessible to tracking or crimping tools and equipment. In these situations, straw-coconut fiber blankets or bonded fiber matrix shall be used.
 - ❑ Small grain straw shall be uniformly and evenly applied immediately after seeding has been completed.
 - ❑ An approved mechanical blower shall be used to apply the straw. Straw mulch applied by blowers shall provide a loose depth of not less than 1/2 nor more than 2" (13 nor more than 50 mm). Ninety-five percent of the blown and shredded straw mulch shall be 6" (150 mm) or more in length when in place.

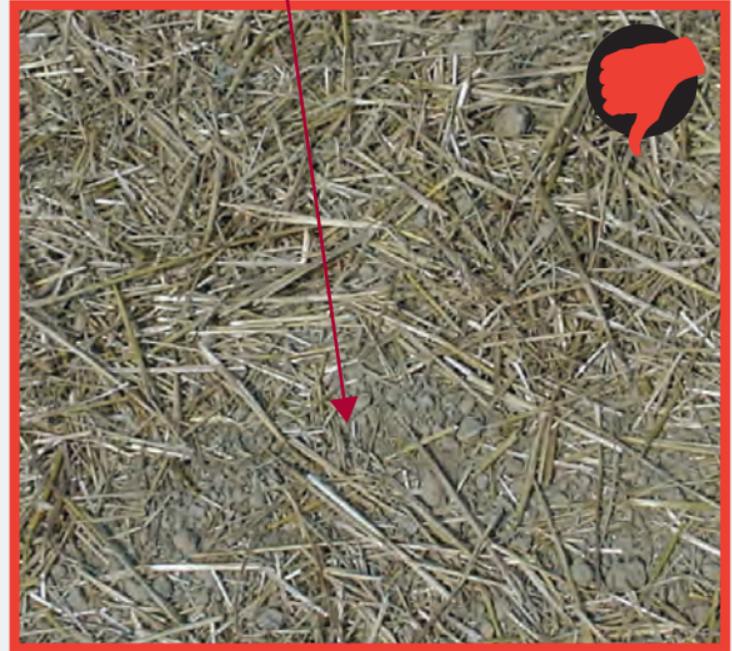


Insufficient mulch coverage.

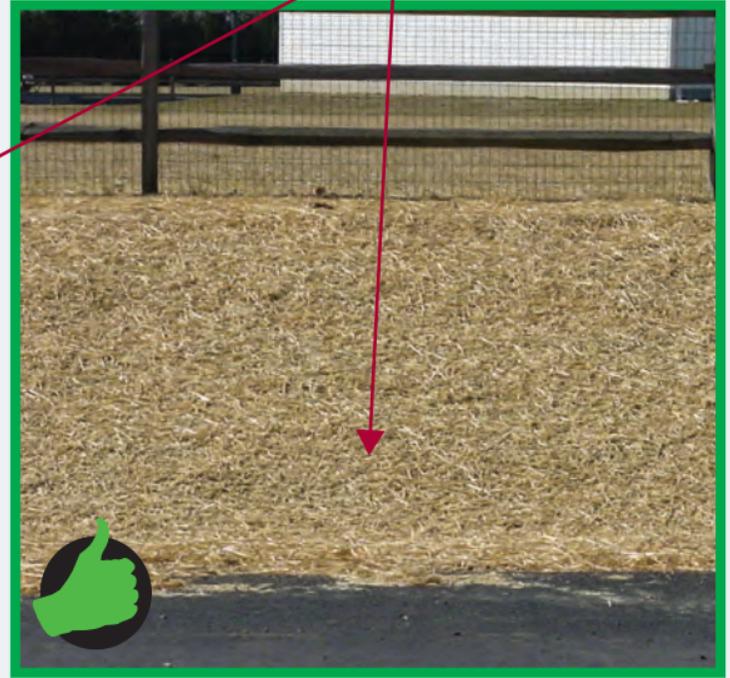
IV. STABILIZATION AND EROSION CONTROL

- Straw mulch shall be applied at the rate of 4000 lb/ac (4500 kg/ha) and secured by one of the following methods:
 - ◆ 1. Crimping Method. This method of incorporating the straw into the ground shall be accomplished with the use of crimping device that produces horizontally oriented indentation. Straw mulch shall be incorporated into the soil to a minimum depth of 2" (50 mm). The crimping device shall be approved by the Engineer.
 - ◆ 2. Tracking Method. This method may be used on all sites mulched with straw and shall involve the use of steel-cleat track-type equipment driving up and down the slopes producing horizontally oriented indentations with the cleats. Cleats shall be capable of incorporating the straw mulch into the soil to a minimum depth of 1.5" (40 mm). The equipment used and the method of tracking shall be approved by the Engineer.

