DESIGN GUIDE 1000 - PERMANENT SEEDING

A. **Description:** Permanent seeding is the establishment of perennial vegetation on disturbed areas for periods longer than 12 months. Permanent vegetation provides economical, long-term erosion control and helps prevent sediment from leaving the site.

B. **Application:** This practice is used when vegetation is designed to permanently stabilize the soil. It is necessary to protect earthen structures such as dikes, channels, and embankments. Particular care is required to establish a thick cover of permanent grass.

C. **Planning Considerations:** Prior to the start of construction, preparation of soil, fertilizer requirements, plant materials, seeding rates, environmental conditions, mulching and maintenance should be specified by a qualified professional. Plans and specifications should be referred to by field personnel throughout the construction process. To ensure germination and growth, prepare seedbed, add fertilizer according to soil tests, mulch all but the most ideal sites, and follow seeding dates. Permanent seeding shall commence after topsoil preparation and landscape grading have been completed, at the earliest time environmental conditions allow.

D. **Design Criteria:**

Seeding rates and mixes shall be as follows:

See Standard Specification Sections 02490 and 02485.

Fertilizer type and rates shall be as follows:

See Standard Specification Sections 02490 and 02485.

Mulching type and rate shall be as follows:

See Standard Specification Sections 02490 and 02485.

Maintenance requirements are as follows:

See Standard Specification Sections 02490 and 02485.

DESIGN GUIDE 1005 - TEMPORARY SEEDING

A. **Description:** Temporary seeding is the establishment of fast-growing annual vegetation to provide economical erosion control for up to 12 months and reduce the amount of sediment moving off the site. Annual plants which sprout rapidly and survive for only one growing season are suitable for establishing temporary vegetative cover.

B. **Application:** This practice applies where short-lived vegetation can be established before permanent seeding can be completed. It helps prevent costly maintenance operations on other erosion control systems such as sediment basin clean-out. Temporary or permanent seeding is necessary to protect earthen structures such as dikes, diversions, and the banks and dams of sediment basins.

C. **Planning Considerations:** Prior to the start of construction, preparation of soil, fertilizer requirements, plant materials, seeding rates, environmental conditions, mulching and maintenance should be specified by a qualified professional. Plans and specifications should be referred to by field personnel throughout the construction process. To ensure emergence, vigorous growth of seedlings, and continued plant growth, prepare seedbed, add fertilizer according to soil tests, mulch all but the most ideal sites, and follow seeding dates. Temporary seeding shall commence immediately after soil preparation and grading have been sufficiently completed.

D. **Design Criteria:**

Seeding rates and mixes shall be as follows:

See Standard Specification Section 02490.
Contractor may submit request for equal substitute temporary seed mix and rate to Engineer for Consideration.

Fertilizer type and rates shall be as follows:

Fertilizer not required.

Mulching type and rate shall be as follows:

See Standard Specification Section 02490.

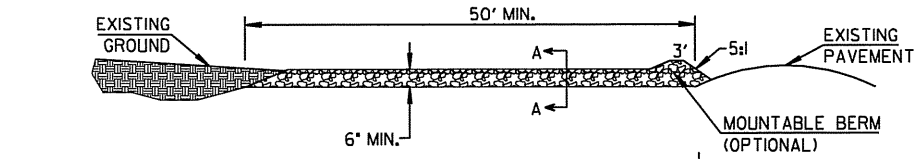
Maintenance requirements are as follows:

See Standard Specification Section 02490.

E. **Alternative Soil Stabilization Erosion Control Methods**

Alternative temporary soil stabilization erosion control methods are available, including Mulch Cover, Hydrocover (Standard or Specialty Mix) and Erosion Control Blankets. See Standard Specification Section 02490.

TEMPORARY CONSTRUCTION ENTRANCE



SIDE ELEVATION
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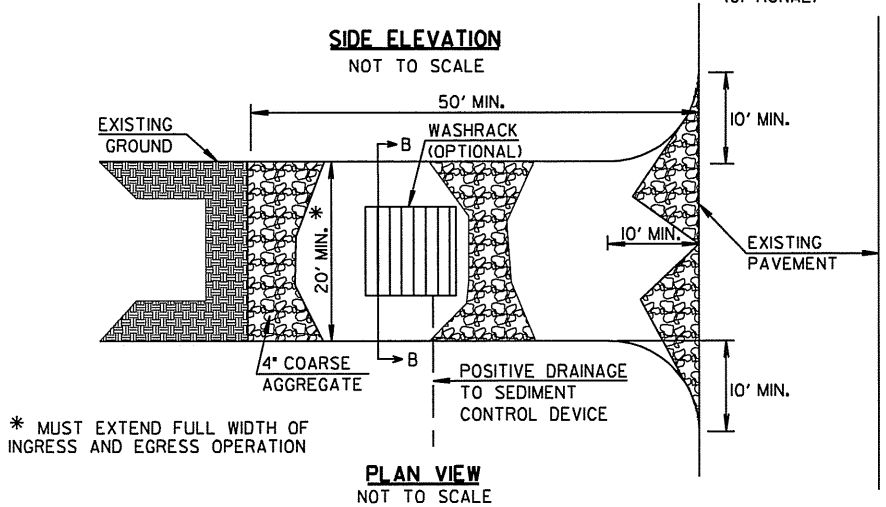

* MUST EXTEND FULL WIDTH OF INGRESS AND EGRESS OPERATION

PLAN VIEW
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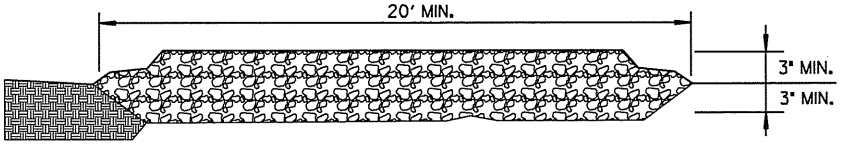

SECTION A-A
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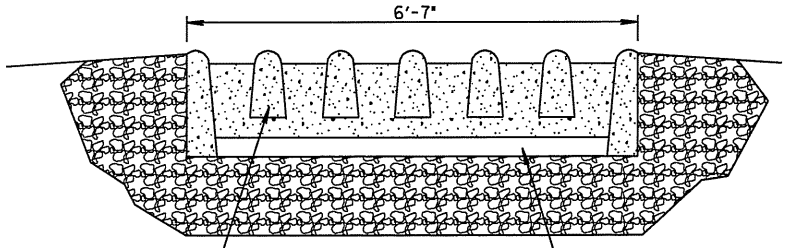


SECTION B-B
NOT TO SCALE

•ENSURE POSITIVE DRAINAGE IS PROVIDED TO SEDIMENT CONTROL DEVICE.

TEMPORARY CONSTRUCTION ENTRANCE PAD NOTES:

A) INSTALLATION:

1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES ON PUBLIC ROADS. IF POSSIBLE, LOCATE WHERE PERMANENT ROADS WILL EVENTUALLY BE CONSTRUCTED.
2. REMOVE ALL VEGETATION AND OTHER UNSUITABLE MATERIAL FROM THE FOUNDATION AREA, GRADE, AND CROWN FOR POSITIVE DRAINAGE.
3. IF SLOPE TOWARDS THE PUBLIC ROAD EXCEEDS 2%, CONSTRUCT A 6 TO 8-INCH HIGH RIDGE WITH 3H:IV SIDE SLOPES ACROSS THE FOUNDATION APPROXIMATELY 15 FEET FROM THE EDGE OF THE PUBLIC ROAD TO DIVERT RUNOFF.
4. INSTALL PIPE UNDER THE ENTRANCE IF NEEDED TO MAINTAIN DRAINAGE DITCHES ALONG PUBLIC ROADS.
5. PLACE STONE TO DIMENSIONS AND GRADE AS SHOWN ON PLANS. LEAVE SURFACE SMOOTH AND SLOPED FOR DRAINAGE.
6. DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE ENTRANCE TO A SEDIMENT CONTROL DEVICE.
7. CONSTRUCTION ENTRANCE SHALL BE CONSTRUCTED SIMULTANEOUSLY WITH RECIEVING SEDIMENT CONTROL DEVICE.
8. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.13 (STABILIZED STONE PAD)

B) TROUBLESHOOTING:

1. CONSULT WITH A QUALIFIED DESIGN PROFESSIONAL IF ANY OF THE FOLLOWING OCCUR:
   a. INADEQUATE RUNOFF CONTROL TO THE EXTENT THAT SEDIMENT WASHES ONTO PUBLIC ROAD - INSTALL DIVERSIONS OR OTHER RUNOFF CONTROL MEASURES.
   b. SMALL STONE, THIN PAD, OR ABSENCE OF GEOTEXTILE FABRIC RESULTS IN RUTS AND MUDDY CONDITIONS AS STONE IS PRESSED INTO SOIL - INCREASE STONE SIZE OR PAD THICKNESS OR ADD GEAOTEXTILE FABRIC.
   c. PAD TOO SHORT FOR HEAVY CONSTRUCTION TRAFFIC - EXTEND PAD BEYOND THE MINIMUM 50-FOOT LENGTH AS NECESSARY.

C) INSPECTION AND MAINTENANCE:

1. INSPECT STONE PAD AND SEDIMENT DISPOSAL AREA WEEKLY AND AFTER 1/2-INCH OR GREATER STORM EVENTS.
2. RESHAPE PAD AS NEEDED FOR PROPER DRAINAGE AND RUNOFF CONTROL.
3. TOPDRESS WITH CLEAN 4-INCH STONE AS NEEDED.
4. IMMEDIATELY REMOVE MUD OR SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROAD. REPAIR ANY BROKEN ROAD PAVEMENT IMMEDIATELY.
5. REMOVE ALL TEMPORARY ROAD MATERIALS FROM AREAS WHERE PERMANENT VEGETATION WILL BE ESTABLISHED.

EROSION & SEDIMENT CONTROL - TEMPORARY CONSTRUCTION ENTRANCE	Newton Kansas	STANDARD DRAWING NUMBER ESC-1010	APPROVAL DATE:	CITY OF NEWTON 201 E. 6th, P.O. Box 426 NEWTON, KS 67114

DESIGN GUIDE 1010 - TEMPORARY CONSTRUCTION ENTRANCE

A. **Description:** A temporary construction entrance is a stabilized layer of large aggregate that is located at any point where traffic leaves a construction site and moves directly onto a public road or other paved area.

B. **Application:** A temporary construction entrance is a stabilized stone pad designed to provide a buffer area where construction vehicles can be cleaned to avoid transporting the soil from the site onto the roads and drives.

C. **Planning Considerations:** Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion. The exposed soil surface is continually disturbed, leaving no opportunity for vegetation to become established. During wet weather, they often become muddy quagmires that generate significant quantities of sediment deposits transported off site on the wheels of construction vehicles. These non surfaced traveled ways can become so unstable during wet weather that they are virtually unusable and unsafe. Therefore, unpaved traveled ways for construction shall be planned and minimized to provide necessary access. Temporary construction entrances shall be installed at all locations vehicles leave the site.

D. **Design Criteria:**

1. **Length** – Minimum of 50 feet or 30 feet for single residence lot.

2. **Width** – Minimum of 20 feet and should be flared at the existing road to provide a turning radius.

3. **Stone** – See Standard Specification Section 02490, Subsection 4, Stabilized Stone Pan.

4. **Surface water** – All surface water flowing to or diverted toward construction entrances shall be piped under the entrance to maintain positive drainage. Pipe installed under the construction entrance shall be protected with a mountable berm. The pipe shall be sized according to the drainage with the minimum diameter being 12 inches. A pipe will not be necessary when the entrance is located at a high spot.

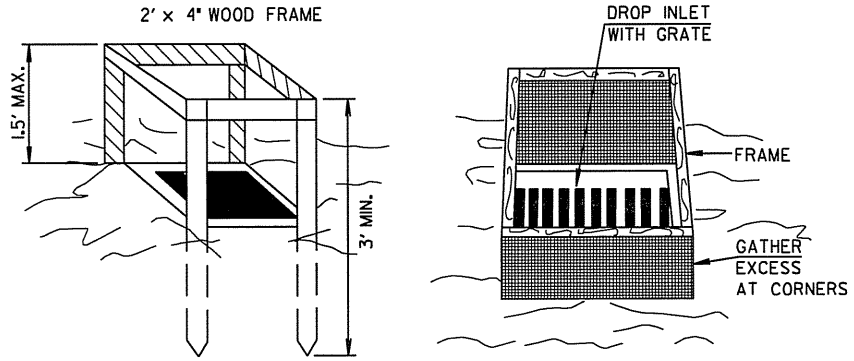
5. **Location** – A temporary construction entrance shall be located at every point where construction traffic enters or leaves a construction site. Vehicles leaving the site must travel over the entire length of the stabilized construction entrance.

E. **Standard Drawing:** See Standard Drawing ESC-1010, Temporary Construction Entrance.

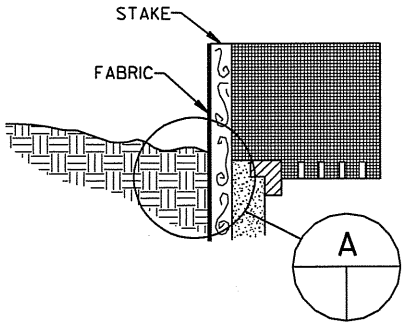
F. **Standard Specification:** City of Newton Standard Specification Section 02490, Construction Site Erosion & Sediment Control, Subsection 4.13, Stabilized Stone Pad.

SEDIMENT FENCE DROP INLET PROTECTION

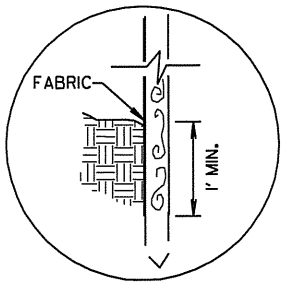
NOTE: FOR ALTERNATE DROP INLET PROTECTION METHODS, SEE SPECIFICATION SECTION 02490, SUBSECTION 4.



PERSPECTIVE VIEWS
NOT TO SCALE



ELEVATION OF STAKE AND FABRIC ORIENTATION



DETAIL A
NOT TO SCALE

SEDIMENT FENCE DROP INLET PROTECTION NOTES:

A) CONSTRUCTION SPECIFICATIONS:

1. SEDIMENT FENCE SHALL CONFORM TO THE CONSTRUCTION SPECIFICATIONS FOR EXTRA STRENGTH FOUND IN THE TABLE BELOW AND SHALL BE CUT FROM A CONTINUOUS ROLL TO AVOID JOINTS.

   PHYSICAL PROPERTIES OF FABRIC IN SEDIMENT FENCE:

PHYSICAL PROPERTY	TEST	REQUIREMENTS
FILTERING EFFICIENCY	ASTM 5141	75%
TENSILE STRENGTH AT 20% (MAX.) ELONGATION*	ASTM 4632 AASHTO M288-96	EXTRA STRENGTH - 50 LBS./LINEAR INCH
FLOW RATE	ASTM 5141	0.3 GAL./SQ.FT/ MINUTE**
ULTRAVIOLET RADIATION STABILITY %	ASTM D 4355	90%

* REQUIREMENTS REDUCED BY 50% AFTER SIX MONTHS OF INSTALLATION.
** HIGH POROSITY FABRIC MAY BE ADDED, IF NECESSARY.

2. FOR STAKES, USE 2x4 WOOD OR EQUIVALENT METAL WITH A MINIMUM LENGTH OF 3 FEET.
3. SPACE STAKES EVENLY AROUND THE PERIMETER OF THE INLET A MAXIMUM OF 3 FEET APART, AND SECURELY DRIVE THEM INTO THE GROUND, APPROXIMATELY 18 INCHES DEEP.
4. TO PROVIDE NEEDED STABILITY TO THE INSTALLATION, FRAME WITH 2x4 WOOD STRIPS AROUND THE CREST OF THE OVERFLOW AREA AT A MAXIMUM OF 1.5 FEET ABOVE THE DROP INLET CREST.
5. PLACE THE BOTTOM 12 INCHES OF THE FABRIC IN A TRENCH AND BACKFILL THE TRENCH WITH 12-INCHES OF COMPACTED SOIL.
6. FASTEN FABRIC SECURELY BY STAPLES, OR WIRE IT TO THE STAKES AND FRAME. JOINTS MUST BE OVERLAPPED TO THE NEXT STAKE.
7. IT MAY BE NECESSARY TO BUILD A TEMPORARY DIKE ON THE DOWNSLOPE SIDE OF THE STRUCTURE TO PREVENT BYPASS FLOW.
8. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.4, USE REQUIREMENTS ON THIS DRAWING IF CONFLICTING REQUIREMENTS EXIST.

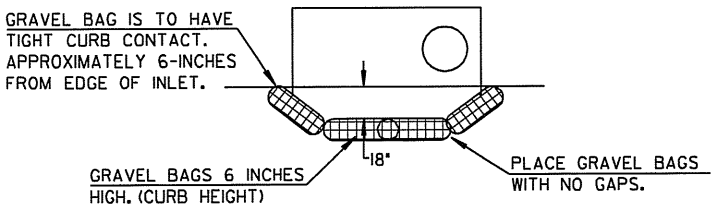
B) INSPECTION AND MAINTENANCE:

1. THE STUCTURE SHALL BE INSPECTED AFTER EACH RAIN EVENT OF ½ INCH OR GREATER AND REPAIRS MADE AS NEEDED.
2. SEDIMENT SHALL BE REMOVED AND THE TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ONE HALF THE DESIGN DEPTH OF THE TRAP.
3. STRUCTURES SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE REMAINING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
4. SEE SPECIFICATIONS SECTION 02490, SUBSECTION 4.3 FOR SEDIMENT REMOVAL AND DISPOSAL REQUIREMENTS.
5. SEE SPECIFICATIONS SECTION 02490. USE REQUIREMENTS ON THIS DRAWING IF CONFLICTING REQUIREMENTS EXIST.

EROSION & SEDIMENT CONTROL - DROP INLET PROTECTION	Newton Kansas	STANDARD DRAWING NUMBER ESC- 1020	APPROVAL DATE:	CITY OF NEWTON 201 E. 6th, P.O. Box 426 NEWTON, KS 67114

CURB INLET PROTECTION
(USE WITH SUMP INLETS ONLY)

NOTE: FOR ALTERNATE CURB INLET PROTECTION METHODS, SEE SPECIFICATION SECTION 02490, SUBSECTION 4.



PLAN VIEW
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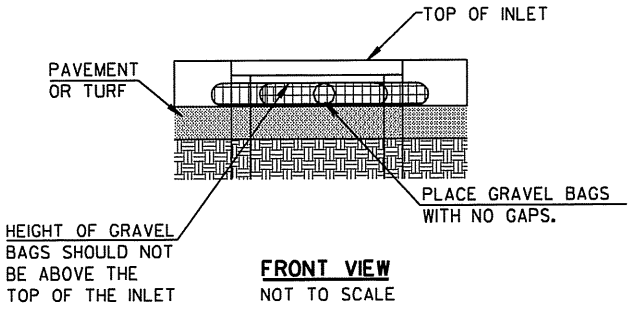


FRONT VIEW
NOT TO SCALE

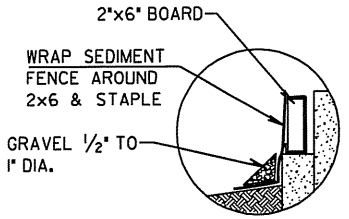
CURB INLET PROTECTION NOTES:

A) INSTALLATION:

1. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.12 FOR INLET PROTECTION REQUIREMENTS.
2. IMMEDIATELY FOLLOWING INLET CONSTRUCTION AND PRIOR TO CONSTRUCTION OF CURB AND INLET THROAT, PROTECT INLET OPENING BY INSTALLING 2" x 6" BOARD AND SEDIMENT FENCING ACROSS INLET OPENING IN ACCORDANCE WITH DETAIL A.

