SCHEDULE OF BEST MANAGEMENT PRACTICES (BMPs)

NAME	DESCRIPTION	DTL. DWG. NO. (208-##)
GENERAL BMP's		
IO	INLET/OUTLET PROTECTION	1A
WP	WATERWAY PROTECTION	1B
WR	WATER RESOURCE PROTECTION	1C
TEMPORARY SOIL STABILIZATION BMPs (SS)		
SS-2	PRESERVATION OF EXISTING VEGETATION	02
SS-3	HYDRAULIC MULCH	04
SS-4	TEMPORARY SEEDING	06
SS-5	SOIL BINDERS	08
SS-6	STRAW MULCH	10
SS-7	GEOTEXTILES, PLASTIC COVERS & EROSION CONT. BLANKETS/MATS	12A & 12B
SS-8	WOOD MULCH	14
SS-9	EARTH DIKES/DRAINAGE SWALES & LINED DITCHES	16
SS-10	OUTLET PROTECTION/VELOCITY DISSIPATION DEVICES	18
SS-11	SLOPE DRAINS	20
SS-12	SLOPE ROUGHENING	22
SS-13	TERRACED SLOPES	24
SS-14	VEGETATED BUFFER	26
SS-15	EROSION SEEDING	28
TEMPORARY SEDIMENT CONTROL BMPs (SC)		
SC-1	SILT FENCE	30
SC-2	DESILTING BASIN	32A & 32B
SC-3	SEDIMENT TRAP	34
SC-4	CHECK DAMS	36
SC-5	FIBER ROLLS	38
SC-6	GRAVEL BAG BERM	40
SC-8	SAND BAG BARRIERS	42
SC-9	STRAW BALE BARRIERS	44
SC-10	STORM DRAIN INLET PROTECTION	46A & 46B
SC-11	DUGOUT DITCH BASIN	48
WIND EROSION CONTROL BMPs (WE)		
WE-1	WIND EROSION CONTROL	50
SNOW ACCUMULATION & SNOW MELT BMPs (SN)		
SN-2	SNOW ACCUMULATION MANAGEMENT	52
SN-3	FREEZE REDUCTION	54
TRACKING CONTROL BMPs (TC)		
TC-1	STABILIZED CONSTRUCTION ENTRANCE/EXIT	56
TC-3	ENTRANCE/OUTLET TIRE WASH	58
NON-STORM WATER MANAGEMENT BMPs (NS)		
NS-4	TEMPORARY STREAM CROSSINGS	60

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING
REFERENCE STANDARD SPEC. SECTION 208 — DWG. NO. 208-00

SCHEDULE OF BEST MANAGEMENT PRACTICES

EFFECTIVE: JANUARY 2004

MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

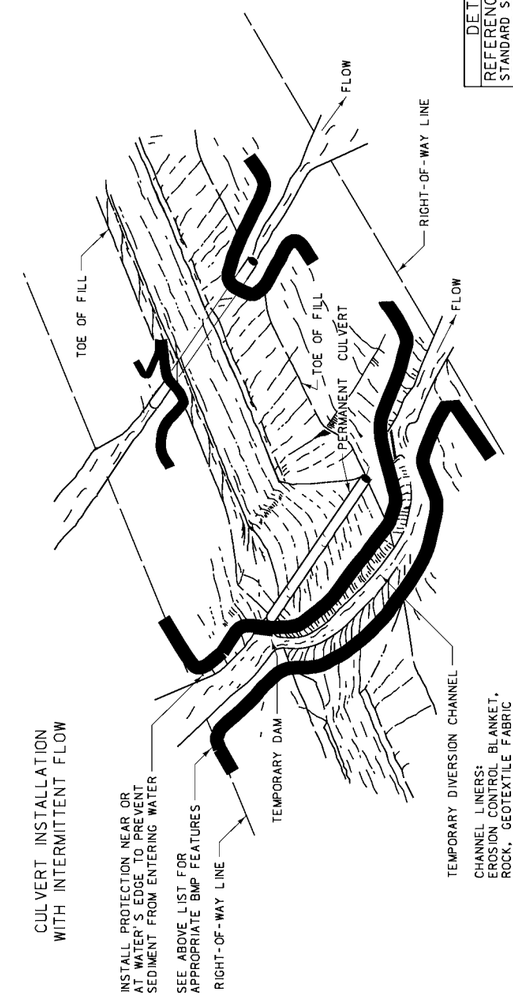
SYMBOL: I/O

INLET/OUTLET PROTECTION:

INLET/OUTLET PROTECTION (I/O) ARE STRUCTURES ASSOCIATED WITH SEDIMENT REMOVAL AT INLETS AND SEDIMENT REMOVAL AT PIPE OUTLETS. THE PURPOSE OF THIS BMP IS TO ALLOW STORM WATERS OF INTERMITTENT DRAINAGES TO FLOW THROUGH DISTURBED AREAS WITH MINIMAL IMPACT DURING STORM EVENTS AND TO KEEP SEDIMENT FROM LEAVING MDT PROPERTY.

INLET/OUTLET PROTECTION IS USED AT CULVERT INSTALLATIONS THAT DISCHARGE DIRECTLY INTO A WATER RESOURCE OR CULTURAL AND HISTORICAL RESOURCE ADJACENT TO THE RIGHT-OF-WAY LINE. DO NOT USE INLET/OUTLET PROTECTION ON STOCK UNDERPASSES OR APPROACH CULVERTS.

APPROPRIATE BMP FEATURES INCLUDE OUTLET PROTECTION/VELOCITY DISSIPATION DEVICES, SILT FENCE, DESILTING BASIN, SEDIMENT TRAP, CHECK DAMS, FIBER ROLLS, GRAVEL BAG BERM, SAND BAG BARRIER, STRAW BALE BARRIER AND STORM DRAIN INLET PROTECTION. THIS BMP LIST IS NOT COMPREHENSIVE AND DOES NOT SUPERSEDE MDT STANDARD SPECIFICATIONS OR MANDATES AND REQUIREMENTS SPECIFIED BY OTHER AUTHORIZED STATE AND FEDERAL AGENCIES.



INTERMITTENT/EPHEMERAL FLOW AND CONSTRUCTION SEASON TERMINATION/WINTER SUSPENSION

CULVERT INSTALLATION WITH INTERMITTENT FLOW

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING
REFERENCE STANDARD SPEC. SECTION 208 — DWG. NO. 208-1A

INLET/OUTLET PROTECTION

EFFECTIVE: JANUARY 2004

MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: (WP)

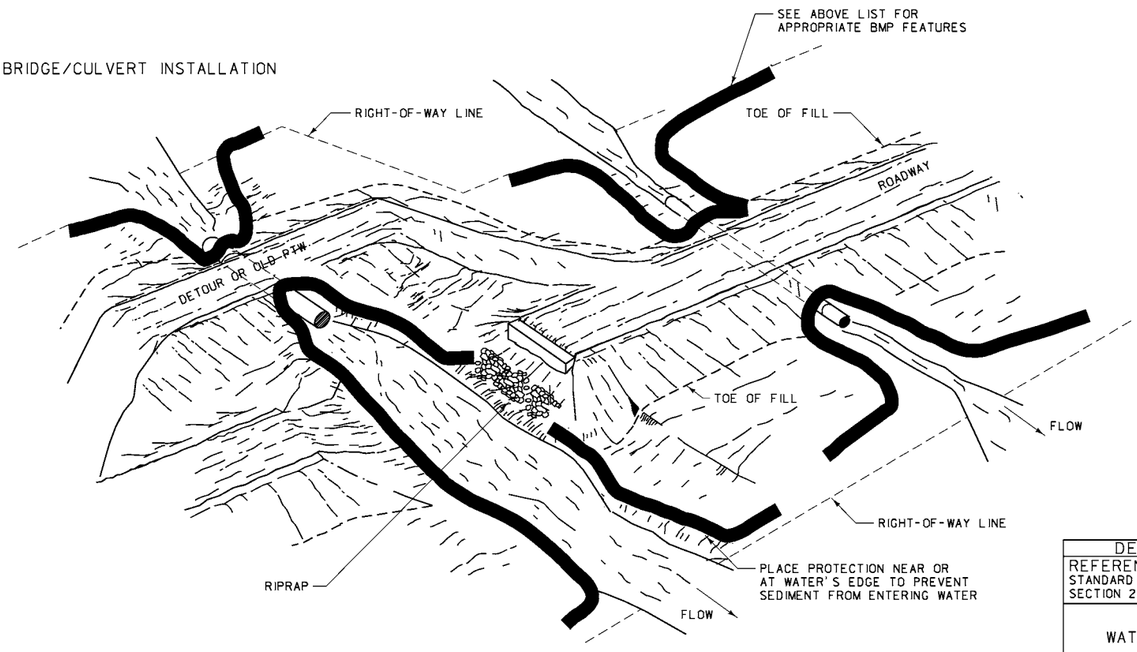
WATERWAY PROTECTION:

WATERWAY PROTECTION (WP) IS AN EROSION CONTROL FOR CONSTRUCTION ACTIVITIES CROSSING WATER RESOURCES. WATERWAY PROTECTION APPLIES TO PERENNIAL STREAM CROSSINGS, WETLANDS, CHANNEL CHANGES, STREAM BANK DISTURBANCES, IRRIGATION SYSTEMS OR OTHER IMPACTS TO WATER RESOURCES FROM BRIDGE CONSTRUCTION OR CULVERT INSTALLATIONS.

APPROPRIATE BMP FEATURES INCLUDE EROSION CONTROL BLANKETS/MATS, SLOPE ROUGHENING, VEGETATIVE BUFFER STRIP, SILT FENCE, CHECK DAMS, FIBER ROLLS, GRAVEL BAG BERM, SAND BAG BARRIER, AND STRAW BALE BARRIER. THIS BMP LIST IS NOT COMPREHENSIVE AND DOES NOT SUPERSEDE MDT STANDARD SPECIFICATIONS OR MANDATES AND REQUIREMENTS SPECIFIED BY OTHER AUTHORIZED STATE AND FEDERAL AGENCIES.

PERENNIAL STREAM CROSSING

BRIDGE/CULVERT INSTALLATION



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

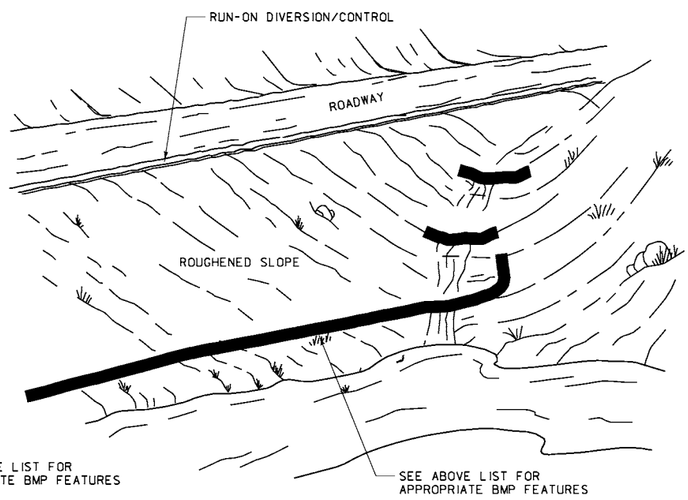
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-1B
WATERWAY PROTECTION	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

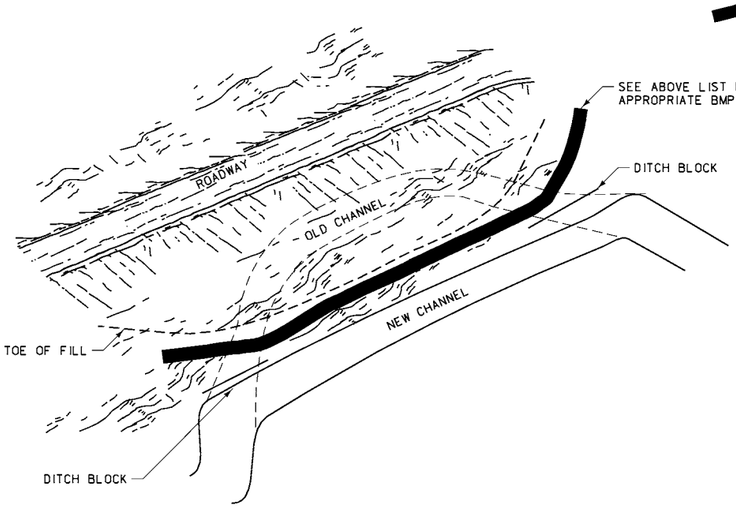
SYMBOL: ← (WR) →

WATER RESOURCE PROTECTION:

WATER RESOURCE PROTECTION (WR) IS EROSION CONTROL FOR CONSTRUCTION ACTIVITIES ADJACENT TO WATER RESOURCES. WATER RESOURCE PROTECTION APPLIES TO PERENNIAL STREAMS, WETLANDS, CHANNEL CHANGES, STREAM BANK DISTURBANCES, IRRIGATION SYSTEMS OR OTHER IMPACTS TO WATER RESOURCES FROM ROAD CONSTRUCTION. IT CAN BE USED FOR CRITICAL RESOURCES. THE DESIGNER DENOTES "CRITICAL RESOURCE" ON THE PLANS AND PUTS WATER RESOURCE PROTECTION WITH IT.

APPROPRIATE BMP FEATURES INCLUDE EROSION CONTROL BLANKETS/MATS, SLOPE ROUGHENING, VEGETATIVE BUFFER STRIP, SILT FENCE, CHECK DAMS, FIBER ROLLS, GRAVEL BAG BERM, SAND BAG BARRIER, AND STRAW BALE BARRIER. THIS BMP LIST IS NOT COMPREHENSIVE AND DOES NOT SUPERSEDE MDT STANDARD SPECIFICATIONS OR MANDATES AND REQUIREMENTS SPECIFIED BY OTHER AUTHORIZED STATE AND FEDERAL AGENCIES.





ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-1C
WATER RESOURCE PROTECTION	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

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SYMBOL: ——— PEV ———

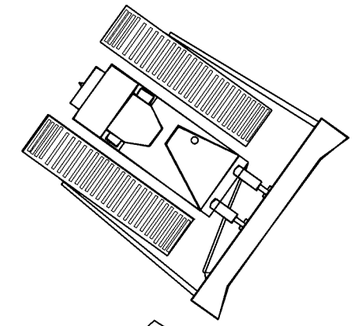
PRESERVATION OF EXISTING VEGETATION SS-2:

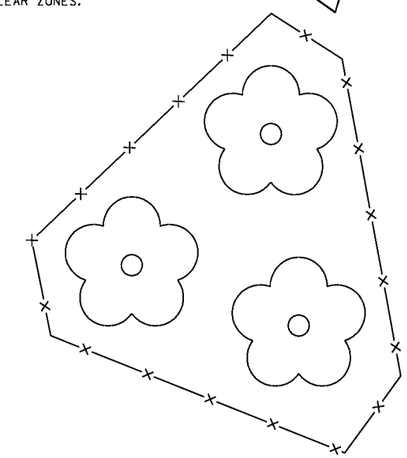
PRESERVATION OF EXISTING VEGETATION IS THE IDENTIFICATION AND PROTECTION OF DESIRABLE VEGETATION THAT PROVIDES EROSION AND SEDIMENT CONTROL BENEFITS. PROVIDE PRESERVATION OF EXISTING VEGETATION PRIOR TO COMMENCEMENT OF CLEARING AND GRUBBING OPERATIONS OR OTHER SOIL DISTURBING ACTIVITIES. MARK THE AREA AS DESIGNATED ON THE CONSTRUCTION PLANS USING TEMPORARY FENCING MADE OF ORANGE POLYPROPYLENE THAT IS STABILIZED AGAINST ULTRAVIOLET LIGHT. AFFIX FENCING TO METAL "T" POST USING 3.05 mm WIRE. PLACE FENCING AN ADEQUATE DISTANCE FROM TREES AND BUSHES TO PREVENT ROOT AND IRRIGATION SYSTEM DAMAGE.

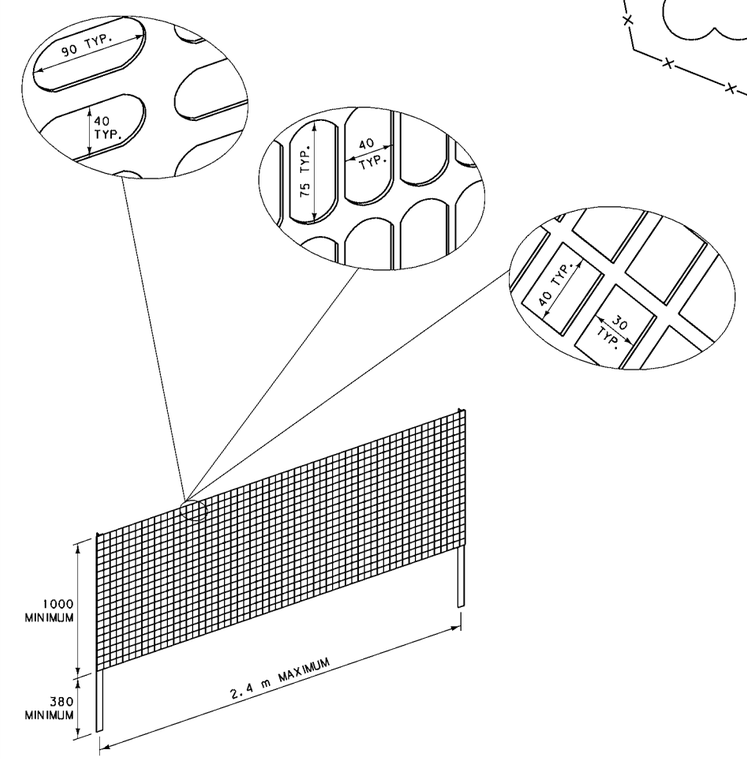
UPON WRITTEN APPROVAL BY THE ENGINEER, THE CONTRACTOR MAY BE ALLOWED TO FLAG OR VERBALLY DESIGNATE AREAS OF EXISTING VEGETATIVE PRESERVATION.

PRESERVATION OF EXISTING VEGETATION MAY BE USED IN CONJUNCTION WITH VEGETATIVE BUFFER (SS-14), WIND EROSION CONTROL (WE-1) AND SNOW ACCUMULATION (SN-1).

FOLLOW CLEAR ZONE REQUIREMENTS FOR ALL FENCING PLACED WITHIN THE CLEAR ZONES.







ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-02
PRESERVATION OF EXISTING VEGETATION (SS-2)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: ——— HM ———

HYDRAULIC MULCH SS-3:

HYDRAULIC MULCH CONSISTS OF APPLYING A MIXTURE OF SMALL PIECES OF CELLULOSE FIBERS WHICH CAN BE MADE FROM SHREDDED WOOD FIBERS OR RECYCLED PAPER AND A STABILIZING EMULSION AND TACKIFIER (SUBJECT TO ENGINEERS DISCRETION) USING HYDRO-MULCHING EQUIPMENT. HYDRAULIC MULCH IS APPLIED TO DISTURBED AREAS REQUIRING TEMPORARY PROTECTION UNTIL PERMANENT VEGETATION IS ESTABLISHED OR DISTURBED AREAS THAT MUST BE RE-DISTURBED FOLLOWING AN EXTENDED PERIOD OF INACTIVITY.

