

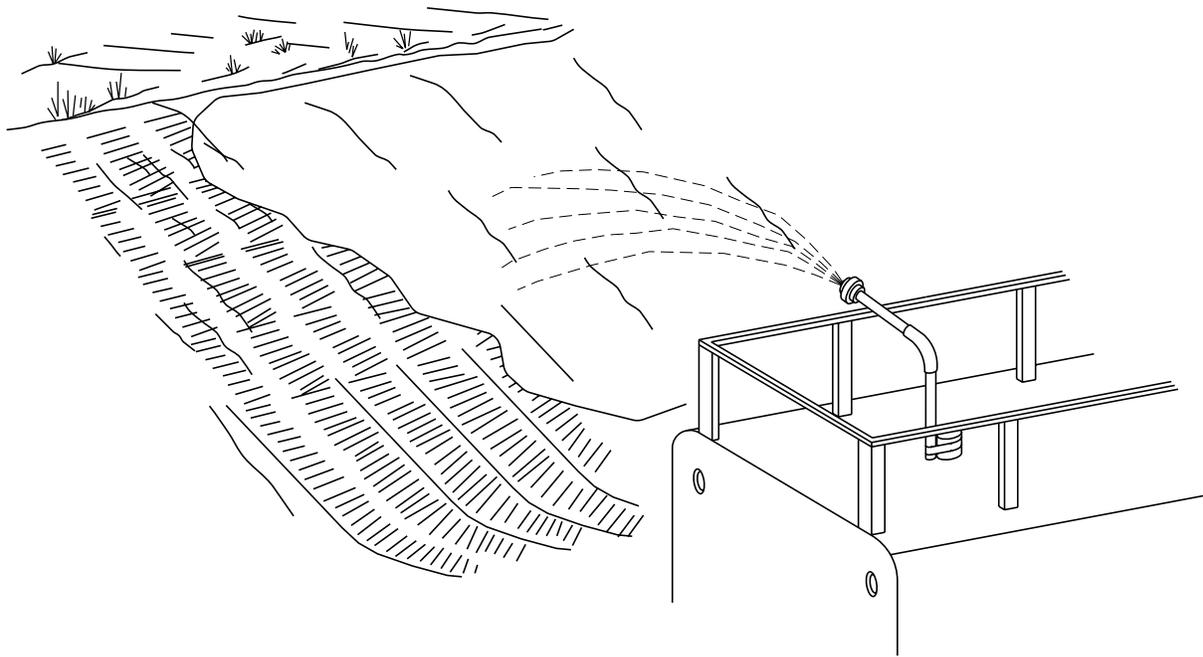
| SCHEDULE OF BEST MANAGEMENT PRACTICES (BMPs) | | |
|--|---|---------------------------|
| NAME | DESCRIPTION | DTL. DWG. NO. (208-##) |
| TEMPORARY EROSION CONTROL BMPs (EC) | | |
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| | |
|---|--------------------|
| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-00 |
| SCHEDULE OF BEST MANAGEMENT PRACTICES | |
| EFFECTIVE: SEPTEMBER 2014 | |
|  | |

SYMBOL: HM

HYDRAULIC MULCH EC-3:

- ① 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 PROJECT MANAGER'S 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.
- ② APPLY HYDRAULIC MULCH A MINIMUM OF 24 HOURS PRIOR TO A STORM EVENT TO ALLOW FOR ADEQUATE DRYING.
- ③ HYDRAULIC MULCH SELECTION MUST MEET MDT SPECIFICATIONS AND BE APPROVED BY THE PROJECT MANAGER PRIOR TO PLACEMENT. ROUGHEN EXISTING EMBANKMENT FOLLOWING GUIDELINES SPECIFIED IN BMP EC-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 EC-4 AND EC-15 FOR SEEDING REQUIREMENTS. REMOVE ANY OVER SPRAY FROM ROADWAYS OR SIDEWALKS IMMEDIATELY FOLLOWING APPLICATION.
- ④ RECYCLED PAPER MULCH SHOULD CONTAIN 100% POST CONSUMER RECYCLED PAPER.
- ⑤ REFER TO BMP EC-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 | 1000 LB./ACRE [1120 kg/ha] (MIN.) |
| WOOD-BASED HYDRAULIC MULCH | WOOD OR WOOD & PAPER | 1000 LB./ACRE [1120 kg/ha] (MIN.) |

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

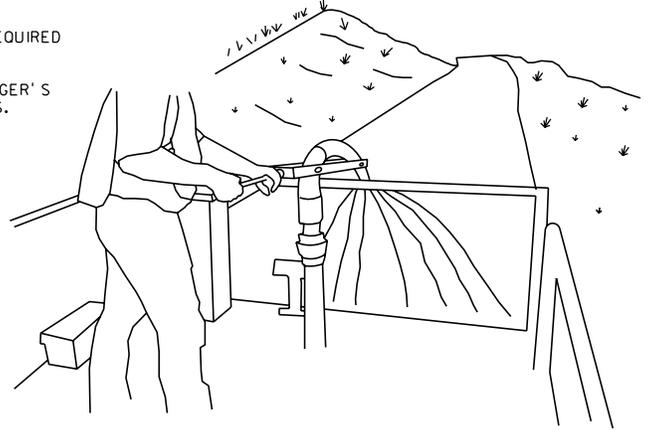
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

| DETAILED DRAWING | |
|---|-----------------|
| REFERENCE STANDARD SPEC. SECTION 208, 610 | DWG. NO. 208-04 |
| HYDRAULIC MULCH (EC-3) | |
| EFFECTIVE: SEPTEMBER 2014 | |
| | |

SYMBOL: ——— SB ———

SOIL BINDERS EC-5:

- ① 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.
- ② DUE TO THE TEMPORARY NATURE OF SOIL BINDERS, REAPPLICATION MAY BE REQUIRED OVER AREAS WITH PEDESTRIAN AND VEHICLE TRAFFIC.
- ③ SOIL BINDER TYPE AND APPLICATION PROCEDURES REQUIRE THE PROJECT MANAGER'S APPROVAL PRIOR TO PLACEMENT. APPLY PER MANUFACTURER'S SPECIFICATIONS.
- ④ REAPPLY SOIL BINDERS, AS SPECIFIED BY THE PROJECT MANAGER, 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 85-105 GAL./ACRE [800-1000 l/ha] | APPLY 600-700 GAL./ACRE [5600-6500 l/ha] | APPLY 150 LB./ACRE [170 kg/ha] WITH 500-2000 LB./ACRE [560-2200 kg/ha] FIBER MULCH | APPLY 100-200 LB./ACRE [110-220 kg/ha] WITH 500-2000 LB./ACRE [560-2200 kg/ha] FIBER MULCH |
| DUST CONTROL APPLICATION RATE | APPLY 30-55 GAL./ACRE [280-520 l/ha] | LOOSEN SURFACE 1-2 INCHES [25-50 mm]. NEED 4-8% FINES. APPLY 50-200 GAL./ACRE [470-1900 l/ha] | APPLY 150 LB./ACRE [170 kg/ha] | APPLY 40-60 LB./ACRE [45-70 kg/ha] |

DETAILED DRAWING

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

SOIL BINDERS
(EC-5)

EFFECTIVE: SEPTEMBER 2014

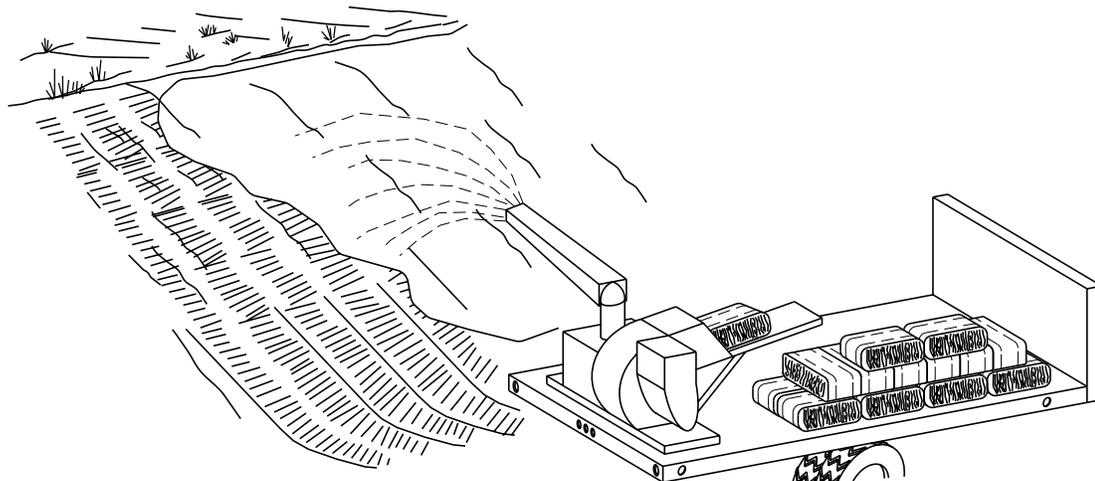
MDT MONTANA DEPARTMENT OF TRANSPORTATION

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

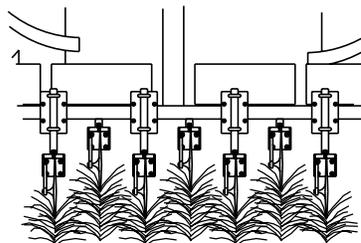
SYMBOL: 

STRAW MULCH EC-6:

- ① 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 A PROJECT MANAGER APPROVED TACKIFIER.
- ② USE STRAW MULCH FOR EROSION CONTROL 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, EROSION SEEDING, AND/OR PERMANENT SEEDING TO ENHANCE PLANT ESTABLISHMENT.
- ③ ALL STRAW MULCH IS REQUIRED TO BE CERTIFIED WEED FREE AND DERIVED FROM WHEAT, BARLEY OR RICE. PROJECT MANAGER'S APPROVAL IS REQUIRED PRIOR TO ANY PLACEMENT OF STRAW MULCH.
- ④ APPLY STRAW MULCH UNDER LOW WIND CONDITIONS. OBTAIN PROJECT MANAGER'S APPROVAL FOR PLACEMENT METHODS PRIOR TO PLACEMENT. EVENLY DISTRIBUTE STRAW MULCH AT A MINIMUM LOOSE RATE OF 4000 LB./ACRE [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 EC-5. WHEN EITHER TEMPORARY OR PERMANENT SEEDING IS COMBINED WITH THE STRAW MULCH BMP, COMPLETE SEEDING OPERATIONS PRIOR TO STRAW MULCH PLACEMENT.
- ⑤ REAPPLICATION OF STRAW MULCH AND TACKIFIER MAY BE REQUIRED BY THE PROJECT MANAGER TO MAINTAIN EFFECTIVE EROSION CONTROL OVER DISTURBED AREAS AND SLOPES.



STRAW BLOWER



STRAW CRIMPING

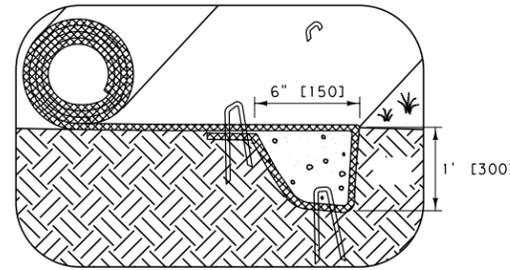
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

| | |
|---|-----------------|
| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-10 |
| STRAW MULCH (EC-6) | |
| EFFECTIVE: SEPTEMBER 2014 | |
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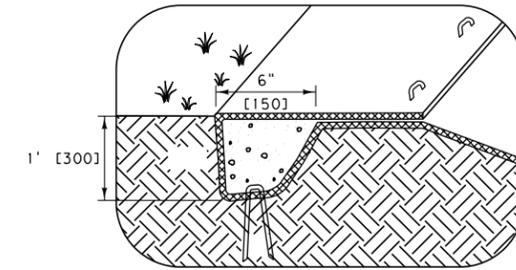
SYMBOL: — EC —

ROLLED EROSION CONTROL PRODUCTS EC-7:

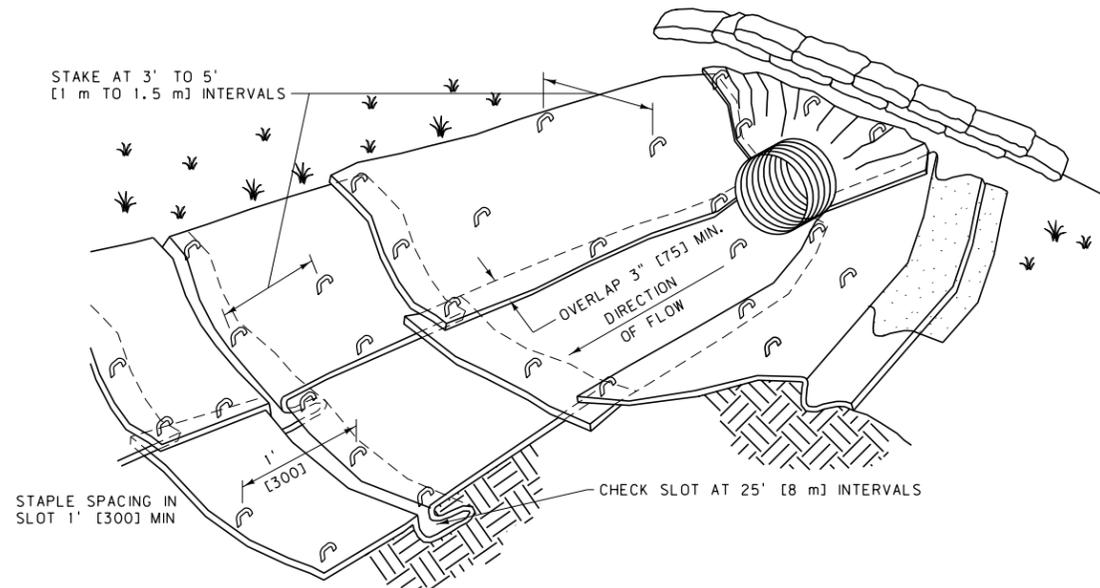
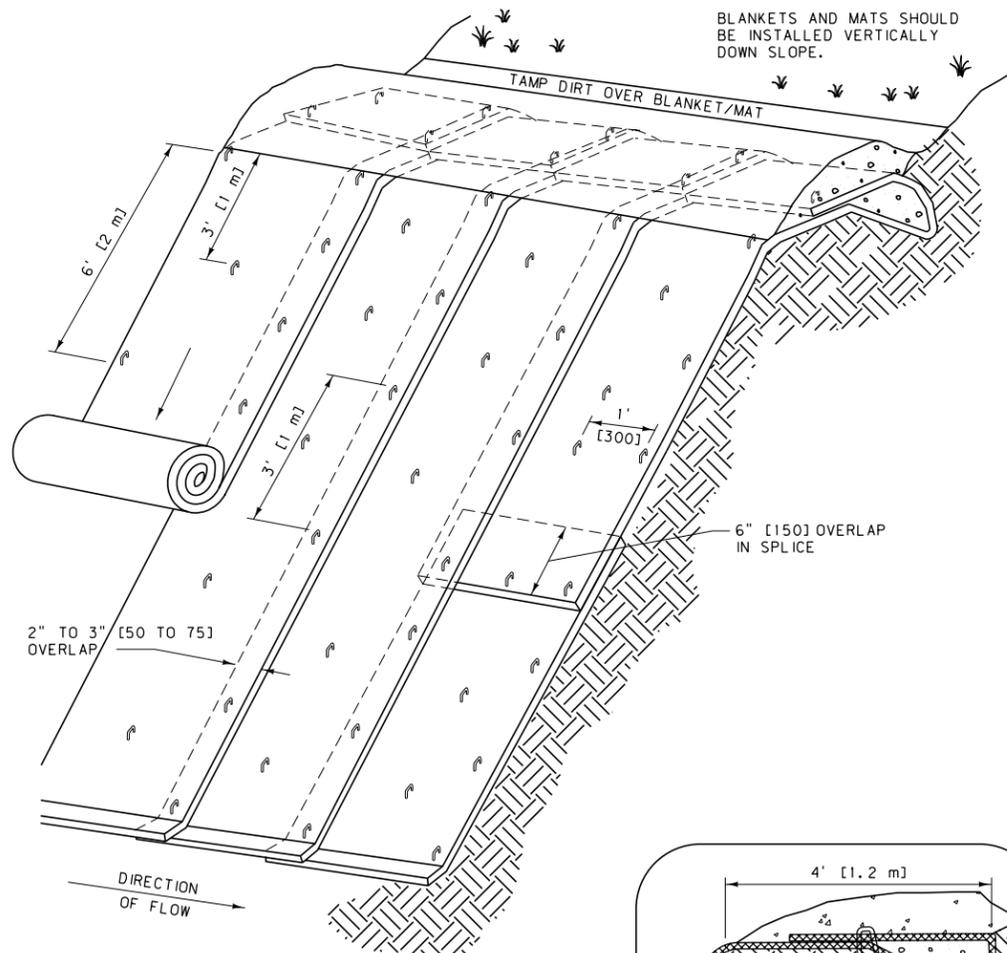
- ① ROLLED EROSION CONTROL PRODUCTS INCLUDE EROSION CONTROL BLANKETS AND MATS, PLASTIC COVERS, AND PERMANENT EROSION CONTROL GEOTEXTILES AND ARE USED TO STABILIZE DISTURBED SOIL AREAS AND PROTECT SOILS FROM EROSION BY WIND AND WATER. THESE PRODUCTS CAN BE USED ON STEEP SLOPES, SLOPES WITH HIGH EROSION HAZARDS, SLOPES WHERE MULCHES CAN NOT BE ANCHORED, UNPROTECTED CHANNELS AND HIGH FLOW CHANNELS.
- ② INSTALL EROSION CONTROL BLANKETS AND MATS IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND SECTION 610.
- ③ INSTALL PERMANENT EROSION CONTROL GEOTEXTILE AND TURF REINFORCEMENT MATS IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND SECTION 622.
- ④ 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 (0.15 mm). ANCHOR PLASTIC COVERS WITH SANDBAGS PLACED NO MORE THAN 10 FT (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 1 FT TO 2 FT (300 mm TO 600 mm) OVERLAP.