B) INSPECTION AND MAINTENANCE:

1. CONTRACTOR TO CLEAN OUT SEDIMENT AFTER EACH SIGNIFICANT RAINFALL. ANY SEDIMENT DEPOSITED INTO INLET SHALL BE PROMPTLY REMOVED.
2. DURING CONSTRUCTION OF RESIDENTIAL SUBDIVISIONS, THE FILTER BAG SHALL BE REPLACED BEFORE BAG MATERIAL BECOMES DEGRADED. ANY GRAVEL DEPOSITED INTO THE INLET SHALL BE PROMPTLY REMOVED.
3. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.3 FOR SEDIMENT REMOVAL AND DISPOSAL REQUIREMENTS.



FOR PROTECTION PRIOR TO POURING THROAT

DETAIL A
NOT TO SCALE

EROSION & SEDIMENT CONTROL - CURB INLET PROTECTION

Newton Kansas	STANDARD DRAWING NUMBER	APPROVAL DATE:	CITY OF NEWTON
	ESC-1030		201 E. 6th, P.O. Box 426 NEWTON, KS 67114

DESIGN GUIDE 1020 - DROP INLET AND CURB INLET PROTECTION

A. **Description:** Inlet protection consists of a sediment barrier with free-draining material such as sediment fence around a storm drain drop inlet or curb inlet. Sediment barriers other than those listed in paragraph C.4. of this section, shall be approved by the City of Newton.

B. **Application:** Inlet protection prevents sediment from entering storm drainage systems prior to permanent stabilization of the disturbed area.

C. **Planning Considerations:** Prior to the start of construction, inlet protection structures should be designed by a registered design professional. Plans and specifications should be referred to by field personnel throughout the construction process.

1. Storm sewers which are made operational prior to stabilization of the associated drainage areas can convey large amounts of sediment to natural waterways. In case of extreme sediment loading, the storm sewer itself may clog and lose its capacity. To avoid these problems it is necessary to prevent sediment from entering the system at the inlets.

2. There are several types of inlet protection and traps which have different applications depending on site conditions and type of inlet. Other innovative techniques for accomplishing the same purpose are encouraged, but shall be approved only after specific plans and details are submitted to the City of Newton for review.

3. Care should be taken when choosing a specific type of inlet protection. Inlet protection which causes excessive ponding in an area of high construction activity may become so inconvenient that it is removed or bypassed. In such situations, a structure with an adequate overflow mechanism should be utilized.

4. The following inlet protection devices are allowed for drainage areas of one acre or less. Runoff from larger disturbed areas should be routed to a temporary sediment trap or a temporary sediment basin. The following are allowable drop and curb inlet protection devices:

   a. Sediment Fence Drop Inlet Protection – Standard Drawing ESC-1020 and Standard Specification 02490, Subsection 4.4
   b. Ultra-DrainGuard® Catch Basin Inserts
   c. UltraCurbGuard Plus® Curb Inlet Protection
   d. Ultra-GutterGuard® and Ultra-GutterGuard Plus® Curb Inlet Protection
   d. Silt Saver®
   e. Gutterbuddy® Curb Inlet Protection
   f. Beaver Dam® or True Dam®

D. **Design Criteria:**

1. Drainage Area: Less than 1 acre.

2. Capacity: 2-year or design storm should enter inlet without bypass flow.

3. The inlet protection device shall be constructed in a manner that will facilitate clean out and disposal of trapped sediment and minimize interference with construction activities.

4. The inlet protection devices shall be constructed in such a manner that any resulting ponding of stormwater will not cause excessive inconvenience or damage to adjacent areas or structures.

5. Design criteria more specific to each particular inlet protection device shall be provided in the Standard Plan Drawings and Standard Specifications.

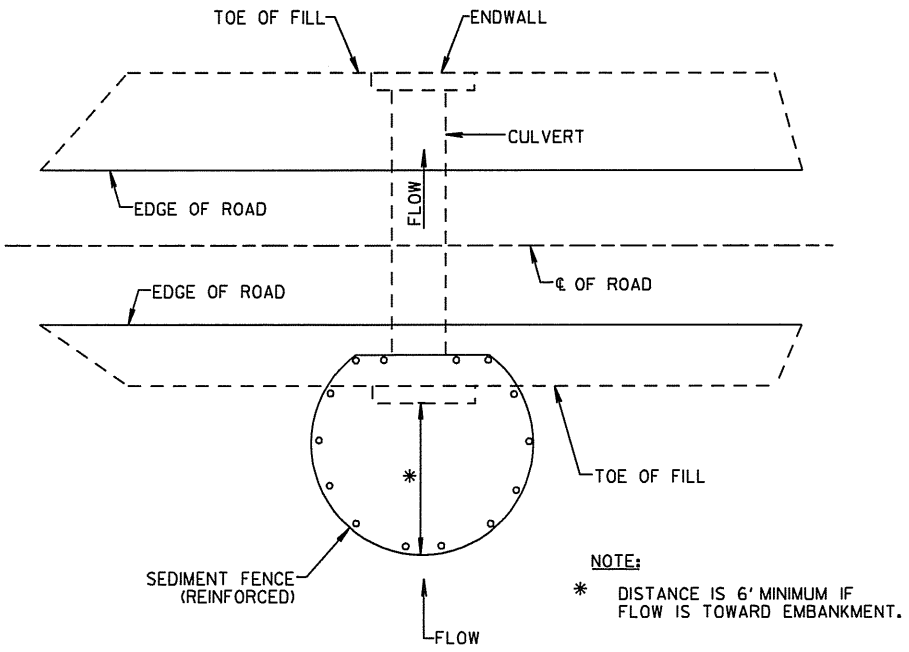
6. For inlet protection devices which utilize stone as the chief ponding medium, a range of stone sizes should be used. The designer or plan reviewer should maximize treatment action and minimize stone size while not creating significant ponding problems.

7. High porosity geotextile fabric may be added to any of the devices which utilize coarse aggregate to significantly enhance sediment removal. The fabric, which must meet the physical requirements noted for extra strength, should be secured between the stone and the inlet on wire-mesh if it is present. As a result of the significant increase in treatment efficiency provided by the fabric, a larger range of stone sizes may be utilized with such a configuration. The larger stone will help keep larger sediment masses from clogging the cloth. Notably, significant ponding may occur at the inlet if geotextile cloth is utilized in this manner.

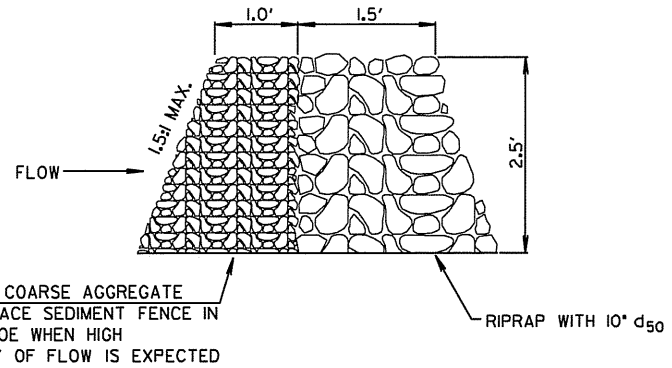
E. **Standard Drawings:** See Standard Drawings ESC-1020 (Drop Inlet Protection) and ESC-1030 (Curb Inlet Protection).

F. **Standard Specification:** See Standard Specification Section 02490, Subsection 4.12 (Inlet Protection).

SEDIMENT FENCE CULVERT INLET PROTECTION



OPTIONAL ROCK BARRIER



CROSS SECTION

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CULVERT INLET PROTECTION NOTES:

A) GENERAL NOTES:

1. THE INLET PROTECTION DEVICE SHALL BE CONSTRUCTED IN A MANNER THAT WILL FACILITATE CLEAN-OUT AND DISPOSAL OF TRAPPED SEDIMENT AND MINIMIZE INTERFERENCE WITH CONSTRUCTION ACTIVITIES.
2. THE INLET PROTECTION DEVICES SHALL BE CONSTRUCTED IN SUCH A MANNER THAT ANY RESULTING PONDED STORMWATER WILL NOT CAUSE EXCESSIVE INCONVENIENCE OR DAMAGE TO ADJACENT AREAS OR STRUCTURES.
3. DESIGN CRITERIA MORE SPECIFIC TO EACH PARTICULAR INLET PROTECTION DEVICE AREA FOUND IN SPECIFICATION SECTION 02490, SUBSECTION 4.

B) SEDIMENT FENCE (REINFORCED) INSTALLATION NOTES:

1. THE HEIGHT OF A SEDIMENT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE AND SHALL NOT EXCEED 34 INCHES ABOVE GROUND SURFACE.
2. THE GEOTEXTILE SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE UNAVOIDABLE, GEOTEXTILE SHALL BE SPLICED TOGETHER AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY SEALED.
3. DIG A TRENCH AT LEAST 6 INCHES DEEP AND 4 INCHES WIDE ALONG THE FENCE ALIGNMENT.
4. DRIVE POSTS AT LEAST 24 INCHES INTO THE GROUND ON THE DOWNSLOPE SIDE OF THE TRENCH. SPACE POSTS A MAXIMUM OF 6 FEET APART.
5. EXTRA-STRENGTH SEDIMENT FENCE FABRIC SHALL BE USED. POSTS FOR THIS TYPE OF FABRIC SHALL BE PLACED A MAXIMUM OF 6 FEET APART. THE SEDIMENT FABRIC SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING MINIMUM ONE-INCH LONG HEAVY-DUTY WIRE STAPLES OR TIE WIRES, AND EIGHT INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. PLACE THE BOTTOM 1 FOOT OF FABRIC IN THE 6-INCH DEEP TRENCH, LAPPING TOWARD THE UPSLOPE SIDE. BACKFILL WITH COMPACTED EARTH OR GRAVEL.
7. IF A SEDIMENT FENCE IS TO BE CONSTRUCTED ACROSS A DITCH LINE OR SWALE, IT MUST BE OF SUFFICIENT LENGTH TO ELIMINATE ENDFLOW, AND THE PLAN CONFIGURATION SHALL RESEMBLE AN ARC OR HORSESHOE WITH THE ENDS ORIENTED UPSLOPE. EXTRA-STRENGTH SEDIMENT FABRIC SHALL BE USED FOR THIS APPLICATION WITH A MAXIMUM 3-FOOT SPACING OF POSTS. ALL OTHER INSTALLATION REQUIREMENTS NOTED IN #5 APPLY.
8. TO REDUCE MAINTENANCE, EXCAVATE A SHALLOW SEDIMENT STORAGE AREA ON THE UPSLOPE SIDE OF THE FENCE. PROVIDE GOOD ACCESS IN AREAS OF HEAVY SEDIMENTATION FOR CLEAN OUT AND MAINTENANCE.
9. SEDIMENT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
10. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.3 FOR SEDIMENT REMOVAL AND DISPOSAL REQUIREMENTS.

EROSION & SEDIMENT CONTROL - CULVERT INLET PROTECTION	Newton Kansas	STANDARD DRAWING NUMBER ESC- 1040	APPROVAL DATE:	CITY OF NEWTON 201 E. 6th, P.O. Box 426 NEWTON, KS 67114

DESIGN GUIDE 1040 - CULVERT INLET PROTECTION

A. **Description:** A sediment settling device located at the inlet end of storm sewer culverts.

B. **Application:**

1 To prevent sediment from entering, accumulating in, and being transferred by a culvert and associated drainage system prior to permanent stabilization of a disturbed area.

2 To provide sediment control at culvert inlets during phases of a project where elevation and drainage patterns change, causing original control measures to be ineffective or in need of removal.

C. **Planning Considerations:**

1 When construction on a project reaches a stage where culverts and other storm sewer appurtenances are installed and areas are brought to plan grade, the erosion control measures used in the early stages normally need to be modified or may need to be removed altogether. At that time, there is a need to provide protection at points where runoff will leave the area via culverts and drop or curb inlets.

2 Similar to drop and curb inlets, culverts which are made operational prior to stabilization of the associated drainage areas can convey large amounts of sediment to natural drainageways. In case of extreme sediment loading, the pipe or pipe system itself may clog and lose its capacity. To avoid these problems, it is necessary to prevent sediment from entering the culvert by using one of the methods noted in this guideline.

D. **Design Criteria:**

1. **Sediment Fence Culvert Inlet Protection**

   a. Sediment fence culvert inlet protection has an expected maximum usable life of three months.
   b. Use reinforced Super Sediment Fence.
   c. Use high porosity geotextile fabric.
   d. Refer to Standard Drawings ESC-1040 (Culvert Inlet Protection), Standard Drawing ESC-1100 (Sediment Fence – Reinforced) and Standard Specification Section 02490, Subsection 4.4 (Sediment Fence) for additional design Criteria.

2. **Rock Barrier Culvert Inlet Protection**

   a. Clean and reconstruct stone culvert inlet protection following rainfall events as necessary to ensure effectiveness.
   b. Refer to Standard Drawing ESC-1040 (Culvert Inlet Protection), Standard Specification Section 02490, Subsection 4.5 (Rock Barriers) for additional design criteria.

3. **Other Culvert Inlet Protection Procedures**

   a. Other procedures for accomplishing the same purpose are available. Alternative procedures shall be approved only after specific plans and details are submitted to the City of Newton for review.

E. **Standard Drawings:** See Standard Drawings ESC-1040 (Culvert Inlet Protection).

F. **Standard Specification:** See Standard Specification Section 02490, Subsection 4.12 (Inlet Protection).

DESIGN GUIDE 1045 - OUTLET STABILIZATION

A. **Description:** Rock riprap outlet stabilization is constructed to control erosion at the outlet of a channel or conduit until permanent erosion control has been established or installed. Rock riprap is designed to prevent scour at stormwater outlets and minimize downstream erosion by reducing outlet velocities.

B. **Application:** This practice applies when discharge velocity of a pipe, box culvert, diversion or other water conveyance exceeds the permissible velocity of the receiving area while exposed during construction.

C. **Planning Considerations:** Prior to the start of construction, outlet stabilization should be designed by a registered design professional. Plans and specifications should be referred to by field personnel throughout the construction process and improvements built according to plan alignment, grade, cross section and length.

D. **Design Criteria:**

1. **Grading:** There should be a smooth transition between the outlet stabilization structure and the receiving channel; the elevation of riprap at the downstream end should be at the same elevation as the bottom of the receiving channel.

2. **Alignment:** The alignment of the riprap should be straight throughout its length. If a curve is required, it should be located in the upstream section of the outlet stabilization structure.

3. **Riprap:** Riprap should consist of a well-graded mixture of rock. Larger rock should predominate, with sufficient smaller sizes to fill the remaining. The diameter of the largest rock size should not be larger than 1.5 times the d_{50} size.

4. **Riprap Thickness and Length:** Minimum thickness of riprap should be 1.5 times the maximum rock diameter. The length of riprap pad must be designed such that erosion of the receiving material at the outlet is minimal.

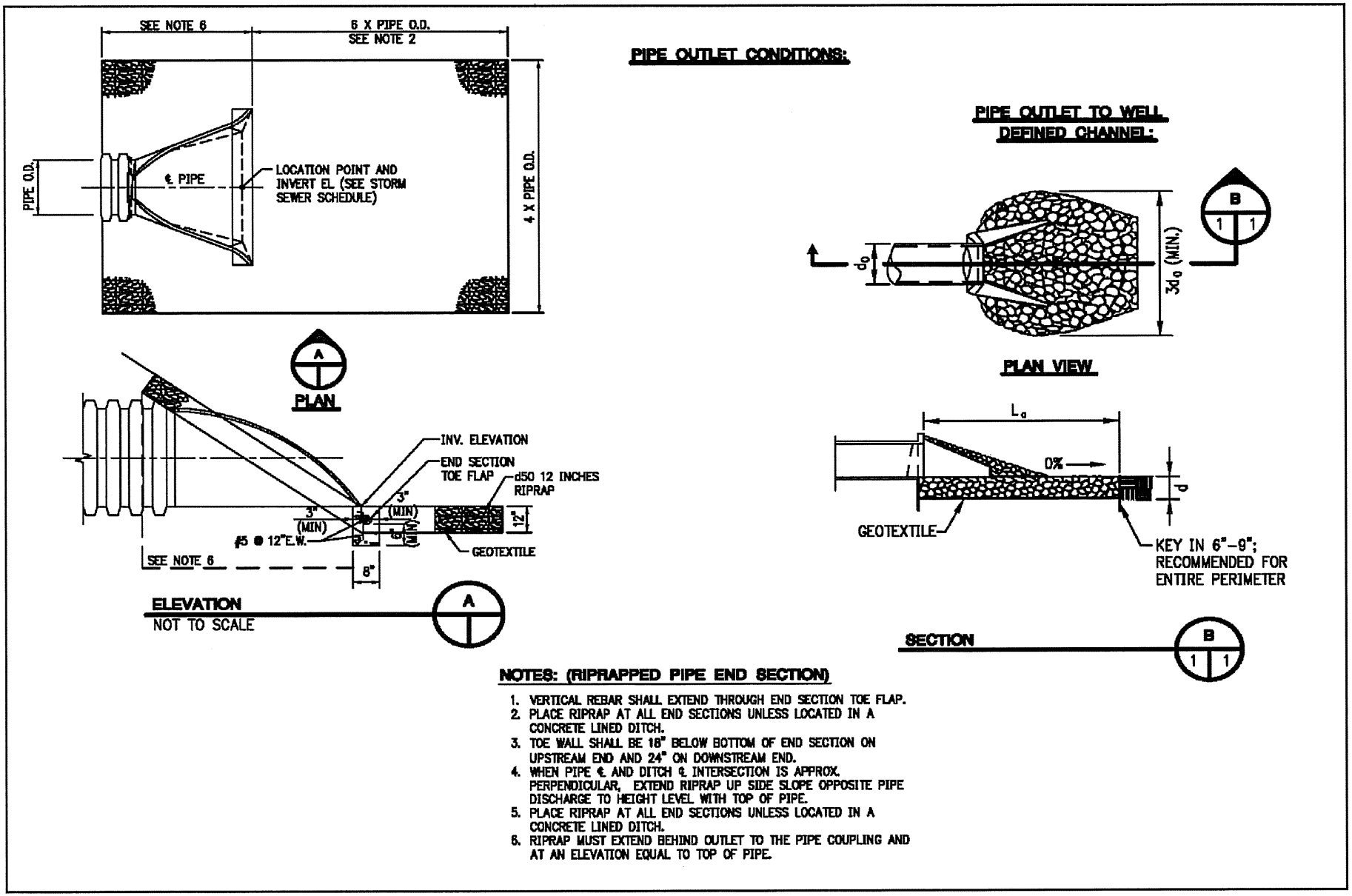
5. **Rock Quality:** Select rock for riprap from field stone or quarry stone. The rock should be hard, angular, and highly chemical and weather resistant. The specific gravity of the individual stones should be at least 2.5.