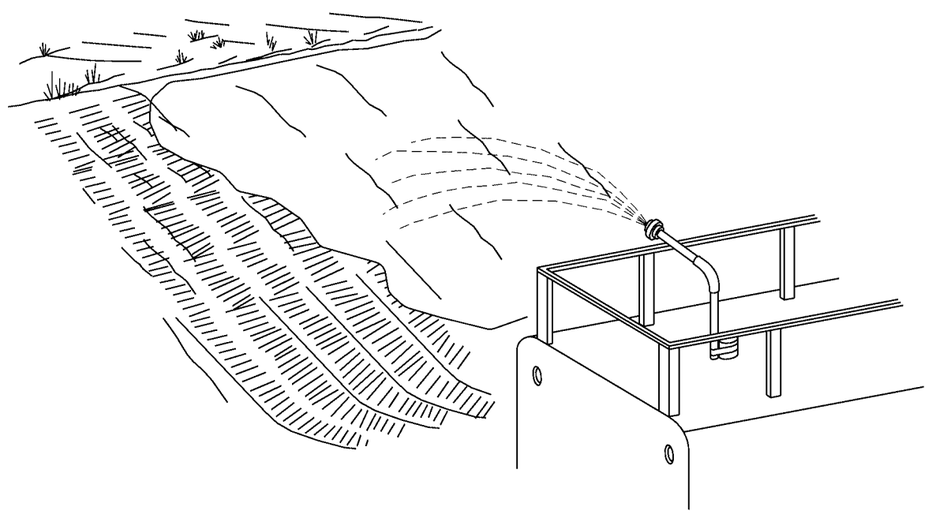
APPLY HYDRAULIC MULCH A MINIMUM OF 24 HOURS PRIOR TO A STORM EVENT TO ALLOW FOR ADEQUATE DRYING.

HYDRAULIC MULCH SELECTION MUST MEET MDT SPECIFICATIONS AND BE APPROVED BY THE ENGINEER PRIOR TO PLACEMENT. ROUGHEN EXISTING EMBANKMENT FOLLOWING GUIDELINES SPECIFIED IN BMP SS-12. WHEN EITHER TEMPORARY SEEDING OR PERMANENT SEEDING IS COMBINED WITH THE HYDRAULIC MULCH BMP, COMPLETE SEEDING OPERATIONS PRIOR TO HYDRAULIC MULCHING OPERATIONS. REFER TO BMPs SS-4 AND SS-5 FOR SEEDING REQUIREMENTS. REMOVE ANY OVER SPRAY FROM ROADWAYS OR SIDEWALKS IMMEDIATELY FOLLOWING APPLICATION.

REAPPLY HYDRAULIC MULCH TO ANY DISTURBED AREAS FOLLOWING A RAIN EVENT OR RESULTING FROM CONSTRUCTION ACTIVITIES.

RECYCLED PAPER MULCH SHOULD CONTAIN 100% POST CONSUMED PAPER.

REFER TO BMP SS-5 (SOIL BINDER) FOR TACKIFIER REQUIREMENTS. ADD ENVIRONMENTALLY SAFE GREEN DYE AS A VISUAL AID DURING APPLICATION.



HYDRAULIC MULCH		
PRODUCT	MATERIAL	APPLICATION RATE *
PAPER-BASED HYDRAULIC MULCH	PAPER	1 120 kg/ha (MIN)
WOOD-BASED HYDRAULIC MULCH	WOOD OR WOOD & PAPER	1 120 kg/ha (MIN)

* APPLICATION RATES VARY WITH SLOPE & MUST BE APPROVED BY THE ENGINEER

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING

REFERENCE	DWG. NO.
STANDARD SPEC. SECTION 208	208-04

HYDRAULIC MULCH (SS-3)

EFFECTIVE: JANUARY 2004

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: ——— TS ———

TEMPORARY SEEDING SS-4:

TEMPORARY SEEDING IS THE ESTABLISHMENT OF A TEMPORARY VEGETATIVE COVER BY SEEDING WITH CEREAL BARLEY. USE TEMPORARY SEEDING ON AREAS 3:1 OR FLATTER THAT WILL BE EXPOSED FOR LONGER THAN 14 DAYS AND THAT WILL UNDERGO FURTHER DISTURBANCE, EXCLUDE ROCK SLOPES THAT CANNOT BE EXCAVATED BY RIPPING.

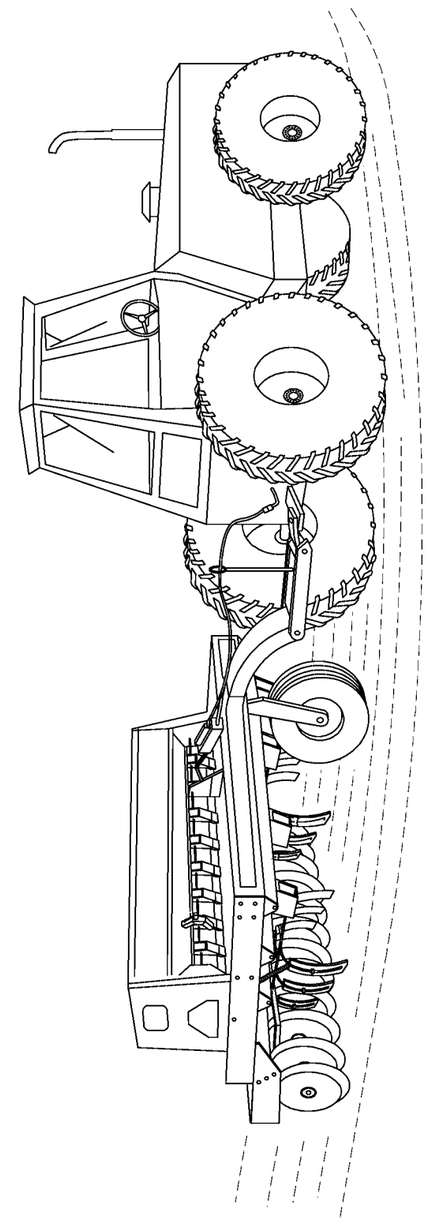
SEEDING DATES AND APPLICATION RATES ARE AS FOLLOWS:

APR. 1 TO JUN. 30: CEREAL BARLEY AT 13.5 kg/ha
JUL. 1 TO AUG. 31: TEMPORARY SEEDING NOT RECOMMENDED
SEP. 1 TO NOV. 15: CEREAL BARLEY AT 13.5 kg/ha

DO NOT TEMPORARY SEED FROM SEP. 1 TO NOV. 15 IF THE AREA IS TO BE PERMANENTLY SEEDED THAT FALL.

CONTACT THE MDT AGRONOMIST, THROUGH THE ENGINEER, PRIOR TO USING SUBSTITUTIONS OR PLACING TEMPORARY SEEDING OUTSIDE THESE DATES. DRILL SEED SLOPES OF 3:1 OR FLATTER. FOR SLOPES STEEPER THAN 3:1, REFER TO EROSION SEEDING.

ANY TEMPORARY SEEDING EFFORTS THAT DO NOT PROVIDE ADEQUATE COVER MUST BE RE SEEDED AS REQUIRED BY THE ENGINEER.



SLOPES 3:1 OR FLATTER

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING

REFERENCE	DWG. NO.
STANDARD SPEC. SECTION 208	208-06

TEMPORARY SEEDING (SS-4)

EFFECTIVE: JANUARY 2004

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: ——— SB ———

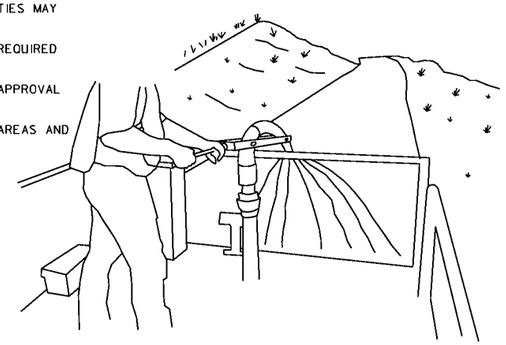
SOIL BINDERS SS-5:

SOIL BINDERS CONSIST OF APPLYING AND MAINTAINING POLYMERIC OR LIGNIN SULFONATE SOIL STABILIZERS OR EMULSIONS. SOIL BINDERS ARE MATERIALS APPLIED TO THE SOIL SURFACE TO TEMPORARILY PREVENT WATER-INDUCED EROSION OF EXPOSED SOILS ON CONSTRUCTION SITES. SOIL BINDERS TYPICALLY ALSO PROVIDE DUST, WIND AND SOIL STABILIZATION BENEFITS. BECAUSE SOIL BINDERS CAN OFTEN BE INCORPORATED INTO THE WORK, THEY MAY BE A GOOD CHOICE FOR AREAS WHERE GRADING ACTIVITIES MAY SOON RESUME.

DUE TO THE TEMPORARY NATURE OF SOIL BINDERS, REAPPLICATION MAY BE REQUIRED OVER AREAS WITH PEDESTRIAN AND VEHICLE TRAFFIC.

SOIL BINDER TYPE AND APPLICATION PROCEDURES REQUIRE THE ENGINEER'S APPROVAL PRIOR TO PLACEMENT. APPLY PER MANUFACTURES SPECIFICATIONS.

REAPPLY SOIL BINDERS, AS SPECIFIED BY THE ENGINEER, IN HIGH TRAFFIC AREAS AND FOLLOWING RAIN EVENTS TO ENSURE AN ADEQUATELY MAINTAINED SURFACE.



PROPERTIES OF SOIL BINDERS FOR EROSION CONTROL

CHEMICALS	COPOLYMER	LIGNIN SULFONATE	PSYLLIUM	GUAR
COMMENTS	FORMS SEMIPERMEABLE TRANSPARENT CRUST. RESISTS ULTRAVIOLET RADIATION & MOISTURE INDUCED BREAKDOWN.	PAPER INDUSTRY WASTE PRODUCT. ACTS AS DISPERSING AGENT. BEST IN DRY CLIMATES. CAN BE SLIPPERY.	EFFECTIVE ON DRY, HARD SOILS. FORMS A CRUST.	EFFECTIVE ON DRY, HARD SOILS. FORMS A CRUST.
RELATIVE COST	HIGH	MODERATE	LOW	LOW
ENVIRONMENTAL HAZARD	LOW	LOW	LOW	LOW
PENETRATION	MODERATE	MODERATE	HIGH	HIGH
EVAPORATION	MODERATE	MODERATE	MODERATE	MODERATE
LEACHING RESISTANCE	LOW	HIGH	HIGH	HIGH
ABRASION RESISTANCE	HIGH	LOW	MODERATE	MODERATE
LONGEVITY	1 TO 2 YEARS	6 MONTHS TO 1 YEAR	3 TO 6 MONTHS	3 TO 6 MONTHS
MINIMUM CURING TIME BEFORE RAIN	24 HOURS	24 HOURS	24 HOURS	24 HOURS
COMPATIBILITY WITH EXISTING VEGETATION	GOOD	POOR	POOR	POOR
MODE OF DEGRADATION	CHEMICALLY DEGRADABLE	BIOLOGICALLY/PHYSICALLY/CHEMICALLY	BIOLOGICALLY DEGRADABLE	BIOLOGICALLY DEGRADABLE
LABOR INTENSIVE	NO	NO	NO	NO
SPECIALIZED APPL. EQUIPMENT	YES	YES	YES	YES
LIQUID/POWDER	LIQUID	POWDER	POWDER	POWDER
SURFACE CRUSTING	YES	YES, BUT DISSOLVED ON REWETTING	YES, BUT DISSOLVED ON REWETTING	YES, BUT DISSOLVED ON REWETTING
CLEAN-UP	SOLVENTS	SOLVENTS	WATER	WATER
EROSION CONTROL APPLICATION RATE	APPLY 800-1000 l/ha	APPLY 5600-6500 (l/ha)	APPLY 170 kg/ha WITH 560-2200 kg/ha FIBER MULCH	APPLY 110-220 kg/ha WITH 560-2200 kg/ha FIBER MULCH
DUST CONTROL APPLICATION RATE	APPLY 280-520 l/ha	LOOSEN SURFACE 25-50 mm. NEED 4-8% FINES. APPLY 470-1900 l/ha.	APPLY 170 kg/ha.	APPLY 45-70 kg/ha.

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 208 — DWG. NO. 208-08

SOIL BINDERS (SS-5)

EFFECTIVE: JANUARY 2004

MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: ——— SM ———

STRAW MULCH SS-6:

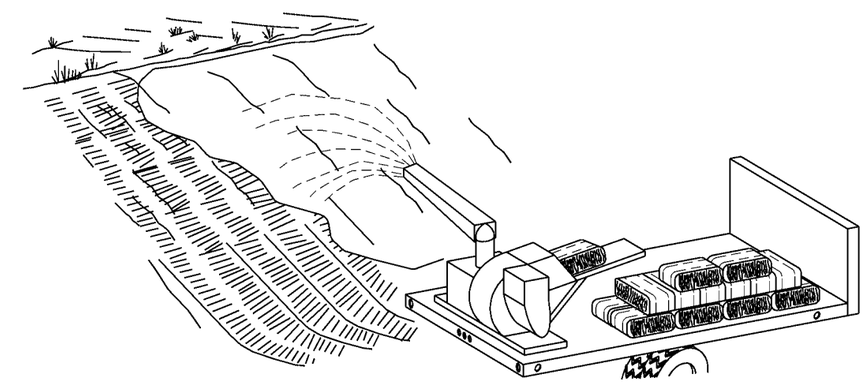
STRAW MULCH CONSISTS OF PLACING A UNIFORM LAYER OF STRAW AND ANCHORING IT INTO THE SOIL WITH A STUDDED ROLLER OR DISK OR BINDING THE STRAW TOGETHER WITH AN ENGINEER APPROVED TACKIFIER.

USE STRAW MULCH FOR SOIL STABILIZATION AS A TEMPORARY SURFACE COVER ON DISTURBED AREAS UNTIL SOILS CAN BE PREPARED OR RE-VEGETATION/PERMANENT VEGETATION IS ESTABLISHED. STRAW MULCH IS COMMONLY USED IN COMBINATION WITH TEMPORARY SEEDING, BMPs SS-4 & SS-15, AND/OR PERMANENT SEEDING TO ENHANCE PLANT ESTABLISHMENT.

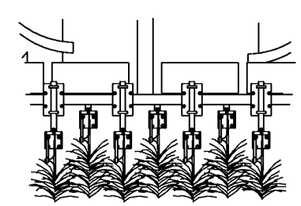
ALL STRAW MULCH IS REQUIRED TO BE CERTIFIED WEED FREE AND DERIVED FROM WHEAT, BARLEY OR RICE. ENGINEERS APPROVAL IS REQUIRED PRIOR TO ANY PLACEMENT OF STRAW MULCH.

STRAW MULCH CAN BE APPLIED BY HAND OR BLOWN UNDER LOW WIND CONDITIONS. OBTAIN ENGINEERS APPROVAL FOR PLACEMENT METHODS PRIOR TO PLACEMENT. EVENLY DISTRIBUTE STRAW MULCH AT A MINIMUM LOOSE RATE OF 4 490 kg/ha. IMMEDIATELY FOLLOWING PLACEMENT, CRIMP OR APPLY TACKIFIERS TO RETAIN MULCH. CRIMP USING DISKS OR A PUNCH-TYPE ROLLER. IF TACKIFIERS ARE USED, FOLLOW GUIDELINES PROVIDED IN BMP SS-5. WHEN EITHER TEMPORARY OR PERMANENT SEEDING IS COMBINED WITH THE STRAW MULCH BMP, COMPLETE SEEDING OPERATIONS PRIOR TO STRAW MULCH PLACEMENT. REFER TO BMPs SS-4 AND SS-15 FOR SEEDING GUIDELINES.

REAPPLICATION OF STRAW MULCH AND TACKIFIER MAY BE REQUIRED BY THE ENGINEER TO MAINTAIN EFFECTIVE SOIL STABILIZATION OVER DISTURBED AREAS AND SLOPES.



STRAW BLOWER



STRAW CRIMPING

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 208 — DWG. NO. 208-10

STRAW MULCH (SS-6)

EFFECTIVE: JANUARY 2004

MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: ——EC——

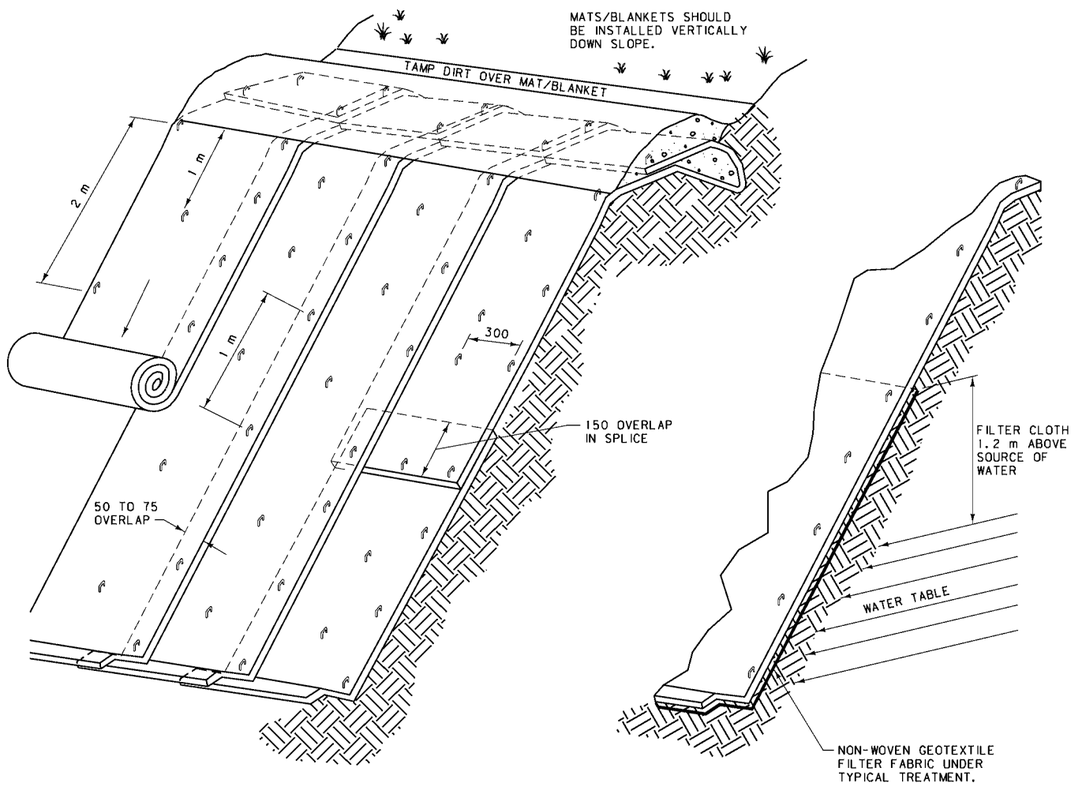
GEOTEXTILES, PLASTIC COVERS & EROSION CONTROL BLANKETS/MATS SS-7:

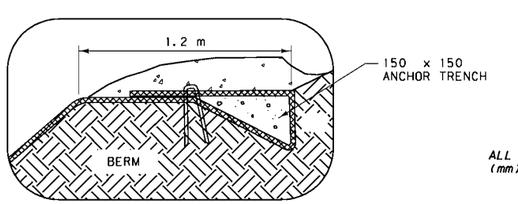
GEOTEXTILES, PLASTIC COVERS, AND EROSION CONTROL BLANKETS/MATS ARE USED TO STABILIZE DISTURBED SOIL AREAS AND PROTECT SOILS FROM EROSION BY WIND AND WATER. THESE PRODUCTS CAN BE USED ON STEEP SLOPES, SLOPES WITH HIGH EROSION HAZARDS, SLOPES WHERE MULCHES CAN NOT BE ANCHORED, UNPROTECTED CHANNELS AND HIGH FLOW CHANNELS.

