EROSION AND SEDIMENT CONTROL FOR CONSTRUCTION ACTIVITIES GUIDANCE MANUAL

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TABLE OF CONTENTS

I. INTRODUCTION

East Grand Water Quality Board's Role:

The mission of the East Grand Water Quality Board is to protect, restore and monitor the headwaters of the Colorado River in the Fraser River watershed. The East Grand Water Quality Board is organized exclusively for charitable, scientific and educational purposes. Developing a non-point source pollution control plan and administering an erosion and sediment control program are some of the objectives intended to achieve this purpose.

This Manual is intended to serve as a reference and a guide to assist with controlling erosion and resulting sedimentation associated with construction activities.

Erosion and Sediment Control Regulations:

Federal and State Regulations
(National Pollutant Discharge Elimination System – NPDES)

- Mandated by the Clean Water Act of 1972 (Point and Non-point source pollution).
- Phase I implemented in 1990 for construction site stormwater discharge (5-Acres or more of disturbance).
- Phase II implemented in 2003 for construction site stormwater discharge (1-Acre or more of disturbance).
- EPA granted authority to the State of Colorado to enforce the Clean Water Act.
- Colorado created the Colorado Water Quality Control Act and issues and enforces NPDES permits, renamed to CDPS (Colorado Discharge Permitting System).

Colorado Department of Public Health and Environment
Water Quality Control Division – Stormwater Program
CDPS General Permit
Stormwater Discharges Associated with Construction Activities

- A permit is required for construction activities disturbing 1-Acre or more, or part of a larger common plan of development.
  - Includes clearing, grubbing, grading, excavating and stockpiling.
  - Permit must be submitted prior to the start of earth disturbing activities.
  - Processing of the application takes approximately 2 weeks.
  - Application must have original signatures by the legally responsible person.
  - Enforcement of the CDPS Permit by the EPA, State, Local Municipalities and/or Citizens through:
    - Inspection
    - Compliance Advisory
    - Notice of Violation / Cease and Desist / Cleanup Order
    - Penalties up to $10,000 per day of violation
  - A Stormwater Management Plan (SWMP) is the main requirement of the Permit and shall be kept on-site at all times.

Principles of Erosion and Sediment Control:

The erosion and sedimentation process is a natural one. Construction activities such as grading disturbs existing vegetation dramatically increasing erosion potential.

Water erosion has five main mechanisms.

- Raindrop Impact Erosion occurs by the forces generated by impact causing exposed soil to become dislodged, facilitating soil migration down slope.
- Sheet Erosion occurs by the accumulating effects of impact leading to uniform migration of soils down slope.
- Rill Erosion occurs as sheet flow begins to become focused.
- Gully Erosion occurs as rills deepen and converge on exposed slopes.
- Channel Erosion is the result of gullies converging.

Sedimentation occurs as a result of erosion.

- As the velocity of sediment-laden runoff decreases sediment deposition occurs.
- This deposited sediment is re-suspended and transported downstream with each recurring runoff event.

Erosion and sedimentation has water quality impacts.

- Sediment in stormwater runoff is the major constituent concerning pollution resulting from construction activities.
- Physical changes in downstream waterways include filling in of pools and riffles adversely effecting fish spawning areas and aquatic insect breeding areas.
- Chemical and biological changes in downstream waterways include excessive nutrient and chemical loadings that are transported along with the eroded soil.

Controlling construction site erosion and sedimentation is imperative.

- Limiting the amount of disturbed areas to only what is necessary decreases erosion potential.
- Stabilizing disturbed areas as soon as practical decreases erosion potential.
- Eliminating sediment-laden stormwater from leaving a construction site reduces sediment deposition downstream.

II. ADMINISTRATIVE BEST MANAGEMENT PRACTICES

Definition:

Best Management Practices (BMPs) for controlling non-point source pollution are the methods, measures, practices and combination of practices determined to be the most effective and practical means to control non-point pollutants at levels compatible with environmental quality goals.

Administrative BMPs are those controls implemented for a construction site that address the manner in which construction activities take place.

The following BMPs are not intended to be all-inclusive and may vary as construction site conditions dictate. The intent however, is to evaluate the effectiveness of all BMPs based on performance.

Planning and Scheduling:

Proper planning and scheduling is perhaps the most effective BMP involving construction site assessment, evaluation and implementation of a plan that will reduce erosion and sedimentation associated with the site. Factors influencing effectiveness of proper planning and scheduling must be considered.

- Minimize design of long, excessively steep slopes.
- Minimize design of directly connected impervious areas.
- Retain as much existing vegetation as practical for as long as possible.
- Designate and mark existing vegetation buffers to remain (areas of no disturbance) adjacent to natural drainageways.
- Stabilize disturbed areas as soon as practical prior to commencing further construction.
- Schedule construction activities to avoid periods of rapid snowmelt and heaviest precipitation.
- Update BMP selection and implementation as necessary to coincide with evolving construction activities and effectiveness to reduce pollutants to the maximum extent practical.

Inspection and Maintenance:

A properly implemented Stormwater Management Plan will reduce erosion potential and eliminate sedimentation in off-site downstream conveyances. The BMPs selected for a construction site will, however, require regular inspection and maintenance to perform as intended. Factors influencing effectiveness of an inspection and maintenance schedule must be considered.

- Site inspections are required at a minimum of every 14 days, and after precipitation or snowmelt events causing runoff.
- BMPs that are in need of maintenance or are not functioning as intended, must be repaired or replaced as soon as practical.
- Routine inspection logs should be kept with the SWMP identifying the BMPs and the required maintenance actions.

Education and Training:

A Stormwater Management Plan will not function as intended if the workers on a construction site either do not know that it exists or how to properly implement the plan. Factors influencing effectiveness of education and training must be considered.

- The SWMP is intended to function as a working document, to be kept on-site and available at all times.
- Construction crews should be trained on proper installation and maintenance requirements of each of the BMPs specified for the site.
- Regular meetings should be held on-site to discuss compliance with the SWMP and how the plan may need to adapt to actual site conditions.
- The SWMP operator should be identified so that workers on a construction site can report any spills, leaks or other potential problem areas.

III. EROSION CONTROL BEST MANAGEMENT PRACTICES

Definition:

Best Management Practices (BMPs) for controlling non-point source pollution are the methods, measures, practices and combination of practices determined to be the most effective and practical means to control non-point pollutants at levels compatible with environmental quality goals.

Erosion Control BMPs are those controls implemented for a construction site that reduce the erosion potential as a result of land disturbing activities. Erosion Control BMPs should be thought of as preventative in nature.

The following BMPs are not intended to be all-inclusive and may vary as construction site conditions dictate. As technology and information evolves and new and improved products and techniques become available, their use is encouraged. The intent however, is to evaluate the effectiveness of all BMPs based on performance.

Grading Techniques:

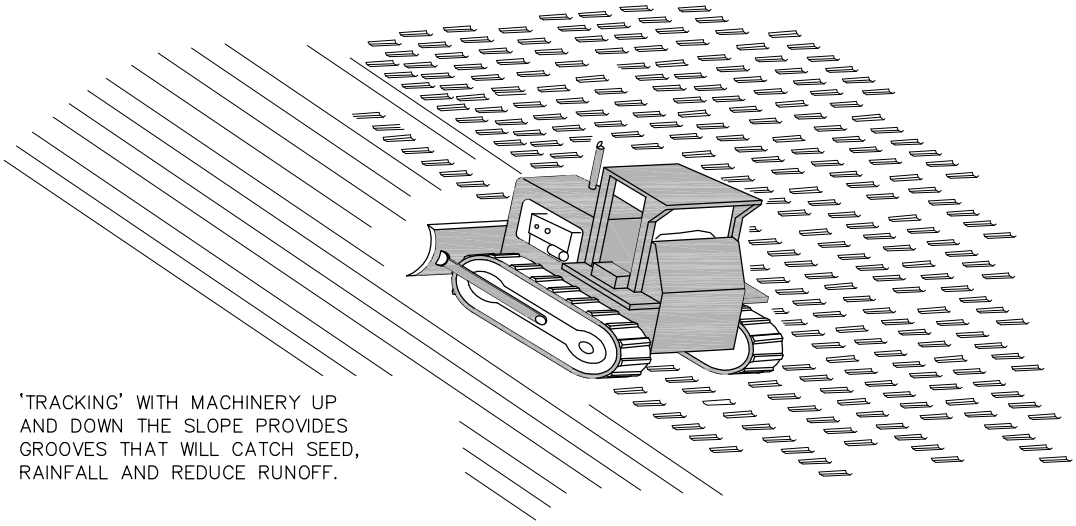
Grading activities on a construction site dramatically increases the erosion potential as existing vegetation is removed. Implementation of certain techniques and practices can limit erosion from occurring. Factors influencing effectiveness of this BMP must be considered.

- Minimize the amount of disturbed areas according to construction schedule and phasing.
- Prepare a stabilized construction entrance prior to commencing earthwork activities.
- Install and/or construct perimeter sediment controls as soon as possible.
- Place topsoil stockpiles away from proposed or existing drainageways.

Surface Roughening:

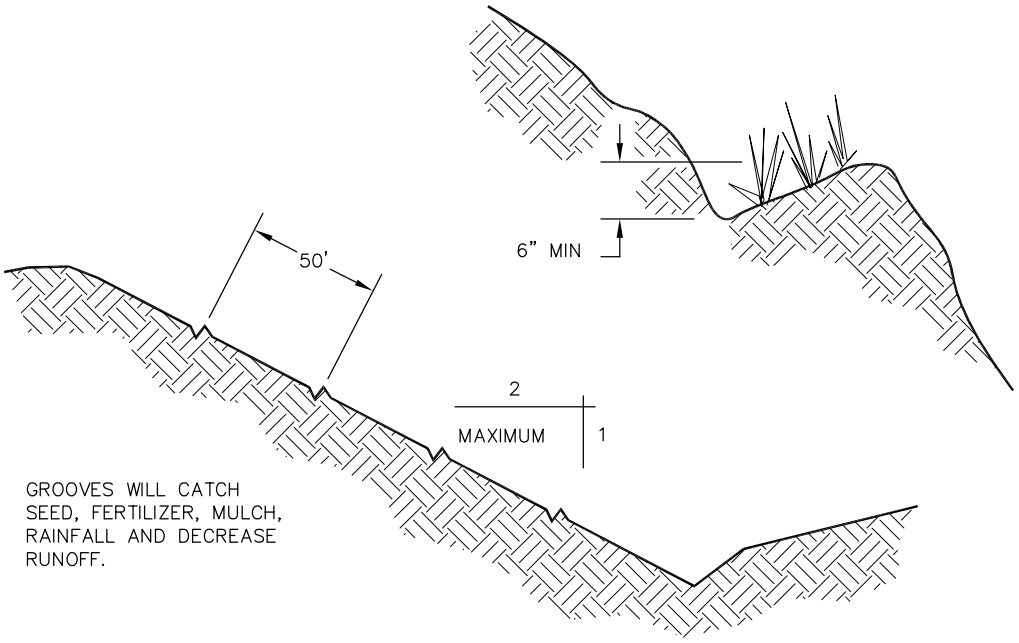
Roughening a newly graded slope promotes establishment of vegetative cover by reducing runoff velocities, providing areas where seed and sediment can deposit and increasing infiltration. Factors influencing effectiveness of this BMP must be considered.