6. **Filter:** Install or construct a filter between the rock riprap and the subgrade to prevent undermining of the structure due to movement of fine-grained subgrade soil. The filter can consist of either properly graded sand or gravel layer, a manufactured geotextile fabric, or a combination of both.

7. **Toewalls:** Construct as needed around the perimeter.

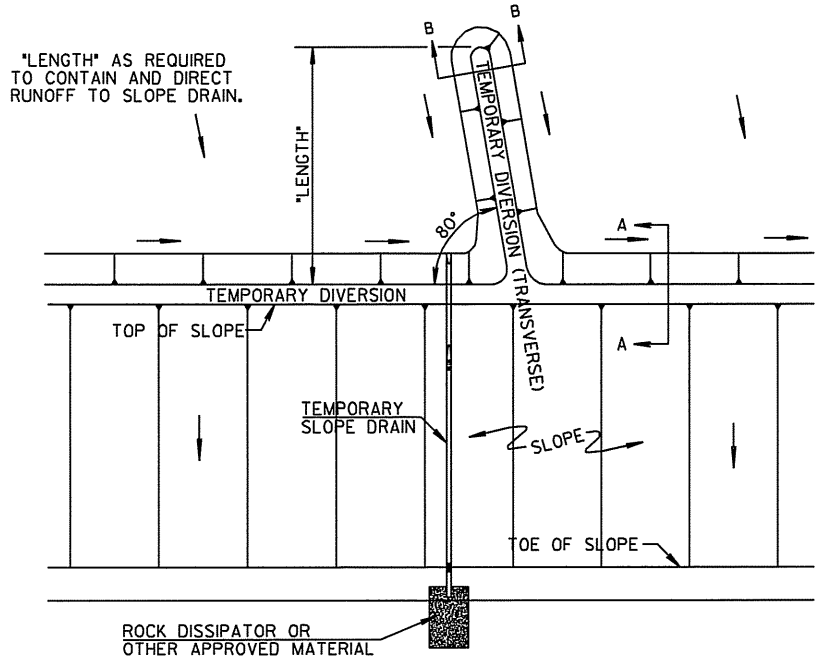
8. Delivered riprap shall be free of soil and organic material.

9. Rolled Erosion Control Products and Sediment Fence (Reinforced) may be acceptable outlet stabilization structures in some applications. Alternative procedures shall be approved only after specific plans and details are submitted to the City of Newton for review.



Source: Modified from VA. DCR, 1992.

TEMPORARY DIVERSION AND SLOPE DRAIN



TYPICAL PLAN VIEW
NO SCALE

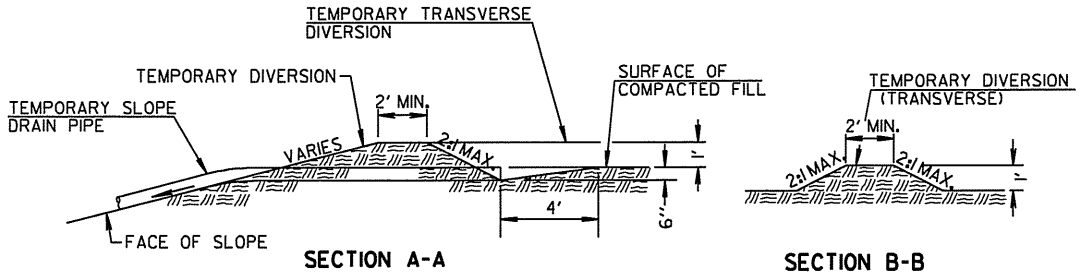
TEMPORARY DIVERSION AND SLOPE DRAIN NOTES:

A) INSTALLATION:

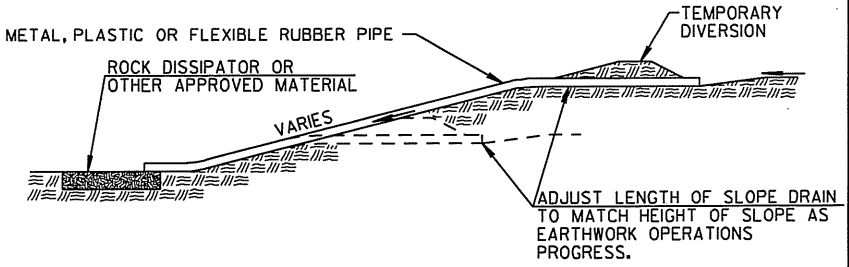
1. TEMPORARY SLOPE DRAIN AND TEMPORARY DIVERSION MAY BE USED TO PROTECT PROJECT SLOPES.
2. THE SLOPE DRAIN SHALL BE DESIGNED TO CONVEY THE PEAK RUNOFF FOR A 10-YEAR, 24 HOUR STORM.
3. SLOPE DRAIN SECTIONS ARE TO BE SECURELY FASTENED TOGETHER AND HAVE WATERTIGHT FITTINGS.
4. DISCHARGE OF SLOPE DRAINS SHALL BE INTO STABLIZED DITCH OR AREA, OR INTO SEDIMENT BASIN.
5. PIPE SHALL BE SECURED IN PLACE WITH REINFORCED HOLD-DOWN GROMMETS, SPACED @ 10-ft OR LESS.
6. SEE SPECIFICATION SECTION 02490, SUBSECTION 4 FOR ADDITIONAL REQUIREMENTS FOR DIVERSIONS AND SLOPE DRAINS.

C) INSPECTION AND MAINTENANCE:

1. SLOPE DRAINS STRUCTURE SHALL BE INSPECTED WEEKLY, AND AFTER EACH STORM EVENT OF 1/2- INCH OR GREATER, NECESSARY REPAIRS SHALL BE MADE PROMPTLY.
2. SLOPE DRAIN IS TO REMIAN IN PLACE UNTIL THE SLOPE HAS BEEN STABILIZED.
3. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.3 FOR SEDIMENT REMOVAL AND DISPOSAL REQUIREMENTS.



TYPICAL PROFILE
NO SCALE



TYPICAL PROFILE OF TEMPORARY SLOPE DRAIN
NO SCALE

EROSION & SEDIMENT CONTROL - TEMPORARY DIVERSION AND SLOPE DRAIN	Newton Kansas	STANDARD DRAWING NUMBER ESC-1050	APPROVAL DATE:	CITY OF NEWTON 201 E. 6th, P.O. Box 426 NEWTON, KS 67114

DESIGN GUIDE 1050 – TEMPORARY DIVERSION

A. **Description:** Diversions consist of an earthen berm and adjacent swale (or diversion channel) from which the berm material is constructed. The berm is constructed on the down slope side of the swale.

B. **Application:** Diversions reduce slope length and intercept and divert stormwater runoff to stabilized outlets or sediment trapping facilities, at non-erosive velocities.

C. **Planning Considerations:**

1. Diversions are useful tools for managing surface water flows and preventing soil erosion. On moderately sloping areas they may be placed at intervals to trap and divert sheet flow before it concentrates and causes rill and gully erosion. They may be placed at the top of cut or fill slopes to keep runoff from upland drainage areas off the slope. They can also be used to protect structures, parking lots, adjacent properties, and other special areas from erosion and flooding.

2. It's important to establish adequate vegetation as promptly after installation to prevent erosion of the diversion structure. It's also important to stabilize the drainage area above the diversion so that sediment will not enter and accumulate in the diversion channel.

3. Typically, these measures are installed after the final grading is complete. On cuts, diversions may be installed before work begins since work proceeds from the top to the bottom of the slope and the diversions have little chance of being covered or damaged. On fills, the work proceeds from the bottom to the top and the elevation changes daily, therefore it's not feasible to construct a diversion until the grading is completed or suspended. The filling operation should be completed as quickly as possible and the permanent slope stabilization measures installed as soon as possible, to minimize erosion.

4. Temporary diversions may be used as a perimeter control in association with sediment traps or sediment basins on moderate to large construction sites. If installed properly in initial phases of grading, maintenance can be minimal. Cleaning of sediment-trapping facilities is typically the most significant maintenance requirement.

D. **Design Criteria:** Diversion location shall be determined by considering outlet conditions, topography, land use, soil type, length of slope, seepage planes, and development layout. Diversions shall be engineered to ensure adequate capacity is provided in non-erosive manner. The following design criteria shall be met:

1. **Drainage Area:** The maximum recommended drainage area is 5 acres.

2. **Height:** The minimum recommended height of the earthen berm is 12 inches.

3. **Side Slopes:** 2H:1V or flatter, with a minimum top width of 2 feet.

3. **Grade:** The channel shall have a positive, non-erosive grade to a stabilized outlet.

4. **Outlet:** The diverted runoff should be released through a stabilized outlet, slope drain, or sediment trapping measure.

E. **Standard Drawings:** See Standard Drawing ESC-1050 (Temporary Diversion and Slope Drain).

F. **Standard Specification:** See Standard Specification Section 02490, Subsection 4.10 (Temporary Diversion).

DESIGN GUIDE 1055 - TEMPORARY SLOPE DRAIN

A. **Description:** A temporary slope drain is a flexible tube or conduit extending from the top to the bottom of a cut or fill slope. A detail is located on Standard Drawing ESC-1050, Temporary Diversion and Slope Drain.

B. **Application:** Temporarily conveys concentrated stormwater runoff down the face of a cut or fill slope, in a conduit, without causing erosion on or below the slope.

C. **Planning Considerations:**

1 There is often significant lag time from the completion of cut or fill slope grading and installation of permanent drainage system. During this period, the slope is particularly vulnerable to erosion. Temporary slope drains provide protection for exposed slopes until permanent drainage structures can be installed and permanent vegetation can be established.

2 Temporary slope drains can be used in conjunction with diversion berms to convey runoff from the entire drainage area above a slope to the base of the slope without erosion. Temporary slope drains and diversions shall be engineered to ensure adequate capacity. The entrance section must be securely entrenched; all connections must be watertight; and the conduit must be staked securely.

D. **Design Criteria:**

1 **Drainage Area:** The maximum allowable drainage area per slope drain is 5 acres.

2 **Flexible Conduit:** Slope drain shall consist of heavy-duty, flexible material designed for this purpose. The diameter of the slope drain shall be equal over its entire length. Reinforced hold-down grommets shall be spaced at or less than 10-foot intervals. Slope drains shall be sized as listed in the table below to be adequate for a 10-year, 24-hour storm event with a runoff coefficient of 0.6. If an area has a runoff coefficient of more than 0.6, designer shall provide the proper pipe size to accommodate the excess flow.

Table 1055-1: Size of Slope Drain

Maximum Drainage Area (acres)	Pipe Diameter (inches)
0.5	12
1.5	18
2.5	21
3.5	24
5.0	30

3. **Entrance Sections:**

a. The entrance to the slope drain shall consist of a standard flared end-section with appropriate inlet protection as set forth in Design Guide 1040, Culvert Inlet Protection. If ponding will cause a problem at the entrance and make such protection impractical, appropriate sediment-removing measures shall be taken at the outlet of the pipe. Watertight fittings shall be provided.

b. The height of the dike at the centerline of the inlet shall be equal to the diameter of the pipe plus 6 inches. Where the dike height is greater than 18 inches at the inlet, it shall be sloped at the rate of 3H:1V or flatter to connect with the remainder of the dike.

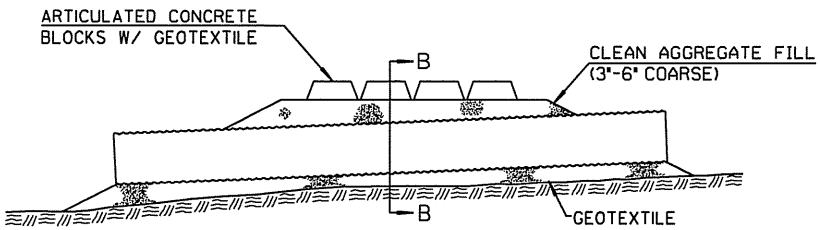
5. **Outlet Protection:** The outlet of the slope drain must be protected from erosion as set forth in Design Guide 1045, Outlet Stabilization.

E. **Standard Drawings:** See Standard Drawing ESC-1050 (Temporary Diversion and Slope Drain).

F. **Standard Specification:** See Standard Specification Section 02490, Subsection 4.11 (Temporary Slope Drain).

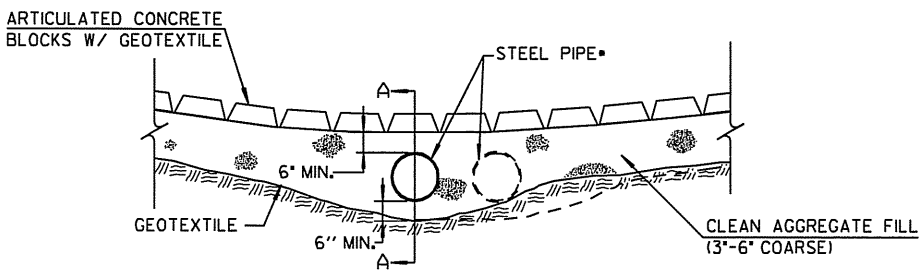
TEMPORARY STREAM CROSSING

(ARTICULATED CONCRETE BLOCKS)



SECTION A-A

NO SCALE

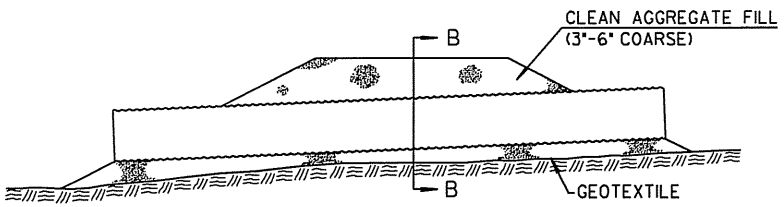


SECTION B-B

NO SCALE

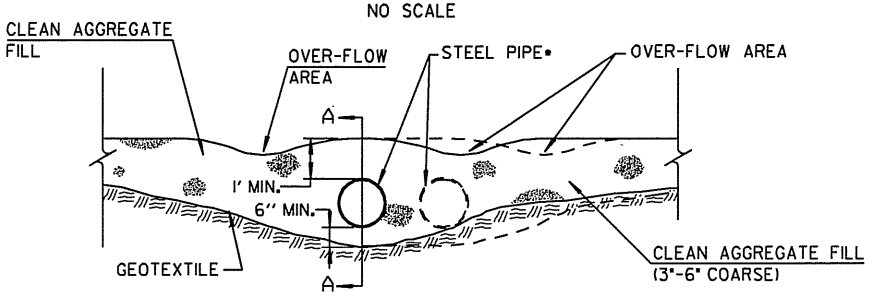
TEMPORARY STREAM CROSSING

(AGGREGATE)



SECTION A-A

NO SCALE



SECTION B-B

NO SCALE

TEMPORARY STREAM CROSSING NOTES:

A) INSTALLATION:

1. *QUANTITY, LENGTH, AND DIAMETER OF STEEL PIPE TO BE DETERMINED BY DESIGN CALCULATIONS.
2. CLEARING AND EXCAVATION OF THE STREAM BED AND BANKS SHALL BE KEPT TO A MINIMUM.
3. THE INVERT ELEVATION OF THE CULVERT SHALL BE INSTALLED ON THE NATURAL STREAMBED GRADE TO MINIMIZE INTERFERENCE WITH FISH MIGRATION.
4. GEOTEXTILE SHALL BE PLACED ON THE STREAMBED AND STREAMBANKS PRIOR TO PLACEMENT OF THE PIPE CULVERT AND AGGREGATE. THE GEOTEXTILE SHALL COVER THE STREAMBED AND EXTEND A MINIMUM OF 6 INCHES AND A MAXIMUM OF 1FOOT BEYOND THE END OF THE CULVERT AND BEDDING MATERIAL. FILTER CLOTH REDUCES SETTLEMENT AND IMPROVES CROSSING STABILITY.
5. THE CULVERT SHALL EXTEND A MINIMUM OF 1FOOT BEYOND THE UPSTREAM AND DOWNSTREAM TOE OF THE AGGREGATE PLACED AROUND THE CULVERT. IN NO CASE SHALL THE CULVERT EXCEED 40 FEET IN LENGTH.
6. WHEN THE CROSSING HAS SERVED ITS PURPOSE, ALL STRUCTURES INCLUDING CULVERTS, BEDDING, AND GEOTEXTILE MATERIALS SHALL BE REMOVED. REMOVAL OF THE STRUCTURE AND CLEAN-UP OF THE AREA SHALL BE ACCOMPLISHED WITHOUT CONSTRUCTION EQUIPMENT WORKING IN THE CHANNEL.
7. UPON REMOVAL OF THE STRUCTURE, THE STREAM SHALL IMMEDIATELY BE SHAPED TO ITS ORIGINAL CROSS-SECTION AND PROPERLY STABILIZED.
8. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.15 (TEMPORARY STREAM CROSSING) FOR ADDITIONAL DESIGN CRITERIA AND REQUIREMENTS.

B) INSPECTION AND MAINTENANCE:

1. CROSSING SHALL BE INSPECTED DAILY. NECESSARY REPAIRS SHALL BE MADE PROMPTLY.

EROSION & SEDIMENT CONTROL - TEMPORARY STREAM CROSSING	Newton Kansas	STANDARD DRAWING NUMBER ESC-1060	APPROVAL DATE:	CITY OF NEWTON 201 E. 6th, P.O. Box 426 NEWTON, KS 67114

DESIGN GUIDE 1060 - TEMPORARY STREAM CROSSING

A. **Description:** A temporary stream crossing is a small stream crossing required when construction vehicles need to cross or when in-stream utility construction is necessary.

B. **Application:** They are generally applicable to flowing streams with drainage areas less than one square mile. Structures or methodology for crossing streams with larger drainage areas should be designed by methods which more accurately define the actual hydrologic and hydraulic parameters which will affect the functioning of the structure. Crossings serve to help protect sediment from entering the stream from construction within approach areas, minimize the amount of disturbance within the stream itself, and allow vehicle access across the stream.

1. VEHICULAR CROSSINGS

a. **Planning Considerations:** Temporary stream crossings are necessary to prevent construction vehicles from damaging streambanks and continually tracking sediment and other pollutants into the flow regime. They should be planned to be in service for the shortest practical period of time and to be removed as soon as their function is completed. The designer must also be aware that such structures are subject to the rules and regulations of the U.S. Army Corps of Engineers for in-stream modifications (i.e., the 404 permit).

A temporary bridge crossing is a structure made of wood, metal, or other material which provides access across a stream or waterway. It is the preferred method for temporary stream crossings. Normally, bridge construction causes the least amount of disturbance to the stream bed and banks when compared to the other types of crossings. They can also be quickly removed and reused. In addition, temporary bridges pose the least chance for interference with fish migration when compared to the other temporary access stream crossings. A temporary culvert crossing is a structure consisting of stone and sections of circular pipe, pipe arches, or oval pipes of reinforced concrete, corrugated metal, or structural plate which are used to convey flowing water through the crossings. Temporary culverts are used where the channel is too wide for normal bridge construction or the anticipated loading of construction vehicles may prove unsafe for single span bridges. The stone, along with the temporary culverts, can be salvaged and reused.

b. **Design Criteria:** See Standard Specification Section 02490, Subsection 4.15 (Temporary Stream Crossing) for design criteria.