INSTALL GEOTEXTILES AND EROSION CONTROL BLANKETS/MATS IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND MDT STANDARD SPECIFICATIONS SECTION 622.

PROVIDE GEOTEXTILE MATERIALS MEETING MDT STANDARD SPECIFICATIONS SECTION 713.

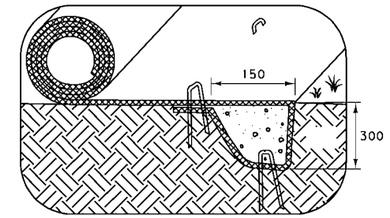
LIMIT USE OF PLASTIC COVERS TO COVERING STOCKPILES, OR VERY SMALL GRADED AREAS FOR SHORT PERIODS OF TIME (SUCH AS THROUGH ONE IMMINENT STORM EVENT) UNTIL ALTERNATIVE MEASURES MAY BE INSTALLED. PLASTIC COVERS ARE REQUIRED TO BE POLYETHYLENE SHEETING HAVING A MINIMUM THICKNESS OF 6 mil. ANCHOR PLASTIC COVERS WITH SANDBAGS PLACED NO MORE THAN 3 m APART AND BY KEYING INTO THE TOP OF SLOPE TO PREVENT INFILTRATION OF SURFACE WATERS UNDER THE PLASTIC. TAPE OR WEIGHT DOWN THE ENTIRE LENGTH OF ALL SEAMS WITH AT LEAST A 300 mm TO 600 mm OVERLAP.



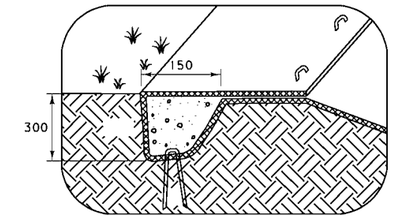


ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

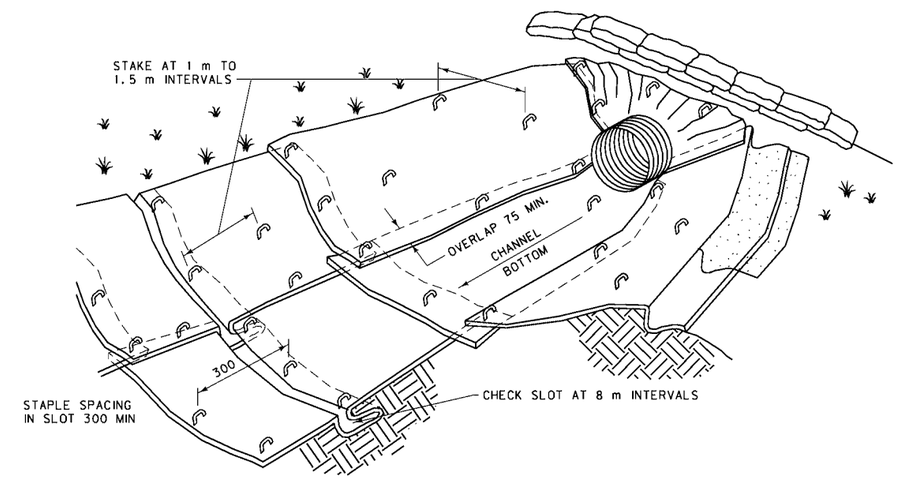
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-12A
GEOTEXTILES, PLASTIC COVERS & EROSION CONT. BLANKETS/ MATS (SS-7) (SHEET 1)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD



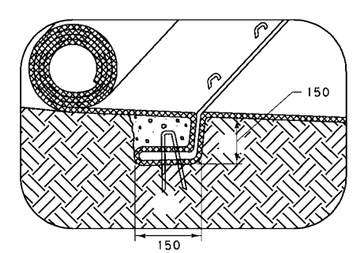
INITIAL CHANNEL ANCHOR TRENCH



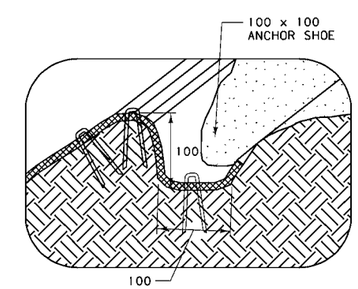
TERMINAL SLOPE & CHANNEL ANCHOR TRENCH



TYPICAL CHANNEL DETAIL - ISOMETRIC VIEW



INTERMITTENT CHECK SLOT



LONGITUDINAL ANCHOR TRENCH

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-12B
GEOTEXTILES, PLASTIC COVERS & EROSION CONT. BLANKETS/ MATS (SS-7) (SHEET 2)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: ——— WM ———

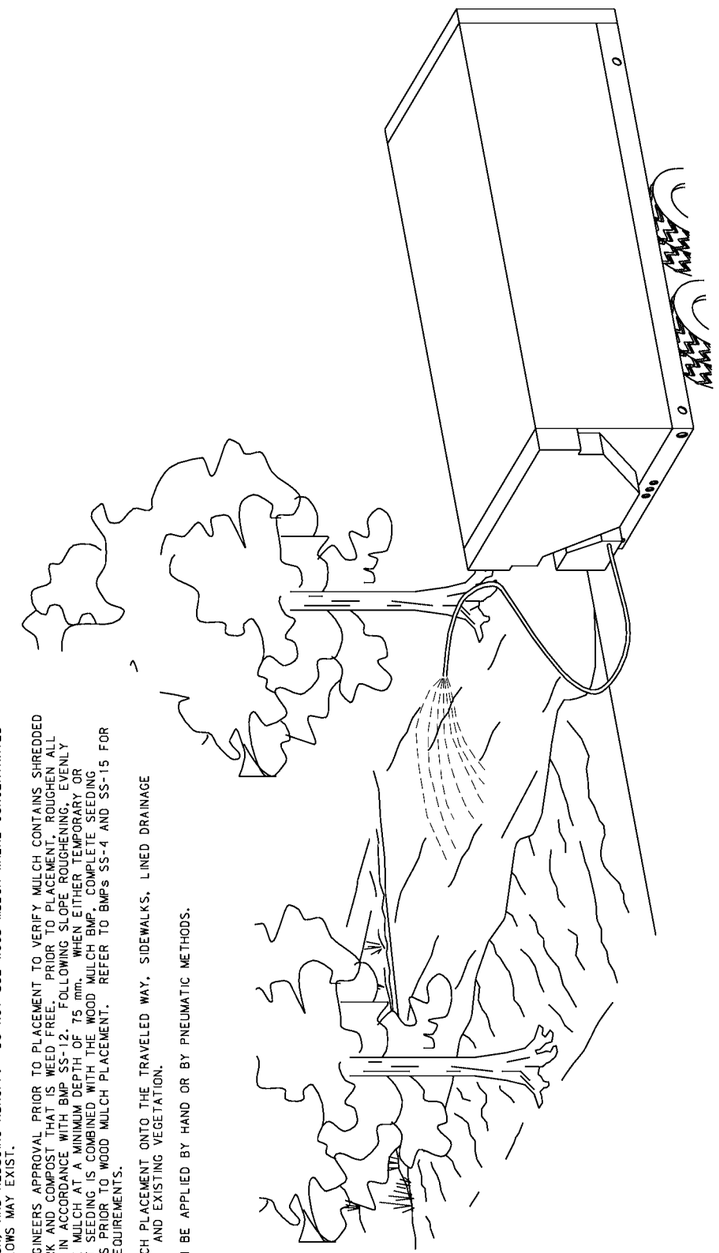
WOOD MULCH SS-8:

WOOD MULCHING CONSISTS OF APPLYING A MIXTURE OF SHREDDED WOOD MULCH, BARK, OR COMPOST. WOOD MULCH IS MOSTLY APPLICABLE TO LANDSCAPE PROJECTS. WOOD MULCHING REDUCES EROSION BY PROTECTING BARE SOIL RAINFALL IMPACT, INCREASING INFILTRATION, AND REDUCING RUNOFF. DO NOT USE WOOD MULCH WHERE CONCENTRATED RUNOFF FLOWS MAY EXIST.

OBTAIN ENGINEERS APPROVAL PRIOR TO PLACEMENT TO VERIFY MULCH CONTAINS SHREDDED WOOD, BARK AND COMPOST THAT IS WEED FREE. PRIOR TO PLACEMENT, ROUGHEN ALL SURFACES IN ACCORDANCE WITH BMP SS-12. FOLLOWING SLOPE ROUGHENING, EVENLY DISTRIBUTE MULCH AT A MINIMUM DEPTH OF 75 mm. WHEN EITHER TEMPORARY OR PERMANENT SEEDING IS COMBINED WITH THE WOOD MULCH BMP, COMPLETE SEEDING OPERATIONS PRIOR TO WOOD MULCH PLACEMENT. REFER TO BMPs SS-4 AND SS-15 FOR SEEDING REQUIREMENTS.

AVOID MULCH PLACEMENT ONTO THE TRAVELED WAY, SIDEWALKS, LINED DRAINAGE CHANNELS, AND EXISTING VEGETATION.

MULCH CAN BE APPLIED BY HAND OR BY PNEUMATIC METHODS.



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-14

WOOD MULCH (SS-8)

EFFECTIVE: JANUARY 2004

MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: ——— ED ———

EARTH DIKES/DRAINAGE SWALES & LINED DITCHES SS-9:

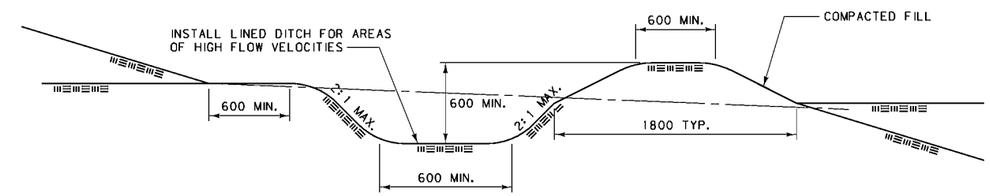
EARTH DIKES, DRAINAGE SWALES AND LINED DITCHES ARE STRUCTURES THAT INTERCEPT, DIVERT, AND CONVEY SURFACE RUN-ON, GENERALLY SHEET FLOW, TO PREVENT EROSION. THESE DEVICES MAY BE IMPLEMENTED ON A PROJECT-BY-PROJECT BASIS WITH OTHER BMPs WHEN DETERMINED NECESSARY AND FEASIBLE BY THE ENGINEER. DIKES, SWALES AND DITCHES ARE CONVEYANCE MEASURES AND ARE NOT INTENDED TO TRAP SEDIMENT. SEDIMENT CONTROL BMPs CAN BE USED IN CONJUNCTION WITH THESE CONVEYANCE DEVICES.

WHEN POSSIBLE, INSTALL AND UTILIZE DIKES, SWALES AND DITCHES EARLY IN THE CONSTRUCTION PHASE. CONSTRUCT SWALES ALONG THE TOP AND BOTTOM OF CUT AND FILL SLOPES, AS SPECIFIED IN THE PLANS OR AS DESIGNATED BY THE ENGINEER. "V" BOTTOM DITCHES CAN BE USED FOR SWALE CONSTRUCTION FOLLOWING ENGINEERS APPROVAL. USE SEDIMENT CONTROL DEVICES FOR RUNOFF THAT IS DIVERTED FROM DISTURBED AREAS. CONVEY FLOWS FROM UNDISTURBED AREAS INTO A STABILIZED AREA AT NON-EROSIVE VELOCITIES. DO NOT PLACE DIKES, SWALES, AND DITCHES IN A MANNER THAT ALLOWS HIGHWAY RUNOFF TO ENTER ONTO OTHER PROPERTY'S RIGHT-OF-WAY.

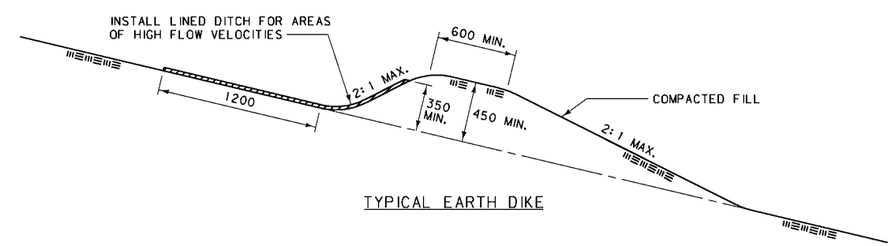
USE LINED DITCHES FOR AREAS OF HIGH FLOW VELOCITIES FOLLOWING THE GUIDELINES SPECIFIED IN SS-7 (GEOTEXTILES, PLASTIC COVERS & EROSION CONTROL BLANKETS/MATS) AND/OR SS-11 (SLOPE DRAINS). SEED ALL UNLINED PORTIONS OF DITCHES, DIKES AND SWALES THAT WILL BE IN USE FOR MORE THEN 14 DAYS IN ACCORDANCE WITH SS-15 (EROSION SEEDING)

INSPECT DIKES, SWALES, AND DITCHES AFTER RAINFALL EVENTS. REMOVE DEBRIS AND SEDIMENT, AND REPAIR LININGS AND EMBANKMENTS AS NEEDED OR AS SPECIFIED BY THE ENGINEER.

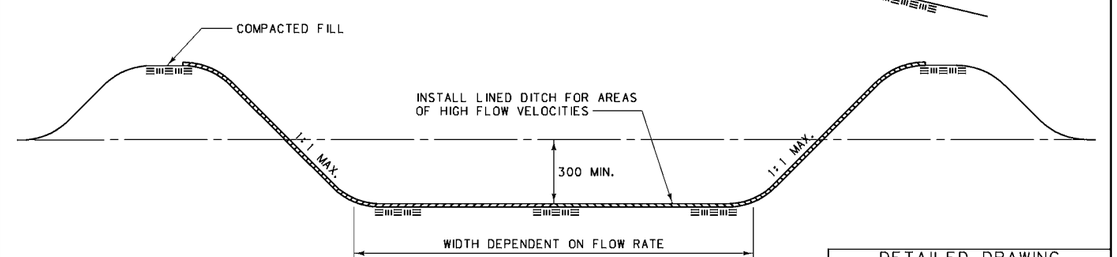
REMOVAL ALL DIKES, SWALES AND LINED DITCHES FROM THE CLEAR ZONES EXPEDIENTLY UPON COMPLETION OF CONSTRUCTION ACTIVITIES.



TYPICAL DRAINAGE SWALE



TYPICAL EARTH DIKE



TYPICAL TRAPEZOIDAL DITCH

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING

REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-16

EARTH DIKES/DRAINAGE SWALES & LINED DITCHES (SS-9)

EFFECTIVE: JANUARY 2004

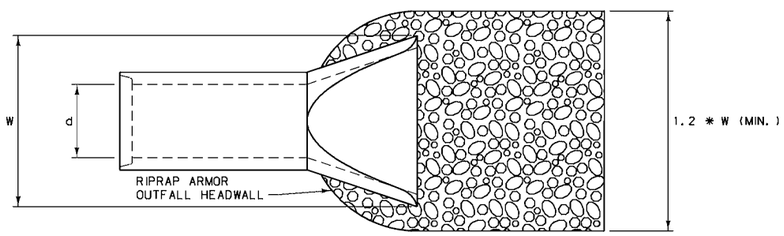
MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: (OP)

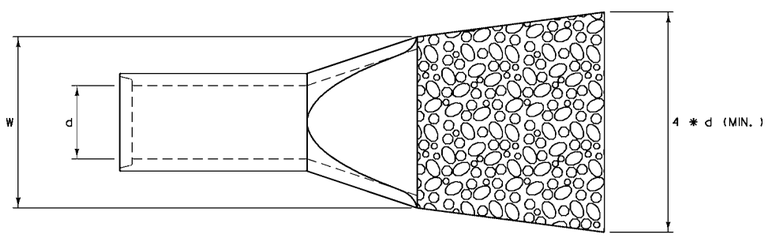
OUTLET PROTECTION/VELOCITY DISSIPATION DEVICES SS-10:

OUTLET PROTECTION AND VELOCITY DISSIPATION DEVICES ARE PLACED AT PIPE OUTLETS TO PREVENT SCOUR AND REDUCE THE VELOCITY AND/OR ENERGY OF EXITING STORM WATER FLOWS. THESE DEVICES CAN BE USED AT THE OUTLETS OF PIPES, DRAINS, CULVERTS, SLOPE DRAINS, DIVERSION DITCHES, SWALES, CONDUITS OR CHANNELS AND SHOULD BE IMPLEMENTED ON A PROJECT-BY-PROJECT BASIS WITH OTHER BMPs WHEN DETERMINED NECESSARY BY THE ENGINEER.

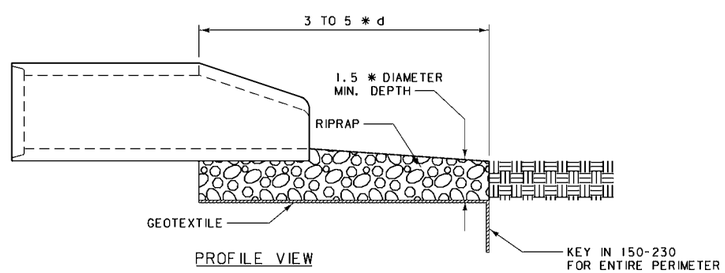
FOLLOW GUIDELINES BELOW FOR SIZING OUTLET PROTECTION AND VELOCITY DISSIPATION DEVICES. FOLLOWING ENGINEER'S APPROVAL, OTHER MATERIALS MAY BE SUBSTITUTED FOR RIPRAP. GEOTEXTILE PLACEMENT MAY BE ELIMINATED FOLLOWING ENGINEERS APPROVAL. PLACE TYPE 1 OR TYPE 2 BANK PROTECTION AT PIPE OUTLET. FOR PIPE DIAMETERS LARGER THAN 600 mm AND/OR HIGH FLOWS, THE APPLICATION IS NOT CONSIDERED TEMPORARY AND A MONTANA REGISTERED ENGINEER'S DESIGN IS REQUIRED.