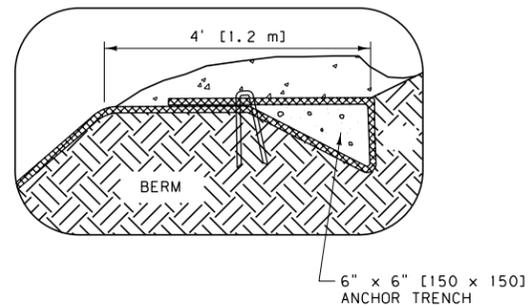
INITIAL CHANNEL ANCHOR TRENCH



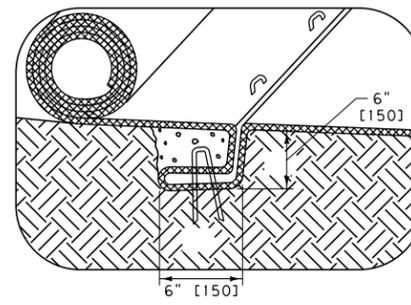
TERMINAL SLOPE & CHANNEL ANCHOR TRENCH



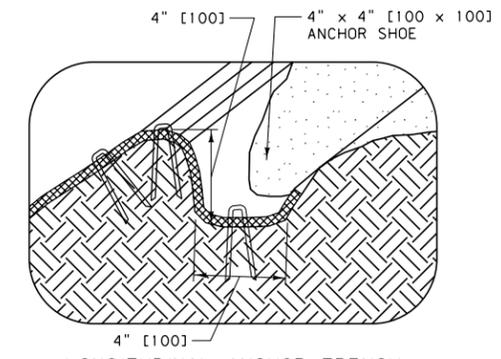
TYPICAL CHANNEL DETAIL - ISOMETRIC VIEW



6" x 6" [150 x 150] ANCHOR TRENCH



INTERMITTENT CHECK SLOT



LONGITUDINAL ANCHOR TRENCH

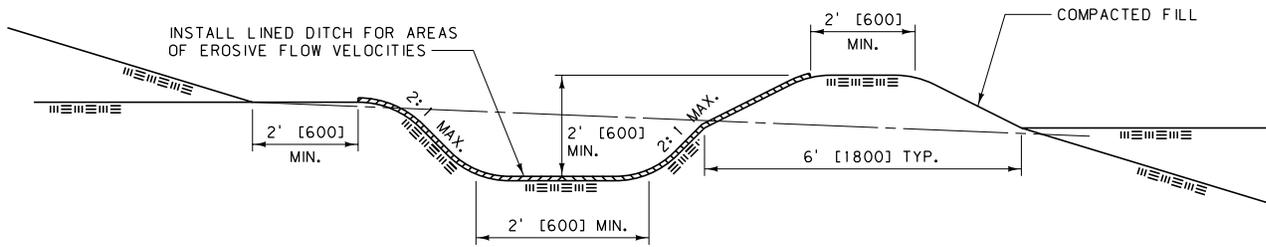
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| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208, 610, 622 | DWG. NO. 208-12 |
| ROLLED EROSION CONTROL PRODUCTS (EC-7) | |
| EFFECTIVE: SEPTEMBER 2014 | |
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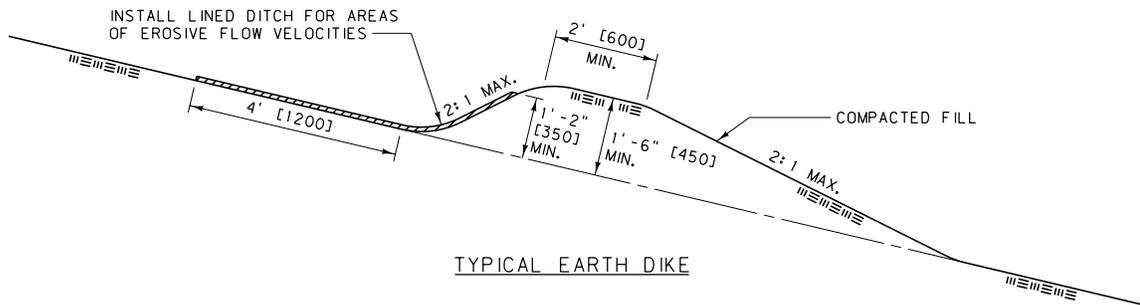
SYMBOL: ——— ED ———

EARTH DIKES, DRAINAGE SWALES, & LINED DITCHES EC-9:

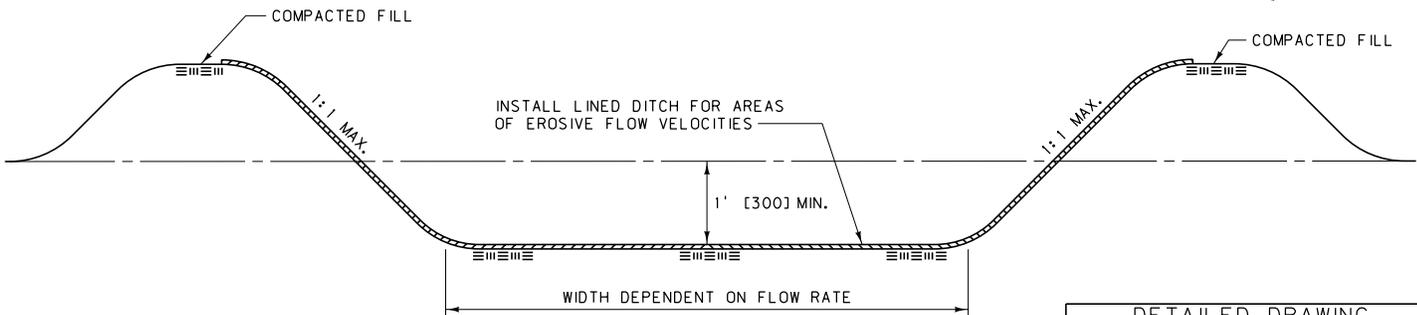
- ① EARTH DIKES, DRAINAGE SWALES, AND LINED DITCHES ARE STRUCTURES THAT INTERCEPT, DIVERT, AND CONVEY SURFACE RUN-ON, GENERALLY SHEET FLOW, TO PREVENT EROSION. THESE DEVICES MAY BE IMPLEMENTED ON A PROJECT-BY-PROJECT BASIS WITH OTHER BMPs WHEN NECESSARY AND FEASIBLE. DIKES, SWALES, AND DITCHES ARE CONVEYANCE MEASURES AND ARE NOT INTENDED TO TRAP SEDIMENT. SEDIMENT CONTROL BMPs CAN BE USED IN CONJUNCTION WITH THESE CONVEYANCE DEVICES.
- ② 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 PROJECT MANAGER. "V" BOTTOM DITCHES CAN BE USED FOR SWALE CONSTRUCTION FOLLOWING PROJECT MANAGER'S 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.
- ③ USE LINED DITCHES FOR AREAS OF EROSION FLOW VELOCITIES FOLLOWING THE GUIDELINES FOR ROLLED EROSION CONTROL PRODUCTS AND/OR SLOPE DRAINS. SEED ALL UNLINED PORTIONS OF DITCHES, DIKES, AND SWALES THAT WILL BE IN USE FOR MORE THAN 14 DAYS PER SECTION 208.
- ④ INSPECT DIKES, SWALES, AND DITCHES AFTER RAINFALL EVENTS. REMOVE DEBRIS AND SEDIMENT, AND REPAIR LININGS AND EMBANKMENTS AS NEEDED OR AS SPECIFIED BY THE PROJECT MANAGER.
- ⑤ REMOVE ALL DIKES, SWALES, AND DITCHES FROM THE CLEAR ZONES EXPEDIENTLY UPON COMPLETION OF CONSTRUCTION ACTIVITIES.



TYPICAL DRAINAGE SWALE



TYPICAL EARTH DIKE



TYPICAL TRAPEZOIDAL DITCH

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

| | |
|--|-----------------|
| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-16 |
| EARTH DIKES, DRAINAGE SWALES, & LINED DITCHES (EC-9) | |

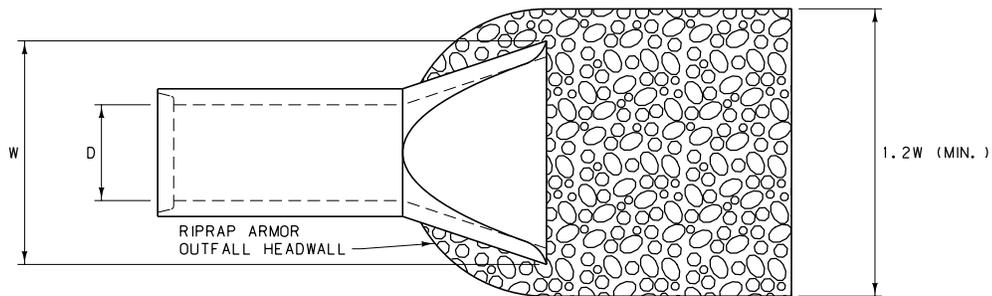
EFFECTIVE: SEPTEMBER 2014



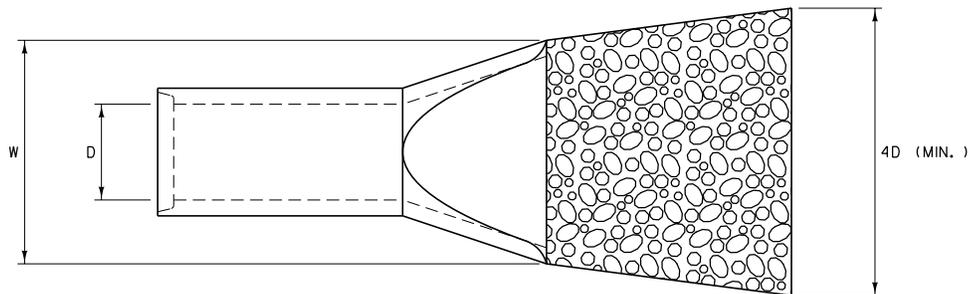
SYMBOL: 

TEMPORARY OUTLET PROTECTION AND VELOCITY DISSIPATION DEVICES EC-10:

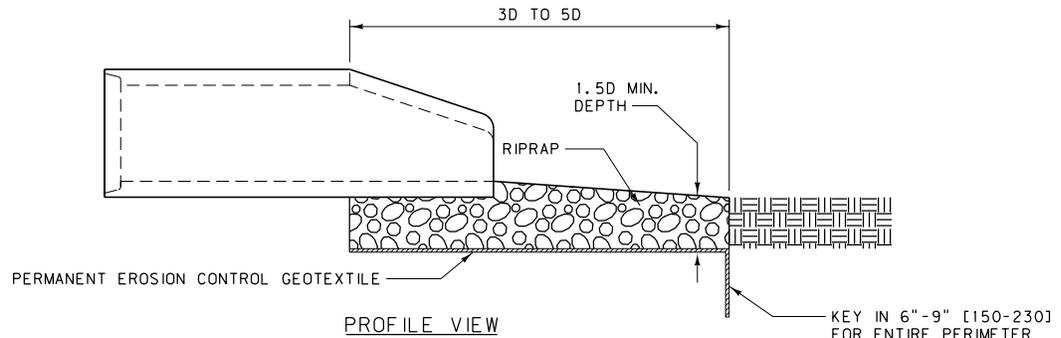
- ① OUTLET PROTECTION AND VELOCITY DISSIPATION DEVICES ARE PLACED AT PIPE OUTLETS TO PREVENT SCOUR AND REDUCE THE VELOCITY AND/OR ENERGY OF EXITING STORM WATER FLOWS. THESE DEVICES CAN BE USED AT THE OUTLETS OF PIPES, DRAINS, CULVERTS, SLOPE DRAINS, DIVERSION DITCHES, SWALES, CONDUITS OR CHANNELS AND SHOULD BE IMPLEMENTED ON A PROJECT-BY-PROJECT BASIS WITH OTHER BMPs WHEN DETERMINED NECESSARY BY THE PROJECT MANAGER.
- ② FOLLOW GUIDELINES BELOW FOR SIZING OUTLET PROTECTION AND VELOCITY DISSIPATION DEVICES. FOLLOWING THE PROJECT MANAGER'S APPROVAL, OTHER MATERIALS MAY BE SUBSTITUTED FOR RIPRAP. PERMANENT EROSION CONTROL GEOTEXTILE PLACEMENT MAY BE ELIMINATED FOLLOWING THE PROJECT MANAGER'S APPROVAL. PLACE TYPE 1 OR TYPE 2 BANK PROTECTION AT PIPE OUTLET. FOR PIPE DIAMETERS LARGER THAN 24" [600] AND/OR HIGH FLOWS, THE APPLICATION IS NOT CONSIDERED TEMPORARY AND A MONTANA REGISTERED ENGINEER'S DESIGN IS REQUIRED.
- ③ INSTALL PERMANENT EROSION CONTROL GEOTEXTILE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND SECTION 622.



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



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



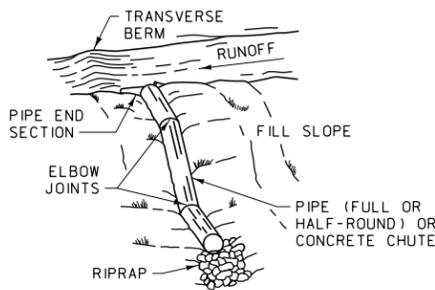
| DETAILED DRAWING | |
|---|-----------------|
| REFERENCE STANDARD SPEC. SECTION 208, 622 | DWG. NO. 208-18 |
| TEMPORARY OUTLET AND VELOCITY DISSIPATION DEVICES (EC-10) | |
| EFFECTIVE: SEPTEMBER 2014 | |

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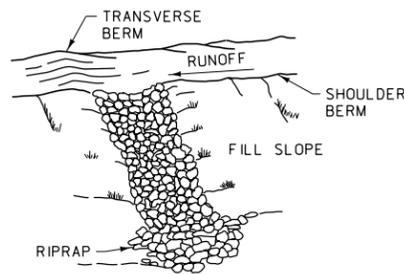
SYMBOL:  TSD

TEMPORARY SLOPE DRAINS EC-11:

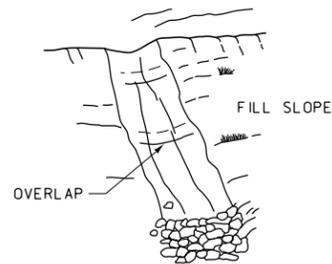
- ① A TEMPORARY SLOPE DRAIN IS A PIPE OR LINED CHANNEL USED TO INTERCEPT AND CONVEY SURFACE RUNOFF OR GROUNDWATER INTO A STABILIZED WATERCOURSE, TRAPPING DEVICE, OR STABILIZED AREA. THIS DEVICE MAY BE USED AT CONSTRUCTION SITES WHERE SLOPES MAY BE ERODED BY SURFACE RUNOFF.
- ② DO NOT EXCEED A DRAINAGE AREA OF 10 ACRES [4 ha] PER SLOPE DRAIN PIPE. FOR AREAS LARGER THAN 10 ACRES [4 ha] USE ROCK LINED CHANNELS. INCORPORATE EARTH DIKES, DRAINAGE SWALES, AND LINED DITCHES TO AID IN FLOW DIVERSION.
- ③ INSTALL SLOPE DRAINS AS FOLLOWS:
 - INSTALL DRAINS PERPENDICULAR TO SLOPE
 - COMPACT SOIL AROUND INLET, OUTLET, AND LENGTH OF STRUCTURE
 - SECURELY ANCHOR SLOPE DRAINS INTO SOIL
 - ENSURE CONNECTIONS ARE WATER TIGHT
 - PROTECT INLET AND OUTLET WITH OUTLET PROTECTION AND VELOCITY DISSIPATION DEVICES
- ④ INSTALL PERMANENT EROSION CONTROL GEOTEXTILE UNDER RIPRAP.