2. UTILITY CROSSINGS

a. **Planning Considerations:** Utility construction, by virtue of its sprawling, linear nature, frequently crosses and impacts live streams. There is a potential for excessive sediment loss into a stream by both the disturbance of the approach areas and by the work within the streambed and banks.

It is often difficult to decide what type of control to use at a utility stream crossing. A method such as the boring and jacking of pipe below a streambed, which would prevent disturbance within the watercourse, is a preferred method if it is practical. However, in cases where in-stream work is unavoidable, consideration must be given to providing adequate mitigation of sediment loss while minimizing the amount of encroachment and time spent working in the channel. Sometimes there is less damage to the environment by providing substantial controls for the approach areas and refraining from installing extensive measures in the stream itself. However, when the installation of the utility line within streambed and banks will take an extended period of construction time, consideration should be given to substantial in-stream controls or stream diversion in order to prevent excessive erosive damage.

Designers and plan reviewers should always make site visits to proposed crossing to help ensure the most appropriate stream crossing method is chosen. State and federal construction permits and corresponding requirements shall apply and be satisfied.

There are several methods for dealing with utility stream crossings which allow for work to be completed under dry conditions to prevent excessive sediment damage. Stream utility crossings plans and specifications shall be submitted to the City of Newton for review and approval, prior to construction.

b. **Design Criteria:** See Standard Specification Section 02490, Subsection 4.15 (Temporary Stream Crossing) for design criteria.

C. **Standard Drawings:** See Standard Drawing ESC-1060 (Temporary Stream Crossing).

D. **Standard Specification:** See Standard Specification Section 02490, Subsection 4.15 (Temporary Stream Crossing).

DESIGN GUIDE 1065 – TEMPORARY SLOPE BREAK

A. **Description:** Slope breaks consist of erosion control practices such as earth diversions, sediment fence or other approved devices, to minimize erosion and sedimentation along long slopes, if no other erosion control practice (temporary seeding, permanent seeding, hydrocover, etc.) is in place, or is not yet established. Slope breaks can include grading practices during construction to minimize long, steep slopes while establishing suitable topography for buildings, facilities, and other land uses.

B. **Application:** Sites with long or steep disturbed slopes.

C. **Planning Considerations:** Review the grading plan showing disturbed areas, cuts, fills, and finished elevations throughout site. Review and improve construction grading phasing plan to minimize erosion.

D. **Design Criteria:**

1. **Scheduling Construction Activities:** Schedule construction activities in such a way that the least area is disturbed at one time.

2. **Slope Breaks:** Use slope breaks, such as diversions, sediment fence or other devices to reduce the length of cut-and-fill slopes to limit sheet and rill erosion. Refer to the following Table, which provides suggested guidelines for spacing of slope breaks.

Table 1065-1: Guidelines for Spacing Slope Breaks

Slope	Spacing (ft)
33-50%	20
25-33%	40
15-25%	60
10-15%	80
6-10%	120
3-6%	200
<3%	300

3. **Surface Runoff:** Avoid disturbing natural drainageways, if possible. At each slope break, intercept runoff and channel to storm drains or stabilized watercourses. If runoff is laden with sediment, protect drain inlets with a filter or divert water to a sediment trap or basin according to the site grading plan.

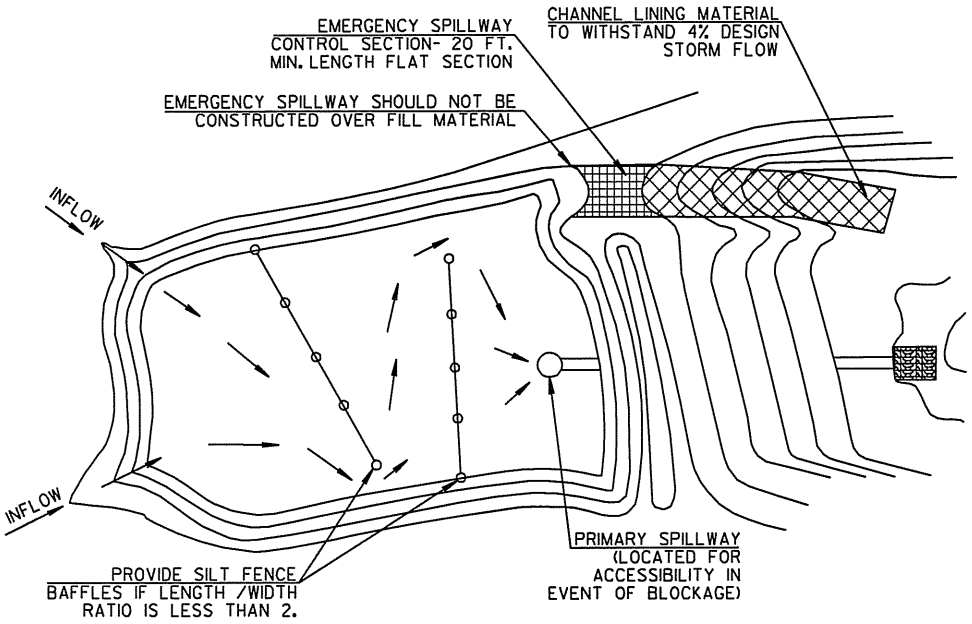
4. **Erosion Control:** Graded areas should be stabilized with mulch, vegetation, crushed stone, riprap, or other measures, as soon as work is completed or if work is interrupted for 30 or more working days.

5. **Slopes to be Vegetated:** Vegetation shall be placed on slopes of 2H:1V or flatter or 3H:1V or flatter where maintained by tractor or other equipment. Slopes should be roughened during grading operations to retain water, increase infiltration, and promote vegetative growth. Slopes should be protected from surface runoff.

6. **Borrow and Disposal Areas:** Borrow and disposal areas shall be shown on the grading plan and no closer than 50 feet to a streambank. Sediment control devices must be used on the down slope side of these areas.

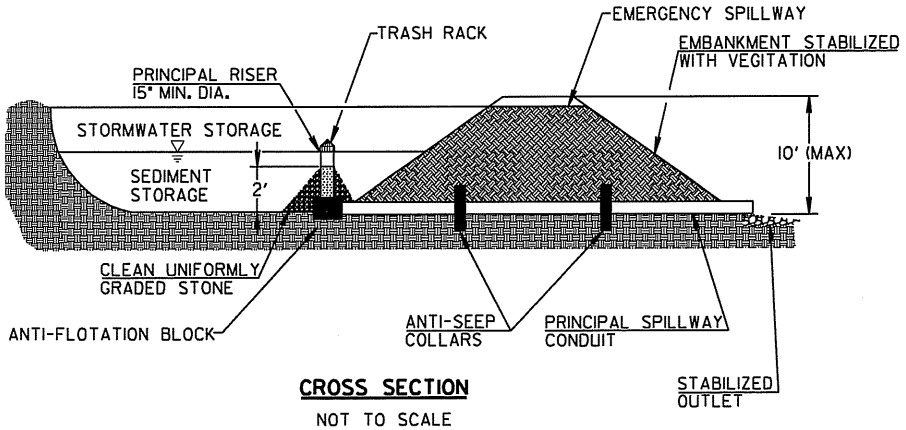
7. **Outlet:** Stable channels and waterways should be provided for runoff from the disturbed area to retain sediment on site.

TEMPORARY SEDIMENT BASIN



PLAN VIEW

NOT TO SCALE



CROSS SECTION

NOT TO SCALE

TEMPORARY SEDIMENT BASIN DESIGN DATA (REQUIRED):

DESIGN ITEM:	BASIN #1	BASIN #2	BASIN #3	UNITS	NOTES
SITE DATA:					
TRIBUTARY DRAINAGE AREA TO POND				ACRES	
50% (2 yr) DESIGN FLOW:				CFS	
4% (25 yr) DESIGN FLOW:				CFS	
POND DATA:					
MINIMUM SEDIMENT STORAGE VOLUME				CU YD	134 CY/ACRE MINIMUM
BOTTOM ELEVATION:				FT	
SEDIMENT CLEANOUT ELEV.:				FT	ELEV EQUAL TO 50% OF ORIGINAL DESIGN VOLUME.
TOP OF RISER ELEV.				FT	TOP OF DRY STORAGE VOLUME
EMERGENCY SPILLWAY ELEV.:				FT	AT OR ABOVE Q-2 ELEV. 1.0 FT MIN ABOVE PRINCIPAL SPILLWAY
TOP OF DAM ELEV.				FT	1.0 FT MIN ABOVE Q-25 ELEV.
BASIN SHAPE DATA:					
A = AREA AT NORMAL POOL				SF	
L = LENGTH OF FLOW PATH				FT	
WE = EFFECTIVE WIDTH =A/L				FT	
LENGTH TO WIDTH RATIO = L/WE					IF LENGTH-WIDTH RATIO IS LESS THAN 2, BAFFLES ARE REQUIRED
PRINCIPAL SPILLWAY DATA:					
RISER PIPE DIA				IN	15-INCH MIN. SIZE FOR 2 YEAR FLOW MIN.
BARREL PIPE DIA.				IN	15-INCH MIN. SIZE FOR 2 YEAR FLOW MIN.
RISER PIPE BASE SIZE				CY	SIZE TO PREVENT FLOTATION. 1.25 SAFETY FACTOR REQUIRED
EMERGENCY SPILLWAY DATA:					
DESIGN DEPTH IN SPILLWAY:				FT	
DESIGN VELOCITY IN SPILLWAY				FT/SEC	
LINING MATERIAL:				N/A	

DESIGN REQUIREMENTS:

1. THE PLAN AND PROFILES ARE SCHEMATIC IN NATURE. CONSTRUCTION PLANS MUST PROVIDE SPECIFIC SITE CONSTRUCTION ARRANGEMENTS. DETAILS GIVEN IN THOSE DRAWINGS SHALL BE USED AS APPROVED BY THE CITY.
2. IF THE POOL LENGTH TO WIDTH RATIO IS LESS THAN 2, INTERIOR SEDIMENT FENCE BAFFLES SHALL BE PROVIDED TO REDUCE SHORT-CIRCUITING OF THE BASIN.
3. EMERGENCY SPILLWAYS TO BE LOCATED IN A NON-FILL LOCATION WHEN FEASIBLE AND SHALL BE LINED WITH A NON- ERODIBLE MATERIAL SUCH AS RIP RAP.
4. SEE DESIGN GUIDE 1070 AND SPECIFICATION 02490, SUBSECTION 4.14 FOR DESIGN CRITERIA.

MAINTENANCE/ SAFETY REQUIREMENTS:

1. THE PERMIT HOLDER SHALL CLEAN OUT DEPOSITED SEDIMENT WHEN SEDIMENT STORAGE HAS BEEN REDUCED BY 50% OF THE ORIGINAL DESIGN STORAGE VOLUME. THE CLEANOUT LEVEL SHALL BE INDICATED ON THE RISER PIPE AS SHOWN ON THE DRAWINGS.
2. SEDIMENT BASIN SHALL BE FENCED USING CONSTRUCTION FENCE OR OTHER MATERIAL FOR SAFETY REASONS AND INCLUDE WARNING SIGNS, READING; "DANGER - "KEEP OUT".
3. SEE SPECIFICATION 02490, SUBSECTION 4.14 FOR MAINTENANCE REQUIREMENTS.

EROSION & SEDIMENT CONTROL - TEMPORARY SEDIMENT BASIN

Newton Kansas

STANDARD DRAWING NUMBER	APPROVAL DATE:	CITY OF NEWTON
ESC-1070		201 E. 6th, P.O. Box 426 NEWTON, KS 67114

DESIGN GUIDE 1070 - TEMPORARY SEDIMENT BASIN

A. **Description:** A temporary sediment basin is a temporary barrier or dam with a controlled stormwater release structure formed by constructing an embankment of compacted soil across a drainageway. It can detain sediment-laden runoff from disturbed areas in wet and dry storage long enough for the majority of the sediment to settle out.

B. **Application:** They are used below disturbed areas where the total contributing drainage area is greater than or equal to 3 acres. There must be significant space and appropriate topography for the construction of a temporary impoundment. These structures are limited to a useful life of 18 months unless they are designed as permanent impoundments. Any sediment basin detaining 30 acre-feet or more or 10 feet in height shall be designed by a professional Engineer and Kansas dam safety rules and regulations shall apply.

C. **Planning Considerations:**

1 **Effectiveness:** The effectiveness of the basin is based on primarily two factors: the system of erosion and sediment controls above the basin and the designed shape of the basin. The sediment basin is usually the final control before stormwater discharges from the site; therefore, it should be used in conjunction with erosion control practices such as temporary seeding, mulching, diversion dikes, and other sediment control devices to reduce the amount of sediment flowing into the basin.

The shape of the basin can increase its effectiveness by increasing the distance between where runoff enters the basin and where it is discharged; this will increase the settling time for the sediment.

The sediment removal efficiency problems of the temporary sediment trap are also applicable to the sediment basin. In order to contain the majority of sediment which flows to the structure, the basin should have a permanent pool, or wet storage area, and a dry storage area which dewaters over time. The volume of wet storage required to prevent short-circuiting of the basin during larger storm events must be an additional 67 cubic yards per acre of drainage area. The total storage volume of the basin at the principal spillway riser crest should therefore be 134 cubic yards per acre of drainage area.

Sediment basins, along with other perimeter controls intended to trap sediment shall be constructed as a first step in any land disturbing action and shall be made functional before upslope land disturbance takes place.

2 **Location:** To improve the effectiveness of the basin, it should be located to intercept the largest possible amount of runoff from the disturbed area. The best locations are generally low areas and natural drainageways below disturbed areas. Drainage into the basin can be improved by the use of diversion dikes and ditches. The basin must not be located in a live stream but should be located to trap runoff before it enters a stream. The basin should not be located where its failure could result in the loss of life or interruption of public utility service or roads.

3 **Multiple Use:** Sediment basins may remain in place after construction and final site stabilization are completed to serve as permanent stormwater management structures. Because the most practical location for a sediment basin is often the most practical location for a stormwater management basin, it is often desirable to utilize these structures for permanent stormwater management purposes. It should be noted that in most cases, a typical structure's outfall system will be defined during construction and post-construction periods. Care must be taken to avoid constructing an outfall system which will achieve the desired post-construction control but will not provide the requirements for construction runoff. The design for permanent ponds is beyond the scope of these standards and specifications.

D. **Design Criteria:**

Sediment Basins shall be designed by a Professional Engineer in Kansas and shall satisfy all applicable local, state and federal rules and regulations.

The embankment, reservoir, spillway and appurtenances shall be constructed as shown on plans drawings prepared by the Professional Engineer and as approved by the City of Newton.

1 **Maximum Drainage Area:** The maximum allowable drainage area to a temporary sediment basin shall be 100 acres. When the drainage area to any one temporary basin exceeds 50 acres, an alternative design procedure shall be used to more accurately define the specific hydrology and hydraulics of the site and the control measure. The design procedures in this document does not generate hydrographs, utilize storage volumes, or provide a routing of the design storms; for a large drainage area, this may result in an excessively large diameter riser or an oversized basin. Design considerations which are more accurate and project-specific than those in this specification are acceptable and encouraged with any size basin.

2 **Basin Capacity:** The design storage capacity of the basin must be at least 134 cubic yards per acre of contributing drainage area. One half of the total design volume shall be in the form of a permanent pool and the remaining half as drawdown volume. The permanent pool shall be from the low point of the basin to the elevation corresponding to one half the total storage volume. The drawdown area shall be from the elevation of the permanent pool to the crest of the principal spillway or riser pipe. Sediment should be removed from the basin when the volume of the permanent pool has been reduced by one-half. In no case shall the sediment clean out level be higher than one foot below the bottom of the dewatering device. The elevation of the sediment clean out level should be calculated and clearly marked on the plans and riser. The location of this mark on the riser normally will be under water; therefore a mark should also appear above the permanent pool a measured distance above the clean out elevation.

While attempting to attain the desired storage capacities, efforts should be made to keep embankment heights to a minimum. This precaution takes on added significance when the basin will only serve as a temporary structure or will need substantial retrofitting prior to functioning as a permanent structure. When site topography permits, the designer should give strong consideration to the use of excavation to obtain the required capacity and to possibly reduce the height of the embankment. This excavation can be performed in a manner which creates a wet storage area or which increases the storage capacity over the entire length of the basin.

a. For a natural basin, the wet storage volume may be approximated as follows:

$$V_1 = 0.4 \times A_1 \times D_1$$

where,
V_1 = the wet storage volume in cubic feet
A_1 = the surface area of the flooded area at the invert of the dewatering outlet in square feet
D_1 = the maximum depth, measured from the low point in the basin to the invert of the dewatering outlet in feet

b. For a natural basin, the dry storage volume may be approximated as follows:

$$V_2 = \{(A_1 + A_2)/2\} \times D_2$$

where,
V_2 = the dry storage volume in cubic feet
A1 = the surface area of the flooded area at the invert of the dewatering outlet in square feet

A2 = the surface area of the flooded area at the crest of the principal spillway in square feet
D2 = the depth measured from the invert of the dewatering outlet to the crest of the principal spillway in feet

Note 1: The volumes may be computed from more precise contour information or other suitable methods.

If the volume of the basin is inadequate or embankment height becomes excessive, use excavation to obtain the required volume.

3. **Basin Shape:** To improve sediment trapping efficiency of the basin, the effective flow length should be twice the effective flow width. This basin shape may be attained by properly selecting the site of the basin or by using excavation or baffles.

   a. The shape of the basin must be such that the length-to-width ratio is at least 2 to 1 according to the following equation:

      Length-to-Width Ratio = L / We

      where,
      We = A/L = the effective width
      A = the surface area of the normal pool
      L = the length of the flow path from the inflow to the outflow. If there is more than one inflow point, any inflow which carries more than 30 percent of the peak rate of inflow must meet these criteria.

   b. Baffles increase the flow length by deflecting the flow. The baffles should be placed halfway between the inflow point and the outflow. Figure 5108-1 shows the detail for baffle construction and three situations where baffles might be used.

4 **Embankment Cross Section:** For embankments of less than 10 feet, the embankment must have a minimum top width of 6 feet, and the side slopes must be 2H:1V or flatter. In the case of an embankment 10 to 14 feet in height, the minimum top width shall be 8 feet and the side slopes shall be 2.5H:1V or flatter.

5 **Spillway Design:** The outlets for the basin shall consist of a principal and an emergency spillway. These outlets must pass the peak runoff expected for a 25-year storm. If a separate emergency spillway is not feasible due to site conditions or basin geometry, the principal spillway must pass the entire peak runoff expected from the 25-year storm. An attempt to provide a separate emergency spillway should always be made. Runoff computations shall be based upon bare soil conditions. The flow through the dewatering orifice cannot be utilized when calculating the 25-year storm elevation because of its potential to become clogged; therefore, available spillway storage must begin at the principal spillway riser crest.