PLAN VIEW - CHANNELIZED FLOW
(OUTFALL TO CHANNEL OR DITCH)



PLAN VIEW - UNCHANNELIZED FLOW
(OUTFALL TO UNCONFINED SURFACE-OVERLAND FLOW)



PROFILE VIEW

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-18
OUTLET PROTECTION/VELOCITY DISSIPATION DEVICES (SS-10)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: _____ TSD _____

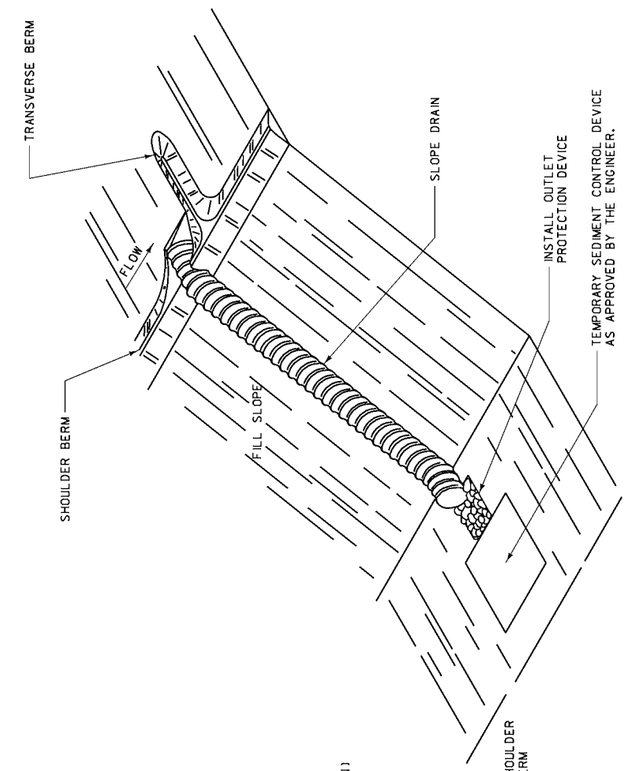
SLOPE DRAINS SS-11

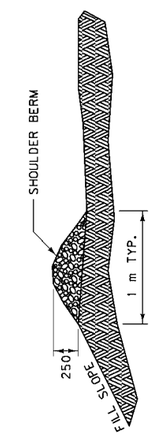
A SLOPE DRAIN IS A PIPE OR LINED CHANNEL USED TO INTERCEPT AND CONVEY SURFACE RUNOFF OR GROUNDWATER INTO A STABILIZED WATERCOURSE, TRAPPING DEVICE, OR STABILIZED AREA. THIS DEVICE MAY BE USED AT CONSTRUCTION SITES WHERE SLOPES MAY BE ERODED BY SURFACE RUNOFF.

DO NOT EXCEED A DRAINAGE AREA OF 4 ha PER SLOPE DRAIN PIPE. FOR AREAS LARGER THAN 4 ha USE ROCK LINED CHANNELS. DO NOT PLACE SLOPE DRAINS ON SLOPES THAT EXCEED 2:1 SLOPES. INCORPORATE BMP SS-9 (EARTH DIKES/DRAINAGE SWALES & LINED DITCHES) TO AID IN FLOW DIVERSION.

INSTALL SLOPE DRAINS AS FOLLOWS:
- INSTALL DRAINS PERPENDICULAR TO SLOPE
- COMPACT SOIL AROUND INLET AND OUTLET
- SECURELY ANCHOR SLOPE DRAINS INTO SOIL
- ENSURE CONNECTIONS ARE WATER TIGHT
- PROTECT INLET AND OUTLET WITH BMP SS-10 (OUTLET PROTECTION & VELOCITY DISSIPATION)

ALL MATERIALS REQUIRE ENGINEER'S APPROVAL PRIOR TO PLACEMENT.

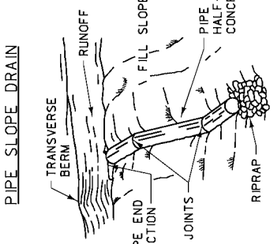




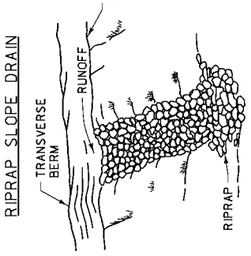
ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-20
SLOPE DRAINS (SS-11)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

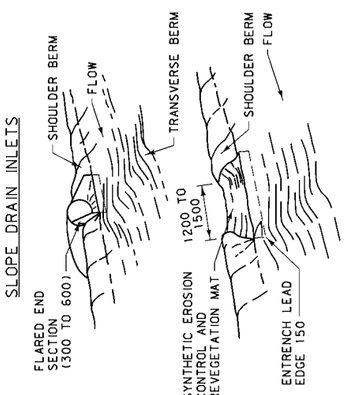
PIPE SLOPE DRAIN



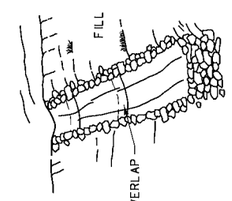
RIPRAP SLOPE DRAIN



SLOPE DRAIN INLETS



DITCH LINER: SYNTHETIC EROSION CONTROL AND REVEGETATION MAT

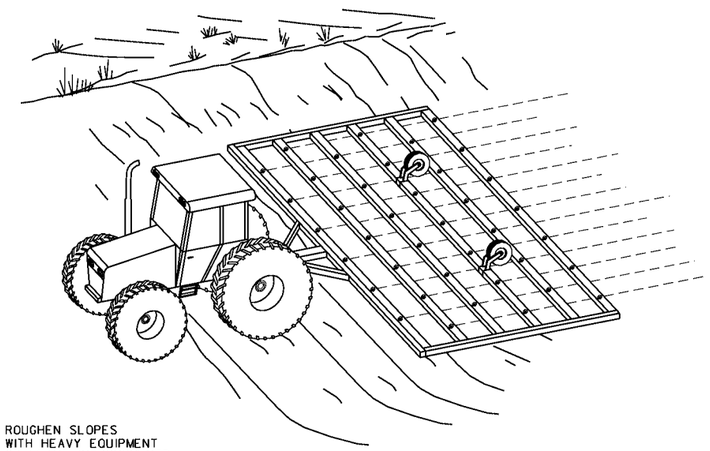


SYMBOL: ——— SR ———

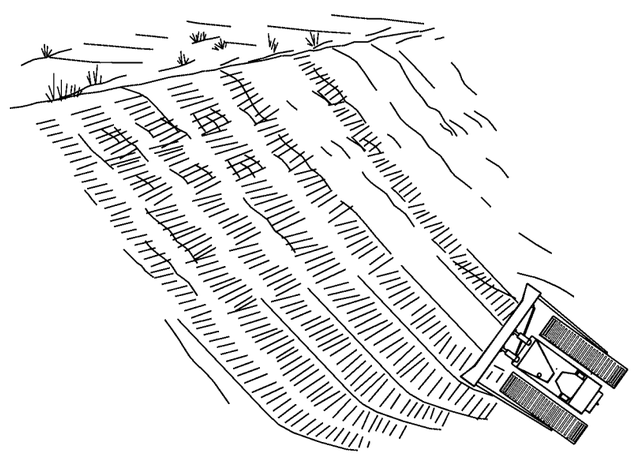
SLOPE ROUGHENING SS-12:

SLOPE ROUGHENING IS A VERY ROUGH SOIL SURFACE ON SLOPES RESULTING FROM CONSTRUCTION ACTIVITIES OR THE SYSTEMATIC ROUGHENING USING HEAVY EQUIPMENT TO CREATE RIDGES OR FURROWS PERPENDICULAR TO THE SLOPE. THE RIDGES OR FURROWS ARE TO BE EQUAL TO OR GREATER THAN 50 mm IN HEIGHT AND NO FURTHER THAN TWICE THE HEIGHT OF THE RIDGE OR FURROW APART. SLOPE ROUGHENING IS A GOOD FIRST LINE OF DEFENSE TO CONTROL EROSION AND SEDIMENT RUNOFF. DEGREE OF SLOPE ROUGHENING IS DEPENDENT ON THE GRADES AND PROXIMITY TO WATER RESOURCES.

ALL SLOPES STEEPER THAN 3:1 AND GREATER THAN 1500 VERTICAL MILLIMETERS REQUIRE SLOPE ROUGHENING, EXCLUDING ROCK SLOPES THAT CANNOT BE EXCAVATED BY RIPPING. ROUGHEN DISTURBED SLOPES OR LEAVE IN A ROUGHENED CONDITION. APPROPRIATE SUPPLEMENTS INCLUDE SOIL STABILIZATION BMPs SUCH AS TEMPORARY SEEDING OR EROSION SEEDING. WHEN FILL SLOPES ARE WITHIN 15 m OF SURFACE WATER, EARTH DIKES/DRAINAGE SWALES & LINED DITCHES (SS-9) AND/OR A SEDIMENT CONTROL BMP ARE REQUIRED.



ROUGHEN SLOPES
WITH HEAVY EQUIPMENT
OR LEAVE IN ROUGHENED
CONDITION



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

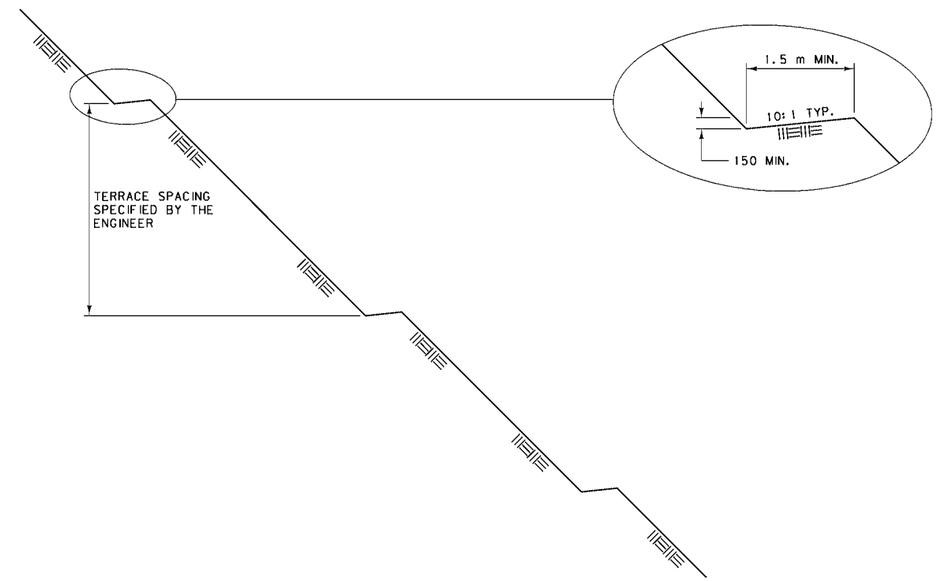
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-22
SLOPE ROUGHENING (SS-12)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

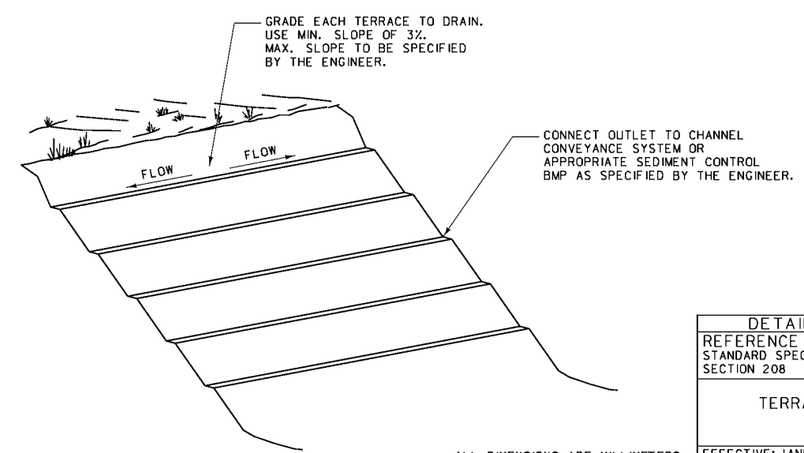
SYMBOL: ——— GT ———

TERRACED SLOPES SS-13:

TERRACED SLOPES ARE MADE OF EITHER EARTHEN EMBANKMENTS OR RIDGE AND CHANNEL SYSTEMS THAT ARE PROPORTIONALLY SPACED AND ARE CONSTRUCTED WITH AN ADEQUATE GRADE. TERRACES REDUCE DAMAGE FROM EROSION BY COLLECTING AND REDISTRIBUTING SURFACE RUNOFF TO STABLE OUTLETS AT SLOWER VELOCITIES AND BY INCREASING THE DISTANCE OF OVERLAND RUNOFF FLOW. THIS BMP IS USUALLY LIMITED TO USE ON LONG STEEP SLOPES WITH A WATER EROSION PROBLEM, OR WHERE IT IS ANTICIPATED THAT WATER EROSION WILL BE A PROBLEM. TERRACED SLOPES ARE NOT APPROPRIATE FOR USE ON SANDY, STONY, OR SHALLOW SOILS.

DESIGN TERRACED SLOPES WITH ADEQUATE AND APPROPRIATE OUTLETS. ENGINEER'S APPROVAL IS REQUIRED PRIOR TO MODIFICATIONS OF SPECIFIED TERRACED SLOPES.





ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

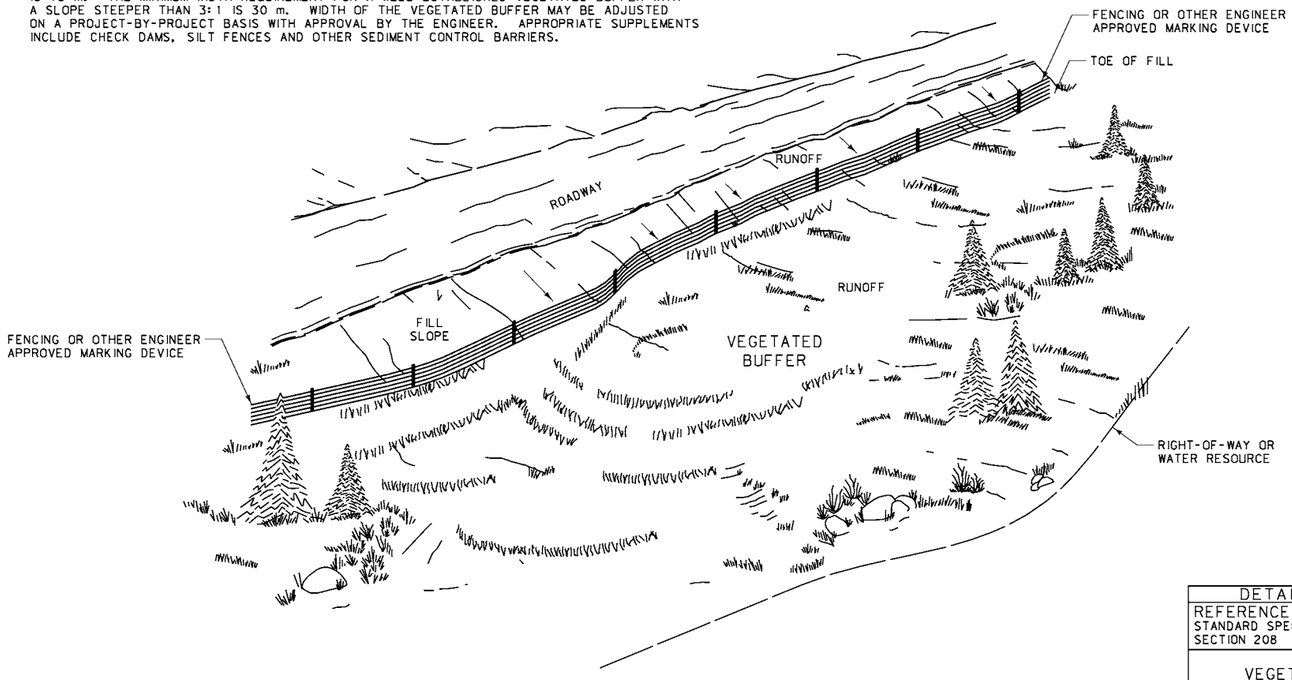
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-24
TERRACED SLOPES (SS-13)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: ——— VBS ———

VEGETATED BUFFER SS-14:

VEGETATED BUFFER IS AN UNDISTURBED AREA OR STRIP OF ESTABLISHED VEGETATION. A VEGETATED BUFFER PROVIDES A LIVING SEDIMENT FILTER TO REDUCE RUNOFF VELOCITIES AND ALLOW CAPTURE AND SETTLING OF COARSE-GRAINED SEDIMENT. VEGETATED BUFFERS REDUCE OR PREVENT SEDIMENTATION FROM LEAVING THE RIGHT-OF-WAY.

IDENTIFY EXISTING VEGETATED BUFFERS BEFORE CONSTRUCTION OCCURS AND MARK AREA PER SS-2 (PRESERVATION OF EXISTING VEGETATION) OR WITH SC-1 (SILT FENCE). ESTABLISHED VEGETATED BUFFERS SHOULD INCLUDE GRASSES AND SHRUBS. IRRIGATION, FERTILIZATION AND WEED AND PEST CONTROL MAY BE REQUIRED IN ORDER TO ESTABLISH AND MAINTAIN AN EFFECTIVE VEGETATED BUFFER. KEEP EQUIPMENT AND FILL MATERIAL OFF OF VEGETATED BUFFERS. ALWAYS CONSIDER VEGETATED BUFFER BUFFERS WHEN WATER RESOURCES ARE ADJACENT TO OR NEAR DISTURBANCES AND REQUIRE PROTECTION. THE MINIMUM WIDTH REQUIREMENT FOR A WELL-ESTABLISHED VEGETATED BUFFER WITH A SLOPE OF 3:1 OR FLATTER IS 15 m. THE MINIMUM WIDTH REQUIREMENT FOR A WELL-ESTABLISHED VEGETATED BUFFER WITH A SLOPE STEEPER THAN 3:1 IS 30 m. WIDTH OF THE VEGETATED BUFFER MAY BE ADJUSTED ON A PROJECT-BY-PROJECT BASIS WITH APPROVAL BY THE ENGINEER. APPROPRIATE SUPPLEMENTS INCLUDE CHECK DAMS, SILT FENCES AND OTHER SEDIMENT CONTROL BARRIERS.



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-26
VEGETATED BUFFER (SS-14)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

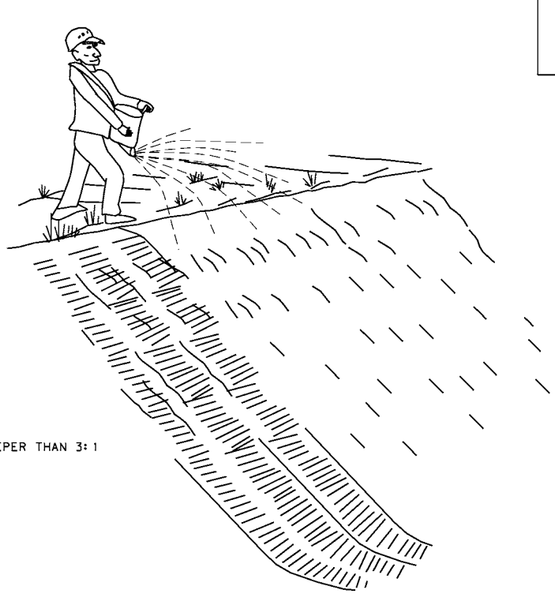
SYMBOL: ——— ES ———

EROSION SEEDING BMP SS-15:

EROSION SEEDING IS THE IMMEDIATE SEEDING OF FRESHLY EXPOSED SLOPES. USE EROSION SEEDING ON CUT AND FILL SLOPES STEEPER THAN 3:1 THAT ARE NOT SUBJECT TO FURTHER DISTURBANCE, EXCLUDE ROCK SLOPES THAT CANNOT BE EXCAVATED BY RIPPING. SEEDING DOES NOT REPLACE OR SUBSTITUTE FOR FINAL SEEDING ACTIVITIES SPECIFIED IN THE SEEDING SPECIAL PROVISION.