Ground should not be visible under mulch.



IV. STABILIZATION AND EROSION CONTROL



Ground should not be visible under mulch.

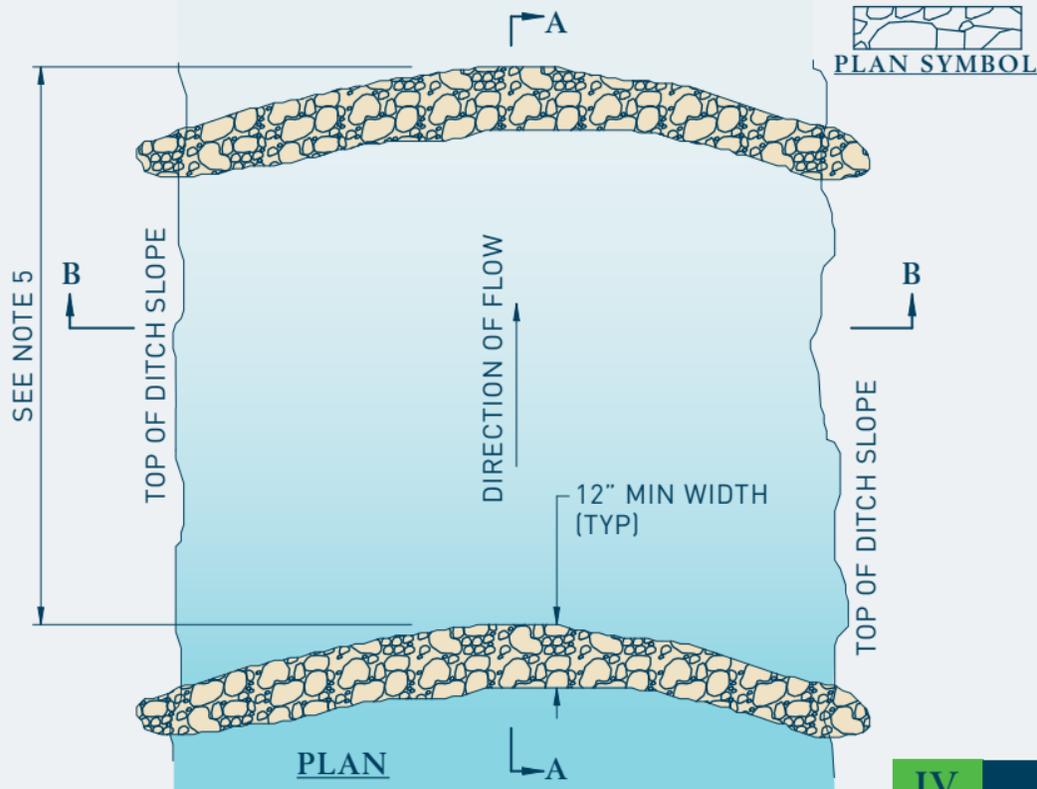
IV. STABILIZATION AND EROSION CONTROL



Good tracking prior to mulch application.

Tracking is in wrong direction.

IV. STABILIZATION AND EROSION CONTROL



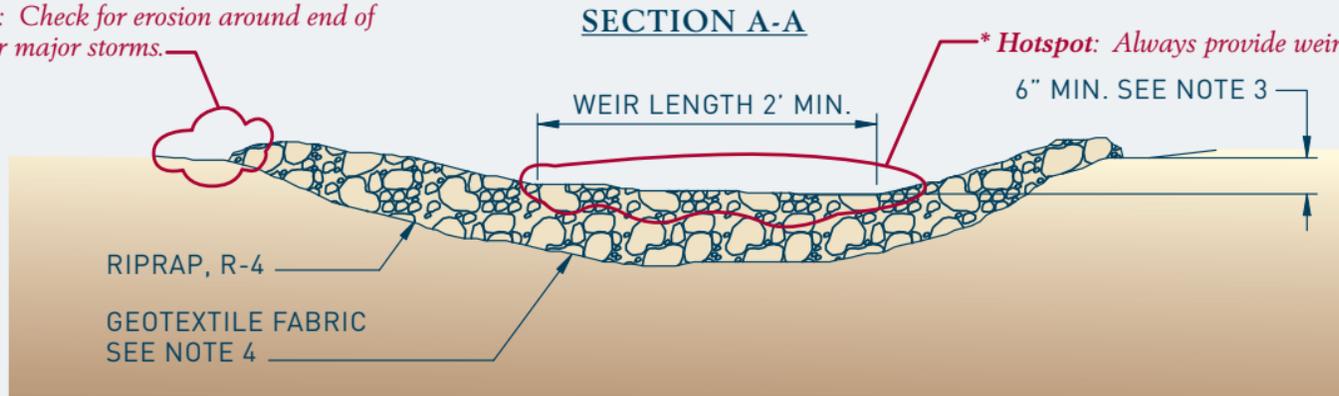
NOTES:

1. FOR DITCHES LESS THAN 30" IN DEPTH, PLACE DAM AS DIRECTED BY THE ENGINEER.
2. THE CHECK DAM HEIGHT MUST NOT EXCEED 2' AT THE CENTER OF THE WEIR.
3. THE CHECK DAM IS TO BE CONSTRUCTED SO THAT THE CENTER IS 6" MIN. LOWER THAN THE OUTER EDGES, FORMING A WEIR THAT WATER CAN FLOW ACROSS.
4. GEOTEXTILE FABRIC IS TO BE INSTALLED UNDERNEATH RIPRAP ON PERMANENT CHECK DAMS ONLY.
5. THE MAXIMUM SPACING BETWEEN DAMS SHALL BE THE DISTANCE IN THE DITCH WHERE THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM DAM AT THE CENTER OF THE WEIR.

IV. STABILIZATION AND EROSION CONTROL



** Hotspot: Check for erosion around end of dam after major storms.*



** Hotspot: Always provide weir.*

SECTION B-B

IV. STABILIZATION AND EROSION CONTROL

IV.E - Maintenance

- After each rainfall, the Contractor shall inspect the stone check dam for sediment accumulation or washout. The Contractor shall replace the riprap whenever washout, construction traffic damage, or silt accumulation among the riprap occurs and whenever the stone check dam ceases to function as intended.
- Sediment shall be removed from behind the check dams when it has accumulated to one-half of the original height of the stone check dam at the spillway.



No weir.



IV.

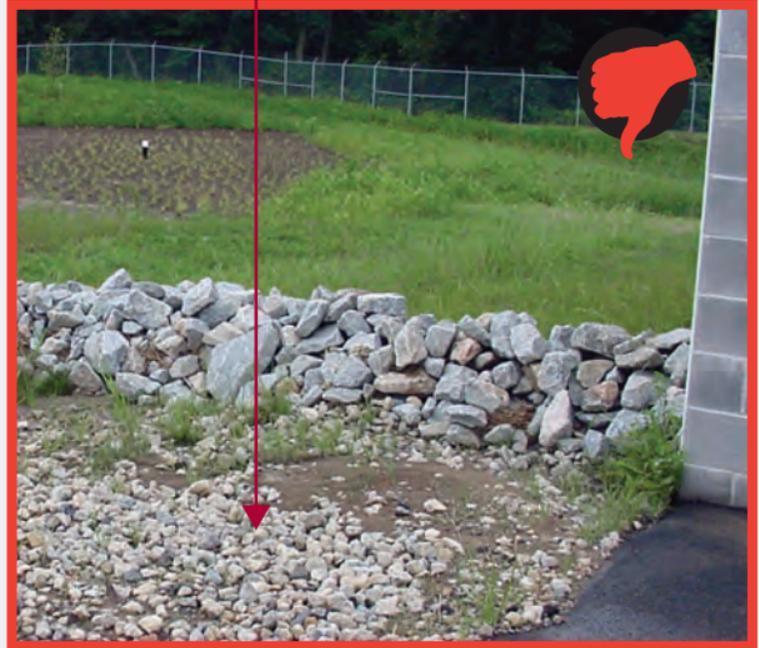
E. Stone Check Dam

IV. STABILIZATION AND EROSION CONTROL

Failure to clean sediment and maintain check dam.