- Track machinery up and down exposed slopes to create grooves perpendicular to the flow direction.
- Contour furrow long slopes every 50 feet, effectively decreasing slope length.



'TRACKING' WITH MACHINERY UP AND DOWN THE SLOPE PROVIDES GROOVES THAT WILL CATCH SEED, RAINFALL AND REDUCE RUNOFF.

TRACKING



GROOVES WILL CATCH SEED, FERTILIZER, MULCH, RAINFALL AND DECREASE RUNOFF.

CONTOUR FURROWS

SR

SURFACE ROUGHENING

CONTOUR FURROWING

Permanent and Temporary Seeding:

Establishing vegetative cover capable of limiting erosion potential to that of pre-disturbed levels is necessary for SWMP compliance. Effective revegetation limits raindrop impact erosion, facilitates infiltration, reduces runoff and reduces negative impacts caused by noxious weeds. Factors influencing revegetation efforts must be considered.

- Permanent seeding is required on all disturbed areas within 14 days of achieving finished grade.
- Temporary seeding is required on all disturbed areas and/or stockpiles expected to remain dormant for a period greater than 30 days.
- Seedbed must be properly prepared to be firm but not compacted for successful seed to soil contact and germination.
- Soil management and/or fertilizer may be required based on soil type. Contact CSU and/or NRCS for further information.
- Irrigation may be necessary based on site conditions.
- Seed application and application rate may vary based on site conditions.
- Proper cover over the seed is essential.
- Seed must be evenly applied to all disturbed areas.

PERMANENT SEED MIX

RECOMMENDED BY GRAND CO. NRCS

LAND USE	% OF MIX	SPECIES	VARIETY	APPLICATION RATE (Lbs/Ac)
DRY LAND NON-IRRIGATED RECLAMATION	50%	SMOOTH BROME	MANCHAR	16 Lbs/Ac
	25%	SHEEP FESCUE	COVAR	8 Lbs/Ac
	20%	PUBESCENT WHEATGRASS	LUNA	6.5 Lbs/Ac
	5%	WILD FLOWER	BLUE FLAX	2 Lbs/Ac

NOTES:
1. THE APPLIED SEED SHALL NOT BE COVERED BY A SOIL THICKNESS GREATER THAN 0.5 INCHES IN DEPTH.

2. SEEDING SHALL TAKE PLACE WITHIN 14 DAYS OF ACHIEVING FINISHED GRADE. SEEDING MUST OCCUR WITHIN 3 DAYS OF TOPSOIL PLACEMENT.

3. TO PROVIDE TEMPORARY EROSION CONTROL PRIOR TO SEED APPLICATION, UTILIZE SURFACE ROUGHENING (ON THE CONTOUR OR PERPENDICULAR TO PREVAILING WINDS) AND APPLY MULCH.

4. SEED SHALL BE PLANTED WITH DRILL SEEDING EQUIPTMENT, WHEN POSSIBLE.

5. AREAS THAT REQUIRE BROADCAST SEEDING SHALL BE MULCHED AND TACKIFIED.

6. SEED APPLIED HYDRAULICALLY SHALL INCLUDE TACKIFIER IN THE MIX, AS SPECIFIED BY MANUFACTURER.

TEMPORARY SEED MIX

RECOMMENDED BY GRAND CO. NRCS

LAND USE	% OF MIX	SPECIES	VARIETY	APPLICATION RATE (Lbs/Ac)
DRY LAND NON-IRRIGATED RECLAMATION	50%	SMOOTH BROME	MANCHAR	8 Lbs/Ac
	50%	PUBESCENT WHEATGRASS	LUNA	8 Lbs/Ac

NOTES:
1. THE APPLIED SEED SHALL NOT BE COVERED BY A SOIL THICKNESS GREATER THAN 0.5 INCHES IN DEPTH.

2. SEEDING SHALL TAKE PLACE ON ALL DISTURBED AREAS AND STOCKPILES EXPECTED TO REMAIN DORMANT FOR A PERIOD GREATER THAN 30 DAYS.

3. TO PROVIDE TEMPORARY EROSION CONTROL PRIOR TO SEED APPLICATION, UTILIZE SURFACE ROUGHENING (ON THE CONTOUR OR PERPENDICULAR TO PREVAILING WINDS) AND APPLY MULCH.

4. SEED SHALL BE PLANTED WITH DRILL SEEDING EQUIPTMENT, WHEN POSSIBLE.

5. AREAS THAT REQUIRE BROADCAST SEEDING SHALL BE MULCHED AND TACKIFIED.

PERMANENT SEEDING PS

TEMPORARY SEEDING TS

Mulching:

Application of an effective mulching over an exposed area limits raindrop impact erosion and facilitates revegetation efforts by increasing available moisture. Factors influencing selection of a proper mulch must be considered.

- Slope/channel steepness.
- Type of runoff expected such as concentrated or sheet flow.
- Quantity of runoff expected.
- Velocity and shear forces expected.
- Mulch must be properly anchored to be effective.

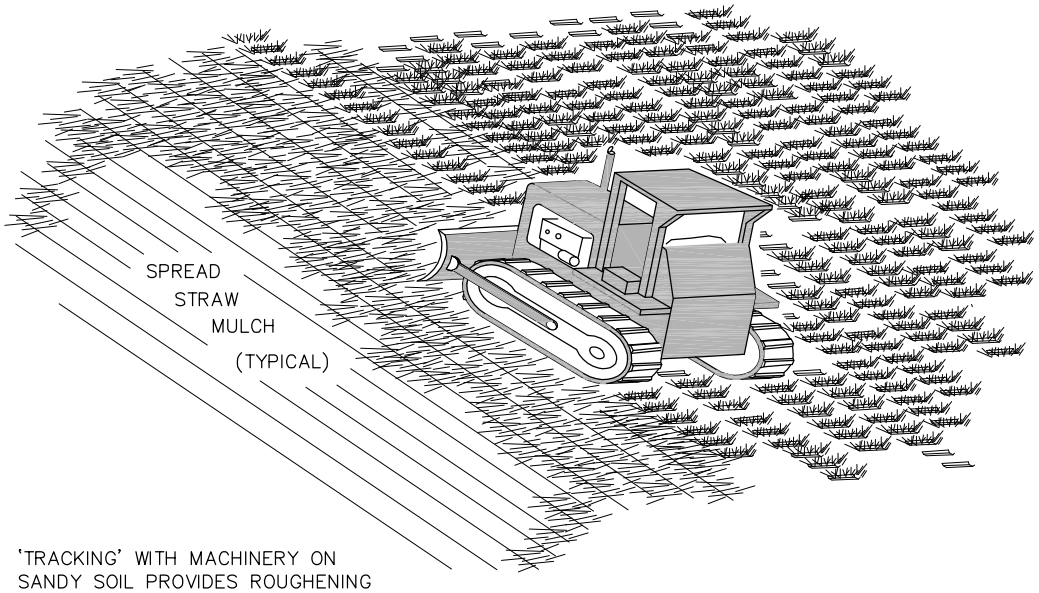
NOTES:
1. STRAW MULCH OBTAINED FROM WHEAT, BARLEY, OAT OR RICE SHALL BE CLEAN AND UNCOMPACTED, FREE OF NOXIOUS WEEDS.

2. STRAW MULCH WITH AN AVERAGE LENGTH OF AT LEAST 10 INCHES, SHALL BE DISTRIBUTED EVENLY EITHER BY BLOWING EQUIPMENT OR BY HAND AT A RATE OF AT LEAST 2 TONS/ACRE, WITH A DEPTH NOT TO EXCEED 4 INCHES.

3. STRAW MULCH SHALL HAVE AN AREAL COVERAGE OF AT LEAST 80% OF THE SOIL/SEEDED SURFACE.

4. STRAW MULCH SHALL BE IMEDIATELY ANCHORED TO THE SEED BED BY EITHER MECHANICAL MEANS SUCH AS CRIMPING, TRACKING OR DISKING OR HYDRAULICALLY APPLIED TACKIFIERS AT A RATE OF 40–120 LBS/ACRE.

5. SEED APPLIED HYDRAULICALLY MAY INCLUDE TACKIFIER IN THE MIX, AS SPECIFIED BY MANUFACTURER.



'TRACKING' WITH MACHINERY ON SANDY SOIL PROVIDES ROUGHENING WITHOUT UNDUE COMPACTION.