SEED COMPLETED SECTIONS DAILY, REGARDLESS OF THE TIME OF YEAR. ACCOMPLISH SEEDING BY MANUAL BROADCASTING WITH A SHOULDER-HARNESSED SPREADER SEEDER WITH NO MULCH OR FERTILIZER APPLIED. TRACK AREAS FOLLOWING SEEDING IN ACCORDANCE TO BMP SS-12, SLOPE ROUGHENING. HYDROSEEDING MAY ONLY BE USED AS APPROVED BY THE MDT AGRONOMIST, THROUGH THE ENGINEER. STORE THE RECOMMENDED SEED MIX ON-SITE PRIOR TO INITIATION OF SLOPE EXCAVATION. IF ONE OR MORE SPECIES IS UNAVAILABLE, CONTACT THE MDT AGRONOMIST, THROUGH THE ENGINEER, FOR THE SUBSTITUTE. ROCK AREAS THAT CANNOT BE RIPPED WILL BE EVALUATED ON A PROJECT-BY-PROJECT BASIS FOR THE NEED OF EROSION SEEDING. THESE AREAS WILL RECEIVE EROSION SEEDING FOLLOWING THE ENGINEER'S APPROVAL. THE SEED MIX AND RATE OF APPLICATION ARE AS FOLLOWS:

DISTRICT	SPECIES	kg/ha PLS
1 (MISSOULA)	CANADA WILDRYE	3.5
	SECAR BLUEBUNCH WHEATGRASS	5.5
	CRITANA THICKSPIKE WHEATGRASS	5.5
	COVAR SHEEP FESCUE	2.0
	CEREAL BARLEY	5.5
2,3,5 (BUTTE, GREAT FALLS, BILLINGS)	CANADA WILDRYE	3.5
	SECAR BLUEBUNCH WHEATGRASS	5.5
	SODAR STREAMBANK WHEATGRASS	5.5
	COVAR SHEEP FESCUE	2.0
	CEREAL BARLEY	5.5
4 (GLENDIVE)	CANADA WILDRYE	3.5
	SECAR BLUEBUNCH WHEATGRASS	5.5
	ROSANA WESTERN WHEATGRASS	5.5
	LODORM GREEN NEEDLEGRASS	3.5
	CEREAL BARLEY	5.5



SLOPES STEEPER THAN 3:1

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-28
EROSION SEEDING (SS-15)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: ——— SF ———

SILT FENCE SC-1:

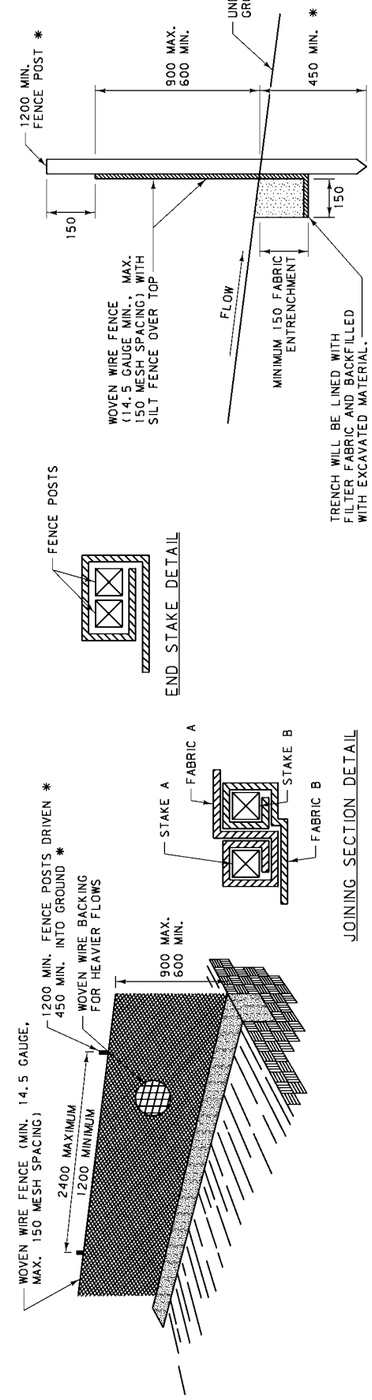
SILT FENCE IS A SINGLE OR SERIES OF FILTER FABRIC SEDIMENT BARRIER STRETCHED AND ATTACHED TO SUPPORTING POSTS. THE FENCE BOTTOM IS ENTRENCHED.

SILT FENCES ARE USED FOR SHEET FLOWS TO ASSIST IN SEDIMENT CONTROL BY RETAINING SOME OF THE ERODED SOIL PARTICLES AND SLOWING THE RUNOFF VELOCITY TO ALLOW PARTICLE SETTLING. APPLICATIONS INCLUDE WATER RESOURCE PROTECTION, INLET PROTECTION, BANK PROTECTION, AND TOE OF SLOPE PROTECTION. INSTALL SILT FENCES PRIOR TO DISTURBING AREAS REQUIRING THIS BMP OR AS SLOPE GRADES ARE ACHIEVED. MAXIMUM CUT OR FILL SLOPE FOR A SILT FENCE IS 2:1. FOLLOW MDT STANDARD SPECIFICATION 622 FOR SILT FENCE MATERIALS AND INSTALLATION.

THERE ARE TWO TYPE OF SILT FENCE INSTALLATIONS:
- UNSTABILIZED - SILT FENCE SUPPORTED WITH EITHER WOOD OR METAL FENCE POSTS.
- STABILIZED - SILT FENCE SUPPORTED WITH METAL POSTS AND WITH WOVEN WIRE BACKING.

ENTRENCHMENT - THE INITIAL SILT FENCE INSTALLATION REQUIRES ONLY THE VERTICAL ENTRENCHMENT COMPONENT UNLESS THE ENGINEER DETERMINES BOTH VERTICAL AND HORIZONTAL ENTRENCHMENT COMPONENTS ARE NECESSARY. THE FENCE REQUIRES REPLACEMENT DUE TO FAILURE FROM FULLOUT OR UNDERCUTTING. THE SUBSEQUENT INSTALLATION WILL INCLUDE BOTH VERTICAL AND HORIZONTAL ENTRENCHMENT COMPONENTS.

SILT FENCES ARE USED BETWEEN THE EDGE OF CONSTRUCTION DISTURBANCE AND A WATER RESOURCE, AND AT A CRITICAL RESOURCE OR RIGHT-OF-WAY LINE THAT IS ADJACENT TO CONSTRUCTION ACTIVITY. POSITION THE BARRIER TO PREVENT SEDIMENT FROM ENTERING DRAINAGES. DO NOT PLACE THE BARRIER ACROSS LIVE STREAMS. WOVEN WIRE BACKING IS NECESSARY WHEN DEALING WITH HEAVIER FLOW VELOCITIES AND SEDIMENT OR AS A ROCK BARRIER. REMOVE SEDIMENT FROM BEHIND THE FENCE WHEN IT ACCUMULATES TO ONE-THIRD THE ORIGINAL HEIGHT. EITHER GRADE AND SEED OR REMOVE THE SEDIMENT DEPOSITS PRIOR TO REMOVAL OF THE FENCE. DISTANCES BETWEEN SILT FENCE WHEN USED FOR SEDIMENT RETENTION ARE AS FOLLOWS:
- FROM 2% TO 3% PLACE SILT FENCE AT 150 METER SPACING
- FROM 3% TO 4% PLACE SILT FENCE AT 90 METER SPACING
- FROM 4% + PLACE SILT FENCE AT 45 METER SPACING



* FOR CLEAR ZONE APPLICATIONS USE MAX. POST LENGTH OF 1500 mm WITH A MAX. BURIAL DEPTH OF 450 mm.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-30

SILT FENCE (SC-1)

EFFECTIVE: JANUARY 2004

MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

SYMBOL: ——— DB ———

DESILTING BASIN SC-2:

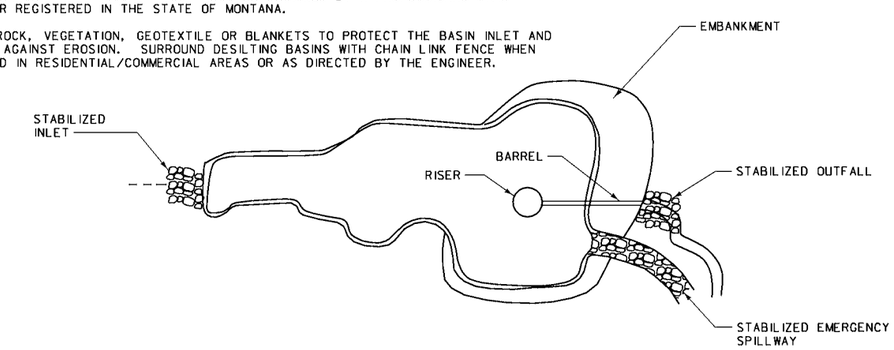
A DESILTING BASIN IS A TEMPORARY BASIN FORMED BY EXCAVATION AND/OR CONSTRUCTING AN EMBANKMENT SO THAT SEDIMENT-LADEN RUNOFF IS TEMPORARILY DETAINED UNDER SLOW FLOWING CONDITIONS, ALLOWING SEDIMENT TO SETTLE OUT BEFORE THE RUNOFF IS DISCHARGED.

USE DESILTING BASINS FOR DISTURBED AREAS BETWEEN 2 ha AND 4 ha WHERE SEDIMENT-LADEN WATER MAY ENTER THE DRAINAGE SYSTEM OR WATERCOURSE.

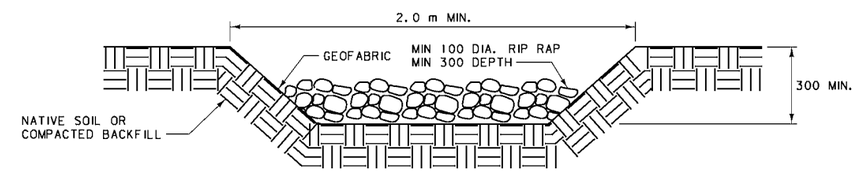
DO NOT USE DESILTING BASINS FOR DRAINAGE AREAS GREATER THEN 30 ha AND DO NOT LOCATE BASINS WITHIN LIVE STREAMS.

SIZE DESILTING BASINS SUCH THAT THERE IS 100 m^3 PER 1 ha OF CONTRIBUTING AREA, LENGTH MUST BE EQUAL OR LARGER THAN TWICE THE WIDTH, DEPTH MUST BE BETWEEN 1 m AND 1.5 m. ANY BASIN MEETING THE DEFINITION OF A "HIGH HAZARD DAM" MUST BE DESIGNED BY A PROFESSIONAL CIVIL ENGINEER REGISTERED IN THE STATE OF MONTANA. BASINS LARGER THAN 1000 m^3 MUST ALSO BE DESIGNED BY A PROFESSIONAL CIVIL ENGINEER REGISTERED IN THE STATE OF MONTANA.

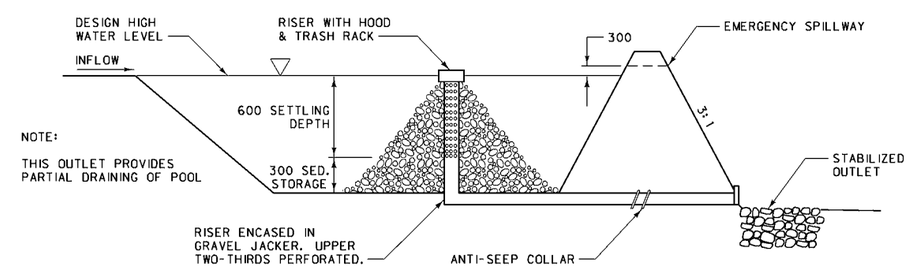
PLACE ROCK, VEGETATION, GEOTEXTILE OR BLANKETS TO PROTECT THE BASIN INLET AND SLOPES AGAINST EROSION. SURROUND DESILTING BASINS WITH CHAIN LINK FENCE WHEN DESIGNED IN RESIDENTIAL/COMMERCIAL AREAS OR AS DIRECTED BY THE ENGINEER.



TYPICAL DESILTING BASIN - TOP VIEW



TYPICAL DESILTING BASIN - EMERGENCY SPILLWAY CROSS SECTION



NOTE:

THIS OUTLET PROVIDES PARTIAL DRAINING OF POOL

TYPICAL DESILTING BASIN - OUTLET #1

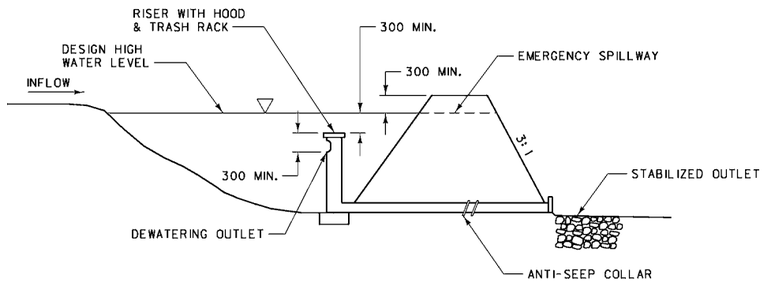
ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-32A

DESILTING BASIN (SC-2) (SHEET 1)

EFFECTIVE: JANUARY 2004

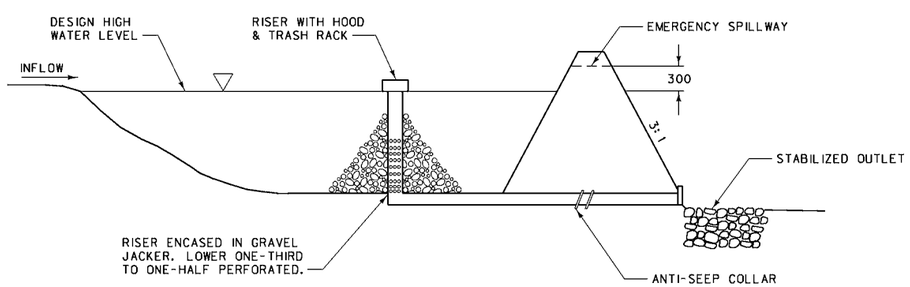
MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD



NOTE:

THIS OUTLET PROVIDES NO
DRAINING OF PERMANANT POOL

TYPICAL DESILTING BASIN - OUTLET #2



NOTE:

THIS OUTLET PROVIDES
COMPLETE DRAINING OF POOL

TYPICAL DESILTING BASIN - OUTLET #3

ALL DIMENSIONS ARE MILLIMETERS
(mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-32B
DESILTING BASIN (SC-2) (SHEET 2)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: ——— ST ———

SEDIMENT TRAP SC-3:

A SEDIMENT TRAP IS A TEMPORARY BASIN WITH A CONTROLLED RELEASE STRUCTURE, FORMED BY EXCAVATING OR CONSTRUCTION OF AN EARTHEN EMBANKMENT ACROSS A WATERWAY OR LOW DRAINAGE AREA.

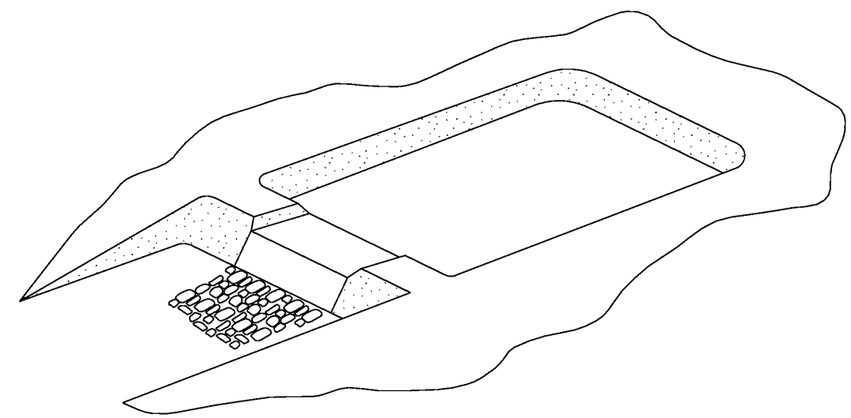
USE SEDIMENT TRAPS WHEN DISTURBED AREAS ARE LESS THAN 2 ha. THIS BMP CAN BE USED TO PROVIDE ADDITIONAL PROTECTION FOR A WATER BODY OR FOR REDUCING SEDIMENT BEFORE IT ENTERS A DRAINAGE SYSTEM.

SEDIMENT BASINS ARE NOT APPROPRIATE FOR DRAINAGE AREAS LARGER THAN 2 ha AND ONLY REMOVE LARGE TO MEDIUM SIZED PARTICLES. DO NOT USE SEDIMENT TRAPS IN LIVE STREAMS.

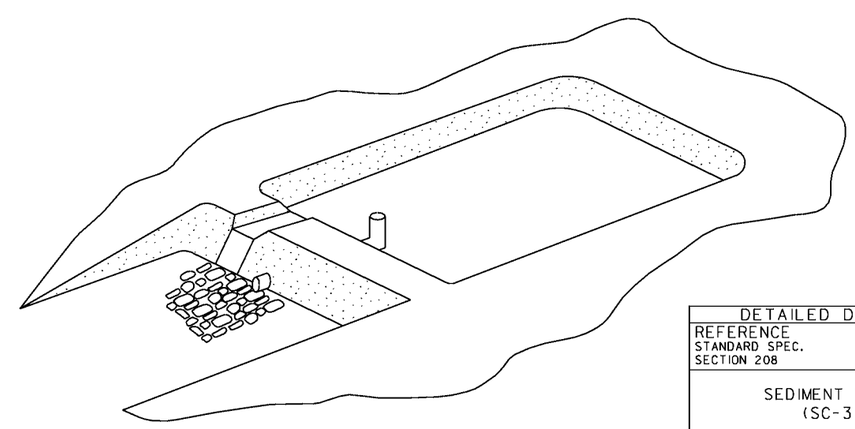
A MINIMUM SETTLING ZONE OF 130 m^3 PER ha AND A MINIMUM SEDIMENT ZONE OF 65 m^3 PER ha IS REQUIRED FOR EACH SEDIMENT TRAP. ANY TRAP MEETING THE DEFINITION OF A "HIGH HAZARD DAM" MUST BE DESIGNED BY A PROFESSIONAL CIVIL ENGINEER LICENSED IN THE STATE OF MONTANA. ALL TRAPS LARGER THAN 1000 m^3 REQUIRE A DESIGN BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF MONTANA.

PLACE ROCK, VEGETATION, GEOTEXTILE OR BLANKETS TO PROTECT THE TRAP'S INLET, OUTLET AND SLOPES AGAINST EROSION. ENCLOSE THE SEDIMENT TRAP WITH CHAN LINK FENCE WHEN PLACED IN RESIDENTIAL/COMMERCIAL AREAS OR AS DIRECTED BY THE ENGINEER.

REFER TO BMP SC-2 FOR RISER PIPE CONFIGURATIONS AND OVERFLOW SPILLWAY DESIGNS.



TYPICAL SEDIMENT TRAP WITH SPILLWAY TYPE OUTFALL



TYPICAL SEDIMENT TRAP WITH RISER PIPE TYPE OUTFALL

ALL DIMENSIONS ARE MILLIMETERS
(mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-34
SEDIMENT TRAP (SC-3)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: ———CD———

CHECK DAMS SC-4:

A CHECK DAM IS A SMALL DEVICE CONSTRUCTED OF GRAVEL, SANDBAGS, OR FIBER ROLLS, PLACED ACROSS A NATURAL OR MAN-MADE CHANNEL OR DRAINAGE DITCH. CHECK DAMS REDUCE SCOUR AND CHANNEL EROSION BY REDUCING FLOW VELOCITIES AND ENCOURAGING SEDIMENT DROPOUT.

CHECK DAMS MAY BE INSTALLED IN SMALL CHANNELS WITH DRAINAGE AREAS OF 4 ha OR LESS AND/OR STEEP CHANNELS WHERE STORM WATER RUNOFF VELOCITIES EXCEED 1.5 m/s. THE MAXIMUM HEIGHT FOR CHECK DAMS WITHIN THE CLEAR ZONE IS 150 mm.