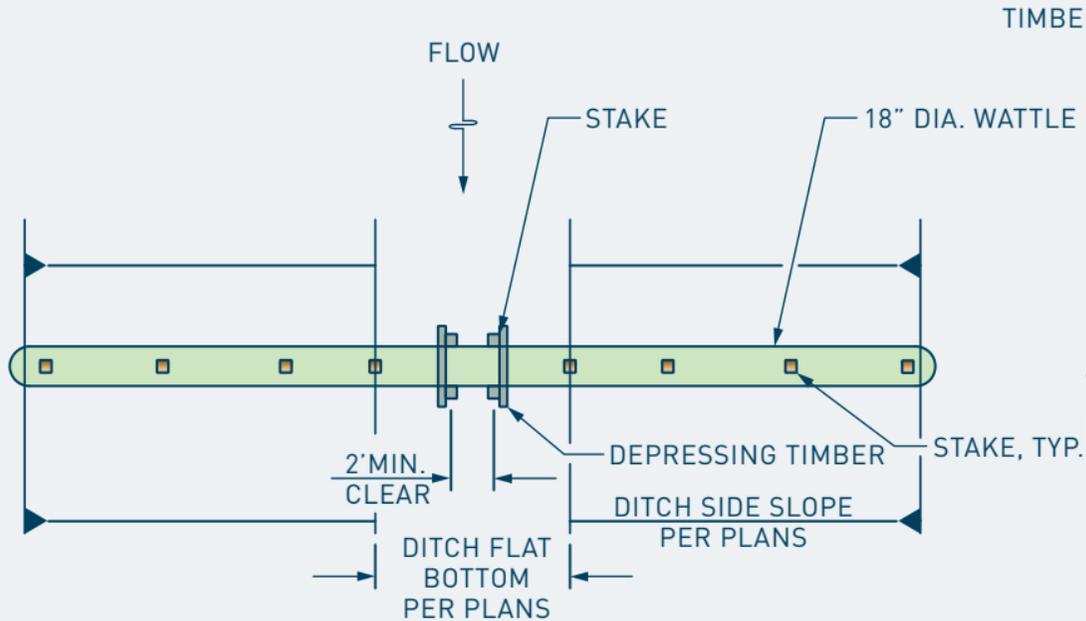
Poor application no ditch line.



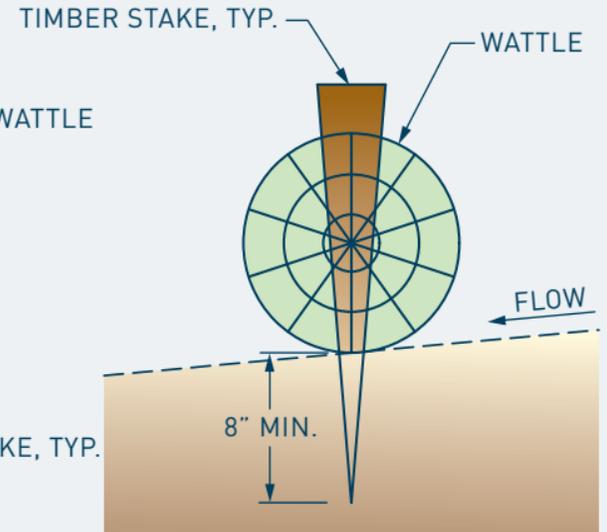
IV.