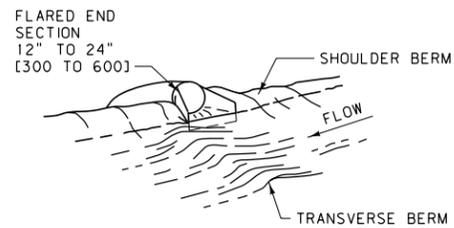
PIPE SLOPE DRAIN



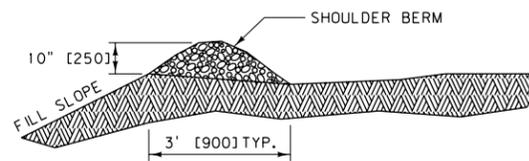
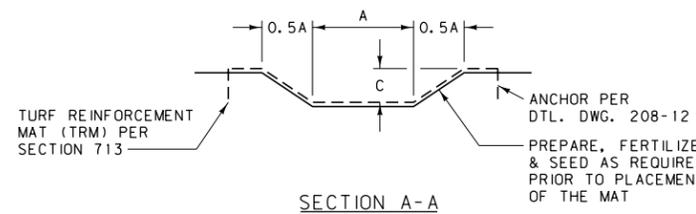
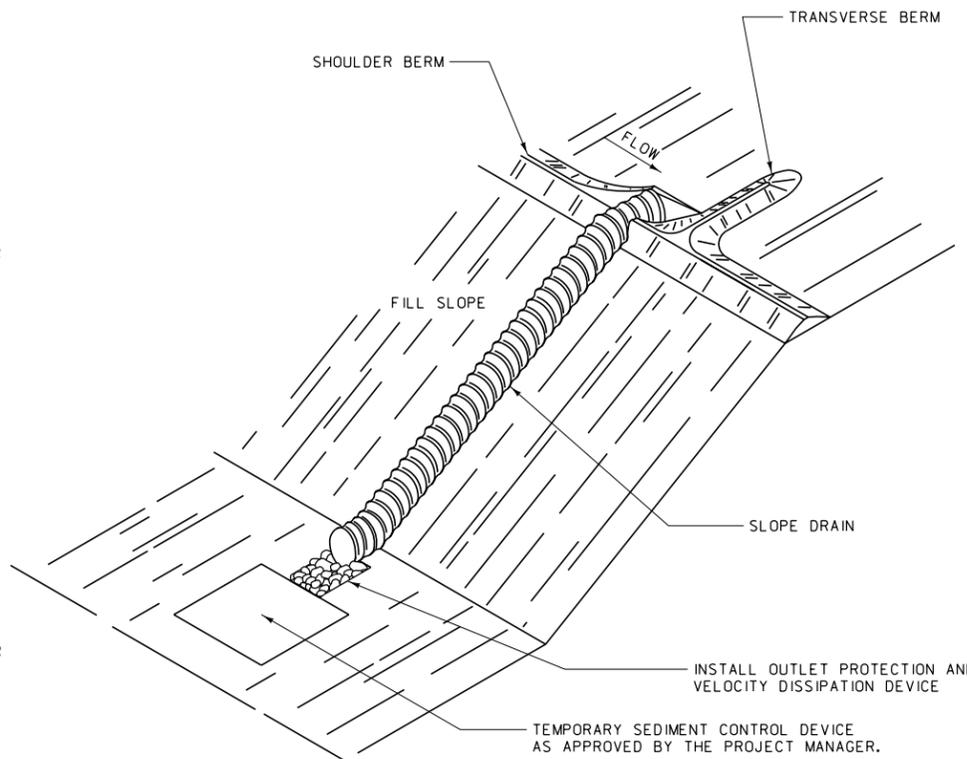
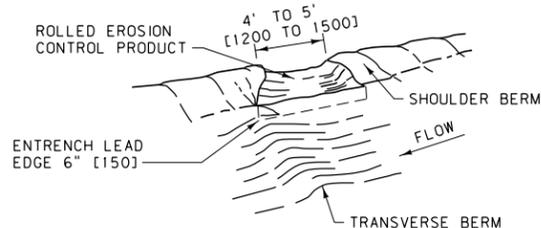
RIPRAP SLOPE DRAIN



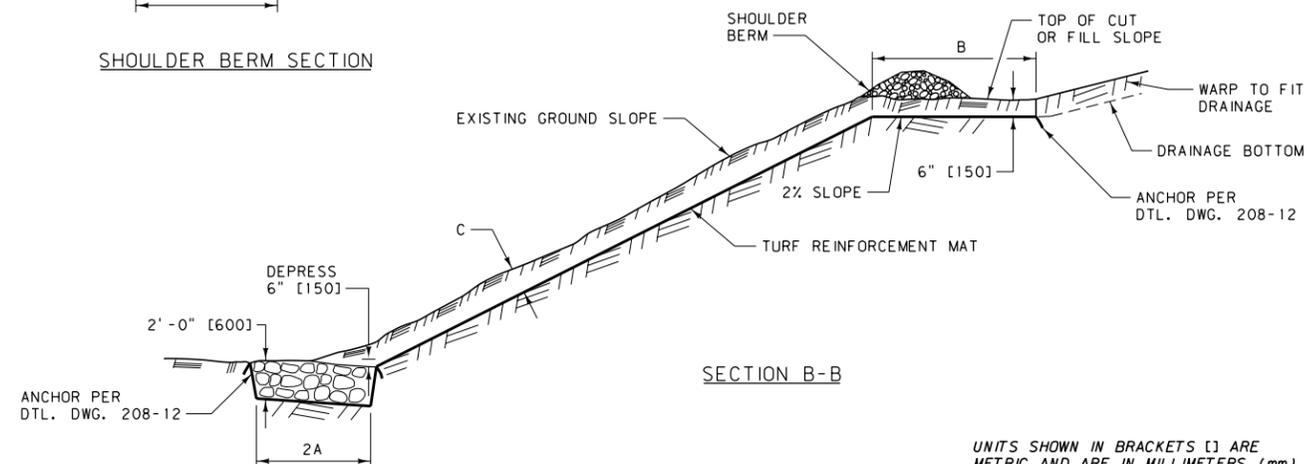
DITCH LINER: ROLLED EROSION CONTROL PRODUCT



SLOPE DRAIN INLETS

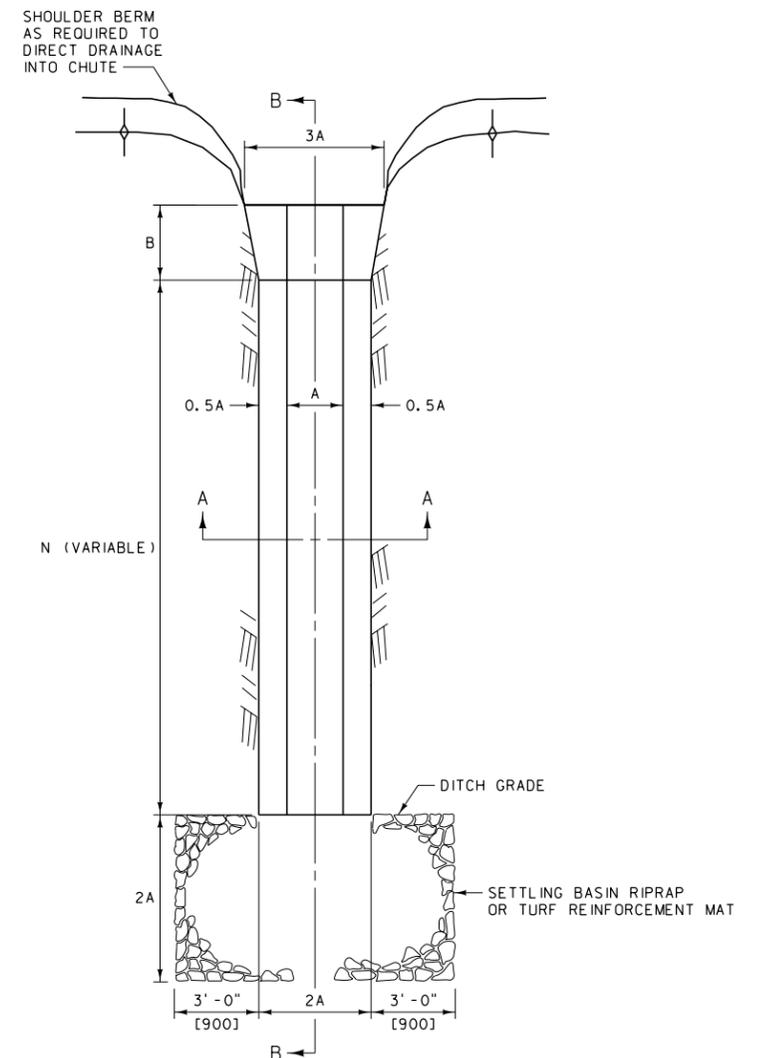


SHOULDER BERM SECTION



SECTION B-B

TURF REINFORCEMENT MAT DRAINAGE CHUTE



PLAN VIEW

SEE DTL. DWG. 613-18 FOR VARIABLE DIMENSIONS SHOWN ABOVE AND SHOWN IN SECTIONS A-A AND B-B.

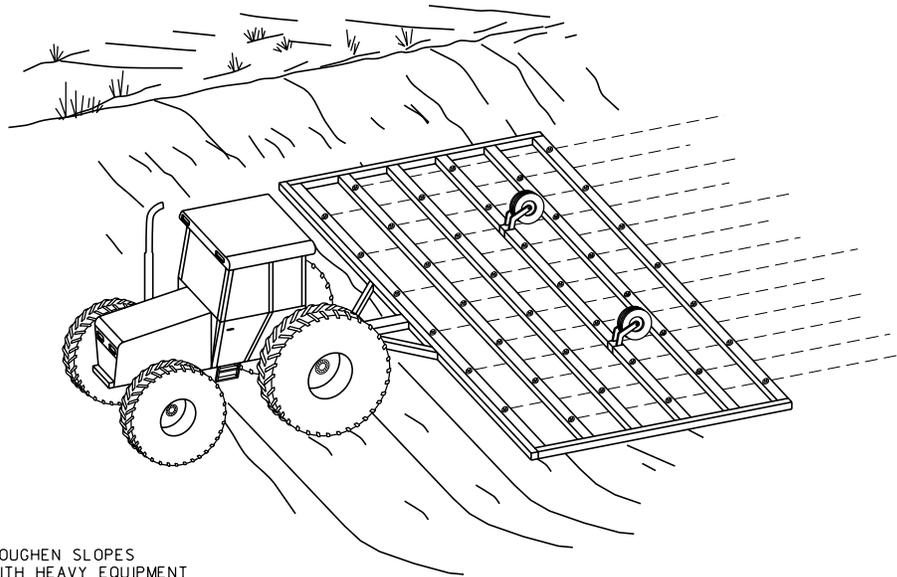
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

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| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208, 713 | DWG. NO. 208-20 |
| TEMPORARY SLOPE DRAINS (EC-11) | |
| EFFECTIVE: SEPTEMBER 2014 | |
|  MONTANA DEPARTMENT OF TRANSPORTATION | |

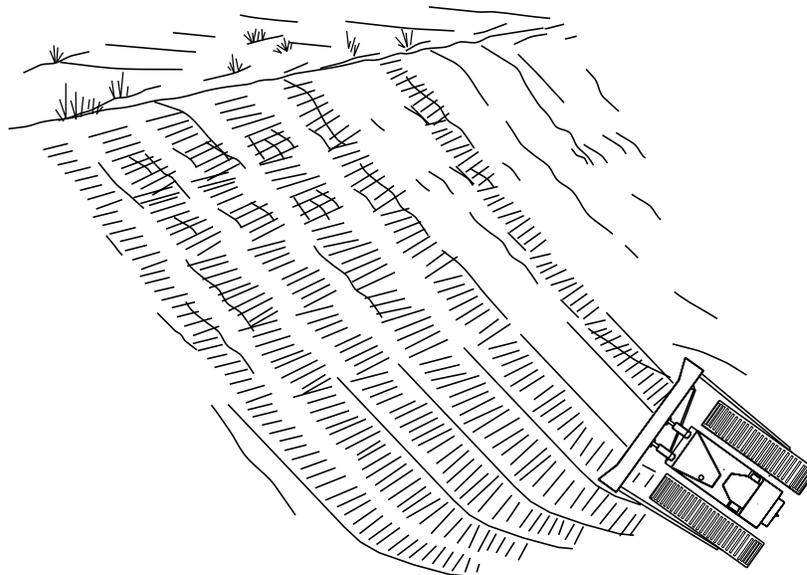
SYMBOL: _____ SR _____

SLOPE ROUGHENING EC-12:

- ① 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 2" [50] IN HEIGHT AND NO FURTHER THAN TWICE THE HEIGHT OF THE RIDGE OR FURROW APART.
- ② ALL SLOPES STEEPER THAN 3:1 AND GREATER THAN 5 [1500] VERTICAL FEET REQUIRE SLOPE ROUGHENING, EXCLUDING ROCK SLOPES THAT CANNOT BE EXCAVATED BY RIPPING. ROUGHEN DISTURBED SLOPES OR LEAVE IN A ROUGHENED CONDITION. APPROPRIATE SUPPLEMENTS INCLUDE EROSION CONTROL BMPs SUCH AS TEMPORARY SEEDING OR EROSION SEEDING.



ROUGHEN SLOPES WITH HEAVY EQUIPMENT OR LEAVE IN ROUGHENED CONDITION



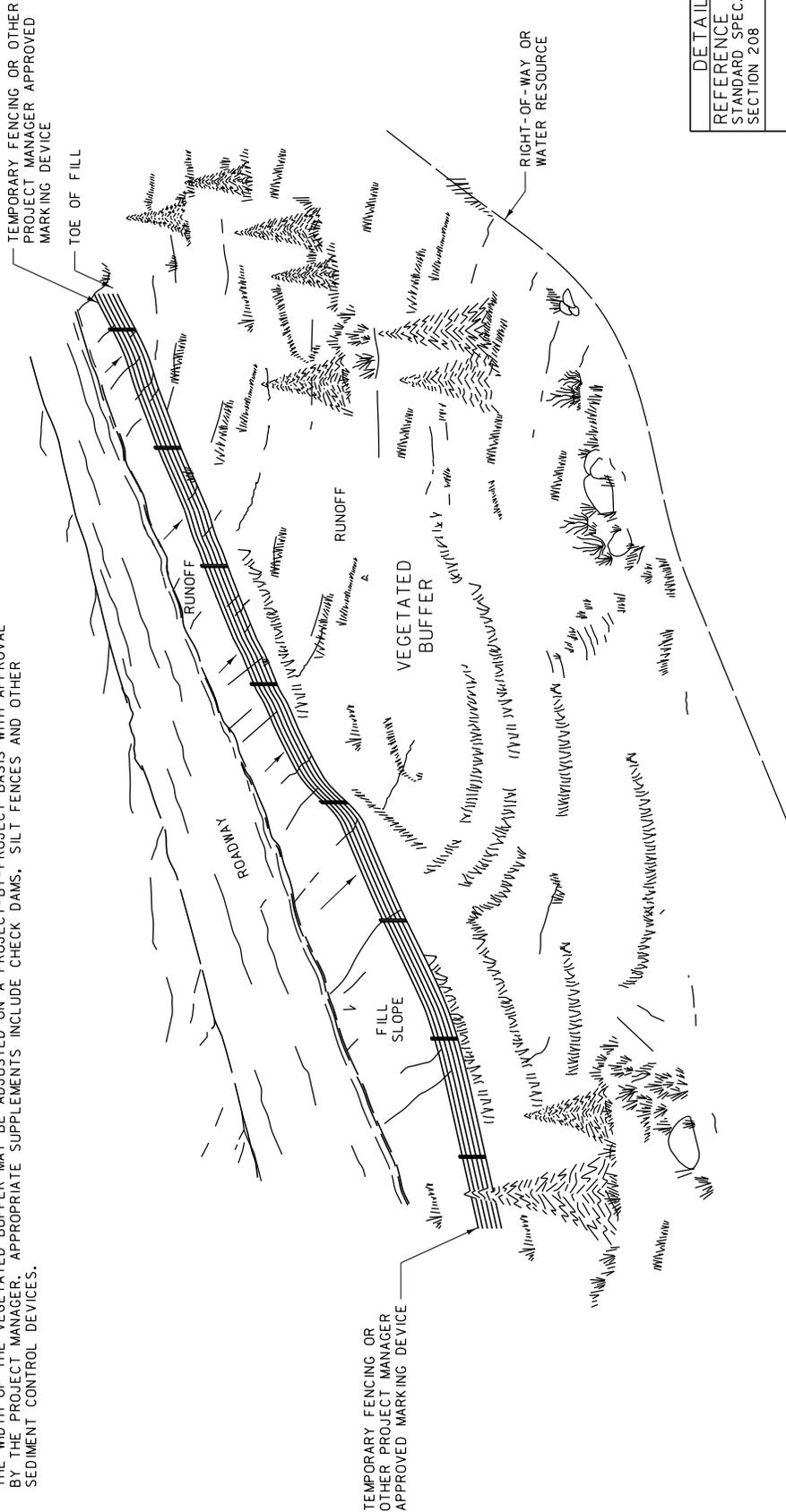
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