STRAW ANCHORING

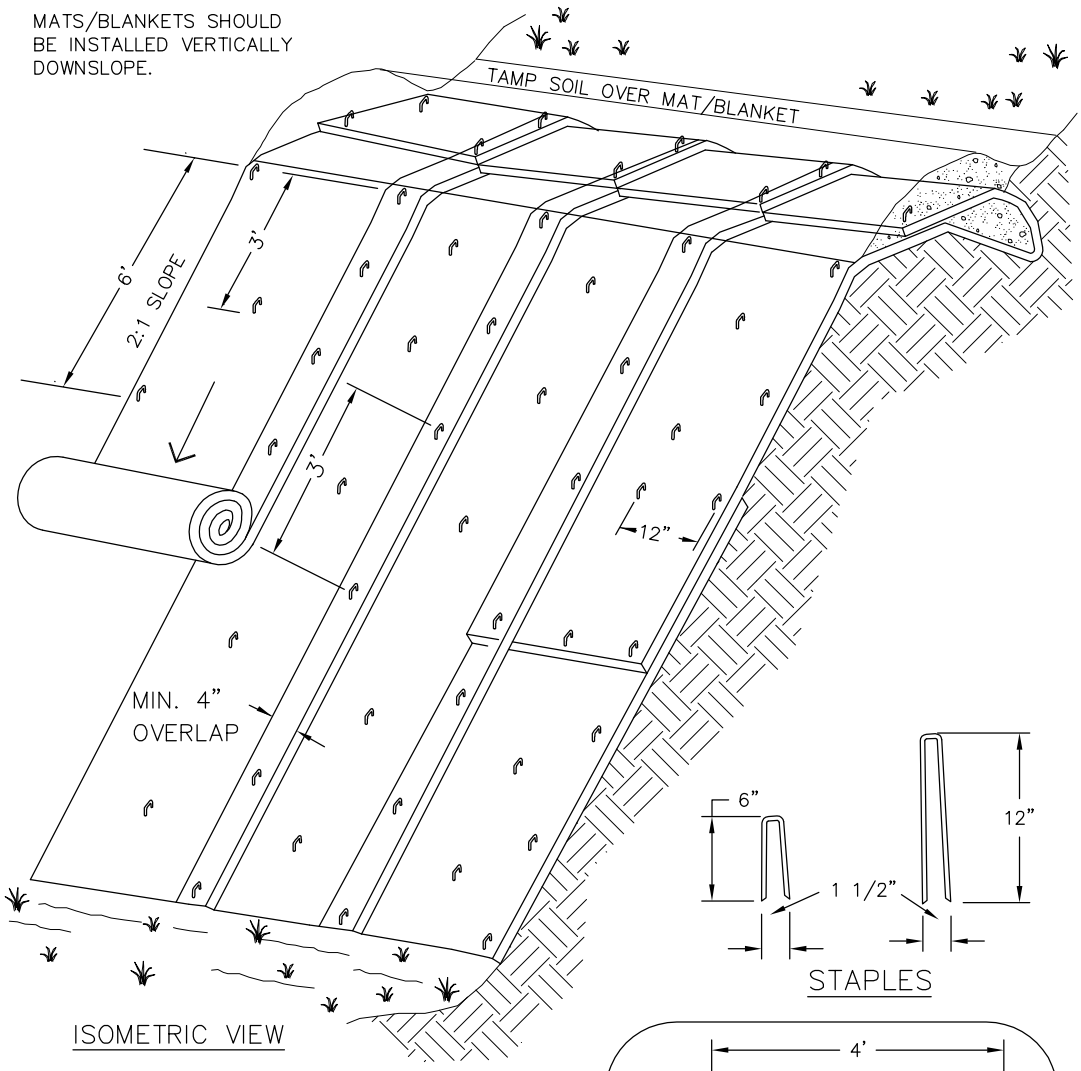
PROCESS:

1. ROUGHEN TOPSOILED SLOPE WITH BULLDOZER
2. APPLY SEED.
3. SPREAD STRAW MULCH 4" THICK. (2 TONS PER ACRE)
4. PUNCH STRAW MULCH INTO SLOPE BY RUNNING BULLDOZER UP AND DOWN SLOPE.

MU1

MULCH PROTECTION

BLOWN STRAW W/ANCHOR



TYPICAL SLOPE
SOIL STABILIZATION

NOT TO SCALE

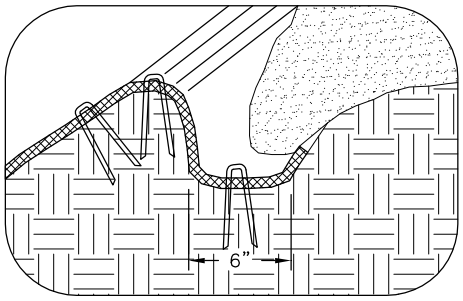
NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/ BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

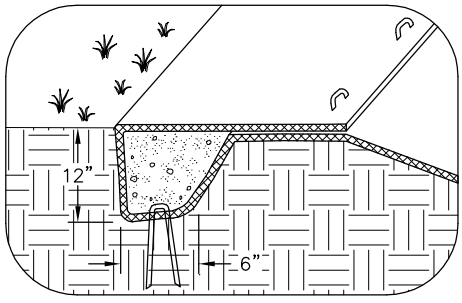
MU2

MULCH PROTECTION

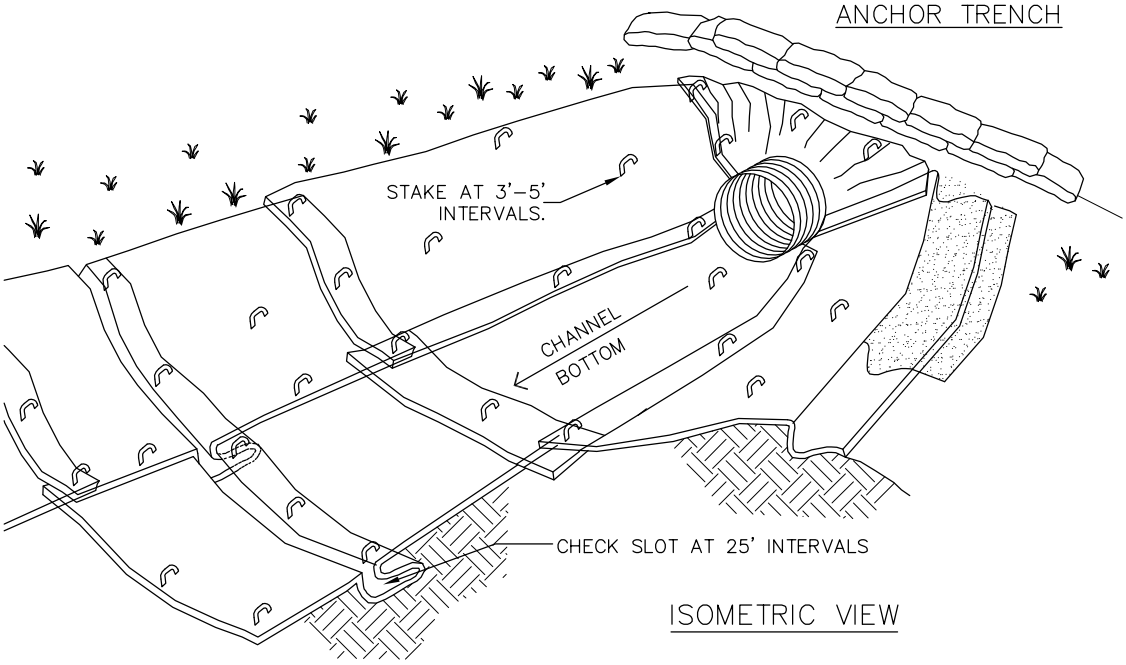
RECP SLOPE



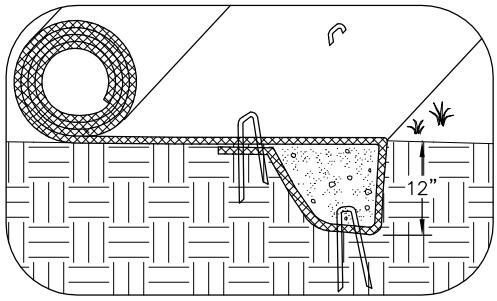
LONGITUDINAL ANCHOR TRENCH



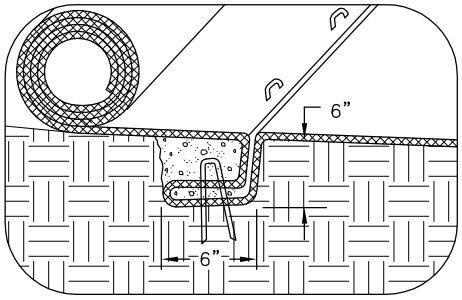
TERMINAL SLOPE AND CHANNEL ANCHOR TRENCH



ISOMETRIC VIEW



INITIAL CHANNEL ANCHOR TRENCH



INTERMITTENT CHECK SLOT

NOTES:

1. CHECK SLOTS TO BE CONSTRUCTED PER MANUFACTURERS SPECIFICATIONS.
2. STAKING OR STAPLING LAYOUT PER MANUFACTURERS SPECIFICATIONS.

MU3

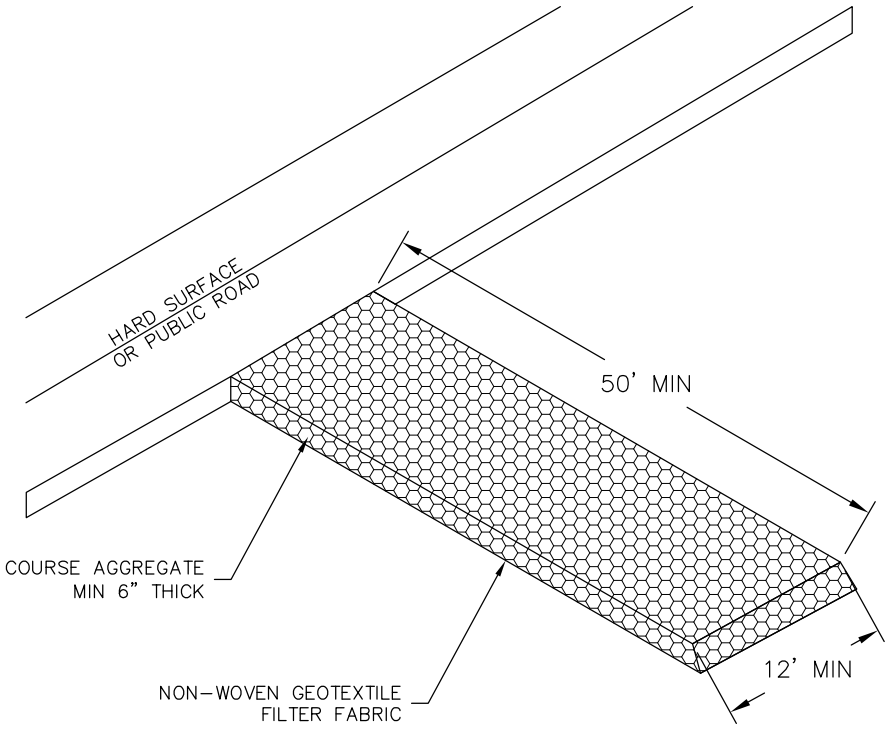
MULCH PROTECTION

RECP CHANNEL

Vehicle Tracking Control:

A stabilized construction entrance limits erosion potential as vehicles enter and exit a construction site. The mud and debris accumulated on tires will be deposited in a controlled manner prior to being tracked onto a public roadway. Factors influencing effectiveness of this BMP must be considered.

- Properly fence, sign and designate the construction entrance to limit confusion as to where construction vehicles shall enter and exit the site.
- Size the aggregate pad to be effective for the most common construction traffic expected for the site.
- Rinsing mud and debris from tires may be necessary, if this is the case, direct this wash water to a temporary sediment basin.