CHECK DAMS CANNOT BE USED IN LIVE STREAMS OR FOR DRAINAGE AREAS LARGER THAN 4 ha. IN ADDITION, CHECK DAMS CANNOT BE CONSTRUCTED FROM SILT FENCE.

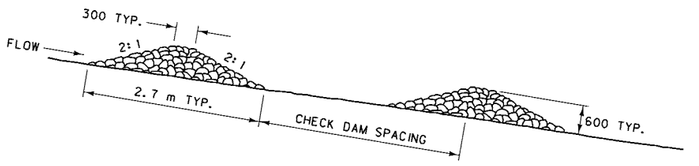
PLACE CHECK DAMS AT A DISTANCE THAT WILL ALLOW SMALL POOLS TO BE FORMED BEHIND EACH DAM. INSTALL THE FIST CHECK DAM APPROXIMATELY 5 METERS FROM THE OUTFALL DEVICE. PLACE MULTIPLE CHECK DAMS SUCH THAT BACKWATER FROM THE DOWNSTREAM DAM WILL REACH THE TOE OF THE UPSTREAM DAM. ROCK MAY BE PLACED BY HAND OR BY MECHANICAL METHOD TO ACHIEVE COMPLETE DITCH OR SWALE COVERAGE.

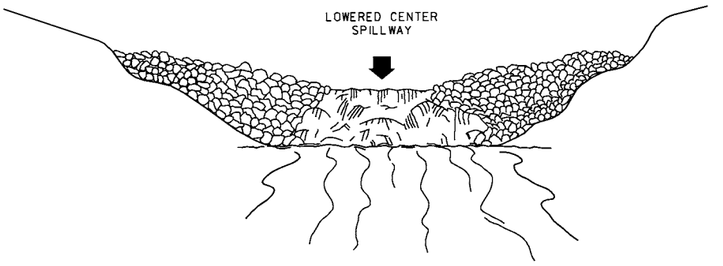
CHECK DAMS CONSTRUCTED FROM GRAVEL MUST BE 100% PASSING THE 50 mm SCREEN AND 10% MAXIMUM PASSING THE 4.75 mm SIEVE. DAM MATERIAL MAY BE PITRUN OR CRUSHED AGGREGATE. REFER TO BMPs SC-5 AND SC-8 FOR USE OF FIBER ROLLS AND SAND BAGS AS CHECK DAMS.

REMOVE SEDIMENT FROM BEHIND THE DAM WHEN IT ACCUMULATES TO ONE-HALF THE ORIGINAL HEIGHT UNLESS ITS DRAINAGE AREA HAS BEEN STABILIZED.

DISTANCES BETWEEN CHECK DAMS ARE AS FOLLOWS:
- FROM 1% TO 3% PLACE CHECK DAMS AT 90 METER SPACING
- FROM 3% TO 4% PLACE CHECK DAMS AT 60 METER SPACING
- FROM 4% + PLACE CHECK DAMS AT 30 METER SPACING

CHECK DAM SPACING MAY BE ADJUSTED ON A PROJECT-BY-PROJECT BASIS BY THE ENGINEER. DO NOT USE CHECK DAMS ON 1-2% GRADES UNLESS DETERMINED NECESSARY BY THE ENGINEER.





ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-36
CHECK DAMS (SC-4)	
EFFECTIVE: JANUARY 2004	
MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

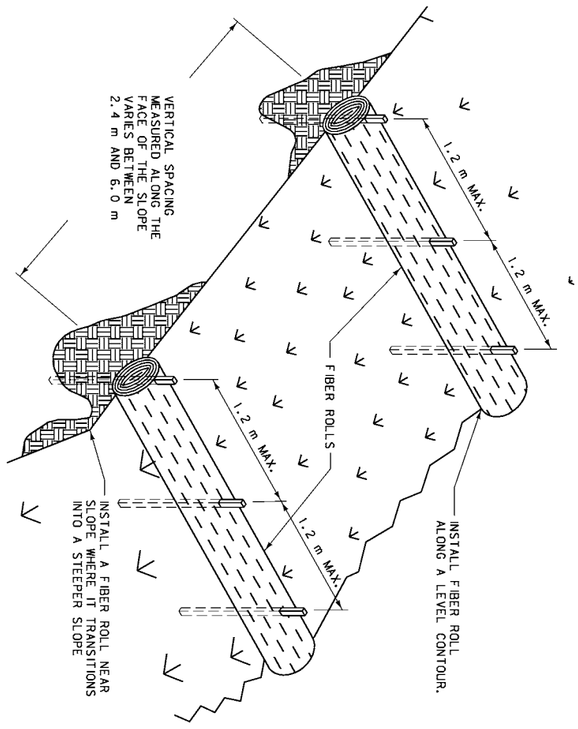
SYMBOL: ———FR———

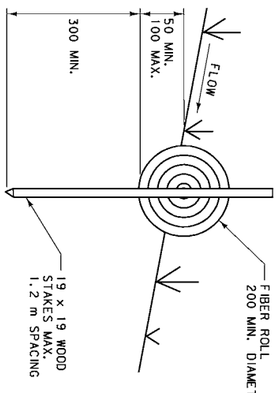
FIBER ROLLS SC-5:

A FIBER ROLL CONSISTS OF EROSION CONTROL BLANKET MATERIAL THAT IS PREFABRICATED, CONTOURED AND WOUND INTO A TIGHT CYLINDRICAL ROLL. AND PLACED ON THE FACE OF SLOPES AT REGULAR INTERVALS TO INTERCEPT RUNOFF, REDUCE ITS FLOW VELOCITY, RELEASE THE RUNOFF AS SHEET FLOW, AND PROVIDE SOME REMOVAL OF SEDIMENT FROM THE RUNOFF.

FIBER ROLLS MAY BE USED ALONG THE TOP, FACE, AND AT GRADE BREAKS OF EXPOSED AND ERODIBLE SLOPES TO SHORTEN SLOPE LENGTH AND SPREAD RUNOFF AS SHEET FLOW. ROLLS MAY BE USED AS CHECK DAMS IF APPROVED BY THE ENGINEER. FOR USE AS CHECK DAMS, PLACE FIBER ROLLS AT 15 m MAXIMUM SPACING OR AS APPROVED BY THE ENGINEER.

ALTHOUGH FIBER ROLLS PROVIDE SOME SEDIMENT REMOVAL, FIBER ROLLS ARE NOT TO BE USED IN PLACE OF A LINEAR SEDIMENT BARRIER (I.E., SILT FENCE, SANDBAG BARRIER, OR STRAW BALE BARRIER).





ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-38
FIBER ROLLS (SC-5)	
EFFECTIVE: JANUARY 2004	
MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: ——— GBB ———

GRAVEL BAG BERM SC-6:

A GRAVEL BAG BERM CONSISTS OF A SINGLE ROW OF GRAVEL BAGS THAT ARE INSTALLED END-TO-END TO FORM A BARRIER ACROSS A SLOPE TO INTERCEPT RUNOFF, REDUCE RUNOFF VELOCITY, RELEASE RUNOFF AS SHEET FLOW, AND PROVIDE SOME SEDIMENT REMOVAL. GRAVEL BAG BERMS CAN BE USED ALONG THE FACE AND AT GRADE BREAKS OF EXPOSED AND ERODIBLE SLOPES TO SHORTEN SLOPE LENGTHS AND SPREAD RUNOFF AS SHEET FLOW.

THESE DEVICES ARE NOT TO BE USED IN PLACE OF A LINEAR SEDIMENT BARRIER (I.E., SILT FENCE, SANDBAG BARRIERS, OR STRAW BALE BARRIERS).

USE WOVEN POLYPROPYLENE, POLYETHYLENE, OR POLYAMIDE FABRIC OR BURLAP MATERIAL FOR BAGS. BAG MATERIAL IS REQUIRED TO HAVE A MINIMUM UNIT WEIGHT OF 135 g/m², MULLEN BURST STRENGTH EXCEEDING 2 070 kPa AND AN ULTRAVIOLET STABILIZATION EXCEEDING 70%.

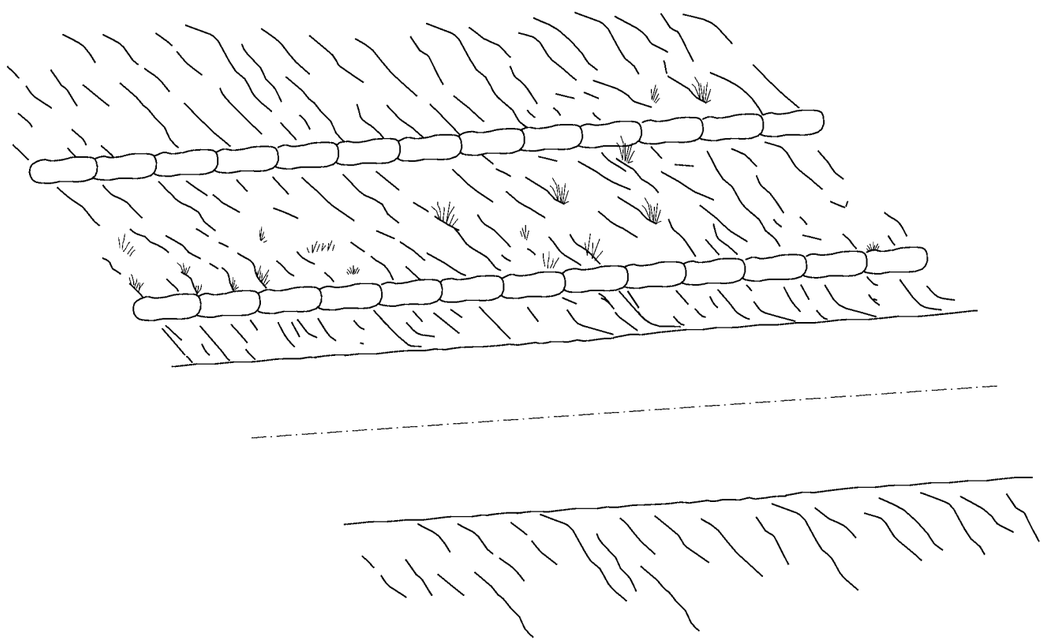
USE GRAVEL BAGS HAVING A LENGTH OF 450 mm, WIDTH OF 300 mm, THICKNESS OF 75 mm, AND A MASS OF APPROXIMATELY 15 kg. ALTERNATIVE BAG SIZES REQUIRE ENGINEERS APPROVAL PRIOR TO USE.

FILL GRAVEL BAGS APPROXIMATELY 75% FULL WITH GRAVEL CONSISTING OF 100% PASSING THE 19 mm SCREEN AND 10% MAXIMUM PASSING THE 4.75 mm SIEVE. FILL MATERIAL MAY BE PITRUN OR CRUSHED AGGREGATE. FILL MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER.

TIGHTLY PLACE GRAVEL BAGS TO MINIMIZE GAPS BETWEEN BAGS. BAGS MAY BE STAGGERED ON A PROJECT-BY PROJECT BASIS AS APPROVED BY THE ENGINEER.

PLACE GRAVEL BAG BERMS AT 2.4 TO 6 m SPACING ALONG THE SLOPE. FOR ABNORMALLY STEEP OR SHALLOW SLOPES FOLLOW ENGINEERS GUIDELINES.

ALL BAGS PLACED WITHIN THE CLEAR ZONE REQUIRE MEASURES TO PROTECT GRAVEL FROM FREEZING. ALL FREEZE REDUCTION METHODS REQUIRE ENGINEERS APPROVAL PRIOR TO IMPLEMENTATION.



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-40
GRAVEL BAG BERM (SC-6)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: ——— SAND-B ———

SAND BAG BARRIERS SC-8:

A SANDBAG BARRIER IS A TEMPORARY LINEAR SEDIMENTATION BARRIER CONSISTING OF STACKED SANDBAGS, DESIGNED TO INTERCEPT AND SLOW THE FLOW OF SEDIMENT-LADEN SHEET FLOW RUNOFF. SANDBAGS CAN ALSO BE USED WHERE FLOWS ARE MODERATELY CONCENTRATED, SUCH AS DITCHES, SWALES, AND STORM DRAIN INLETS TO DIVERT AND/OR DETAIN FLOWS.

LIMIT THE USE OF SANDBAG BARRIERS TO DRAINAGE AREAS OF 2 ha OR SMALLER, DUE TO THE BAG MATERIAL, SANDBAG BARRIERS HAVE A TENDENCY TO FAIL OVER LONG-TERM PROJECTS.

USE WOVEN POLYPROPYLENE, POLYETHYLENE, OR POLYAMIDE FABRIC OR BURLAP MATERIAL FOR BAGS. BAG MATERIAL IS REQUIRED TO HAVE A MINIMUM UNIT WEIGHT OF 135 g/m², A MULLEN BURST STRENGTH EXCEEDING 2 070 kPa AND AN ULTRAVIOLET STABILIZATION EXCEEDING 70%.

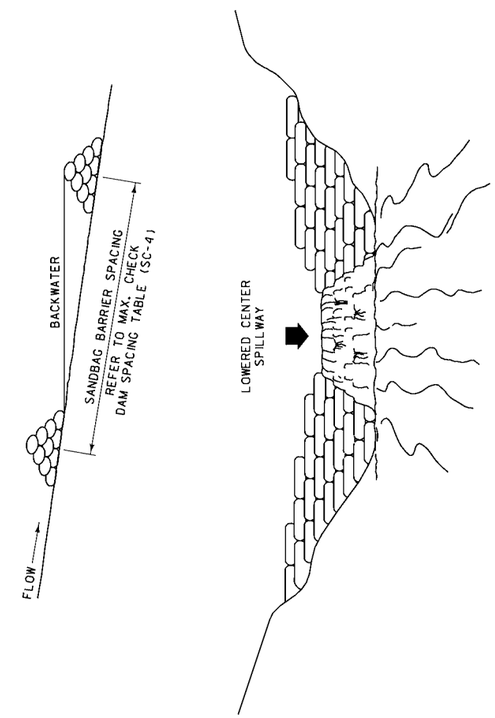
USE SANDBAGS HAVING A LENGTH OF 450 mm, WIDTH OF 300 mm, THICKNESS OF 75 mm, AND A MASS OF APPROXIMATELY 15 kg. ALTERNATIVE BAG SIZES MAY REQUIRE ENGINEER'S APPROVAL PRIOR TO USE.

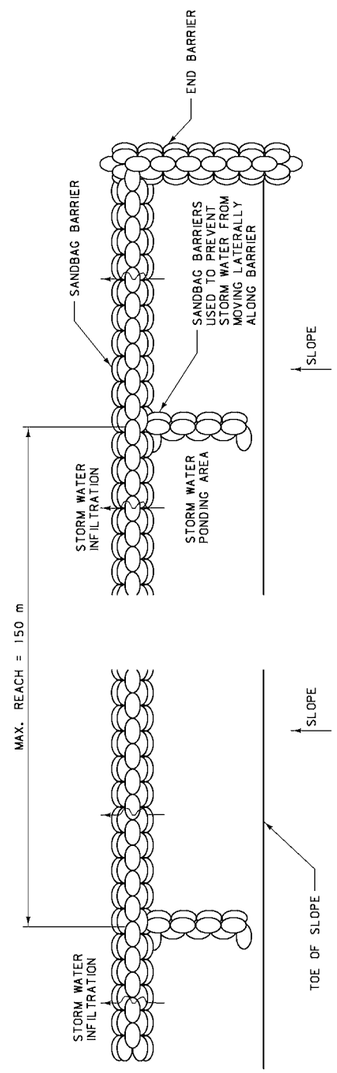
FILL SANDBAGS WITH SAND CONSISTING OF 100% PASSING THE 4.75 mm SCREEN, 50% PASSING THE 2.00 mm SIEVE, AND 20% MAXIMUM PASSING THE 0.075 mm SIEVE. FILL MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER.

WHEN INSTALLING SANDBAG BARRIERS AS LINEAR CONTROL, PLACE BAGS ALONG A LEVEL CONTOUR. UPON ENDING THE SANDBAG RUN, PLACE THE LAST BAGS TO ANGLE UP THE SLOPE SO THAT FLOWS DO NOT ESCAPE AROUND THE END.

WHEN SANDBAG BARRIERS ARE PLACED IN CONCENTRATED FLOWS, STACK SANDBAGS TO HEIGHT USING A PYRAMID APPROACH WITH THE UPPER SANDBAGS OVERLAPPING THE LOWER ROW. THIS APPLICATION MAY NOT BE USED WITHIN THE CLEAR ZONE UNLESS OVERALL HEIGHT IS 150 mm OR LESS.

ALL BAGS PLACED WITHIN THE CLEAR ZONE REQUIRE MEASURES TO PROTECT SAND FROM FREEZING. ALL FREEZE REDUCTION METHODS REQUIRE ENGINEERS APPROVAL PRIOR TO IMPLEMENTATION.





ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-42
SAND BAG BARRIERS (SC-8)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

SYMBOL: ——— STRAW-B ———

STRAW BALE BARRIERS SC-9:

STRAW BALE BARRIERS ARE A SEDIMENT BARRIER CONSISTING OF ENTRENCHED, OVERLAPPING AND ANCHORED STRAW BALES THAT REDUCE RUNOFF VELOCITIES AND RETAIN SEDIMENT. DO NOT USE STRAW BALE BARRIERS INSIDE THE CLEAR ZONE. STRAW BALES MUST BE CERTIFIED WEED-FREE.

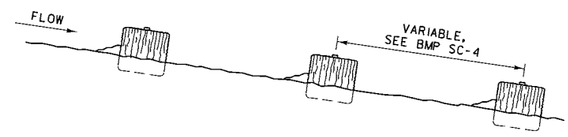
STRAW BALE BARRIERS ARE USED FOR SHEET OR CONCENTRATED FLOWS TO REDUCE RUNOFF VELOCITY, PROMOTE SEDIMENT RETENTION AND ALLOW SETTLING. DO NOT USE STRAW BALES IN HIGH FLOWS SUCH AS CHANNELS OR LIVE STREAMS. IN ADDITION, STRAW BALES CAN NOT BE USED ON SURFACE WHICH DO NOT ALLOW FOR ENTRENCHMENT.

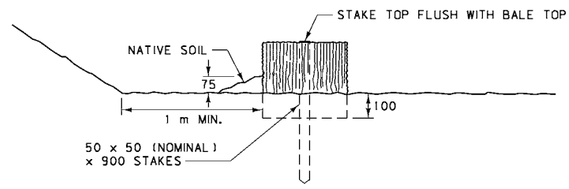
MINIMUM STRAW BALES SIZE REQUIREMENTS ARE A WIDTH OF 360 mm, HEIGHT OF 450 mm, LENGTH OF 900 mm AND A MASS OF 23 kg. USE STEEL WIRE (1.57 mm MIN. DIAMETER), NYLON OR POLYPROPYLENE STRING (2 mm MIN. DIAMETER) TO BIND BALES. MINIMUM BREAKING STRENGTH OF BINDING MATERIAL IS 360 N. USE 50 mm BY 50 mm (NOMINAL) BY 900 mm LONG WOODEN STAKES. DO NOT USE METAL STAKES.