E. **Principal Spillway:** For maximum effectiveness, the principal spillway should consist of a vertical pipe or box of corrugated metal or reinforced concrete with a minimum diameter of 15 inches, joined by a watertight connection to a horizontal outlet pipe, or barrel extending through the embankment and outletting beyond the downstream toe of the fill.

1. **Principal Spillway Design:**

   a. If an emergency spillway is included, the principal spillway must be at least pass the peak rate of runoff from the basin drainage area for a 2-year, 24-hour storm.

      Q_p = the 2-year peak rate of runoff

   b. If an emergency spillway is not included, the principal spillway must pass the peak rate of runoff from the basin drainage area for a 25 year storm.

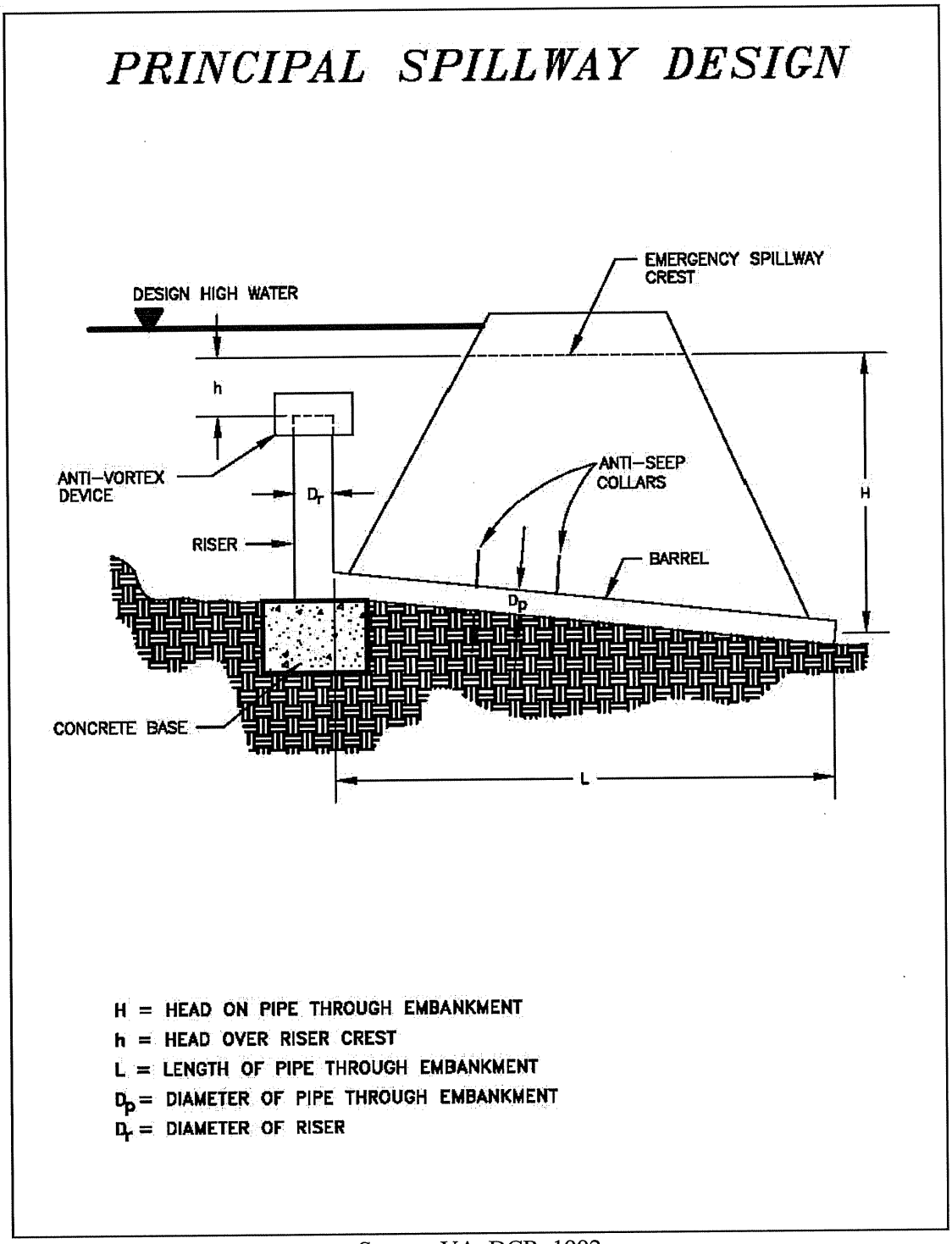
      Therefore, Q_p = the 25-year peak rate of runoff

   c. Refer to Figure 1070-1, where h is the difference between the elevation of the crest of the principal spillway and the elevation of the crest of the emergency spillway.

   d. Determine the riser diameter by choosing the smallest riser with slightly more flow capacity than the horizontal principal spillway pipe with the available head, h.

   e. Refer to Figure 1070-1 where H is the difference in elevation of the centerline of the outlet of the barrel and the crest of the emergency spillway. L is the length of the barrel through the embankment.

Figure 1070-1



Source: VA. DCR, 1992

f. Determine the appropriate barrel size which will pass the required flow volume.

2 **Design Elevations:** The crest of the principal spillway shall be set at the elevation corresponding to the total storage volume required. If the principal spillway is used in conjunction with an emergency spillway, this elevation shall be at least 1.0 foot below the crest of the emergency spillway. A minimum freeboard of 1.0 foot shall be provided between the design high water and the top of the embankment. See Figure 1070-2. If no emergency spillway is used, the crest of the principal spillway shall be at least 3

feet below the top of the embankment; a minimum freeboard of 2.0 feet shall be provided between the design high water and the top of the embankment.

3. **Additional Design Elements:** The following additional design elements shall be considered, documented in plans, specifications and the attached temporary sediment basin data sheet, and submitted to the City of Newton for review and approval, prior to construction.

   a. Principal spillway anti-vortex device
   b. Basin dewatering device (drawdown valve)
   c. Need for anti-seep collars
   d. Emergency spillway capacity and stability - The emergency spillway must pass the remainder of the 25-year peak rate of runoff not carried by the principal spillway
   e. Pedestrian safety.

4. **Temporary Sediment Basin Design Data Sheet:** The following data sheet shall be completed and submitted to the City of Newton for review and approval, prior to construction.

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

(with or without emergency spillway)

Project _____

Basin # _____ Location _____

Total area draining to basin: _____ acres.

Basin Volume Design

Wet Storage:

1 Minimum required volume = 67 cu. yds. X Total Drainage Area (acres).
67 cu. yds/acre x _____ acres = _____ cu. yds.

2 Available basin volume = _____ cu. yds. at elevation _____.
(From storage – elevation curve).

3 Excavate _____ cu. yds. to obtain required volume*.
*Elevation corresponding to required volume = invert of the dewatering orifice.

4 Available volume before cleanout required:
33 cu. yds/acre x _____ acres = _____ cu. yds.

5 Elevation corresponding to cleanout level = _____.
(From Storage – Elevation Curve).

6 Distance from invert of the dewatering orifice to cleanout level = _____ ft. (Min. = 1.0 ft.)

Dry Storage:

7 Minimum required volume = 67 cu. yds. x Total Drainage Area in acres.
67 cu. yds. X _____ acres = _____ cu. yds.

8 Total available basin volume at crest of riser* = _____ cu. yds. at elevation _____.
(From Storage – Elevation Curve).

a.

b. *Minimum = 134 cu. yds./acre of total drainage area.

9 Diameter of dewatering orifice = _____ in.

Preliminary Design Elevations:

11 Crest of Riser = _____

Top of Dam = _____

Design High Water = _____

Upstream Toe of Dam = _____

Basin Shape:

12 $\frac{\text{Length of Flow}}{\text{Effective Width}}$ $\frac{L}{We}$ = _____

If > 2, baffles are not required _____

If < 2, baffles are required _____

Runoff:

13 Q_2 = _____ cfs

14 Q_{25} = _____ cfs

Principal Spillway Design:

15. With emergency spillway, required spillway capacity $Q_p = Q_2$ = _____ cfs. (riser and barrel)

Without emergency spillway, required spillway capacity $Q_p = Q_{25}$ = _____ cfs. (riser and barrel)

16 With emergency spillway:

Assumed available head, h = _____ ft. (Using Q_2)

h = Crest of Emergency Spillway Elevation – Crest of Riser Elevation

Without Emergency spillway:

Assumed available head, h = _____ ft. (Using Q2)

H = Design High Water Elevation – Crest of Riser Elevation

17 Riser diameter, Dr = _____ in. Actual head, h = _____ ft.
Note: Avoid orifice flow conditions

18 Barrel length, l = _____ ft.
Head, H, on barrel through embankment = _____ ft.

19 Barrel diameter = _____ in.

20 Trash rack and anti-vortex device

Diameter = _____ inches.

Height = _____ inches.

Emergency Spillway Design:

21 Required spillway capacity $Q_e = Q_{25} - Q_p$ = _____ cfs.

22 Bottom width, b = _____ ft.; the slope of the exit channel, s = _____ foot/ foot; and the minimum length of the exit channel, x = _____ ft.

Anti-Seep Collar Design:

23 Depth of water at principal spillway crest, Y = _____ ft.

Slope of upstream face of embankment, Z = _____ : 1

Slope of principal spillway barrel, S_b = _____ %

Length of barrel in saturated zone, L_s = _____ ft.

24 Number of collars required = _____ dimensions = _____

Final Design Elevations:

25 Top of Dam = _____

Design High Water = _____

Emergency Spillway Crest = _____

Principal Spillway Crest = _____

Dewatering Orifice Invert = _____

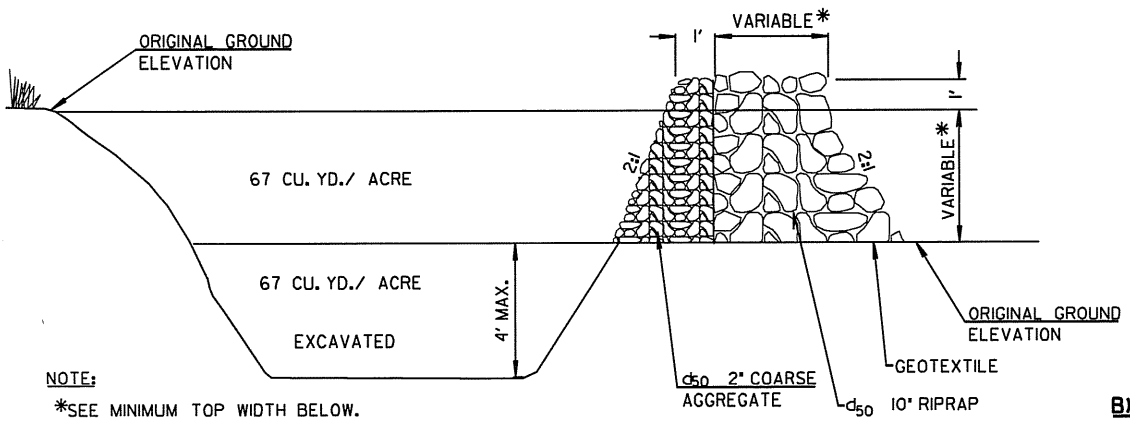
Cleanout Elevation = _____

Elevation of Upstream Toe of Dam or Excavated Bottom of "Wet Storage Area" (if excavation was performed) = _____

F. **Standard Drawings:** See Standard Drawing ESC-1070 (Temporary Sediment Basin).

G. **Standard Specification:** See Standard Specification Section 02490, Subsection 4.14 (Temporary Sediment Crossing).

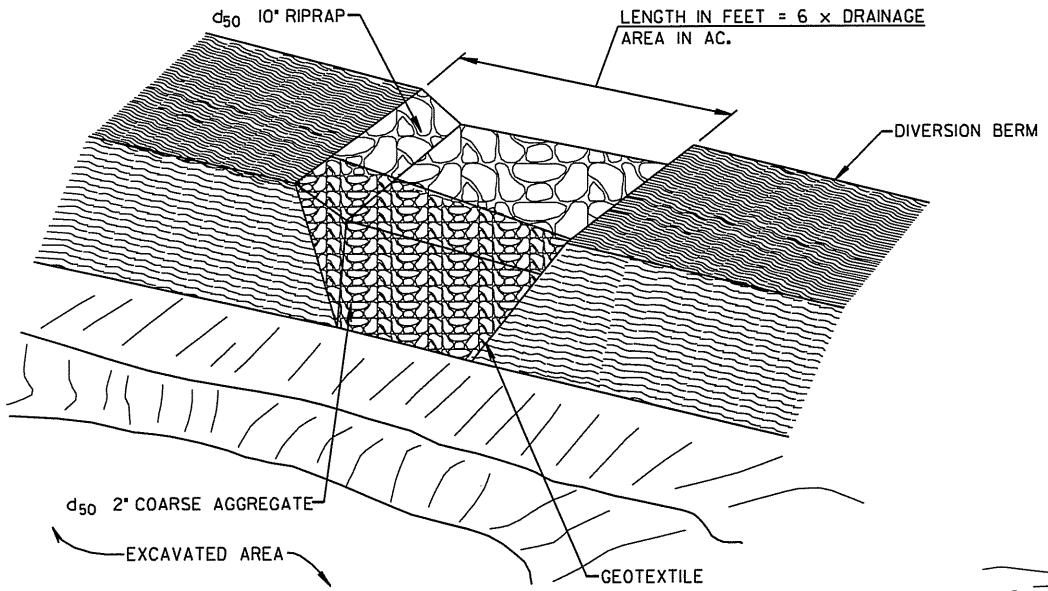
TEMPORARY SEDIMENT TRAP



NOTE:
*SEE MINIMUM TOP WIDTH BELOW.

CROSS SECTION OF OUTLET STRUCTURE

NOT TO SCALE



OUTLET STRUCTURE (PERSPECTIVE VIEW)

NOT TO SCALE

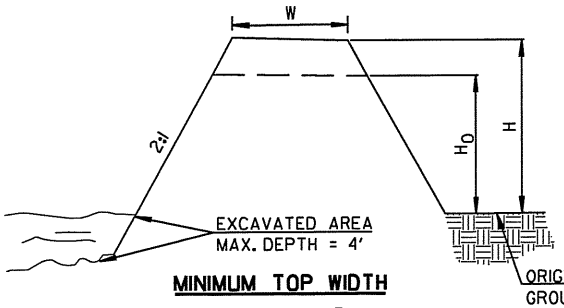
TEMPORARY SEDIMENT TRAP NOTES:

A) CONSTRUCTION:

1. THE AREA UNDER THE EMBANKMENT SHALL BE CLEARED, GRUBBED, AND STRIPPED OF ANY VEGETATION AND ROOT MAT.
2. FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION, ORGANIC MATERIAL, LARGE STONES, AND OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHOULD BE COMPACTED IN 6-INCH LAYERS BY TRAVERSING WITH CONSTRUCTION EQUIPMENT.
3. THE EARTHEN EMBANKMENT SHALL BE SEEDED WITH TEMPORARY OR PERMANENT VEGETATION IMMEDIATELY AFTER INSTALLATION.
4. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT TO MINIMIZE EROSION AND WATER POLLUTION.
5. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE UPSLOPE DRAINAGE AREA HAS BEEN STABILIZED.
6. ALL CUT AND FILL SLOPES SHALL BE 2H:IV OR FLATTER EXCEPT FOR EXCAVATED, WET STORAGE AREAS WHICH MAY BE AT A MAXIMUM IH:IV GRADE.
7. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.5 (ROCK BARRIERS) AND 4.10 (TEMPORARY DIVERSIONS).

B) INSPECTION AND MAINTENANCE:

1. INSPECT THE TEMPORARY SEDIMENT TRAP AFTER EACH STORM EVENT OF 1/2-INCH OR GREATER.
2. REMOVE AND PROPERLY DISPOSE OF SEDIMENT WHEN IT ACCUMULATES TO ONE-HALF THE DESIGN VOLUME AS INDICATED BY THE CLEAN-OUT STAKE.
3. PERIODICALLY CHECK THE EMBANKMENT, SPILLWAY, AND OUTLET APRON FOR EROSION DAMAGE, SETTLING, SEEPAGE, OR SLUMPING ALONG THE TOE AND REPAIR IMMEDIATELY.
4. REPLACE THE OUTLET STRUCTURE GRAVEL FACING IF IT BECOMES CLOGGED.
5. INSPECT VEGETATION AND RESEED IF NECESSARY.
6. REPLACE ANY DISPLACED RIPRAP SO THAT NO REPLACEMENT ROCK IS ABOVE THE DESIGN GRADE.
7. REMOVE THE TEMPORARY SEDIMENT TRAP AFTER THE DRAINAGE AREA HAS BEEN PERMANENTLY STABILIZED, INSPECTED, AND APPROVED. DO SO BY DRAINING WATER, REMOVING THE SEDIMENT TO A DESIGNATED DISPOSAL AREA, AND GRADING THE SITE TO BLEND WITH THE SURROUNDING AREA; THEN STABILIZE.
8. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.3 FOR SEDIMENT REMOVAL AND DISPOSAL REQUIREMENTS.



H	H_O	W
1.5	0.5	2.0
2.0	1.0	2.0
2.5	1.5	2.5
3.0	2.0	2.5
3.5	2.5	3.0
4.0	3.0	3.0
4.5	3.5	4.0
5.0	4.0	4.5

MINIMUM TOP WIDTH

NOT TO SCALE

EROSION & SEDIMENT CONTROL - TEMPORARY SEDIMENT TRAP

Newton Kansas

STANDARD DRAWING NUMBER	APPROVAL DATE:	CITY OF NEWTON
ESC-1080		201 E. 6th, P.O. Box 426 NEWTON, KS 67114

DESIGN GUIDE 1080 - TEMPORARY SEDIMENT TRAP

A. **Description:** A temporary sediment trap is a temporary ponding area formed by constructing an earthen embankment with a stone outlet. It serves to detain sediment-laden runoff from small-disturbed areas long enough to allow the majority of the sediment to settle out.

B. **Application:**

1 Locate the trap below disturbed areas where the total contributing drainage area is less than 3 acres.

2 The trap will be used no longer than 18 months.

3 The sediment trap may be constructed either independently or in conjunction with a temporary diversion.

C. **Planning Considerations:** Sediment traps should be used only for small drainage areas. If the contributing drainage area is 3 acres or greater, refer to Subsection 4.14, Temporary Sediment Basin. Sediment traps, along with other perimeter controls intended to trap sediment shall be constructed as a first step in any land-disturbing activity and shall be made functional before upslope land disturbance takes place.

In most cases excavation will be required to attain the necessary storage volume. Also, sediment must be periodically removed from the trap to maintain the required volume. Plans should detail how excavated sediment is to be disposed of.

D. **Design Criteria:**

1 **Trap Capacity:** The sediment trap must have an initial storage volume of 134 cubic yards per acre of drainage area, half of which shall be in the form of a permanent pool or wet storage to provide a stable settling medium. The remaining half shall be in the form of a drawdown or dry storage which will provide extended settling time during less frequent, larger storm events. The volume of the wet storage shall be measured from the low point of the excavated area to the base of the stone outlet to the crest of the stone outlet overflow mechanism. Sediment should be removed from the basin when the volume of the wet storage is reduced by one-half.