VTC

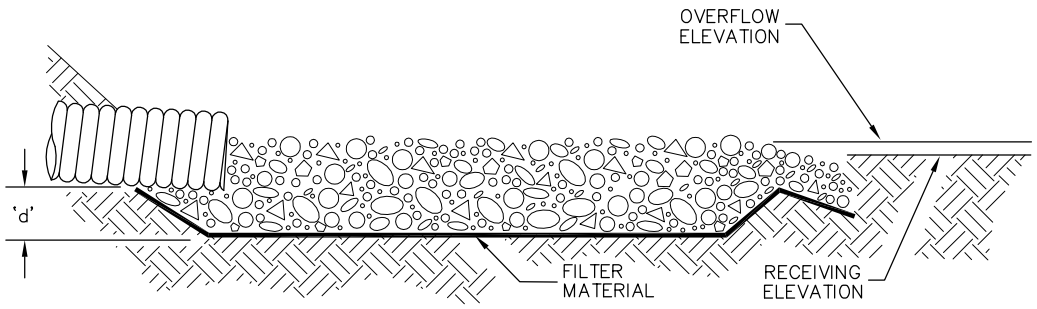
VEHICLE TRACKING CONTROL

AGGREGATE PAD

Energy Dissipaters:

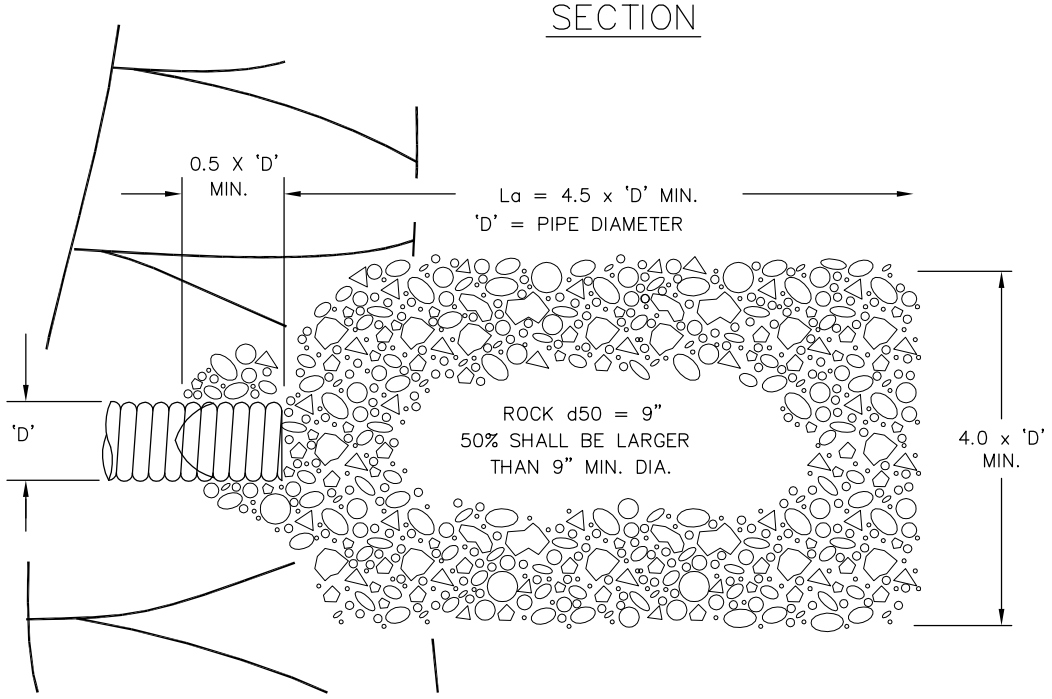
Dissipating the energy of stormwater as it flows through conduits is necessary to prevent adverse effects of scour. A riprap pad will aid in decreasing velocities and stabilize downstream channels. Factors influencing effectiveness of this BMP must be considered.

- The size and angularity of the stone must be sufficient to not become dislodged as a result of expected stormwater flows.
- The size of the pad must be sufficient to limit expected stormwater flows to non-erodable velocities.



THICKNESS ('d') = 1.5 x MAX. ROCK DIAMETER – 6" MIN.

SECTION



PLAN

NOTES:

1. 'La' = LENGTH OF APRON. DISTANCE 'La' SHALL BE OF SUFFICIENT LENGTH TO DISSIPATE ENERGY.
2. APRON SHALL BE SET AT A ZERO GRADE AND ALIGNED STRAIGHT.
3. FILTER MATERIAL SHALL BE FILTER FABRIC OR 6" (150mm) THICK MINIMUM GRADED GRAVEL LAYER.

RR

ENERGY DISSIPATER

RIP RAP PAD

IV. SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

Definition:

Best Management Practices (BMPs) for controlling non-point source pollution are the methods, measures, practices and combination of practices determined to be the most effective and practical means to control non-point pollutants at levels compatible with environmental quality goals.

Sediment Control BMPs are those controls implemented for a construction site that limit the amount of sediment capable of being transported and deposited off-site. The aforementioned Erosion Control BMPs serve a prevention function whereas these Sediment Control BMPs serve a treatment function.

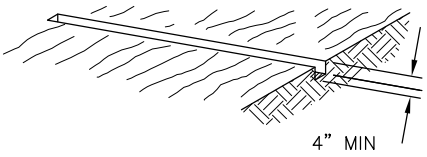
The following BMPs are not intended to be all-inclusive and may vary as construction site conditions dictate. As technology and information evolves and new and improved products and techniques become available, their use is encouraged. The intent however, is to evaluate the effectiveness of all BMPs based on performance.

Perimeter Protection:

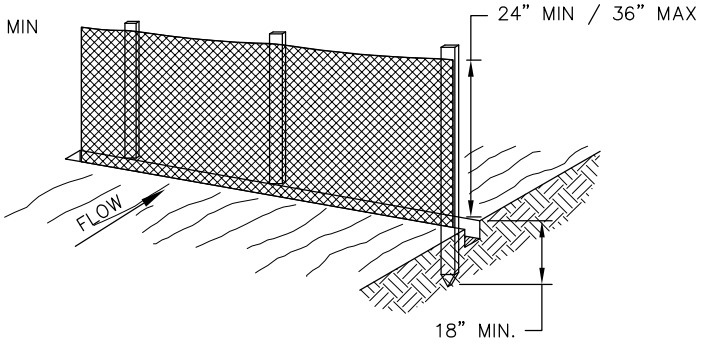
Perimeter protection BMPs function as a barrier to sediment-laden stormwater runoff around the down-gradient perimeter of a construction site. The intent of these controls is to pond sediment-laden stormwater associated with overland sheet flow allowing sediment-free stormwater to permeate through or overtop the BMP. As the velocity decreases, sediment is deposited in a controlled manner prior to exiting the construction site. Factors influencing effectiveness of these BMPs must be considered.

- Recommended tributary area is less than ¼ Acre per 100 linear foot of control.
- Installed protection must be placed parallel to the contours on the construction site.
- These controls are not intended for areas where focused flow is expected.
- Regular maintenance is necessary to ensure proper function and deposited sediment should be removed.

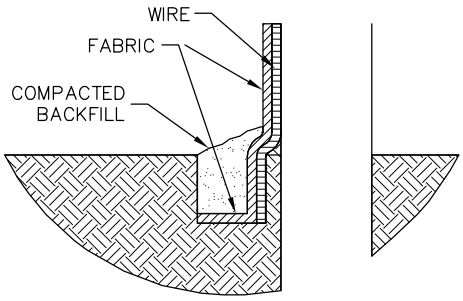
1. EXCAVATE A 4" X 4" MIN TRENCH ALONG THE DESIRED FENCE LINE. PLACE EXCAVATED MATERIAL UPSLOPE.



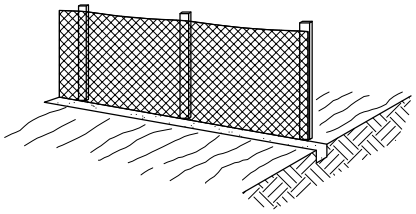
2. PLACE WOODEN POST AT 10' MAXIMUM SPACING. ANCHOR FILTER FABRIC TO POSTS, PER MANUFACTURER SPECIFICATIONS. EXTEND FILTER FABRIC INTO TRENCH. OVERLAP SECTIONS OF FENCE A MINIMUM OF 18".



3. EXTENSION OF FABRIC AND WIRE INTO THE TRENCH.



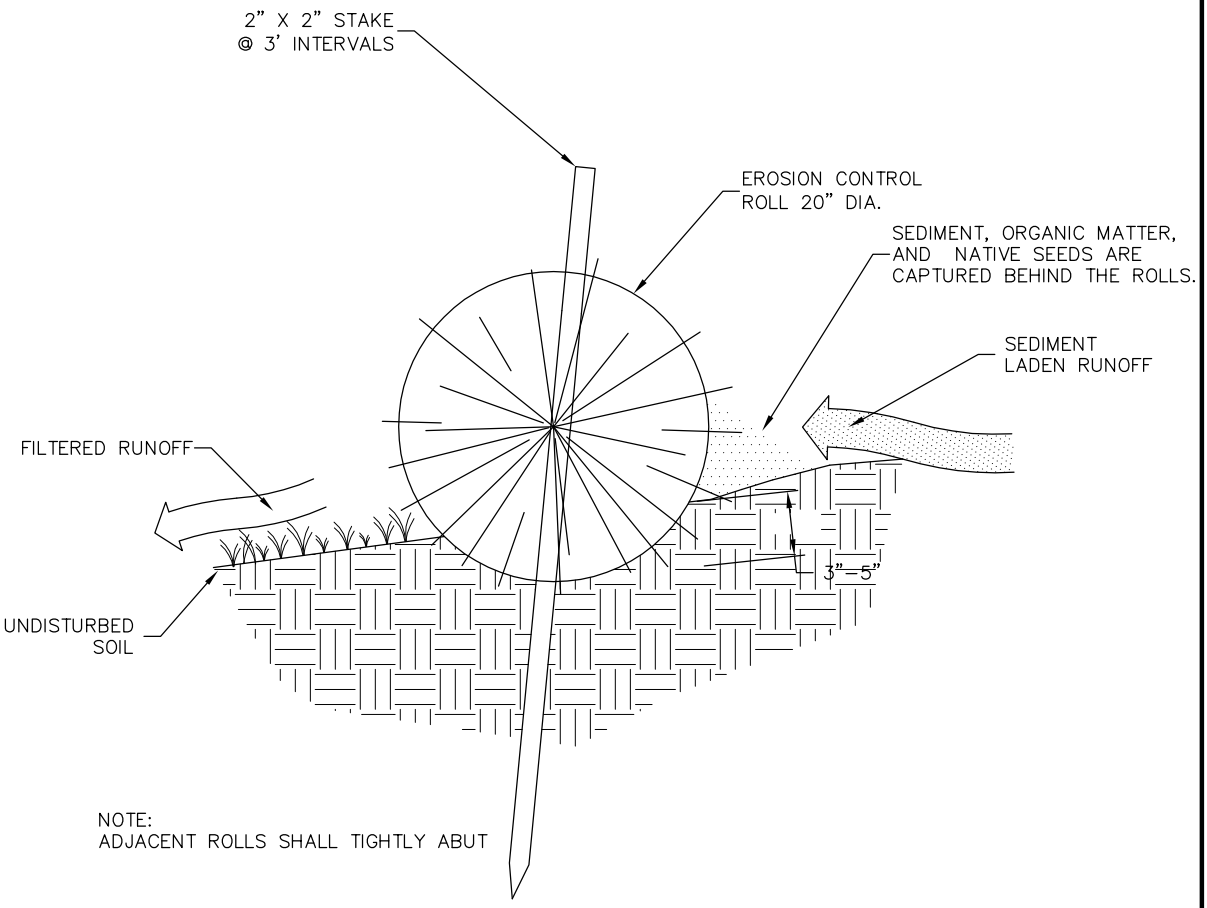
4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