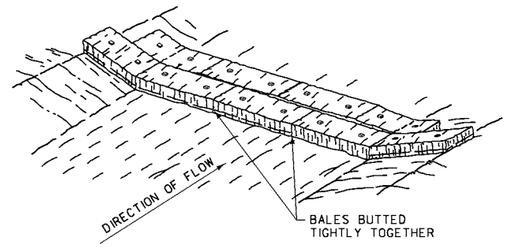
INSTALL STRAW BALES ALONG A LEVEL CONTOUR, WITH THE LAST BALE TURNED UP SLOPE. PLACE BALES IN A 100 mm DEEP TRENCH, TIGHTLY ABUT ADJACENT BALES, AND STAKE USING A MINIMUM OF TWO STAKES PER BALE. IF SLOPES EXCEED 10:1 THE LENGTH OF SLOPE UP STREAM OF THE BARRIER MUST BE LESS THAN 15 m. OFFSET BALES AT LEAST 1 m FROM THE TOE OF SLOPES. IF SITE CONDITIONS DO NOT ALLOW FOR OFFSET, BALES MAY BE PLACED AT TOE.

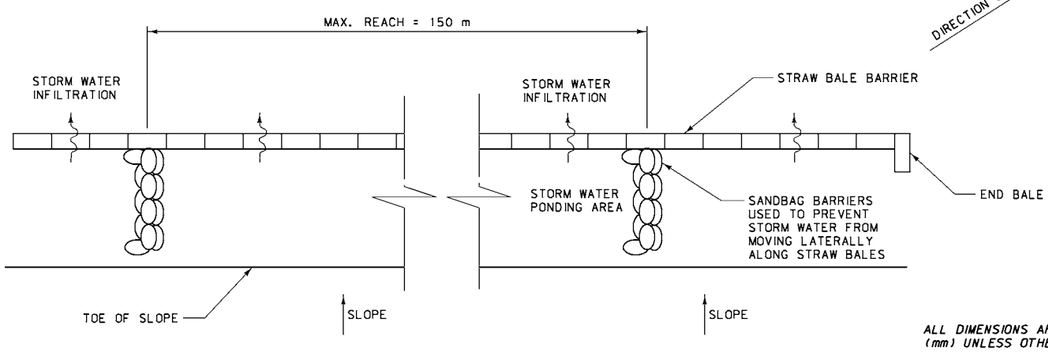
FOLLOW GUIDELINES IN BMP SC-4 IF BALES ARE USED AS CHECK DAMS.

REPAIR OR REPLACE DAMAGED, UNDER-CUT OR END RUN BALES. REMOVE SEDIMENT BUILDUP FROM BALES ONCE IT REACHES A HEIGHT OF 1/3 THE BALE HEIGHT.









ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-44
STRAW BALE BARRIERS (SC-9)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

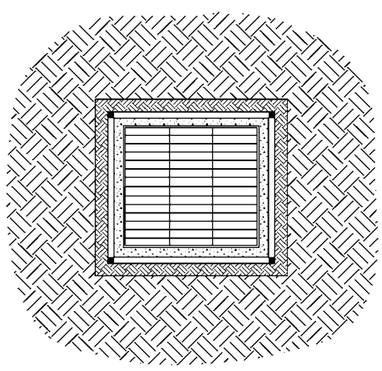
SYMBOL: (SDP)

STORM DRAIN INLET PROTECTION SC-10:

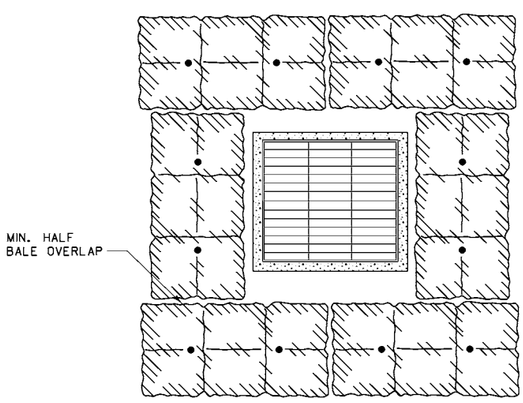
STORM DRAIN INLET PROTECTION IS USED AT STORM DRAIN INLETS THAT ARE SUBJECT TO RUNOFF FROM CONSTRUCTION ACTIVITIES. THESE DEVICES DRAIN AND/OR FILTER SEDIMENT-LADEN RUNOFF AND ALLOW SEDIMENT TO SETTLE PRIOR TO DISCHARGE OF STORM WATER INTO STORM WATER DRAINAGE SYSTEMS OR WATERCOURSES.

USE STORM DRAIN INLET PROTECTION WHEN PONDING WILL NOT ENCROACH INTO HIGHWAY AND FOR DRAINAGE AREAS OF 0.4 ha OR LESS. FOR FLOWS LESS THEN 0.014 m^3/s SILT FENCE OR STRAW BALES MAY BE USED. WHEN FLOWS EXCEED 0.014 m^3/s USE SANDBAG BARRIERS OR GRAVEL CHECK DAMS. FOLLOW SILT FENCE (SC-1), STRAW BALE BARRIERS (SC-9), SANDBAG BARRIERS (SC-8) AND CHECK DAMS (SC-4) FOR INSTALLATION REQUIREMENTS FOR EACH TYPE OF MATERIAL.

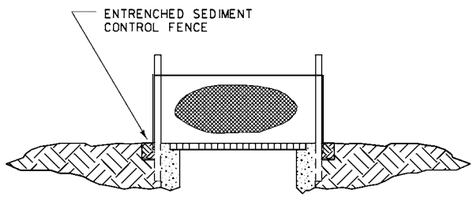
STRAW BALES, SAND BAGS, AND GRAVEL BERMS MAY BE USED WITHIN THE CLEAR ZONE UPON ENGINEERS APPROVAL. EXPEDIENTLY REMOVE ALL STRAW BALES, SAND BAGS, AND GRAVEL BERMS FROM THE CLEAR ZONE UPON COMPLETION OF CONSTRUCTION ACTIVITIES.



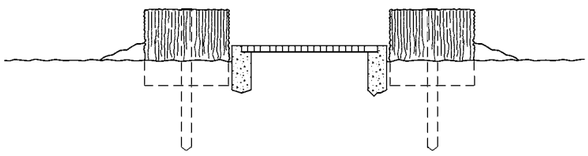
SILT FENCE - PLAN VIEW



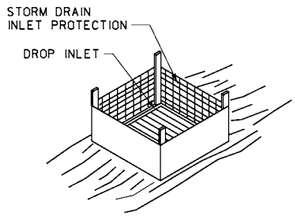
STRAW BALE BARRIER - PLAN VIEW



SILT FENCE - PROFILE VIEW



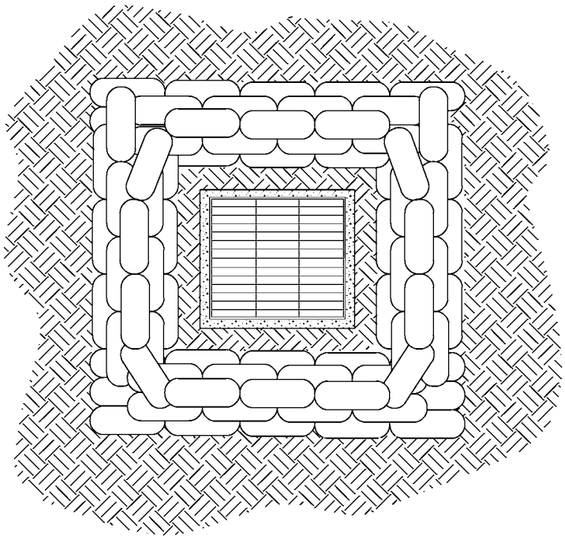
STRAW BALE BARRIER - PROFILE VIEW



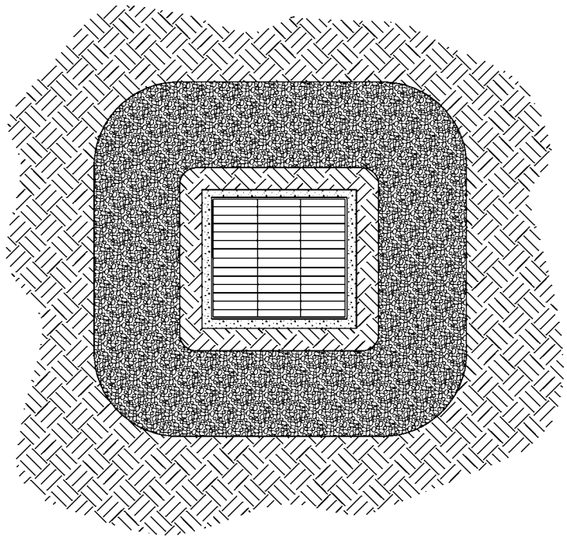
EXAMPLE ISOMETRIC VIEW

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-46A
STORM DRAIN INLET PROTECTION (SC-10) (SHEET 1)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD



SANDBAG BARRIER - PLAN VIEW



GRAVEL CHECK DAM - PLAN VIEW

SANDBAG BARRIER - PROFILE VIEW

GRAVEL CHECK DAM - PROFILE VIEW

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-46B
STORM DRAIN INLET PROTECTION (SC-10) (SHEET 2)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

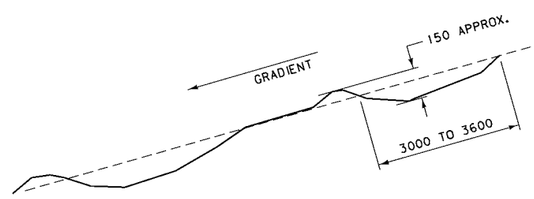
SYMBOL: ——— DDB ———

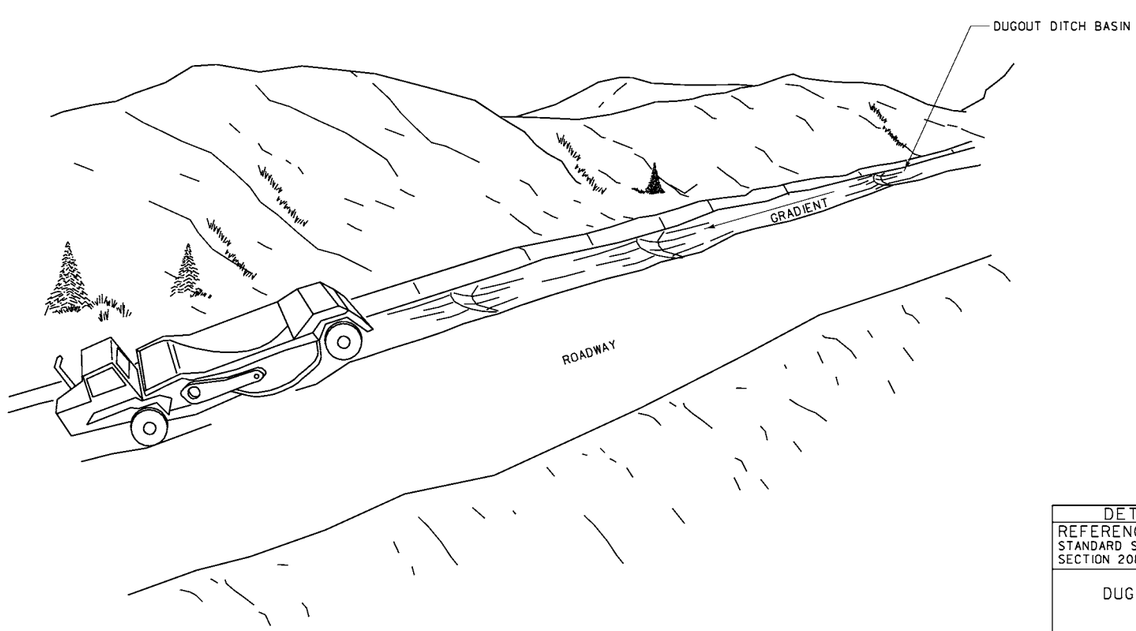
DUGOUT DITCH BASIN SC-11:

DUGOUT DITCH BASINS CONSIST OF ONE OR A SERIES OF SMALL DUGOUT BASINS USED FOR CONCENTRATED FLOWS TO REDUCE RUNOFF VELOCITY, PROMOTE SEDIMENT RETENTION AND ALLOW SETTLING. THE MAXIMUM HEIGHT FOR DUGOUT DITCH BASINS USED INSIDE THE CLEAR ZONE IS 150 mm.

DUGOUT DITCH BASINS ARE USED FOR LONGITUDINAL SLOPE STEEPNESS (GRADE) SEDIMENT RETENTION. APPLICATIONS INCLUDE DITCH SEDIMENT TRAPS, INTERCEPTOR DITCHES AND TOE OF SLOPE PROTECTION. USE IS DEPENDENT ON SOIL TYPE. DISTANCES BETWEEN DUGOUT DITCH BASINS ARE AS FOLLOWS:
- FROM 2% TO 3% PLACE DUGOUT DITCH BASINS AT 90 METER SPACING
- FROM 3% TO 4% PLACE DUGOUT DITCH BASINS AT 45 METER SPACING
- FROM 4% + PLACE DUGOUT DITCH BASINS AT 15 METER SPACING

DUGOUT DITCH BASIN SPACING CAN BE ADJUSTED ON A PROJECT-BY-PROJECT BASIS FOLLOWING ENGINEERS APPROVAL.





ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-48
DUGOUT DITCH BASIN (SC-11)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

WIND EROSION CONTROL WE-1:

WIND EROSION CONTROL CONSISTS OF APPLYING WATER OR OTHER DUST SUPPRESSANTS, ROUGHENING SURFACES OR INSTALLING WIND BARRIERS TO PREVENT WIND EROSION BY PROTECTING SOIL SURFACES OR BY REDUCING WIND VELOCITIES.

WATER SPRAYING:

APPLY BY MEANS OF PRESSURE-TYPE DISTRIBUTORS OR PIPELINES EQUIPPED WITH A SPRAY SYSTEM OR HOSES AND NOZZLES THAT MAY ENSURE EVEN DISTRIBUTION. DO NOT USE EXCESSIVE AMOUNTS OF WATER FOR DUST SUPPRESSION THAT MAY CAUSE SOILS TO BECOME SATURATED AND CREATE OTHER PROBLEMS SUCH AS EXCESS RUNOFF, MUD/DIRT TRACKING OR ICING IN THE WINTER MONTHS. EQUIP ALL DISTRIBUTION SYSTEMS WITH A POSITIVE MEANS OF SHUTOFF. UNLESS WATER IS APPLIED BY MEANS OF PIPELINES, AT LEAST ONE MOBILE IS REQUIRED TO BE AVAILABLE AT ALL TIMES ON THE CONSTRUCTION SITE TO APPLY WATER OR DUST SUPPRESSANTS. IF RECLAIMED WASTEWATER IS USED, THE SOURCES AND DISCHARGE MUST MEET MONTANA DEQ WATER RECLAMATION CRITERIA. DO NOT USE NON-POTABLE WATER IN TANKS OR DRAIN PIPES THAT MAY BE USED TO CONVEY POTABLE WATER. DO NOT CONNECT BETWEEN POTABLE AND NON-POTABLE SUPPLIES. MARK ALL NON-POTABLE TANKS, PIPES AND OTHER CONVEYANCES AS "NON-POTABLE WATER - DO NOT DRINK".

DUST SUPPRESSANTS:

MATERIALS APPLIED AS TEMPORARY SOIL STABILIZERS AND SOIL BINDERS MAY ALSO PROVIDE WIND EROSION CONTROL BENEFITS. APPLY THESE MATERIALS PER MANUFACTURE'S SPECIFICATIONS IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS. SEE SS-5 SOIL BINDERS.

CALCIUM CHLORIDE OR OTHER DUST SUPPRESSANTS USED ON ROADWAYS THAT ARE NOT LISTED IN SS-5 MUST MEET MDT SPECIFICATIONS AND/OR BE APPROVED BY THE ENGINEER PRIOR TO USE.

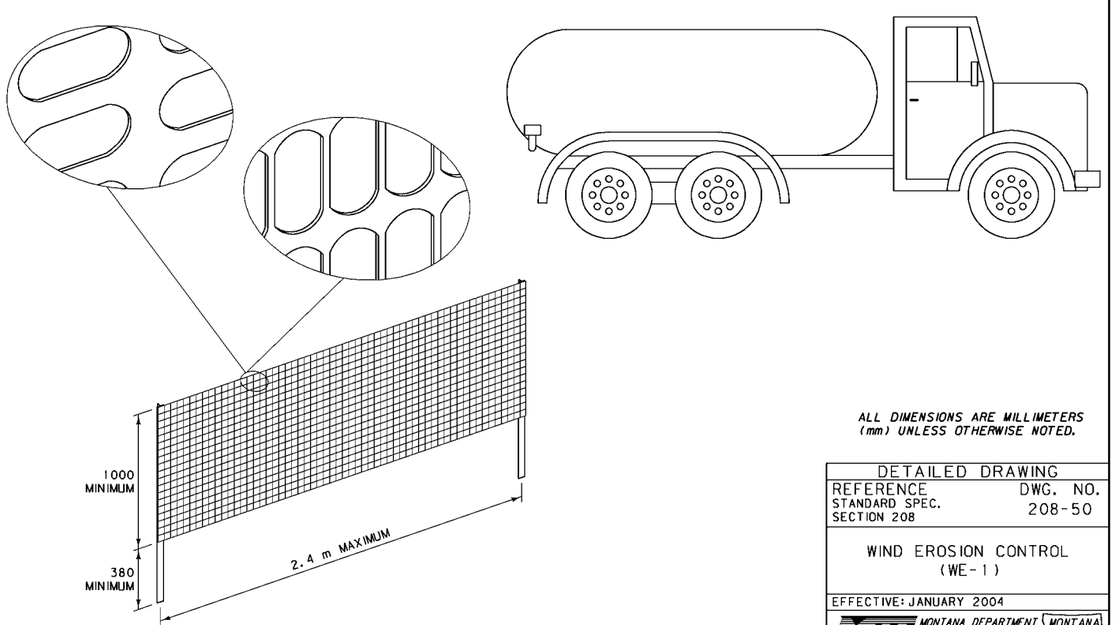
SLOPE ROUGHENING:

REFER TO SLOPE ROUGHENING TECHNIQUES DISCUSSED IN SS-12 SLOPE ROUGHENING.

WIND BARRIERS:

WIND BARRIERS PROVIDE AN AREA OF REDUCED WIND VELOCITY WHICH ALLOWS SETTLING OF LARGE SEDIMENT PARTICLES. MAXIMUM REDUCTION OF WIND VELOCITIES OCCUR IMMEDIATELY DOWNWIND OF THE WIND BARRIER, GRADUALLY DECREASING FURTHER DOWNWIND.

USE TEMPORARY WIND FENCING AS WIND BARRIERS ON CONSTRUCTION SITES. BOARD FENCING, EARTHEN BANKS, STRAW ROWS, ROCK WALLS, OR OTHER TEMPORARY WIND BARRIERS MAY BE UTILIZED AS APPROVED BY THE ENGINEER. WIND FENCING CAUSES WIND VELOCITY TO SLOW DOWN FOR APPROXIMATELY 40-50 TIMES THE FENCE HEIGHT, HOWEVER THE WIND FENCING IS ONLY EFFECTIVE FOR WIND BREAKING FOR APPROXIMATELY 10-25 TIMES THE HEIGHT OF THE FENCE. WIND FENCE IS REQUIRED TO BE A PREFABRICATED COMMERCIAL PRODUCT MADE OF WOVEN POLYETHYLENE AND ULTRAVIOLET RESISTANT MATERIAL WITH A POROSITY OF 50% MINIMUM. WIND FENCING IS MOST PROTECTIVE IN A DIRECTION THAT IS PERPENDICULAR TO THE WIND DIRECTION. FOR WIND PROTECTION OF STOCKPILES, PLACE WIND FENCING APPROXIMATELY 3 PILE HEIGHTS UPWIND OF THE STOCKPILE BASE.