E. Stone Check Dam

IV. STABILIZATION AND EROSION CONTROL

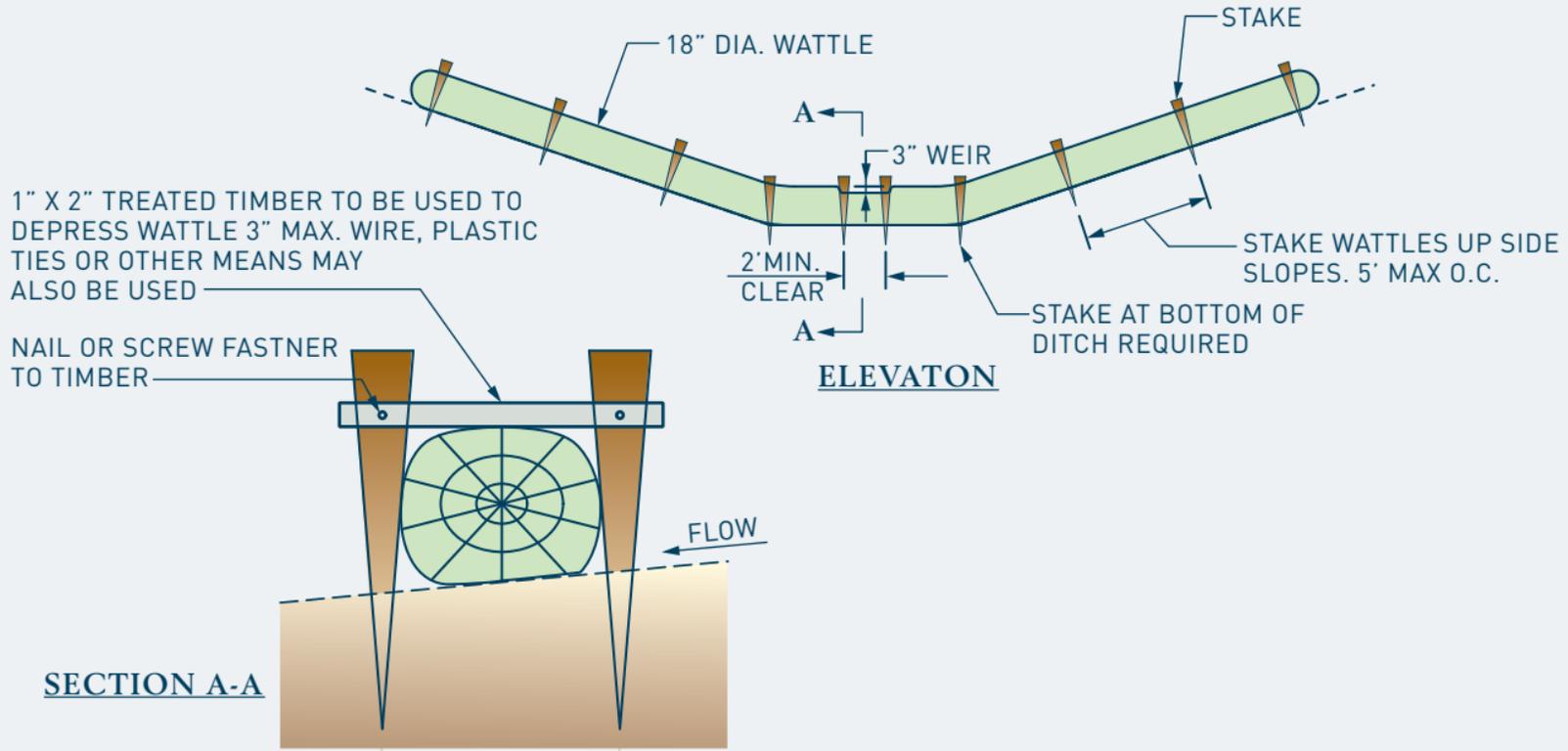


PLAN VIEW

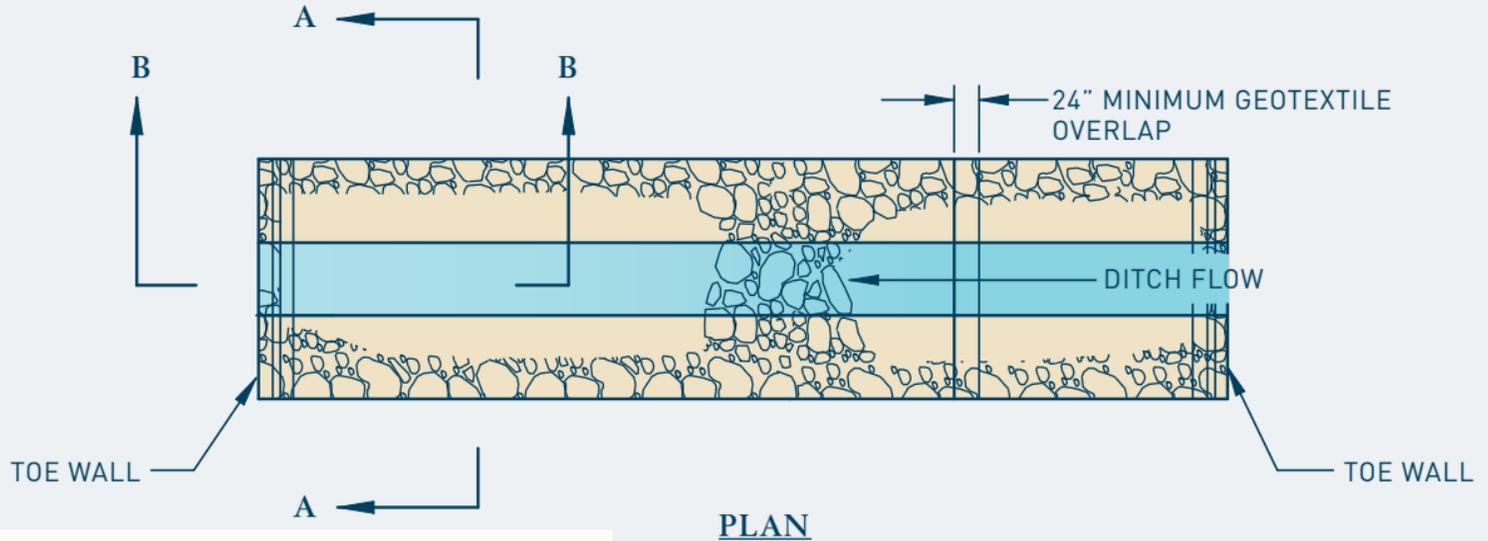