For a sediment trap the wet storage volume may be approximated as follows:

$$V_1 = 0.85 \times A_1 \times D_1$$

where,
V_1 = the wet storage volume in cubic feet
A_1 = the surface area of the flooded area at the base of the stone outlet in square feet.
D_1 = the maximum depth in feet, measured from the low point in the trap to the base of the stone outlet

The dry storage volume may be approximated as follows:

$$V_2 = \{(A_1 + A_2)/2\} \times D_2$$

where,
V_2 = the dry storage volume in cubic feet
A_1 = the surface area of the flooded area at the base of the stone outlet in square feet

A_2 = the surface area of the flooded area at the crest of the stone outlet overflow mechanism, in square feet
D_2 = the depth in feet, measured from the base of the stone outlet to the crest of the stone outlet

The design shall attempt provide a storage area which has a minimum 2:1 length to width ratio measured from the point of maximum runoff introduction to outlet.

2 **Excavation:** Side slopes of excavated areas should be no steeper than 1H:1V. The maximum depth of excavation within the wet storage area should be 4 feet to facilitate clean-out and for site safety considerations.

3 **Outlet Structure:** The outlet structure for the sediment trap shall consist of a stone section of the embankment located at the low point in the basin. A combination of coarse aggregate and riprap shall be used to provide for filtering and detention as well as outlet stability. The smaller stone, which enhances filter efficiency, shall be 2-inch, and riprap shall be 10-inch d_{50}. Filter cloth shall be placed at the stone-soil interface to act as a separator. The minimum length of the outlet shall be 6 feet times the number of acres comprising the total area draining to the trap. The crest of the stone outlet must be at least 1.0 foot below the top of the embankment to ensure that the flow will travel over the stone and not the embankment.

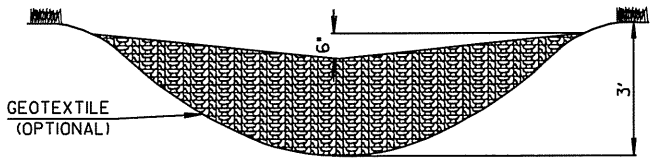
4 **Embankment Cross Section:** The maximum height of the sediment trap embankment shall be 5 feet as measured from the base of the stone outlet. Minimum top widths (W) and outlet heights (H_o) for various embankment heights (H) are shown in Standard Drawing ESC-1080. Side slopes of the embankment shall be 2H:1V or flatter.

5 **Removal:** Sediment traps must be removed after the contributing drainage area is stabilized. Restore original grade elevations and stabilize soil throughout limits of sediment trap, after removal.

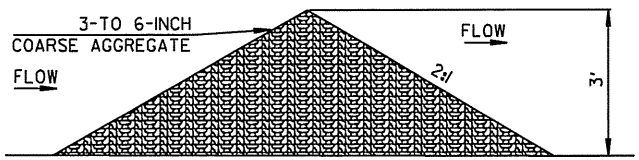
E. **Standard Drawings:** See Standard Drawing ESC-1080 (Temporary Sediment Trap).

F. **Standard Specification:** See Standard Specification Section 02490, Subsections 4.5 (Rock Barrier) and 4.10 (Temporary Diversion).

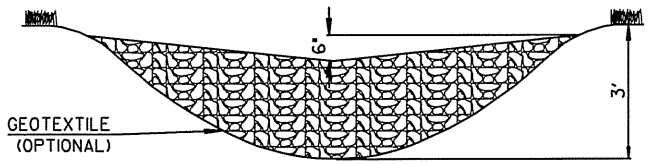
ROCK CHECK DAM



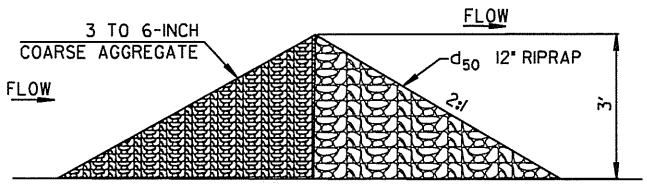
2 ACRES OR LESS OF DRAINAGE AREA
NOT TO SCALE



(SIDE VIEW)
NOT TO SCALE



2-10 ACRES OF DRAINAGE AREA
NOT TO SCALE



(SIDE VIEW)
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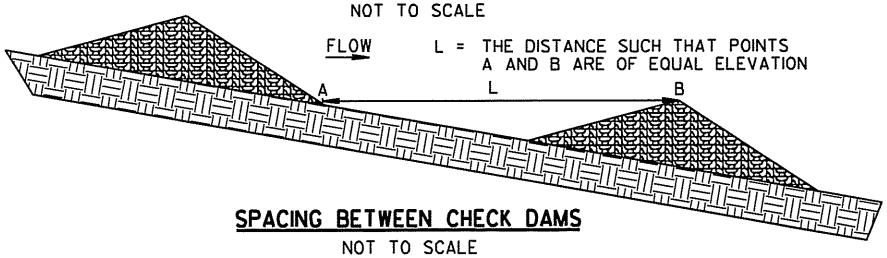


SPACING BETWEEN CHECK DAMS
NOT TO SCALE

ROCK CHECK DAM NOTES:

A) CONSTRUCTION:

1. THE DRAINAGE AREA OF THE DITCH OR SWALE BEING PROTECTED SHALL NOT EXCEED 2 ACRES WHEN A COARSE AGGREGATE IS USED ALONE AND SHALL NOT EXCEED 10 ACRES WHEN A COMBINATION OF CLASS I RIPRAP AND COARSE AGGREGATE IS USED. AN EFFORT SHOULD BE MADE TO EXTEND THE STONE TO THE TOP OF CHANNEL BANKS.
2. THE MAXIMUM HEIGHT OF THE DAM SHALL BE 3 FEET. THE CENTER OF THE CHECK DAM IS AT THE SAME ELEVATION AS THE TOP OF THE OUTER EDGES.
3. FOR ADDED STABILITY, THE BASE OF THE CHECK DAM CAN BE KEYED INTO THE SOIL APPROXIMATELY 6 INCHES.
4. THE MAXIMUM SPACING BETWEEN THE DAMS SHOULD BE SUCH THAT THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM DAM.
5. STONE SHOULD BE PLACED ACCORDING TO THE CONFIGURATION TO THE LEFT. HAND OR MECHANICAL PLACEMENT WILL BE NECESSARY TO ACHIEVE COMPLETE COVERAGE OF THE DITCH OR SWALE AND TO ENSURE THAT THE CENTER OF THE DAM IS LOWER THAN THE EDGES.
6. GEOTEXTILE MAY BE USED UNDER THE STONE TO PROVIDE A STABLE FOUNDATION AND TO FACILITATE REMOVAL OF THE STONE.

B) INSPECTION AND MAINTENANCE:

1. CHECK DAMS SHOULD BE CHECKED FOR SEDIMENT ACCUMULATION AFTER EACH STORM EVENT OF 1/2-INCH OR GREATER. SEDIMENT SHOULD BE REMOVED WHEN IT REACHES ONE HALF OF THE ORIGINAL HEIGHT OF THE DAM.
2. REGULAR INSPECTIONS SHOULD BE MADE TO ENSURE THAT THE CENTER OF THE DAM IS LOWER THAN THE EDGES. EROSION CAUSED BY HIGH FLOWS AROUND THE EDGES OF THE DAM SHOULD BE CORRECTED.
3. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.3 FOR SEDIMENT REMOVAL AND DISPOSAL REQUIREMENTS.

C) REMOVAL OF PRACTICE:

UNLESS THEY ARE TO BE PERMANENT CHECK DAMS SHALL BE REMOVED WHEN THEIR USEFUL LIFE HAS BEEN COMPLETED. IN TEMPORARY DITCHES AND SWALES, CHECK DAMS SHOULD BE REMOVED AND THE DITCH FILLED. IN PERMANENT STRUCTURES, CHECK DAMS SHALL BE REMOVED WHEN A PERMANENT LINING IS INSTALLED. IN THE CASE OF GRASS-LINED DITCHES, CHECK DAMS SHOULD BE REMOVED WHEN THE GRASS HAS MATURED SUFFICIENTLY TO PROTECT THE DITCH OR SWALE. THE AREA BENEATH THE CHECK DAMS SHOULD BE SEEDED AND MULCHED IMMEDIATELY AFTER THEY ARE REMOVED. THE USE OF FILTER CLOTH UNDERNEATH THE STONE WILL MAKE REMOVAL OF THE STONE EASIER.

NOTE: ALTERNATE CHECK DAM MATERIAL INCLUDES SEDIMENT FENCE (REINFORCED).

EROSION & SEDIMENT CONTROL - TEMPORARY CHECK DAM

Newton Kansas

STANDARD DRAWING NUMBER	APPROVAL DATE:	CITY OF NEWTON
ESC-1090		201 E. 6th, P.O. Box 426 NEWTON, KS 67114

DESIGN GUIDE 1090 – TEMPORARY CHECK DAM

A. **Description:** Check dams are small temporary dams constructed across a swale or drainage ditch. These can be constructed of Rock Barriers or Sediment Fence (Reinforced) under low flow conditions. See Standard Specification Section 02490, Subsections 4.5 (Rock Barriers) and 4.4 (Sediment Fence).

B. **Application:** Check dams reduce the velocity of concentrated stormwater flows, thereby reducing erosion of the swale or ditch. They also trap sediment generated from adjacent areas or the ditch itself, by creating ponding areas for the runoff.

C. **Planning Considerations:** Permanent vegetation or structural lining shall be installed as promptly as possible after flow is confined, in addition to installing check dams.

   Remove sedimentation, restore plan grade elevations and reseed as necessary after check dams are removed.

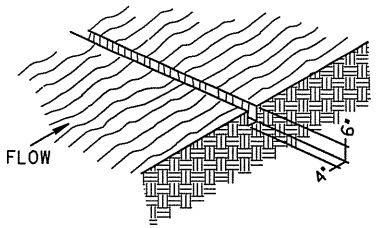
   Care shall be taken to remove all stone when the dam is removed, including any stone which has washed downstream. Geotextile fabric may be used under the rock for easier removal.

D. **Standard Drawings:** See Standard Drawing ESC-1090 (Temporary Check Dam).

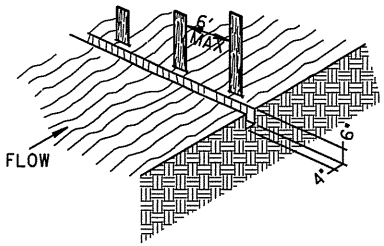
E. **Standard Specification:** See Standard Specification Section 02490, Subsections 4.4 (Sediment Fence) and 4.5 (Rock Barrier).

SEDIMENT FENCE

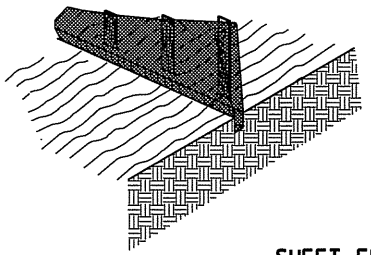
1. EXCAVATE A 6"x4" TRENCH.



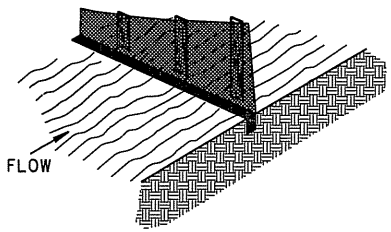
2. SET THE STAKES ALONG THE DOWN SLOPE SIDE OF THE TRENCH.



3. STAPLE GEOTEXTILE MATERIAL TO STAKES AND EXTEND IT INTO AND AROUND THE BOTTOM OF THE TRENCH.

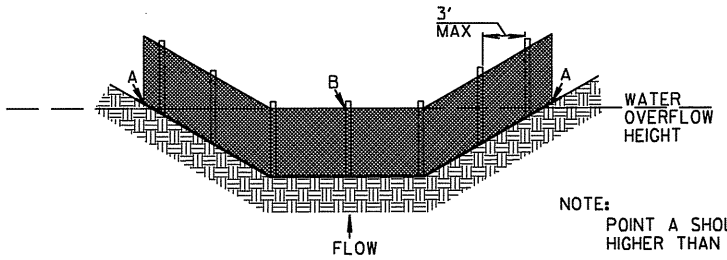


4. BACKFILL AND COMPACT THE EXCAVATED SOIL OVER THE GEOTEXTILE IN THE TRENCH.



SHEET FLOW INSTALLATION (PERSPECTIVE VIEW)

NOT TO SCALE



NOTE: POINT A SHOULD BE HIGHER THAN POINT B.

DRAINAGEWAY INSTALLATION (FRONT ELEVATION)

NOT TO SCALE

SEDIMENT FENCE NOTES:

A) INSTALLATION:

1. THE HEIGHT OF SEDIMENT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE AND SHALL NOT EXCEED 34 INCHES ABOVE THE GROUND SURFACE.
2. THE FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE UNAVOIDABLE, FILTER CLOTH SHALL BE SECURELY SPLICED TOGETHER ONLY AT SUPPORT POSTS, WITH A MAX 6-INCH OVERLAP.
3. DIG A TRENCH AT LEAST 6 INCHES DEEP AND 4 INCHES WIDE ALONG THE FENCE ALIGNMENT.
4. DRIVE POSTS AT LEAST 24 INCHES INTO THE GROUND ON THE DOWNSLOPE SIDE OF THE TRENCH. SPACE POSTS A MAXIMUM OF 6 FEET APART.
5. EXTRA-STRENGTH SEDIMENT FENCE FABRIC SHALL BE USED. POSTS FOR THIS TYPE OF FABRIC SHALL BE PLACED A MAXIMUM OF 6 FEET APART. THE SEDIMENT FABRIC SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING A MINIMUM OF ONE INCH LONG. HEAVY-DUTY WIRE STAPLES OR TIE-WIRES, AND EIGHT INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. PLACE THE BOTTOM 1 FOOT OF FABRIC IN THE MINIMUM-OF-6-INCH DEEP TRENCH, LAPPING TOWARD THE UPSLOPE SIDE. BACKFILL WITH COMPACTED EARTH OR GRAVEL.
7. IF A SEDIMENT FENCE IS TO BE CONSTRUCTED ACROSS A DITCH LINE OR SWALE, IT MUST BE OF SUFFICIENT LENGTH TO ELIMINATE ENDFLOW, AND THE PLAN CONFIGURATION SHALL RESEMBLE AN ARC OR HORSESHOE, PLACED ON A CONTOUR WITH THE ENDS ORIENTED UPSLOPE. EXTRA-STRENGTH SEDIMENT FABRIC SHALL BE USED WITH A MAXIMUM 3-FOOT SPACING OF POSTS.
8. TO REDUCE MAINTENANCE, EXCAVATE A SHALLOW SEDIMENT STORAGE AREA IN THE UPSLOPE SIDE OF THE FENCE. PROVIDE GOOD ACCESS IN AREAS OF HEAVY SEDIMENTATION FOR CLEAN OUT AND MAINTENANCE.
9. SEDIMENT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS ESTABLISHED PERMANENT VEGETATION.
10. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.4 (SEDIMENT FENCE)

B) TROUBLESHOOTING:

1. DETERMINE THE EXACT LOCATION OF UNDERGROUND UTILITIES, BEFORE FENCE INSTALLATION SO UTILITIES ARE NOT DISTURBED.
2. GRADE ALIGNMENT OF FENCE AS NEEDED TO PROVIDE A BROAD, NEARLY LEVEL AREA UPSTREAM OF FENCE TO ALLOW SEDIMENT COLLECTION AREA.

C) INSPECTION AND MAINTENANCE:

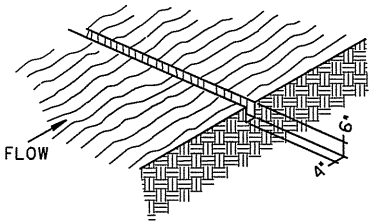
1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REMOVE SEDIMENT DEPOSITS AS DIRECTED BY ENGINEER TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. AVOID DAMAGING OR UNDERMINING THE FENCE DURING CLEANOUT. SEDIMENT ACCUMULATION SHOULD NOT EXCEED ½THE HEIGHT OF THE FENCE.
4. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS, AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY AND COMPLETELY STABILIZED.
5. MATERIAL REMOVED FROM BMP'S SHALL BE WASTED ON SITES APPROVED BY THE ENGINEER AS TO SUITABILITY, APPEARANCE, AND SITE LOCATION. DISPOSAL SITES SHALL ALSO BE ACCEPTABLE TO KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT, KANSAS DIVISION OF WATER RESOURCES, AND US ARMY CORE OF ENGINEERS.
6. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.3 FOR SEDIMENT REMOVAL AND DISPOSAL REQUIREMENTS.

EROSION & SEDIMENT CONTROL - SEDIMENT FENCE

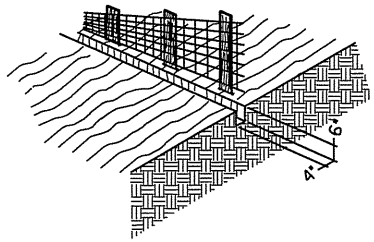
Newton Kansas	STANDARD DRAWING NUMBER	APPROVAL DATE:	CITY OF NEWTON
	ESC-1100		201 E. 6th, P.O. Box 426 NEWTON, KS 67114

SEDIMENT FENCE (REINFORCED)

1. EXCAVATE A 6"x4" TRENCH.

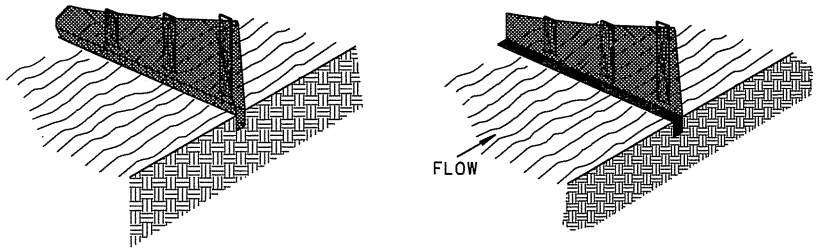


2. SET THE METAL T-POSTS OR FENCE POSTS ON THE DOWNSLOPE SIDE OF THE TRENCH. SECURE WIRE FENCING TO THE POSTS.



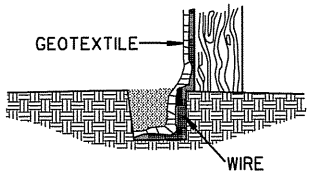
3. ATTACH THE GEOTEXTILE FABRIC TO THE WIRE FENCE AND EXTEND IT INTO AND AROUND THE BOTTOM OF THE TRENCH.