PP1

PERIMETER PROTECTION

SILT FENCE



PP2

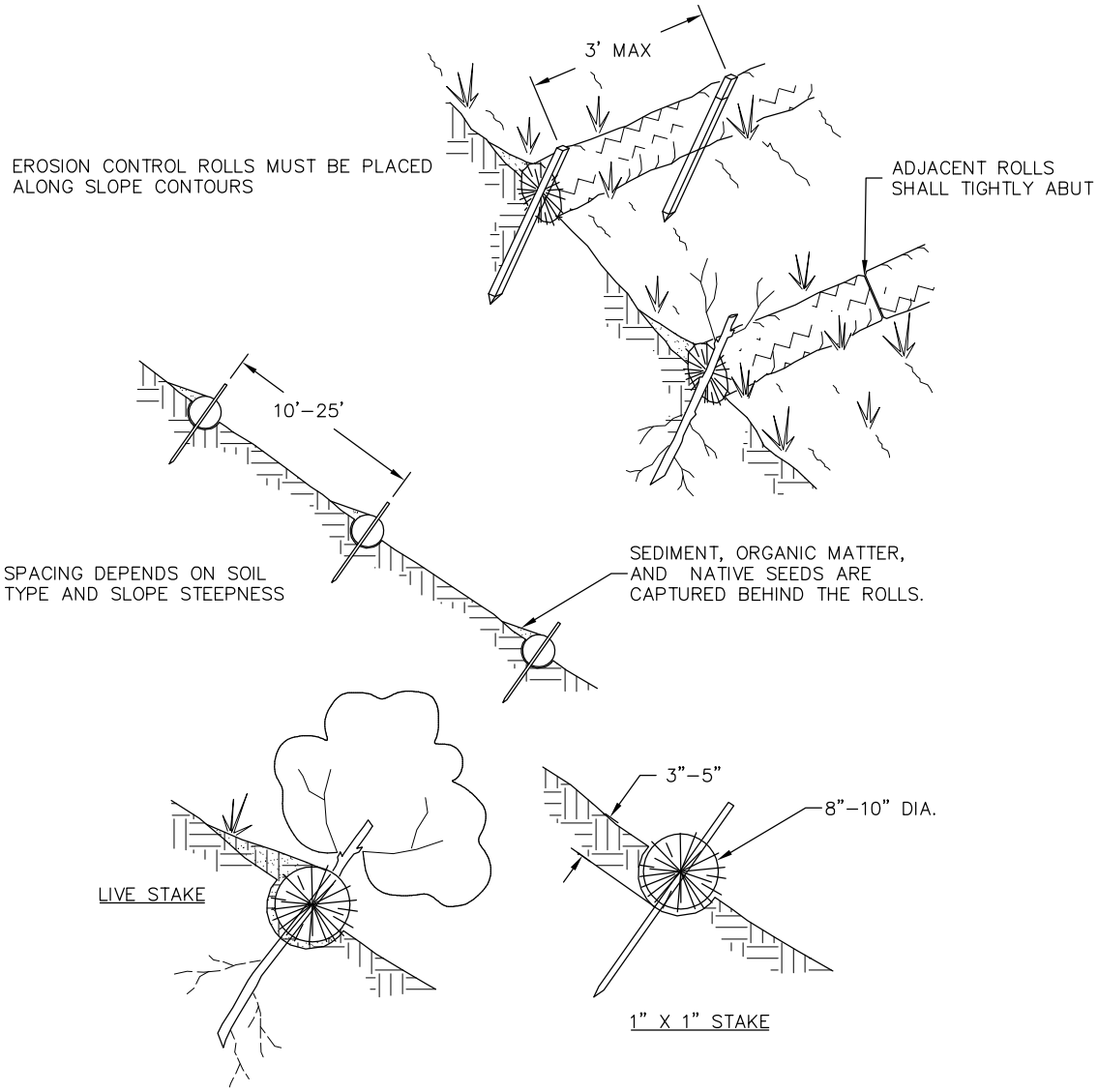
PERIMETER PROTECTION

EROSION CONTROL ROLL (20")

Slope Interruption:

Slope interruption BMPs function by effectively decreasing slope length, protecting disturbed slopes and capturing eroded sediment. These controls decrease stormwater velocity on exposed slopes, allowing suspended sediment to settle. Additionally, these BMPs can be implemented to divert stormwater from disturbed slopes so that focused flows can be conveyed in a controlled manner. Factors influencing effectiveness of these BMPs must be considered.

- Recommended installation at the top, mid and bottom of exposed slopes.
- Installed protection must be placed parallel to the contours on the construction site.
- Placement must account for steepness of the slope.
- Diverted stormwater must be conveyed down slope in an erosion resistant rundown.
- Regular maintenance is necessary to ensure proper function and deposited sediment should be removed.

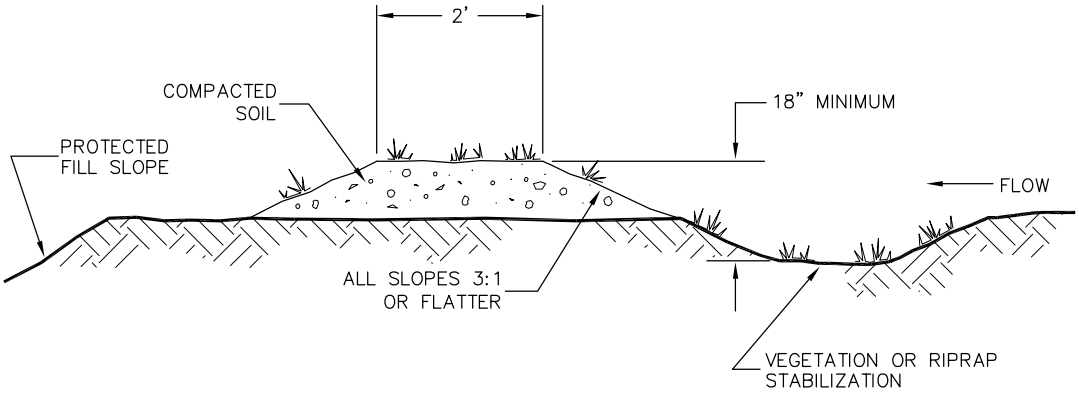


NOTE:
1. STRAW ROLL INSTALLATION REQUIRES THE PLACEMENT AND SECURE STAKING OF THE ROLL IN A TRENCH, 3"–5" DEEP, DUG ON CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.

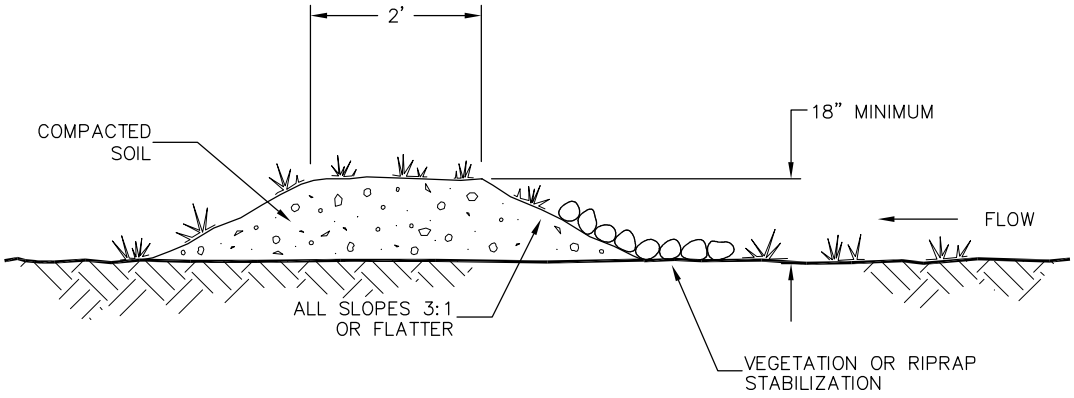
SID1

SLOPE INTERRUPTION DEVICE

EROSION CONTROL ROLL (8–10")



TYPICAL FILL DIVERSION



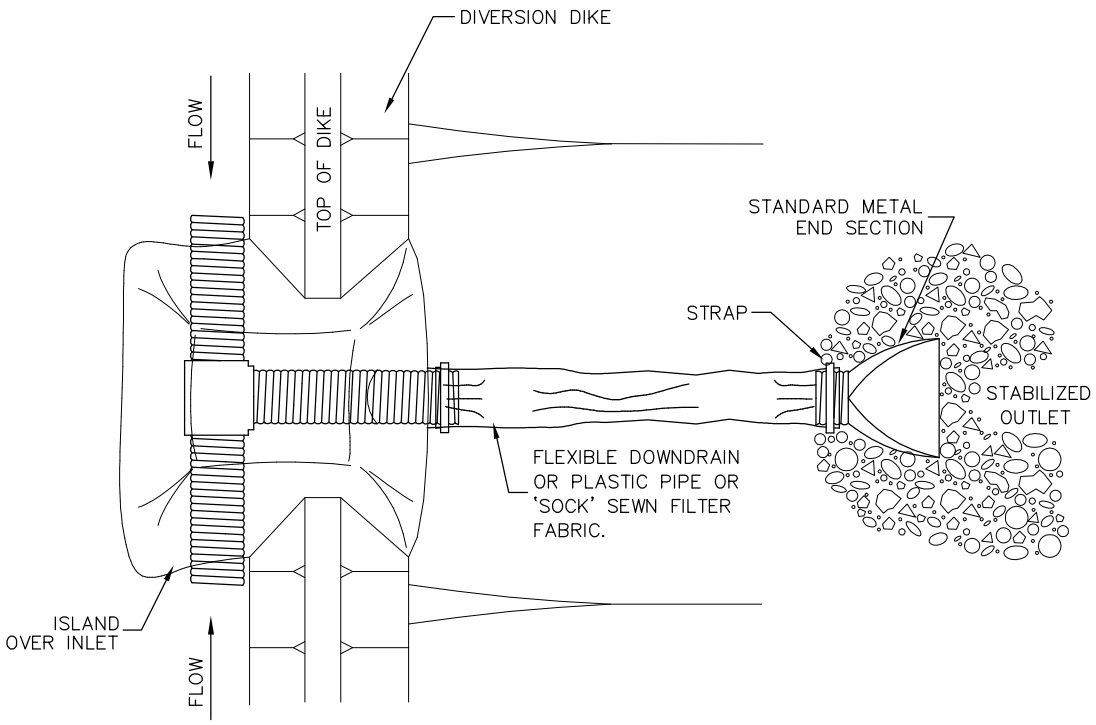
TYPICAL TEMPORARY DIVERSION DIKE

NOTES:
1. THE CHANNEL BEHIND THE DIKE SHALL HAVE POSITIVE GRADE TO A STABILIZED OUTLET.
2. THE DIKE SHALL BE ADEQUATELY COMPACTED TO PREVENT FAILURE.
3. THE DIKE SHALL BE STABILIZED WITH TEMPORARY OR PERMANENT SEEDING OR RIPRAP.