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| DETAILED DRAWING | |
| REFERENCE | DWG. NO. |
| STANDARD SPEC. | 208-22 |
| SECTION 208 | |
| SLOPE ROUGHENING (EC-12) | |
| EFFECTIVE: SEPTEMBER 2014 | |
| MDT MONTANA DEPARTMENT OF TRANSPORTATION | |

SYMBOL: _____ VBS _____

VEGETATED BUFFER EC-14:

- ① VEGETATED BUFFER IS AN UNDISTURBED AREA OR STRIP OF ESTABLISHED VEGETATION PRESERVED FOR EROSION AND SEDIMENT CONTROL. 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.
- ② IDENTIFY EXISTING VEGETATED BUFFERS BEFORE CONSTRUCTION OCCURS AND MARK THEIR BOUNDARIES. KEEP EQUIPMENT AND FILL MATERIAL OFF OF VEGETATED BUFFERS. ALWAYS CONSIDER VEGETATED BUFFER ZONES 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 50 FT. [15 m]. THE MINIMUM WIDTH REQUIREMENT FOR A WELL-ESTABLISHED VEGETATED BUFFER WITH A SLOPE STEEPER THAN 3:1 IS 100 FT. [30 m]. THE WIDTH OF THE VEGETATED BUFFER MAY BE ADJUSTED ON A PROJECT-BY-PROJECT BASIS WITH APPROVAL BY THE PROJECT MANAGER. APPROPRIATE SUPPLEMENTS INCLUDE CHECK DAMS, SILT FENCES AND OTHER SEDIMENT CONTROL DEVICES.



UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

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| DETAILED DRAWING |
| REFERENCE DWG. NO. 208-26 |
| STANDARD SPEC. SECTION 208 |

VEGETATED BUFFER (EC-14)

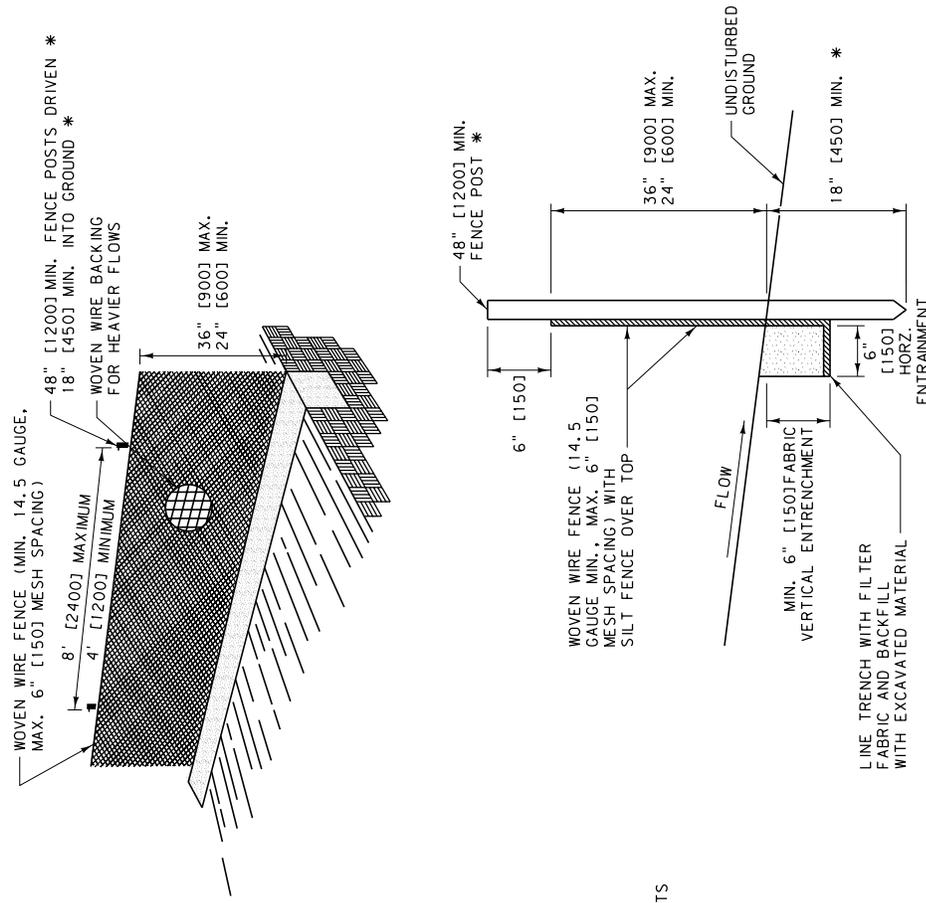
EFFECTIVE: SEPTEMBER 2014



SYMBOL: _____ SF _____

SILT FENCE SC-1:

- ① SILT FENCE IS A SINGLE OR SERIES OF FILTER FABRIC SEDIMENT BARRIER STRETCHED AND ATTACHED TO SUPPORTING POSTS. THE FENCE BOTTOM IS ENTRENCHED.
- ② 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. INSTALL SILT FENCES IN ACCORDANCE WITH SECTION 622.
- ③ THERE ARE TWO TYPES OF SILT FENCE INSTALLATIONS:
 - UNSTABILIZED - SILT FENCE SUPPORTED WITH METAL POSTS AND WITH WOVEN WIRE BACKING.
 - STABILIZED - SILT FENCE SUPPORTED WITH METAL POSTS AND WITH WOVEN WIRE BACKING.
- ④ ENTRENCHMENT - THE INITIAL SILT FENCE INSTALLATION REQUIRES ONLY THE VERTICAL ENTRENCHMENT COMPONENT UNLESS THE PROJECT MANAGER DETERMINES BOTH VERTICAL AND HORIZONTAL ENTRENCHMENT COMPONENTS ARE NECESSARY. IF THE FENCE REQUIRES REPLACEMENT DUE TO FAILURE FROM PULLOUT OR UNDERCUTTING, THE SUBSEQUENT INSTALLATION WILL INCLUDE BOTH VERTICAL AND HORIZONTAL ENTRENCHMENT COMPONENTS.
- ⑤ USE SILT FENCES 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 OR WHERE CONCENTRATED FLOWS MAY OCCUR. 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 500 FT. [150 m] SPACING
 - FROM 3: TO 4: PLACE SILT FENCE AT 300 FT. [90 m] SPACING
 - FROM 4: + PLACE SILT FENCE AT 150 FT. [45 m] SPACING

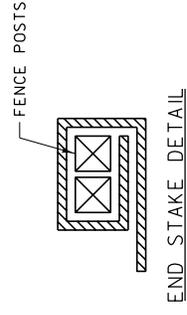


SILT FENCE - CROSS SECTION

* FOR CLEAR ZONE APPLICATIONS USE MAX. POST LENGTH OF 60" [1500] WITH A MAX. BURIAL DEPTH OF 18" [450].

| DETAILED DRAWING | |
|--------------------------|-----------------|
| REFERENCE STANDARD SPEC. | DWG. NO. 208-30 |
| SECTION 208.622 | |
| SILT FENCE (SC-1) | |

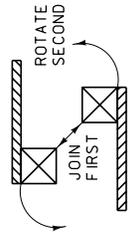
EFFECTIVE: SEPTEMBER 2014
MDTA MONTANA DEPARTMENT OF TRANSPORTATION



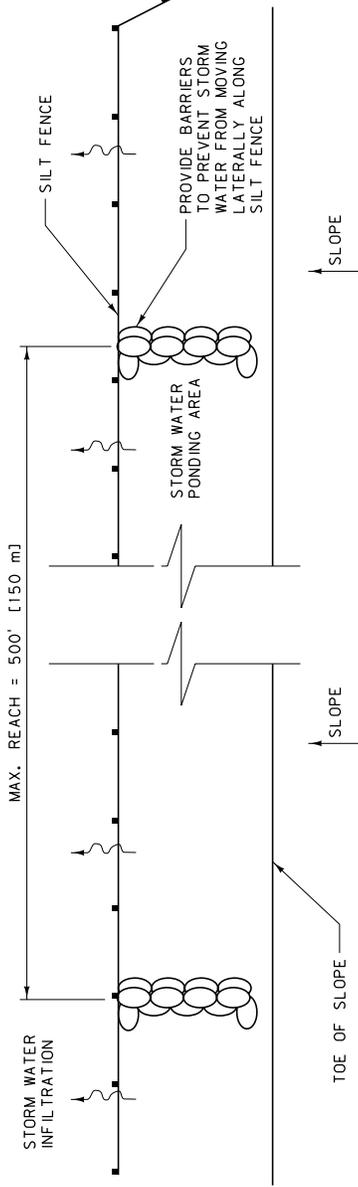
END STAKE DETAIL

SILT FENCE JOINTS

JOIN POSTS AS SHOWN, ROTATE 180° IN DIRECTION SHOWN AND DRIVE INTO THE GROUND.



OVERLAP POSTS AT JOINTS SO NO GAPS EXIST IN SILT FENCE.



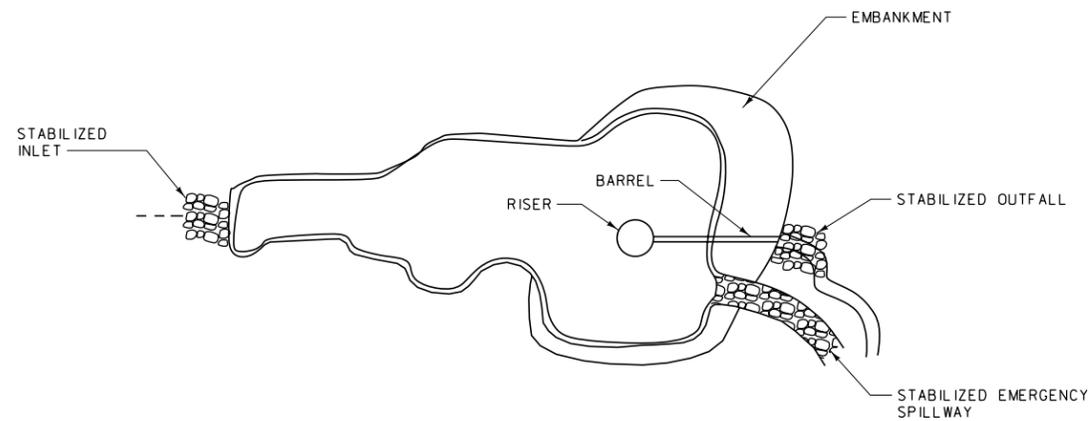
SILT FENCE - PLAN VIEW

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

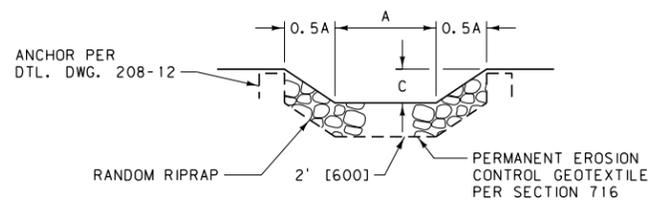
SYMBOL: DB

DESILTING BASIN SC-2:

- ① 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.
- ② USE DESILTING BASINS FOR DISTURBED AREAS BETWEEN 5 ACRES (2 ha) AND 10 ACRES (4 ha) WHERE SEDIMENT-LADEN WATER MAY ENTER THE DRAINAGE SYSTEM OR WATERCOURSE.
- ③ DO NOT USE DESILTING BASINS FOR DRAINAGE AREAS GREATER THAN 75 ACRES (30 ha) AND DO NOT LOCATE BASINS WITHIN LIVE STREAMS.
- ④ SIZE DESILTING BASINS SUCH THAT THERE IS 50 C.Y. PER ACRE (100 m³ PER 1 ha) OF CONTRIBUTING AREA. LENGTH MUST BE EQUAL OR LARGER THAN TWICE THE WIDTH, DEPTH MUST BE BETWEEN 3 FT. AND 5 FT. (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 1300 C.Y. (1000 m³) MUST ALSO BE DESIGNED BY A PROFESSIONAL CIVIL ENGINEER REGISTERED IN THE STATE OF MONTANA.
- ⑤ PLACE ROCK, VEGETATION, OR PERMANENT EROSION CONTROL GEOTEXTILE 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 PROJECT MANAGER.
- ⑥ INSTALL PERMANENT EROSION CONTROL GEOTEXTILE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND SECTION 622.

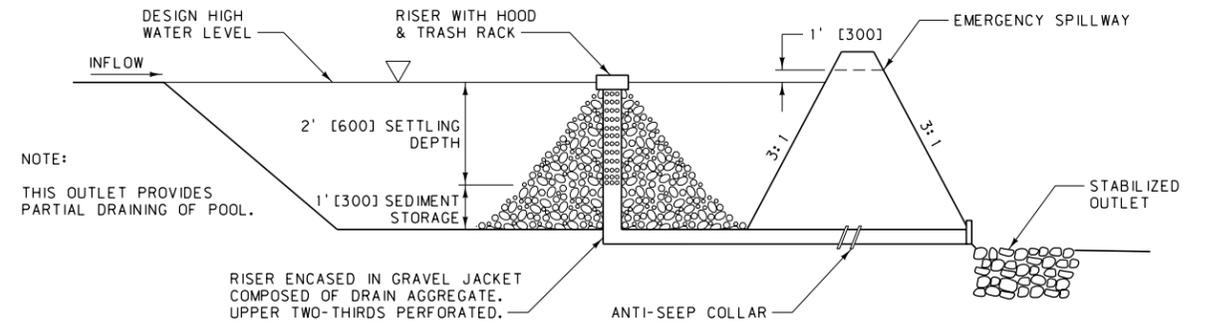


TYPICAL DESILTING BASIN - TOP VIEW

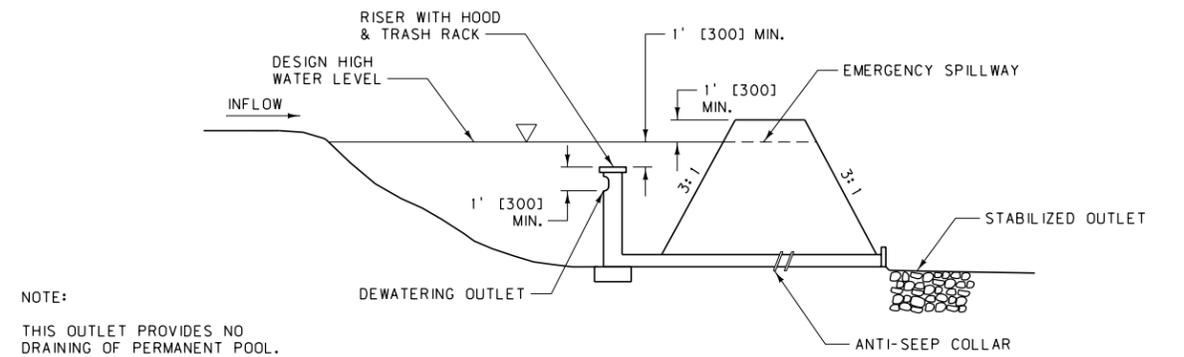


SECTION A-A

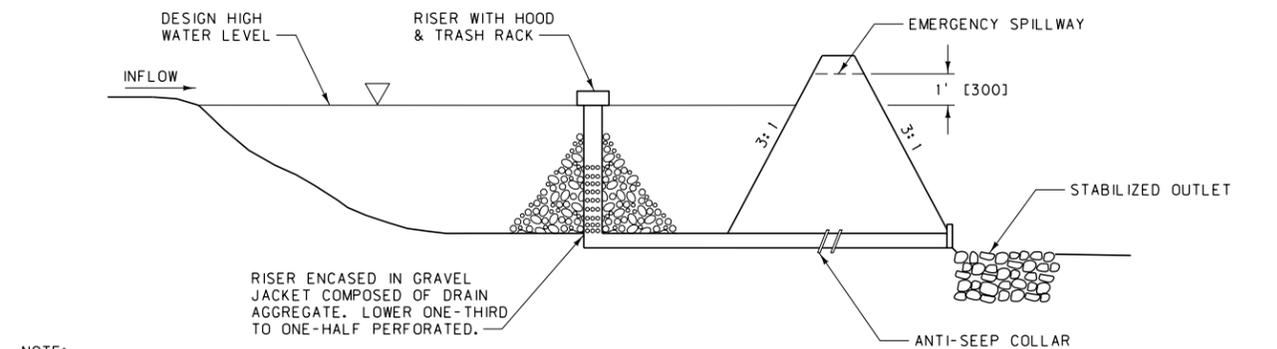
RIPRAP CHUTE: SEE DTL. DWG. 613-18 FOR VARIABLE DIMENSIONS SHOWN ABOVE.