4. BACKFILL AND COMPACT THE EXCAVATED SOIL.



EXTENSION OF FABRIC AND WIRE INTO THE TRENCH

NOT TO SCALE



SECTIONAL FENCE ANCHOR DETAIL

NOT TO SCALE

SEDIMENT FENCE (REINFORCED) NOTES:

A) CONSTRUCTION:

1. FENCING SHALL BE 42-INCHES IN HEIGHT.
2. WIRE FENCE SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES AND STAPLES. THE LOWER TENSION WIRE, BRACE AND TRUSS RODS. DRIVE ANCHORS, AND POST CAPS ARE NOT REQUIRED EXCEPT ON THE ENDS OF THE FENCE.
3. SEDIMENT FENCE SHALL BE FASTENED SECURELY TO THE WIRE FENCE WITH TIES SPACED EVERY 24 INCHES AT THE TOP AND MID-SECTION.
4. SEDIMENT FENCE AND WIRE SHALL BE EMBEDDED A MINIMUM OF 8-INCHES INTO THE GROUND.
5. WHEN TWO SECTIONS OF GEOTEXTILE FABRIC ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6-INCHES AND FOLDED.
6. WIRE FENCE WILL BE BETWEEN 9 AND 14 GAUGE AND SHALL HAVE A MAXIMUM MESH SPACING OF 6-INCHES.
7. SEDIMENT FENCE SHALL MEET THE FOLLOWING REQUIREMENTS FOR GEOTEXTILE CLASS F: ADDITIONAL SPECIFICATIONS ARE FOUND IN ASTM 6461.

SEDIMENT FENCE REQUIREMENTS

TENSION STRENGTH	50 LB/IN OR MORE	ASTM 4632
TENSION MODULS	20 LB/IN OR MORE	ASTM 4632
FLOW RATE	0.3 GAL/FT²/MINUTE OR LESS	ASTM5141
FILTERING EFFICIENCY	75% OR MORE	ASTM5141

B) INSTALLATION:

1. THE HEIGHT OF SEDIMENT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE AND SHALL NOT EXCEED 34 INCHES ABOVE THE GROUND SURFACE.
2. THE FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE UNAVOIDABLE, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT SUPPORT POSTS, WITH A MIN. 6-INCH OVERLAP. AND SECURELY SEALED.
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES WIDE AND 6 INCHES DEEP ON THE UPSLOPE SIDE OF THE PROPOSED LOCATION OF THE FENCE.
4. WHEN WIRE SUPPORT IS USED, STANDARD-STRENGTH FILTER CLOTH MAY BE USED. POSTS FOR THIS TYPE OF INSTALLATION SHALL BE PLACED A MAXIMUM OF 10 FEET APART. THE WIRE MESH FENCE MUST BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES, OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 2 INCHES AND SHALL NOT EXTEND MORE THAN 34 INCHES ABOVE THE ORIGINAL GROUND SURFACE. THE STANDARD-STRENGTH FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 8 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
5. IF A SEDIMENT FENCE IS TO BE CONSTRUCTED ACROSS A DITCH LINE OR SWALE, IT MUST BE OF SUFFICIENT LENGTH TO ELIMINATE ENDFLOW, AND THE PLAN CONFIGURATION SHALL RESEMBLE AN ARC OR HORSESHOE WITH THE ENDS ORIENTED UPSLOPE. EXTRA-STRENGTH FILTER FABRIC SHALL BE USED FOR THIS APPLICATION WITH A MAXIMUM 3-FOOT SPACING OF POSTS.
6. THE 4 INCH BY 6 INCH TRENCH SHALL BE BACKFILLED AND THE SOIL COMPACTED OVER THE FILTER FABRIC.
7. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.4 (SEDIMENT FENCE)

C) INSPECTION AND MAINTENANCE:

1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. MAINTENANCE SHALL BE PERFORMED AS DIRECTED BY ENGINEER AND SEDIMENT BUILD-UPS REMOVED WHEN BULGES DEVELOP IN THE SEDIMENT FENCE OR WHEN SEDIMENT REACHES 50% OF THE FENCE HEIGHT. AVOID DAMAGING OR UNDERMINING THE FENCE DURING CLEAN OUT.
4. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS, AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
5. SEE SPECIFICATION SECTION 02490, SUBSECTION 4.3 FOR SEDIMENT REMOVAL AND DISPOSAL REQUIREMENTS.

EROSION & SEDIMENT CONTROL - SEDIMENT FENCE (REINFORCED)	Newton Kansas	STANDARD DRAWING NUMBER ESC-1110	APPROVAL DATE:

CITY OF NEWTON
201 E. 6th, P.O. Box 426
NEWTON, KS 67114

DESIGN GUIDE 1100 - SEDIMENT FENCE

I. STANDARD SEDIMENT FENCE

A. **Description:** Sediment fence is a temporary sediment barrier consisting of a synthetic fabric stretched across and attached to supporting posts and entrenched or sliced in place. See Standard Drawing ESC-1100, for details.

B. **Application:**

1 To intercept and detain small amounts of sediment from disturbed areas of limited extent in order to prevent sediment from leaving the construction site.

2 To decrease the velocity of sheet flows.

C. **Planning Considerations:** Prior to start of construction, sediment fence placement should be designed by a qualified professional. Plans and specifications should be referred to by field personnel throughout the construction process.

D. **Design Criteria:**

1 **Drainage Area:** Limited to ¼ acre per 100 feet of fence. Area is further restricted by slope steepness as shown in Table 1100-1.

2 **Location:** Fence should be built on a nearly level grade and at least 10 feet from the toe of the slope to provide a broad shallow sediment pool. Install on the contour where fence can intercept runoff as a sheet flow, not in channels, waterways, or other concentrated flow paths and not attached to existing trees.

3 **Length:** Maximum of 600 feet. Flare ends of fence uphill to temporarily impound water.

Table 1100-1: Typical Land Slope and Distance for Sediment Fence

Land Slope (%)	Maximum Slope Distance* above Fence (feet)
Less than 2	150
2 to 5	100

* Follow manufacturer's recommendations for proper placing.

4 **Spacing of Support Posts:** 10 feet maximum for fence supported by wire; 6 feet maximum for high strength fabric without supportive wire backing.

5 **Trench:** Bottom 1 foot of fence must be buried minimum of 6 inches deep, per Standard Drawing ESC-1100.

6 **Impounded Water Depth:** Not to exceed 1.5 feet at any point along the fence.

7 **Support Posts:** 4-inch diameter wood or 1.33 lb./linear foot steel, buried or driven to a depth of 24 inches with support wire; 2-inch square wood or 1.0 lb./linear foot steel without support wire. Steel posts should have projections for fastening fabric.

8 **Synthetic Geotextile Fabric:** Conforming to specifications in the table below and containing ultraviolet light inhibitors and stabilizers. Minimum design life of 6 months.

Table 114-2: Example Specifications for Sediment Fence Fabric

Physical Property	Minimum Requirement	Test
Filtering Efficiency	75%	ASTM 5141
Tensile Strength at 20% (maximum) elongation*: Standard strength	30 lb./ linear inch	ASTM 4632
High strength	50 lb./linear inch	ASTM 4632
Flow Rate	0.2 gal./sq.ft./minute	ASTM 5141
Ultraviolet Radiation Stability	90 %	ASTM-G-26

* Properties are reduced by 50% after 6 months of installation.

See Standard Drawing ESC-1100, Sediment Fence for additional details.

9 **Installation:** Sediment fence shall be installed using sediment fence installation machines specifically manufactured for the purpose of installing sediment fence.

II. SEDIMENT FENCE (REINFORCED)

A. **Description:** A temporary barrier of Geotextile Class F over wire fence is used to intercept sediment-laden runoff from small drainage areas.

B. **Application:** Sediment Fence (Reinforced) reduces runoff velocity and allows for the deposition of transported sediment. Limits imposed by ultraviolet light stability of the fabric will dictate the maximum period that the sediment fence may be used.

1 Sediment Fence (Reinforced) provides a barrier that collects and holds debris and soil, protecting sensitive areas, woods, and wetlands.

2 Sediment Fence (Reinforced) can be used where the installation of a dike would destroy sensitive areas, woods, and wetlands.

3 Sediment Fence (Reinforced) shall be placed as close to the contour as possible. No section of sediment fence should exceed a longitudinal grade of 5% for a distance of more than 50 feet.

C. **Planning Considerations:** See Standard Drawing ESC-1110, Sediment Fence (Reinforced) for additional details.

D. **Design Criteria:** Length of the flow above a Sediment Fence (Reinforced) shall conform to the limitations in Table 1100-3:

Table 1100-3: Length of Super Sediment Fence

Slope	Slope Steepness	Slope Length (maximum)	Sediment Fence Length (maximum)
0 – 10%	0 – 10:1	Unlimited	Unlimited
10 – 20%	10:1 – 5:1	200 feet	1,500 feet
20 – 33%	5:1 – 3:1	100 feet	1,000 feet
33 – 50%	3:1 – 2:1	100 feet	500 feet
50% +	2:1 +	50 feet	250 feet

Ends of geotextile fabric shall be overlapped, folded, and stapled to prevent sediment bypass.

See Standard Drawing ESC-11, Super Sediment Fence for additional details.

III. REFERENCES

A. **Standard Drawings:** See Standard Drawings ESC-1100 (Sediment Fence) and ESC-1110 (Sediment Fence – Reinforced).

B. **Standard Specification:** See Standard Specification Section 02490, Subsection 4.4.

DESIGN GUIDE 1115 – STRAW WATTLE

A. **Description:** Log or wattle products are tubes of open weave containment material filled with rice or wheat straw fibers and used as a small height barrier for diversion or sedimentation devices. They come in a variety of diameters and lengths.

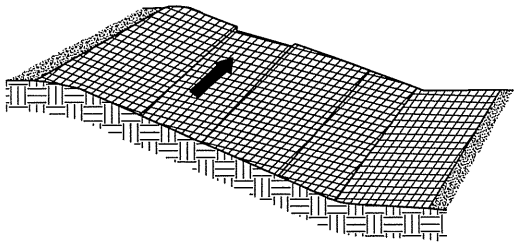
B. **Application:** Logs or wattles can be used as perimeter control for disturbed areas of one quarter acre or less, along contours as slope breaks, for inlet protection, for ditch checks, and for streambank protection.

C. **Planning Considerations:** This type of sediment barrier is designed for surface flows not exceeding 1 cfs, slopes 1H:1V or flatter, and areas where sediment fence in not practicable.

D. **Design Criteria:** Logs or wattles should be designed and used as per manufacturer's recommendations for each specific products.

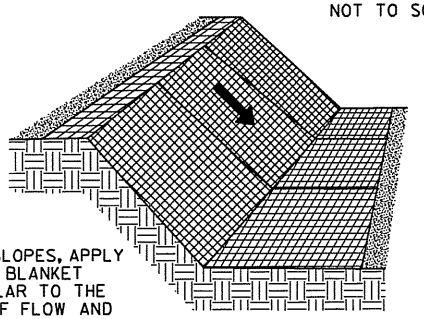
E. **Standard Specification:** See Standard Specification Section 02490, Subsections 4.7 (Straw Wattle).

EROSION CONTROL BLANKET (I)



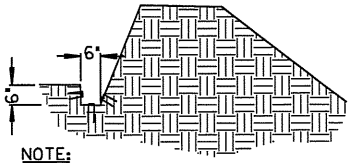
NOTE:
ON SHALLOW SLOPES, PROTECTIVE EROSION CONTROL BLANKETS MAY BE APPLIED ACROSS THE SLOPE.

SHALLOW SLOPE
NOT TO SCALE



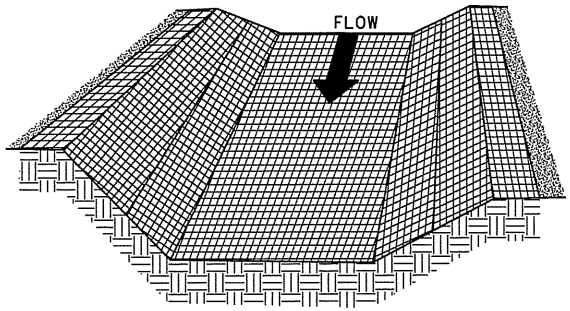
NOTE:
ON STEEP SLOPES, APPLY PROTECTIVE BLANKET PERPENDICULAR TO THE DIRECTION OF FLOW AND ANCHOR SECURELY.

STEEP SLOPE
NOT TO SCALE



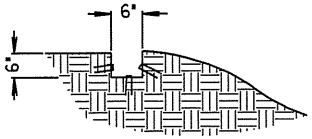
NOTE:
WHERE THERE IS A BERM AT THE TOP OF THE SLOPE, BRING THE MATERIAL OVER THE BERM AND ANCHOR IT BEHIND THE BERM.

SLOPE BERM
NOT TO SCALE



NOTE:
IN DITCHES, APPLY PROTECTIVE COVERING PARALLEL TO THE DIRECTION OF FLOW. USE CHECK SLOTS AS REQUIRED. AVOID JOINING MATERIAL IN THE CENTER OF THE DITCH IF AT ALL POSSIBLE. FOLLOW BLANKET MANUFACTURER'S RECOMMENDATIONS FOR ALLOWABLE VELOCITY AND SHEAR STRESS.

DITCH
NOT TO SCALE



NOTE:
BRING MATERIAL DOWN TO A LEVEL AREA BEFORE TERMINATING THE INSTALLATION.

TOP OF SLOPE BLANKET ANCHOR SLOT
NOT TO SCALE

EROSION CONTROL BLANKET NOTES (I):

A) SITE PREPARATION:

AFTER SITE HAS BEEN SHAPED AND GRADED, PREPARE A FRIABLE SEEDBED RELATIVELY FREE FROM CLODS AND ROCKS MORE THAN 1½ INCHES IN DIAMETER AND ANY FOREIGN MATERIAL THAT WILL PREVENT UNIFORM CONTACT OF THE PROTECTIVE COVERING WITH THE SOIL SURFACE.

B) PLANTING:

LIME, FERTILIZE, AND SEED IN ACCORDANCE WITH SEEDING OR PLANTING PLAN. WHEN USING JUTE MESH ON A SEEDED AREA, APPLY APPROXIMATELY ONE HALF THE SEED AFTER LAYING THE MAT. THE PROTECTIVE COVERING CAN BE LAID OVER SPRIGGED AREAS WHERE SMALL GRASS PLANTS HAVE BEEN INSERTED INTO THE SOIL. WHERE GROUND COVERS ARE TO BE PLANTED, LAY THE PROTECTIVE COVERING FIRST AND THEN PLANT THROUGH THE MATERIAL AS PER PLANTING PLAN.

C) LAYING AND STAPLING:

IF INSTRUCTIONS HAVE BEEN FOLLOWED, ALL NEEDED CHECK SLOTS WILL HAVE BEEN INSTALLED, AND THE PROTECTIVE COVERING WILL BE LAID ON A FRIABLE SEEDBED FREE FROM CLODS, ROCKS, ROOTS, ETC. THAT MIGHT IMPEDE GOOD CONTACT.

1. START LAYING THE PROTECTIVE COVERING FROM THE TOP OF THE CHANNEL OR SLOPE AND UNROLL DOWN-GRADE. ALLOW TO LAY LOOSELY ON SOIL; DO NOT STRETCH.
2. UPSLOPE ENDS OF THE BLANKET SHOULD BE BURIED IN AN ANCHOR SLOT NO LESS THAN 6-INCHES DEEP. TAMP EARTH
3. FIRMLY OVER THE MATERIAL, WHEN TOP IS RELATIVELY FLAT, EXTEND BLANKET ABOUT 40 INCHES AWAY FROM SLOPE, STAPLE THE MATERIAL AT A MINIMUM OF EVERY 12 INCHES ACROSS THE TOP END.
4. EDGES OF THE MATERIAL SHALL BE STAPLED EVERY 3 FEET. WHERE MULTIPLE WIDTHS ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHALL BE OVERLAPPED A MINIMUM OF 6 INCHES AND STAPLED TOGETHER.
5. STAPLES SHALL BE PLACED DOWN THE CENTER, STAGGERED WITH THE EDGES AT 3-FOOT INTERVALS.
6. SEE SPECIFICATION SECTION 02490, SUBSECTION 3.8 (EROSION CONTROL BLANKETS).

D) TROUBLESHOOTING:

CONSULT WITH A QUALIFIED DESIGN PROFESSIONAL, IF ANY OF THE FOLLOWING OCCUR;

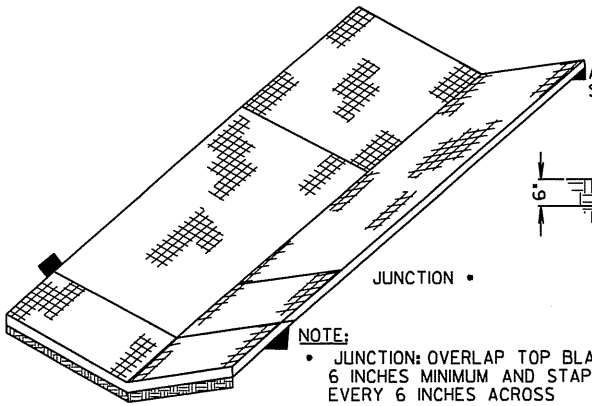
1. MOVEMENT OF THE BLANKET OR EROSION UNDER THE BLANKET IS OBSERVED.
2. VARIATIONS IN TOPOGRAPHY ON SITE INDICATE EROSION CONTROL MAT WILL NOT FUNCTION AS INTENDED; CHANGES IN PLAN MAY BE NEEDED, OR A BLANKET WITH A SHORTER OR LONGER LIFE MAY BE NEEDED.
3. DESIGN SPECIFICATIONS FOR SEED VARIETY, SEEDING DATES, OR EROSION CONTROL MATERIALS CANNOT BE MET; SUBSTITUTION MAY BE REQUIRED, UNAPPROVED SUBSTITUTIONS COULD RESULT IN FAILURE TO ESTABLISH VEGETATION.

E) MAINTENANCE & INSPECTION

INSPECTION CONTROLS AFTER EACH RAIN EVENT OF ½ INCH OR GREATER, AND EVERY 7 DAYS UNTIL VEGETATION IS ESTABLISHED, FOR EROSION OR UNDERMINING BENEATH THE NETTING, BLANKETS, OR MATS. IF ANY AREA SHOWS EROSION, PULL BACK THAT PORTION OF THE MATERIAL, ADD SOIL, TAMP DOWN, AND RESEED; RESECURE THE MATERIAL IN PLACE. IF NETTING, BLANKETS OR MATS BECOME DISLOCATED OR DAMAGED, REPAIR OR REPLACE AND RESECURE IMMEDIATELY.

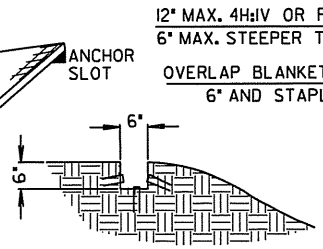
NOTE:
REFER TO ESC-1121, EROSION CONTROL BLANKET (2), FOR MORE EROSION CONTROL APPLICATIONS AND NOTES.

EROSION CONTROL BLANKET (2)



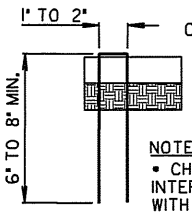
NOTE:
• JUNCTION: OVERLAP TOP BLANKET 6 INCHES MINIMUM AND STAPLE EVERY 6 INCHES ACROSS

ISOMETRIC VIEW
NOT TO SCALE

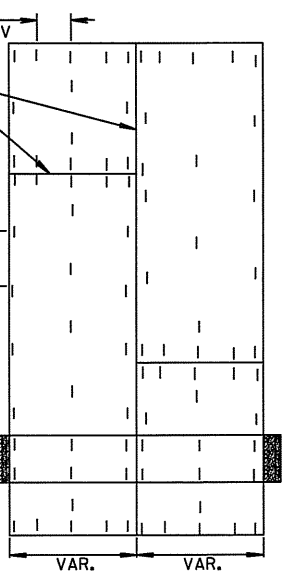


ANCHOR SLOT
NOT TO SCALE

NOTE:
STAPLE FORMED FROM NO. 11 STEEL WIRE.
MIN. 8" STAPLE LENGTH FOR SANDY SOIL.
MIN. 6" STAPLE LENGTH FOR OTHER SOIL.