STAKE AND WATTLE

IV. STABILIZATION AND EROSION CONTROL



IV. STABILIZATION AND EROSION CONTROL

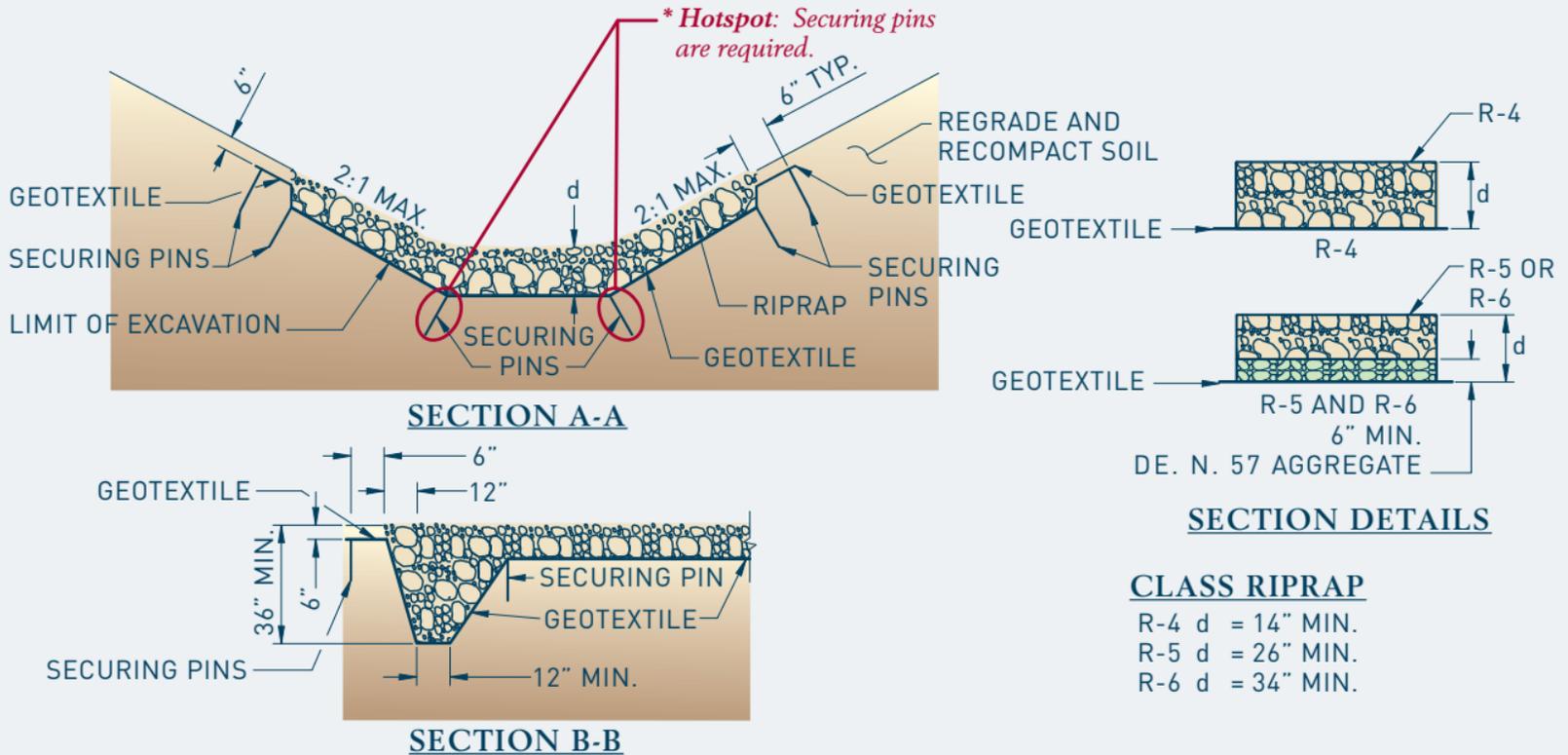


PLAN

NOTES:

1. SECURING PINS ARE TO BE PLACED AT LOCATIONS SHOWN AND AT 24" LONGITUDINAL AND LATERAL SPACING.
2. SEE PLANS FOR LOCATION, DIMENSIONS, GRADES, ETC.

IV. STABILIZATION AND EROSION CONTROL



IV. STABILIZATION AND EROSION CONTROL

IV.F - Maintenance

- Throughout the Project construction period, the Contractor shall maintain the original dimensions and function of the riprap ditch.

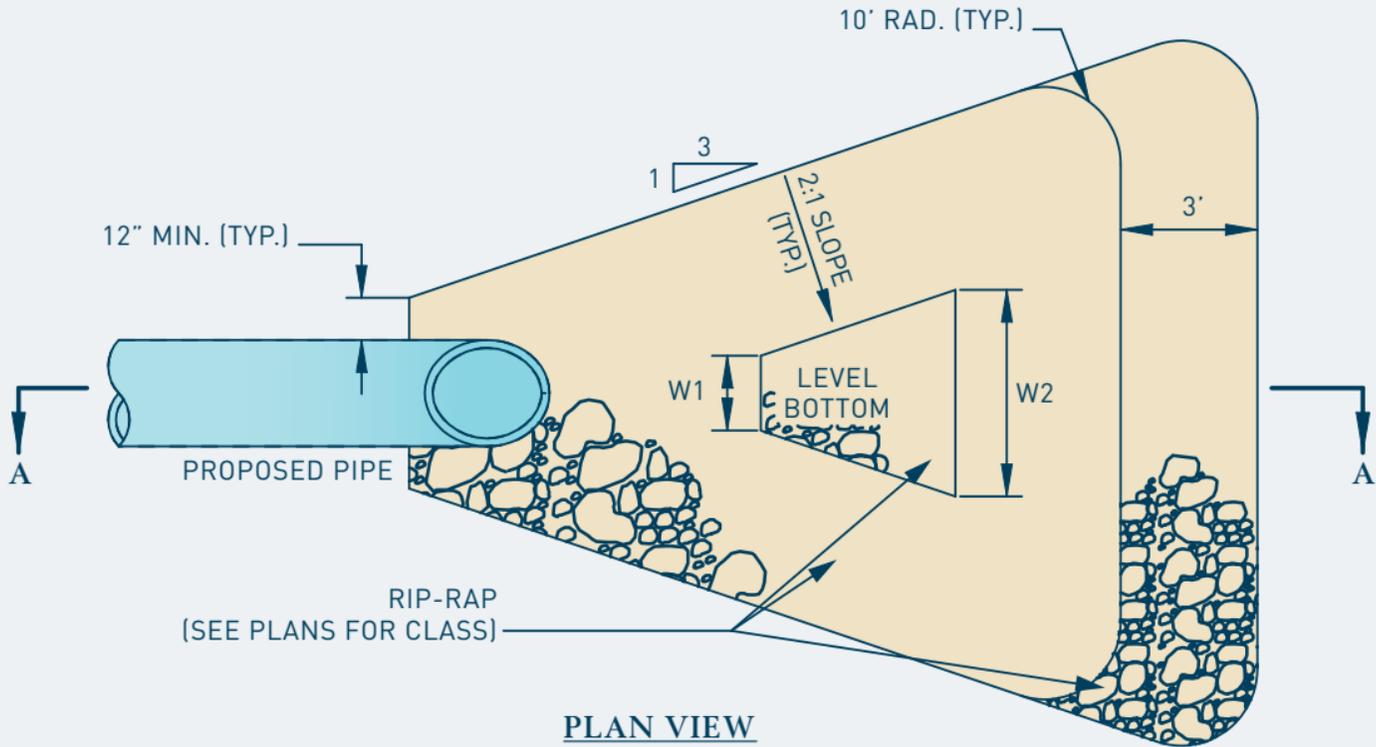


*Proper examples of buried geotextile,
proper stone placement*

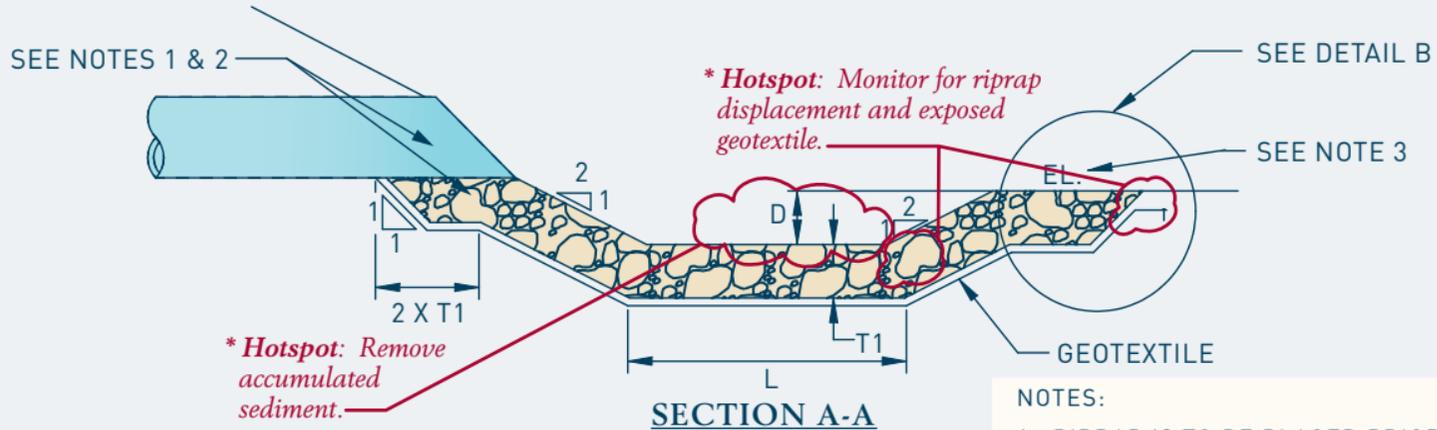
IV. STABILIZATION AND EROSION CONTROL



IV. STABILIZATION AND EROSION CONTROL

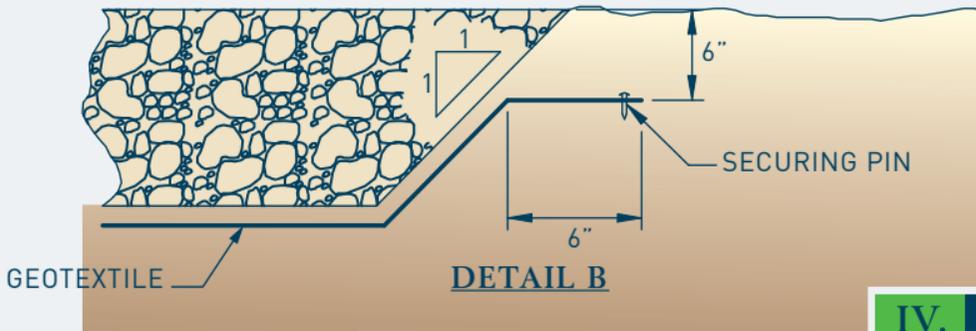


IV. STABILIZATION AND EROSION CONTROL



NOTES:

1. RIPRAP IS TO BE PLACED PRIOR TO PLACING PIPE.
2. PLACE DELAWARE NO. 3 STONE UNDER PIPE.
3. ELEVATION (EL.) SHOULD NOT BE HIGHER THAN PIPE INVERT.
4. REFER TO THE PIPE ENERGY DISSIPATOR SCHEDULE ON THE CONSTRUCTION PLANS FOR THE VALUE OF DIMENSION VARIABLES.



IV. STABILIZATION AND EROSION CONTROL

IV.G - Maintenance

- Throughout the Project construction period, the Contractor shall maintain the original dimensions and function of the riprap energy dissipator.



No No. 3 stone under end section.



*Insufficient riprap coverage.
No geotextile.*

IV.

G. Riprap Energy Dissipator

IV. STABILIZATION AND EROSION CONTROL

3 ft. apron replaced with concrete level spreader.



IV.

G. Riprap Energy Dissipator