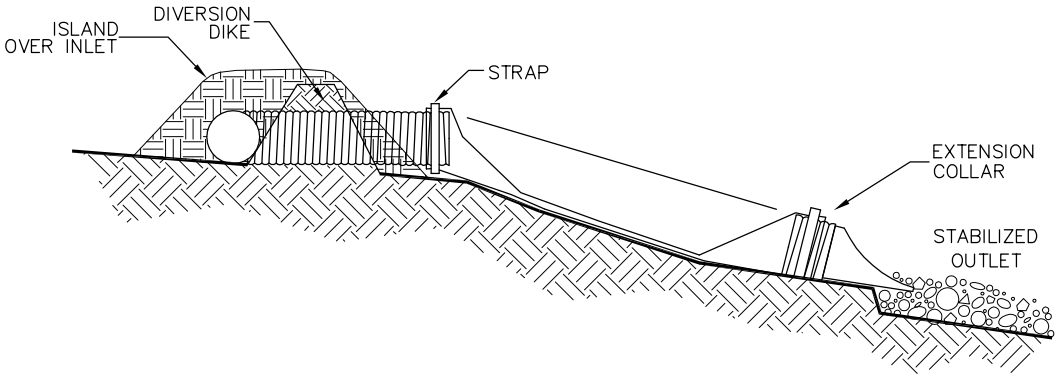
SID2

SLOPE INTERRUPTION DEVICE

DIVERSION DIKE



PLAN VIEW



SECTION

SID3

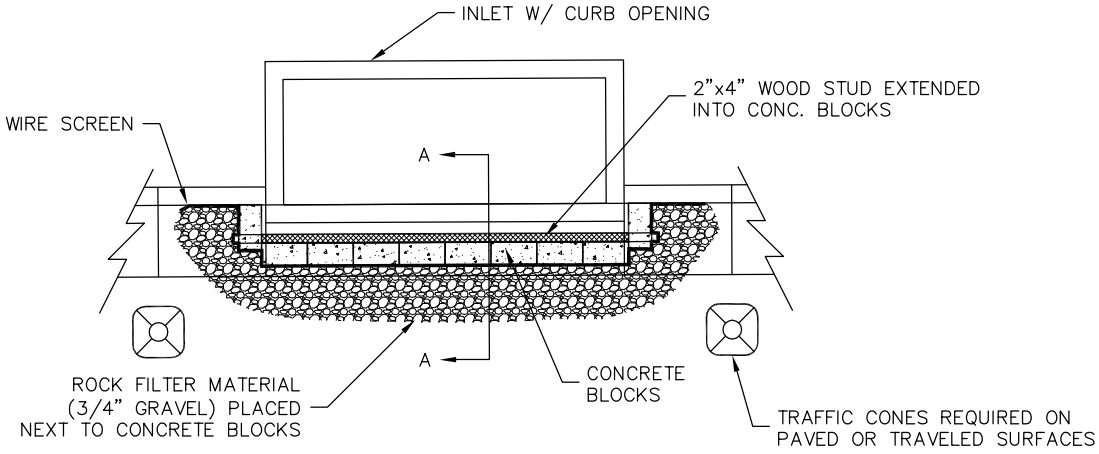
SLOPE INTERRUPTION DEVICE

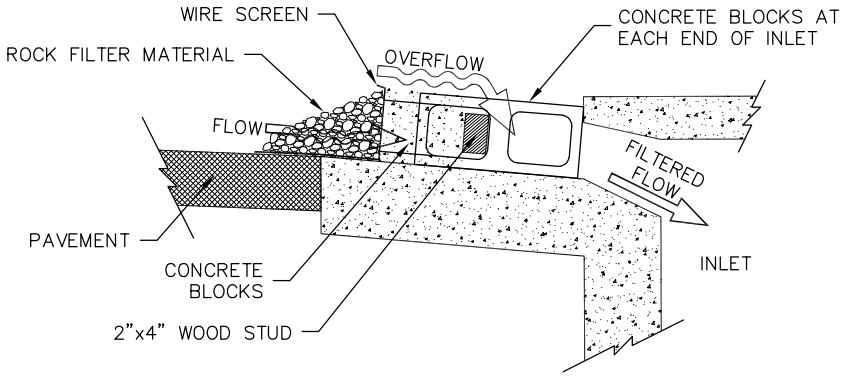
SLOPE DRAIN

Inlet Protection:

Inlet protection BMPs function as a barrier to sediment-laden stormwater runoff from entering culvert crossings and storm sewers. These controls are designed to pond sediment-laden stormwater associated with focused flows entering drainage conveyances allowing sediment-fee stormwater to permeate through or overtop the BMP. As this runoff ponds, suspended sediment is deposited in a controlled manner. Factors influencing effectiveness of these BMPs must be considered.

- Obstructions in the flow path of focused stormwater runoff must be properly secured from the forces generated.
- Drainage conveyances are designed to accept runoff, implementation of these BMPs must allow this infrastructure to function as intended by incorporating overflow spillways yet still allow for ponding.
- Regular maintenance is necessary to ensure proper function and deposited sediment should be removed.