TYPICAL DESILTING BASIN - OUTLET #1



TYPICAL DESILTING BASIN - OUTLET #2



TYPICAL DESILTING BASIN - OUTLET #3

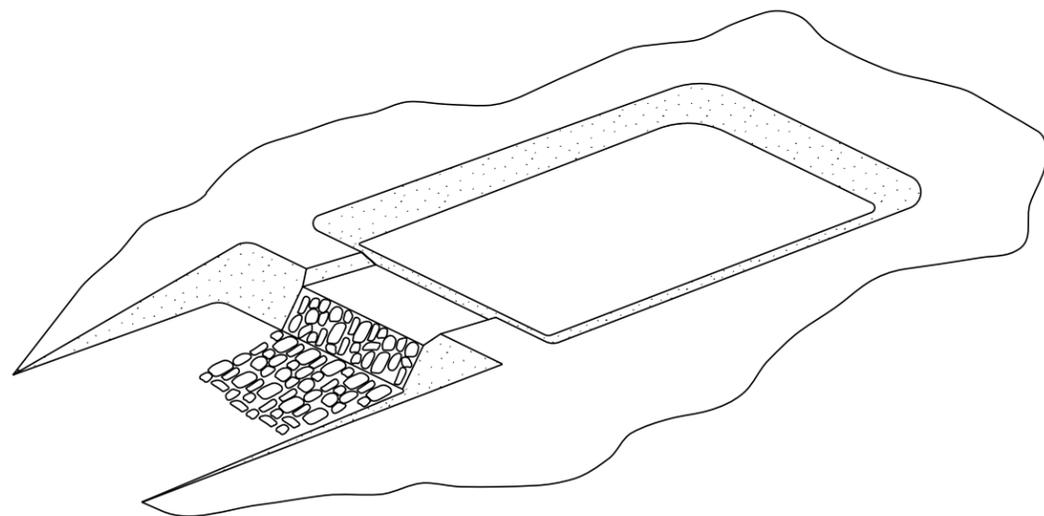
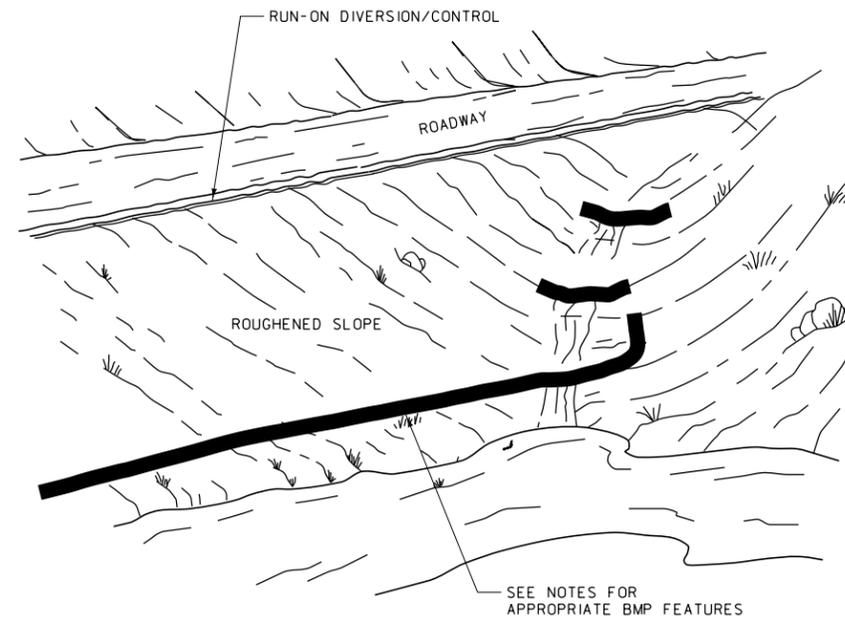
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

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| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208,622 | DWG. NO. 208-32 |
| DESILTING BASIN (SC-2) | |
| EFFECTIVE: SEPTEMBER 2014 | |
| MDT MONTANA DEPARTMENT OF TRANSPORTATION | |

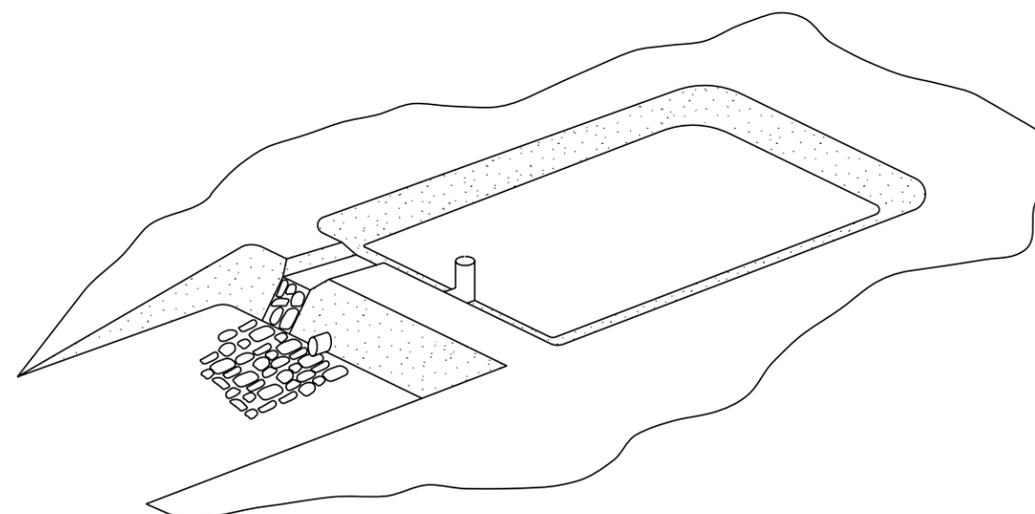
SYMBOL: ———— ST ————

SEDIMENT TRAP SC-3:

- ① A SEDIMENT TRAP IS A TEMPORARY BASIN WITH A CONTROLLED RELEASE STRUCTURE, FORMED BY EXCAVATING OR CONSTRUCTION OF AN EARTHEN EMBANKMENT ACROSS A LOW DRAINAGE AREA.
- ② USE SEDIMENT TRAPS WHEN DISTURBED AREAS ARE LESS THAN 5 ACRES [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.
- ③ SEDIMENT BASINS ARE NOT APPROPRIATE FOR DRAINAGE AREAS LARGER THAN 5 ACRES [2 ha] AND ONLY REMOVE LARGE TO MEDIUM SIZED PARTICLES. DO NOT USE SEDIMENT TRAPS IN LIVE STREAMS.
- ④ A MINIMUM SETTLING ZONE OF 70 C.Y. PER ACRE [130 m³ PER ha] AND A MINIMUM SEDIMENT ZONE OF 35 C.Y. PER ACRE [65 m³ 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 1300 C.Y. [1000 m³] REQUIRE A DESIGN BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF MONTANA.
- ⑤ PLACE ROCK, VEGETATION, GEOTEXTILE OR BLANKETS TO PROTECT THE TRAP'S INLET, OUTLET AND SLOPES AGAINST EROSION. ENCLOSE THE SEDIMENT TRAP WITH CHAIN LINK FENCE WHEN PLACED IN RESIDENTIAL/COMMERCIAL AREAS OR AS DIRECTED BY THE PROJECT MANAGER.
- ⑥ REFER TO DESILTING BASINS FOR RISER PIPE CONFIGURATIONS AND OVERFLOW SPILLWAY DESIGNS.



TYPICAL SEDIMENT TRAP WITH SPILLWAY TYPE OUTFALL



TYPICAL SEDIMENT TRAP WITH RISER PIPE TYPE OUTFALL

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

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| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-34 |

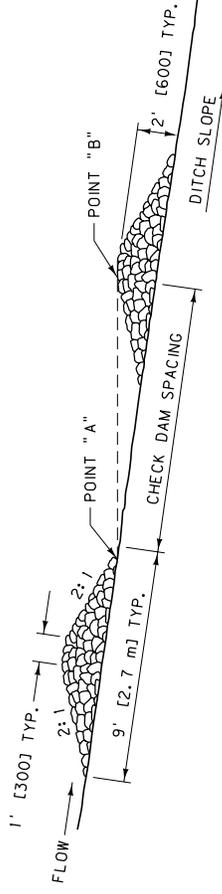
SEDIMENT TRAP (SC-3)

EFFECTIVE: SEPTEMBER 2014

SYMBOL: _____ CD _____

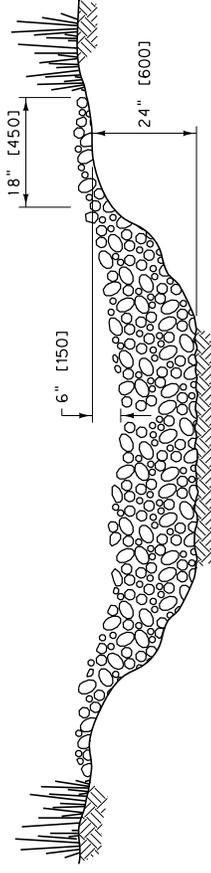
CHECK DAMS SC-4:

- ① 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.
- ② CHECK DAMS MAY BE INSTALLED IN SMALL CHANNELS WITH DRAINAGE AREAS OF 10 ACRES [4 ha] OR LESS AND/OR STEEP CHANNELS WHERE STORM WATER RUNOFF VELOCITIES EXCEED 5 FT./S [1.5 m/s]. THE MAXIMUM HEIGHT FOR CHECK DAMS WITHIN THE CLEAR ZONE IS 6" [150].
- ③ CHECK DAMS CANNOT BE USED IN LIVE STREAMS OR FOR DRAINAGE AREAS LARGER THAN 10 ACRES [4 ha]. IN ADDITION, CHECK DAMS CANNOT BE CONSTRUCTED FROM SILT FENCE.
- ④ PLACE CHECK DAMS AT A DISTANCE THAT WILL ALLOW SMALL POOLS TO BE FORMED BEHIND EACH DAM. INSTALL THE FIRST CHECK DAM APPROXIMATELY 15 FT. [5 m] FROM THE OUTFALL DEVICE. PLACE MULTIPLE CHECK DAMS SUCH THAT BACKWATER FROM THE DOWN-STREAM DAM WILL REACH THE TOE OF THE UPSTREAM DAM. ROCK MAY BE PLACED BY HAND OR BY MECHANICAL METHODS TO ACHIEVE COMPLETE DITCH OR SWALE COVERAGE.
- ⑤ CHECK DAMS CONSTRUCTED FROM GRAVEL MUST BE 100% PASSING THE 2" [50] SCREEN AND 10% MAXIMUM PASSING THE NO. 4 [4.75] SIEVE. DAM MATERIAL MAY BE PITRIN OR CRUSHED AGGREGATE. REFER TO DTL, DWG. NO. 203-38 AND 208-42 FOR USE OF FIBER ROLLS AND SAND BAGS AS CHECK DAMS.
- ⑥ REMOVE SEDIMENT FROM BEHIND THE DAM WHEN IT ACCUMULATES TO ONE-HALF THE ORIGINAL HEIGHT UNLESS ITS DRAINAGE AREA HAS BEEN STABILIZED.
- ⑦ DISTANCES BETWEEN CHECK DAMS ARE AS FOLLOWS:
 - 1% DITCH SLOPE - PLACE CHECK DAMS AT 200 FT. [60 m] SPACING
 - 2% DITCH SLOPE - PLACE CHECK DAMS AT 100 FT. [30 m] SPACING
 - 3% DITCH SLOPE - PLACE CHECK DAMS AT 67 FT. [20 m] SPACING
 - 4% DITCH SLOPE - PLACE CHECK DAMS AT 50 FT. [15 m] SPACING
 - 5% DITCH SLOPE - PLACE CHECK DAMS AT 40 FT. [12 m] SPACING
- ⑧ CHECK DAM SPACING MAY BE ADJUSTED ON A PROJECT-BY-PROJECT BASIS BY THE PROJECT MANAGER.



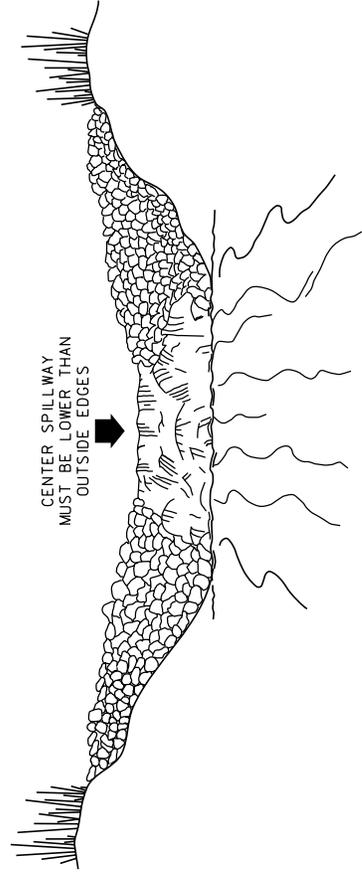
CHECK DAM SPACING

CHECK DAM SPACING = THE DISTANCE SUCH THAT POINTS "A" AND "B" ARE OF EQUAL ELEVATION



UPSTREAM VIEW

NOTE:
KEY GRAVEL INTO CHANNEL BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 18" [450] TO PREVENT FLOW AROUND DAM



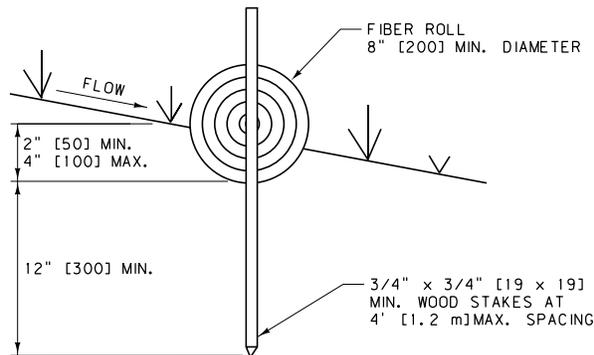
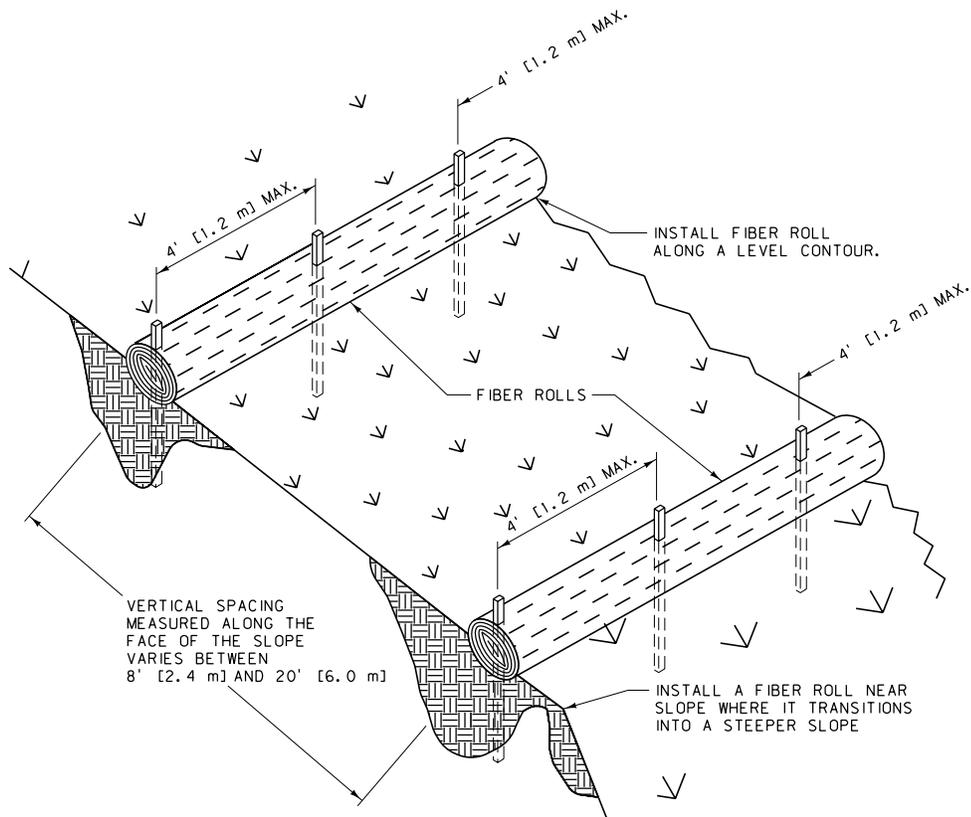
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| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-36 |
| CHECK DAMS (SC-4) | |
| EFFECTIVE: SEPTEMBER 2014 | |
| MONTANA DEPARTMENT OF TRANSPORTATION | |

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

SYMBOL: 

FIBER ROLLS SC-5:

- ① A FIBER ROLL CONSISTS OF EROSION CONTROL BLANKET MATERIAL THAT IS PREFABRICATED, OR ROLLED AND BOUND IN THE FIELD INTO A TIGHT TUBULAR 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.
- ② 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 PROJECT MANAGER. FOR USE AS CHECK DAMS, PLACE FIBER ROLLS AT 50 FT. [15 m] MAXIMUM SPACING OR AS APPROVED BY THE PROJECT MANAGER.