STAPLE
NOT TO SCALE



NOTE:
• CHECK SLOTS AT 50' INTERVALS; NOT REQUIRED WITH ALL COMBINATION BLANKETS

PLAN VIEW
STAPLING DIAGRAM
NOT TO SCALE

INSTALLATION FOR CHANNELS
NOT TO SCALE

EROSION CONTROL BLANKET NOTES (2):

F) STAPLES:

STAPLES FOR ANCHORING BLANKET SHALL BE NO. 11-GAUGE WIRE OR HEAVIER. THEIR LENGTH SHALL BE A MINIMUM OF 6 INCHES. A LARGER STAPLE WITH A LENGTH OF UP TO 12 INCHES SHALL BE USED ON LOOSE, SANDY, OR UNSTABLE SOILS.

G) JOINING PROTECTIVE COVERINGS:

OVERLAP THE END PREVIOUS ROLL A MINIMUM OF 6 INCHES AND STAPLE. STAPLE ACROSS THE END OF THE ROLL JUST BELOW THE ANCHOR SLOT AND ACROSS THE MATERIAL EVERY 6 INCHES.

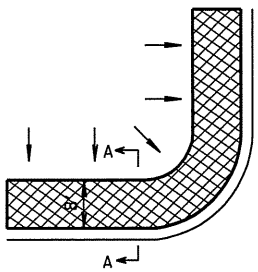
H) TERMINAL END:

AT THE POINT AT WHICH THE MATERIAL IS DISCONTINUED, OR WHERE THE PROTECTIVE COVERING MEETS A STRUCTURE OF SOME TYPE, STAPLE A MINIMUM OF EVERY 12 INCHES.

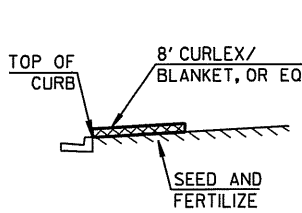
I) FINAL CHECK:

THESE INSTALLATION CRITERIA MUST BE ADHERED TO:
1. ALL DISTURBED AREAS ARE SEEDED.
2. PROTECTIVE BLANKET IS IN UNIFORM CONTACT WITH THE SOIL.
3. ALL LAP JOINTS ARE SECURE.
4. ALL STAPLES ARE DRIVEN FLUSH WITH THE GROUND.

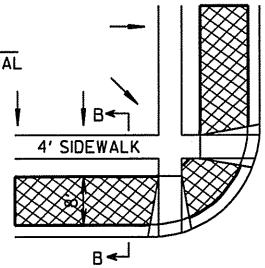
NOTE:
APPROXIMATELY 200 STAPLES ARE REQUIRED PER 100 SQ. YDS. OF MATERIAL ROLL. ANCHOR SLOTS, JUNCTION SLOTS, AND CHECK SLOTS TO BE BURIED 6" TO 12" DEEP.



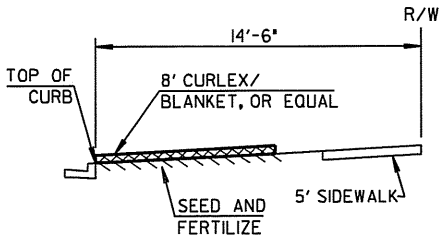
PLAN VIEW
NOT TO SCALE



SECTION A-A
NOT TO SCALE



PLAN VIEW
NOT TO SCALE



SECTION B-B
NOT TO SCALE

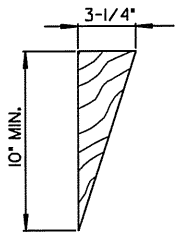
NOTE:
INSTALL 8' WIDE CURLEX/ EXCELSIOR BLANKET, OR EQUAL, ON PREPARED SURFACE BACK OF CURB. EDGE OF BLANKET WILL BE AT BACK OF CURB. INSTALL PER MANUFACTURERS RECOMMENDATION, INCLUDING STAPLES.

BACK OF CURB PROTECTION
NOT TO SCALE

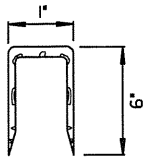
NOTE:
REFER TO ESC-1120, EROSION CONTROL BLANKET (1), FOR MORE EROSION CONTROL APPLICATIONS AND NOTES.

Newton Kansas	STANDARD DRAWING NUMBER	APPROVAL DATE:	CITY OF NEWTON
	ESC-1121		201 E. 6th, P.O. Box 426 NEWTON, KS 67114

STAKES, STAPLES, AND PINS

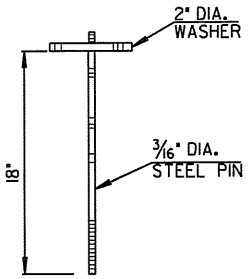


1. STAKE
SEE NOTE 1



11 GAUGE STEEL 6"x1"x6" STAPLE

2. STAPLE
SEE NOTE 2



3. PIN
SEE NOTE 3

STAKES, STAPLES, AND PINS FOR INSTALLATION OF ROLLED EROSION CONTROL PRODUCTS

NOT TO SCALE

STAKES, STAPLES, AND PINS NOTES:

GENERAL NOTES:

1. STAKES SHALL BE 1x4 TRIANGULAR SURVEY STAKES A MINIMUM OF 10" IN LONG.
2. STAPLES SHALL BE 11 GAUGE STEEL A MINIMUM OF 1" WIDE BY 6" IN LONG. A 2"x8" STAPLE MAY BE REQUIRED IN CERTAIN SOIL CONDITIONS.
3. STEEL PINS SHALL BE 3/16 DIAMETER BY 18" IN LONG WITH A 2" DIAMETER WASHER ON TOP. (SEE ILLUSTRATION.)
4. ANCHORING METHODS AND RECOMMENDATIONS VARY BY MANUFACTURERS. THE EXPECTATION OF HIGH VELOCITIES SHOULD DICTATE THE USE OF MORE SUBSTANTIAL ANCHORING.

Newton Kansas

STANDARD DRAWING NUMBER	APPROVAL DATE:	CITY OF NEWTON
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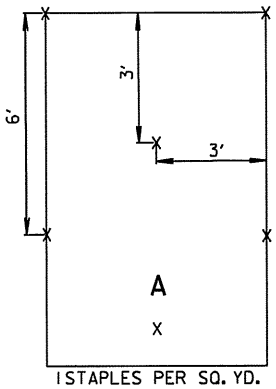
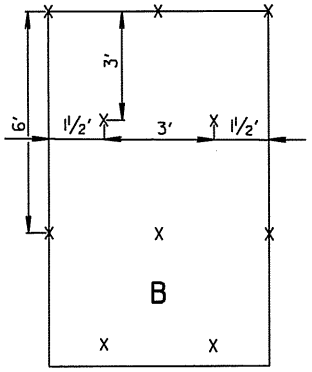
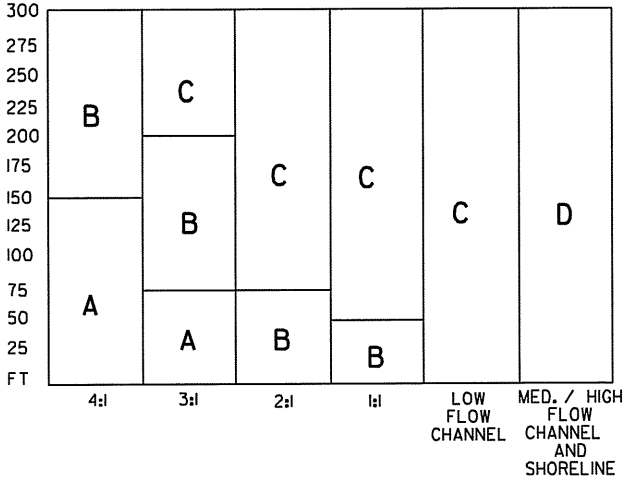
STAPLE PATTERNS FOR ROLLED EROSION CONTROL PRODUCTS

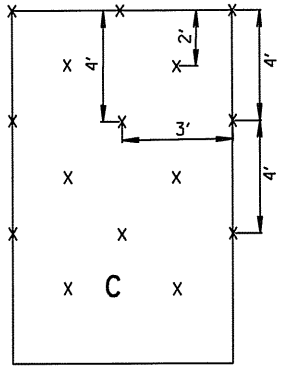


1 STAPLES PER SQ. YD.

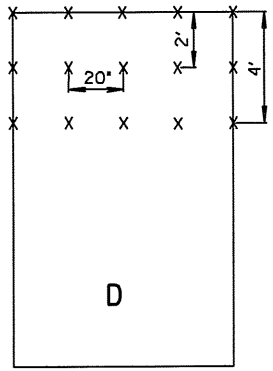


1½ STAPLES PER SQ. YD.





2 STAPLES PER SQ. YD.



3½STAPLES PER SQ. YD.

GENERAL STAPLE PATTERN GUIDE AND RECOMMENDATIONS FOR ROLLED EROSION CONTROL PRODUCTS

NOT TO SCALE

A) NOTES:

1. FOR OPTIMUM RESULTS, THESE RECOMMENDED STAPLE PATTERN GUIDES MUST BE FOLLOWED UNLESS OTHERWISE DICTATED BY THE MANUFACTURER. SUGGESTED ANCHORING METHODS VARY BY MANUFACTURER. THIS CHART SHOWS HOW SLOPE LENGTHS AND GRADIENTS AFFECT STAPLING PATTERNS.

DESIGN GUIDE 1120 - EROSION CONTROL BLANKET

A. **Description:** Rolled erosion control products are protective covering netting, blankets or turf reinforcement mats (TRMs) installed on a prepared planting area of a steep slope, channel, or shoreline. They aid in controlling erosion on critical areas by absorbing the energy from raindrop impacts and providing a microclimate which protects young vegetation and promotes its establishment. TRMs are also used to raise the maximum permissible velocity and shear stress of turf grass stands in channelized areas by enabling the turf to resist the forces of erosion during storm events.

B. **Application:** Netting, blankets, and TRMs will aid in controlling erosion on slopes steeper than 8 percent and of highly erodible soils by providing a protective cover made of straw, jute, wood, or other organic plant fiber with cotton string or polypropylene netting to hold the product in a flat form. Netting can be used alone over blown straw as an alternative to crimping or use of a tackifier.

These products can be used on short, steep slopes where erosion hazard is high and planting is likely to be too slow in providing adequate protective cover; in vegetated channels where the design velocity and shear stress of design flow exceed allowable on streambanks where moving water is likely to wash out new plantings; or in areas where the forces of wind prevent standard mulching practices from remaining in place until vegetation becomes established.

Before installation of these products, the area should be final graded to a smooth and uniform surface, free of debris. Topsoil should be incorporated if needed. Seed and fertilize as shown on the plan. The erosion control netting, blankets, and mats should be installed in accordance with the manufacturer's recommendations and specifications. All products should be anchored firmly with continuous contact to the soil surface. Product should be anchored following the manufacturer's recommended stapling pattern for each specific application. Details for blanket and mat installation can be found in Standard Drawings ESC-1120 through ESC-15.

Some important factors in the choice of netting, blanket, or TRM are soil conditions, steepness of slope, length of slope, type and duration of protection required to establish desired vegetation, and probable sheer stress. Consult the manufacturer's product specifications to determine the correct product for each specific application required.

C. **Planning Considerations:** Rolled erosion control blankets and mats can be applied to problem areas to supplement vegetation in its initial establishment and to provide a safe and more natural conveyance for high velocity stormwater runoff. They are used in many applications where a structural lining would previously have been required. Care must be taken to choose the blanket or matting which is most appropriate for the specific needs of a project. Two general types of blankets and mats are discussed within this section. However, with the abundance of soil stabilization products available today, it is impossible to cover all the advantages, disadvantages, and specifications of all manufactured blankets and mats. Therefore, there is no substitute for a thorough understanding of the manufacturer's recommendations and a site visit by a designer or plan reviewer to verify a product's appropriateness.

Blankets should be used to help establish vegetation on previously disturbed slopes of 3H:1V or steeper. Since the materials which compose the soil stabilization blankets will deteriorate

over time, they should be used in permanent conveyance channels with the realization that resistance to erosion will ultimately be based on the type of vegetation planted and the existing soil characteristics. During the establishment of vegetation, blankets should not be subjected to velocities greater than 4 feet per second.

Blankets provide the following benefits in vegetative stabilization when properly applied:

1. Protection of the seed and soil from raindrop impact and subsequent displacement.

2. Thermal consistency and moisture retention for seedbed area.

3. Stronger and faster germination of grasses and legumes.

4. Planning off excess stormwater runoff.

5. Prevention of sloughing of topsoil added to steeper slopes.

TRMs consist of a non-degradable, three-dimensional polypropylene structure which may also have coconut or other organic fiber layers within it so long as the nondegradable portion of the blanket will withstand design velocities and shear stresses after the organic fibers degrade. The matting becomes entangled and penetrated by roots forming continuous anchorage for surface growth and promoting enhanced energy dissipation. They should be used on slopes 2H:1V or steeper, and in stormwater conveyance channels.

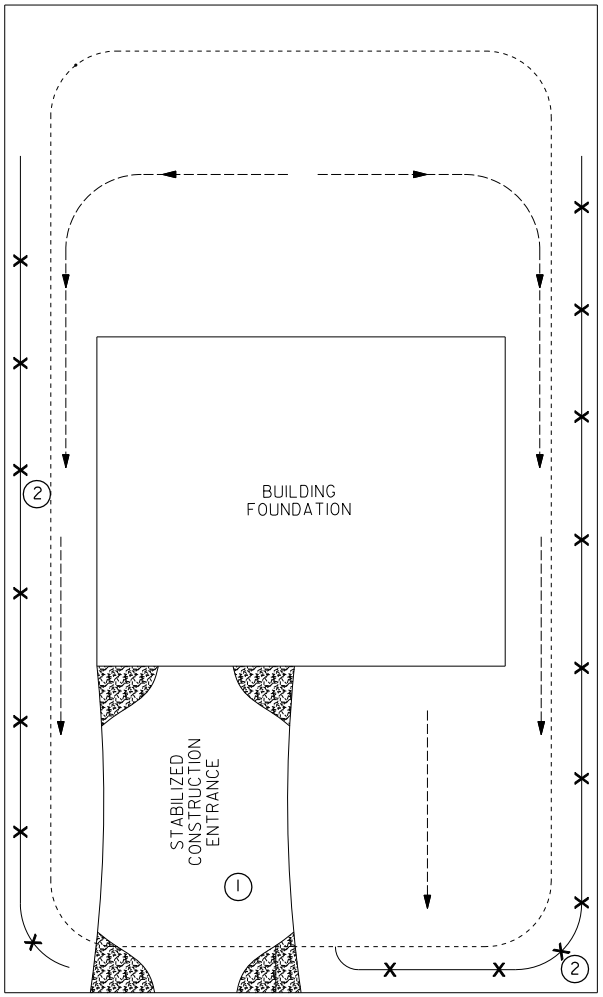
In addition to those benefits noted for blankets, TRMs provide the following benefits for vegetative stabilization and when replacing concrete and riprap channel linings:

1. Cause sediment to drop out of stormwater and fill matrix with fine soils which become the growth medium for the development of roots.

2. Act with the vegetative root system to form an erosion resistant cover, which resists hydraulic lift and shear forces when embedded in the soil within stormwater channels.

Since TRMs are non-degradable, they can be used in permanent conveyance channels to withstand higher velocities and shear stresses than would normally be allowable with only soil and vegetation. Permissible velocities and shear stresses of TRM for reinforced grass-lined channels range from 10-20 fps and 6-10 psf respectively.

INDIVIDUAL BUILDING LOT LAYOUT (LESS THAN ONE ACRE)



GENERAL INSTALLATION/CONSTRUCTION SEQUENCE:

1. STABILIZED CONSTRUCTION ENTRANCE (SEE STANDARD DRAWING ESC-1010, TEMPORARY CONSTRUCTION ENTRANCE)

2. SEDIMENT BARRIERS (SEE STANDARD DRAWING ESC-1100, SEDIMENT FENCE)
   - PLACE WHERE STORMWATER RUNOFF LEAVES THE SITE.
   - INSPECT AND MAINTAIN CONTROLS.

3. EXCAVATE AND BACKFILL FOUNDATION
   - SPOIL PILE MUST REMAIN A MINIMUM OF 5 FT. FROM BACK OF CURB AND NOT EXTEND BEYOND PROPERTY LINE.

4. CONSTRUCTION ACTIVITIES
   - MAINTAIN AND REPAIR ALL CONTROLS UNTIL FINAL CERTIFICATE OF OCCUPANCY IS ISSUED.

5. FINAL GRADING AND SOD OR SEED PLACEMENT (SEE DESIGN GUIDE 1000 & 1005 AS WELL AS STANDARD SPECIFICATION, SECTION 1 AND 3)

6. PERIMETER CONTROLS REMOVED
   - REMOVE AFTER PERMANENT GROUND COVER IS OBTAINED AT A DENSITY SUFFICIENT TO CONTROL EROSION.

CONCENTRATED FLOW:

1. PROVIDE CHECKS (ROCK, SEDIMENT FENCE, ETC.) OR EROSION PROTECTION (EROSION CONTROL BLANKET, SOD, ETC.) FOR CONCENTRATED FLOW AREAS. (SEE STANDARD DRAWING ESC-1090, TEMPORARY CHECK DAM; ESC-1100 SEDIMENT FENCE, OR ESC 1120-1123, EROSION CONTROL BLANKET)

2. PROVIDE SOIL PROTECTION AND ENERGY DISSIPATION AT GUTTER DOWN SPOUTS IF THEY ARE IN PLACE PRIOR TO FULL VEGETATIVE COVER OVER THE AREA.

DISCLAIMER:

THIS STANDARD DRAWING IS INTENDED AS A GUIDELINE AND IF MORE EROSION AND SEDIMENT CONTROL MEASURES ARE NEEDED, THIS PLAN MUST BE MODIFIED ACCORDINGLY. THE CITY CAN MANDATE ADDITIONAL CONTROLS AS NECESSARY. THE LOT OWNER ASSUMES RESPONSIBILITY FOR EXISTING CONTROL MEASURES ON THE PROPERTY AND MUST PRESERVE THEM UNTIL THE SITE IS FULLY STABILIZED.

LEGEND:

- PROPERTY LINE
- SEDIMENT BARRIER
- LIMITS OF DISTURBANCE
- DIRECTION OF SURFACE WATER RUNOFF

EROSION & SEDIMENT CONTROL - INDIVIDUAL BUILDING LOT LAYOUT	Newton Kansas	STANDARD DRAWING NUMBER ESC-1130	APPROVAL DATE:	CITY OF NEWTON 201 E. 6th, P.O. Box 426 NEWTON, KS 67114