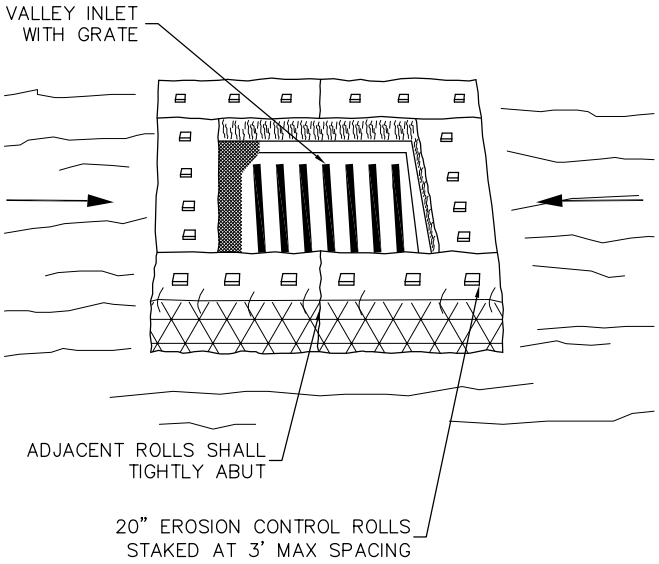


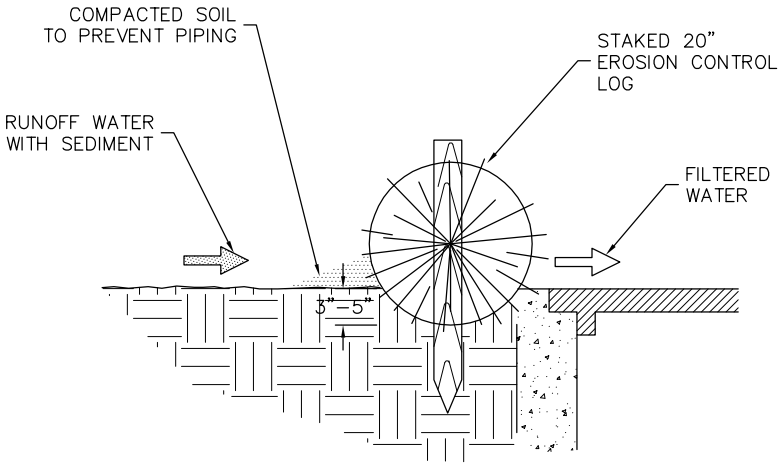
SECTION A–A

IP1

INLET PROTECTION – CURB

BLOCK & GRAVEL

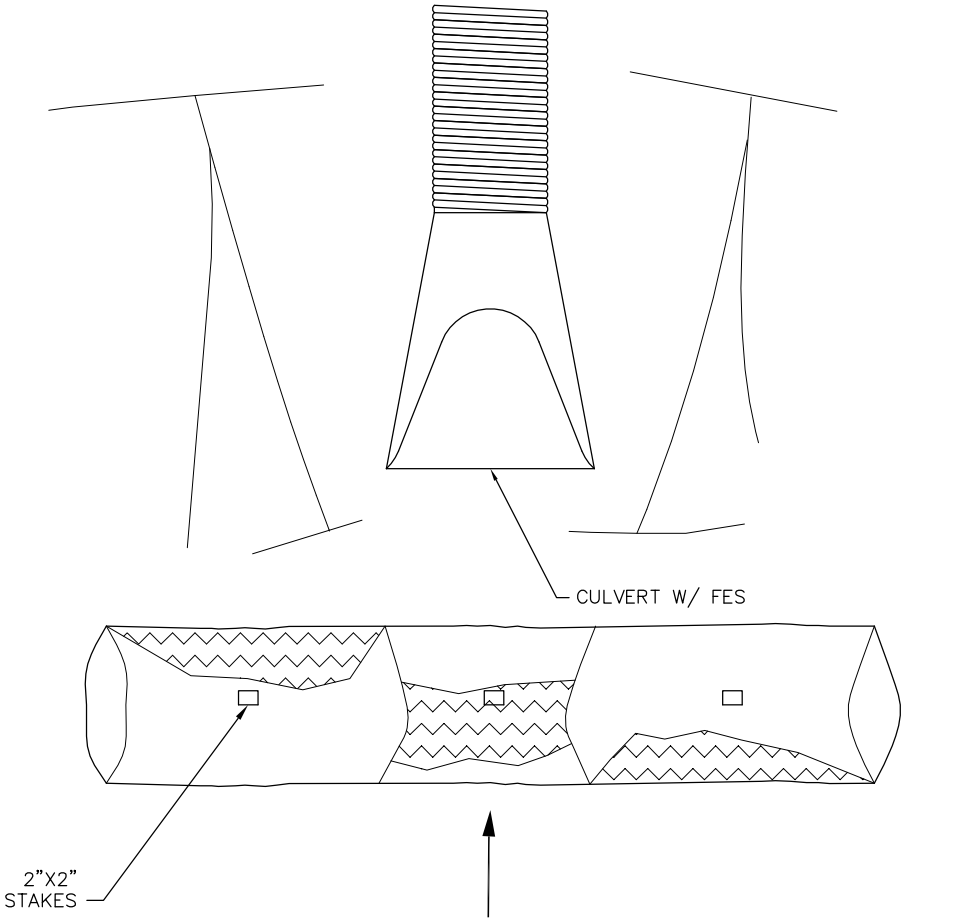


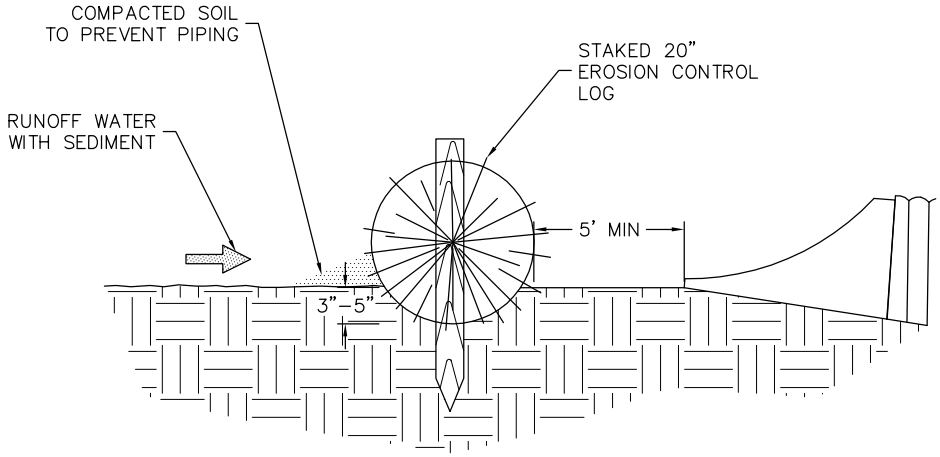


IP2

INLET PROTECTION – VALLEY

EROSION CONTROL ROLL (20")

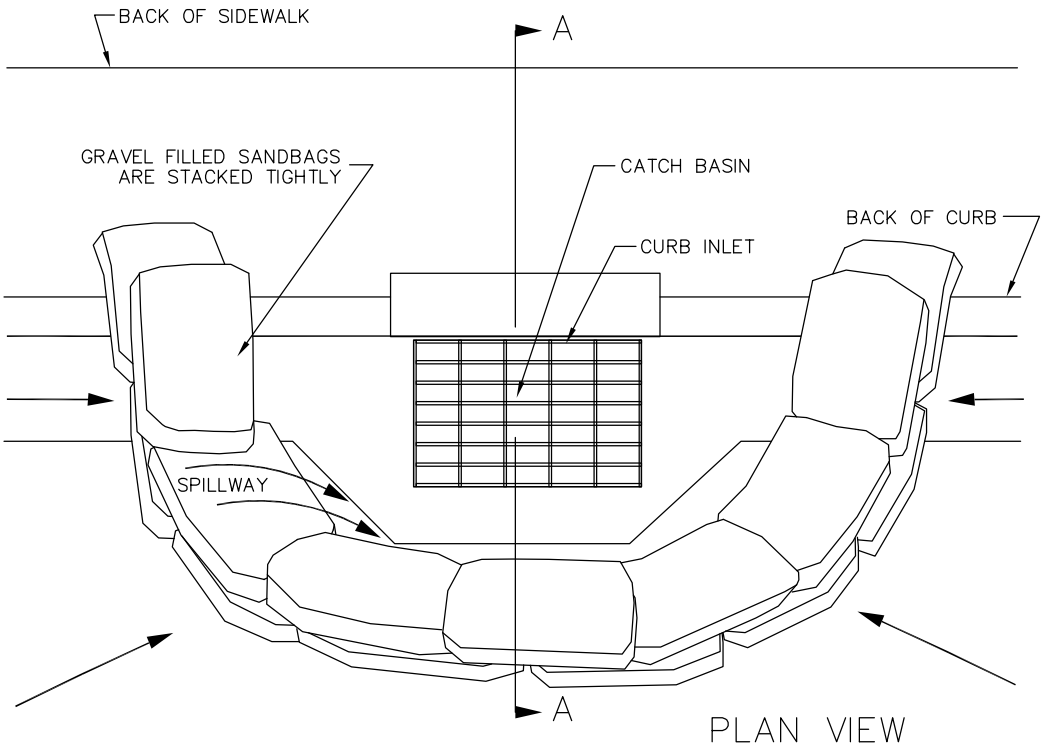




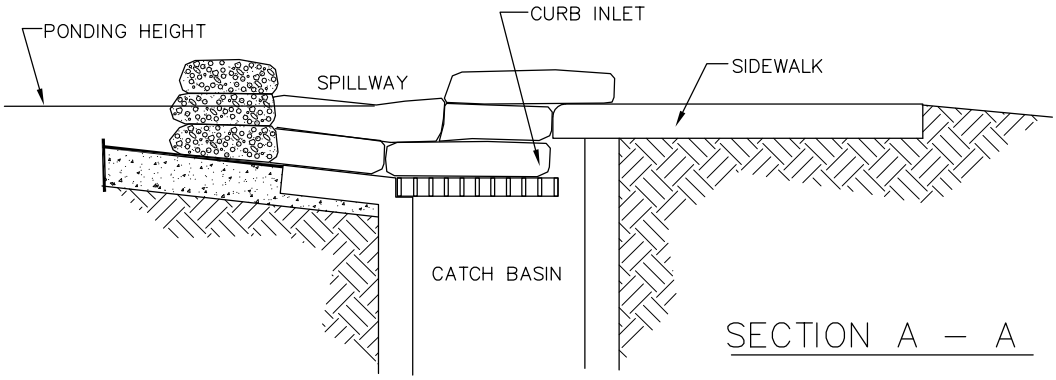
IP3

INLET PROTECTION – CULVERT

EROSION CONTROL ROLL (20")



PLAN VIEW



SECTION A – A

NOTES:

1. PLACE CURB TYPE SEDIMENT BARRIERS ON GENTLY SLOPING STREET SEGMENTS WHERE WATER CAN POND AND ALLOW SEDIMENT TO SEPARATE FROM RUNOFF.
2. SANDBAGS, OF EITHER BURLAP OR WOVEN GEOTEXTILE FABRIC, ARE FILLED WITH GRAVEL, LAYERED AND PACKED TIGHTLY.
3. LEAVE ONE SANDBAG GAP IN THE TOP ROW TO PROVIDE A SPILLWAY FOR OVERFLOW.
4. INSPECT BARRIERS AND REMOVE SEDIMENT AFTER EACH STORM EVENT. SEDIMENT AND GRAVEL MUST BE REMOVED FROM THE TRAVELED WAY IMMEDIATELY.

IP4

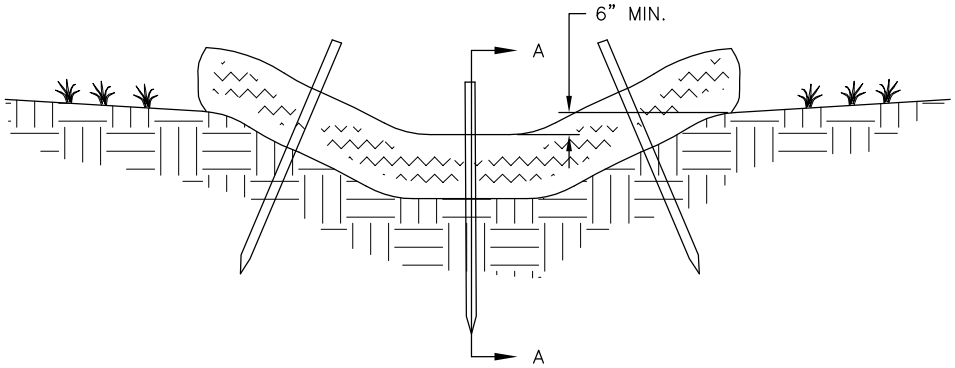
INLET PROTECTION – CURB

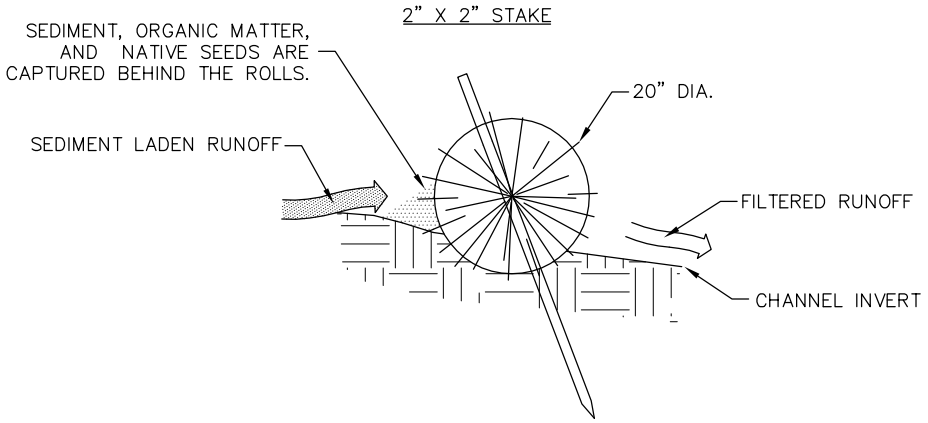
GRAVEL BAG

Check Dams:

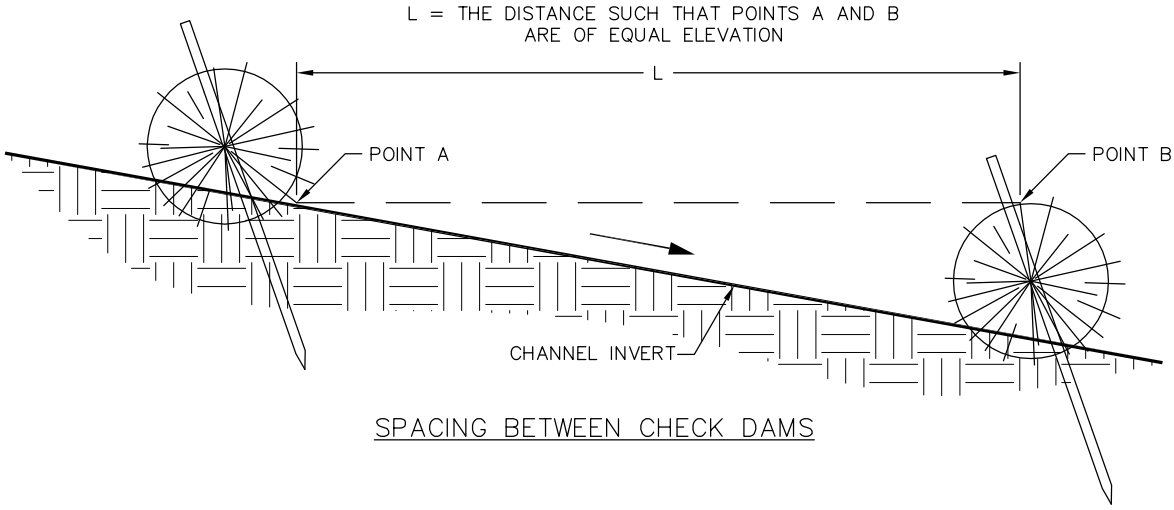
Check dam BMPs facilitate deposition of sediment in drainage channels. They function by allowing sediment-laden stormwater to pond allowing sediment-free stormwater to permeate through or overtop the BMP. As this runoff ponds, suspended sediment is deposited in a controlled manner. Factors influencing effectiveness of these BMPs must be considered.