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-50
WIND EROSION CONTROL (WE-1)	
EFFECTIVE: JANUARY 2004	

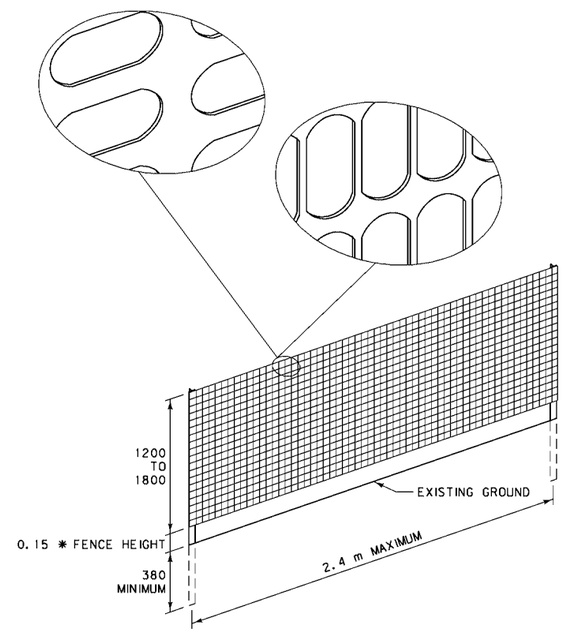
MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SNOW ACCUMULATION MANAGEMENT (SN-2):

SNOW ACCUMULATION BARRIERS PROVIDE AN AREA OF REDUCED WIND VELOCITY WHICH ALLOWS SETTLING OF SNOW. MAXIMUM REDUCTION OF WIND VELOCITIES OCCUR IMMEDIATELY DOWNWIND OF THE SNOW BARRIER, GRADUALLY DECREASING FURTHER DOWNWIND.

SNOW FENCING IS ONLY EFFECTIVE FOR DRIFT CONTROL FOR APPROXIMATELY 15-20 TIMES THE HEIGHT OF THE FENCE. SNOW FENCE IS REQUIRED TO BE A PREFABRICATED COMMERCIAL PRODUCT MADE OF WOVEN POLYETHYLENE AND ULTRAVIOLET RESISTANT MATERIAL WITH A POROSITY OF 40-60%. SNOW FENCING IS MOST PROTECTIVE IN A DIRECTION THAT IS PERPENDICULAR TO THE WIND DIRECTION. SEVERAL PARALLEL FENCES CAN BE USED IN AREAS OF HIGH SNOW ACCUMULATION OR HIGH WIND CONDITIONS. SECURE FENCING TO APPROVED POSTS WITH FOLLOWING MANUFACTURE RECOMMENDATIONS.

MAINTAIN SNOW FENCING AS NEEDED OR AS SPECIFIED BY THE ENGINEER. REMOVE SNOW ACCUMULATIONS FROM FENCING ONCE LEVELS HAVE REACHED THE BOTTOM OF THE FENCE.



ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

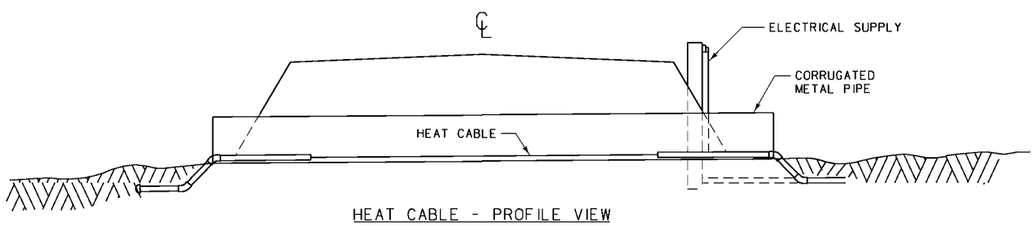
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-52
SNOW ACCUMULATION MANAGEMENT (SN-2)	
EFFECTIVE: JANUARY 2004	

MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

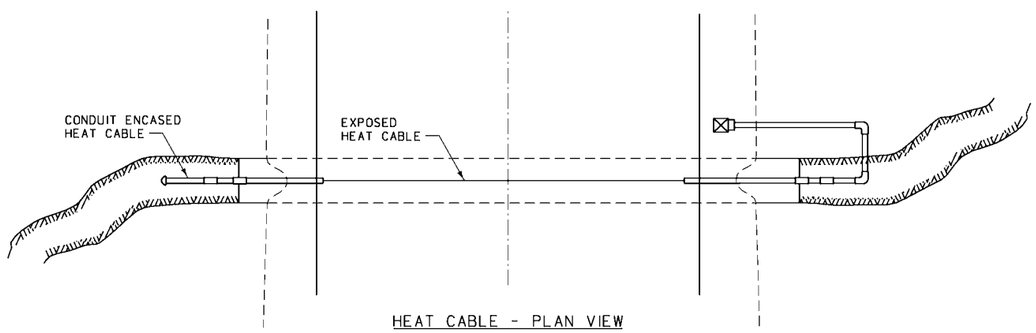
FREEZE REDUCTION SN-3:

FREEZE REDUCTION BMPS ARE USED TO ENSURE THAT CRITICAL CULVERTS DO NOT FREEZE DURING THE WINTER MONTHS. USE HEAT TRACE IN CULVERTS TO PREVENT FREEZING. IN ENGINEER APPROVED CONDITIONS A DOUBLE CULVERT SYSTEM MAY BE USED. WITH THIS SYSTEM IF ONE CULVERT FREEZES A SECOND, HIGHER OR LOWER, CULVERT WILL CONTAIN RUNOFF.

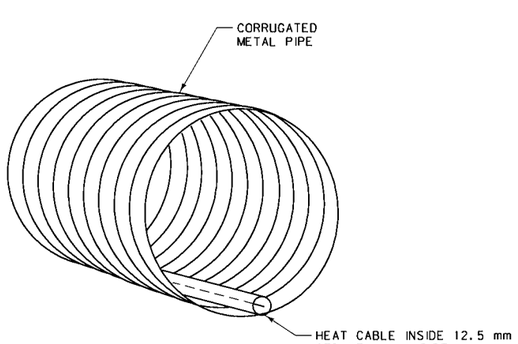
ALL ELECTRICAL WORK TO BE COMPLETED BY A LICENSED ELECTRICIAN IN ACCORDANCE WITH NATIONAL ELECTRICAL CODES AND MDT STANDARD SPECIFICATIONS. HEAT CABLE IS INTENDED FOR CONTINUOUS OPERATION IN THE WINTER AND CAN NOT BE USED TO THAW FROZEN CULVERTS.



HEAT CABLE - PROFILE VIEW



HEAT CABLE - PLAN VIEW



HEAT PLACEMENT WITHIN PIPE

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-54
FREEZE REDUCTION (SN-3)	
EFFECTIVE: JANUARY 2004	

MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: SCEE

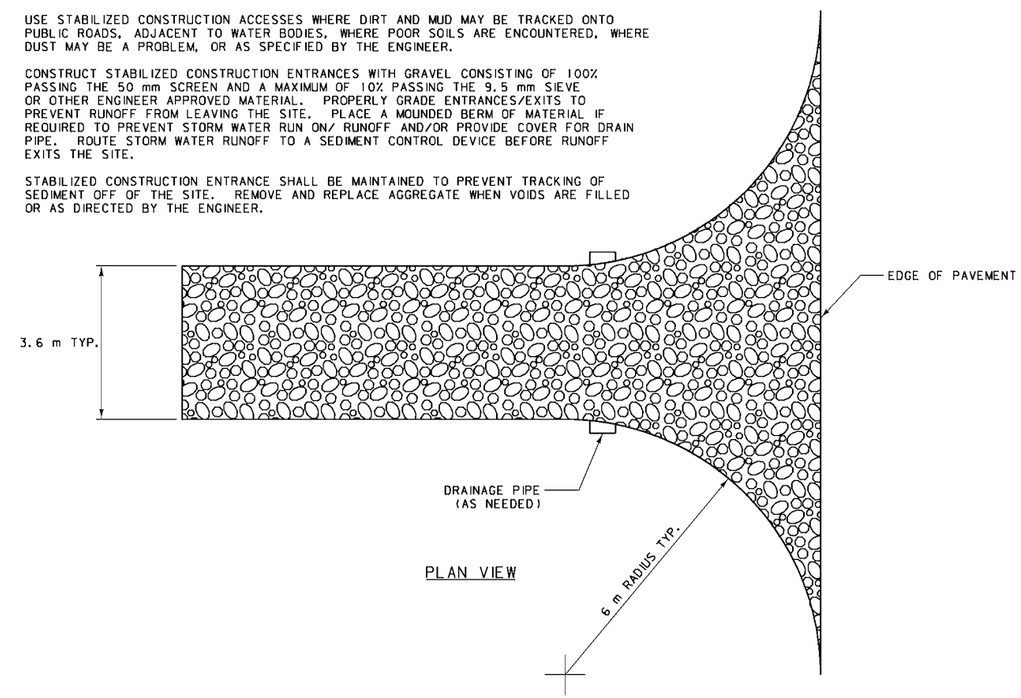
STABILIZED CONSTRUCTION ENTRANCE/EXIT TC-1:

A STABILIZED CONSTRUCTION ACCESS IS A DEFINED POINT OF ENTRANCE/EXIT TO A CONSTRUCTION SITE THAT IS STABILIZED TO REDUCE THE TRACKING OF MUD AND DIRT ONTO PUBLIC ROADS BY CONSTRUCTION VEHICLES.

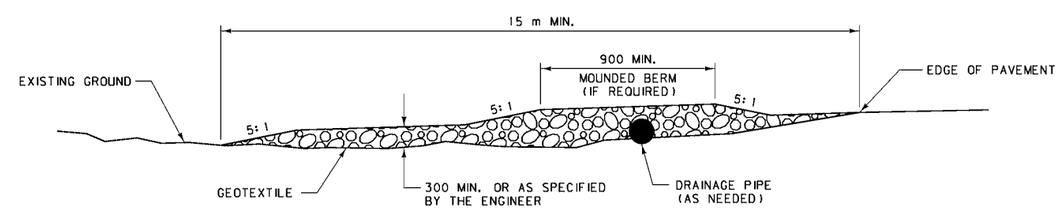
USE STABILIZED CONSTRUCTION ACCESSES WHERE DIRT AND MUD MAY BE TRACKED ONTO PUBLIC ROADS, ADJACENT TO WATER BODIES, WHERE POOR SOILS ARE ENCOUNTERED, WHERE DUST MAY BE A PROBLEM, OR AS SPECIFIED BY THE ENGINEER.

CONSTRUCT STABILIZED CONSTRUCTION ENTRANCES WITH GRAVEL CONSISTING OF 100% PASSING THE 50 mm SCREEN AND A MAXIMUM OF 10% PASSING THE 9.5 mm SIEVE OR OTHER ENGINEER APPROVED MATERIAL. PROPERLY GRADE ENTRANCES/EXITS TO PREVENT RUNOFF FROM LEAVING THE SITE. PLACE A MOUNDED BERM OF MATERIAL IF REQUIRED TO PREVENT STORM WATER RUN ON/ RUNOFF AND/OR PROVIDE COVER FOR DRAIN PIPE. ROUTE STORM WATER RUNOFF TO A SEDIMENT CONTROL DEVICE BEFORE RUNOFF EXITS THE SITE.

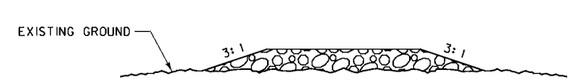
STABILIZED CONSTRUCTION ENTRANCE SHALL BE MAINTAINED TO PREVENT TRACKING OF SEDIMENT OFF OF THE SITE. REMOVE AND REPLACE AGGREGATE WHEN VOIDS ARE FILLED OR AS DIRECTED BY THE ENGINEER.



PLAN VIEW



PROFILE VIEW



END VIEW

ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-56
STABILIZED CONSTRUCTION ENTRANCE/EXIT (TC-1)	
EFFECTIVE: JANUARY 2004	

MDT MONTANA DEPARTMENT OF TRANSPORTATION — MONTANA CADD

SYMBOL: EETW

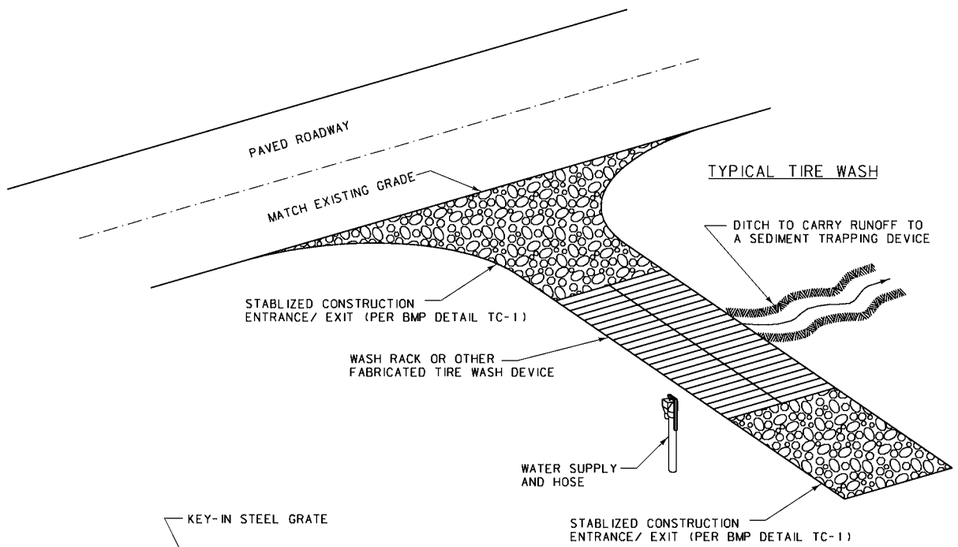
ENTRANCE/EXIT TIRE WASH TC-3:

A TIRE WASH IS AN AREA LOCATED AT A STABILIZED CONSTRUCTION ACCESS POINT WHERE PRESSURIZED WATER IS USED TO REMOVE SEDIMENT FROM TIRES AND UNDERCARRIAGE, AND TO PREVENT SEDIMENT FROM BEING TRANSPORTED ONTO PUBLIC ROADWAYS.

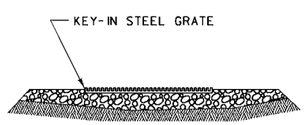
TIRE WASHES ARE MEANT TO BE USED ON A PROJECT-BY-PROJECT BASIS AND REQUIRES APPROVAL BY THE ENGINEER. THESE DEVICES REQUIRE A SUPPLY OF WASH WATER AND MAY REQUIRE A TURNOUT OR DOUBLE WIDE ACCESS.

FOLLOW BMP TC-1 FOR STABILIZED CONSTRUCTION ENTRANCES/EXITS. PROVIDE WASH RACK SUITABLE FOR SUPPORTING TRAFFIC LOADS. DIRECT WASH WATER FROM THE RACK, THROUGH A DRAINAGE DITCH, TO A SEDIMENT TRAP DEVICE. ENGINEERS APPROVAL IS REQUIRED PRIOR TO CONSTRUCTION.

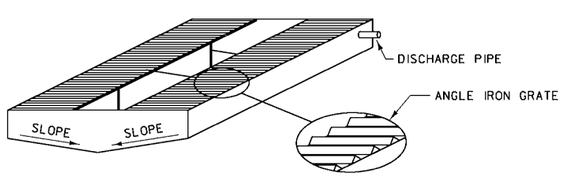
TIRE WASH DEVICES OTHER THEN THOSE SHOWN MAY BE USED AS APPROVED BY THE ENGINEER.



TYPICAL TIRE WASH



STEEL GRATE WASH RACK



SELF-CONTAINED STEEL TIRE WASH

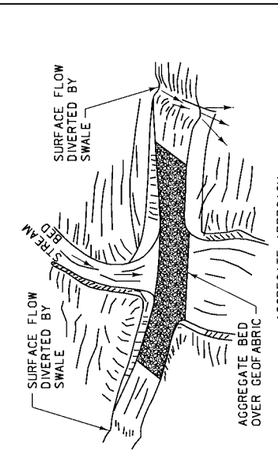
ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

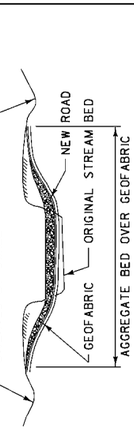
DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-58
ENTRANCE/EXIT TIRE WASH (TC-3)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

TEMPORARY STREAM CROSSINGS NS-4:

A TEMPORARY STREAM CROSSING IS A STRUCTURE PLACED ACROSS A WATERWAY THAT ALLOWS VEHICLES AND/OR HEAVY EQUIPMENT TO CROSS THE WATERWAY DURING CONSTRUCTION. THE STREAM CROSSINGS PROTECT THE STREAM BANKS AND CHANNELS FROM DAMAGE CAUSED BY VEHICLE MOVEMENT WHICH RELEASES SEDIMENT.

TEMPORARY STREAM CROSSINGS CAN CONSIST OF BRIDGES, CULVERTS OR FORDS. FOLLOW STREAM CROSSING GUIDELINES PROVIDED IN THE MDT/FWP TASK FORCE RECOMMENDATIONS REPORT. TEMPORARY STREAM CROSSINGS REQUIRE THE ACQUISITION OF SPECIAL PERMITS.

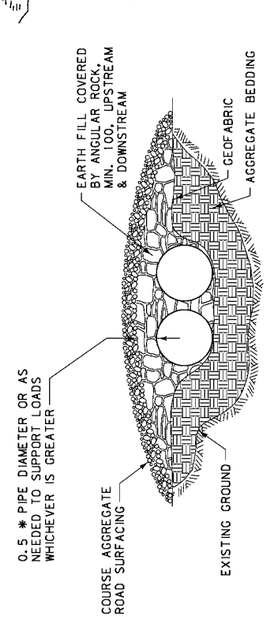


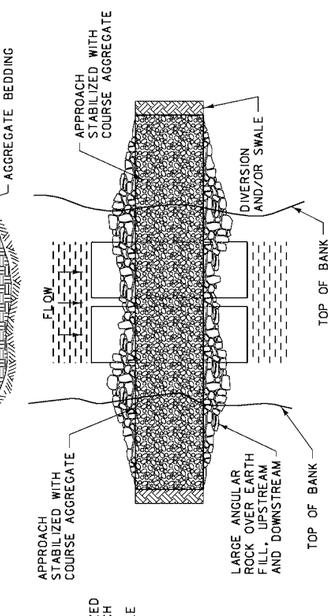


TYPICAL FORD CROSSING

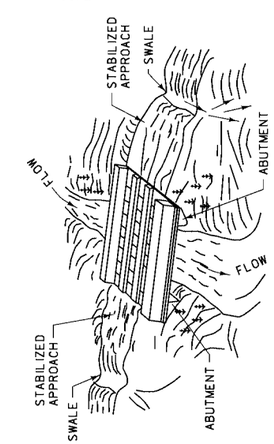
ALL DIMENSIONS ARE MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 208	DWG. NO. 208-60
TEMPORARY STREAM CROSSINGS (NS-4)	
EFFECTIVE: JANUARY 2004	
MDT MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD





TYPICAL CULVERT CROSSING



NOTE:
SURFACE FLOW OF ROAD DIVERTED BY SWALE AND/OR DIKE

TYPICAL BRIDGE CROSSING