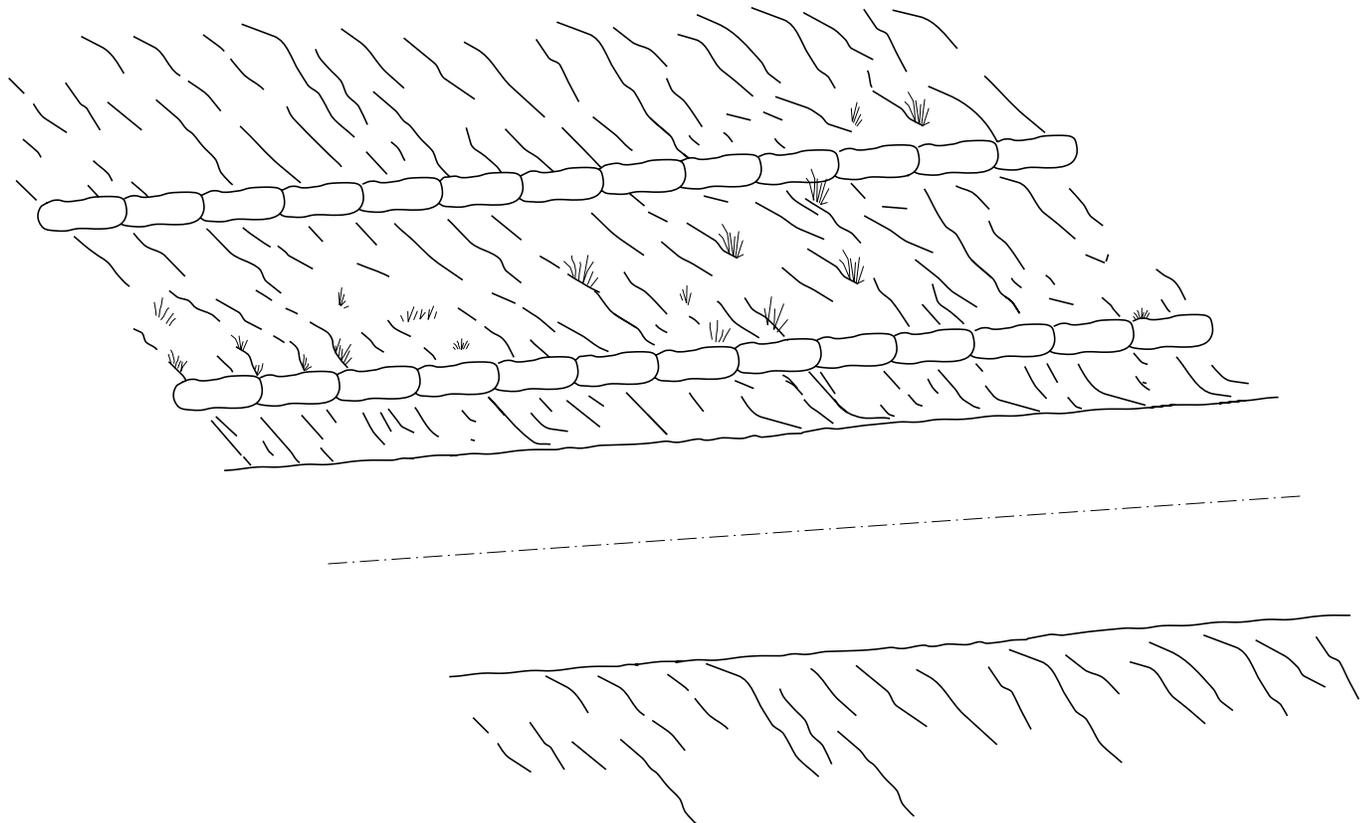
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

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| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-38 |
| FIBER ROLLS (SC-5) | |
| EFFECTIVE: SEPTEMBER 2014 | |
|  MONTANA DEPARTMENT OF TRANSPORTATION | |

SYMBOL:  GBB

GRAVEL BAG BERM SC-6:

- ① 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.
- ② THESE DEVICES ARE NOT TO BE USED IN PLACE OF A LINEAR SEDIMENT BARRIER (I.E., SILT FENCE, SANDBAG BARRIERS, OR STRAW BALE BARRIERS).
- ③ USE WOVEN POLYPROPYLENE, POLYETHYLENE, OR POLYAMIDE FABRIC OR BURLAP MATERIAL FOR BAGS. BAG MATERIAL IS REQUIRED TO HAVE A MINIMUM UNIT WEIGHT OF 0.25 LB./S.Y. [135 g/m²], MULLEN BURST STRENGTH EXCEEDING 300 PSI [2 070 kPa] AND AN ULTRAVIOLET STABILIZATION EXCEEDING 70%.
- ④ USE GRAVEL BAGS HAVING A LENGTH OF 1' -6" [450], WIDTH OF 12" [300], THICKNESS OF 3" [75], AND A MASS OF APPROXIMATELY 35 LB [15 kg]. ALTERNATIVE BAG SIZES REQUIRE PROJECT MANAGER'S APPROVAL PRIOR TO USE.
- ⑤ FILL GRAVEL BAGS APPROXIMATELY 75% FULL WITH GRAVEL CONSISTING OF 100% PASSING THE 3/4" [19] SCREEN AND 10% MAXIMUM PASSING THE NO. 4 [4.75] SIEVE. FILL MATERIAL MAY BE PITRUN OR CRUSHED AGGREGATE. FILL MATERIAL IS SUBJECT TO APPROVAL BY THE PROJECT MANAGER.
- ⑥ TIGHTLY PLACE GRAVEL BAGS TO MINIMIZE GAPS BETWEEN BAGS. BAGS MAY BE STAGGERED ON A PROJECT-BY-PROJECT BASIS AS APPROVED BY THE PROJECT MANAGER.
- ⑦ PLACE GRAVEL BAG BERMS AT 8 FT. TO 20 FT. [2.4 TO 6.0 m] SPACING ALONG THE SLOPE. FOR ABNORMALLY STEEP OR SHALLOW SLOPES FOLLOW PROJECT MANAGER'S GUIDELINES.
- ⑧ ALL BAGS PLACED WITHIN THE CLEAR ZONE REQUIRE MEASURES TO PROTECT GRAVEL FROM FREEZING. ALL FREEZE REDUCTION METHODS REQUIRE PROJECT MANAGER'S APPROVAL PRIOR TO IMPLEMENTATION.



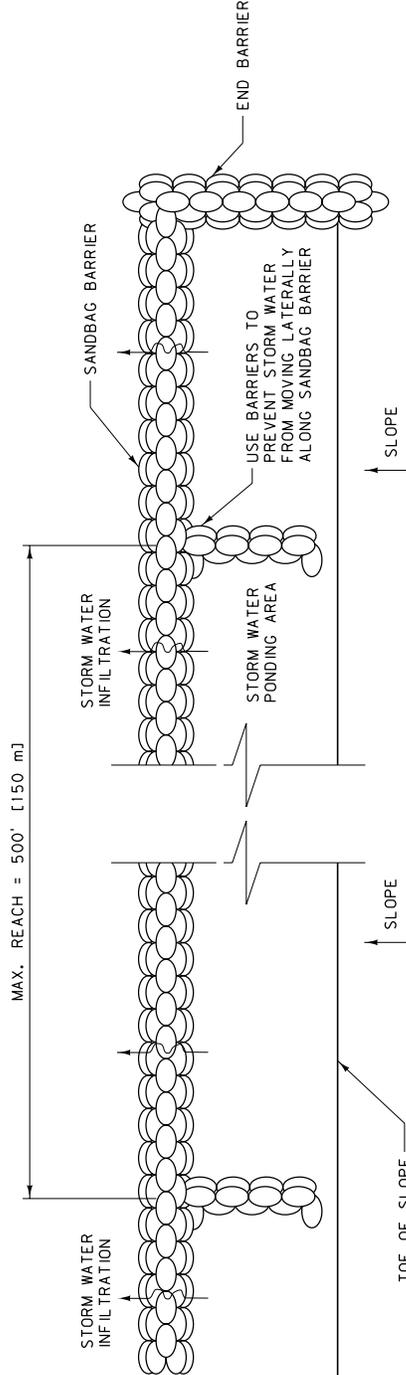
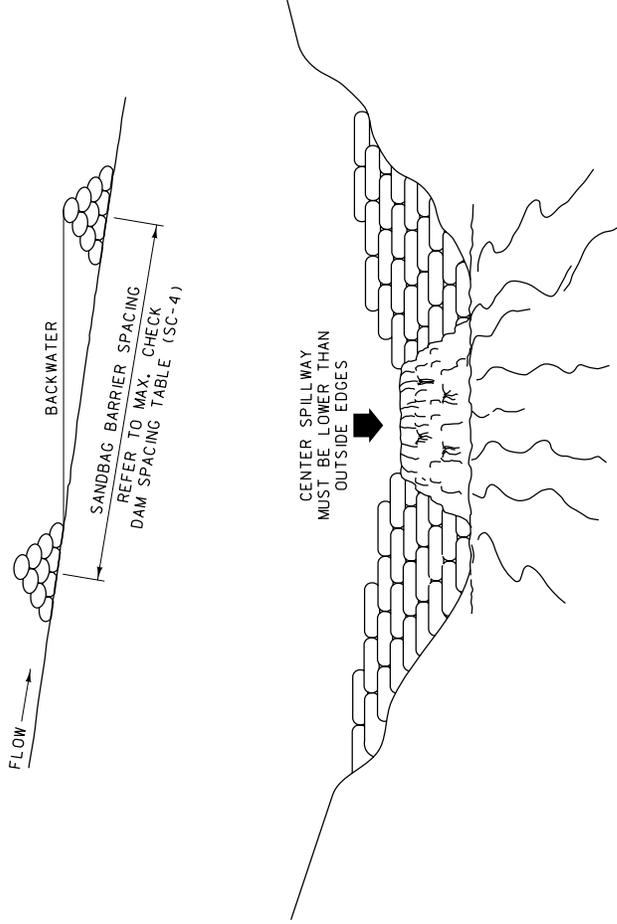
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

| | |
|--|-----------------|
| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-40 |
| GRAVEL BAG BERM (SC-6) | |
| EFFECTIVE: SEPTEMBER 2014 | |
|  MONTANA DEPARTMENT OF TRANSPORTATION | |

SYMBOL: _____ SAND-B _____

SAND BAG BARRIERS SC-8:

- ① 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.
- ② LIMIT THE USE OF SANDBAG BARRIERS TO DRAINAGE AREAS OF 5 ACRES [2 ha] OR SMALLER.
- ③ USE WOVEN POLYPROPYLENE, POLYETHYLENE, OR POLYAMIDE FABRIC OR BURLAP MATERIAL FOR BAGS. BAG MATERIAL IS REQUIRED TO HAVE A MINIMUM UNIT WEIGHT OF 0.25 LB./S.Y. [135 g/m²], A MULLEN BURST STRENGTH EXCEEDING 300 PSI [2070 kPa] AND AN ULTRAVIOLET STABILIZATION EXCEEDING 70%.
- ④ USE SANDBAGS HAVING A LENGTH OF 1'-6" [450], WIDTH OF 12" [300], THICKNESS OF 3" [75], AND A MASS OF APPROXIMATELY 35 LB [15 kg]. ALTERNATIVE BAG SIZES MAY REQUIRE PROJECT MANAGER'S APPROVAL PRIOR TO USE.
- ⑤ FILL SANDBAGS WITH SAND CONSISTING OF 100% PASSING THE NO. 4 [4.75] SIEVE, 50% PASSING THE NO. 10 [2.00 mm] SIEVE, AND 20% MAXIMUM PASSING THE NO. 200 [0.075] SIEVE. FILL MATERIAL IS SUBJECT TO APPROVAL BY THE PROJECT MANAGER.
- ⑥ 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.
- ⑦ 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 6' [150] OR LESS.
- ⑧ ALL BAGS PLACED WITHIN THE CLEAR ZONE REQUIRE MEASURES TO PROTECT SAND FROM FREEZING. ALL FREEZE REDUCTION METHODS REQUIRE PROJECT MANAGER'S APPROVAL PRIOR TO IMPLEMENTATION.



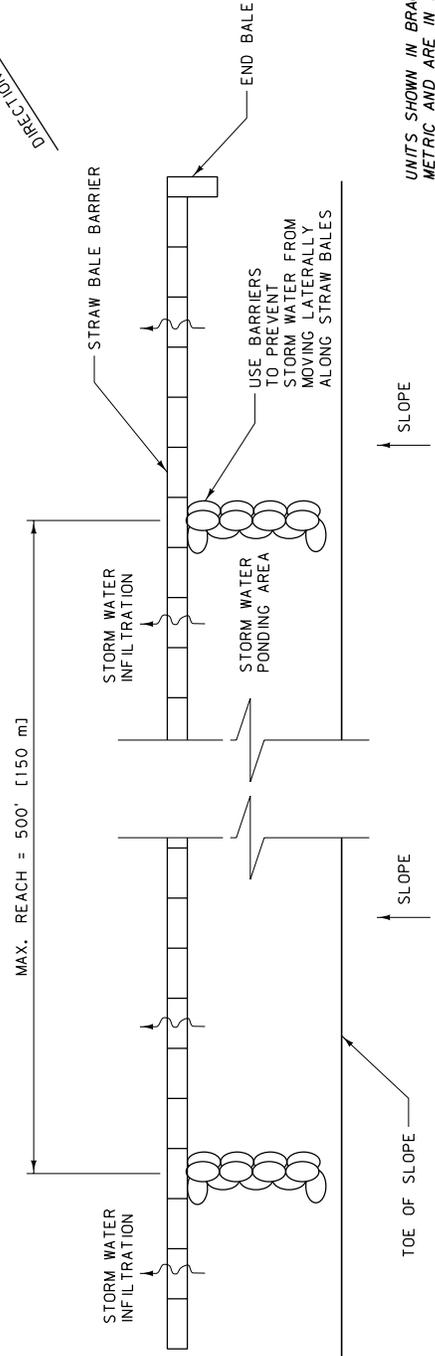
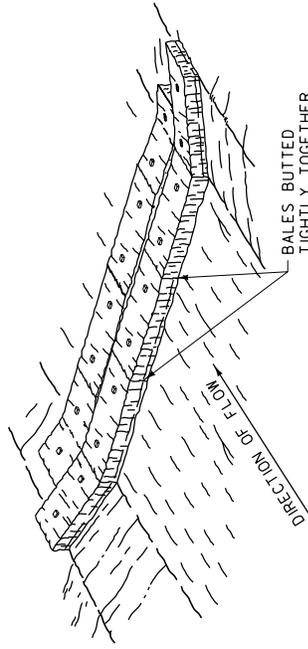
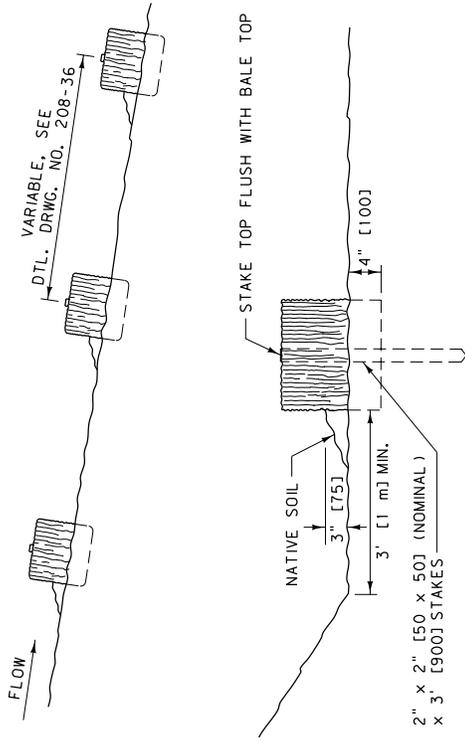
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