- Obstructions in the flow path of focused stormwater runoff must be properly secured from the forces generated.
- Drainage channels are designed to convey runoff, implementation of these BMPs must allow these channels to function as intended by incorporating overflow spillways yet still allow for ponding.
- Placement of these BMPs must account for the slope of the channel.
- Regular maintenance is necessary to ensure proper function and deposited sediment should be removed.





SECTION A–A

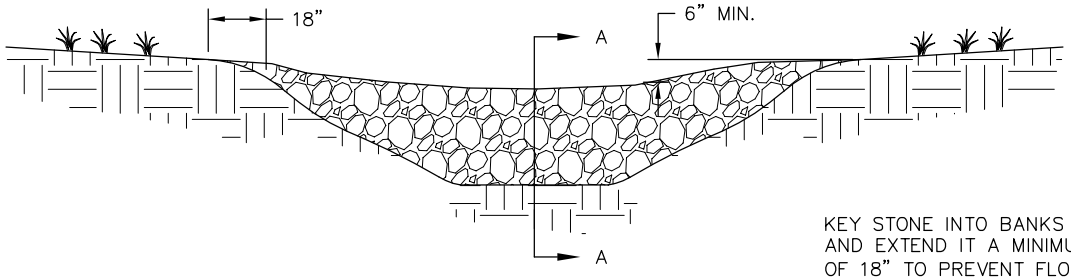


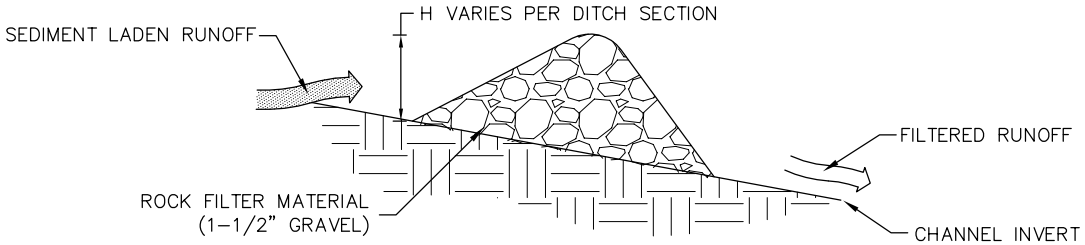
SPACING BETWEEN CHECK DAMS

CD1

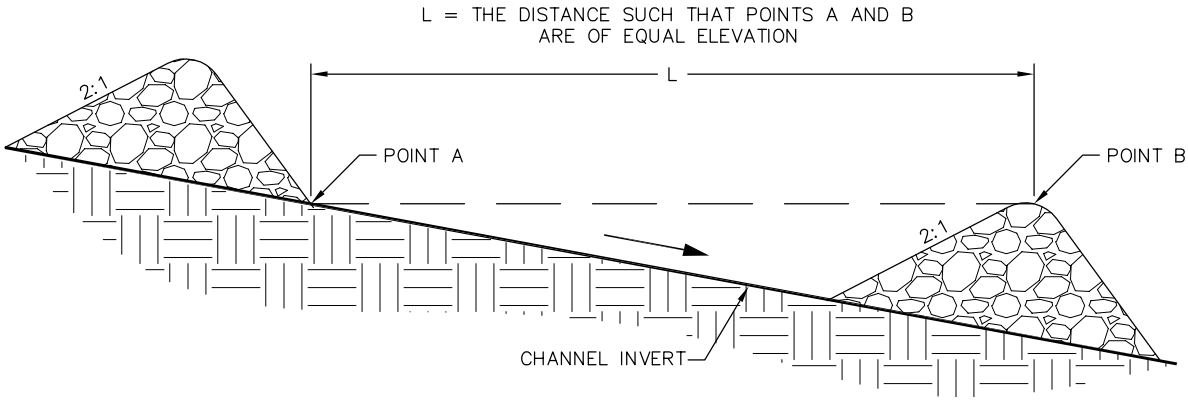
CHECK DAM

EROSION CONTROL ROLL (20")





SECTION A–A



SPACING BETWEEN CHECK DAMS

CD2

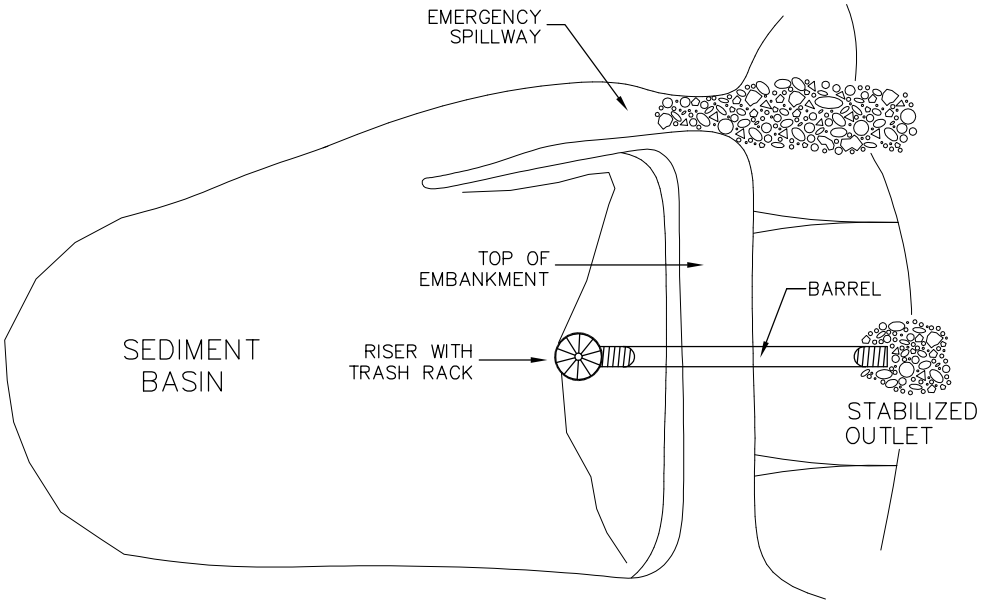
CHECK DAM

ROCK

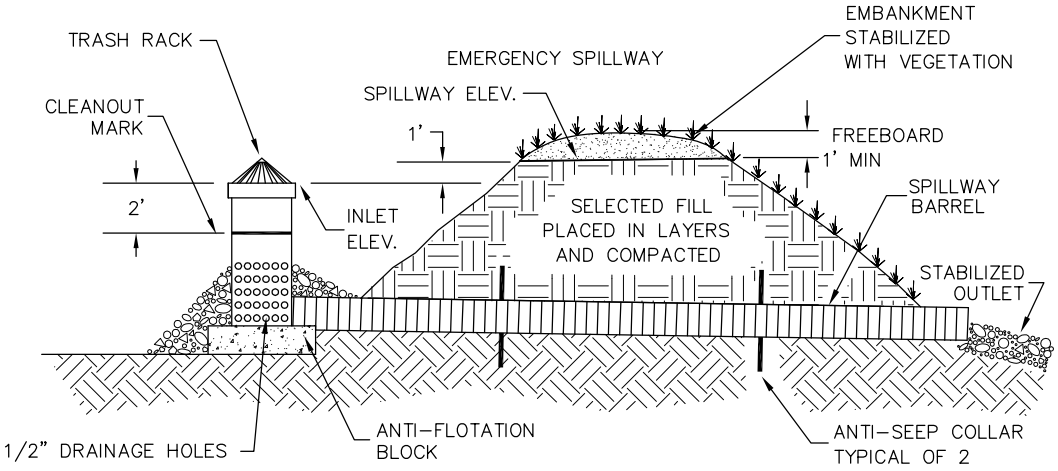
Sediment Basins:

Sediment basin BMPs temporarily detain stormwater runoff allowing suspended sediment to be deposited prior to entering a receiving waterway. Proper implementation of this BMP accounts for stormwater from the vast majority of the construction site to be routed to these facilities. They function by allowing sediment-laden stormwater to pond allowing sediment-free stormwater to release in a controlled manner. These BMPs are typically the last line of defense for controlling sediment migration off-site. Although they serve as temporary controls during construction activities, they can be incorporated into permanent stormwater detention facilities if so designed. Factors influencing effectiveness of this BMP must be considered.

- Volume of the basin must be a minimum of 1800 cubic feet per disturbed tributary acre.
- Length to width ratio should be greater the 3:1.
- Emergency overflow spillway must be incorporated into embankment and protected from scour.
- Outlet pipe shall be a minimum of 18" diameter and must be protected from scour.
- Regular maintenance is necessary to ensure proper function and deposited sediment should be removed prior to becoming half-full.



PLAN



SECTION

NOTE:
1. SEDIMENT BASIN SHALL BE SIZED TO PROVIDE A MINIMUM VOLUME OF 1800 CUBIC FEET PER TRIBUTARY AREA.

TSB

TEMPORARY SEDIMENT BASIN

FIELD FIT

V. REFERENCES

Information utilized for preparation of this Manual has been adapted from the following sources.

- Erosion Draw 5.0 Erosion Control Standards and Construction Drawings, Salix Applied Earthcare, John McCullah, 2004.
- Northwest Colorado Council of Governments, Water Quality Protection Standards, 1998.
- Urban Storm Drainage Criteria Manual, Vol. 1-3 Urban Drainage and Flood Control District, Denver, CO June 2001.
- CDOT Erosion Control Supervisor Stormwater Management During Construction Training Program, Student Manual, Scott Olson July 2003.

Guidance Information:

Additional information can be obtained from the following sources.

- CDOT Erosion Control and Stormwater Quality Pocketbook, Colorado Department of Transportation, 2002.
- Colorado Department of Public Health and Environment, Water Quality Control Division. **www.cdphe.state.co.us/wq/permitsunit** (303) 692-3575.
- Environmental Protection Agency, Region VIII Stormwater Program (303) 312-6082.
- Army Corps of Engineers, 404 Permitting (970) 668-9676.
- USDA, National Resource Conservation Service (970) 724-3456
- International Erosion Control Association. **www.ieca.org** (970) 879-3010.
- Erosion Control Technology Council **www.ectc.org** (651) 554-1895.