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| DETAILED DRAWING | DWG. NO. |
| REFERENCE STANDARD SPEC. | 208-42 |
| SECTION 208 | |
| SAND BAG BARRIERS (SC-8) | |

SYMBOL: _____ STRAW-B _____

STRAW BALE BARRIERS SC-9:

- ① 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.
- ② 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 CANNOT BE USED ON SURFACES WHICH DO NOT ALLOW FOR ENTRENCHMENT.
- ③ MINIMUM STRAW BALES SIZE REQUIREMENTS ARE A WIDTH OF 1'-2" [360], HEIGHT OF 1'-6" [450], LENGTH OF 3 FT. [900] AND A MASS OF 50 LB [23 kg]. USE STEEL WIRE (16 GAUGE [1.57 DIAMETER] MIN.), NYLON OR POLYPROPYLENE STRING (1/16" [2] MIN. DIAMETER) TO BIND BALES. MINIMUM BREAKING STRENGTH OF BINDING MATERIAL IS 80 LB [360 N]. USE 2" BY 2" [50 x 50] (NOMINAL) BY 3 FT. [900] LONG WOODEN STAKES. DO NOT USE METAL STAKES.
- ④ INSTALL STRAW BALES ALONG A LEVEL CONTOUR, WITH THE LAST BALE TURNED UP SLOPE. PLACE BALES IN A 4" [100] DEEP TRENCH, TIGHTLY ABOUT 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 50 FT. [15 m]. OFFSET BALES AT LEAST 3 FT. [1 m] FROM THE TOE OF SLOPES. IF SITE CONDITIONS DO NOT ALLOW FOR OFFSET, BALES MAY BE PLACED AT TOE.
- ⑤ FOLLOW GUIDELINES IN DTL. DRWG. NO. 208-36 IF BALES ARE USED AS CHECK DAMS.
- ⑥ 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.



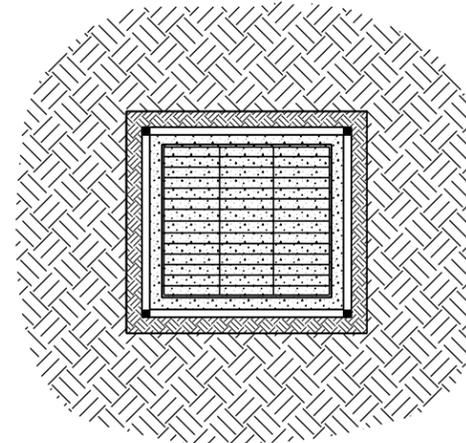
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| DETAILED DRAWING | |
| REFERENCE DWG. NO. | 208-44 |
| STANDARD SPEC. SECTION | 208 |
| STRAW BALE BARRIERS (SC-9) | |
| EFFECTIVE: SEPTEMBER 2014 | |
| MDTA MONTANA DEPARTMENT OF TRANSPORTATION | |

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

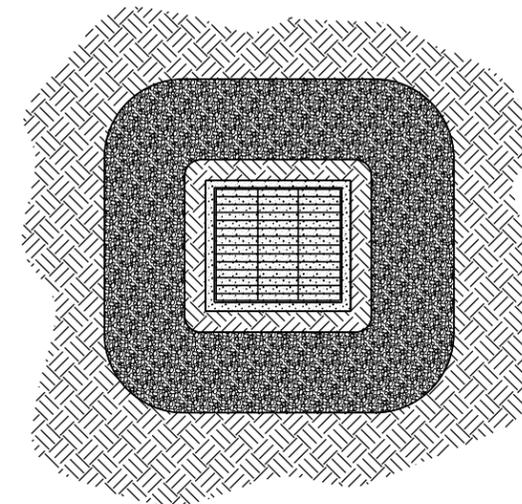
SYMBOL: 

STORM DRAIN INLET PROTECTION SC-10:

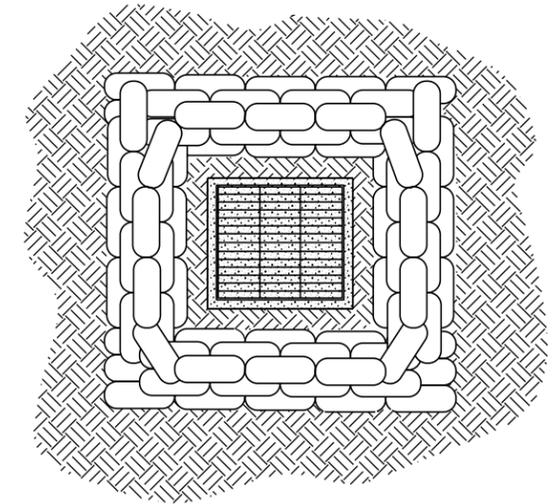
- ① STORM DRAIN INLET PROTECTION IS USED AT STORM DRAIN INLETS THAT ARE SUBJECT TO RUNOFF FROM CONSTRUCTION ACTIVITIES. THESE DEVICES DRAIN AND/OR FILTER SEDIMENT-LADEN RUNOFF AND ALLOW SEDIMENT TO SETTLE PRIOR TO DISCHARGE OF STORM WATER INTO STORM WATER DRAINAGE SYSTEMS OR WATERCOURSES.
- ② USE STORM DRAIN INLET PROTECTION WHEN PONDING WILL NOT ENCRoACH INTO HIGHWAY AND FOR DRAINAGE AREAS OF 1 ACRE (0.4 ha) OR LESS. FOR FLOWS LESS THAN 0.5 CFS (0.014 m³/s) SILT FENCE OR STRAW BALES MAY BE USED. WHEN FLOWS EXCEED 0.5 CFS (0.014 m³/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.
- ③ STRAW BALES, SAND BAGS, AND GRAVEL BERMS MAY BE USED WITHIN THE CLEAR ZONE UPON PROJECT MANAGER'S APPROVAL. EXPEDITIOUSLY REMOVE ALL STRAW BALES, SAND BAGS, AND GRAVEL BERMS FROM THE CLEAR ZONE UPON COMPLETION OF CONSTRUCTION ACTIVITIES.



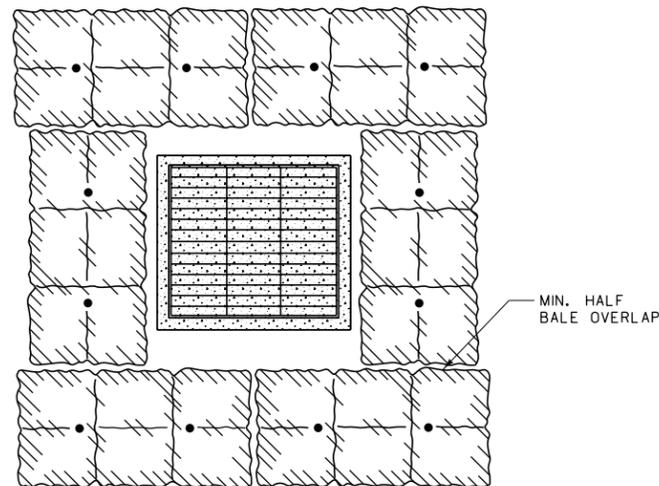
SILT FENCE - PLAN VIEW



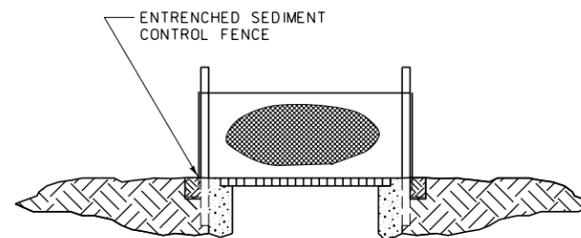
GRAVEL CHECK DAM - PLAN VIEW



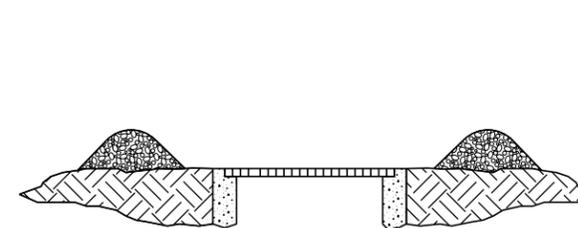
SANDBAG BARRIER - PLAN VIEW



STRAW BALE BARRIER - PLAN VIEW



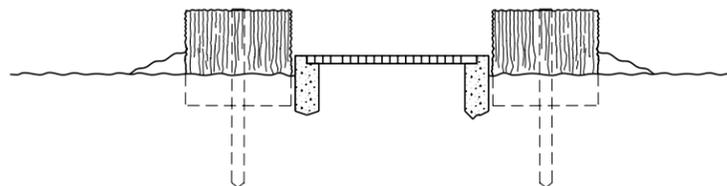
SILT FENCE - PROFILE VIEW



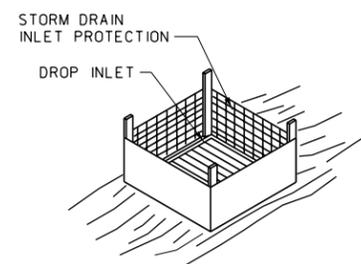
GRAVEL CHECK DAM - PROFILE VIEW



SANDBAG BARRIER - PROFILE VIEW



STRAW BALE BARRIER - PROFILE VIEW



EXAMPLE ISOMETRIC VIEW

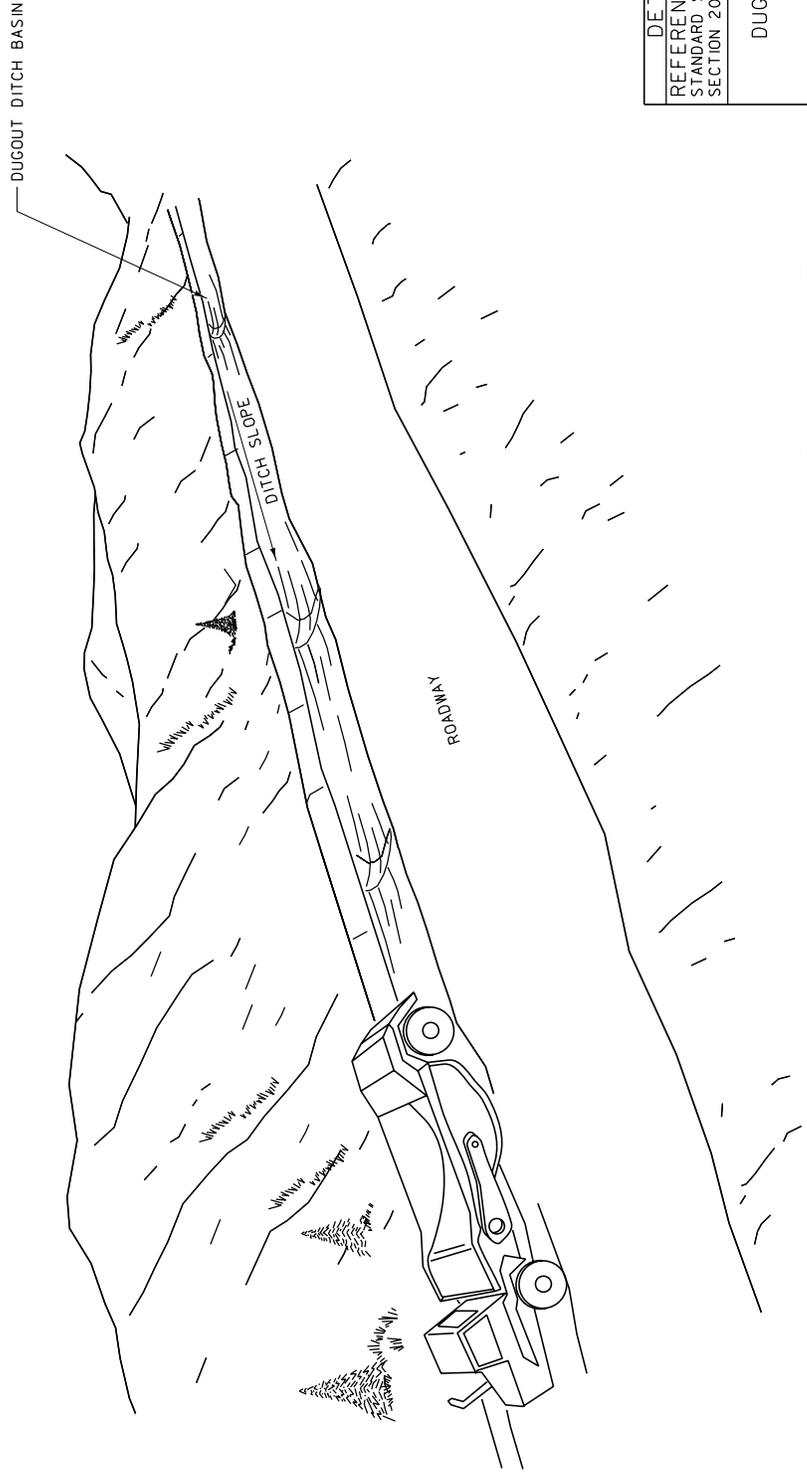
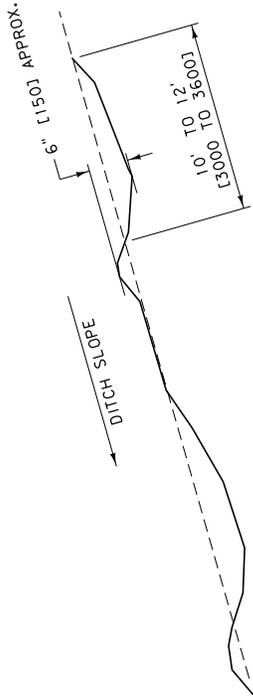
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

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| DETAILED DRAWING | |
| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-46 |
| STORM DRAIN INLET PROTECTION (SC-10) | |
| EFFECTIVE: SEPTEMBER 2014 | |
| MDT MONTANA DEPARTMENT OF TRANSPORTATION | |

SYMBOL: _____ DDB _____

DUGOUT DITCH BASIN SC-11:

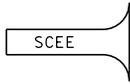
- ① DUGOUT DITCH BASINS CONSIST OF ONE OR A SERIES OF SMALL DUGOUT BASINS USED FOR CONCENTRATED FLOWS TO REDUCE RUNOFF VELOCITY, PROMOTE SEDIMENT RETENTION AND ALLOW SETTLING. THE MAXIMUM HEIGHT FOR DUGOUT DITCH BASINS USED INSIDE THE CLEAR ZONE IS 6" [150].
- ② DUGOUT DITCH BASINS ARE USED FOR LONGITUDINAL 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: DITCH SLOPE PLACE DUGOUT DITCH BASINS AT 300 FT. [90 m] SPACING
 - FROM 3: TO 4: DITCH SLOPE PLACE DUGOUT DITCH BASINS AT 150 FT. [45 m] SPACING
 - FROM 4: + DITCH SLOPE PLACE DUGOUT DITCH BASINS AT 50 FT. [15 m] SPACING
- ③ DUGOUT DITCH BASIN SPACING CAN BE ADJUSTED ON A PROJECT-BY-PROJECT BASIS FOLLOWING PROJECT MANAGER'S APPROVAL.



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| DETAILED DRAWING |
| REFERENCE DWG. NO. 208-48 |
| STANDARD SPEC. SECTION 208 |
| DUGOUT DITCH BASIN (SC-11) |
| EFFECTIVE: SEPTEMBER 2014 |
| MDTA MONTANA DEPARTMENT OF TRANSPORTATION |

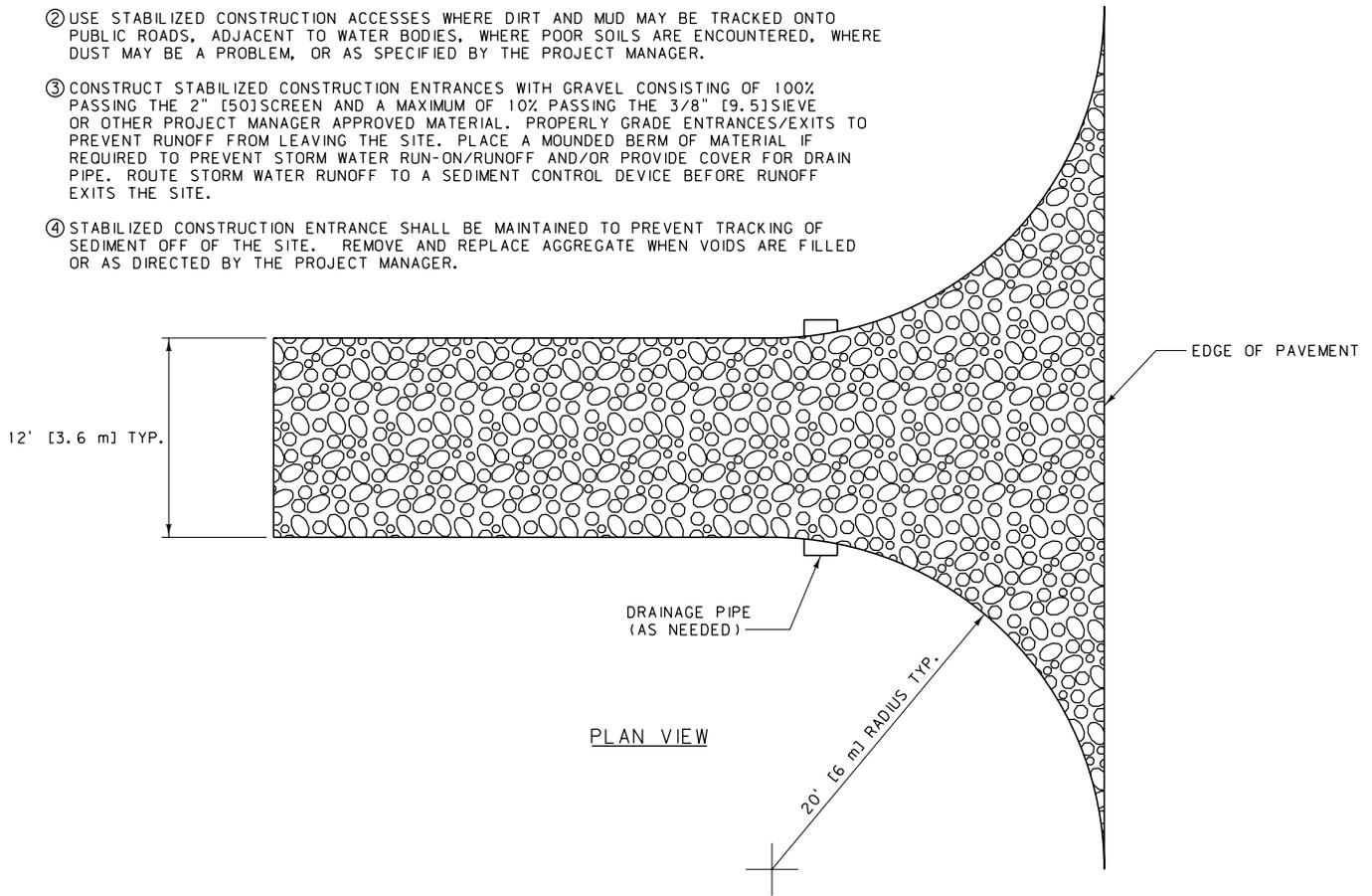
UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

SYMBOL:

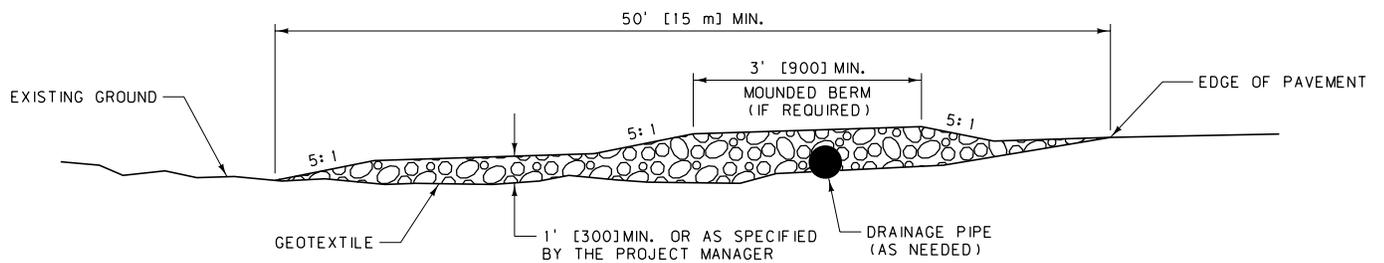


STABILIZED CONSTRUCTION ENTRANCE/EXIT TC-1:

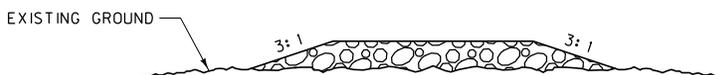
- ① A STABILIZED CONSTRUCTION ACCESS IS A DEFINED POINT OF ENTRANCE/EXIT TO A CONSTRUCTION SITE THAT IS STABILIZED TO REDUCE THE TRACKING OF MUD AND DIRT ONTO PUBLIC ROADS BY CONSTRUCTION VEHICLES.
- ② USE STABILIZED CONSTRUCTION ACCESSES WHERE DIRT AND MUD MAY BE TRACKED ONTO PUBLIC ROADS, ADJACENT TO WATER BODIES, WHERE POOR SOILS ARE ENCOUNTERED, WHERE DUST MAY BE A PROBLEM, OR AS SPECIFIED BY THE PROJECT MANAGER.
- ③ CONSTRUCT STABILIZED CONSTRUCTION ENTRANCES WITH GRAVEL CONSISTING OF 100% PASSING THE 2" [50] SCREEN AND A MAXIMUM OF 10% PASSING THE 3/8" [9.5] SIEVE OR OTHER PROJECT MANAGER 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.
- ④ 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 PROJECT MANAGER.



PLAN VIEW



PROFILE VIEW



END VIEW

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

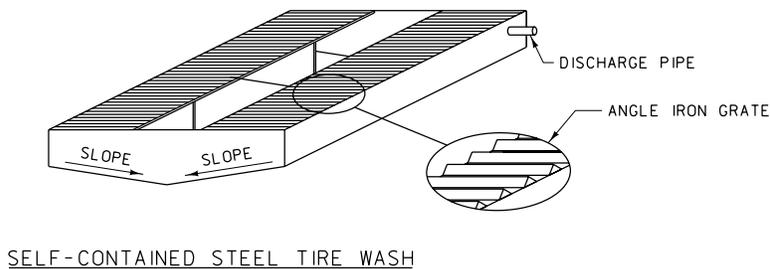
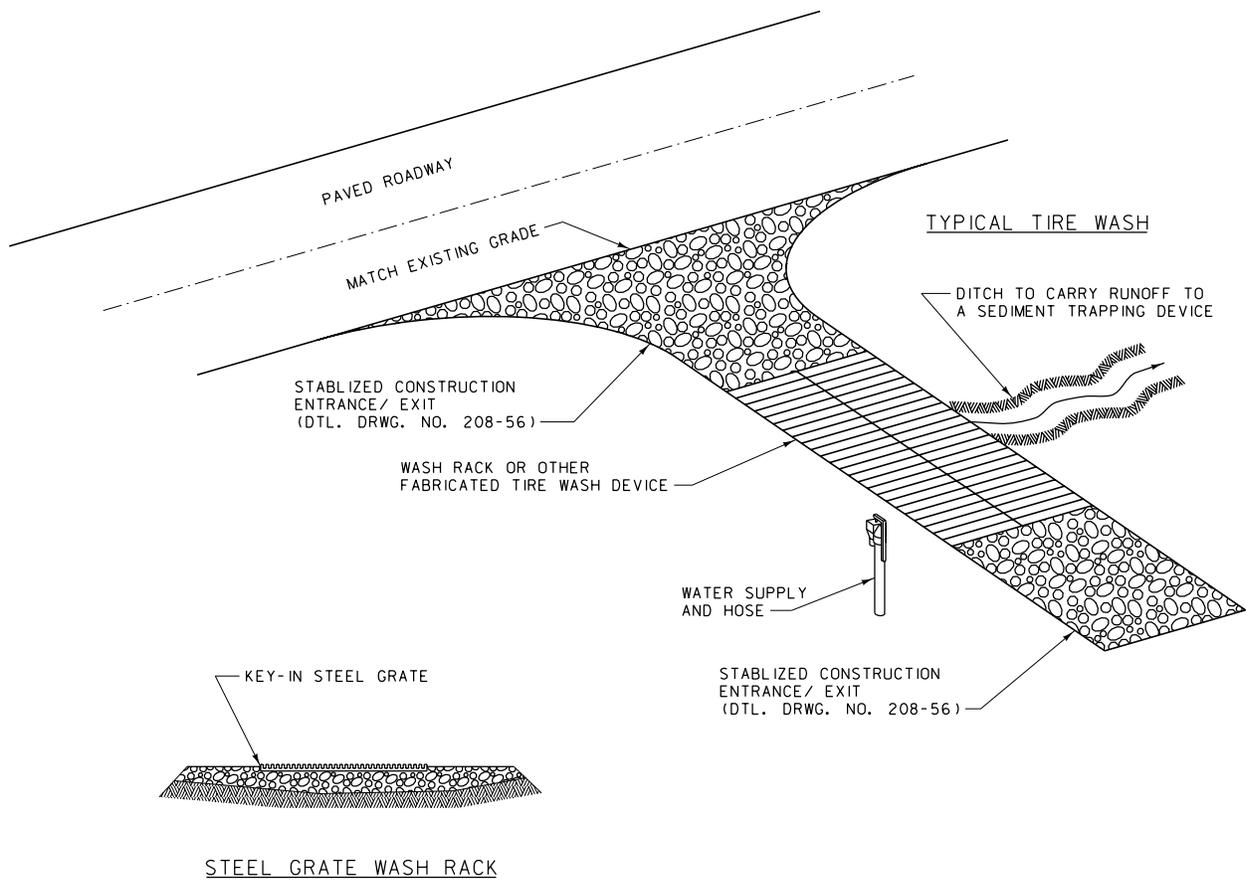
| DETAILED DRAWING | |
|---|-----------------|
| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-56 |
| STABILIZED CONSTRUCTION ENTRANCE/EXIT (TC-1) | |
| EFFECTIVE: SEPTEMBER 2014 | |
| MDT MONTANA DEPARTMENT OF TRANSPORTATION | |

SYMBOL:



ENTRANCE/EXIT TIRE WASH TC-3:

- ① 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.
- ② TIRE WASHES ARE MEANT TO BE USED ON A PROJECT-BY-PROJECT BASIS AND REQUIRES APPROVAL BY THE PROJECT MANAGER. THESE DEVICES REQUIRE A SUPPLY OF WASH WATER AND MAY REQUIRE A TURNOUT OR DOUBLE WIDE ACCESS.
- ③ FOLLOW DTL. DRWG. NO. 208-56 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. PROJECT MANAGER'S APPROVAL IS REQUIRED PRIOR TO CONSTRUCTION.
- ④ TIRE WASH DEVICES OTHER THAN THOSE SHOWN MAY BE USED AS APPROVED BY THE PROJECT MANAGER.

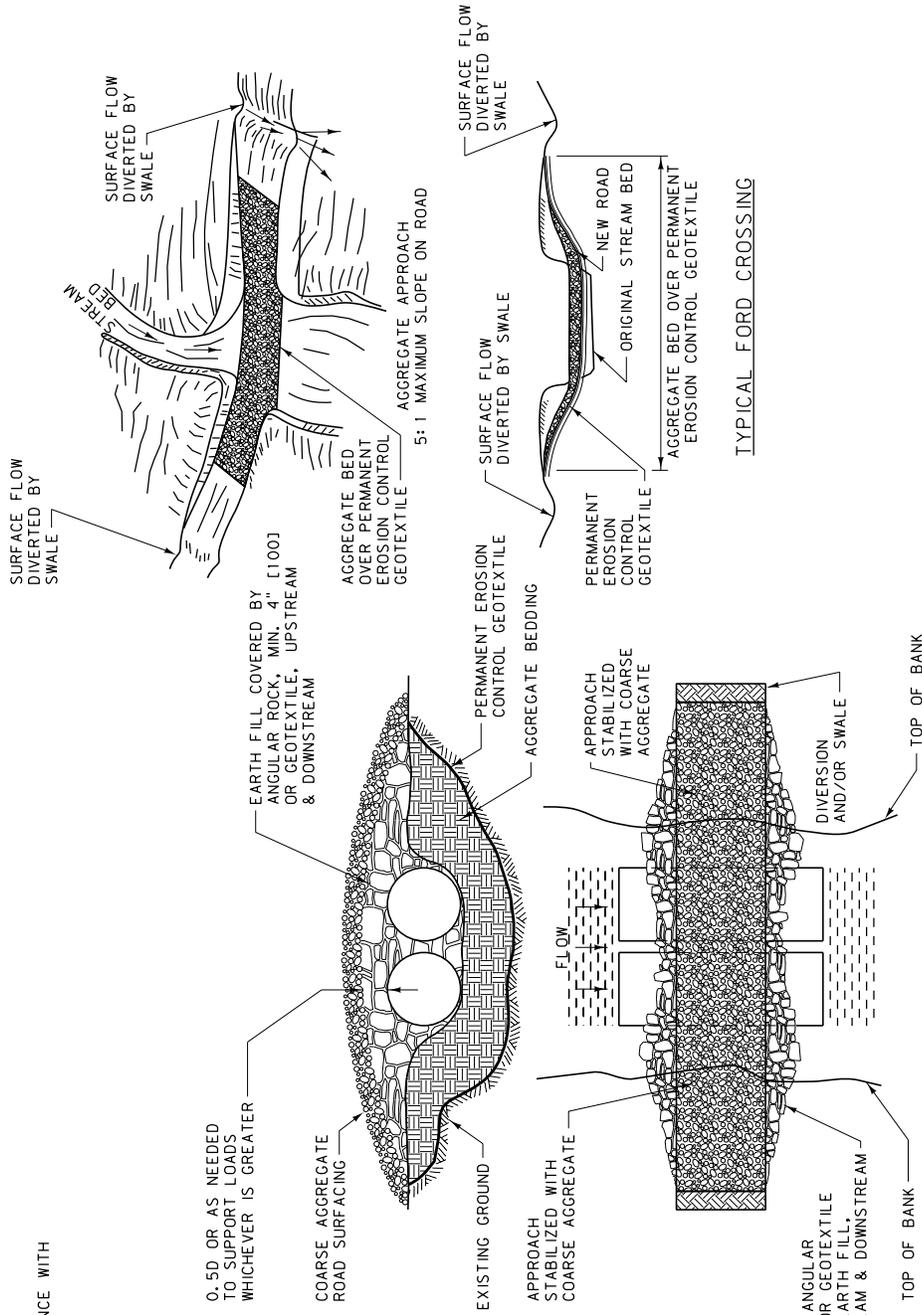


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| DETAILED DRAWING | |
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| REFERENCE STANDARD SPEC. SECTION 208 | DWG. NO. 208-58 |
| ENTRANCE/EXIT TIRE WASH (TC-3) | |
| EFFECTIVE: SEPTEMBER 2014 | |
| MDT MONTANA DEPARTMENT OF TRANSPORTATION | |

TEMPORARY STREAM CROSSINGS NS-4:

- ① 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.
- ② 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.
- ③ INSTALL PERMANENT EROSION CONTROL GEOTEXTILE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND SECTION 622.



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| DETAILED DRAWING | |
| REFERENCE DWG. NO. | 208-60 |
| STANDARD SPEC. | SECTION 208, 622 |
| TEMPORARY STREAM CROSSINGS (NS-4) | |
| EFFECTIVE: SEPTEMBER 2014 | |
| MDTA MONTANA DEPARTMENT OF TRANSPORTATION | |

UNITS SHOWN IN BRACKETS [] ARE METRIC AND ARE IN MILLIMETERS (mm) UNLESS OTHER UNITS ARE SHOWN.

TYPICAL_CULVERT_CROSSING

TYPICAL_BRIDGE_CROSSING

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